

Amateur Radio Emergency Communications Training Course

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Emergency Preparedness

Excerpts from FEMA Independent Study Course IS-2 "Emergency Preparedness U.S.A."

1. The Four Phases of Emergency Management

1. Preparedness – Preparing to handle an emergency
Plans or preparations to save lives and to help response and rescue operations.
2. Response – Responding safely to an emergency
Actions taken to save lives and prevent further property damage in a disaster or emergency situation
3. Recovery – Recovering from an emergency
Actions taken to return to a normal or even safer situation following an emergency
4. Mitigation – Preventing future emergencies or minimizing their effects.
Any activities that prevent an emergency, reduce the chance of an emergency happening, or reduce the damaging effects of unavoidable emergencies.

2. Analyzing the Risks

Determining Local Hazards

- Your community's past history of emergencies caused by the hazard,
- Geographical considerations,
- Community characteristics, and
- Distance from transportation routes, large urban areas, large industrial areas, or military bases.

The Major Natural Hazards

- **Severe Thunderstorm**
Severe thunderstorms are weather systems accompanied by strong winds, lightning, heavy rain or hail, and possibly tornados.
Every State – Southeast and Midwest have the greatest frequency. Florida has the greatest occurrence
- **Flood and Flash Flood**
A flood occurs when a river or stream overflows its bed onto normally dry land. Floods can be slow to develop, or in the case of flash floods, they can occur suddenly with devastating power.
Every State
- **Landslide and Mudflow**
A landslide is a the movement of unstable soil and rocks down the side of a slope.
Every State – Major landslides occur along the West Coast, the western slope of the Rockies, the central Mississippi Valley, and the Appalachian Region.

- **Tornado**

Tornados are extremely violent localized windstorms. A tornado is characterized by a funnel cloud that reaches to the ground with wind velocities inside the funnel as high as 200 miles per hour. Tornados are formed by violent thunderstorms and hurricanes. They appear as a vertical funnel cloud reaching to the ground, and creating an incredibly loud roar. Tornados almost always travel from the southwest to the northeast.

Every State – More frequent in the Midwest, Southeast, and Southwest. The states of Mississippi, Kansas, Arkansas, Oklahoma, Illinois, Indiana, Iowa, Missouri, Nebraska, Texas, Louisiana, Florida, Georgia, Alabama, and South Dakota are at greatest risk.

- **Hurricane**

Hurricanes are severe tropical storms that spiral around a calm center known as the eye. Wind speeds range from 74 miles per hour to a high of 220 miles per hour. As hurricanes approach land, they create a storm surge along the coastline that raises water several feet above high tide levels. Hurricanes also dump heavy rains and cause flooding as they travel inland.

Vulnerable areas in the United States include the territories in the Caribbean, the coast from Texas to Maine, and tropical areas of the western Pacific Ocean, including Hawaii.

- **Winter Storm**

Winter storms vary in size and intensity and may affect a small part of one State or several States at once. Winter storms may be categorized as ice storms, heavy snowfall, or blizzards.

Almost all of the United States, except Hawaii and the Territories are at risk.

- **Drought and Extreme Heat**

A drought is an extended period of unusually dry weather. Droughts become severe if several months pass without significant precipitation.

Extreme heat is defined as temperatures that are 10 or more degrees above the average temperature, and that last for several weeks during the hottest time of the year.

Anywhere in the United States.

- **Wildfire**

Wildfire is any instance of uncontrolled burning in grasslands, brush, or woodlands. Wildfires can be caused by lightning, human carelessness, or arson. Wildfires can occur in all wooded, brush, and grassy areas, especially those in Kansas, Mississippi, Louisiana, Georgia, Florida, the Carolinas, Tennessee, California, Massachusetts, and the national forests in the western States.

- **Earthquake**

An earthquake is a trembling of the ground that results from the sudden shifting of rock beneath the earth's crust. Earthquakes can occur along fault lines where massive plates of rock located beneath the Earth's crust move against one another. Earthquakes have occurred in most areas of the United States. The most frequent earthquake events occur States west of the Rocky Mountains, although

historically the most violent Earthquakes have occurred in the Eastern United States and in the Central Mississippi Valley. California is especially vulnerable because of its high Seismic activity. Other highly vulnerable areas are Charleston, South Carolina, and the central United States (the New Madrid Seismic Zone), both of which were devastated by earthquakes in the last century.

- **Tsunami**

A tsunami is a series of giant sea waves. These are generated by earthquake or Volcanic action on the ocean floor or near coastal areas. Tsunami waves can travel more than 500 miles per hour through open seas and build to heights of 100 feet or more when approaching the shoreline. Tsunamis have occurred mainly in the Pacific. However, it is possible for a tsunami to occur along any coastline.

- **Volcanic Eruption**

A volcano is an eruption from the earth's interior. The material coming from the eruption may be in the form of slow lava flow, or an explosive blast of powdered rock, steam, and other gases. The primary areas affected include the Pacific Rim States of Hawaii, Alaska, Washington, Oregon, and California. Montana and Wyoming also are at risk, but to a lesser extent.

- **Dam Failure**

The failure of dams due to excessive rainfall, volcanic eruption, poor construction, poor maintenance, or earthquake activity can cause catastrophic floods. States; more than 20,000 are classified as posing "high" or "significant" hazards. These designations mean that if such a dam failed, lives could be lost and extensive property damage would be suffered.

Hazardous Materials

Areas at risk would be along highways, rail lines, pipelines, rivers, and port areas. Because major highways run through virtually all local jurisdictions, all sections of the country are at risk.

Radiological Materials

Dangers posed by radioactive wastes are concentrated in the immediate vicinity of the Disposal sites or along transportation routes. Disposal sites are located in remote areas or at nuclear power facilities.

