

THE EXTENSION AGENT'S

*Handbook for
Emergency Preparation
and
Response*

A Special Project

by

Texas Agricultural Extension Service

and

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INTRODUCTION

The *Extension Agent's Handbook for Disaster Preparedness and Response* can be a valuable response tool for you, the Extension agent, in times of emergency or as an aid in preparedness education activities. The Handbook is divided into two parts to provide the information you need in an easy-to-use format. The first section of the Handbook, *General Family Preparedness*, provides basic information you may need to access quickly in any disaster or emergency situation. It also may be used as a preparedness education tool for the public.

The second section of the Handbook covers 10 **disaster specific** situations. For the purposes of this manual, a disaster is any event which drastically affects a person's life or livelihood. Floods, fires, hurricanes, tornadoes, winter storms, earthquakes, droughts and volcanic eruptions are considered to be natural disasters, events over which one usually has no control. Radiological and hazardous materials accidents may be caused by the failure of people to maintain control over the operation, transportation or storage of certain materials. In addition to an overview of the disaster, each section provides a series of preparedness measures and post-disaster responses that should be taken in conjunction with those outlined in the *General Family Preparedness* section.

This handbook is not intended to cover every situation. It provides basic information you will need for a disaster situation and early post-disaster response. Because every community is different, special consideration for the local area should be taken into account along with the information provided in the Handbook.

Pages and sections of the Handbook may be removed and photocopied. Information is structured in a manner conducive to public use. Extension agents are encouraged to provide copies of the material to the public both as "preventive education" and for response needs.

This Handbook was developed as a joint effort of Extension Service-United States Department of Agriculture, the Texas Agricultural Extension Service and the Hazard Reduction and Recovery Center, Texas A&M University.

The information given herein is for educational purpose only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas Agricultural Extension Service is implied.

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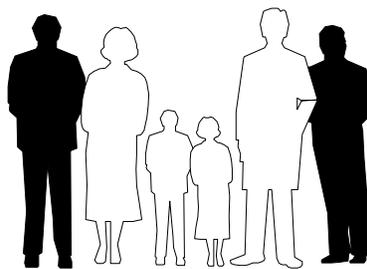
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General Family Preparedness

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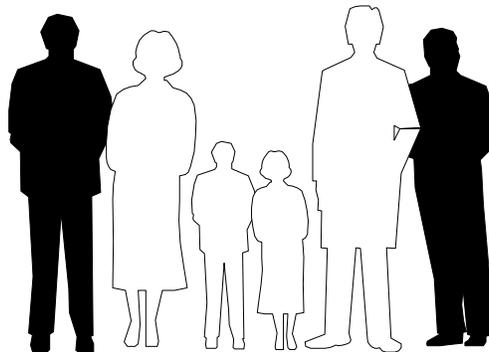


GENERAL FAMILY PREPAREDNESS

Why Preparedness?

Disasters can affect any part of the United States at any time of the year, swiftly and without warning. Most people don't think of a disaster until it is too late; then they suddenly realize how unprepared they are for the massive changes it makes in their lives. Local officials can be overwhelmed and emergency response personnel may not be able to reach everyone who needs help right away.

Each type of disaster requires clean-up and recovery. The period after a disaster is often very difficult for families, at times as devastating as the disaster itself. Families which are prepared ahead of time can reduce the fear, confusion and losses that come with disaster. They can be ready to evacuate their homes, know what to expect in public shelters and how to provide basic first aid.



Family Disaster Supply Kit

One of the first steps toward preparedness is the creation of a family disaster supply kit. This will help families get through the first few days after a disaster. Public shelter after a disaster may not offer some of the basic necessities. The development of a kit will make a stay in a public shelter more comfortable, should it be necessary. Store the kit in a convenient place known to all family members. Store items in airtight bags or containers. Replenish the kit twice a year.

Include six basic items:

- Water (*page 2*)
- Food (*page 3*)
- First Aid Kit (*page 4*)
- Tools and Supplies (*page 5*)
- Clothing and Bedding (*page 6*)
- Special Items (*page 6*)



1. Water

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| <ul style="list-style-type: none"> ● Store water in clean plastic containers such as thoroughly washed and rinsed soft drink bottles with tight fitting screw-on caps. ● Store 1 gallon per day per family member (2 quarts for drinking, 2 quarts for food preparation/ sanitation). Children, nursing mothers and ill people will need more. | <ul style="list-style-type: none"> ● A 3-day supply of water should be stored for every family member. ● Replace water every 6 months. |
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Notes:



2. Food

Store at least a 3-day supply of non-perishable food. Select foods that require no refrigeration, preparation or cooking and little or no water. If you must heat food, pack a can of sterno. Rotate these foods into the regular diet frequently to keep the supply fresh. In a disaster supply kit include:

- Ready-to-eat canned meats, fruits and vegetables
- Canned juices, milk, soup (if powdered, store extra water)
- Staples such as sugar, salt, pepper
- High energy foods such as peanut butter, jelly, crackers, granola bars, trail mix
- Vitamins, infant food and food for special diets
- Comfort/stress foods such as cookies, hard candy, instant coffee, tea bags

Notes:

|  3. First Aid Kit | |
|---|---|
| <p>Assemble a first aid kit for the home and one for each vehicle. An approved American Red Cross kit may be purchased, or one may be assembled with the following items:</p> <ul style="list-style-type: none"> ● Sterile adhesive bandages in assorted sizes ● 2-inch and 4-inch sterile gauze pads (4-6 of each) ● Hypoallergenic adhesive tape ● Triangular bandages (3) ● 2-inch and 3-inch sterile roller bandages (3 rolls each) ● Scissors ● Tweezers ● Needle ● Moistened towelettes ● Antiseptic ● Thermometer | <ul style="list-style-type: none"> ● Tongue blades (2) ● Sunscreen ● Tube of petroleum jelly or other lubricant ● Assorted sizes of safety pins ● Cleansing agent/soap ● Latex gloves (2 pairs) <p><u>Non-prescription drugs</u></p> <ul style="list-style-type: none"> ● Aspirin or nonaspirin pain reliever ● Anti-diarrhea medication ● Antacid (for stomach upset) ● Syrup of Ipecac (use to induce vomiting if advised by the Poison Control Center) ● Laxative ● Activated charcoal (use if advised by the Poison Control Center) |

Notes:

|  4. Tools and Supplies | |
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| <p>Various tools and supplies may be needed for temporary repairs or personal needs. Include these items in your disaster supply kit:</p> <ul style="list-style-type: none"> ● Battery operated radio and extra batteries ● Flashlight and extra batteries ● Non-electric can opener, utility knife ● Map of the area (for locating shelters) ● Cash or traveler's checks, change ● Fire extinguisher: small canister, ABC type ● Tube tent ● Pliers ● Tape ● Compass ● Matches in waterproof container ● Aluminum foil ● Plastic storage containers ● Signal flare | <ul style="list-style-type: none"> ● Paper, pencil ● Needles, thread ● Medicine dropper ● Shut-off wrench, to turn off household gas and water ● Whistle ● Plastic sheeting ● Mess kits or paper cups, plates and plastic utensils ● Emergency preparedness manual <p><u>Sanitation</u></p> <ul style="list-style-type: none"> ● Toilet paper ● Soap, liquid detergent ● Feminine hygiene supplies ● Personal hygiene items ● Plastic garbage bags, ties (for personal sanitation uses) ● Plastic bucket with tight lid ● Disinfectant ● Household chlorine bleach |

Notes:

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|  <h2 style="margin: 0;">5. Clothing and Bedding</h2> | |
| <p>Your disaster supply kit should include at least one complete change of clothing and footwear per person. Items to include are:</p> <ul style="list-style-type: none"> ● Sturdy shoes or work boots ● Rain gear | <ul style="list-style-type: none"> ● Blankets or sleeping bags ● Hat and gloves ● Thermal underwear ● Sunglasses |

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|  <h2 style="margin: 0;">6. Special Items</h2> | |
| <p>Family members may have special needs. Other items you may add to your kit include:</p> <p><u>For Babies:</u></p> <ul style="list-style-type: none"> ● Formula ● Diapers ● Bottles ● Powdered milk ● Medications <p><u>For Adults:</u></p> <ul style="list-style-type: none"> ● Heart and high blood pressure medication ● Insulin ● Prescription drugs ● Denture needs ● Contact lenses and supplies ● Extra pair of eye glasses | <p><u>Entertainment</u></p> <ul style="list-style-type: none"> ● Games and books <p><u>Important Family Documents:</u></p> <p>Keep these in a waterproof, portable container.</p> <ul style="list-style-type: none"> ● Wills, insurance policies, contracts, deeds, stocks and bonds ● Passports, social security cards, immunization records ● Bank account numbers ● Credit card account numbers and companies ● Inventory of valuable goods, important telephone numbers ● Family records (birth, marriage, death certificates) |

4-Step Family Preparedness Plan

In addition to your family disaster supply kit, develop a family preparedness plan. This plan needs to be known to all family members. A basic preparedness plan has four steps:

- Do your homework (*page 7*)
- Create a family disaster plan (*page 8*)
- Make a checklist and periodically update it (*page 8*)
- Practice and maintain your plan (*page 9*)

1. Do your homework

Find out what disasters could happen in your area. Contact your local emergency management or civil defense office and American Red Cross chapter to:

- | | |
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| <ul style="list-style-type: none"> ● Learn which disasters are possible where you live and how these disasters might affect your family. ● Request information on how to prepare and respond to each potential disaster. ● Learn about your community's warning signals, what they sound like, what they mean and what actions you should take when they are activated. | <ul style="list-style-type: none"> ● Learn about local, state or federal assistance plans. ● Find out about the emergency response plan for your workplace, your children's school or day-care center, as well as other places where your family spends time. ● Develop a list of important telephone numbers (doctor, work, school, relatives) and keep it in a prominent place in your home. ● Ask about animal care. Pets may not be allowed inside shelters because of health regulations. |
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Notes:

2. Create a family disaster plan

Discuss with your family the need to prepare for disaster. Explain the danger of fire, severe weather (tornadoes, hurricanes) and floods to children. Develop a plan to share responsibilities and how to work together as a team.

- Discuss the types of disasters that are most likely to occur and how to respond.
- Establish meeting places inside and outside your home, as well as outside the neighborhood. Make sure everyone knows when and how to contact each other if separated.
- Decide on the best escape routes from your home. Identify two ways out of each room.
- Plan how to take care of your pets.
- Establish a family contact out-of-town (friend or relative). Call this person after the disaster to let them know where you are and if you are okay. Make sure everyone knows the contact's phone number.
- Learn what to do if you are advised to evacuate.

3. Make a checklist and periodically update it

- Post emergency telephone numbers by phones (fire, police, ambulance, etc.).
- Teach your children how and when to call 911 or your local EMS number for help.
- Show each family member how to turn off the water, gas and electricity at the main valves or switches.
- Teach each family member how to use a fire extinguisher (ABC type) and have a central place to keep it. Check it each year.
- Install smoke detectors on each level of your home, especially near bedrooms.
- Conduct a home hazard hunt.
- Stock emergency supplies and assemble a disaster supply kit.
- Learn basic first aid. At the very least, each family member should know CPR, how to help someone who is choking and first aid for severe bleeding and shock. The Red Cross offers basic training of this nature.
- Identify safe places in your home to go for each type of disaster.
- Check to be sure you have adequate insurance coverage.

Notes:

4. Practice and maintain your plan

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| <ul style="list-style-type: none"> • Test children's knowledge of the plan every 6 months so they remember what to do. • Conduct fire and emergency evacuation drills. | <ul style="list-style-type: none"> • Replace stored water and food every 6 months. • Test your smoke detectors monthly and change the batteries once a year. |
|--|--|

And... In conjunction with the preparedness plan, working with neighbors can save lives and property. **Meet with neighbors** to plan how the neighborhood could work together after a disaster until help arrives. Members of a neighborhood organization, such as a home association or crime watch group, can introduce disaster preparedness as a new activity.

Know your neighbors' special skills (medical, technical) and consider how to help neighbors who have special needs, such as disabled and elderly persons. Make plans for child care in case parents can't get home.

Notes:

Preparing Children for Disaster

As you develop your preparedness plan, include children in the planning process. Teach your children how to recognize danger signals. Make sure they know what smoke detectors and other alarms sound like. Make sure they know how and when to call for help. If you live in a 9-1-1 service area, tell your child to call 9-1-1. If not, check your telephone directory for the number. Keep all emergency numbers posted by the phone.

Help your children to memorize important family information. They should memorize their family name, phone number and address. They also should know where to meet in case of an emergency. If children are not old enough to memorize the information, they should carry a small index card to give to an adult or babysitter that lists the emergency information.

Special Preparations for People with Disabilities

People with disabilities may need to take additional steps to prepare for disaster. If you are disabled or know someone who is, the following precautions should be taken.

- Ask about special assistance that may be available to you in an emergency. Many communities ask people with disabilities to register, usually with the fire department or emergency management office, so needed help can be provided quickly in an emergency.
- If you currently use a personal care attendant obtained from an agency, check to see if the agency has special provisions for emergencies (e.g. providing services at another location should an evacuation be ordered).
- Determine what you will need to do for each type of emergency. For example, most people head for a basement when there is a tornado warning, but most basements are not wheelchair accessible. Determine in advance what your alternative shelter will be and how you will get there.
- Learn what to do in case of power outages and personal injuries. Know how to connect or start a back-up power supply for essential medical equipment.
- If you or someone in your household uses a wheelchair, make more than one exit from your home wheelchair accessible in case the primary exit is blocked.
- Consider getting a medic alert system that will allow you to call for help if you are immobilized in an emergency.
- Store back-up equipment, such as a manual wheelchair, at a neighbor's home, school or your workplace.
- Avoid possible hazards by fastening shelves to the wall and placing large, heavy objects on the lower shelves or near the wall. Also hang pictures or mirrors away from beds. Bolt large pictures or mirrors to the wall. Secure water heaters by strapping them to a nearby wall.

Special Preparations for the Hearing Impaired

Deaf or hearing impaired individuals will have a more difficult time communicating after a disaster. People may not realize you can't hear warning signals and instructions, and may leave you behind. If there is a power failure, your teletypewriter will be useless, and communicating in the dark will require a flashlight. To avoid potential problems you should:

- Make sure you have a flashlight, pad and pencil by your bed at home.

- Ask a neighbor to be your source of information as it comes over the radio.
- Remind co-workers that you can't hear an evacuation order.
- If you are trapped in a room, knock on the door or hit objects together to let others know you are there.

Special Preparations for the Visually Impaired

Blind or visually impaired individuals will have a difficult time after a disaster if surroundings have been greatly disrupted. In addition, seeing eye dogs may be too frightened or injured to be reliable.

Have an extra cane at home and work, even if you have a seeing eye dog. If you are trapped, make noise to alert others. Also keep in mind that, if electricity fails, blind people can assist sighted people and potentially save lives.

Notes:

Evacuation Procedures

- Evacuations during a disaster are a common event. Evacuation procedures vary by location and disaster. Contact your local emergency management or civil defense office for specific evacuation plans.
- The amount of time you will have to evacuate depends on the disaster. Some disasters, such as hurricanes, may allow several days to prepare. Hazardous materials accidents may only allow moments to leave. This means that preparation is essential since there may not be time to collect the basic necessities.
- Evacuations can last for several days. During this time you may be responsible for part or all of your own food, clothing and other supplies.
- Preparing for Evacuation (*page 13*)
- Evacuating (*page 14*)
- Returning Home After the Disaster (*page 15*)

Notes:

| Preparing for Evacuation | |
|--|---|
| <p>Advance planning will make evacuation procedures easier. First, you should have your family disaster supply kit and plan ready. Additional steps that can aid preparedness include:</p> <ol style="list-style-type: none"> 1. Review possible evacuation procedures with your family. <ul style="list-style-type: none"> ● Ask a friend or relative outside your area to be the check-in contact so that everyone in the family can call that person to say they are safe. ● Find out where children will be sent if they are in school when an evacuation is announced. 2. Plan now where you would go if you had to evacuate. <ul style="list-style-type: none"> ● Consider the homes of relatives or friends who live nearby, but outside the area of potential disaster. | <ul style="list-style-type: none"> ● Contact the local emergency management office for community evacuation plans. Review public information to identify reception areas and shelter areas. <ol style="list-style-type: none"> 3. Keep fuel in your car's gas tank at all times. During emergencies, filling stations may be closed. Never store extra fuel in the garage. 4. If you do not have a car or other vehicle, make transportation arrangements with friends, neighbors or your local emergency management office. 5. Know where and how to shut off electricity, gas and water at main switches and valves. Make sure you have the tools you need to do this (usually pipe and crescent or adjustable wrenches). Check with your local utilities for instructions. |

Notes:

| Evacuating | |
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| <p>When you are told to evacuate there are four steps you need to take:</p> <ol style="list-style-type: none">1. If there is time, secure your house.<ul style="list-style-type: none">● Unplug appliances.● In a flood hazard area, store propane tanks or secure them safely to the structure.● Turn off the main water valve.● Take any actions needed to prevent damage to water pipes by freezing weather, if this is a threat. | <ul style="list-style-type: none">● Securely close and lock all doors, windows and garage. <ol style="list-style-type: none">2. Follow recommended evacuation routes. Do not take shortcuts, they may be blocked.3. Listen to the radio for emergency shelter information.4. Carry your family disaster supply kit. |

Notes:

| Returning Home After the Disaster | |
|---|---|
| <ol style="list-style-type: none"> 1. Do not return until the local authorities say it is safe. 2. Continue listening to the radio for information and instructions. 3. Use extreme caution when entering or working in buildings—structures may have been damaged or weakened. Watch for poisonous snakes in flooded structures and debris. 4. Do not take lanterns, torches or any kind of flame into a damaged building. There may be leaking gas or other flammable materials present. Use battery-operated flashlights for light. If you suspect a gas leak, do not use any kind of light. The light itself could cause an explosion. 5. If you smell leaking gas, turn off the main gas valve at the meter. If you can open windows safely, do so. <ul style="list-style-type: none"> ● Do not turn on lights—they can produce sparks that may ignite the gas. | <ul style="list-style-type: none"> ● Leave the house immediately and notify the gas company or the fire department. ● Do not reenter the house until an authorized person tells you it is safe to do so. <ol style="list-style-type: none"> 6. Notify the power company or fire department if you see fallen or damaged electrical wires. 7. If any of your appliances are wet, turn off the main electrical power switch in your home before you unplug them. Dry out appliances, wall switches and sockets before you plug them in again. Call utility companies for assistance. 8. Check food and water supplies for contamination and spoilage before using them. 9. Wear sturdy shoes when walking through broken glass or debris, and use heavy gloves when removing debris. 10. After the emergency is over, telephone your family and friends to tell them you are safe. |

Notes:

When Disaster Strikes

Hopefully you will never have to experience disaster. When it does happen, however, try to remain calm and patient and put your family preparedness plan into action. You should follow the following steps:

- Retrieve your disaster supply kit.
- Wear protective clothing and sturdy shoes.
- Confine or secure pets to protect them.
- Go to the safe place in your home you identified and stay there until well after the disaster is over.
- Listen to your battery-powered radio for news and instructions.
- Evacuate, if advised to do so.

The Role of Government After a Disaster

After a preliminary damage assessment report has been completed, the governor of a state can request a major disaster or emergency declaration from the president.

DECLARATION OF AN EMERGENCY. The president can issue a Declaration of Emergency to supplement the state and local effort to save lives and protect property. The president can act only after a state governor has requested a Declaration of an Emergency be issued. Total assistance provided in any given emergency declaration may not exceed \$5 million.

DECLARATION OF A MAJOR DISASTER. A major disaster declaration may be requested by the governor to the president after a natural catastrophe occurs. Assistance is offered to both the public and private sectors. With the declaration, the Federal Emergency Management Agency (FEMA) has the authority to engage the services of 12 federal departments, two agencies, one commission, one corporation and one authority offering 97 different Federal assistance programs. These 97 programs provide many different services to help people and state and local governments deal with recovery from a disaster. A listing of the main agencies that provide assistance can be found in *General Family Preparedness, Insurance and Resources After a Disaster*.

Emotional Recovery After a Disaster

In addition to the physical damage a disaster brings, stress and emotional disequilibrium need to be addressed by victims. Steps you can take to reduce the effects of a disaster include:

- Be extra patient.
- Keep in mind that other people may have a different viewpoint about what should be top priority.
- Realize that it will take time to restore things, both physically and emotionally.
- Try to keep your family diet as nutritious as possible.
- Focus on the big picture instead of the little details. This will give you a sense of completeness.
- Talk with friends, family and clergy. A support network is essential in a disaster situation.
- Watch for the tendency to resort to bad habits when you are under stress.

If you are dealing with disaster victims, realize that it's natural for them to express disbelief, sadness, anger, anxiety and depression. Also realize that these emotions and moods can change unexpectedly.

Notes:

Helping Children Cope After a Disaster

Children may require special attention after experiencing a disaster. Four common fears children have are death, darkness, animals and abandonment. In a disaster children may experience any or all of these. You should encourage children to talk about what they are feeling and to express this through play, drawing or painting.

A child's reaction to a disaster may vary depending on age, maturity and previous experience. In all cases it is important to acknowledge what happened and take time to talk with children about their fears.

Some behaviors you may find children exhibiting after a disaster include:

- Being upset at the loss of a favorite toy, blanket, teddy bear, etc.
- Hitting, throwing or kicking to show their anger and frustration.
- Fear of the disaster coming again.
- Fear of being left alone or sleeping alone. They may want to sleep with another person.
- Behaving as they did when they were younger, including wetting the bed, sucking their thumb, wanting to be held, etc.
- Exhibiting symptoms of illness such as nausea, fever, headaches, not wanting to eat, etc.
- Becoming quiet and withdrawn.

- Becoming easily upset.
- Feeling that they caused the disaster in some way.
- Feeling neglected by parents who are busy cleaning up or rebuilding.
- Refusing to go to school or to be out of the parent's sight.

Parents and other adults can help children come to terms with their feelings in several ways.

- Let children know you love them and they can count on you. Reassure them that they are not responsible for what occurred.
- Talk with your children about your own feelings.
- Give simple, accurate answers to children's questions.
- Hold them. Close contact assures children you are there for them and will not abandon them.
- Let children grieve for a lost toy or blanket that was special to them. It will help them cope with their feelings.
- Provide play experiences to relieve stress.
- Repeat assurances and information as often as you need to; do not stop responding.
- Spend extra time putting children to bed at night.

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Helping Children Cope After a Disaster

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- Listen to what children say. Repeat their words to clarify what they are feeling.

If additional help is needed for adults or children, contact a community resource such as a counseling center, minister or mental health agency.

Notes:

Food Safety

Food safety precautions can make an important difference after a disaster occurs. Food can become contaminated as a result of fire, flood and wind related exposure. It also may spoil or become unsafe after a power outage.

Precautions Against Power Outages

If your area comes under an advisory that may lead to prolonged power outages (hurricanes, prolonged flooding, etc.) take these steps to help keep your food safe:

- Turn your refrigerator and freezer to the coldest setting. This will help the food stay frozen.
- Purchase a 50-pound block of dry ice. This will keep food in a full 18 cubic foot freezer safe for 2 days. Wrap it in brown paper for longer storage. Separate it from direct food contact with a piece of cardboard.
- Fill partially filled freezers with crumpled newspaper to reduce air currents which will dissipate dry ice.

After a Power Outage

If you should lose power, the emergency food supplies in your family disaster supply kit will be safe. Food in the refrigerator and freezer may be in trouble.

Generally, food in a refrigerator will be safe if the power is not out longer than a few hours and the temperature has been at 40°F or below. Food in a full, free-standing freezer should be safe for about 2 days if the temperature was at 0°F or below. Food in a half-full freezer should be safe for about 1 day if the temperature was at 0°F or below. To prolong the life of your food the following measures should be taken.

- Group meat and poultry to one side, or on a tray, so their juices won't contaminate other foods if they begin to thaw.
- Be wary of using meat, poultry and foods containing milk, cream, sour cream or soft cheese.
- Don't rely on odor or appearance of food. If perishable food has been at room temperature for more than 2 hours, discard it.

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| After a Power Outage <i>(continued)</i> | |
|--|---|
| <p>In emergency conditions, the following foods should keep at room temperature (above 40°F) a few days. Discard anything that turns moldy or has an unusual odor or look.</p> <ul style="list-style-type: none"> ● Butter, margarine ● Fresh fruits and vegetables ● Dried fruits and coconut ● Opened jars of salad dressing, peanut butter, jelly, relish, taco sauce, barbecue sauce, mustard, catsup, olives ● Hard and processed cheeses ● Fruit juices ● Fresh herbs and spices ● Flour and nuts ● Fruit pies ● Bread, rolls, cakes and muffins | <p>Discard the following foods if kept for more than 2 hours above 40°F.</p> <ul style="list-style-type: none"> ● Raw or cooked meat, poultry and seafood ● Milk, cream, yogurt, soft cheese ● Cooked pasta, pasta salads ● Custard, chiffon or cheese pies ● Fresh eggs, egg substitutes ● Meat topped pizzas, lunchmeats ● Casseroles, stews or soups ● Mayonnaise and tartar sauce ● Refrigerator and cookie doughs ● Cream filled pastries <p>Refreeze thawed foods that still contain ice crystals or feel cold.</p> |

| Tornado and Wind Related Contamination | |
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| <p>If you live in an area that has sustained tornado or wind damage, take the following measures.</p> <ul style="list-style-type: none"> ● Drink only approved or chlorinated water. ● Consider all water from wells, cisterns and other delivery systems in the disaster area unsafe until tested. | <ul style="list-style-type: none"> ● Check foods and discard any containing particles of glass or slivers of other debris. ● Discard canned foods with broken seams. |

Notes:

| Flooded Food Recovery | |
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| <p>Flood waters may carry contaminants such as silt, raw sewage or chemical waste. Disease bacteria in the water also can contaminate any food it touches. If you have experienced flood conditions, follow these guidelines:</p> <ul style="list-style-type: none"> ● Save undamaged commercially canned foods (except as noted later). ● Do not use home-canned foods that have been covered with flood water. ● Commercial glass jars of food are safe if the containers are sanitized (except as noted later). ● Remove the labels from jars and cans and mark the contents on can or jar lid with indelible ink. Paper can harbor dangerous bacteria. <p>To sanitize jars, cans, dishes and glassware, wash in a strong detergent solution with a scrub brush. After washing, immerse them in a solution of 2 teaspoons chlorine bleach per gallon of room temperature water. Air dry before using. If needed, clean empty glass also may be sanitized by boiling in water for 10 minutes. To sanitize metal pans and utensils, boil in water for 10 minutes.</p> | <p>Discard wooden and plastic utensils, baby nipples, pacifiers and any other porous nonfood items that are used with food. Discard the following foods:</p> <ul style="list-style-type: none"> ● Meat, poultry, fish and eggs ● Fresh produce ● Preserves sealed with paraffin ● Unopened jars with waxed cardboard seals such as mayonnaise and salad dressing ● All foods in cardboard boxes, paper, foil, cellophane or cloth ● Spices, seasonings and extracts ● Home-canned foods ● Opened containers and packages ● Flour, grain, sugar, coffee and other staples in canisters ● Dented, leaking, bulging or rusted cans |

Notes:

| Food Safety After a Fire | |
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| <p>Food that has been exposed to fire can be affected by three factors:</p> <ul style="list-style-type: none">• the heat of the fire• smoke fumes• the chemicals used to fight the fire <p>Food in cans or jars that have been close to the heat of the fire may appear to be unharmed, but the heat from the fire can activate food spoilage bacteria, leaving them inedible.</p> <p>Burning materials may release toxic fumes that contaminate food. Discard any type of food stored in permeable packaging such as cardboard or plastic wrap. Discard raw food outside the refrigerator. Food in refrigerators and freezers also may be contaminated. The seal on these appliances is not completely airtight. Discard any food with an off-flavor or smell.</p> | <p>The chemicals used to fight fires contain toxic material that can contaminate food and cookware. Throw away foods exposed to the chemicals. Chemicals cannot be washed off the food. This includes foods stored at room temperature, as well as foods stored in permeable containers such as cardboard and screw-topped jars and bottles.</p> <p>Sanitize canned goods and cookware in the same method as recommended for flooded foods.</p> |

Notes:

Insurance and Resources After a Disaster

Most homeowner policies offer coverage for losses due to natural disasters except flooding. If you are unsure what your policy covers, check it before a disaster happens. Contact your agent for clarification if you are still unsure. In general most insurance policies cover:

- Your house, rental units that are part of the building and any attachments to the building, such as the garage.
- Structures on the grounds that are not attached to the house, such as a pool, gazebo, tool shed, etc. This also includes the lawn, trees and shrubs on the property.
- Vacant land you own or rent, with the exception of farmland.
- Cemetery plots or burial vaults you may own.
- Personal possessions, including those of members of your household and guests, and contents of the house. This does not include the possessions of tenants in your home.
- Any items that have been loaned to you, or given for safe keeping.
- Living expense if your home is unlivable due to damage.
- Rental payments, if you rent one part of your house but it is unlivable due to damage.
- Responsibility for unauthorized use of your credit cards, forged checks or counterfeit currency accepted in good faith.
- Settlement, medical expenses and court costs brought against you for bodily injury of others or damage to the property of others.

Most homeowner policies DO NOT cover loss due to flooding. You should check to see if your community participates in the National Flood Insurance Program.

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| If you need financial assistance, programs are available. Programs include: |
| The American Red Cross ...offers emergency assistance for groceries, new clothes, medical needs and immediate building repairs. |
| Farmers Home Administration(FmHA) ...offers agricultural loans only when other credit is not available. Qualifying farmers can get short-, medium- or long-term loans with moderate interest. |
| Federal Crop Insurance Corporation (FCIC) ...Farmers can insure crops for 50, 65 or 75 percent of yield. Unavoidable losses due to any adverse weather conditions including drought, excessive moisture, hail, wind, hurricanes, tornadoes and lightning are covered. Unavoidable losses due to insect infestations, plant diseases, floods, fires and earthquakes also are covered. You must have this insurance prior to the disaster. |
| Small Business Administration (SBA) ...offers medium- and long-term loans for rebuilding non-farm homes and small businesses with moderate interest rates. |
| Commercial and federal land banks offer loans for home repair and improvement, land, equipment and livestock. Insurance companies offer long-term loans at relatively high interest for the same things. Assistance also may be available through a variety of state or local agencies and volunteer groups. Listen to your battery operated radio after a disaster for information on disaster relief services and locations. |

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| Non-financial resources also are available to many disaster victims. Technical assistance is available from: |
| The Agricultural Stabilization and Conservation Service (ASCS) ...for information on livestock and wildlife feeding, production and conservation practices. |
| The Animal and Plant Health Inspection Service (APHIS) ...offers technical assistance on animal and plant pests and diseases. |
| Extension Service-USDA ...offers information, educational material and advice on cleanup. |
| The Food Safety Inspection Service (FSIS) ...can be reached toll free at (800) 535-4555 for questions on the safe handling of meat and poultry. |

Notes:

Special Post-Disaster Considerations

Restoring Flooded Water Systems

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| <p>1. Do not start submerged electric motors until they have been cleaned, dried and checked for safety.</p> <ul style="list-style-type: none"> ● Disconnect the motor. An ejector or jet pump motor may be a separate unit mounted on the pump, or the end bell of the motor may be part of the pump. The separate motor unit can be disconnected and serviced easily. With the second type, remove the pump and motor as a unit. It is not necessary to remove the drop pipes. ● Take the motor to an electrical repair shop. In the shop, the motor should be checked for any short circuits or grounding caused by moisture. If the motor was submerged in mud and water, it should be thoroughly cleaned. Windings should be dried in a drying oven. The bearings should be lubricated before you use the motor again. ● Clean and dry electrical controls and pressure switches. Check all wiring for short circuits. <p>2. Pumps usually are damaged by sediment deposited in the bearings. Clean pumps. Check valves for silt and sand. Remove all dirt and water from the gears in the gear box and replace the lubricant with fresh oil.</p> <ul style="list-style-type: none"> ● Submersible pumps. The bearings on water-lubricated pumps will not be damaged by flood waters, since these bearings | <p>are constantly submerged in water. As soon as possible, flush clean water down the casing to remove sediment and silt. Then disinfect the well.</p> <ul style="list-style-type: none"> ● Centrifugal pumps. Many centrifugal pumps contain two sets of oil-lubricated bearings along the drive shaft between the motor and the pump. If the pump has been flooded, dismantle the container bracket and remove the bearings. ● Clean the bearings, or install new bearings if the old ones are worn out. ● Close-coupled centrifugal pumps contain no bearings, so there is little chance of flood damage except to the electric motor. <p>3. Injector-type pumps. These pumps usually contain watertight packing at the ground surface, with sealed impellers. Flood waters probably will not damage this type of pump.</p> <p>4. The storage tank and piping should be all right unless muddy water was pumped through it. If tank is contaminated, disinfect the entire system with a strong chlorine solution. Use 1 quart household laundry bleach or check with local health department for recommended solution strength.</p> <p>Open all faucets while the system is being filled. Do not close the spigot until a definite smell of chlorine is evident. Do not use the system for</p> |
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Restoring Flooded Water Systems

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| <p>24 hours. Then start the pump and run water from all faucets until the chlorine odor is gone.</p> <p>5. Wells probably will not be damaged structurally from floods, but they may be contaminated. Have your well tested by health officials before you use the water.</p> <p>6. If the well is located in a low spot, it may be contaminated with silt from floodwaters draining into it. If so, the well and entire water system should be disinfected. To disinfect the well system:</p> <ul style="list-style-type: none"> ● Pump the well until water is clear. ● Pour a solution of 1 quart liquid laundry bleach (Clorox®, Purex®, Hilex® or a similar hypochlorite solution) mixed in 3 gallons of water into the well casing. Leave it there at least 4 hours, or preferably overnight. ● Pump the chlorinated water into the piping system, and leave it there for at least 2 hours or even overnight. ● The next day, pump and flush out the system until the taste and odor of chlorine are no longer apparent. Two days after you have disinfected the water system take a sample of water according to recommended procedures and have it tested for purity. Boil or treat all drinking water until a water test indicates that water is safe for all purposes. | <p>7. Do not drink water from a flooded cistern until you disinfect the cistern and the entire piping system. To disinfect the cistern:</p> <ul style="list-style-type: none"> ● Use an auxiliary pump to remove the water and empty the cistern. Do not pump water through the pipeline distribution system. ● Wash down the walls and ceiling with clean water, and pump out the dirty water with an auxiliary pump. ● Check the cistern walls, ceiling and floor for cracks where groundwater could come in. ● Disinfect the interior with a solution of 1 quart laundry bleach in 3 gallons of water. Be sure the bleach contains no soap. Apply the chlorine solution with a sprayer or scrub with a stiff broom. <p style="padding-left: 40px;">Swab or pump out the disinfecting solution that collects in the bottom of the cistern.</p> <ul style="list-style-type: none"> ● Leave the chlorine solution in the pipes for at least 2 hours (overnight if possible) before you drain them. ● Fill the cistern with water for use. This water will have a chlorine taste for awhile, but it will be safe for all purposes. <p>8. Regenerate water softeners before you use them. Use clean chlorinated water to backwash the filterbed.</p> |
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| Disinfecting Wells | |
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| <p>Disinfect flooded wells before they are used as a source of drinking water. To disinfect a well:</p> <ol style="list-style-type: none"> 1. Scrub the pumphouse and wash all equipment, including piping, pump and pressure tank. 2. Remove the well seal at the top of the casing. Pour a solution of 1 quart laundry bleach and 3 gallons of water into the top of the well. Pour the solution so it washes down the inside of the casing and the outside of the | <p>drop pipes. In some wells you will need only to remove a plug from the seal to pour the solution into the well.</p> <ol style="list-style-type: none"> 3. Leave the solution in the well about 4 hours. Then pump it into the pressure tank and distribution system. 4. Draw the chlorinated water into all piping by opening each faucet until the odor of chlorine is apparent. Leave the chlorine in the piping at least 2 hours. Then run the water until the taste and odor are no longer objectionable. |

| Disposing of Animal Carcasses | |
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| <ol style="list-style-type: none"> 1. Prompt and sanitary disposal of animal carcasses is necessary to protect the living animals in an area from disease. 2. Search all pastures for dead animals as soon as possible. Carcasses may have some commercial value, so send them to a rendering plant if possible. 3. If rendering is impractical, dispose of the dead animals on the premises. Use the following procedure: <ul style="list-style-type: none"> ● Immediately after finding a carcass, cover it with crude oil or kerosene to keep away dogs, buzzards and vermin. | <ul style="list-style-type: none"> ● Fat swine are the only animal carcasses that will burn satisfactorily. Used railroad ties can be used as starters. ● Bury other carcasses. Use power equipment if it is available. Choose a site where subsurface drainage will not reach water supplies. ● Bury the carcasses at least 3 to 4 feet deep so predatory animals won't be able to reach them. If quicklime is available, cover carcasses with it before filling. Quicklime will hasten decomposition. |

Notes:

Additional Resources

For further information on disaster preparedness or recovery, the following resources are suggested:

- Small Business Administration 1-800-827-5722

Contact your local American Red Cross chapter or write to FEMA, P.O. Box 70274, Washington, D.C. 20024 for the following information:

- *Your Family Disaster Supplies Kit.* Federal Emergency Management Agency brochure L-189 and American Red Cross brochure 4463, March 1992.
- *Your Family Disaster Plan.* Federal Emergency Management Agency brochure L-191 and American Red Cross brochure 4466, September 1991.
- *Emergency Preparedness Checklist.* Federal Emergency Management Agency and American Red Cross brochure 44471, November 1991.
- *Helping Children Cope with Disaster.* Federal Emergency Management Agency and American Red Cross brochure 4499, September 1992.
- *Preparing for Emergencies: A Checklist for People with Mobility Problems.* Federal Emergency Management Agency brochure L-154(M) and American Red Cross brochure 4497, October 1992.

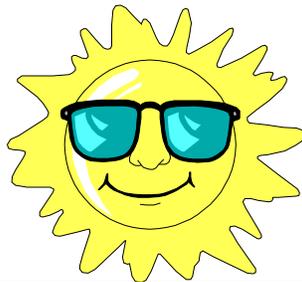
The following are available from the Federal Emergency Management Agency:

- *Preparedness for People with Disabilities.* Earthquake Hazard Reduction Series 9, FEMA 75.
- *Are You Ready?* H-34, Item #8-0908.

Notes:

Drought

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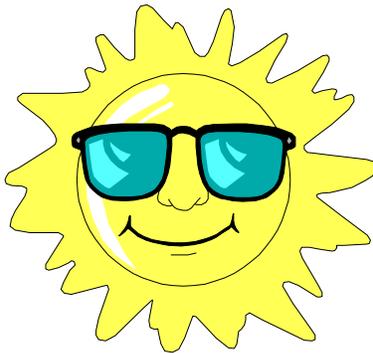
DROUGHT

Water Conservation

Water conservation is defined as the efficient use of water so that unnecessary or wasteful uses are eliminated. In many areas, more groundwater is drawn out of the aquifers each year than is recharged through rainfall and stream flow. As a result, groundwater levels have dropped dramatically. Demand for water from a state's streams and reservoirs may rapidly approach the available long-term supply. Across many states, many communities are regularly required to limit water use at some time during the year.

While some additional water supplies can be developed by constructing new reservoirs, in many locations the demand for water will still equal or exceed the available long-term supply. For these towns and cities, water conservation can make the difference between adequate supplies and shortages. Importantly, the way water is used and, in some instances, wasted must be rethought.

This section explains easy ways that water can be conserved and money can be saved at the same time. Useful information is also provided on how to measure home water use, how simple repairs can be made, and how water-saving devices are installed. In addition to the measures found in this section, also refer to the *General Family Preparedness* section found at the beginning of this handbook.



Water Conservation at Home

There are dozens of ways to conserve water and save money around the home. As a starting point, seven of the easiest ways to reduce water use at home are listed below. These should be part of your everyday routine, not just precautionary measures in times of drought.

1. Install a water-saving showerhead.

- An effective water-saving showerhead should have a flow rate of 3 gallons or less a minute. The standard showerhead uses 5 to 10 gallons a minute. Therefore, a showerhead using only 2½ gallons a minute can save as much as 75 gallons of water during a normal 10-minute shower.
- To determine whether a low-flow showerhead needs to be installed, check the flow rate of the current showerhead by using the water meter or by putting a gallon container under the showerhead while the water is on and measuring the time it takes to fill the container at the usual shower setting. If it fills in less than 20 seconds, the flow is greater than 3 gallons per minute.
- Low-flow showerheads can be purchased at most department, hardware and plumbing stores.
- Models costing from under \$3 are available. A showerhead can usually be installed in 10 minutes.

2. Place displacement devices in the toilet.

Three types of displacement devices can be used in toilets, but they should

not be used in newer, low-water use toilets which use less than 3½ gallons per flush.

- To determine the capacity of the toilet tank, either turn off the water supply valve to the toilet (usually located on the pipe behind the toilet) or hold the float ball up so that the tank does not refill, and flush the toilet. Measure the capacity of the tank by filling it to the normal level with a gallon container.
- Toilet dams can be installed in toilet tanks to reduce the amount of water used, typically saving ½ to 2 gallons per flush. Toilet dams are available from many utilities or from most plumbing supply stores from under \$5 per pair.
- A plastic bottle filled with water and weighted down with a few stones can accomplish the same purpose as dams. It is important to place the bottle in the toilet tank where it will not interfere with the flushing mechanism. A plastic bottle in the tank will save ½ to 1 gallon per flush.
- A toilet bag which is available free of charge from many utilities, can also be used in place of dams. A displacement bag in the tank will save ½ to 1 gallon per flush.
- Bricks should not be used in the tank because small pieces can break off and permanently damage the plumbing system.

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Water Conservation At Home

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3. Install faucet aerators.

- The standard faucet flow rate is 5 gallons a minute. A low-flow aerator can reduce this flow to approximately 2½ gallons a minute while still providing adequate water for washing and rinsing. Installing aerators on the kitchen sink and lavatory faucets will save hot water and cut water use by as much as 60 gallons a month for a typical family of four.
- Most aerators have either internal or external threads. Before purchasing aerators, the location of the threads and the diameter of each spout should be determined.
- If the faucet already has a standard aerator (not a low-flow type), it can be removed and taken to the store to ensure that the correct low-flow size is purchased. Aerators are available for less than a dollar from most stores that sell plumbing fixtures.
- If the kitchen has a portable dishwasher that must be connected to the faucet, do not install a low-flow aerator because the reduced flow may affect the performance of the dishwasher and result in dishes that are not properly cleaned.

4. Change your water use patterns.

- The washing machine and dishwasher should only be used when fully loaded. This practice can save at least two loads or approximately 60 gallons each week.

5. Examine personal water use habits.

- Changing tooth brushing habits can save as much as 14 gallons of water a day. Instead of allowing the tap water to run while brushing, use a cup, and run the tap just to rinse the toothbrush.
- The same method can be used to conserve additional water when shaving, washing hands or taking a shower.
- Use a pan when washing vegetables or rinsing dishes in the kitchen instead of running water constantly.

6. Find water leaks.

According to water utilities, leaks can easily account for 10 percent of a water bill and waste both water and energy if the source is a hot water tap.

- **Toilet Leaks.** When a toilet leaks, water escapes from the tank into the bowl. Toilets are notorious for hidden or silent leaks, because leaks are seldom noticed unless the toilet "runs" after each flush (which can waste 4 to 5 gallons a minute).

To determine if the toilet is leaking, look first at the toilet bowl after the tank has stopped filling. If water is still running into the bowl or if water can be heard running, the toilet is leaking.

Often the toilet may have a "silent leak." To test for a silent leak, mix a few drops of food coloring or place a

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Water Conservation At Home

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dye capsule or tablet (available from many utilities and hardware stores) into the water in the toilet tank after the water has stopped filling and the tank is full. **Do Not** flush the toilet. Wait for about 10 minutes, and if the dye or food coloring appears in the toilet bowl, the toilet has a silent leak.

Leaks of this type usually are caused by a defective flush valve (flapper) ball or a corroded or scaled valve seat.

Replacement balls and valves, which can be installed in less than 30 minutes, are available from most hardware and plumbing stores for under \$3.

- **Faucet Leaks.** Faucet leaks are obvious. However, periodically check seldom used taps in the basement or outside the house. The cause of faucet leaks is frequently a worn washer that can be replaced with two or three hand tools. Replacement washers can be purchased from most hardware and variety stores and cost only a few cents.

7. Use efficient outside watering practices.

- Plant native vegetation. Once established, which usually takes two years, these plants require less frequent watering.

- Water grass only when needed. If grass springs up after being walked on, it does not need watering.
- Soak grass long enough for water to reach the roots. **Water slowly and deeply.**
- Water during the cool, early morning hours to minimize water loss by evaporation and discourage disease. Do not water on windy days.
- Use sprinklers that produce droplets instead of mist and that have a low trajectory. This type of sprinkler will lose less water by evaporation and be less affected by the wind.
- Use drip irrigation systems for shrubs, flowerbeds and other frequently watered areas.
- During the summer, keep the grass about 2 to 3 inches high. This height shades the root system and holds soil moisture better than does a closely clipped lawn.
- Do not water streets and sidewalks. Adjust the hose or sprinkler until it waters just the grass or shrubs. For flowerbeds, shrubs and trees, use drip or soaker systems.

Notes:

| Reading a Water Meter To Measure Leaks | |
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| <p>If your house has a water meter, the entire plumbing system can be checked for an undetected leak in five easy steps:</p> <ol style="list-style-type: none"> 1. Find the water meter. (It may be outdoors or hidden in a dark corner of the basement.) 2. Turn off all running water and water-using appliances, and do not flush the toilet. 3. Read the dial (or dials) and record the reading. | <ol style="list-style-type: none"> 4. After 15 to 20 minutes, re-check the meter. 5. If no water has been turned on or used and the reading has changed, a leak is occurring. The rate (gallons per minute) of the leak can be determined by dividing the number of gallons by the elapsed time. 6. If the leak cannot be found and fixed, a plumber should be called. Before calling, check all toilets for silent leaks. |

| Installing a Low-Flow Showerhead To Conserve Water | |
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| <ol style="list-style-type: none"> 1. In some cases, a newly purchased low-flow showerhead may not fit on the existing pipe. This is often the case when the neck ends in a ball joint. <p>Most necks can be unscrewed and replaced, or an adaptor can be used. Adaptors or replacement necks are readily available in plumbing and most hardware stores.</p> | <ol style="list-style-type: none"> 2. When installing the new showerhead, teflon tape or pipe joint compound could be applied to the exposed threads of the new neck so that the joint will be sealed and provide a leakproof connection. 3. If the shower neck has been on for a few years and the neck joint is too stiff to unscrew with moderate pressure, consider having a plumber replace it. |

| Installing Shower Flow Restrictors to Conserve Water | |
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| <ul style="list-style-type: none"> • Restricting devices fit into the space between the showerhead and the shower neck. These devices range from a simple washer with a small hole in it to small chrome-plated pressure compensating fittings. | <ul style="list-style-type: none"> • While restrictors reduce water flow, low-flow showerheads produce a flow that is more satisfying to most individuals. |

Notes:

Installing Toilet Dams, Toilet Bags and Plastic Bottles to Conserve Water

Many of the toilets in homes today use from 5 to 7 gallons per flush. Several effective retrofit devices are available that can reduce the volume of water used with each flush by 2 to 3 gallons.

While these devices can be used in some of the low-flush toilets on the market today that use from 3 to 4 gallons per flush, they generally perform better when used in the older 5- to 7-gallon per flush models.

The height of water in the toilet tank (not just the volume) causes the bowl to flush, so the purpose of displacement devices is to reduce the volume of water used in each flush without affecting water height in the tank. The following three types of devices have proven to be effective.

1. Toilet Dams:

- To install a dam, flex or bend the dam and insert it into the tank.
- The dam should fit tightly against the tank sides and bottom and should curve outward away from the plumbing fixtures in the tank. Most tanks work best when a single dam is used.

2. Toilet Bags:

- Fill the bag with water, securely seal the top of the bag with the bag clamp and hang the bag in the tank by using the bag clip and hanger that are provided.
- Make sure the bag is located in the tank so it does not interfere with the operation of the toilet tank.

3. Plastic Bottles:

- Fill a plastic bottle with water and weight down with a few stones, and place in the most open portion of the tank. This will save as much water as is displaced by the bottle.
- Make sure the bottle does not interfere with the operation of the moving parts of the tank.

Check all such devices periodically to ensure that they remain in place.

Notes:

Water Saving Steps When Remodeling or Replacing Fixtures and Appliances

1. Hot Water Pipes.

Where possible, insulate hot water pipes from the hot water heater to fixtures and appliances. This will reduce the time between turning the water on and the time hot water comes out of the faucet and reaches a constant temperature.

2. New or Replacement Fixtures and Appliances.

Install low-water use fixtures when remodeling or replacing fixtures.

- Install toilets that use 3½ gallons or less per flush.

- Install low-flow showerheads that flow at 3 gallons or less per minute.
- Install water-saving dishwashing and clothes-washing machines. Be sure to check the water efficiency of appliances when shopping for replacement appliances.

3. Pools and Hot Tubs.

- Run the filter backwash onto the lawn rather than down the sewer.
- Purchase covers for hot tubs and pool to reduce evaporation losses.

Making Repairs To Toilets To Stop Water Loss

Some types of toilet leaks are relatively easy to fix. Other leaks may require the services of a plumber. Several simple repair steps that can be done without contacting a plumber are listed below.

1. If the water is too high in the toilet tank and is spilling into the overflow tube, the float can be adjusted by turning the adjustment screw or by very gently bending the float arm down so that the water shuts off at a level slightly below the top of the overflow tube.

Ideally, the water level should be set so that it is about even with the fill line on the back of the toilet tank.

2. A frequent problem that causes a toilet to leak is a worn flapper ball or a flapper ball that does not seat properly into the valve seat. If the flapper ball is worn, it can be

removed and replaced with a new flapper ball.

When replacing a flapper ball, take care to note how the chain is adjusted before the old ball is removed. Also, check the valve seat for scale or corrosion and clean if necessary. If cleaning does not work, install a retrofit valve seat, available from most plumbing or hardware stores.

3. If the handle needs to be jiggled to keep the toilet from "running," the guide-wire or the handle itself may be sticking. If the handle is sticking, adjust the nut that secures it in the toilet tank. If that does not work, replace the handle.
4. If none of the preceding steps solve the problem, contact a plumber to repair the toilet.

Repairing Faucet Leaks

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| <p>1. Leaky faucets, which can develop even in new houses, are wasteful and a nuisance. With a few simple tools, a leaky faucet can be repaired in less than an hour.</p> <p>2. Most water faucets in houses today are compression-type units in which a washer is compressed over a pipe opening when the faucet is closed, thus closing off the water.</p> <p style="padding-left: 20px;">All compression-type faucets may not look alike, but all are similar in their operation and repair.</p> <p>3. The exact point where a leak appears on a faucet is a good clue to finding its cause:</p> <ul style="list-style-type: none"> ● A spout drip is usually caused by a worn upper faucet washer or a corroded seat. ● Leaks at the stem result from a loose cap nut or worn cone or bonnet packing. ● A cap leak, or water oozing below the cap nut, indicates a worn bib or packing washer. ● A leak at the base of the faucet results from water seeping past a worn lower faucet washer. <p>4. To repair a leaky compression type faucet, use the following steps:</p> <ul style="list-style-type: none"> ● Turn off the water supply at the valve nearest the faucet. Next, open the tap to drain the faucet. ● Remove the handle screw and lift handle off the spindle. | <ul style="list-style-type: none"> ● Unscrew the cap nut. Use a protective cover of adhesive tape or a rag to avoid marring the finish. ● Unscrew the stem with finger pressure and lift it out. ● Remove the screw from the bottom end of the spindle. Scrape away all worn washer parts. Be careful not to damage the rim. Install a new washer. (Take either the old washer or the complete spindle unit with you to purchase the correct size and shape (flat or conical) replacement washer.) Double-check to make sure the replacement is like the worn washer. ● Check the seat (which is located down inside the faucet) to make sure it is not pitted or rough. If the seat is scarred or rough, use a seat-dressing kit to grind the seat to a smooth finish. ● A leak at the stem usually means that the packing inside the cap nut needs replacing. To replace the packing, pry out the old packing washer with a screwdriver. If a washer is used, replace it with a new one. If there is no washer, wrap the spindle tightly with "packing wicking." String can be used if commercial wicking is not available. ● Reassemble the faucet. Tighten the cap nut just enough to prevent leaking. Screwing the nut down too tightly causes rapid wear on the stem. |
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Repairing Faucet Leaks

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| <ul style="list-style-type: none"> ● Turn the shutoff valves to the on position and check the faucet for leaks. <p>5. A mixing faucet may look more complicated than a single faucet, but repairs are made in much the same way.</p> <ul style="list-style-type: none"> ● Actually, a mixing faucet is two separate units with a single spout. ● Mixing faucets are used on sinks, bathtubs and laundry tubs. Repairs must be made separately on each faucet unit. | <ul style="list-style-type: none"> ● Follow the same steps listed above, but remember to turn off the water before beginning work. <p>6. Every washerless and single-lever faucet model is a little different. When repairs are required, homeowners can purchase a repair kit for their model which includes instructions and the parts that generally will be worn. By replacing all the parts at once, the faucet should function for several years without needing further repair.</p> |
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Notes:

Adding New Landscape Or Redesigning The Yard To Conserve Water

When planning to add new landscaping or to redesign existing landscaping, the following suggestions may help you to save 50 percent or more of the water needed to maintain a traditional lawn.

1. If hiring a landscape architect or gardener, select one who is experienced in Xeriscape, the conservation of water and energy through creative landscaping.
2. Design the yard to reduce the grassed areas to only that amount which will actually be used for recreation and entertainment. Front and side yards are most frequently just for show and are logical areas that can be completely or partially converted from lawns to native grasses, ground covers and shrubs.
3. Use native grasses, ground covers, shrubs and trees. Many beautiful varieties of native species can be used in landscaping and are preferable to imported species.