Structural Fire and Explosion

Accidental structural fire and explosion can strike anywhere. Though arson once was confined to major urban areas, it now can occur in practically any community in the United States.

3. Natural Hazards: Applying the Four Phases

SEVERE THUNDERSTORMS

SIGNS AND WARNINGS

Lightning, thunder, and storm clouds occur together. Dark, towering, or threatening clouds are the first indication of possible thunderstorms. Distant lightning and thunder is another sign. Because light travels so much faster than sound, lightning flashes can be seen long before the resulting thunder is heard. To estimate how many miles away a thunderstorm is from your area, count the number of seconds between a flash of lightning and the next clap of thunder, and then divide by five. For example, if there are 10 seconds between the lightning flash and thunder, the storm is two miles away (10 seconds divided by five).

Because thunderstorms may occur singly, in clusters, or in lines, it is possible that several thunderstorms may affect you in the course of a few hours.

The National Severe Storms Forecast Center in Kansas City, Missouri, issues severe thunderstorm watches. Local National Weather Service offices issue warnings and statements about severe weather and localized storms.

A severe thunderstorm watch means that conditions are right for lightning and/or damaging winds greater than 58 miles per hour, hail that could reach a diameter of three quarters of an inch, and heavy rain.

A severe thunderstorm warning means that severe thunderstorms have been sighted in your area.

IMMEDIATE DANGERS

Sudden strong winds often accompany a thunderstorm and may blow down trees across roads and power lines. In a severe thunderstorm the winds can cause extensive damage to roof and windows and may tip over mobile homes.

Lightning presents the greatest immediate danger during a thunderstorm. In an average year lightning kills more people in the United States than the number of persons killed from tornados, floods, and hurricanes combined.

Flash floods and tornados can develop during thunderstorms

Hail can severely damage agricultural crops.

LONG-TERM DANGERS

One or more severe thunderstorms occurring over a period of less than a week can cause extensive power outages, agricultural damage, and may lead to flooding.

MITIGATION

Install lightning rods on all high-risk buildings. Lightning rods will carry the dangerous electrical charge of lightning bolts safely to the ground.

Crops can be insured against loss from storm damage through the Federal Crop Insurance Corporation of the U.S. Department of Agriculture.

Support the adoption and enforcement of a floodplain management ordinance.

Buy flood insurance through your local property insurance agent.

PREPAREDNESS

If you plan to be outdoors, check the latest weather forecast and keep a weather eye on the sky. When you observe signs of an impending storm—towering thunderheads, darkening skies, lightning, increasing wind - tune in your NOAA Weather Radio, AM-FM radio, or television for the latest weather information.

If you live in a mobile home, you should make sure that it has been securely tied down to a solid foundation or ground anchors to keep the wind from shifting it or turning it over.

Designate a safe area in or near your home to shelter your family in a severe thunderstorm.

Teach all family members to pay attention to storm warnings and educate them on what to do in a storm if they are at home, outside, or in a car.

Stock your shelter with candles or flashlights and with a battery-powered radio to listen to weather reports.

RESPONSE

Do not stay in a mobile home during a severe thunderstorm.

Get inside a storm shelter, home or large building, or inside a vehicle (but not a convertible).

If you are inside a home, avoid using the telephone except for emergencies.

If you are outside and do not have time to reach a safe building or an automobile follow these rules:

- Do not stand underneath a natural lightning rod such as a tall, isolated tree in an open area.
- Get out of and away from open water.

- Get away from tractors and other metal farm equipment.
- Get off of and away from motorcycles, scooters, golf carts, and bicycles. Put down golf clubs.
- Stay away from wire fences, clotheslines, metal pipes, rails, and other metallic paths that could carry lightning to you from some distance away.
- In a forest, seek shelter in a low area under a thick growth of small trees. In open areas, go to a low place such as a ravine or valley, but remain alert for flash floods.
- If you are isolated in a level field or prairie and you feel your hair stand on end (which shows that lightning is about to strike), drop to your knees and bend forward, putting your hands on your knees. Do not lie flat on the ground.

If you are in a car, pull safely on to the shoulder and turn on your emergency flashers until the heavy rain subsides.

A person struck by lightning will receive severe electrical shock and may be burned; however, the individual will carry no electrical charge and can be handled safely. Give first aid and call emergency medical assistance immediately.

- If a victim is not breathing, mouth-to-mouth resuscitation should be given immediately to prevent permanent brain damage.
- Victims who appear only stunned or otherwise unhurt may also need attention. Check for burns, especially at fingers and toes and next to buckles and jewelry.

More than one storm may strike an area within a few hours. Once one storm subsides, be certain there are no more storms approaching before resuming your normal activity.

RECOVERY

Have damage to your home and property assessed as required by your property insurance company. Clean up and repair damage as soon as authorized by your insurer.

RELATED EMERGENCIES

Keep in mind that thunderstorms can cause other major natural hazards. Tornadoes and flash floods may be caused by severe storms. Also, lightning is a major cause of wildfires. Thunderstorms originate in clouds called "thunderheads" which form in warm, moist air as it rises above cold air.

FLOOD AND FLASH FLOOD

SIGNS AND WARNINGS

Floods and flash floods almost always occur during or after a period of heavy rain or sudden snowmelt. A flood may be building in your area when you notice local streams and rivers flowing more swiftly and at a noticeably higher level than normal.

Many communities have installed water gauges to help monitor water levels.

Flood warnings are issued by the National Weather Service. Local police, the sheriff, the highway patrol, the county flood control district office, and other local agencies may also supply flood warnings.

- A flash flood watch is issued when flash flooding is possible within the designated watch area; be alert.
- A flash flood warning is issued when a flash flood has been reported or is imminent: take necessary precautions.
- A flood warning is issued as an advance notice that a flood is imminent or is in progress at a certain location or in a certain river basin. Take precautions as directed.