The advantage of native species is that, once they are established (usually about 2 years), they do not need to be watered as frequently (about $\frac{1}{3}$ to $\frac{1}{2}$ as often), and they can survive a dry period without any watering.

4. When installing an irrigation system for lawn, shrubs and trees, sprinkler heads for the lawn should be low-angle spray heads that sprinkle the grass without spraying the water high into the air or allowing the water to drift onto the sidewalks and streets. The heads should produce droplets of water instead of a mist.

- The preferable irrigation system for shrub beds and trees is a drip-type system. There are several varieties, including soaker hoses, bubblers and "leaky pipe."

If a sprinkler system is installed for shrubs, an upright pipe extension may be needed if low-angle spray heads are to be used. This is done to spray evenly without obstructions.

- Automatic controls will allow the proper watering time and minimize waste.
- Regular spacing between spray heads will provide uniform coverage.

For more information, contact a licensed landscape irrigator or a reputable dealer.

5. Shape the soil to protect against erosion and use conditioners to promote water penetration and retention.
 - Shape the soil into earthen basins around all shrubs.
 - If the original soil is rocky, shallow or a heavy clay, improve the soil by adding 2 to 4 inches of organic material or topsoil that is compatible with the soil type.
6. Watering needs vary:
 - Plants: During summer month, most plants will need about 1 inch of water every 5 to 7 days.
 - Lawns: The frequency of watering depends on the type of grass.

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Landscape Water Conservation

A water conscious landscape design can reduce water use for landscape maintenance by 50 percent or more and also reduce the amount of maintenance required. Of equal importance, the natural beauty and function of the landscape also can be preserved by using adapted plant materials.

1. By using plant materials adapted to specific areas, water needs for landscape maintenance can be reduced by more than 50 percent.
 - Water conscious landscaping involves more than just using adapted plant materials—it includes the use of other conservation techniques and practices.
 - Water saving practices include the use of low pressure drip or trickle irrigation systems for watering trees, shrubs, gardens and individual plants or beds; the use of mulches around shrubs, beds and gardens to conserve water; the use of bark, rock or other landscape material in ground cover in areas difficult to water or in areas where plants are not needed; the use of vegetative groundcovers such as ivy, jasmine, liriopse and vinca in small, isolated areas, sloping sites that are difficult to water and in heavily shaded sites.
2. Water conscious landscape designs minimize intensively maintained lawn space. Manicured lawn areas may be the focal point of the landscape, but they do not need to cover the entire area unless the lawn is used as a playground or sports field.
 - Highly maintained grass areas generally require more irrigation than any other component of the landscape. On golf courses, for example, only the landing areas need to be intensively maintained. Rough areas may have a more drought tolerant grass, taller mowing heights and a separate water system.
 - Large open areas of the landscape where a grass cover is needed can be planted to low maintenance grasses such as buffalograss, centipede grass or bahiagrass. Native plants and wildflowers also can be allowed to develop in these areas.
 - Such plantings require very little maintenance and no supplemental water once they become established.
3. Proper site preparation will produce a more beautiful landscape and result in more efficient water utilization.
 - Slopes, areas with shallow topsoil, compacted soils and deep sands are difficult sites to establish grass and are inefficient with respect to water use.
 - Modifying or amending the sites before planting is more effective than waiting until problems develop.

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Landscape Water Conservation

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| <p>4. As the foundation is the strength of a building, the <u>seedbed</u> is the support for a turf. The <u>seedbed</u> refers to the few surface inches of soil that are modified prior to planting.</p> <ul style="list-style-type: none"> ● Poor soil conditions result in continuous turf maintenance problems. ● To prepare a seedbed, first remove all debris such as large stones, wood or other trash that may have been left after construction. ● Next, the nature of the soil may need to be altered. A sandy loam soil high in organic matter is best for turf. If the original surface soil is a heavy clay or a fine sand, add organic matter to improve soil structure. This organic material can be peat, compost, decomposed gin trash, rice hulls, bark or sawdust (preferably hardwood), leaf mold or similar material. Thoroughly mix 1 inch of organic matter with the top 3 to 4 inches of soil to produce a uniform seedbed. ● This mixing can be done by repeated cultivation with a garden tiller or with a tractor and rotovator. ● When adding un-decomposed organic matter to the soil, also add 3 pounds of ammonium nitrate or 5 pounds of ammonium sulfate per 1,000 square feet to aid decomposition of the organic material. | <ul style="list-style-type: none"> ● Most soils are deficient in the major nutrients required for turf. Sandy soils normally are deficient in nitrogen, phosphorus, potassium and lime. In the blackland areas, nitrogen and phosphorus may not be adequate for good turf development. Potassium in the soil may become deficient for turf growth when high amounts of nitrogen are used in areas not normally deficient in potassium. ● If possible, base rates and combinations of fertilizer nutrients on the results of soil tests. In the absence of a soil test, apply a complete fertilizer to the surface of the seedbed. Apply a fertilizer with a 1-2-1 (10-20-10, 6-12-6) or 1 (8-8-8) ratio at a rate to supply 1 pound of phosphorus per 1,000 square feet of lawn. ● Grade the seedbed to provide surface drainage away from structures, walks and driveways. A fall of 6 inches for every 40 to 50 surface feet is adequate for drainage on sandy soils, provided no pockets or depressions exist. ● Clay or clay loam soils may require twice that slope to provide adequate surface drainage. In some cases, subsurface drainage systems may be needed to remove excess water from poorly drained sites. ● If a considerable part of the landscape needs to be filled, use a loam or sandy loam soil. Repeated wetting of the filled site will help settle the soil. |
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Landscape Water Conservation

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| <ul style="list-style-type: none"> ● The final step in seedbed preparation is raking the surface to remove large clods and stones. At the same time, fill depressions that have developed and level high spots. Walks and driveways should be about 1 inch above the final soil surface. The site is now ready to be seeded, sprigged or sodded. <p>5. Conservation and reduced maintenance costs are enhanced by good cultural practices. By some estimates as much as 50 percent of the water used for landscape maintenance is wasted through run-off and evaporation.</p> <ul style="list-style-type: none"> ● Proper timing and method of application will reduce much of this water loss. ● The most important water conserving practice is to water only when grasses show symptoms of water stress. ● Grasses wilt and begin to go off color when under moisture stress. Shrubs and small trees wilt and begin to drop their leaves under moisture stress. Ideally, water shrubs before the first sign of moisture stress. ● When water is needed, thoroughly wet the soil 4 to 6 inches deep by applying water slowly or at intervals to avoid run-off. One inch of water, properly applied, will wet most soils 4 to 6 inches deep. (One inch of water is equivalent to 62 gallons per 100 square feet.) | <ul style="list-style-type: none"> ● During summer months an inch of water will meet most plant needs for 4 or 5 days. But wait until the plants (or grass) show moisture stress before watering again. Early morning dew, cooler temperatures or rain may extend the interval between irrigations several days. <p>6. Mowing is the key to maintaining neat, attractive turf areas. Low maintenance grasses such as buffalograss require less mowing than bermudagrass or St. Augustine. But regular mowing will improve the density and uniformity of all turf areas.</p> <ul style="list-style-type: none"> ● During the growing season, weekly mowing is ideal for lawn areas. When mowed weekly, there is seldom a need to pick up grass clippings. The clippings break down rapidly in the lawn and recycle plant nutrients. When clippings are picked up, they can be composted or used for mulch in gardens. ● During hot, dry conditions raise mowing heights to reduce water needs. Grass mowed at 2 to 3 inches maintains a deeper root system than grass mowed at 1 inch. Supplemental water needs are reduced with more effective use of water in the soil by deep rooted grasses. Mow St. Augustine, bluegrass and tall fescue lawns at 3 inches during drought conditions. Do not mow bermudagrass and zoysia higher than 2 inches. |
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Landscape Water Conservation

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| <p>7. <u>Thatch</u>, the organic layer between the soil and the green leaves, can slow water movement into the soil and cause excess run-off.</p> <ul style="list-style-type: none"> ● Thatch accumulation results from heavy fertilization, improper mowing practices, over watering and frequent pesticide use. ● Aeration and thatch removal increase water penetration and reduce run-off. Under some conditions wetting agents (surfactants) improve water penetration in a heavily thatched lawn. ● Water movement into the root zone is even more difficult where compaction develops. Aeration of compacted soils once or twice a year helps break up the compacted layer and increases water penetration. Aeration also reduces run-off from sloping sites. | <p>8. In soils containing high levels of sodium salts, gypsum can aid water penetration. Soil test information available through county Extension agents can reveal the presence of high levels of sodium. Like the other three factors affecting water use, the quality of the water used can influence the amount of water needed to keep a turf healthy.</p> <ul style="list-style-type: none"> ● Where salt is a problem, it is important to thoroughly wet the soil during each application. Light, frequent applications of water high in salts result in an accumulation of salts near the surface. Thorough watering helps move the salts below the root zone of grasses. |
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Notes:

Watering Lawns and Plants During a Drought

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| 1. If water is rationed during a drought, give priority to shrubs that are more expensive and harder to replace than grass and annual plants. | 2. During a severe drought when outside watering is prohibited, water plants with "gray water" saved from bathing, dishwashing and clothes washing, if this is permitted by the city or local health department. |
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Notes:

Special Considerations for Agricultural Producers

In addition to the precautions and responses covered in the previous pages, the agricultural producer will want to consider the following measures.

Developing a Crop Water Management Plan

Develop a water management system before you are faced with a drought situation.

1. Water Use Efficiency

- In areas where water supply is limited or expensive, it is economically important for farmers to attain high water use efficiency as well as high yields. Water use efficiency values can be calculated in several ways and should be clearly defined to avoid misinterpretation.
- Water use efficiency for a crop and irrigation system can be expressed as crop yield (pounds) per unit of water applied to or actually used by the crop (acre-inches).

2. Rainfall Patterns

- Average monthly rainfall data can be misleading because large variations occur. Therefore, percent probability that a certain rainfall amount will occur is a better way of assessing risk.
- Dryland crops should be grown during periods of high rainfall probabilities to allow more of the rainfall to be used for evapotranspiration.

Notes:

Crop Water Requirements and Water Use Efficiencies

Experimental results for yield and water use efficiency have varied, but many common water management principles have emerged and are receiving widespread application by farmers. Limited irrigation is now being widely practiced on drought tolerant crops to take advantage of expected rainfall.

1. Sorghum

- Sorghum has good ability to adjust to water stress. Sorghum requires 13 to 24 inches of seasonal water use (evapotranspiration) from precipitation, stored soil moisture and irrigation to achieve grain yields of 3,000 to 6,700 pounds per acre.
- Dryland sorghum yields an average of about 1,600 pounds per acre, although yields of up to 3,000 pounds per acre are not uncommon during high rainfall years.
- Pre-plant irrigation is often not needed and may be inefficiently applied, especially when using conventional graded furrow irrigation systems.
- The same amount of water may be more efficiently used if applied at later stages of crop growth.
- Conservation tillage can reduce the need for pre-plant irrigation of sorghum through improved soil moisture storage.
- Irrigations should be timed to avoid water stress during periods of peak water use (boot, heading

and flowering stages) to achieve reasonably good yields and maximum irrigation water use efficiency.

- Two well-timed seasonal irrigations of 4 inches per application or the equivalent are adequate in normal years for good yields of medium maturity hybrids. Saving irrigation water by withholding a 4-inch irrigation reduces sorghum grain yields by only about 10 percent during the early 6- to 8-leaf stage but by almost 50 percent if withheld at the heading and bloom stage.

2. Corn

- Corn is much more sensitive to water stress than sorghum, wheat or cotton. Corn is planted earlier than sorghum and typically allows more efficient use of the May-June wet season than sorghum.
- The early planting date required for corn increases the need for pre-plant irrigation for stand establishment. The total seasonal water use to achieve any corn grain yield is about 13 inches.
- Pre-plant irrigation is often necessary. Drought seasons require one or two additional irrigations.
- Moisture stress caused by low soil water availability or hot, dry conditions during the flowering stage (which includes tasseling, silking and pollination) can severely restrict corn yield.

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Crop Water Requirements and Water Use Efficiencies

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| <ul style="list-style-type: none"> ● Reduced irrigation of corn has generally resulted in significant yield decreases. Planned water deficits into the stress range are not recommended and may be feasible only on soils with moderate to high water storage and during the early vegetative or grain ripening stages. ● Reduced acreage, rather than reduced irrigation, offers the best way to adjust corn irrigation to limited water supplies. <p>3. Wheat</p> <ul style="list-style-type: none"> ● Winter wheat is a major drought-tolerant crop that grows vegetatively during the normal dry period from fall to early spring and develops grain during a period of increasing spring rainfall. Wheat is normally planted around October 1 and requires available soil moisture from irrigation or precipitation for germination and early growth. ● Wheat also should receive one late fall irrigation followed by two to three spring irrigations for high grain yields. One additional early irrigation (together with additional applied fertilizer) is usually needed for early planted wheat that is grazed and also managed for grain production. ● The highest wheat yield response to irrigation usually occurs during jointing and boot stages. These stages also coincide with a period of relatively low probability of rainfall. ● The least efficient irrigation is during grain filling, which | <p>normally is associated with increased rainfall.</p> <p>4. Cotton</p> <ul style="list-style-type: none"> ● Cotton is a drought-tolerant, long-season crop that lends itself to limited irrigation despite a somewhat complicated pattern of water use, deficits and application. ● Early fruit set is important in cotton production. However, the production, placement and retention of fruiting sites are sensitive to soil water availability. ● Under dryland conditions, expected lint yields are in the range of 250 to 300 pounds per acre. Cotton requires more than 13 inches of seasonal water use to produce appreciable lint yields. ● High levels of water application can decrease lint yield by causing excessive vegetative development and fall immaturity. ● A pre-plant irrigation of 4 inches is usually advantageous, especially if spring rainfall is not adequate, but heavier pre-plant irrigations are not warranted. ● Cotton has the ability to overcome moisture stress at most growth stages if water becomes available and low temperatures do not limit growth. ● The most critical period for irrigation is early to mid-bloom. If water is available, a second irrigation should be applied at peak to late bloom. |
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| Developing and Improving Vegetative Cover | |
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| <p>1. Good cover (standing vegetation and mulch) lessens the impact of rain that dislodges soil particles, and thus reduces the amount of sediment in surface run-off. Good cover also slows the movement of run-off so that more water soaks into the soil and more sediment is deposited on the grazing land rather than being carried into streams or ponds. Vegetative cover also entraps manure and prevents pollution of streams with animal waste.</p> <p>2. Best management practices for preventing nonpoint source pollution from grazing lands include locating animal holding pens and feeding areas away from streams and other hydrologically sensitive areas, and establishing and maintaining good vegetative cover.</p> <p>3. The amount and type of vegetation present significantly influence the rate of infiltration of water.</p> | <p>Standing vegetation and a mulch or litter layer increase infiltration. Organic matter in the surface soil improves soil aggregation, making it easier for water to move through the soil.</p> <p>4. Pores in the soil created by plant roots increase the rate at which water can enter the soil by providing pathways for water movement. Long-lived, perennial bunchgrasses have deeper root systems than sodgrasses and allow water to move deeper.</p> <p>5. The height of grass also affects water movement. Water moves more rapidly across closely grazed grass than grasses left with several inches of stubble.</p> <p>6. If the watershed has been severely overgrazed, the vegetative cover will need to be improved by controlling undesirable plants such as broadleaf weeds and shrubs and/or seeding desirable plants.</p> |

Notes:

| Maintaining Vegetative Cover | |
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| <p>1. If at least 10 to 15 percent of the desirable vegetation is present, the most practical and economical way to maintain a desirable vegetative cover is through proper grazing management.</p> <ul style="list-style-type: none"> ● The key to proper grazing management is to balance the number of grazing animals with the forage produced. The proper balance will leave a sufficient amount of plant residue to maintain stored food reserves, plant vigor, a healthy root system and seed production of the desired plants. ● It also allows seedlings to become established. <p>2. For planning purposes, an appropriate long-term stocking rate may be determined based on the "take half and leave half" rule of thumb. However, a more realistic approach is to manage the grazing stocking rate so that a given amount of residue is left prior to resumption of growth in the spring.</p> <p>The amount of residue required will vary according to the area of the state and the vegetation types. For example, 300 pounds of plant residue may be adequate for a semi-arid area with short-grass vegetation, while 1,200 pounds of residue may be required in a more humid area with tall-grass vegetation.</p> <p>3. It also is important to properly distribute animals over the grazing land. Poor distribution may result in</p> | <p>extreme overgrazing of one area and little use of another in the same unit. Often these overgrazed areas are located near water, thus increasing the potential for pollution.</p> <p>Practices which contribute to proper grazing distribution include the development and strategic placement of water sources, construction of fences, strategic location of salt and feeding sites, building of trails, fertilization, prescribed burning and spot seeding.</p> <p>4. Plants benefit from periods of no grazing. Deferment from grazing is particularly useful on areas where vegetation needs to be improved.</p> <p>5. Planned grazing systems divide an area into two or more grazing units to allow periods of grazing and rest from grazing in a sequence determined by management objectives, physiological needs of the plants and the design of the system.</p> <ul style="list-style-type: none"> ● Grazing systems may include as few as 2 or as many as 30 or more grazing units. ● Some temporary soil compaction may occur with systems that concentrate animals in a small area for short periods of time. However, if the period is short, the soil will recover rapidly from the compaction. A planned grazing system makes more effective use of forage and, combined with the proper stocking rate, protects desirable range plants and water quality. |

Notes:

Managing Salinity

Salinity problems normally occur in arid or semi-arid climatic regions. Salinity is a major nonpoint source pollutant in the west as irrigation return flows can carry dissolved salts into waterways. In humid climates, soluble salts are generally leached downward through the soil profile where they cannot cause problems.

In general, accumulation of salt results from water evaporation at the soil surface. This condition can render land vegetatively nonproductive, and may lead to nonpoint source pollution through erosion and sedimentation. Further, the salt concentration may run off during a storm and affect adjacent lands. These problems normally occur where either surface seep areas appear or where a high water table exists in the soil profile.

Sometimes rainfall moves through the ground to the water table or to a barrier above the water table. Here it accumulates and moves laterally, often parallel with the land slope, toward an outlet or low point in the landscape. It then forms a wet weather or saline seep. During the summer or periods of low rainfall, such seepage spots may completely dry out. Only detailed analyses of borings, soils and surveys can establish the source and amount of groundwater contributing to seep areas.

1. Irrigated land in arid areas sometimes must be drained to prevent or reduce salinity problems. Topographic surveys and subsurface investigations should be made to obtain information on the soils, geology and water table elevations. These data are the basis for determining the extent of the problem and for setting design parameters.

2. Plant nutrients and pesticides should be applied in such a manner as to limit the potential for contamination of surface and groundwater supplies by outflow from drainage systems.
3. One alternative treatment is to establish permanent salt tolerant species such as bermudagrass, aikali sacaton, gramas and kleingrass. Salt tolerant species will allow a vegetative cover where bare ground would otherwise lead to water quality problems.
4. Cropping with salt tolerant, seasonal species such as cotton or small grains assists in addressing the problem of saline soils. Planting high water use crops such as alfalfa, four-wing saltbush or trees above a seep area helps control the amount of moisture that accumulates.
5. Organic or inorganic additives to the soil surface will increase water infiltration. This will allow water to force dissolved salts below the root zones and prevent further concentration of salts on the soil surface.
 - Organic amendments include cotton burs and gin "trash" that may be obtained from cotton processing facilities.
 - Inorganic agents to increase soil tilth include gypsum or calcium sulfate.

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Managing Salinity

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6. Land alterations are sometimes used to alleviate salinity problems. Such constructed systems have a place in salinity control, but use caution when implementing them. In some cases, altering the land surface by smoothing or grading may eliminate the effects of the problem by confining the seep area or providing natural surface drainage.

Practices such as closed-end terraces or basin terraces which impound water can be used on areas with minimal seepage, but should be scrutinized where they might contribute to problems associated with saline seeps. When seeps threaten downstream water quality, installing a fresh water interceptor drain above the seep may be an alternative treatment.

7. Drainage may be used in severe cases of salinity. The location of a suitable outlet and the quality of discharge and receiving waters is crucial in considering either a surface or subsurface drain. Surface drainage can be accomplished by several methods, depending on the conditions at the site.

- A surface drainage system may be the least expensive alternative, but potential maintenance problems and obstructions to farming operations should be considered. Maintaining water quality of any discharge waters is of utmost importance.

- Most subsurface drainage uses corrugated plastic tubing installed with a synthetic filter envelope. Again, as with any other drainage system, an adequate outlet is imperative, especially considering the discharge water quality in comparison to receiving waters.

8. Irrigation water management is important on saline soils. Salt accumulates in soils because of salts in irrigation water or the presence of a high water table. To prevent harmful accumulation of salts in soils irrigated with saline water, an additional quantity of water, above that required for the crop, must be passed through the root zone to leach salt from the soil.

A high water table contributes to salt accumulation because capillary action causes water and soluble salts to rise to the soil surface. There the water evaporates, leaving behind salt deposits. Enough water must be applied periodically to leach out accumulated salts without excessive waste of water. If a seep area could be made worse by applying liquid agricultural waste, proper management must be used, including nutrient management.

Earthquakes

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EARTHQUAKES

The crust of the earth is made up of seven masses called tectonic plates. They are in steady motion. Accumulated stress builds up from the continental plates grinding, sliding or colliding against or slipping under each other. Pressure is released in a powerful explosion of energy that fractures the earth's surface, shakes the ground, causes the ground to roll, liquefies some soil and generates giant water waves.

When an earthquake will unleash its force remains unpredictable. Preliminary cracks may send off foreshocks before a main fracture. These foreshocks can occur months or minutes before the rapid onset of the earthquake. An earthquake lasts for seconds or minutes, while aftershocks may occur for months after the main earthquake.

Powerful and widespread ruptures or shaking ground can cause buildings to move off their foundations or collapse; damage utility lines, other structures and roads; set off fires; and threaten the lives of people and animals. It is the damage to structures that presents the greatest risks to life and property.

Earthquakes create a trigger for other natural hazards such as landslides, tsunamis, avalanches, fires and flash floods.

The greatest likelihood of major earthquakes is in the western United States, particularly along the San Andreas Fault in California and up the Alaskan Coast, in the New Madrid Fault Zone in the Midwest, and in a few pockets on the East Coast, particularly in South Carolina and New England. There is no seasonal or yearly cycle of occurrence. Earthquakes can happen at any time. Major earthquakes appear to occur in cycles of between 50 and 275 years.

How Earthquakes are Measured

The Richter Scale provides a measure of the magnitude of the earthquake in terms of energy released, measured in equivalent tons of TNT. Each unit represents a 10-fold energy release.

An earthquake of Richter 2.5 or less is usually ignored. Dishes rattling and china shaking occur at 3. The Modified Mercalli Intensity Scale is a more subjective accounting or survey of behavior and damage based on observation at the site.

Depending on the intensity of ground vibrations, the elasticity of buildings and structures, and how well structures are connected to their foundation, falling or collapsing objects and structures accompany earthquakes. Structural instability, such as dam failures, can trigger flash floods. Fires have been the greatest cause of damage in the past. Offshore earthquakes may cause tsunamis.

Preparing for an Earthquake

In addition to precautions outlined in the sections on *General Family Preparedness*, *Residential Fires* and *Hazardous Material Accidents*, you need to take the following steps.

1. Become familiar with earthquake terms.
 - Aftershocks: Tremors that occur in the hours or days after the initial earthquake shaking is over.
 - Epicenter: The place on the surface of the earth directly above an earthquake's first movement (focus).
 - Fault: A fracture in the earth's crust along which rocks have been displaced.
 - Focus: The point beneath the surface of the earth where the rocks first break and move, beginning the earthquake.
 - Intensity: An indication of an earthquake's apparent severity at a specific location, based on its effects on people and structures.
 - Magnitude: Size of an earthquake determined from the size of the seismic waves it generates as recorded by seismographs.
 - Mercalli Scale: The scale used to measure the strength of an earthquake as determined by people's eyewitness observations.
 - Tidal wave: This is a misnomer for a tsunami. Tidal waves occur from the interaction of the moon and large bodies of water. Waves you see rolling into the ocean shore every day are tidal waves.
2. Safeguard your home by:
 - Tsunami: A seismic sea wave. An unusually large wave (or series of them) produced by an undersea earthquake or volcanic eruption.
 - Bolting bookshelves, water heaters and cabinets to wall studs.
 - Anchoring things so that they will not move or fall during an earthquake is the most important thing you can do to make yourself safe. Keeping things in place also means they will not break.
3. There are many ways to make the contents of your home and workplace less hazardous.
 - Move cabinets and tall furniture so that if they fall they are not likely to hit people.
 - Use steel angle brackets to anchor them to studs in the wall.
 - Put heavy or breakable things on bottom shelves. You can even put "fences" or restraining wires to keep items from falling off open shelves.
 - Put child-proof or swing-hook latches on bathroom and kitchen cabinets. At work, put strong latches on cabinets where hazardous items are stored.
 - Use screw-eyes or tongue-in-groove hangers to mount mirrors or pictures instead of hanging them on nails.
 - Be sure that ceiling fans and light fixtures are well anchored or have earthquake safety wiring.

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Preparing for an Earthquake

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| <ul style="list-style-type: none"> ● Anchor typewriters, computers, televisions, stereos and like items with heavy duty Velcro, at home and at work. ● Strap your water heater to anchor it to wall studs. You can buy metal strapping, called plumber's tape or strap iron, in hardware stores. Use it to strap the heater at the top and bottom. This not only preserves your best source of | <p>water but also significantly reduces the fire hazard in your home by preventing a broken gas line.</p> <ul style="list-style-type: none"> ● Do not assume that anything is too heavy to move in an earthquake. When the ground is going up and down in waves, it bounces even the heaviest equipment into the air. |
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During an Earthquake

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| <ol style="list-style-type: none"> 1. Get under a heavy table or desk and hold on, or sit or stand against an <u>inside</u> wall. 2. Keep away from windows. 3. If indoors, stay indoors. 4. If outdoors, stay outdoors away from falling debris, trees and power lines. | <ol style="list-style-type: none"> 5. If in a car, stay in the car. 6. Many injuries occur when people act on their impulse to run. Train yourself to take cover where you are. |
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Notes:

Responses Inside Buildings During an Earthquake

For most of us the biggest danger in an earthquake is not from a building collapsing, but from things inside the building falling or flying around while the building is shaking.

Hazards found inside buildings include overhead lights, ceiling tiles, cabinets, windows, furniture and equipment.

If an earthquake happens, the best thing to do is:

1. Drop, cover, and hold on.
 - Get under a table.
 - If there are no tables, get under or down between rows of chairs or against inner walls.

2. Do not stand in a doorway. Buildings today have so much partitioning, much of which is temporary, that many doorways are actually weak points. Doorways are not a good solution in a group situation either.
3. If you have nothing to get under, sit down against an interior wall or next to a chair, holding on if possible.
4. If you are in bed, it's best to stay there, hold on, and pull the pillows over your head for protection.
5. If children are in another room, take cover in the closest safe place and call to them to do the same.

Children will need you alive and unhurt after the earthquake. Avoid the urge to run to protect your children, as that puts you in more danger of being hurt or injured.

Responses if You are Outside During an Earthquake

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| <ol style="list-style-type: none"> 1. Outside, get away from buildings, walls, trees and power lines. <ul style="list-style-type: none"> ● If you cannot get clear of hazards, getting back inside a building is better than staying on the sidewalk. ● Sidewalks next to buildings are among the worst places to be. | <ol style="list-style-type: none"> 2. In a car, ease off the accelerator and slow down carefully. Do not stop on or under overpasses and bridges if you can avoid them. Be aware of what traffic around you is doing and act accordingly. 3. If you live in coastal areas, be aware of possible tsunamis. |
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Notes:

| After an Earthquake | |
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| <p>1. Take basic precautions immediately after an earthquake. In addition to those outlined in the <i>General Family Preparedness, Residential Fires</i> and <i>Hazardous Materials Accidents</i> sections you should:</p> <ul style="list-style-type: none"> ● Expect aftershocks. ● Avoid using vehicles except in emergencies. <p>2. Check yourself for injuries and protect yourself by putting on shoes, work gloves and any other protective gear at hand.</p> <p>3. If the electricity is off, turn on a flashlight.</p> <p>4. Once you are sure that you're all right, check the people around you for injuries.</p> <ul style="list-style-type: none"> ● You might ask loudly, "Is everyone okay?" This will also help calm people. | <ul style="list-style-type: none"> ● The types of injuries that happen most often in an earthquake include cuts, bruises, fractures and physiological shock. <p>5. Check the entire building for structural damage and chemical spills. Refer to the section on <i>Hazardous Materials Accidents</i> for further response information.</p> <p>Check chimneys for cracks and damage. The initial check should be made from a distance. Have a professional inspect the chimney for internal damage that could lead to fire.</p> <p>6. Right after an earthquake, hang up your phone. If the receivers are shaken off the hooks, these lines register as "open" in the system and it overloads. You can help restore telephone service by hanging up your phone.</p> |

Notes:

Special Considerations for Agricultural Producers

In addition to the precautions and responses covered in the previous pages, the agricultural producer should consider the following measures.

1. Immediately after an earthquake, animals will react with great fear. Animals, including cats and dogs, that are usually docile and accustomed to humans, may react violently. They may bite, scratch or run at you.
2. Earthquake aftershocks compound the problem of caring for animals right after an earthquake. Aftershocks are quite frequent after large earthquakes, and further increase the fear and skittish reactions of animals.
3. The best thing to do for animals after an earthquake is to get them out in the open, to open pasture or rangeland. Let the animals run free. Do not attempt to rope or chain large animals such as cows and horses because they may injure or kill themselves if an aftershock occurs and they try to run.
4. Get animals out of barns or buildings that may have been damaged in an earthquake. Barns are especially susceptible to earthquake damage. Large beams and rafters may not be well secured, thus making the barn subject to collapse during aftershocks.
 - Hay bales and large equipment may be tossed around and come tumbling down on animals and people inside barns.
 - Immediately open the doors and let the animals out. It's easier to recover a live animal than replace a dead one.
5. Ensure that mechanical equipment has not been turned over or damaged. If there is danger of electrical shock, turn off the main electrical circuit breaker or fuse. If you smell gas or suspect a gas leak, turn off the main valve.
6. Check fence lines and posts. You may need to build a make-shift yard from temporary posts and fencing. Then repair/rebuild the regular fencing, and open the temporary yard when completed.
7. If animal carcasses need to be disposed of refer to the *General Family Preparedness, Special Post-Disaster Considerations* section for appropriate handling.

Notes:

Residential Fires

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RESIDENTIAL FIRES

Fire safety and prevention are important for everyday emergencies, but they are crucial during disasters. More than 6,000 Americans die and 100,000 more are injured by fires each year. Fire spreads quickly. A fire's heat is more dangerous than the flames; inhaling super hot air can sear your lungs. Fires produce poisonous gases that make you drowsy and disoriented. In addition to those measures outlined in the *General Family Preparedness* section, the following fire specific measures should be followed.



Fire Safety and Prevention

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| <ol style="list-style-type: none"> 1. Install smoke detectors in your house or apartment. <ul style="list-style-type: none"> ● Place detectors on every level of your house: <ul style="list-style-type: none"> - outside bedrooms - at the top of open stairways or the bottom of enclosed stairs - near (but not in) the kitchen. ● Clean smoke detectors regularly and replace batteries once a year. 2. Plan escape routes with your family. See the <i>General Family Preparedness</i> section of the Handbook. 3. Clean out storage areas. Don't let trash accumulate. 4. Check electrical wiring. <ul style="list-style-type: none"> ● Inspect extension cords for frayed or exposed wires or loose plugs. ● Do not overload extension cords or outlets. 5. Never use gasoline, benzine, naphtha or similar liquids indoors. <ul style="list-style-type: none"> ● Never smoke near these flammable liquids. ● Safely discard all rags or materials soaked in flammable material after use. | <ol style="list-style-type: none"> 6. Check heating sources. Make sure they are clean and in working order. 7. Alternative heating sources such as wood, coal and kerosene should be used carefully. 8. Make sure that home insulation is not in contact with electrical wiring. 9. Know where your gas meter and central electrical panels are so you can shut them off in an emergency. If you shut off your gas line, allow only a gas company representative to turn it on again to make sure it is done properly. 10. Ask your local fire department to inspect your house for fire safety and prevention. 11. If you live in wildland areas, your house could be a target for wildfire. <ul style="list-style-type: none"> ● Call local authorities and get information about wildfires in your area. ● Do not install an untreated wood shake roof. ● Make your landscape fire safe by removing excess brush and undergrowth, planting fire resistant plants, and pruning trees of low branches. |
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Notes:

What to Do in Case of a Fire

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| <ol style="list-style-type: none">1. To put out a small fire, take away its air or fuel, or cool it with water or fire extinguishing chemicals.2. Never use water on an electrical fire. Use only a fire extinguisher.3. Oil and grease fires occur primarily in the kitchen. Smother the flames with baking soda or salt or put a lid over the flame if it is burning in a pan.4. Small fires can be controlled with water or fire extinguishers, but do not try to put out a fire which is getting out of control.5. If your clothes catch on fire, stop, drop and roll until the fire is extinguished. Running only makes the fire burn faster. | <ol style="list-style-type: none">6. Sleep with your door closed. If you wake up to the sound of a smoke detector, feel the door before you open it.<ul style="list-style-type: none">● If the door is cool, leave immediately. Be prepared to bend low or crawl. Smoke and heat rise, and the air is cooler near the floor.● If the door is hot, escape through a window. If you cannot escape, hang a white or light-colored sheet outside the window to alert fire fighters of your presence. |
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Notes:

| What to Do After a Fire | |
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| <ol style="list-style-type: none"> 1. Contact your insurance agent about estimates and loss coverage. 2. Do not enter a fire-damaged building unless authorities have given you permission. 3. When entering a building, be watchful for signs of heat or smoke because they may be signs of smoldering remains of fire. 4. Have an electrician check your household wiring before the current is turned back on. Do not attempt to reconnect any utilities yourself. 5. Beware of structural damage. Roofs and floors may be weakened and need repair. | <ol style="list-style-type: none"> 6. Discard food, beverages and medicines that have been exposed to heat, smoke or soot. 7. If you have a safe or strong box, do not try to open it. A safe or fire proof box can hold intense heat for several hours. If the door is opened before the box is cooled, the entering air combined with the high internal temperature may cause the contents to burst into flames. <p>Refer also to the <i>General Family Preparedness</i> section.</p> |

Notes:

Floods

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FLOODS

Floods are the most common and widespread of all natural hazards. Some floods develop over a period of days, but flash floods can result in raging waters in just a few minutes. Even very small creeks, gullies, culverts, dry streambeds or low-lying ground that may appear harmless in dry weather can flood. Wherever you live, be aware of potential flooding hazards. If you live in a low-lying area, near water or downstream from a dam, you must be prepared for floods. In addition to the information provided here, also refer to the *General Family Preparedness* section.



Preparing for Floods and Flash Floods

Some simple advance preparation will help you be ready for possible floods in your area.

1. Know the flood warning system in your community and be sure your family knows the warning. Instruct family members in emergency procedures during a flood warning.

If you live in an area subject to frequent or sudden floods, especially flash floods, you may wish to have family flood drills. Assign each family member an emergency task such as gathering emergency supplies, turning off utilities, or listening to the radio for instructions.

2. Flood proof your buildings.

- Install check valves in sewer traps to prevent water from backing up in sewer drains.
- Seal cracks in walls and floors with hydraulic cement.
- Place heavy screens over lower windows to prevent breakage from floating objects.

3. Be ready to protect appliances from minor flooding. Put a half-block of cement under each corner of refrigerators, freezers, washing machines and dryers. Use bricks or boards if you don't have cement blocks.

4. Identify fire hazards.

- During a flood, fire danger is increased. In addition, fire departments may be unable to get to fires through high water.

- Watch for these fire hazards on your property:
 - Broken or leaking gas lines
 - flooded electrical circuits,
 - submerged furnaces or electrical appliances
 - flammable or explosive materials coming from upstream.

5. Before floodwaters crest, turn off the main power switch if you think the electrical circuits are going to be under water.

Never Touch The Switch While You Are Wet Or Standing In Water. Do not turn the electrical system back on until it has been inspected by an electrician.

6. Know what a river height forecast means for your property—especially how far your property is above or below expected flood levels.
7. Know where to go in case of flooding. Remember that you must seek higher ground as quickly as possible, on foot if necessary.
8. If you are camping, know how far your campsite is above nearby waterways.
 - Know how to seek higher ground. Stay out of unknown water paths such as dry creeks or river beds.
 - If advised to leave the area, do so immediately.
9. Refer to the *General Family Preparedness* section of this Handbook for additional steps to take.

Notes:

Building Dikes To Prevent Minor Surface Flooding

Standing water from melting snow or heavy rains can flood basements and damage yards, wells, feed supplies, machinery and other property. Flooding is more apt to occur in areas with poor surface drainage systems or ice dams.

A 1- to 3-foot high sandbag earth dike offers protection from shallow flooding (water depth less than 3 feet). Contact a construction firm, lumber yard or Civil Defense officials for information on where to buy sandbags in the area.

A sandbag dike can be constructed as follows:

1. Select the site for the dike, making the best use of natural land features to keep it as short and low as possible. Avoid trees or other obstructions which would weaken the structure. Do not build the dike against a basement wall. Leave about 8 feet of space to maneuver between the dike and buildings.
 2. Remove ice and snow (down to the bare ground if possible) from a strip of land about 8 feet wide.
 3. Fill and lap sandbags.
 - Fill bags approximately half full of clay, silt or sand. Do not tie.
 - Alternate direction of bags with bottom layer lengthwise of dike. Lap unfilled portion under next bag.
 - Tamp thoroughly in place.
4. Seal the finished dike to increase its watertightness. To seal the dike:
 - Build the dike three times as wide as it is high.
 - Spread a layer of earth or sand 1 inch deep and about 1 foot wide along the bottom of the dike on the water side.
 - Lay polyethylene plastic sheeting so that the bottom edge extends 1 foot beyond the bottom edge of the dike over the loose dirt. The upper edge should extend over the top of the dike. (This plastic sheeting, available from construction supply firms, comes in 100-foot rolls and is 8 or 10 feet wide.)
 - Lay the plastic sheeting down very loosely so that the pressure of the water will make the plastic conform easily with the sandbag surface. If the plastic is stretched too lightly, the water force can puncture it.
 - Place a row of tightly fitting sandbags on the bottom edge of the plastic to form a watertight seal along the water side.
 - Place sandbags at about 6-foot intervals to hold down the top edge of the plastic. Place boards or dirt between these sandbags to prevent winds from disturbing the plastic. As you work, avoid puncturing the plastic with sharp objects or by walking on it.

Notes:

Preventing Leaks in Basements

Quick thaws or heavy rains can mean damp or flooded basements. Leaks in basements may be caused by cracked walls, improper grading, water in window wells or water pressure under floors.

Cracks

Watertight concrete is important to prevent water seepage in the basement. Fill cracks when the soil is dry, so cracks will be dry. It is best to fill cracks when there is no artificial heat in the basement so thin layers of mortar can cure.

1. **Wide cracks** (½ inch or more). Shape the crack like a **V** with a star drill or cold chisel. Fill with mortar.
 - Chisel out the sides of the crack to make a **V** opening about 1 inch deep and 1 inch wide at the surface.
 - Coat the crack with a creamy mixture of cement and water.
 - With a trowel immediately fill the opening with a 1:2 mixture of cement and sand mortar (one amount of cement to two amounts of sand mortar). Or use a chemically treated cement available at hardware or building supply stores.
2. **Hairline cracks**. Fill the cracks with a cement base paint. With a scrub brush apply a cement wash of Portland cement and water. Or check for other leak-stopping materials at your local lumberyard or hardware store.
3. The ground around foundations should slope away from the house at a rate of at least 6 inches in 10 feet. You should regrade by cutting and filling if you notice water standing along foundations, or if the surrounding ground is flat or slopes toward the house.
4. Carry roof water away from the building by eave gutters and downspouts. Water from downspouts should be carried about 3 feet away from the foundation wall.
 - Use a splash block, downspouting or tile drain.
 - Do not direct water from the downspouting into the drain around the footing.

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Notes:

Preventing Leaks in Basements

(continued)

| Window Wells | Basement Floors |
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| <ol style="list-style-type: none"> 1. Check window wells to be sure that surrounding ground ends a few inches below the top of the well. 2. To prevent water seeping down the outer surface and under the well, compact several inches of dirt around the well. 3. If there is tile around basement footing, dig a post hole inside the well to this tile. Fill with clean gravel. 4. If there is no tile around footing, improve drainage by laying drain tile from the bottom of the window well to a lower point in the yard. | <p>Water pressure under concrete basement floors may cause them to leak or buckle. To relieve this pressure:</p> <ol style="list-style-type: none"> 1. Build a sump so water can run into it and be pumped out. 2. If there is a layer of clean gravel under the floor, drill a hole in the side of a floor drain. This will allow water to flow through the gravel to the drain, and will relieve the pressure under the floor. 3. Leaks sometimes can be diverted through concrete lined channels below or above floor level. Make a channel by chipping away floor and smoothing it with mortar, or by building a ditch above floor level. Carry the channel around the wall to a floor drain. |

Notes:

Cleaning Up After a Flood—Setting Priorities

Priorities will vary with the kind and seriousness of damage. Buildings may not be habitable during repair.

1. Examine building structure. Check foundations for settling, cracking or undermining. Examine walls, floors, doors and windows to determine what repairs are necessary. You may want to repair only temporarily until extensive work can be done.
2. If basement is flooded, start pumping the water in stages. Pump about one-third of the water each day.
3. Get the electrical system in operation. If the switch box is in a flooded basement, do not turn electricity back on until water has been pumped out. Take electrical appliances to a serviceman as soon as possible.
4. Get the water system in operation. Disinfect wells and water system.
5. Shovel out mud and silt before it dries.
6. Before they dry, wash down flooded walls and floors with a hose. Start at upper limit of flooding and work downward.
7. Scrub and disinfect walls and floors.
8. Start the heating system if possible to speed up drying. Before operating it, the heating system may need to be cleaned, dried and reconditioned. Make sure chimneys are clean before starting system.
9. Dry out walls and floors. If necessary for proper drying, strip walls open up to water level. Drill holes in exterior siding. Complete drying may take months.
10. Repair buckled walls and floors.
11. Clean and dry household items, furniture, carpets, clothing, dishes and bedding. Disinfect when necessary.
12. Treat items for mildew as needed.
13. Care for damaged trees, shrubs and lawn.
14. Repaint, repair, refinish as necessary.

Notes:

Salvaging Sewing Machines and Sergers

Most damage to flooded sewing machines and sergers is caused by rust. Even if the machine was not submerged, check for rust caused by general dampness. Rust develops quickly on highly polished, machined or plated surfaces.

1. If the equipment was submerged, the machine (head and controls) or the serger should be serviced by a dealer or professional sewing machine/serger repair person within 10 days if possible.
2. Try to prevent as much damage as possible by drying equipment quickly.
 - Use a hand-held hair dryer to help dry interior parts.
 - Dry attachments with a soft cloth or a hair dryer.
 - Rinse attachments and removable metal parts in dry cleaning solvent or a light machine oil. Oil replaces water and protects the metal.
3. Oil interior parts to protect them. Put a few drops of machine oil on each moving part and operate the sewing machine or serger by hand for several minutes to distribute oil.

If the equipment has been submerged, do not use the motor and controls to operate the equipment until they have been inspected by a dealer or a repair person.

4. If the sewing machine, serger or attachments have already begun to rust, follow preventive measures as above. Then rub rusted parts with very fine steel wool and reapply a coating of oil.
5. If the equipment cannot be serviced within 2 weeks, be sure a light film of oil remains on the parts.
 - Store equipment in a large plastic bag until serviced to protect other surfaces from leaking oil.
 - Place a chemical dehumidifier in the bag with the machine to absorb any residual moisture.
6. If equipment and controls were not submerged, professional servicing may not be necessary. Follow rust prevention measures for metal parts and then operate the equipment with the motor.

If the equipment works properly, remove excess oil from attachments and other removable parts with a soft cloth. To remove excess oil from interior metal parts and thread-handling mechanisms sew/serge through scrap fabrics until no more oil is absorbed into fabric.

Notes:

Cleaning Flood-soiled Pillows and Mattresses

Mattresses

1. A good innerspring mattress should be sent to a commercial renovating company. Renovation is too difficult to do at home. Ask about the cost of the work. It may be less expensive to buy a good reconditioned or new mattress.
2. If a mattress must be used temporarily, scrape off surface dirt and expose mattress to sunlight to dry as much as possible. Cover mattress with a rubber or plastic sheet or mattress cover before using it.
3. If you decide to keep a flood-soiled mattress, it should be sterilized.
 - This must be done at a sterilizing plant such as a mattress company or a state hospital.
 - Ask your local public health department or county Extension agent for information on mattress sterilizing plants in your area.
 - Have mattresses as dry as possible before taking them to a sterilizing plant. Use crop drying fans or household fans to speed up the drying process.

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Notes:

Cleaning Flood-soiled Pillows and Mattresses

(continued)

Feather Pillows

1. For feather pillows, if ticking is in good condition and does not contain red or yellow stains, wash feather and ticking together.
 - Brush off surface dirt.
 - Wash in machine or by hand in warm (not hot) suds 15 to 20 minutes. Use a disinfectant, following product directions for use. If using an automatic washer, wash no more than two pillows at one time.
 - If washing by hand, rinse at least three times in clear warm water.
 - Spin off water or squeeze out as much water as possible. Do not put pillows through a wringer.
 - Dry in an automatic dryer at moderate heat setting. Put several bath towels in the dryer with the pillow to speed up drying. Allow about 2 hours. Or dry pillows in a warm room on a sweater drying rack with a fan on them. Shake and turn pillows occasionally to fluff feathers and hasten drying. Or hang pillows on a clothesline by two corners. Change position end to end and shake occasionally to fluff feathers and speed drying.
2. If ticking is not in good condition or is stained with red or yellow mud, wash feathers and ticking separately.
 - Find or make a bag of light weight, firmly woven fabric such as muslin. The bag should be two to three times larger than the ticking.
 - Open one edge of the ticking.
 - Pin the open edges of the ticking and the bag together. Shake feathers from ticking into bag.
 - Sew seam in bag to close it.
 - Wash and dry the bag of feathers, following directions for washing feathers and ticking together.
 - Wash the ticking, using a disinfectant in the first wash. Follow product directions for use. Repeat washing until stains have been removed. Difficult red and yellow stains may need to be bleached or treated with rust remover. Avoid drying the ticking with heat until all stains have been removed.
 - Transfer clean feathers to clean ticking, using the same method as for emptying the ticking. Sew seam in ticking to close it.
 - Feathers will slide into the ticking more easily if ticking has been starched and ironed.
3. If pillows have been badly soaked with flood water, it may not be possible to remove all objectionable odors.

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Notes:

Cleaning Flood-soiled Pillows and Mattresses

(continued)

| Polyester Fiberfill Pillows | Foam Rubber or Urethane Pillows |
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| <ol style="list-style-type: none"> 1. Brush off surface dirt. 2. Wash in machine on gentle cycle or by hand in warm (not hot) suds, using a disinfectant. Follow product directions for use. If washing by hand, flush water through the pillow by compressing it. Do not wring or twist. Repeat if all stains are not removed. 3. If washing by hand, rinse three times in clear, warm water. 4. Spin off water or press out as much water as possible by hand. 5. Follow directions for drying given for feather pillows. | <ol style="list-style-type: none"> 1. Brush off surface dirt. 2. Follow manufacturer's directions if available. Otherwise, wash in machine on gentle cycle or by hand in warm (not hot) suds, using a disinfectant. Follow product directions for use. If washing by hand, use a bathtub or large sink. Wash by pushing down on the pillow, releasing and pushing down again. Rinse the same way. Do not wring or twist. 3. Rinse well with lukewarm water. 4. Gently squeeze or spin out excess water. Blot with towels. 5. Dry away from heat or sunlight. Pillows may be tumbled in an automatic dryer on "air only" setting. Do not use heat. Or air dry on a flat surface, turning regularly. Pillows may dry very slowly in the air. |

Notes:

Cleaning Flood-soiled Blankets, Quilts, Comforters, Linens

Wash only one blanket, quilt or comforter at a time. Shake and brush to remove surface dirt. Follow manufacturer's laundering directions if available. Otherwise follow the directions below.

Wool Blankets, Quilts and Comforters

1. Soak for 15 to 20 minutes in lukewarm water. Use a bathtub or large sink. Turn two or three times during soak period. Drain off water. Several soak periods maybe needed if the blanket is very soiled.
2. Wash in lukewarm water with mild detergent and disinfectant appropriate for fiber content. Follow product directions for use. Immerse blanket and work suds through gently, using as little agitation as possible. If necessary, repeat washing procedure.
3. Rinse in clear water three or four times.
4. Gently squeeze out water. Hang blanket over two or more clotheslines. Let blanket droop between lines to distribute weight evenly. Or use automatic dryer set on low heat or air only. Remove blanket from dryer while it is still damp and hang over clotheslines to finish drying. Gently stretch blanket into shape as it dries.
5. Brush blanket on both sides to raise nap. Steam press binding, using a synthetic setting. Quilts and comforters do not need brushing or pressing.

Cotton and Synthetic Blankets (Not Electric)

1. Machine wash on gentle cycle in warm (not hot) water with detergent and disinfectant. Follow product directions for use. Repeat if necessary.

Use bleach or rust remover to remove red or yellow stains. Test before use because some bleaches and rust removers may remove or change the colors.

2. Dry in automatic dryer on moderate heat. Add several towels to speed drying. Or air dry on a clothesline.
3. Press binding if needed.

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Notes:

Cleaning Flood-soiled Blankets, Quilts, Comforters, Linens

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| Electric Blankets | Sheets, Towels, Linens |
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| <ol style="list-style-type: none"> 1. Avoid twisting, crimping and wringing the wiring. 2. Machine wash on gentle in warm (not hot) water no more than 5 minutes. Dissolve detergent in wash water before putting blanket in machine. Disinfect, following product directions. Do not use chlorine bleach as the disinfectant. Evenly distribute the blanket in the machine. Use cold rinse. Do not put blanket through a wringer. 3. Machine dry by preheating dryer at a moderate or warm setting. Add the blanket and allow it to tumble for 10 minutes. Remove blanket while still damp and hang over two or more clotheslines to finish drying. Straighten and shape blanket as it dries. 4. If washing by hand, follow directions for wool blankets. Electric mattress pad and foot-warmer pads may be washed like electric blankets. | <ol style="list-style-type: none"> 1. Brush and shake off as much loose dirt as possible. 2. Soak or rinse mud-stained fabric in cool water in washing machine to remove some of the soil. 3. Wash in warm suds and disinfectant several times if necessary. Follow product label directions for use. Do not use hot water or dry with heat until all stains have been removed. 4. If stains remain after several washings, bleach with sodium perborate or chlorine bleach. Rust remover may remove red or yellow stains. Test bleaches and rust removers before use because they may remove or change the colors. |

Notes:

Restoring Electrical Service After a Flood

CAUTION: Wear rubber gloves and rubber soled boots for all work with electrical circuits. Rubber is an insulator and will help protect you from shocks.

After a flood, your electrical system should be thoroughly checked and repaired by an electrician. If such service is unavailable and you need to do your own repairing, proceed as follows:

1. Turn power off.

- Disconnect the main electrical power switch and other switches controlling pumps or outbuildings. If your main switch is located in the basement, be sure all flood water has been pumped out before you attempt any work on the electrical system.
- Stand on a dry board when touching any switches and use a dry stick or wear rubber gloves to pull handles.
- Remove all branch circuit fuses or place circuit breakers in off position to ensure that power is off.
- Disconnect all plug-in equipment and turn off the switch at each piece of permanently connected equipment. Unscrew all light bulbs.

2. Clean and dry the system.

- If flood water covered your first floor, electrical outlets and switches are probably wet. They must be dried before service can be restored.

- Remove the covers from switches, convenience outlets and other electrical connections.
- Pull receptacles, switches and wires about 2 inches out from their boxes. Do not disconnect the wires.
- Clean out mud and dirt with clean water. Allow wires and connections to dry.
- Use extreme caution in cleaning mud and dirt from the main entrance box. Because the power line enters here, this is the most hazardous part of the electrical system to work on. Assume the sewer line is hot even if a test shows power is off. Never hose out a hot switchbox. Wear rubber gloves and rubber soled shoes. Do not touch anything wet or stand in water while working on the box.
- In an emergency, pull the electrical meter from its base to disconnect the power. Notify the electric company that you broke the seal, lock or tag.
- Allow electrical wires and connectors to dry completely. This may take days depending on how wet the system is and if any heat is available.