IMMEDIATE DANGERS

The immediate danger from flash floods is from the strength of the water current as it surges through an area, carrying debris and causing injuries and drowning.

Floods can interrupt power, disable fuel sources, and make roads impassable. People may be stranded in their homes, or be unable to reach their homes.

LONG-TERM DANGERS

Dangers include the outbreak of disease, widespread animal death, broken sewage lines and widespread water supply pollution, broken gas lines, downed power lines and fires.

Large-scale flooding can disrupt a community for a long time while utilities are restored, debris is cleared, and property is repaired.

Agricultural lands can be ruined and crops destroyed by flooding.

MITIGATION

Through the National Flood Insurance Program (NFIP), people can protect themselves from financial ruin due to property loss from floods. Ask your local property insurance agency about flood insurance.

Avoid building in a flood plain unless you elevate and reinforce your home. Check local building codes and ordinances. While the cost of protecting your home may be expensive, the investment will save you from the potential of even costlier damage. Remember, the cherished possessions of a lifetime cannot be replaced by money.

PREPAREDNESS

Stockpile emergency building materials such as sandbags, plywood, plastic sheeting, and lumber.

Install check valves in building sewer traps to prevent flood water from backing up in sewer drains.

Keep your car fueled. If electric power is disrupted, gas station pumps maybe out of operation for several days.

Make family evacuation plans. If you are in a flash flood area, have several alternate routes to ensure rapid evacuation.

Maintain emergency supplies such as a first aid kit, water, and foods that require little or no cooking and no refrigeration. A portable radio, emergency cooking equipment, and flashlights should all be maintained in a designated area.

Store drinking water in jugs, bottles, and pans.

RESPONSE

As flood waters rise, take these key precautions:

- Secure all outdoor items or store them inside on upper levels.
- Move all valuable household possessions to upper levels away from rising floods.
- Move cars, machinery, and all livestock to higher ground.
- Check emergency food and water supplies—keep them high and dry.

Listen to radio announcements from emergency officials. If you are told to evacuate, do so immediately. Use only those routes recommended by local authorities. Any other route could be blocked or otherwise made impassable by flooding.

If there is time before evacuation turn off all utilities at the main switch. Do not touch any electrical equipment unless it is in a dry area, or you are well insulated with rubber footwear and gloves.

Do not attempt to drive over a flooded road; you can become stranded or trapped. If your car stalls while in flowing water, abandon it immediately. Cars may only serve as traps in the face of a raging flood.

Do not attempt to cross a flowing stream where water is above your knees.

In a flash flood warning, the only thing to do is move immediately to high ground. Because of the speed with which a flash flood travels, you have no time to save any possessions or implement any precautionary measures. Save your life by moving to high ground without any hesitation.

RECOVERY

If your home, apartment, or business has been damaged and you have a flood insurance policy, immediately call your property insurance agent for advice on what you should do next to receive assistance.

Do not use fresh food that has come in contact with flood waters. Have all drinking water tested by local health authorities before using. Wells should be pumped out and the water tested before drinking.

Before entering a building, check for structural damage; make sure it is not in danger of collapsing.

Open the building and let it air out for several minutes before entering to remove foul odors or escaped gas.

Upon entering the building, do not use a match or lantern as a source of light because of the possibility of gas buildup; a battery powered flashlight is recommended. Check for electrical shorts and live wires. Make certain the power is turned off and do not use any appliances or lights until an electrician has checked your electrical system.

Report broken utility lines to appropriate authorities.

Open all doors and windows to help dry the building. Shovel out mud while it is still moist to give walls and floors an opportunity to dry.

RELATED EMERGENCIES

Keep in mind that floods can cause landslides, mudflows, and power outages.

LANDSLIDE AND MUDFLOW

SIGNS AND WARNINGS

Landslide warning signs include opening of cracks on hill slopes—evidence of slow, downhill movement of rock and soil; tilting of trees, poles, or walls; or perceptible changes such as the formation of sags and bumps in the slope.

Mudflows are most commonly triggered by high-intensity rainstorms, but can also occur following forest fires when soil is newly bare. They tend to flow in channels, but will often spread out over the flood plain. They generally occur in places where they have occurred before.

If you suspect a slope is unstable, have a specialist examine the slope. Possible signs of slope failure include the following:

- Doors or windows sticking or jamming for the first time;
- New cracks appearing in plaster, tile, brick, or foundations;
- Outside walls, walks, or stairs beginning to pull away from the building;
- Slowly developing, widening cracks appearing on the ground or on paved
- Underground utility lines breaking;
- Fences, retaining walls, utility poles, or trees tilting or moving; and/or
- Water or bulging ground appearing at the base of a slope.

IMMEDIATE DANGERS

Immediate dangers from landslides or mudflows include injuries, fatalities, and destruction of property as rocks, mud, and water slide downhill or downstream.

LONG-TERM DANGERS

Long-term, slow-moving landslides destroy many structures each year by gradual downhill movement. Once such movement begins it is very difficult to control.

Associated dangers include broken electrical, water, gas, and sewage lines. Fires also may be started by damaged electrical wires and gas lines.

Other long-term dangers from this hazard include the continued threat of landslides due to unstable land. Erosion from the loss of adequate ground cover could be very damaging and lead to flash flooding during periods of heavy rain or following heavy snows.

MITIGATION

Before buying land or building on any property, check with the county land commissioner or with the local office of the U.S. Geological Survey for ground composition, drainage, and stability.

Plant groundcover on slopes, or build retaining walls.

Reinforce the foundation and walls of your home.

Install flexible rather than stiff pipe fittings to avoid gas or water leaks in the event of a landslide or mudflow.

In mudflow areas, construct channels or reinforced masonry walls to direct the mudflows around your home or buildings.