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Restoring Electrical Service After A Flood

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| <p>3. Check the system for electrical shorts.</p> <ul style="list-style-type: none"> ● While standing on a dry board or ladder and wearing rubber gloves and rubber soled shoes, check the main switch box to be sure all fuses are removed. ● Close the main switch and look for sparks or smoking wires. These indicate shorted switch connections. If you see evidence of such shorts, carefully try to correct the problem. You may need a new switch. ● If the switch is in working order, open the switch and insert a fuse in one branch circuit. ● Close the switch to check for shorts in that branch circuit. ● If the fuse doesn't blow immediately, wait at least 15 minutes to check for slower electrical leaks. Smoking wires and sparks in the circuit also indicate trouble and you should carefully inspect all parts of the branch circuit you are checking. ● If there are any signs of smoking or heating, if the fuse blows, or circuit breaker trips, remove all fuses and open the main switch. You may need to do additional cleaning or drying, or you may possibly need to replace circuit parts. | <ul style="list-style-type: none"> ● Repeat steps for each of the other circuits one at a time. ● After you have checked all the circuits and found them in good condition, once again remove all fuses and open the main switch. Replace wires for electrical receptacles, switches and light outlets in junction boxes. Replace covers. ● Then check each branch circuit again by replacing one fuse at a time and closing the main switch. ● If everything is okay, close the main switch. <p>4. For 24 hours be careful when using receptacles and switches. There may be slow leaks which could cause shocks. Do not plug in electrical appliances that have been flooded until they have been reconditioned.</p> <p>5. If some circuits are faulty, use only the undamaged circuits. Do not overload undamaged circuits with too many lights or appliances until normal capacity is restored.</p> <p>6. Some newer homes may have a ground fault circuit interruption system with their circuit breaker. This will probably need to be replaced.</p> |
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Notes:

Flooded Gardens

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| <p>1. If flood waters have covered a garden, some produce will be unsafe to eat. The safety of unharvested fruits and vegetables will depend on:</p> <ul style="list-style-type: none"> ● Kind of produce ● Maturity of produce at the time of flooding ● Time of year flooding occurred ● Severity of flooding (depth of water and silt) ● Duration of flooding ● Bacterial content of floodwater ● Likelihood of contamination from sewage or other bacterial contaminants <p>2. In general, fruits and vegetables which were immature at the time of flooding should be safe to eat by the time they are ready to harvest. For additional safety, disinfect produce and cook it before eating.</p> <p>3. Unless flooding was light and there is no danger of bacterial contamination from floodwater, do not use fruits and vegetables that were ready for harvest at the time of flooding unless they are disinfected, peeled and thoroughly cooked. Some fruits and vegetables are more susceptible than others to bacterial contamination.</p> <ul style="list-style-type: none"> ● Leafy vegetables such as lettuce, cabbage, mustard, kale, collards, spinach, swiss chard, celery, and fleshy vegetables and berry fruits such as tomatoes, summer squash, strawberries and peppers are highly susceptible to bacterial contamination. ● Silt and other contaminants may be imbedded in the leaves, | <p>petioles, stems or other natural openings of fleshy structures and can be difficult to remove.</p> <ul style="list-style-type: none"> ● Root, bulb and tuber crops such as beets, carrots, radishes, turnips, onions and potatoes are less susceptible to bacterial contamination. Disinfect these vegetables, peel and cook them thoroughly before eating. ● Produce with a protected fruit or impervious outer skin such as peas, melons, eggplant, sweet corn or winter squash should be washed and disinfected before the outer shell skin or husk is removed. Then shell, peel or husk the produce and cook it if possible. <p>4. Thoroughly wash and disinfect any produce before eating.</p> <ul style="list-style-type: none"> ● Wash in a strong detergent solution with a scrub brush. Remove all silt. ● Immerse produce for 15 to 20 minutes in a chlorine solution. Household bleaches contain from 2 to 6 percent chlorine. The amount of bleach to add to water depends on the percentage chlorine it contains: 2 percent—3/4 tablespoon/quart; 4 percent—1 teaspoon/quart; 6 percent—1/2 teaspoon/quart). ● Rinse thoroughly with safe drinking water. ● Peel if possible and cook thoroughly before eating. ● Refer any specific questions to health authorities or your county Extension agent. |
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Notes:

Checking Flood-damaged Buildings

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| <ol style="list-style-type: none"> 1. Use extreme caution when entering any damaged building. 2. If you must enter at night, carry a flashlight or other light. 3. If gas lines are broken, turn off gas at the meter or tank. 4. Do not smoke or use any open flame. 5. Watch for loose plaster and ceilings that could fall. 6. Open as many doors and windows as possible to remove moisture, odors and flammable or toxic gases. If windows are stuck tight, take off window strips and remove entire sash. If doors are stuck, drive out door hinge pins with a screwdriver and hammer, and remove doors. 7. If you are not qualified to judge the stability of a foundation, hire a contractor to make this inspection. A neighborhood might join together in hiring a contractor for this work. 8. Examine foundations and supports for undermining. If walls or foundations have settled or cracked, uncover footings and raise, reinforce or brace any settled sections. Be extremely careful when uncovering footings, because of the possibility of cavernous washouts. 9. If underlying material has been washed away, fill spaces to within 12 inches of the footing with gravel or crushed rock. Fill the remaining space with concrete reinforced with steel rods. | <ol style="list-style-type: none"> 10. Check piers for settling or shifting. 11. If the building has shifted or the floors have settled badly, it may be necessary to install temporary bracing until extensive work can be done. 12. Drain any crawl spaces which contain water. 13. Wash out mud, dirt and debris as soon as possible with a hose and mop, cloth or sponge. Clean walls and floors before silt or mud dries. 14. Start cleaning from the top floor or upper limit of flooding and work downward toward the first floor or basement. 15. Check walls with a level or plumb bob. 16. Brace walls where necessary. 17. Check mudsills, plates, soles and anchorage. Replace or repair where necessary, using redwood, cedar or treated lumber. 18. To speed up drying of flooded studding and insulation, remove all siding strips or plaster from upper and lower parts of the walls. Do not repaint walls until they are completely dry. <ul style="list-style-type: none"> ● This may take several months. Flooded insulation may be ruined. 19. Remove loose plaster. After house is completely dry, repair damaged plaster on walls and ceilings. Badly damaged plaster walls can be resurfaced with gypsum board or plywood. |
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Checking Flood Damaged Buildings

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| <p>20. Flooded wooden floors will dry out slowly. Don't build fires to speed up their drying, as this could cause cracking or splitting from uneven drying. However, if the central heating system is operating, keep the temperature of the house at 60° to 70° F to hasten drying without causing additional problems.</p> <p>21. To prevent further buckling and warping, drive nails where the floor tends to lift or bulge.</p> <p>22. After floors are completely dry, plane or sand them level.</p> <p>23. If floors are too badly damaged to be refinished, lay a new floor over the old, or cover with carpet, vinyl or linoleum.</p> | <p>24. If a concrete floor is badly damaged, break it up and install a new floor.</p> <p style="padding-left: 20px;">If damage is minor, patch with a rich mixture of concrete containing no coarse gravel aggregate.</p> <p>25. Use plastic sheeting or roll roofing for temporary repair on solid deck roofs covered with asphalt shingles, wood shingles or roll roofing.</p> <p>26. Use knife consistency patching compounds to repair minor leaks.</p> <p>27. You probably will have to replace damaged metal roofing on spaced roof decks.</p> |
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Notes:

Cleaning and Repairing Flooded Basements

Before you enter a flooded basement:

1. Turn off the electricity, preferably at the meter.
 2. Check outside cellar walls for possible cave-ins, evidence of structural damage or other hazards.
 3. Turn off gas or fuel service valves.
 4. Open doors and windows or use blowers to force fresh air into the basement.
 5. Do not use an electric pump powered by your own electrical system. Use a gas-powered pump or one connected to an outside line. Fire departments in some communities may help with such services.
 - More damage may be done by pumping water from the basement too soon or too quickly, than from letting the floodwater remain. Water in the basement helps brace the walls against the extra pressure of water-logged soil outside.
 - If water is pumped out too soon, walls may be pushed in or floors pushed up.
 - To help prevent such structural damage, pump the water from the basement in stages. Remove about one-third of the water each day. Watch walls for signs of failing. If the outside water level rises again after the day's pumping, start with a new water line.
- The soil may be very slow to drain, but do not hurry the pumping. Whatever is submerged in the flooded basement will not be damaged further. By delaying the pumping, serious structural damage may be prevented.
6. After water has been pumped from the basement, shovel out the mud and debris while it is still moist. Hose down walls to remove as much silt as possible before it dries. Floors and walls may need sanitizing, particularly if sewage has entered the basement. Scrub walls and floors with one of these sanitizing solutions:
 - Chloride of lime (25 percent available chlorine). Dissolve a 12-ounce can in 2 gallons of water.
 - High test hypochlorate (65 percent available chlorine) Stir 5 ounces into 2 gallons of water.
 7. Oil stains in basements caused by overturned or damaged oil tanks may be a problem following flooding. Commercial products (such as Neutrodal®) will help neutralize fuel oil.
 - Products are available in powder form or an aerosol spray for hard-to-reach places.
 - To remove oil stains and destroy odor, wipe up excess oil, shake or spray product on the spot according to manufacturer's directions, and let it set.

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Cleaning and Repairing Flooded Basements

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| <p>8. Check supporting columns, beams, walls and floors. Structural damage to flooded basements usually includes buckled walls, settled walls or heaved floors.</p> <p>9. Buckled walls are evidenced by horizontal cracking and walls moving out of plumb. When this condition is minor, you need not repair the wall immediately. However, any noticeably buckled wall will eventually collapse from normal ground pressures and seasonal temperature changes.</p> <ul style="list-style-type: none"> ● When buckling has seriously weakened the wall, rebuild the damaged parts immediately. Build pilaster into walls over 15 feet long for reinforcement. Pilaster spacing should be 12 to 15 feet. <p>10. Settled walls and footings are indicated by vertical cracks either in small areas or throughout the structure. Repairs are difficult without special equipment. Contact a reliable contractor for this work.</p> | <p>11. Heaved floors are those that have not returned to their original level, or have cracked badly. You may need to construct a new floor:</p> <ul style="list-style-type: none"> ● Remove old, broken concrete. ● Place 6 inches of gravel fill on the basement floor surface. ● Cover area with a polyethylene vapor barrier. ● Lay a 4-inch concrete floor with water proof expansion joints between the floor and the walls. The floor should be reinforced with steel. ● Welded wire reinforcement placed at mid-height in the slab is minimum reinforcement. <p>12. If a floor is badly cracked, but has returned to its original level, and if there is sufficient headroom, place a new floor over the old one. Add a vapor barrier between the two floors. The new floor should be at least 2 inches thick.</p> <p>13. In houses without basements, the area below the floor may be completely filled with mud. Remove the mud as soon as possible to avoid rotting joists or foundation wood. Jack up the house, if necessary, to make sure all mud is removed.</p> |
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Notes:

| Finding and Repairing Leaks in Roofs | |
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| <p>Causes of Leaks</p> <ul style="list-style-type: none"> ● Defective flashing. Wet spots near a chimney or outside wall may mean the leak is caused by defective flashing, narrow flashing or loose mortar joints. <p>On sloping roof valleys and at junctions of dormers and roof, look for corroded, loose or displaced flashing. Defective flashing often occurs around dormers and plumbing vent pipes.</p> <ul style="list-style-type: none"> ● Clogged downspouts or eaves. Check for choked downspouts on flat roofs. Accumulated water or snow on the roof above the flashing may cause a leak. Ice accumulations on eaves can form ridges that cause melting snow under the eaves to back up. ● Cracks and deterioration. Roofing (especially wood or composition shingles) usually deteriorates first on southern exposures. Check southern slopes for cracking or deterioration. ● Holes. Wet spots on plain roofs usually are caused by missing shingles or holes in the roofing. To find holes, look for light coming through places in unsealed attics. Stick a straw through the hole to mark the spot on the outside. | <p>Repairing Leaks</p> <p>Methods of repair will depend on the kind of roofing and the nature and extent of the leak.</p> <ol style="list-style-type: none"> 1. Replace missing shingles with similar shingles or pieces of rust-resistant metal. (In an emergency you can use metal cut from a tin can.) <ul style="list-style-type: none"> ● Paint the metal on both sides and slip it under the upper layer of shingles. Be careful not to dislodge or loosen sound shingles. ● Cut out old nails with a long thin cold chisel. ● Cover exposed nails with roofer's cement. 2. Patch small holes with metal screws. Use neaprene washers in low places. 3. Repair large holes by replacing metal sheets or patching with a heavy cloth or canvas and elastic roofer's cement. Apply cement carefully over the patch to prevent canvas from sagging into the hole. 4. To repair cracks in the roof: <ul style="list-style-type: none"> ● Place heavy cloth or light canvas over the cracked area, extending the cloth approximately 6 inches beyond the cracked area. ● Use a roofing brush to smooth out cloth, and brush on two thin coats of roof coating. Keep cloth smooth while brushing. |

Notes:

Controlling Rodents After Floods

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| <ol style="list-style-type: none"> 1. Rats and other rodents often move into buildings to escape flood waters. Rats can carry disease and small vermin. They should be eliminated as soon as possible. 2. Because of the danger of rat infestation, use caution when entering flooded buildings. <ul style="list-style-type: none"> ● Carry a solid club and a flashlight. ● Inspect likely hiding places for rats. Check closets, furniture, drawers, mattresses, stacks of clothes or paper, appliances, upholstered furniture, dark corners, attics and basements. ● Be extremely careful when approaching rats. A starving rat can be dangerous. 3. Eliminate rat populations by poisoning rats that can't be destroyed by clubbing or trapping. Use rat control measures as recommended by your county Extension agent. Be extremely careful when using rat poison or bait, especially if there are children in the house. | <ol style="list-style-type: none"> 4. After infestation has been controlled, clean up rat harboring places. (Rats may move into buildings when their hiding places are removed.) Remove trash piles and piles of damaged furniture or equipment. Store materials on platforms or shelves 1 to 18 inches above the ground. 5. Remove food sources. Store food supplies in rat-proof bins or containers. Suspend garbage containers from trees or posts. Remove animal carcasses which may attract rats. Do not leave scraps of food around. 6. Maintain several permanent rat bait stations in strategic locations, even after rat infestation has been controlled. This should eliminate rats that can migrate from neighboring areas, and will help prevent another infestation. Inspect baits frequently and replace them with fresh material whenever necessary. 7. If you are bitten by a rat, take the rat to your local health authorities or a veterinarian. The animal should be checked for rabies. |
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Notes:

Controlling Insects After Floods

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| <p>1. Eliminate breeding spots.</p> <ul style="list-style-type: none"> ● Empty water from barrels, old tires, cans and other vessels. (This water may be polluted by floodwaters and may be a health hazard, in addition to being a breeding place for insects.) Also, check clogged gutters and flat roofs which have poor drainage. Make sure cisterns, cesspools, septic tanks, fire barrels and rain barrels are covered tightly. ● Whenever possible, drain ponds, pools or any standing water in which mosquitoes may breed. ● Dispose of refuse. Bury animal carcasses as soon as possible. Bury or burn garbage at least once every week. Be sure garbage cans have tightly fitting lids. When using manure and garbage as fertilizer, spread it thinly so it will dry quickly and not support fly development. | <ul style="list-style-type: none"> ● Clean up debris. In some climates, scorpions may seek refuge in and around buildings during flood conditions. During the day they hide beneath loose stones, loose bark of fallen trees, boards, piles of lumber, and within walls of buildings. <p>2. Patch screens and other places where mosquitoes may enter buildings. Paint screens with an insecticide solution recommended by your county Extension agent.</p> <p>3. Use a household spray or an aerosol bomb to kill mosquitoes, flies or other insects that get into buildings. Do not apply oil-based sprays to flowers or ornamental plants. Spray shrubbery and shaded areas of buildings to kill adult insects. Contact your county Extension agent for specific recommendations.</p> <p>4. If possible, keep small children indoors, especially in the evening. Persons who must go outside at dusk should use a repellent on exposed parts of the body and clothing.</p> |
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Notes:

Special Considerations for Agricultural Producers

In addition to the precautions and responses covered in the previous pages, the agricultural producer will want to consider the following measures.

Preparing For a Flood or Flash Flood on Your Farm or Ranch

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| <ol style="list-style-type: none"> 1. If you graze livestock in areas subject to flash flooding, consider using the area for larger animals. Pigs and calves are less likely to survive a flood than larger animals. | <ol style="list-style-type: none"> 2. Leave animals an exit route to higher ground when possible. Animals will not always use an exit wisely. 3. If heavy rains are expected, pen animals on high ground at night. |
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Protecting Livestock During a Flood

Livestock that are not in a confined area usually can take care of themselves during floods. Do not let them become trapped in low-lying pens.

In broad, level flood plains where flood waters are seldom deeper than 3 or 4 feet, construct mounds of soil on which livestock can stay until flood waters recede. Or carry bales of hay for hogs to climb on. Try to locate these mounds where they will not be washed away by fast flowing water.

1. Provide feed and water. Water is essential. Thirsty animals will try to break out to get to flood waters. If water is in short supply, limit feed intake.
2. If animals are housed with machinery, fasten bales of straw in front of sharp edges and protruding parts such as cutter bars or crank handles.
 - Do not use hay because animals will eat it.

- Try to cover wooden paddle wheels on combines or choppers because these parts can be dangerous if partially broken.
3. Block off narrow passageways where animals would be unable to turn around. A few heavy animals in a narrow dead end can be dangerous both to themselves and the building.
 4. Be absolutely sure that herbicides, pesticides and treated seeds are not even remotely accessible to livestock and are stored where flood water will not contaminate livestock feed or water.
 5. Turn off electricity at the main switch. Livestock could damage electric fixtures, causing fires or electrocutions.
 6. If there is a possibility that dairy barns may become inundated, drive cattle out of the barn. During a rapid rise of water, cattle often refuse to leave the barn and may drown if the water rises high enough.

Preparing to Evacuate Your Farm

Ensure family safety first. See the *General Family Preparedness* section for more information on evacuation procedures. Be certain you have enough time to get to higher ground before access is cut off. If you have time before you receive an evacuation order, the following precautions may help you protect your farm buildings, livestock and equipment from flood damage:

1. Move machinery, feed, grain, pesticides and herbicides to higher elevations.
2. Construct mounds of soil for livestock, or open gates so livestock can escape high water.

Small numbers of hogs can sometimes be saved by bringing them bales of hay to climb on.
3. Animals swim well. The greatest problem for grazing animals will be fences and other obstacles. Try to drive stock through water free of obstructions.

Long swims through calm water are safer than short swims through a swift current.
4. Leave building doors and windows open at least 2 inches to equalize water pressure and help prevent buildings from shifting.
5. If possible, move motors and portable electric equipment to a dry location.
6. Disconnect electric power to all buildings which may be flooded. Call your utility company if in doubt about how to disconnect power electric.

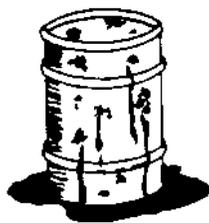
7. Dairymen who anticipate extensive flooding should:
 - Check with a veterinarian to be sure cattle are properly immunized before being exposed to flood waters.
 - Check with the Department of Health concerning approval of temporary milking facilities.
 - Try to obtain standby equipment or services for emergency milk pickup.
 - When possible, move grain out of reach of flood water.
8. Tie down lumber, logs, irrigation pipes, fuel tanks and other loose equipment or material.
9. Prepare immovable power units and machinery for flooding.
 - Seal radiator openings (tighten caps and plug overflow).
 - Remove air cleaners and carburetors; seal openings. Use material strong enough to withstand water pressure.
 - Fill oil reservoirs. Plug breather pipes and openings.
 - Fill bearings with fresh lubricant.
 - Protect open gears, sprockets, pulleys and wearing and cutting edges of machinery with lubricant or rust inhibitor.
 - Drape polyethylene sheeting over bell ends of motor. Tie securely with cord on cylindrical part of motor housing, or fasten with a strong rubber band.

| Safety Rules for Farm Clean-up | |
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| <ol style="list-style-type: none"> 1. Delay permanent repairs until buildings are thoroughly dry. 2. Spread wet feeds to dry. Avoid feeding wet feeds to livestock unless absolutely necessary. 3. To avoid a fire hazard, move wet hay outside and spread it out to dry. 4. Move livestock to unflooded pastures to prevent disease. 5. Get rid of pests such as rodents, snakes and insects. 6. Promptly dispose of animal carcasses. 7. Disassemble, clean, dry and lubricate farm machinery. Do not start motors or engines until they are cleaned and reconditioned. | <ol style="list-style-type: none"> 8. Clear and open drains, ditches, channels, small streams and tile-drain outlets. Drain floodwater, if possible, from fields. 9. Plug breaks in dikes; use temporary structures to stop breaks and prevent further high water. 10. Clear debris, especially barbed wire and other materials which could be dangerous to livestock, from lots and fields. 11. Avoid overexertion and strain in lifting and moving heavy objects or loads. 12. When using kerosene, keep away from heat, sparks and open flame. |

Notes:

Hazardous Materials Accidents

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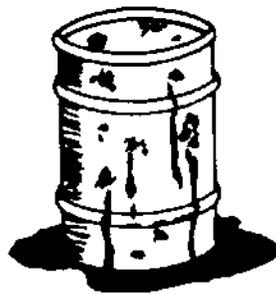


Corrosivity

HAZARDOUS MATERIALS ACCIDENTS

Hazardous materials are substances which, because of their chemical, biological or physical nature, pose a potential risk to life, health or property if they are released. Potential hazards can occur during any stage of use from production and storage to transportation, use or disposal. Production and storage occurs in chemical plants, gas stations, hospitals and many other sites. Hazardous materials accidents can range from a chemical spill on a highway to groundwater contamination by naturally occurring methane gas to a household hazardous materials accident. Radiological accidents involving a specific hazardous material will be covered in another section of this handbook. In addition to the information provided in the following pages, you should also refer to the *General Family Preparedness* section of this handbook.

- Be familiar with the local warning and notification methods.
- Contact your local emergency planning committee to find out where reportable quantities of extremely hazardous materials are stored and used in your area.
- Ask about community response plans if there is a hazardous materials accident at a plant or facility, or a hazardous materials transportation accident.



Preparing for Hazardous Materials Accidents in the Home

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| <ol style="list-style-type: none"> 1. Go on a home hazard hunt. Some cleaners can cause an explosion or fire if they come in contact with each other, water, heat or flames. 2. Make a list of the hazardous products you have in your home. List the name of the product and emergency care information. 3. Store hazardous household products according to safety recommendations. <ul style="list-style-type: none"> ● Store hazardous materials in a safe, dry location. ● Be sure all containers are closed to avoid spills and escaping vapors. ● Store flammable products and corrosive products in separate locations. The label will indicate if the product is corrosive or flammable. ● Place oily polishing rags or waste in covered metal cans. ● Never store aerosols on or near fireplaces, radiators, space heaters, wood stoves, pilot lights, furnaces and kitchen appliances. ● Keep herbicides and pesticides away from any heat source. ● Store herbicides separately from pesticides. Herbicide vapors can contaminate other products. ● Store pesticides and herbicides away from fertilizer. Their vapors can contaminate fertilizers. | <ul style="list-style-type: none"> ● Periodically check hazardous product containers for deterioration and possible leaks. ● Check periodically to be sure that labels on hazardous products are secure and readable. ● Store hazardous products on high shelves or in locked cabinets to prevent poisoning of children and pets. ● Do not store flammable liquids such as gasoline and kerosene in a garage or utility room attached to the house. ● Never store flammable liquids or even a lawn mower filled with gasoline near a heat source such as gas water heaters, furnaces, radiators, space heaters, etc. Spontaneous combustion can occur if the flammable liquid vapors escape. <ol style="list-style-type: none"> 4. To prevent household hazardous materials from being spilled during a disaster such as a flood, fire or earthquake, take the following preventive measures: <ul style="list-style-type: none"> ● Securely fasten shelves where hazardous materials are stored. ● Store incompatible products in separate locations so they will not come in contact with each other. ● Label the shelves where flammable products are stored. ● Store hazardous materials in a metal cabinet to protect them from fire. |
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Preparing for Hazardous Materials Accidents in the Home

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| <ul style="list-style-type: none"> ● Dry off containers that get wet in a flood. Move them off damp shelves until the shelf material has dried thoroughly. ● Check labels on wet containers and reglue or tape them securely before they come off completely. <p>5. Be aware of how different chemicals may react during mixed spills. Some common chemicals and their dangers are:</p> <ul style="list-style-type: none"> ● Kitchen <ul style="list-style-type: none"> • Cleansers (reactive) • Detergents (reactive) • Cooking oil (flammable) • Aerosols (explosive in fire) ● Bathroom <ul style="list-style-type: none"> • Aerosols (explosive in fire) • Alcohol (flammable) • Nail polish remover (flammable) • Medicines (see label) ● Bedrooms <ul style="list-style-type: none"> • Aerosols (explosive in fire) • Gun ammunition (explosive in fire) • Medicines (see label) | <ul style="list-style-type: none"> ● Workshops <ul style="list-style-type: none"> • Paints (toxic) • Paint thinner (toxic, flammable) • Adhesives (toxic, flammable) ● Garage <ul style="list-style-type: none"> • Gasoline (toxic, flammable) • Antifreeze (toxic, flammable) • Brake fluid (toxic, flammable) • Transmission fluid (toxic, flammable) • Oil (flammable) ● Laundry Room <ul style="list-style-type: none"> • Detergents (reactive) • Cleansers (reactive) • Bleach (reactive) ● Gardening <ul style="list-style-type: none"> • Pesticides (toxic, reactive) • Fertilizers (toxic, reactive, most flammable or explosive when mixed with gasoline) ● General <ul style="list-style-type: none"> • Natural gas (flammable, explosive) • Sewer gases from broken sewer pipes (toxic, explosive) |
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Notes:

What to Do If a Hazardous Materials Accident Occurs

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| <p>1. If you witness a hazardous materials accident, spill or leak, call 911, your local emergency number or the fire department as soon as possible.</p> <p>2. Stay away from the incident site to minimize your chances of contamination.</p> <p>3. If you are caught outside during an incident try to stay upstream, uphill and upwind. Hazardous materials can be transported quickly by water and wind.</p> <ul style="list-style-type: none"> ● In general, try to go at least ½ mile (10 city blocks) from the accident area. ● If you are in a vehicle, close off ventilation and close the windows to reduce contamination or inhalation of the hazardous material. <p>4. If you are told to evacuate, do so immediately.</p> <p style="padding-left: 20px;">Before leaving your home or office, close all windows, shut vents and turn off attic fans to minimize contamination.</p> <p>5. In some circumstances, it is safer to keep community residents inside. This is known as "in-place sheltering." If you are instructed to stay inside:</p> <ul style="list-style-type: none"> ● Follow all instructions carefully. ● Seal entry routes as efficiently as possible. Close windows and doors and seal drafty places with wet towels, blankets or duct tape. | <ul style="list-style-type: none"> ● Turn off furnaces, air conditioners, vents and fans to keep fumes from entering the house. ● If dangerous fumes do enter the home, take shallow breaths through a cloth or towel. ● Quickly fill up your bathtub with a supply of uncontaminated water and turn off the intake valve to your home. ● Stay in protected areas of the house (bathroom, stairwell, basement) where toxic vapors are less likely to penetrate. ● Close all fireplace dampers. ● Seal any gaps around window air conditioning units, bathroom and kitchen exhaust fan grilles and stove and dryer vents with tape and plastic sheeting, wax paper or aluminum wrap. ● If local authorities warn of an outdoor explosion, close all drapes, curtains and shades. Stay away from windows to prevent injury from breaking glass. <p>6. Avoid contact with any spilled liquid materials, airborne mist or condensed solid chemical deposit.</p> <p style="padding-left: 20px;">Keep your body fully covered and wear gloves, socks and shoes, even though these measures may offer minimal protection.</p> <p>7. Avoid eating or drinking any food or water that may be contaminated.</p> |
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Notes:

After a Hazardous Materials Incident

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| <ol style="list-style-type: none"> 1. Do not return home until authorities say it is safe. 2. Upon returning home, open windows and vents, and turn on fans to provide ventilation. 3. A person or item that has been exposed to a hazardous material may be contaminated and could contaminate other people or items. If you have come in contact with or been exposed to hazardous materials: <ul style="list-style-type: none"> ● Follow decontamination instructions from your local authorities. ● Stay away from water or showers until you know if the material reacts with water. ● Seek medical treatment for unusual symptoms that may be related to hazardous materials release. | <ul style="list-style-type: none"> ● If medical help is not available immediately and you believe you may be contaminated, remove all of your clothing and shower thoroughly (unless authorities advise otherwise). Change into fresh, loose, warm clothing and seek medical help as soon as possible. ● Place exposed clothing and shoes in tightly sealed container without allowing them to touch other materials and call local authorities to find out about proper disposal. ● Advise others who come in contact with you that you may have been exposed to a toxic substance. <ol style="list-style-type: none"> 4. Report any lingering vapors or other hazards to your local emergency services. 5. Find out from local authorities how to clean up your land and property. |
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Reacting to a Hazardous Spill in Your Home

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| <ol style="list-style-type: none"> 1. If the spill is large and too big for one person to control and clean up, call 911 or your local emergency number as soon as possible. 2. Keep the area of the spill from spreading. Set up barriers and ventilate the area if it is inside the home or garage. Keep children and pets away. 3. Check label for instructions about contact. <ul style="list-style-type: none"> ● Wear rubber gloves and boots. ● Wear long pants and a long sleeved shirt to avoid skin contact. 4. Clean up as soon as possible. <ul style="list-style-type: none"> ● Don't flush the spill away with a hose. ● If dust or powder is spilled, limit air movement in the area and pick up the material in a way that minimizes making the dust or powder airborne. ● If liquid is spilled, cover it with an absorbent material such as kitty litter, paper towels or old rags. | <ul style="list-style-type: none"> ● Sweep or scoop the solids and the original container into a plastic bag, also scoop up any contaminated dirt or gravel. Seal the plastic bag. ● Scrub the area with detergent or water. ● For very toxic liquid substances such as pesticides, cover again with absorbent materials and sweep or scoop up the absorbent into a plastic bag. ● Scrub repeatedly until traces of the chemical are gone. <ol style="list-style-type: none"> 5. Place all cloths in a used plastic bag. Double bag, seal and label. 6. Completely rinse the area and any tools used. 7. Dispose of contaminated materials in an appropriate manner according to directions on the label. 8. If the spill is a very toxic product, decontaminate clothing and equipment to avoid contaminating your home and others. Follow the same decontamination procedures you would for a toxic spill outside the home. |
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Notes:

Special Considerations for Agricultural Producers

In addition to the precautions and responses covered in the previous pages, the agricultural producer will want to consider the following measures. Also refer to the section on *General Family Preparedness*.

Prevent a hazardous materials accident by making sure agricultural chemicals are properly stored. Follow instructions on labels.

What to do if a Hazardous Materials Accident Occurs

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| 1. Follow the same response procedures outlined in the first part of this section. | 3. Do not enter the area or attempt to reach animals if you must pass the area of incident. |
| 2. If livestock are downwind, downhill or downstream of the incident move them as far from the area as possible. | 4. Refer to the <i>Radiological Accidents</i> section for information on protecting food and water sources. |

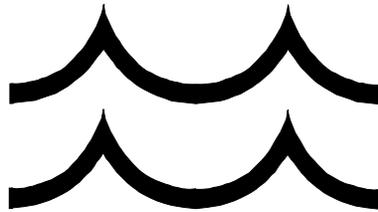
After a Hazardous Materials Accident

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| 1. Monitor animals for signs of illness that may be associated with the accident. | 2. Contact local authorities for information on the cleanup of land and animals. |
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Notes:

Hurricanes

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HURRICANES

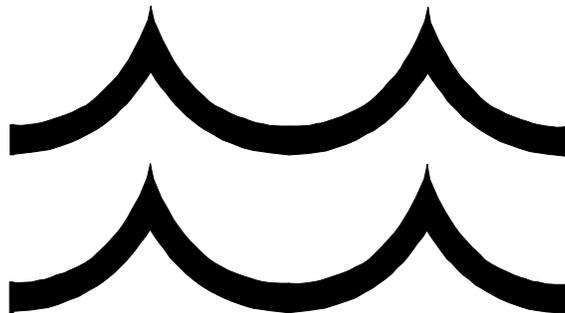
How and Where Hurricanes Form

Counterclockwise winds draw heat and moisture from the tropical ocean, contributing to the formation of an intense and strong tropical cyclone. Hurricane proportions are reached when winds are sustained at 74 miles per hour (mph) or more. This air revolves around a relatively calm 20- to 30-mile-wide eye, spreading outward almost 400 miles. As the storm moves forward at about 15 mph, it releases heavy rains and accelerating winds and causes the ocean to swell. Hurricanes may be preceded by a tornado in the right front quadrant. Losing some intensity as it approaches land, the storm brings severe rains, wind and storm surges that inundate coastal areas. Moving further inland, a hurricane loses strength but continues its outpouring of rain and high winds.

Hurricanes are formed in the North Atlantic, Caribbean Sea, Gulf of Mexico and the Pacific Coast of Mexico. The greatest likelihood of a hurricane striking land areas is along the Gulf Coast and the southeastern seaboard. But hurricanes also have hit central Pennsylvania and the coast of New Jersey, New York and New England.

Over land, hurricanes break up rapidly. Cut off from their oceanic source of energy and with the added effects of frictional drag from land, their circulation rapidly weakens and becomes more disorganized. Torrential rains, however, may continue even after the winds are much diminished. In the southeastern United States, about one-fourth of the annual rainfall comes from dissipating hurricanes.

The Atlantic hurricane season lasts from June through November. August and September are peak months. There is no "season" for Pacific hurricanes. Hurricanes occur north of the equator over the Atlantic and Pacific oceans. Typhoons occur in the South Pacific. Tropical cyclones occur over the Indian Ocean. All of these storms are the same phenomenon.



Why Hurricanes are a Risk to People

Nearly 100 million Americans are at risk from hurricanes. Hurricanes pose three major threats:

1. **Wind:** Hurricane winds exceed 74 mph. The winds of Hurricane Andrew were measured more than 120 mph. Hurricane winds cause buildings to rip apart, uproot unstable structures or objects, damage utility lines and threaten lives. Wind damage can occur hundreds of miles inland. Heavy rains in mountainous areas can cause flash flooding where there is little warning of this major threat to life and property.
2. **Heavy rain:** There are "dry" and "wet" hurricanes. A "dry" hurricane moves quickly over land and may drop a total of 5 inches of rain or less. These hurricanes usually do not pose much of a risk from flooding but usually can cause great wind damage. "Wet" hurricanes can drop more than 9 inches of rain per square mile and are slow moving. They can stall, dropping 18 inches or more of rain in some areas.

3. A **storm surge** is a large dome of water pushed up in advance of a hurricane making landfall. This dome of water can exceed 20 feet, depending on the strength of the hurricane. It's important to differentiate storm surge from a tsunami (incorrectly referred to as a "tidal wave"). A storm surge is a large amount of water, on top of which there is heavy wave action. A storm surge can last for several hours.

The advancing storm surge combines with the normal tide to create the hurricane storm tide. In addition, wind waves 5 to 10 feet high are superimposed on the storm tide. This buildup of water level can cause severe flooding in coastal areas, particularly when the storm surge coincides with normal high tides. In addition to the information you will find in this section also refer to the section on *General Family Preparedness*.

Notes:

How to Prepare for a Hurricane

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| <ol style="list-style-type: none"> 1. Know the risks of the area. If you live in an Atlantic or Gulf Coastal state within 100 miles of the shore, or on Hawaii, Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa or Palau, you are subject to devastating effects from hurricanes. 2. Know what a hurricane "watch" and "warning" mean. <ul style="list-style-type: none"> ● A Hurricane Watch means a hurricane may hit your area. ● A Hurricane Warning means a hurricane is headed for your area. You may be told to move to a shelter or evacuate the area. Do so immediately. | <ol style="list-style-type: none"> 3. Review your family disaster plan. (See the section on <i>General Family Preparedness</i>.) <ul style="list-style-type: none"> ● Check straps and anchors for manufactured homes, sheds and outbuildings. ● Install hurricane shutters or precut ¾-inch marine plywood for each window of your home. Install anchors for the plywood and predrill holes in it so that you can put up the plywood quickly when a WATCH is issued. ● Make trees more wind resistant by strategically removing branches so that wind can blow through them. Remove diseased or damaged limbs. 4. Refer to the <i>General Family Preparedness</i> section for additional precautions you should take. |
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Actions During a Hurricane Situation

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| <p>1. During a watch (24 to 36 hours before landfall):</p> <ul style="list-style-type: none"> ● Cover ALL windows of your home. If shutters are not installed, use precut plywood. If you do not have plywood, do what you can to protect windows from breaking. Tape does not work. Remove tree limbs, branches, shrubbery and other objects that can break windows. ● Recheck manufactured home tie-downs. ● Listen to the advice of local officials and leave if told to do so. ● Take in lawn furniture, outdoor decorations or ornaments, trash cans, hanging plants and anything else that can be picked up by the wind and become a missile of destruction. | <p>2. During a warning (24 hours before landfall):</p> <ul style="list-style-type: none"> ● Evacuate if you are advised to do so. See the <i>General Family Preparedness</i> section for steps that should be taken. Also see the <i>Floods</i> section if heavy rains or flooding are present. ● If you are not advised to evacuate, stay indoors and away from windows. ● Be aware of the calm "eye;" the storm is not over. The worst part of the storm will happen when the eye passes over and wind comes from the opposite direction. Trees, shrubs, buildings and other objects damaged by the first winds can be broken or destroyed by the second winds, whose force is opposite the direction of the first winds. ● Be alert for tornadoes. Tornadoes can happen during and after a hurricane passes over. Remain indoors, in the center of your home, in a closet or bathroom without windows. <i>The section on Tornadoes offers additional information you will need if a tornado occurs.</i> |
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Basic Response After a Hurricane

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| <p>1. Wait until an area is declared safe before entering.</p> <ul style="list-style-type: none"> ● Roads may be closed because they have been damaged or are covered by water. Barricades have been placed for your protection. If you come upon a barricade or a flooded road, go another way. ● Keep listening to the radio for news about what to do, where to go or places to avoid. <p>2. If you <u>must</u> walk or drive in areas that have been affected by the hurricane, stay on firm ground. Moving water only 6 inches deep can sweep you off your feet. Standing water may be electrically charged from underground or downed power lines.</p> | <p>3. Check gas, water and electrical lines and appliances for damage.</p> <ul style="list-style-type: none"> ● Use a flashlight to inspect for damage. ● If necessary, turn off main gas valves and electrical switches or fuses. Have these services restored by a professional. <p>4. Use the telephone to report life-threatening emergencies only.</p> <p>5. If you need assistance, visit your local Red Cross service center or chapter facility. State and federal agencies often provide assistance to individuals, families and businesses after larger storms. Listen to the radio for information on how to obtain governmental assistance.</p> <p>6. Hurricanes bring a variety of associated problems. Refer to the <i>Floods</i>, <i>Tornadoes</i> and <i>General Family Preparedness</i> sections for information on various hazard responses.</p> |
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Notes:

Special Considerations for Agricultural Producers

In addition to the precautions and responses covered in the previous pages, the agricultural producer will want to consider the following measures.

Turf Grass Recovery After a Storm Surge

The surge of salt water brought inland by a hurricane can damage turfgrasses on lawns, golf courses, sod farms, parks, playgrounds, sports fields and leisure-recreation sites.

1. Irrigation with clean, sodium-free, fresh water is probably the most important practice to follow when rinsing accumulated salts from turf leaf surfaces and leaching salts from root zones of soils.
 - Test all irrigation water sources for salinity.
 - If the irrigation lake has been flooded with salt water, pump it out and fill with clean river or well water.
 - You also can irrigate from a well or river if not contaminated with salt.
2. Bermuda, zoysia, creeping bent and St. Augustine turfgrasses have good relative salinity tolerance.
 - Tall fescue and perennial ryegrass have medium salinity tolerance.
 - Red fescue, Kentucky bluegrass, and centipede grass have poor relative salinity tolerance.
3. Repeated irrigation with water containing 1200 parts per million (ppm) total soluble salts will be harmful to the turf unless followed by sufficient rainfall or fresh irrigation water. Even irrigation water containing 500 to 600 ppm total soluble salts, when used repeatedly without being flushed with fresh water from rainfall or irrigation, can create a problem by allowing salts to accumulate in the root zone of the soil.
4. If it is overseeding time, remember that turf-type perennial ryegrasses have only medium tolerance to salinity. Test the soils for salinity before overseeding to avoid a loss in stand of winter cover.
5. Use gypsum (calcium sulfate, 18 percent sulfur, 20 percent calcium) to help leach salt from the soil. Gypsum works best when incorporated into the soil but it can be broadcast on the turf. Gypsum is not very soluble in water but it is more soluble than limestone.
 - Irrigate after gypsum application to move it into the soil surface and root zone of the turf. Allow a period of time for the chemical reaction, then continue irrigation to leach the salts into soil below the root zone.

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Turf Grass Recovery After A Storm Surge*(continued)*

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| <ul style="list-style-type: none">● Poorly drained soils will be difficult to leach. Water logging the soil for extended periods of time can be as harmful to the turf as excess soluble salts. | <ul style="list-style-type: none">● Core aeration or deep tine aeration, preferably with coring tines, can greatly assist with improving infiltration and percolation of water and salts through the soil and below the root zone. |
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Notes:

Recovering Small Fruits

Storm damage to small fruits shows itself in different ways, depending on crop growth habit as well as proximity to the storm. In addition to wind, too much water, in some instances salt water, can adversely impact crops.

The following suggestions will help fruit growers evaluate damage and take corrective action.

1. Where wind damage is significant, pruning should be as light as possible. However, if large areas of cambium are exposed, the plant probably will not survive without attention. Make clean cuts to minimize the exposed cambium area. If the plant can be saved, several growing seasons may be needed to retrain.
2. Many plants that are leaning or uprooted can be reset if the root ball is intact. Once reset, secure with stakes to immobilize them.
3. Reshape altered dikes, terraces or raised planting beds to protect the area, cover exposed roots or provide a medium for new root growth. Use the smallest equipment possible to accomplish the job to minimize compaction and reduce further root damage.
4. If strawberry plants can be secured in the next 10 days, most plastic- culture plantings should be replanted. The most expensive inputs, irrigation, plastic mulch and fumigation, are still intact, while plant costs are relatively small compared to these.
5. Premature defoliation caused by tremendous wind speeds will weaken fruits. Defoliation coupled with root damage cause additional stress because the root system serves as a storage reservoir for carbohydrates manufactured by the leaves.
 - Without this reservoir of carbohydrates to call on for energy during the winter, the plants may be saved in the short run only to be killed during the winter.
 - Once the top damage has been pruned out and after the first freeze, apply nitrogen in a complete fertilizer at the rate of 30 pounds actual N per acre. This will help the plant start new root growth, which will continue during the winter as long as the soil temperature is above 45°F.
6. Soil concentrations of 3,000 ppm soluble salt will make fruit culture very difficult. However, some fruits are much more salt tolerant than others.
 - Grapes, figs, pomegranates and pecans are examples of fruits that will not be hurt by increased salt concentrations as readily as blueberries, strawberries and blackberries.
 - If the soil salt concentration is high, irrigate frequently to help reduce the buildup of salt following evaporation.

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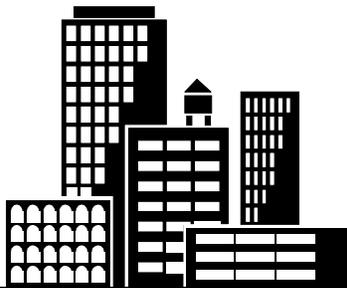
Recovering Small Fruits*(continued)*

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| <ul style="list-style-type: none">● Test all irrigation water for salinity. If irrigation ponds have been contaminated, pump them out and fill with clean river or well water.● Rainfall, while complicating other cleanup activities, aids in flushing the soil. | <ul style="list-style-type: none">● If the sodium content is 250 ppm or more, internal drainage problems will occur. This can be corrected somewhat by the use of gypsum as a soil additive. Apply at the rate of 2 ounces (2$\frac{3}{4}$ tons per acre) of gypsum per square foot of area and immediately irrigate to move the material into the soil profile. |
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Notes:

Radiological Accidents

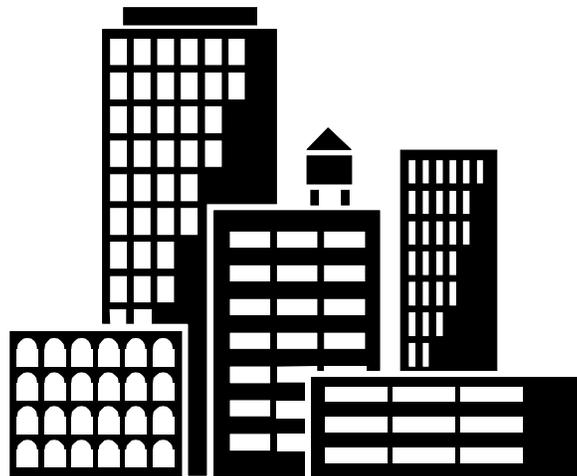
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RADIOLOGICAL ACCIDENTS

Radiation is energy in the form of waves or particles and is part of our everyday lives. Our planet receives radiation from outer space and from the sun. Other naturally occurring radioactive materials are present in the soil, in the structures where we live, and in the food and water we consume. These natural forms of radiation are referred to as "background radiation."

Radioactive materials also are a source of fuel for nuclear power plants. While the history of such plants in the United States has been generally safe, residents living near power plants should know what preparations and responses are appropriate to take in the event of a radiological accident. In addition to the information in this section, also refer to the *General Family Preparedness* section.



Radiation Types

The three basic forms of radiation are:

1. **Alpha particles** can be stopped by a single sheet of paper or a few layers of dead skin. Therefore, alpha radiation is not an external hazard. However, if the source of radiation is within the body, it is the most serious hazard, because of alpha radiation's greater biological effects on live tissue.
2. **Beta particles** can be stopped by a few layers of clothing, 10 feet of air or a half-inch of tissue. If beta particles are retained in the skin, they can damage living cells by causing severe skin or eye burns. They also can damage cells in the digestive tract if particles are ingested with food or water.

3. **Gamma rays** are similar to x-rays and are the major radiation of concern in radiological environments. Gamma rays are deeply penetrating and can damage body cells. Although all cells are subject to damage, bone marrow cells and cells in the intestinal lining seem to be particularly sensitive. Gamma rays can be shielded to acceptable levels by sufficient amounts of materials.

Radioactive materials can be released in the form of particles or gases. Both are spread by the wind. The farther the particles travel, the lower the concentration of radioactive material. Contamination is an undesired presence of radioactive materials. In an accident that releases radiation into the environment, people, farm equipment, animals, crops and the soil can become contaminated. In addition to the following procedures, homeowners and agricultural producers also should refer to the section on *General Family Preparedness*.

Notes:

Preparing for a Nuclear Power Plant Accident

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| <p>1. If you live near a power plant, familiarize yourself with the terms used to describe a nuclear emergency.</p> <ul style="list-style-type: none"> ● Notification of unusual event means a small problem has occurred at the plant. No radiation leak is expected. No action is necessary on your part. ● Alert means a small problem has occurred and small amounts of radiation could leak inside the plant. You should not have to do anything. ● A site area emergency is a more serious problem. Small amounts of radiation could leak from the plant. Area sirens may be sounded. Listen to your radio or television for safety information. | <ul style="list-style-type: none"> ● A general emergency is the most serious problem. Radiation could leak outside the plant and off the plant site. The sirens will sound. Tune to your local radio or television station. Be prepared to follow state and county officials instructions. <p>2. Learn your community's warning system. Nuclear power plants are required to install sirens and other warning systems to cover a ten-mile area around the plant.</p> <p>3. Obtain public emergency information materials from the company that operates your local nuclear power plant or from your local emergency services office.</p> |
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Notes:

What to Do in a Nuclear Power Plant Emergency

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| <ol style="list-style-type: none"> 1. Keep calm. Not all incidents result in the release of radiation. 2. Stay tuned to local radio or television. Specific instructions will be given by authorities. <i>Local instructions should take precedence over any advice given in this handbook.</i> 3. Evacuate if you are advised to do so. See the section on Evacuation Procedures in the <i>General Family Preparedness</i> section. Keep car windows and vents closed; use recirculated air. 4. If you are not advised to evacuate, remain indoors. <ul style="list-style-type: none"> ● Close doors and windows. ● Turn off the air conditioner, ventilation fans, furnace and other air intakes. ● Go to a basement or other underground area if possible. | <ul style="list-style-type: none"> ● If you must go outdoors, cover your nose and mouth with a handkerchief. <ol style="list-style-type: none"> 5. Do not use the telephone unless absolutely necessary. All lines will be needed for emergency calls. 6. If you have just been outdoors, take a thorough shower. <ul style="list-style-type: none"> ● Change your clothes and shoes. ● Put the items you were wearing in a plastic bag. ● Seal the bag and store it out of the way. ● Clothes can later be washed as you normally would in the washing machine. Any contamination would remain in the water and not contaminate the washing machine. 7. Put food in covered containers or in the refrigerator. Food not previously in covered containers should be washed first. |
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Notes:

Safety of Home Gardens After a Nuclear Accident

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| <ol style="list-style-type: none"> 1. Test homegrown produce for radioactive contamination before it is consumed. 2. If you work outside make sure you: <ul style="list-style-type: none"> ● Wash hands thoroughly before eating. ● Wear protective clothing that covers all portions of your body while outside. | <ul style="list-style-type: none"> ● Remove outer clothing before you go inside. ● Wear a dust mask or a folded, damp cloth over your nose and mouth while you work. ● Avoid dust-producing activities as much as possible. |
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Recovering Losses and Expenses from a Nuclear Accident

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| <ol style="list-style-type: none"> 1. Nuclear power station operators are required to have insurance to cover damages suffered by the public. Additional living expenses, loss of farm or business income, and physical or property damage are covered. | <ol style="list-style-type: none"> 2. The Federal Emergency Management Agency also may provide funds for temporary housing and home repair, as well as other types of assistance. See the section on <i>General Family Preparedness</i> for post-disaster assistance information. |
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Notes:

Special Considerations for Agricultural Producers

In addition to the precautions and responses covered in the previous pages, the agricultural producer will want to consider the following measures.

What to Do in a Nuclear Power Plant Emergency

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| <ol style="list-style-type: none"> 1. Shelter livestock and give them stored feed if advised to do so by authorities. <ul style="list-style-type: none"> ● Some farm buildings provide better protection than others because of heavy construction. Placing earth, hay, sacked feed or fertilizer, concrete blocks or other materials around exposed shelter walls will increase shielding effectiveness. ● Make sure that adequate ventilation is provided. If you must use a fan, set it on a low speed to avoid bringing in air from the outside. ● Give adequate space to more valuable animals rather than providing shelter for all animals and risking losses from overcrowding. ● Natural shelters such as caves, ravines, forests and wood lots offer some protection. ● Cattle could be penned in cattle underpasses or bridges if available. Cattle confined in pens shelter each other to a limited extent. | <ul style="list-style-type: none"> ● Move dairy cattle and goats indoors first because radioactive material easily transfers to milk. <ol style="list-style-type: none"> 2. Do not add water to covered storage unless it is from a protected source. 3. Protect standing water by covering the surface at the outset of an emergency. 4. Cover feed to protect it from falling particles. Protect haystacks in an open field with tarpaulins, plastic sheets or similar coverings. 5. Poultry are somewhat more resistant to radiation than other farm animals. <ul style="list-style-type: none"> ● Confined shelters and use of stored feed also lower concern of contamination. ● The same feed, water and shelter ventilation measures taken for livestock should be followed to reduce the likelihood of contaminated egg and poultry products. 6. Swine care should follow the steps taken with other livestock. Water is a primary necessity for hogs, so make sure the source is protected. |
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Notes:

Animal Care After a Nuclear Accident

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| <p>1. Limit the use of feeds to those under cover or protected from contamination.</p> <ul style="list-style-type: none"> ● Grain in permanent indoor storage, hay in a barn and silage in a covered silo may be considered protected. ● Rolled bales of hay should be used only when absolutely necessary, and only if the outer layers are removed and discarded. ● Do not let animals graze until you are notified that forage in your area is safe. ● If grazing cannot be avoided, supplementing it with protected feed will limit ingested contamination. ● If no stored feed is available, animals can survive on water for a period. ● Make a special effort to prevent dairy animals from becoming contaminated by providing clean food and water. ● If possible, prevent cattle from drinking from ponds, lakes, rivers and streams. Spring and well water should be free of contamination. | <p>2. If you have been evacuated and your absence is longer than the protected feed sources will last, emergency officials may allow you to reenter the area.</p> <p style="padding-left: 20px;">You must conform to rules regarding emergency workers, including the use of protective equipment and instrumentation and limitation of stay.</p> <p>3. It is unlikely that even a worst case event would cause the death of any animals.</p> <ul style="list-style-type: none"> ● Any unexplained illness or death would more likely be the result of changes in routines of livestock feeding and patterns of grazing. ● In the event of death or illness of an animal contact your State Department of Agriculture or Extension agent immediately to assist in diagnosis of the problem. <p>4. Soap and water will remove contamination from animal hides.</p> <p>5. Wear protective clothing similar to that used in pesticide application.</p> |
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Notes:

Recovering Exposed Fruits, Vegetables and Soils

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| <p>1. Fruit and vegetables may be externally contaminated by radioactive particles.</p> <ul style="list-style-type: none">● Normal washing of leaves, pods and fruits that are surface contaminated is effective in removing contamination.● Washing should be done in a place other than the kitchen to prevent contamination of foods and dishes. <p>2. Underground crops absorb little radiation. Standard washing is sufficient for these foods.</p> | <p>3. Most land should be ready for normal agricultural use several weeks after the incident.</p> <ul style="list-style-type: none">● Officials can monitor and sample your land, advising you when it is appropriate to return to it.● If soil is highly contaminated, removal and disposal may be necessary.● Planting alternative crops such as cotton or flax instead of food crops may be recommended in some situations.● Deep plowing will remove radioactive substances below the plant root level and prevent plants from taking up contaminated substances. |
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Notes:

| Monitoring Fish and Marine Life | |
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| <p>1. Fish and marine life in ponds may be harvested unless officials determine they are contaminated.</p> | <p>2. Samples of water, fish and marine life from open bodies of fresh and saltwater should be analyzed for contamination.</p> |

| Marketing Animals and Products | |
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| <p>1. A buffer zone, called a Food Control Area, will be established around land which may be contaminated.</p> <p>2. State emergency officials will monitor milk on farms and at points on its way to market.</p> <ul style="list-style-type: none"> ● You will be notified if sampled milk contains radioactive materials. ● Milk should be safe if it is from dairy animals that have been adequately sheltered and protected. | <ul style="list-style-type: none"> ● There may be delays in milk pickups which will require holding milk for longer periods of time. Be prepared to provide alternate storage or some milk may have to be discarded. <p>3. Do not destroy animal foods unless storage has made them inedible.</p> <p>4. Livestock that have been exposed to external contamination can be used for food if they have been washed well and monitored by authorities prior to slaughter. Meat animals that have internal contamination cannot be slaughtered until officials advise that it is safe to do so.</p> |

Notes:

Tornadoes

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TORNADOES

Tornadoes are nature's most violent storms and can leave an area devastated in seconds. A tornado appears as a rotating, funnel shaped cloud, striking the ground with whirling winds of up to 200 miles per hour or more. A tornado spins like a top and may sound like a train or an airplane.