Mudflow is covered by flood insurance policies from the National Flood Insurance Program. Buy flood insurance through your local property insurance agent.

PREPAREDNESS

Be prepared to evacuate your home.

RESPONSE

If you are warned of an impending landslide or mudflow, evacuate at once to stable ground.

If you are inside a building during a landslide, stay inside and get under a desk, table, or other piece of sturdy furniture.

If you are outside and cannot get into a sturdy building while scattered rocks and debris tumble toward you, curl into a tight ball and protect your head.

Usually, you can survive a mudflow only by avoiding it. If you are in a valley, get out as soon as possible once you hear rumbling from upstream or feel the ground tremble. These are signs that a mudflow may be coming your way.

RECOVERY

If a landslide or mudflow has occurred near your home, thoroughly check the

Check for damaged gas, electrical, or waterlines. Do not strike a match or attempt to turn on electricity until you are sure it is safe. Report damages to the appropriate utility companies.

Stabilization of new land should take place as quickly as possible to reinforce against secondary slippage.

Replanting damaged land will help tremendously in both short- and long-term

TORNADO

SIGNS AND WARNINGS

Tornados develop during severe thunderstorms and hurricanes. While not all thunderstorms and hurricanes create tornados, the potential is there. During violent weather, keep tuned to a local television or radio station for tornado reports.

If you are outside and see a funnel-shaped cloud with obvious rotating motion, it may be a tornado. As a tornado develops, it will produce a loud roar that grows louder as the funnel cloud touches the ground. When nearby, a tornado has a loud sound comparable to the combined roars of several jet engines.

The National Severe Storms Forecast Center in Kansas City, Missouri, issues tornado watches. Local National Weather Service offices issue tornado warnings. Local officials may sound sirens in a tornado warning.

- A tornado watch indicates that conditions are right for a tornado to develop and that the sky should be watched.

- A tornado warning indicates a tornado has been sighted or is spotted on radar. Warnings will give the location of the tornado and the area immediately affected by the warning.

IMMEDIATE DANGERS

The immediate threat from tornados is danger to life and damage to property from violently whirling winds and debris hurled through the air by the winds.

LONG-TERM DANGERS

Long-term risks include the possibility of building collapse, fallen trees and power lines, broken gas lines, broken sewer and water mains, and the outbreak of fires. Agriculture, crops, and, industries may be damaged or destroyed.

MITIGATION

Follow relevant building code practices such as the use of wind-resistant design.

PREPAREDNESS

The best preparation for a tornado is to designate a safe place in or around your home as a tornado shelter. Tornado shelters are safest if they are underground.

A storm cellar or basement away from windows offers the best protection.

If neither of these is available, plan to find shelter under heavy furniture or mattresses near an inside wall of your house on the ground floor. Get under solid

furniture or cover yourself with mattresses pulled off the bed.

Plan tornado drills with your family so everyone knows what to do.

Know the location of the designated shelter where you work or go to school.

Plan to evacuate your manufactured (mobile) home.

Make an inventory of your household furnishings and other possessions. Supplement the written inventory with photographs or video. Keep inventories and pictures in a safe deposit box or some other safe place away from the premises.

RESPONSE

If you have a storm cellar or shelter, go to it immediately with your family. If no shelter is available, go to your basement and get under a heavy workbench or stairs. Do not position yourself directly underneath heavy appliances on the floor above you.

If your home has no basement, stay in the center of the house away from the windows or in a small room on the ground floor that is away from outside walls. Take cover under solid furniture or mattresses. Protect your head.

In mobile homes or vehicles, leave and take shelter in a substantial structure. If there is no nearby shelter, lie flat in the nearest ditch or ravine with your hands shielding your head.

In any large building, such as an office or a department store, avoid all large, poorly supported roofs. Go to the basement or to an inner hallway on a lower floor.

Do not drive. You are safer in a home or basement shelter than in a car.

If you are driving in a city and spot a tornado, get out of your car and go in to a nearby building.

If you are driving in open country, drive at a right angle away from the tornado's path if you can safely do so. Do not try to outrun the storm. If you cannot avoid the tornado, get out of your car. Lie flat in the nearest depression, such as a ditch, culvert, or ravine. Protect your head, and stay low to the ground.

RECOVERY

After a tornado passes, keep tuned to the local radio or TV station to get an all-clear signal before leaving your shelter. Sometimes more than one tornado will develop during a violent storm.

Re-enter buildings with extreme caution.

Be alert to fire hazards such as broken electrical wires or damaged electrical equipment, gas or oil leaks, or smoldering piles of wet hay or feed. Report broken utility lines to the appropriate authorities.

Have damage to your property assessed by your insurance company.

RELATED EMERGENCIES

Tornados are part of a severe thunderstorm and bring with them the dangers of lightning, high winds, floods, and flash floods from extremely heavy rainfall.

HURRICANE

SIGNS AND WARNINGS

As a hurricane approaches, the skies will gradually darken over the ocean or gulf, and winds will continue to grow in velocity. The barometric pressure will fall, winds will increase, and rain will fall in torrents.

The National Hurricane Center in Miami monitors weather data and will issue forecasts for hurricanes in the Atlantic Ocean, Caribbean Sea, Gulf of Mexico, and the eastern Pacific Ocean. Your local National Weather Service office, as well as local and State officials, may disseminate hurricane information.

Learn the terminology used to convey hurricane emergency information.

- A hurricane advisory tells where the storm is located, the intensity of wind speeds, and the direction of movement.
- A hurricane watch is issued for a coastal area when there is a threat of hurricane conditions within 24 to 36 hours. In some more vulnerable areas, actions for protection of life and property should begin at this point.
- A hurricane warning is issued when hurricane conditions are expected in a specified coastal area in 24 hours or less. Hurricane conditions include winds of 74 miles an hour (64 knots) and/or dangerously high tides and waves. Final actions for protection of life and property should be completed as quickly as possible before high winds and heavy rains arrive.

IMMEDIATE DANGERS

The storm surge can destroy property along a coastline and is the major threat to life. Dangers associated with a hurricane emergency include extremely high winds that can demolish houses, uproot trees, and fill the air with debris. Tornadoes may develop as a hurricane passes.

LONG-TERM DANGERS

Long-Term hazards come in the form of interrupted gas, water, and electric power, fires and explosions from gas leaks, fallen power lines, electrical short circuits, and contaminated food and water.

MITIGATION

Retrofit your home to withstand wind and flooding. Coastal homes in flood hazard areas should be elevated. All windows should be shuttered, and structural connectors reinforced. Un-reinforced masonry should be strengthened. Consult FEMA's Coastal Construction Manual (FEMA-55) for guidance (see page R-1).

Support the adoption and enforcement of floodplain management requirements.

In addition to your property insurance, buy a flood insurance policy from your insurance agent. Renters also can buy a flood policy for personal property.

PREPAREDNESS

Learn about hurricanes - the warnings, the dangers, and how to protect your property, your family, and yourself.

Be prepared as each hurricane season begins. Every June, recheck your window shutters and supply of boards, tools, batteries, nonperishable foods, bottled water, and other equipment needed to ensure your safety.

Plan a flood-free evacuation route if your area is vulnerable to flooding or if you live in a mobile home.

Make a household inventory with pictures or a video and keep it with your insurance policies in a safe place such as a safety deposit box.

RESPONSE

When your area receives a hurricane watch, keep calm; plan your time before the storm arrives and avoid a last-minute rush that might leave you marooned or unprepared. Take the following precautions.

- Listen for weather updates.
- Moor your boat securely, or move it to a designated safe area.
- Board up your windows, or protect them with shutters or tape to reduce danger from wind-driven debris and high wind pressure.
- Secure outdoor objects such as tools, porch furniture, garbage cans, and bicycles that could become deadly projectiles in, hurricane winds. Store them inside if possible.
- Store drinking water in clean bathtubs; bottles; and pans. Ensure batteries are fresh and in sufficient quantity.
- Keep your car's gas tank filled during a hurricane watch. Service stations may be closed for several days after a hurricane, due to power outages and flooding.

Manufactured (mobile) homes are extremely susceptible to high winds and should be evacuated for more substantial shelter.

Evacuate low-lying areas when ordered by officials, and turn off utilities at the

main switch, if time permits.

Stay at home only if it is safe to do so. If you are advised to evacuate, follow directions of local officials.

When a hurricane strikes, stay indoors away from windows.

Travel is extremely dangerous during high winds and storm surges. Do not attempt to travel by car or foot once high winds reach your area.

If the storm center passes directly overhead, the wind will calm down to a period lasting from a few minutes to half an hour or more. Do not be fooled into thinking the hurricane has passed while the eye is over your area. Many people lose their lives by making this mistake. When the winds begin again, they will grow rapidly to hurricane force, and come from the opposite direction.

Severe flooding may follow hurricanes as they move inland. Stay away from river banks and streams. Monitor National Weather Service advisories on flood stages.

RECOVERY

If you evacuated; return home when authorities tell you it is safe. Before entering, be sure the structure is safe to enter.

Call your insurance agent and take pictures of damage to your house and its contents. Hose down hard goods such as major appliances and furniture, even if they are destroyed. You need to keep these for the adjuster's inspection. The adjuster will help you make decisions on whether to repair possessions or replace them.

Throw out perishable or water-contaminated foods.

Avoid loose or dangling wires, and report them to the power company.

Report broken sewer or water mains to the water department.

Check for gas leaks, and do not strike a match or relight appliances until they have been inspected.

Open windows and doors to let the air circulate. This will help remove foul odors and protect you from escaping gas. It also will help dry out the house.

Pump out the basement if it is flooded, but do it gradually. Drain one-third of the flood water each day, to minimize further structure damage. Shovel out the mud while it is still moist, and dry rugs and carpets thoroughly.

Make any temporary repairs necessary to prevent further losses.

Assure that substantially damaged structures are elevated above the base flood

elevation when reconstructed.

RELATED EMERGENCIES

Hurricanes can be accompanied by other severe storm hazards such as lightning, tornados, and flooding.

WINTER STORM

SIGNS AND WARNINGS

The National Weather Service issues watches and warnings for hazardous winter weather. Keep informed by listening to weather forecasts on radio or TV and reading local newspapers. Know the terms used to describe storm status.

- Winter storm watch	Severe winter weather may affect your area.
- Winter storm warning	Severe winter weather conditions are expected.
- Ice storm warning	Significant, possibly damaging, ice accumulation is expected.
- Heavy snow warning	A snowfall of at least four inches in 12 hours or six inches in 24 hours is expected.
- Blizzard warning	Large amounts of falling or blowing snow and winds of at least 35 miles per hour are expected for several hours.
- Severe blizzard warning	Considerable falling or blowing snow, winds of at least 45 miles per hour, and temperatures of 10 degrees Fahrenheit or lower are expected for several hours.
- High wind warning	Winds of at least 40 miles per hour are expected to last at least one hour.
- Travelers' advisory	Ice and snow are expected to hinder travel, but the anticipated weather conditions are not serious enough to require warnings.

IMMEDIATE DANGERS

Heavy snowfall and blizzards can trap motorists in their cars, cause major traffic accidents, and trap people in their homes.

Ice storms can break power lines, causing widespread blackouts.

Fire during winter storms presents a great danger because water supplies may freeze and the firefighting equipment may not be able to get to the fire.

One of the more serious dangers accompanying any winter storm is the threat of physical overexertion that can lead to heart attacks and strokes. While this occurs more often among older people, younger individuals also should take precautions.