Although tornadoes usually travel for up to 10 miles before they subside, 200-mile "tornado tracks" have been reported. Tornadoes can strike any time of the year and often accompany hurricanes. In addition to those measures listed in the *General Family Preparedness* section, also use the following tornado preparedness and response measures.

How to Prepare for a Tornado

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| <ol style="list-style-type: none">1. Know the tornado season for your area.2. Learn to recognize severe weather signs. Tornado weather is usually hot and humid with southerly winds.3. Know what a tornado looks and sounds like. | <ol style="list-style-type: none">4. Know what a tornado watch or warning is:<ul style="list-style-type: none">● A Tornado Watch indicates that weather conditions may cause tornadoes or severe thunderstorms to develop in or near the watch area. A watch does not mean a tornado has been sighted.● A Tornado Warning means that a tornado has actually been sighted or indicated by radar and residents should take shelter. |
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Notes:

Special Precautions for Mobile Home Dwellers

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| <p>1. When you purchase a mobile home, look for built-in safety features:</p> <ul style="list-style-type: none"> ● Factory installed anchoring straps under the skin of the mobile home ● Steel binding of the mobile home top to the frame ● Covered bottom <p>2. When selecting a mobile home park, consider the protection it offers your home against the wind.</p> <ul style="list-style-type: none"> ● Consider lots with solid concrete foundations with steel anchor locations. ● Natural barriers such as older trees or small hills will help shelter your home. ● Locate your home so the small end is directed into the direction of prevailing winds, reducing surface exposure to wind impact. | <p>3. Encourage your neighbors to tie down, too. An unanchored mobile home blown into your home can cause extensive damage.</p> <p>4. Have your mobile home blocked properly. Open concrete blocks are less expensive but are never good enough.</p> <p>5. Make sure you purchase approved tie-downs.</p> <p>6. Skirting your mobile home will help protect underneath the home from moisture and winter weather, as well as reduce soil heaving caused by soil thawing and freezing during winter months. Soil heaving destabilizes the mobile home, requiring retightening of the tie-downs.</p> <p>7. Be aware of where designated tornado facilities or shelters are.</p> |
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Notes:

What to Do During a Tornado Warning

1. When a tornado has been sighted, stay away from windows, doors and outside walls. Protect your head from falling objects or flying debris. Take cover wherever you are.
 - In a house or small building, go to the storm cellar or basement. If there is no basement, go to an interior part of the structure on the lowest level (closets, interior hallways). In either case, get under something sturdy (such as a heavy table) and stay there until the danger has passed.
 - In a school, nursing home, hospital, factory or shopping center, go to a designated shelter area. Stay away from windows and open spaces.
 - In a vehicle, trailer or mobile home, get out immediately and go to a more substantial structure.
 - If there is no shelter nearby, lie flat in the nearest ditch, ravine or culvert with your hands shielding your head.
2. Do not attempt to flee from a tornado in a car or other vehicle.

Notes:

Responses After a Tornado

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| <p>1. Use great caution when entering a building damaged by high winds. Be sure that walls, ceiling and roof are in place and that the structure rests firmly on the foundation.</p> | <p>2. Look out for broken glass and downed power lines.</p> |
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Inspecting Buildings for Hidden Wind Damage

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| <p>1. Check the roof for:</p> <ul style="list-style-type: none"> ● Missing or damaged shingles. ● Loose nails on metal roofing. If nails don't hold when hammered back in, use #12 or #14 metal screws to fill old nail holes. ● Potential leaks that could indicate structural separation. This is more easily checked for on sunny days. | <p>2. Inspect the foundation to make sure that joints where the foundation and wall meet haven't separated. On stone or concrete foundations, check to see that plate bolts have not worked loose.</p> <p>3. Inspect the interior of buildings for structural damage.</p> <ul style="list-style-type: none"> ● Using a good light, check the framing. ● Look for ridge separation, loose knee braces and loose rafters where the rafters join the walls. |
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Notes:

Special Considerations for Agricultural Producers

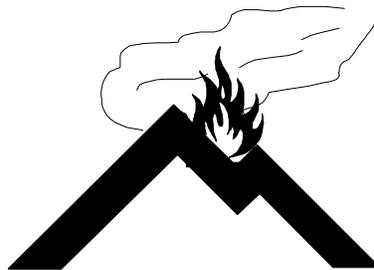
In addition to those tornado concerns listed previously, agricultural producers should inspect silos for hidden wind damage.

- Make sure the silo is still plumb.
- Look for loose hoops.
- Inspect the base of metal silos inside and out for hairline cracks.
- Remove any rust around the base with a wire brush.
- Look for new cracks in the plaster of empty concrete stave silos.

Notes:

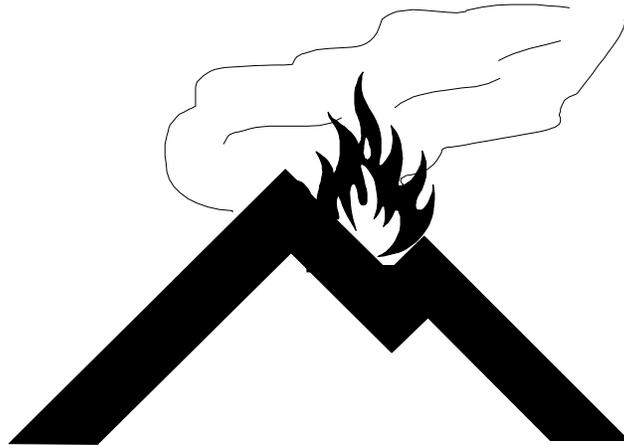
Volcanic Eruptions

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VOLCANIC ERUPTIONS

Volcanoes are eruptions from the earth's interior which can cause violent explosions of gases and rock. Eruptions can cause lava flows, mudslides, avalanches, falling ash and floods. Active volcanoes in the U.S. are found mainly in Hawaii, Alaska and the Pacific Northwest. Fresh volcanic ash, made of pulverized rock, can be harsh, acid, gritty, glassy and smelly. While not immediately dangerous to most adults, the combination of acidic gas and ash which may be present within miles of the eruption can cause lung damage to small infants, very old people or those suffering from severe respiratory illnesses.



Preparing for a Volcanic Eruption

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| <ol style="list-style-type: none"> 1. Follow the information located in the <i>General Family Preparedness</i> section of the Handbook. 2. Be familiar with terms associated with a volcanic eruption. <ul style="list-style-type: none"> ● Volcanic ash usually is erupted into the air above the volcano and then is carried downward along with volcanic gases. Pieces of ash may range from dust sized particles to pieces of rock. Ash can overload roofs, corrode metals, cause fabrics to decompose, clog machinery, block drains and water intakes and injure or kill vegetation. ● Lava flows are streams of molten rock from a vent or from a lava fountain. ● Volcanic gases associated with active volcanoes are water vapor, carbon dioxide, hydrogen sulfide, hydrogen, helium, carbon monoxide and hydrochloric acid. People with respiratory problems and heart disease are especially susceptible to volcanic gases. | <p>Gases rarely reach populated areas in lethal concentrations, although sulfur dioxide can react with the atmosphere downwind and fall as acid rain.</p> <ul style="list-style-type: none"> ● Pyroclastic flows and surges are mixtures of hot rock fragments that sweep away from their source at hurricane velocity. Because of their high speed and temperature, pyroclastic flows and surges kill or destroy virtually everything in their path. ● Volcanic landslides are not always associated with eruptions; heavy rainfall or a large earthquake can trigger landslides on steep volcanic slopes. <ol style="list-style-type: none"> 2. Check with your local emergency management agency to locate hazard maps of your area. Areas that could be endangered by volcanic ash, pyroclastic flows, lava flows and mudflows are identified in these maps. |
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Notes:

During a Volcanic Eruption

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| <ol style="list-style-type: none"> 1. Do not visit the volcano site; you could be killed by a sudden explosion. 2. If ash is being expelled, avoid areas downwind from the volcano. A building offers good shelter from volcanic ash but not from lava flows and rock debris. 3. Be aware of flying rocks and mudflows. The danger from a mudflow increases as you approach a stream channel and decreases as you move away and toward higher ground. <ul style="list-style-type: none"> ● Mudflows can move faster than you can walk or run. ● Look upstream before crossing a bridge, and do not cross if the mudflow is approaching. | <ol style="list-style-type: none"> 4. If ash is falling, stay indoors until the ash has settled. 5. During an ashfall, close doors, windows and all ventilation in the house. 6. Remove ash from flat or low pitched roofs and rain gutters to prevent thick accumulation. 7. Avoid driving in heavy dust conditions unless absolutely required. If you must drive in dense dust, keep speed down to 35 mph or slower. |
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Notes:

Driving in Heavy Ash Areas

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| <ol style="list-style-type: none"> 1. Avoid driving in heavy dust conditions unless absolutely required. The more dense the dust, the more urgent the requirement should be for driving. 2. When required to drive in dense dust, keep the speed down to 35 mph or lower. <ul style="list-style-type: none"> ● Do not follow too close to cars in front of you. ● Use headlights on low beam. 3. Change oil often. In very dense dust, change at 50- to 100-mile intervals. <ul style="list-style-type: none"> ● In light dust conditions, change oil at 500- to 1000-mile intervals. ● Lubricate all chassis components at each oil change. 4. Clean air filter by backflushing filter paper with compressed air (30 psi). <ul style="list-style-type: none"> ● CAUTION! Blow element from inside (clean side) to outside (dirty side). DO NOT strike filter against anything. ● If you are unsure, have a qualified mechanic perform the air filter service. 5. Cover passenger compartment vent inlet (located at base of windshield and usually under hood) with thick, loosely woven, felt-type material to filter air into vehicle. | <ul style="list-style-type: none"> ● With vent filter in place, keep heater blower on high. The blower will slightly pressurize the inside of the vehicle and keep dust from entering through body gaps or holes. ● If a vent filter is not installed, keep air conditioner and heater blowers off. <ol style="list-style-type: none"> 6. Have a service garage clean wheel brake assemblies every 50 to 100 miles for very severe road condition, or every 200 to 500 miles for heavy dust conditions. 7. Have a service garage clean alternator winding with compressed air after heavy dust accumulation or every 500 to 1,000 miles of severe dust exposure. 8. Wash the engine compartment with a garden hose or steam cleaner. Be sure to seal off air intakes and electrical components before cleaning. 9. Commercial truck filters can be installed to increase the filtering capacity of the air cleaner. However, this is expensive and should be attempted only by trained garage mechanics or experienced personnel. This would be beneficial for vehicles operating continuously in extreme dust conditions. |
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Notes:

Winter Storms

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WINTER STORMS

Winter storms can strike any area. Even areas that normally experience mild winters can be hit with a major snowstorm or extreme cold. The results can be isolation from power outages, blocked roads and cars trying to maneuver ice-covered highways. Everyone needs to be prepared to protect themselves from the hazards of winter weather-blizzards, heavy snow, freezing rain and sleet.



Preparing for Winter Storms

1. Being familiar with terminology used by the Weather Service will help you know what to expect when weather warnings are issued. The following terms are used frequently in winter weather releases:
 - **Freezing rain** occurs when temperatures are below 32°F and rain freezes on impact. This causes an ice coating on all exposed surfaces. If the coating is heavy, falling trees or wires can be additional hazards.
 - Freezing rain or drizzle is called an **ice storm** when a substantial glaze layer accumulates. In some parts of the country, ice storms are called "silver thaws" or "silver frosts."
 - **Sleet** is frozen rain drops (ice pellets) which bounce on surface impact. Sleet does not stick to objects, but sufficient accumulation can cause dangerous driving conditions.
 - **Travelers' advisory** means that falling snow and/or drifting snow, strong winds, freezing rain or drizzle will make driving hazardous.
 - **Heavy snow warnings** are issued when 4 or more inches are expected during a 12-hour period, or when 6 inches or more are expected during a 24-hour period.
 - **Blowing and drifting snow** result from strong winds. Blowing, falling snow or loose snow on the ground can produce sizeable drifts.
- | <u>Temp.</u> | <u>Wind</u> | | |
|--------------|---------------|---------------|---------------|
| | <u>15 mph</u> | <u>30 mph</u> | <u>40 mph</u> |
| 30°F | 11°F | - 2°F | -4°F |
| 20°F | - 5°F | - 18°F | - 22°F |
| 10°F | - 18°F | - 33°F | - 36°F |
| 0°F | - 33°F | - 49°F | - 54°F |
| -10°F | - 45°F | - 63°F | - 69°F |
| -20°F | - 60°F | - 78°F | - 87°F |
| -30°F | - 70°F | - 94°F | -101°F |
| -40°F | - 85°F | -109°F | -116°F |
2. Pay attention to weather forecasts and other winter weather releases on radio and television.
 3. Check battery powered equipment, emergency cooking facilities and flashlights so you won't be without heat or light during a storm.
 4. Check your supply of heating fuel. Fuel carriers may not be able to deliver during heavy snow.

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Preparing for Winter Storms

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| <p>5. Stock extra food. Include food that needs no cooking in case of power failure.</p> <p>6. If power is out, keep your refrigerator and freezer doors closed as much as possible.</p> <p>7. Prevent fires by not overheating your stove, heater or furnace. Don't leave fireplaces unattended.</p> <p>8. Stay indoors during cold snaps and storms unless you are in top physical condition. If you must go out, don't overexert.</p> <ul style="list-style-type: none"> ● Be particularly careful when shoveling snow. ● Heart attack is a common cause of death during and after winter storms. Remember that cold winds and temperatures put extra stress on your body—even if you are in good condition. <p>9. Wear several layers of loose-fitting, lightweight, warm clothing. Layers of clothing trap warm air close to your body.</p> <ul style="list-style-type: none"> ● You can remove clothing to prevent perspiring and subsequent chill. Outer clothes should be tightly woven, water repellent and hooded if possible. ● Cover your mouth to protect your lungs from extreme cold. | <p>10. Get your car winterized before the cold season.</p> <ul style="list-style-type: none"> ● Use snow tires or chains. ● Keep the fuel tank filled to prevent water from getting into the fuel and causing the engine to stall. <p>11. If you must travel when bad weather is forecast, be sure someone knows where you are going and the time you expect to arrive. Travel with someone else if at all possible.</p> <p>12. Blizzards may require long periods of isolation. If you need outside help during this time, you should know the following emergency distress signals to signal aircraft:</p> <p style="margin-left: 20px;">Need doctor I</p> <p style="margin-left: 20px;">Need medical supplies II</p> <p style="margin-left: 20px;">Need food and water F</p> <p style="margin-left: 20px;">Need fuel L</p> <p style="margin-left: 20px;">International distress signal SOS</p> <ul style="list-style-type: none"> ● Make these signals on the ground where they will be clearly visible from the air. The letters should be at least 10 feet tall. ● Use black cloth or plastic, hay, boards or other material readily visible on the white snow. If no materials are available, tramp the letters into the snow, deep enough to create as much shadow as possible. |
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Notes:

Special Considerations for Travelers

When traveling any distance by car during the winter, observe these safety precautions:

1. Before you leave, have your car checked. A thorough winterizing check should include:
 - Ignition system
 - Battery
 - Lights
 - Snow tires installed
 - Cooling system
 - Fuel system
 - Exhaust system
 - Heater
 - Brakes
 - Wiper blades
 - Defroster
 - Tire chains and tow chains
 - Antifreeze
 - Winter-grade oil
2. Select alternate routes before you leave, in case your preferred route isn't passable.
3. Listen to the radio as you travel and heed latest weather information.
4. Seek shelter immediately if the storm seems severe.
5. Try not to travel alone during a storm. Two or three people are better than one because they can help each other. Travel with another car if possible.
6. Make sure someone knows where you are going, when you leave, the time you expect to arrive and your expected route.
7. Always fill your gas tank before entering open country, even for short distances. You will be less likely to be stranded from running out of gas. In case you are stranded by the storm, you will have enough fuel to run the motor and heat the car.
8. Drive defensively.
9. Carry a winter storm car kit. This should include:
 - Blankets or sleeping bags to keep you warm, or a box of newspaper to use as insulation
 - Matches and candles for light
 - Empty coffee can with plastic cover to use as a toilet
 - Facial tissues and paper towels
 - Extra clothing, especially caps, mittens and overshoes
 - High-calorie nonperishable food
 - Compass and road maps
 - Knife
 - First aid kit
 - Shovel
 - Sack of sand
 - Flashlight or signal light with extra batteries
 - Windshield scraper
 - Booster cables
 - Two tow chains
 - Fire extinguisher
 - Catalytic heater
 - Axe
 - Plastic scraper
 - Transistor radio with extra battery
 - Tools—pliers, screwdriver, adjustable wrench
 - Flares

Notes:

Winterizing Mobile Homes

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| <ol style="list-style-type: none"> 1. Inspect the roof for leaks and cracks. Water can seep through to damage ceilings, interior panels or furnishings. <ul style="list-style-type: none"> ● When making inspections or repairs, do not walk on the roof unless it is absolutely necessary. ● Most repair work can be done from an extension ladder. Be careful not to lean to the side of the ladder when making repairs. Instead, move the ladder to the work area. 2. Check locked or lapped roof seams for loose screws, spreading, parting or buckling. Add new screws if necessary, and cover all seams with roof coating or asphalt-base paint. 3. Check stacks and vents for cracks, and make sure they are free of debris. 4. Check the flashing for loose screws and separation from the roof. <ul style="list-style-type: none"> ● Water can freeze between loose flashing and the roof, causing damage when it melts. ● If necessary, attach flashing to roof area with a liberal coat of caulking and extra sheet metal screws. Then coat screws and flashing area with roof coating or paint. 5. Check to see that molding is secure where roof meets exterior walls. 6. Check total roof surface for cracks, breaks, rust or oxidation. Scrape or wire brush rusted seams and recoat entire roof. | <ol style="list-style-type: none"> 7. Provide at least one front and rear circulation vent and two side circulation vents when installing skirting. <ul style="list-style-type: none"> ● Keep vents free from obstructions. ● Allow for frost and ground expansion. Do not apply skirting tight against the ground or tight against the bottom of the unit. ● Without expansion room, frozen ground can heave the skirting against interior panels, causing wall to buckle. 8. Clean or change furnace filters as recommended by manufacturer. Collected dust can be pulled into the motor, causing it to overheat. <ul style="list-style-type: none"> ● Some filters can be cleaned with a vacuum cleaner; some should be washed in a detergent solution; and others require replacement. ● Follow manufacturer's instructions for cleaning, oiling and replacing parts. 9. During the summer months when the heater is not used, keep the fuel tank full to prevent condensation and rusting. <ul style="list-style-type: none"> ● Use only No. 1 fuel oil or kerosene in the outside fuel tank. ● No. 2 fuel oil can be used in underground tanks. ● Never add gasoline or naphtha to the fuel oil. |
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Winterizing Mobile Homes

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| <p>10. If the mobile home is not positioned on concrete pads, frozen ground may cause it to heave or rise. This could make the doors stick. To correct this, turn the jack handle on the front hitch, raising the front as needed. Reverse the jack handle when the ground thaws in the spring and the unit settles again.</p> <p>11. During sub-freezing temperatures give extra protection to water systems, especially if the unit is not set on a permanent sub-surface heated basement.</p> <ul style="list-style-type: none"> ● Skirting will help reduce some possibility of freezing damage, but will probably not eliminate the problem. ● On most modern units, pipes leading from the underground pipe connection to the faucets are protected within the floor system. You will need to protect only the exposed pipes. ● Use electric heat tape equipped with a thermostat. This material is available at most hardware or plumbing stores. ● Tapes with built-in thermostats at the cord end are more easily accessible. ● Tape the thermostat securely to the pipe where it leaves the floor of the unit. Be sure the thermostat is held firmly against the pipe for accurate temperature sensing and correct operation of the tape. | <ul style="list-style-type: none"> ● Wrap the heat tape in spirals down the pipe, keeping it snug against the pipe. In general, three turns per foot of pipe (a spacing of about 4 inches between spirals) is adequate. ● Apply friction tape at 12- to 16-inch intervals to hold the heat tape in place. ● Wrap heat tape over the full length of the water pipe from the floor to below frost level. The heat tape should not touch itself at any point because hot spots could develop, causing failure of the tape. ● Place insulation around the pipe to save electricity. Inch-thick, pre-foamed pipe insulation with a waterproof coating is recommended. Tape all joints with a waterproof tape or seal them with adhesive. Be sure the thermostat is also covered with insulation. ● Plug the heat tape cord into an electrical outlet when cold weather arrives. <p>12. Freezing problems sometimes occur in mobile home drainage systems, especially when drain pipes below the floor are installed with very little slope. To help prevent damage from freezing:</p> <ul style="list-style-type: none"> ● Fix leaky faucets. When water flow in drain pipes is very slow (as from a dripping faucet) the water in the pipeline may freeze. This is especially true if faucets drip overnight. |
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Winterizing Mobile Homes

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| <ul style="list-style-type: none">● Check toilet tanks. Water running or dripping in the toilet tank could cause sewer lines to freeze.● Install electric heating tape on the drain line. Drain pipes are less susceptible to freezing than pipes in a potable water system, so a single strand of heat tape taped to the bottom of the drain line usually will prevent freezing problems. | <ul style="list-style-type: none">● Install insulation over the heat tape. Hold the eave in place with friction tape at 12-inch intervals. Be sure the thermostat is held securely to the pipe and is covered with insulation. Use preformed pipe insulation with a waterproof cover. Tape all joints in the insulation with waterproof tape. |
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Notes:

Winterizing Residential Buildings

When winterizing your house, check each of the following items. Repair as necessary.

Roof

1. Check for broken, damaged or loose shingles; small holes; and loose nails.
2. Check flashing around all dormers, vent pipes, chimneys and any other projections where the roof covering meets an adjoining surface.

Gutters and downspouts

1. Clean out leaves, dirt and debris.
2. Paint any rusty gutters.
3. Check supports.

Exterior

1. Repair cracks in stucco or masonry walls.
2. Spot repair and paint any defective areas to prevent damage from freezing and thawing.

Windows and doors

1. Check weather-stripping around windows, doors and between foundation and siding. Replace where needed.
2. Check metal weather-stripping for dents, bends, breaks, loss of tension or other damage that could make it less effective.
3. Repair and paint storm windows if necessary.

Heating system

1. Have a qualified serviceman clean and check your furnace, replacing necessary parts. Furnace check should include:
 - Fan belts—check for proper tension, cracks or wear.
 - Motors and bearings—oil units equipped with oil parts.
 - Filters—clean or install new filters. Fiberglass filters will need to be replaced because they lose their effectiveness if cleaned and re-used.
 - Hot and cold air registers—vacuum if necessary.
 - Humidifier (if part of furnace)—remove scale, lime deposits and corrosion. Check float valve and evaporator plate.
 2. Remove air conditioner for winter storage. Cover with dust-proof cover. If air conditioner is left in the window, install a weather proof cover and seal the space around the unit.
- ### Driveways and sidewalks
1. Clean and repair cracks, fissures and joints in concrete surfaces.
 2. Upgrade gravel driveways.
 3. Repair cracks or fissures in asphalt drives. Seal with asphalt topcoating.

Notes:

Preparations to Reduce Heat Loss from Buildings

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| <ol style="list-style-type: none"> 1. Install overhead and sidewall insulation. <ul style="list-style-type: none"> ● Adequate insulation is one of the most important factors in reducing heat loss and will increase the comfort of your home in both summer and winter. ● Under most conditions you need the equivalent of 6 inches of fiberglass thermal insulation over your top floor ceiling; 3½ or 4 inches of sidewall insulation is also recommended. 2. Weatherstrip and caulk around all joints and frames of windows and doors. 3. Install storm windows and doors or insulating glass. Storm windows can result in a 10 to 20 percent reduction in heating costs. If buying storm windows is not practical (as when renting), tape clear plastic to the window frame. 4. Clean and change furnace filters regularly. Have furnaces checked and cleaned by a qualified repairman once a year. Clean and replace air filters when they become loaded with dust or lint. 5. Close window draperies at night. Regular draperies reduce heat loss | <p style="margin-left: 20px;">slightly; insulated draperies cut down heat loss even more.</p> <ol style="list-style-type: none"> 6. Seal as tightly as possible any openings which may permit cold air leakage from the attic. <ul style="list-style-type: none"> ● Leakage is likely to occur around attic stairway doors, pulldown stairways, electric light fixtures, ceiling fans, air ducts and plumbing vents or pipes. ● Air leakage from the attic not only increases heat loss but also increases the possibility of moisture condensation in the attic. Condensation can wet insulation and building materials, eventually causing structural damage and reducing the effectiveness of the insulation. 7. If your basement is heated, close off upper wall construction that is open to the attic. However, be sure to provide exterior vents into the wall cavity. 8. Repair leaking hot water faucets. Leaky faucets waste both heat and water. 9. Close fireplace dampers when they are not in use. This will keep heated air from escaping up the chimney. |
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Notes:

What To Do During a Home Power Failure

During severe winter storms, your home heating system could be inoperative for as long as several days. To minimize discomfort and possible health problems during this time, take the following steps:

1. Conserve body heat.
2. Put on extra clothing. If cold is severe, your bed may be the warmest place.
 - Extra blankets and coverings will trap body heat. This is a good way to keep children warm.
 - Farm families might consider taking refuge in the relative warmth of the livestock barn.
3. Find or improvise an alternative heat source. You may have alternative heating resources around your home. Possibilities include:
 - Fireplace
 - Wood, coal, gas or oil stove or spaceheater
 - Catalytic camp stove
 - Electric or gas oven and surface units
 - Portable electric heater
 - Gas-fired hot water heater
4. Provide fuel. Common fuel materials include:
 - Furnace coal
 - Canned heat

- Furnace oil
- Wood chips
- Campstove fuel
- Alcohol
- Newspapers, magazines
- Charcoal lighter fluid
- Kerosene, gasoline
- Straw
- Firewood
- Corncobs
- You can burn coal in a fireplace or stove if you make a grate to hold it, allowing air to circulate underneath. "Hardware cloth" screening placed on a standard wood grate will keep coal from falling through.
- Tightly rolled newspapers or magazines can be used for paper "logs." Before burning the "logs," stack them properly to allow for air circulation.
- Consider burning wood, including lumber or furniture, if the situation becomes critical.
- **CAUTION:** Do not store fuels in the heated area because of fire danger, especially if you have highly combustible materials such as gasoline or kerosene.