LONG-TERM DANGERS

If the storm lasts more than one or two days, there is a greatly increased possibility of utility failures and interruption of services. This can lead to extreme hardship and even death from extended exposure to cold temperatures.

MITIGATION

Purchase a flood insurance policy to cover possible flood damage that may occur during the spring thaw.

PREPAREDNESS

Be prepared for isolation at home, particularly if you live in a rural area. It is highly possible that a severe winter storm could isolate you for one or two weeks.

Insulate your home so you will be able to conserve heat better.

Use your radio, television, and newspapers to keep informed of current weather conditions in your area. You can better understand weather predictions by knowing the different types of winter storms. Knowledge of weather predictions will also help you to prepare better for the storm before it hits.

Have fuel and a safe type of emergency heating equipment available in case of power failures that would shut down standard furnaces. A camp stove with fuel or a supply of wood or coal for your fireplace could be used for emergency heat. Be prepared to keep at least one room of your house warm enough to live in for a week or two.

Be sure that all family members know how to use your emergency heating and lighting equipment safely to prevent fires or dangerous fumes. Proper ventilation is essential. Never use fuel in equipment that was not designed for that fuel. Burning charcoal will give off deadly amounts of carbon monoxide. Burning it indoors, even in a fireplace, is dangerous.

Stock an emergency supply of food and water. It is more practical to have some foods that do not require cooking or other preparation.

Should a power failure occur, have a battery-powered radio and extra batteries on hand so you can listen to weather forecasts, emergency information, and other advice broadcast by local authorities. Also, have flashlights, lanterns, candles, and matches ready for use.

Always have on hand simple tools and other equipment needed to fight a small fire. Winter storms may interrupt fire department services.

Keep your car winterized with antifreeze. Carry a winter car kit that includes food and water, a windshield scraper, a flashlight, a tow chain or rope, a shovel, tire chains, a blanket, a bag of sand or salt, a fluorescent distress flag, and an

emergency flare, in case you are trapped in a winter storm. Keep extra mittens, hats, and outerwear in the car.

RESPONSE

Do not be fooled if a winter storm seems mild as it begins. Some storms may take several hours to move into an area and may last for several days.

Cold weather itself, without any physical exertion, puts an extra strain on your heart. If strenuous physical activity such as shoveling snow, pushing a car, or even walking fast or far through deep snow is added to your body's over worked system, you are risking serious or fatal results. In any cold weather, and especially during winter storms, be aware of this danger and avoid overexertion.

Avoid all unnecessary trips. If you are at home when a winter storm strikes, plan to stay there.

If you must be outdoors, wear several layers of loose-fitting, lightweight, protective clothing rather than a single layer of thick clothing. Mittens are warmer than gloves. Hoods should be worn to protect your head and face. Cover your mouth to protect your lungs from the extremely cold air.

If you are traveling and your car breaks down, or if you become stalled or lost, think through the problem, decide what is the safest and best thing to do, and do it slowly and carefully.

If you are stuck on a well-traveled road, display a trouble signal on your flashing hazard lights, raise the hood of your car, or hang a bright cloth from the antenna or car window.

Stay in your car and wait for help. Do not leave your car to search for assistance unless you are absolutely certain you can find help within one hundred yards of your car. It is very easy to become disoriented and lost during a severe storm.

While in your car awaiting assistance, take the following precautions.

- If you run your engine to keep warm, remember to keep snow away from the exhaust pipe. Keep a window open slightly to provide proper ventilation and protection from carbon monoxide poisoning.
- Do not let everyone in the car sleep at the same time.
- At night, turn on the inside dome light so work crews can spot you.

RECOVERY

After the storm, check on the neighbors in your immediate area. Be sure they have proper heating and sufficient supplies to get them through the emergency.

Check roofs for damage from heavy snow.

Avoid overexertion while clearing snow by working slowly and taking frequent breaks, particularly if you become dizzy or tired.

Keep in mind that large amounts of snow can lead to localized flooding if warmer temperatures melt the snow in a short period of time.

DROUGHT AND EXTREME HEAT

SIGNS AND WARNINGS

Local community officials will alert you through your local newspaper, radio station, or television station when drought and extreme heat conditions exist in your area. Although extreme heat conditions are easily recognized, drought conditions develop so slowly that it is recommended that you keep track of local weather advisories so you can take proper action as drought conditions become more likely.

IMMEDIATE DANGERS

There are three stages of danger from extreme heat.

- | | |
|-------------|--|
| Strain | Occurs when hot weather and / or exertion threaten to raise your body core temperature above 99 degrees Fahrenheit. |
| Impairment | Occurs when your body temperature approaches 102 degrees Fahrenheit, creating an abnormal internal state that disrupts normal physical and mental functions. |
| Emergencies | When heat strain from overexposure lasts too long or becomes too severe, collapse from water depletion, heatstroke, or heart attack may occur. |

LONG-TERM DANGERS

A prolonged drought can have serious economic impact on a community. Agriculture production can be damaged or destroyed by loss of crops or livestock, resulting in food shortages. Increased demand for water and electricity can result in shortages of these resources. When combined with extreme heat, droughts can make life very difficult, especially if the situation lasts for a long time.

MITIGATION

Practice personal water conservation measures to avoid depletion of water supplies both before and during periods of extended drought. An example of a water conservation measure is to place a brick, or other large, solid object, in the flush tank of your toilet. This reduces the amount of water used in flushing.

If you are a farmer, consider establishing alternative sources and supplies of water.

Conserve electricity. During periods of heat and drought, people use a lot of power for air conditioning. Excessive drain on the community's energy supply could lead to another emergency, such as a power shortage or outage. Insulating your home will reduce the demand for air conditioning; keeping the thermostat set to 78 degrees F will also reduce energy use.

PREPAREDNESS

All family members should learn to recognize heat impairment symptoms and administer appropriate first aid.

HEAT DISORDER	SYMPTOMS	FIRST AID
Sunburn	Redness and pain. In severe cases swelling of skin, blisters, fever, headaches	Ointments for mild cases if blisters appear and do not break. If breaking occurs, apply sterile dressing. Serious, extensive cases should be seen by a physician
Heat cramps	Painful spasms usually in muscles of legs and abdomen. Heavy sweating	Firm pressure on cramping muscles, or gentle massage to relieve spasm. Give sips of water. If nausea occurs, discontinue use.
Heat exhaustion	Heavy sweating, weakness, skin cold, pale, and clammy. Pulse thready. Normal temperature possible. Fainting and vomiting.	Get victim out of sun. Lay down and loosen clothing. Apply cool, wet cloths. Fan or move victim to air conditioned room. Give sips of water. If nausea occurs, discontinue use. If vomiting continues, seek immediate medical attention.
Heat stroke (or sunstroke)	High body temperature 106 degrees F or higher Hot dry skin. Rapid and strong pulse. Possible unconsciousness	HEAT STROKE IS A SEVERE MEDICAL EMERGENCY. SUMMON EMERGENCY MEDICAL ASSISTANCE OR GET THE VICTIM TO A HOSPITAL IMMEDIATELY. DELAY CAN BE FATAL. Move the victim to a cooler environment. Reduce body temperature with cold bath or sponging. Use extreme caution. Remove clothing, use fans and air conditioners. If temperature rises again Repeat process. Do not give fluids.

For more information, enroll in a First Aid course through your local Red Cross.

RESPONSE

Extreme Heat

During periods of extreme heat, limit your heat exposure by wearing loose-fitting, porous clothing, and a hat with a wide brim.

While in direct sunlight, keep as much of your skin covered as possible and use a sunscreen lotion with a rating of 15 or above. Sunburned skin cannot sweat.

Pace yourself while working. Begin at a very slow pace and continue until you achieve normal pulse and breathing rates at your working level. Do not exceed this pace.

Replace sweat by drinking water to keep the body fluid volume and salt level as close to normal as possible. Although beer and other alcoholic beverages appear to satisfy thirst, they cause further dehydration of your body.

Check with your physician to see if you should take additional salt during times of heat.

Rest regularly. This allows your natural cooling system to work. A few minutes of sweat-free rest every hour will help restore physical and mental energy. Soaking hands or feet in cool water also will help lower your body temperature.

Drought

Curtail all non-essential water uses. Watering your lawn and washing your car are not essential to your well-being.

Re-use water whenever possible.

RECOVERY

Continue to conserve water even after the drought appears to have ended.

If you own a farm and your crop is lost, contact the county Farmers' Home Administration Office for disaster assistance information.

RELATED EMERGENCIES

Keep in mind that drought conditions, with or without extreme heat, can, greatly increase the risk of forest fires. As the forest dries up, debris on the forest floor, as well as the trees themselves, become prone to fire, even from the slightest spark. The loss of vegetation in the absence of sufficient water can result in flooding, even from average rainfall, following drought conditions.

WILDFIRE

SIGNS AND WARNINGS

Wildfires can occur at any time of the year, but usually are concentrated during hot, dry weather.

Wildfires are usually signaled by dense smoke that fills the air for miles around.

The National Weather Service, U.S. Forest Service, and State forestry agencies combine to give fire weather forecasts. Local radio and TV stations broadcast forecasts and warnings concerning local fire conditions.

Large forested areas may have watchtowers where spotters look for signs of fires and alert fire fighters immediately

IMMEDIATE DANGERS

The immediate danger from wildfire is destruction of timber, property, wildlife, and injury or loss of human life. Persons who live in the affected area or who are using recreational facilities in the forested area where the fire breaks out are in danger of being trapped.

LONG-TERM DANGERS

Wildfires can leave a large amount of scorched and barren land. This land may take many years or decades to return to its pre-fire condition. Major fires can destroy groundcover, which leads to erosion. If heavy rains follow a major fire, flash floods, landslides, and mudflows can occur. Once trees are gone there is nothing left to hold soil in place or to hold back rainwater or slopes.

MITIGATION

Use only fire-resistant materials on the exterior of your home, including roof, siding, decking, and trim.

Use fire carefully and wisely so that you do not cause a fire. Teach family members safe practices.

Install a spark arrestor on your chimney.

Keep your chimney clean and avoid open burning during dry weather.

Store firewood well away from your home.

Clean roof surfaces and gutters regularly.

PREPAREDNESS

Learn how to recognize dangerous fire conditions.

Provide wide spacing between trees. For trees within 100 feet of your house, remove tree limbs within 15 - 20 feet of the ground or over roofs, and limbs that are above or near a chimney.

Use fire-resistive plants. Check with local fire officials about the best species for your area.

Plan several evaluation routes in case fires block your escape.

Clear an open space around your house to serve as a fire break - at least 30 feet wide for all structures and 75 feet wide for homes built in pine forests.

Have fire tools handy: a ladder, garden hose, shovel, rake, and bucket.

RESPONSE

If water sprinklers and adequate water are available, leave sprinklers on roofs and anything else that might be damaged by fire. Be sure that efforts by you and your neighbors to protect your property do not leave firefighters without the huge amounts of water that will be needed to fight the blaze. Place valuables that will not be damaged by water in a pool or pond, or take them with you.

If officials are evacuating your area, do not hesitate to leave. Fires can spread rapidly and unpredictably.

If you are on an outing in a forest when a fire breaks out, note the weather conditions and wind direction. Find out the direction of the fire and plan your escape routes in other directions. Evacuate quickly - fires can spread at rapid speeds.

If you are caught in a wildfire, knowledge of survival techniques could save your life.