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What To Do During A Home Power Failure

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| <p>5. Select a room to be heated. To increase efficiency of available heat, close off all rooms except the one to be heated. When selecting a room or area to be heated, consider the following:</p> <ul style="list-style-type: none"> ● If using a vented stove or space heater, select a room with a stove or chimney flue. ● Confine emergency heat to a small area. ● Try to select a room on the "warm" side of the house, away from prevailing winds. Avoid rooms with large windows or uninsulated walls. Interior bathrooms probably have the lowest air leakage and heat loss. Your basement may be a warm place in cold weather because the earth acts as insulation and minimizes heat loss. ● Isolate the room from the rest of the house by keeping doors closed, hanging bedding or heavy drapes over entry ways, or by erecting temporary partitions of cardboard or plywood. ● Hang drapes, bedding or shower curtains over doors and windows, especially at night. <p>6. Provide adequate safety measures. Safety is of prime importance in a heating emergency. Your chances of freezing to death in your home are small. Fire, asphyxiation from lack of oxygen, or carbon monoxide poisoning are much greater dangers unless you take adequate safety precautions.</p> | <ul style="list-style-type: none"> ● Do not burn anything larger than candles inside your home without providing adequate ventilation to the outside. ● Any type of heater (except electric) should be vented. Connect the stove pipe to a chimney flue if at all possible. (Many older homes have capped pipe thimbles in rooms once heated by stoves.) Or hook up your stove to the flue entrance of the nonfunctioning furnace pipe (after removing the pipe). ● Sometimes a stovepipe can be extended through a window if no other alternative exists. Replace the window glass with a metal sheet, and run the temporary stovepipe through the metal. ● Do not run emergency stovepiping close to flammable materials. Be particularly careful with window-mounted flues. The wood sash, curtains and shades are especially flammable. ● If you use a catalytic or unvented heater, provide plenty of ventilation in the room. Whenever the device is in use, cross ventilate by opening a window an inch on each side of the room. It is better to let in some cold air than to run the risk of carbon monoxide poisoning. ● Do not burn outdoor barbecue materials such as charcoal briquets inside—even in a fireplace. |
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What To Do During A Home Power Failure

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| <ul style="list-style-type: none">• Do not try to use bottled gas in natural gas appliances unless you have converted the appliances for such use. Also, flues and piping suitable for gas burning appliances may be unsafe for use with higher temperature oil, coal or wood smoke. | <ul style="list-style-type: none">• Have one person as a firewatch whenever alternative heat sources are used. One person should stay awake to watch for fire and to make sure ventilation is adequate. If the firewatch feels drowsy, it may be a sign of inadequate ventilation.• Keep fire fighting materials on hand. |
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Notes:

Responses to Other Heat Loss Problems

During a power failure, keeping warm will be a major problem. However, several other related heat loss problems also should be considered.

1. If it seems likely that the heat will be off for several hours in below freezing temperatures, protect exposed plumbing.
 - Drain all pipes (including hot water heating pipes) in any rooms where temperature falls below 40°F. You may need to drain only portions of your system.
 - Drain the sink, tub and shower traps, toilet tanks and bowls, hot water heater, dish and clothes washers, water pumps and furnace boiler.
2. If your water pump is electrically powered, a power outage could restrict your water use.
 - Save as much water as possible when you drain the system.
 - Store the water in closed or covered containers, preferably where it will not freeze.
 - You may use water from your hot water heater and toilet tanks (not the bowls) for drinking and household use. Water from the heating system will be unfit for drinking or other household use.
3. Keep on hand a good supply of candles, matches and at least one kerosene or gas lantern with ample fuel. Also have a dependable flashlight with spare bulbs and batteries.
4. If your water supply is shut off, sanitation will become a problem.
 - Flush the toilet only often enough to prevent clogging. (Disconnect the chain or lever attached to the toilet handle to prevent children from flushing.)
 - Provide covered containers for disposing of toilet paper. A portable camper's toilet might be useful.
5. Camp stoves or fireplaces may be used for cook stoves in an emergency.
 - Meal-in-a-can foods such as stews, soups, canned meats, beans or spaghetti require little heat for cooking, and some can be eaten without cooling.
 - Cereals, breads, dried meats and cheese are other "no cook" possibilities. Freeze-dried meals used by campers and backpackers can be prepared with a minimum of heat.

Notes:

Protecting Your Hot Water System During A Winter Storm Power Failure

1. If you think the heat will be off several hours or more during below freezing temperatures, you will need to keep exposed heating pipes from freezing. This can be done by circulating water through the pipes or adding antifreeze to the system.
2. If electrical power is available, keep the circulator pump going. Moving water does not freeze readily. However, if the room temperature drops to below 40°F, you probably should begin to drain the pipes.
3. Most hot water heating systems are not easily drained. Pipes may have to be disconnected to drain low points. Open the vents on radiators to release air so pipes can drain.
4. Consult a heating contractor about adding antifreeze to your system.
 - Antifreeze is poisonous and must not be allowed to get into the drinking water system. Make sure the house water system and the boiler water system are not connected.
 - Use only antifreeze containing ethylene glycol. Do not use antifreeze containing methanol. (Methanol vaporizes readily when heated, and could cause excessive pressure in the system.)
 - Make sure the antifreeze does not contain leak-stopping additives. These may foul pumps, valves, air vents and other parts.

Notes:

Protecting Your Plumbing System During A Winter Storm Power Failure

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| <ol style="list-style-type: none">1. Shut off the water at the main valve, or turn off the well pump if it is in the house.2. Drain the pressure tank.3. Open all faucets until they drain completely! Some valves will open only when there is water pressure. If so, remove the valve from the faucet.4. Drain the entire system by disconnecting pipe unions or joints as close to the main valve as possible. You may use compressed air to blow water from pipes. | <ol style="list-style-type: none">5. Insulate undrainable pipes around their main valves. Use newspaper, blankets or housing insulation.6. Drain toilet flush tanks and spray hoses.7. Disconnect the water softening unit so water can drain from the hard and soft water pipes and from the controls. Lay the softener tank on its side to drain as much water as possible. Also drain controls and tubing on brine (salt) tank. A brine tank itself will not be harmed by freezing. |
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Notes:

**Protecting Your Sewage System During
A Winter Storm Power Failure**

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| <ol style="list-style-type: none"> 1. Empty all drain traps by carefully removing drain plugs or by disconnecting traps. 2. Blow out inaccessible traps with compressed air or add ethylene-glycol base antifreeze in an amount equal to the water in the trap (1 pint to 1 quart is sufficient, depending on the size of the trap). | <ol style="list-style-type: none"> 3. Check kitchen sinks, bathroom sinks, bathtub drains, toilets, washtubs, showers, floor drains and sump pumps. |
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**Protecting Appliances During
A Winter Storm Power Failure**

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| <ol style="list-style-type: none"> 1. Disconnect the electric power or shut off the fuel to all water-using units. 2. Shut off the water supply and disconnect the hoses if possible. 3. Drain all water-using appliances. | <ol style="list-style-type: none"> 4. Check the water heater, humidifiers, ice-making unit of the refrigerator, washing machine and the dishwasher. Do not put antifreeze in these appliances. Close valves to the furnace, water heater and dryer. |
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Notes:

Preventing Ice Dams on Eaves

Ice dams along eaves may cause considerable damage to the roof and inside walls of a house. Poorly insulated roofs are the chief cause of ice build-up on eaves. Ice forms when the snow melts off a warm roof, runs down to the eave line, and refreezes there. Ice in the eave trough prevents water from running off freely. If water backs up high enough, it may seep under shingles and down into the house. Sometimes it leaks through plaster walls and ceiling.

Ice dams are usually a problem only on cold days when the roof is warmer than the eave overhang. On warm days the snow melts at the same rate on the eaves and water runs off freely.

To prevent ice dams:

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| <ol style="list-style-type: none"> 1. Insulate between the top floor ceiling and the attic, or along the underside of the eaves if the attic is used as living space. Insulation also will help cut fuel bills. | <ol style="list-style-type: none"> 2. Ventilate the attic through windows and louvers when insulation is added to the attic floor. This will help reduce moisture condensation in the attic. 3. Use electric heating cables along the eaves if insulation or ventilation is not possible. <ul style="list-style-type: none"> ● Cables can be strung out along the edge of eaves. When plugged in, they will heat the area, melt any ice already formed and prevent further freezing when water drips off the roof. ● Be sure cables are approved for the intended use by the Underwriters Laboratory. Check with your electrician for correct installation. 4. Do not use salt to melt snow or ice from roof. Salt will rust nails, damage gutters and downspouts, and ruin next year's lawn. |
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Notes:

Responses to Take When Caught Outdoors During A Winter Storm

Hunters, sportsmen or snowmobile riders occasionally become lost or injured in severe winter weather. Be sure someone knows where you are going and when you plan to return. Don't travel alone. Dress properly. If you do become stranded:

1. Remain calm. Don't rush to get out immediately. You can easily become disoriented and lose your way during a snowstorm.
2. Build a shelter for the night, preferably on the leeward side of brush or timber.
 - In timber country a lean-to gives good protection. Construct one by using two "Y" poles for corners and a sturdy cross shaft.
 - Place poles from cross shaft to the ground and cover with evergreen boughs.
 - In open country where snow is shallow and the temperature isn't too cold, a snow trench can provide adequate shelter.
 - "Snow caves" (in snow at least 4 feet deep) provide the warmest shelter during cold weather. Dig your cave on the leeward side of a drift. Be sure that you don't locate the opening under an overhanging drift or in a possible avalanche path.
3. Gather a fuel supply that will last throughout the night.
 - Cover the bottom of your shelter with boughs, grass or sticks if they are available. Soft, springy boughs are good for a mattress.
 - Gather fuel while it is still daylight.
 - Build a fire approximately 2 feet from the shelter, using a log or piled rocks to reflect the heat. When daylight comes again, be prepared to increase the size of the fire. Try to produce as much smoke as possible to signal rescue parties.
5. Remain at your shelter area unless you are positive that you can walk out safely. It is better to wait for rescue than to become disoriented and further lost.
 - In some areas snowmobile clubs and other groups are organized for rescue operations.

Notes:

Responses If Trapped By a Blizzard While Traveling

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| <ol style="list-style-type: none"> 1. Avoid overexertion and overexposure. Strenuous acts such as pushing your car or shoveling snow can cause a heart attack in cold weather conditions. 2. Stay in your car where you are sheltered and more likely to be found. You can become quickly disoriented when trying to walk around in blowing snow. 3. Stay calm. 4. Keep fresh air in your car. <ul style="list-style-type: none"> ● Freezing wet and wind-driven snow can seal the passenger compartment and suffocate you. ● Keep the downwind window open about an inch when you run the motor and heater. Be sure snow has not blocked the exhaust pipe. 5. Exercise from time to time by clapping hands and moving arms and legs vigorously. Don't stay in one position long. | <ol style="list-style-type: none"> 6. Keep the dome light on at night to make the car visible to snow plows or rescue crews. 7. Have one person keep watch. Don't allow everyone in the car to sleep at once. 8. In a snowstorm, automobile parts can sometimes be used for emergency tools: <ul style="list-style-type: none"> ● A hubcap or sun visor can be used as a shovel. ● Seat covers can serve as blankets. ● Floor mats will help shut out wind and cold. Place them against windows on the upwind side to help reduce drafts. ● Engine oil burned in a hub cap creates a smoke signal visible for miles. To light the oil, prime with a little gasoline or use paper for starter fuel. ● Signal with the horn. An automobile horn can be heard as far as a mile downwind. |
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Notes:

Special Considerations for Agricultural Producers

In addition to the precautions and responses covered in the previous pages, the agricultural producer will want to consider the following measures.

Preparing for a Winter Storm

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| <p>1. Be aware of winter storm terminology. Stockman advisories are issued with combinations of cold, wet and windy weather, specifically, cold rain and/or snow with temperatures of 45°F or colder and winds of 25 miles</p> | <p>per hour or higher. If the temperatures are in the mid-30s or lower the wind speed criteria are lowered to 15 miles per hour.</p> <p>2. Stockmen also should consider the effect of the wind chill factor on livestock.</p> |
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Notes:

Providing Windbreaks for Livestock Protection

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| <ol style="list-style-type: none"> 1. Simple shelters, sheds or windbreaks are necessary to protect livestock from winter storms. <ul style="list-style-type: none"> ● Usually, severe cold alone will not affect the performance of animals on full feed. Wind, however, can be a serious stress factor. A strong wind has about the same effect on animals as exposure to a sudden drop in temperature. ● In general, a 20 mph wind is approximately equivalent to a 30°F drop in temperature. Under extreme conditions, simple wind and snow protection devices will not be 100 percent effective. 2. Consider wind and snow as a joint problem when deciding the kinds of livestock protection you need. 3. Simple windbreaks, shelters or sheds are essential for livestock protection from wind and snow. 4. The effectiveness of a windbreak depends on its height and density. Windbreaks may be natural (trees) or manmade (fences). 5. Cottonwood or poplar trees are relatively ineffective as windbreaks because of their low branch density. Supplement these trees with thick-growing trees such as red pines, or with fences. 6. Snow fences can be good substitutes for tree windbreaks which take time to grow and are not practical under all conditions. 7. Porous fences of 80 percent density offer the best wind protection. | <ol style="list-style-type: none"> 8. Snow will drift through a porous fence. A solid fence keeps most of the snow outside a yard and provides the best snow barrier, but may direct snow to other parts of the farmstead. Porous fences can give good snow control if you locate the fences to allow for the resulting drifts. 9. Swirling and relocation of snow within a farmstead is often the main cause of drifting problems. 10. Shallow open-front sheds provide excellent shelters for livestock. Such shelters should have slot openings along the eaves on the back side of the shelter. These openings will provide ventilation and prevent snow from swirling into the front of the shed. <ul style="list-style-type: none"> ● Plan slot size according to building width. ● You should have a 1- to 2-inch opening per 10 feet of building width. Ridge ventilators also are recommended. 11. Do not attach windbreak fences directly to the front corner of an open-front shed. Instead, use a swirl chamber arrangement. <ul style="list-style-type: none"> ● Attach a separate short fence to the building. ● Start the longer fence behind it and away from the building. 12. Divide long open-front sheds into 20- to 40-foot sections to reduce drafts and possible snow build-ups. 13. Locate shelters so that adjacent buildings will not deflect wind and snow into a shed. |
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Notes:

| Creating Windbreaks On Your Property | |
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| <p>1. On some farms a windbreak may be necessary for protection from strong winds and blowing snow. A windbreak will:</p> <ul style="list-style-type: none"> ● Protect livestock and reduce winter feed requirements. ● Help protect homes and reduce fuel use. ● Help eliminate snow drifting around farmstead buildings and work areas. <p>2. Plan the windbreak before you plant. In designing the windbreak you should consider size and location, tree species, tree spacing and soil preparation.</p> <p>3. To give the best protection from wind and snow a windbreak should be:</p> <ul style="list-style-type: none"> ● Located to the northwest of the farmstead ● L-, U- or E-shaped, with the ends extending about 50 feet beyond each corner of the area to be protected ● At least 50 feet and preferably 100 feet from farm buildings and feedlots on level land (If your land slopes steeply to the north or west, plant trees closer to the farmstead, but no closer than 60 feet from the main buildings or drives.) <p>4. Avoid planting windbreaks across old feedlots, near manure pits or across barnyard drainage ways. Many trees, especially evergreens, are susceptible to "nitrogen burning." If any section of the windbreak is likely to be</p> | <p>saturated by barnyard seepage, plan to construct a ditch or use drainage tile to carry the seepage away from trees.</p> <p>5. Do not plant windbreaks where they could cause visibility hazards at intersections.</p> <p>6. If it is necessary to cross fields, driveways or large ditches with a windbreak planting, try to make the crossing at oblique angles. This will prevent direct wind tunnels through the planting.</p> <p>7. Windbreaks should contain several tree species.</p> <ul style="list-style-type: none"> ● A mixture of species offers protection against disease, insects and weather damage, and takes advantage of differences in growth rates. ● Both deciduous and evergreen species should be included, but all trees must have adequate space. ● Select low, dense growing shrubs for outside rows. Plant medium sized trees next, and tall growing trees in center rows. ● Your choice of species will depend on your needs, climate and type of soil. Contact your county Extension agent for information about appropriate windbreak species for your area. <p>8. Sod, loosely powdered soil or field soil is best for tree planting. In late summer or early fall, plow heavy soil and soil covered with sod. If the soil has been deeply plowed and is relatively loose, roll or cultipack it.</p> |

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Creating Windbreaks On Your Property

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| <ul style="list-style-type: none"> ● During winter months cover light or sandy soils with organic material such as well-rotted manure. This will increase soil fertility and reduce the possibility of erosion and moisture losses during winter and early spring. ● In dry regions summer fallow the land during the year prior to planting. Cultivate frequently enough to prevent any weed or plant growth and to keep the soil in suitable condition for absorbing moisture. ● If the soil is sandy and subject to blowing, plant a cultivated row crop such as corn instead of summer fallowing. ● Thoroughly disc and harrow the soil just before planting. <p>9. Do not overcrowd trees. Trees must have adequate space, especially when deciduous and evergreen species are mixed.</p> <ul style="list-style-type: none"> ● Allow at least 20 feet between deciduous and evergreen species. ● A five-row planting is recommended for the most efficient windbreak but if space is limited use fewer rows rather than overcrowd trees. ● Properly spaced trees will have increased growth and vigor. ● Stagger trees in adjacent rows to offset wide spaces between young trees. | <ul style="list-style-type: none"> ● Be sure to allow enough space for operating any necessary maintenance equipment. <p>10. Plant trees as soon as possible after receiving them. If you must hold trees for a few days before planting them, unpack them and heel them in until they are to be planted.</p> <ul style="list-style-type: none"> ● Keep roots moist at all times during planting. ● Plant in rows according to predetermined plan. ● For specific planting instructions, contact a local nursery or your county agricultural Extension agent. <p>11. Provide protection and care for young seedlings.</p> <ul style="list-style-type: none"> ● Protect trees permanently from poultry and livestock. ● Protect trees from rodents. Use screen wire, tree wrap materials or commercial repellents. ● Inspect trees periodically for disease or insect damage. ● To eliminate competition from grass or weeds, cultivate until crowns of trees have grown together and shade the ground, preventing growth of competitive vegetation. ● Be sure cultivation is shallow to avoid damaging the roots. ● For fire protection cultivate a strip on all sides of the windbreak. |
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Notes:

Protecting Livestock During Winter Storms

Large numbers of livestock may be killed in winter storms. Wind coupled with severe or prolonged cold weather causes additional stress on livestock, increasing their need for food, water and shelter. To minimize livestock loss during winter storms, stockmen should:

1. Move stock, especially the young, into sheltered areas.
 - Windbreaks, properly oriented and laid out, or timber-covered lowlands are better protection for range cattle than most shed-type shelters which may overcrowd and overheat cattle, causing subsequent respiratory disorders.
 - Never close indoor shelters tightly because stock can suffocate from lack of oxygen.
 - Extremities that become wet or are normally wet are particularly subject to frostbite and freezing during sub-zero weather. The loss of ears or tails may be of little economic significance, but damage to male reproductive organs can impair the animals' fertility or ability to breed.
2. During severe or prolonged cold weather, animals need extra feed to provide body heat and to maintain production weight gains.
 - A grain ration that maintains an animal during the summer may not carry it through the stress of prolonged or severe cold. Haul extra grain to feeding areas before the storm arrives.
 - If the storm lasts for more than over 48 hours, emergency feeding methods may be required. Pelleted cake or cake concentrates make good emergency feed.
 - Mechanized feeders may be inoperable during power failures unless you have a source of emergency power.
3. Use heaters in water tanks to provide livestock with enough water. Cattle cannot lick enough snow to satisfy their water requirements.

Notes:

Caring for Livestock After a Blizzard

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| <p>1. Following a blizzard, water will be a crucial need for livestock. Cattle will not be able to satisfy all of their water requirements by eating snow.</p> <ul style="list-style-type: none"> ● In pastures with severe drifting, water in shallow streams may be absorbed by snow in the stream bed. Very little, if any, running water may be available for several days. You may need to haul water to cattle. | <ul style="list-style-type: none"> ● If water is limited, keep cattle off salt. Cattle which have been away from feed and water for several days may overeat salt, causing salt poisoning. <p>2. When stock cannot be reached by roads, use planes, helicopters or snowmobiles to provide emergency rations.</p> |
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Feeding Cattle After a Blizzard

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| <p>1. Feedlot cattle that have gone through a severe storm or stress period should be put back on feed carefully.</p> <ul style="list-style-type: none"> ● Change the ration gradually from a low to a high proportion of concentrate. Watch your herd carefully for several weeks following prolonged exposure. ● Isolate cattle showing signs of scouring or labored breathing. Keep these animals in a dry, draft-free place and contact a veterinarian. <p>2. Cattle which have not been fed for several days or are unaccustomed to grain should be limited to 2 to 4 pounds per head of whole grain in one feeding, or a total of 5 pounds per head the first day.</p> <ul style="list-style-type: none"> ● Increase the amount of feed by 2 lb/head/day for large cows. Make any additional increases slowly. <p>3. Add hay, even poor quality roughage, to the ration as soon as possible. Feeding 3 pounds per head of hay daily will greatly reduce the possibility of founder (acute indigestion).</p> | <ul style="list-style-type: none"> ● Cattle can use hay to better advantage than grains when they must be fed on the ground. Even moisture-saturated hay can be used until suitable feed is available. Do not use mildewed hay. <p>4. Grind whole grains to increase their value to cattle. Half of some whole grains may pass through cattle undigested.</p> <p>5. Watch cattle for signs of founder.</p> <ul style="list-style-type: none"> ● Founder is caused by cattle eating large amounts of green corn or other easily fermentable feeds to which they are unaccustomed. ● Founder occurs suddenly. Body temperature is usually normal. Symptoms include poor appetite and depression, followed by colic and diarrhea. ● Animals may die in a few days. Some survivors may develop acute lameness. Prompt treatment can reduce deaths, crippling and recurring digestive disturbances. |
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Feeding Sheep After a Blizzard

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| <ol style="list-style-type: none"> 1. If sheep, especially pregnant ewes, are withheld from feed heavy losses may occur. 2. Ewes in good flesh late in pregnancy may incur pregnancy disease if they are without feed for even a short time. Early symptoms of pregnancy disease include listlessness and depression. As intoxication advances, ewes develop a wobbly gait, become uncoordinated and die. | <ol style="list-style-type: none"> 3. Sheep can eat 1 to 3 pounds of whole grain per day. A small amount of roughage will prevent digestive trouble. Drying feed before giving it to sheep can reduce the possibility of digestive problems. |
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Feeding Horses After a Blizzard

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| <ol style="list-style-type: none"> 1. Horses fed a maintenance ration adequate for summer conditions may need additional energy in their winter feed. | <ol style="list-style-type: none"> 2. They can tolerate reduced rations for a few weeks unless they are mares nursing foals. |
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Feeding Swine After a Blizzard

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| <ol style="list-style-type: none"> 1. Swine present few problems during periods of feed shortage. <ul style="list-style-type: none"> ● If you are substituting other feed, such as dairy feed, for regular swine feed, be sure swine have adequate fresh water available at all times. | <ul style="list-style-type: none"> ● The salt content of cattle feed will produce salt poisoning in swine unless they have constant access to water. |
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Notes:

Protecting Poultry and Livestock During a Winter Storm Power Failure

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| <ol style="list-style-type: none"> 1. Ventilate shelter. Do not close buildings tight to conserve heat because animals could suffocate from lack of oxygen. Because oxygen eventually will be used up in mechanically ventilated production facilities, clear ice and snow from all vents. Then open vents to facilitate natural air flow. 2. Poultry facilities should be equipped with knock-out panels for emergency ventilation. 3. In dairy facilities, open door or turn cows outside. 4. Provide water. All animals, especially cattle, need plenty of water during cold weather. It may be possible to drive your water pump with a small gasoline engine and a belt. Otherwise, you will need to haul water. <ul style="list-style-type: none"> ● If you have an outside source of water, cattle can be turned out to it. | <ul style="list-style-type: none"> ● Be sure to place sand or other gritty material on icy feedlots to provide good footing. ● Whatever the source of water, watch that it remains unfrozen so animals can drink it. If no water is available, dairymen can feed cows their own milk as a last resort. <ol style="list-style-type: none"> 5. Provide heat. Use camp stoves and heaters as emergency heat sources for brooders. Plan ahead to have this equipment ready when needed. 6. Provide feed. Animals need extra energy for body heat during severe or prolonged cold weather, especially if they are outside without shelter. Mechanical feeders will be inoperable during a power failure. Provide for emergency feeding procedures. Pelleted cake or cake concentrate may be used for emergency feed. |
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Notes:

| Protecting Equipment During A Winter Storm Power Failure | |
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| <ol style="list-style-type: none"> 1. Unplug or turn off all electric equipment to prevent damage when power is restored. 2. If you use portable space heaters for supplemental heat, close off the fuel valve as soon as possible after power is interrupted. | <p>On models not equipped with safety shut-offs, and especially on some models with gravity feed fuel systems, fuel continues to flow even when the burner is inoperative. An explosion or fire can result when power is restored.</p> |

| Storing Milk and Cream During A Winter Storm Power Failure | |
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| <ol style="list-style-type: none"> 1. You can use the intake manifold on the tractor engine as a source of vacuum to operate milkers that do not have a magnetic pulsator. 2. Ask the dairy to pick up milk as soon as possible. 3. Consider adding a standby power generator to handle vital electric equipment on the dairy. | <ol style="list-style-type: none"> 4. Even if you are short of extra milk storage facilities, do not store milk in stock tanks or other containers such as bathtubs. Dairy plants may not accept milk that has been stored in anything other than regular milk storage containers. Check with your local dairy about policy regarding emergency storage of milk and cream. 5. Check your tank for souring each time you add milk to it if you are unable to cool your milk or have it picked up. This check could mean the difference between losing all or only part of your milk supply. |

Notes:

Repairing Ice and Snow Damage to Shrubs and Trees

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| <p>1. To prevent ice damage to trees or shrubs, try to remove ice before winds cause major damage. Do not try to break ice off branches. Connect a garden hose to the hot water faucet to melt the ice. If branches have been badly damaged, remove or repair them as suggested below.</p> <p>2. Heavy accumulations of wet snow can cause damage to trees and shrubs. Evergreens and weak-wooded trees are more susceptible to snow damage than deciduous and hard-wood trees.</p> <p>Snow damage is more common to shrubs than to trees because snow depth often equals or exceeds shrub height. Evergreen shrubs are more easily damaged than deciduous shrubs because there is more foliage surface for snow accumulation.</p> <p>To remove heavy snow accumulations:</p> <ul style="list-style-type: none"> ● Tap the branches lightly with a broom soon after the snow falls or as it accumulates. ● If snow has melted and refrozen, do not use this procedure because you could break the branches. ● To remove frozen snow, spray the shrubs with a hose connected to the hot water faucet. <p>Shrubs also may be damaged when snow from walks or drives is piled onto them, or when salt is used for snow removal along drives, walks and streets. With a hose, wash off shrubs that have been splashed with salt from streets.</p> | <p>Often snow damage to evergreens is not apparent until the following spring as a broken branch will retain its green color until warm weather.</p> <p>3. Determine whether the tree can be repaired, or if it should be removed completely. If the main trunk is completely broken or if the tree is uprooted, it should be removed. Most broken branches can be either repaired or pruned. Some branches broken at a crotch can be lifted into place and then bolted and cabled.</p> <ul style="list-style-type: none"> ● Remove broken branch to the nearest branch or to the tree trunk. Never leave a ragged stub. ● Remove large branches with three cuts. This will prevent splintering and peeling. <ul style="list-style-type: none"> • Make the first cut upward from the bottom of the branch about 12 inches from the next branch. • Cut about halfway through the branch, or until the saw begins to pitch. • Make the second cut 5 or 6 inches further out, and continue cutting until the branch falls. • With a third cut remove the stub cleanly without peeling. • Treat wound. |
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Notes:

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