- Look for a nearby body of water and crouch in it, covering your head and upper body with a wet shirt or other article of clothing.
- Look for a rock outcropping or cleared area to obtain shelter from the fire.
- If possible, breathe through a wet handkerchief or wet piece of clothing to avoid scorching your lungs or inhaling smoke.
- Oxygen may be in short supply, so try to remain calm to reduce the rate at which you use oxygen. If possible, breathe the less smoky air close to the ground.

- Do not try to outrun a fire that is burning uphill. Instead, move at right angles

RECOVERY

Care must be taken in reentering burned forest areas. There still may be hotspots that could flare up without warning.

Replant burned-out forests quickly and efficiently in order to reduce the soil erosion caused by the loss of trees in an area. Ask your State forestry commission for guidelines.

Consult your insurance agent and have damages assessed as soon as possible.

RELATED EMERGENCIES

Keep in mind that landslides, mudflows, and floods can occur following a wildfire. Once trees and ground cover have been burned away, there is not much left to hold soil in place on steep slopes and hillsides.

EARTHQUAKE

SIGNS AND WARNINGS

Earthquakes usually occur without warning. If an earthquake is occurring in your area, you will feel a trembling in the ground or floor. You may notice curtains or trees vibrating and swaying.

Earthquake monitoring is conducted by the U.S. Geological Survey, the National Oceanic Atmospheric Administration, and universities throughout the United States. However, the exact time and place an earthquake will occur still cannot be predicted precisely.

Earthquakes tend to reoccur along fault lines (fractures in the earth's surface). Though quakes usually strike without warning, scientists have produced risk maps that show areas where an earthquake is likely to occur. Other clues to the probability of a quake come from studying faults, measuring the tilt of the earth's crust, watching changes in the water levels of wells, and even observing the behavior of animals.

IMMEDIATE DANGERS

The actual movement of the ground is seldom the direct cause of death or injury. Earthquake-related casualties are commonly caused by (1) partial or total building collapse, including toppling chimneys or walls, falling ceiling plaster, light fixtures, and pictures; (2) flying glass from broken windows and skylights (this danger may be greater from windows in high-rise structures); (3) overturned bookcases, fixtures, and other large furniture and appliances; (4) fires from broken chimneys and broken gas lines; (5) fallen power lines; and (6) an inappropriate or drastic human reaction caused by fear.

Fires caused by earthquakes are particularly dangerous. Water mains may be broken and fire fighting equipment may be unable to reach the fire. Broken gas lines often are a major cause of earthquake-related fires.

LONG-TERM DANGERS

Earthquakes can cause damage to buildings, utility lines, bridges, or dams. Water supplies can become contaminated by seepage around broken water mains. Damage to roadways and to other means of transportation may create food and other resource shortages if transportation is interrupted.

MITIGATION

Check your home for potential earthquake and fire risks. Bolt down or reinforce water heaters and other gas appliances, since fire damage can result from broken gas lines and appliance connections. Use flexible connections wherever possible. Place large and heavy objects on lower shelves, and securely fasten shelves to walls. Brace-anchor all tall or top-heavy objects.

Affix tabletop equipment (such as computers or typewriters) with industrial strength Velcro. Overhead lighting fixtures should be anchored solidly in place. A little extra wire is usually all that is necessary.

Deep plaster cracks in ceilings and foundations should be investigated and repaired by experts, especially if there are signs of structural defects.

Be sure the house is firmly anchored to its foundation.

Purchase earthquake insurance.

Support local safe land use and building codes that regulate land use along fault lines. Insist on code inspection and enforcement in areas where damaging earthquakes can be expected. Modern engineering can produce structures that resist earthquake damage much better than older masonry buildings, and existing buildings can be "retrofitted" to better withstand tremors. If you live in a high-risk area where no such regulations or codes exist, you should support their enactment.

PREPAREDNESS

Provide your family with the knowledge of how to protect themselves during an earthquake. Conduct calm family discussions about earthquakes and other possible disasters. Do not tell frightening stories about disasters. Be prepared to survive for 72 hours without any assistance, even from local resources.

Help organize and support earthquake preparedness programs in your community. For example, your local emergency management agency, schools, volunteer agencies active in disasters, or civic organizations could hold earthquake drills and public education programs to prepare citizens for when earthquakes occur.

Teach responsible members of your family how to turn off gas, electricity, and water at main switches and valves. Check with your local utilities offices for instructions.

Learn how to extinguish small fires and to provide emergency first aid.

Conduct family earthquake drills. Know where the safest places are at home, work, or school.

Ensure that batteries are on hand for your radio and for flashlights in the event of power failure.

RESPONSE

Above all, remain calm, try to reassure others, and think through the consequences of any action you take. If you are indoors, stay indoors; if outdoors,

stay outdoors.

If you are indoors, take cover under a sturdy piece of furniture (such as a heavy desk, table, or bed) to protect yourself from falling objects such as falling plaster, bricks, light fixtures, high bookcases, china cabinets, shelves, and other furniture that might slide or topple. Stay away from objects that can shatter (such as windows, mirrors, or skylights) and from chimneys. DO NOT run outside - you could be injured by falling objects or live wires. Encourage others to follow your example.

If you are in a high-rise building, do not dash for exits. Stairways may be broken or jammed with people. Power for elevators may fail.

If you are in a crowded store or mall, do not rush for a doorway since many other people may have the same idea. If you must leave the building, choose your exit as carefully as possible.

If you are outside, get away from buildings, walls, utility poles, downed wires, and all other objects that could fall. If possible, move to an open area away from hazards and stay there until the shaking stops.

If you are in a car, stop as quickly as safety permits, but stay in the vehicle until the shaking stops. Avoid bridges, underpasses, and tall buildings.

Check for injuries and attend to them; seek medical help if necessary.

Check for fires or fire hazards.

RECOVERY

If you are unsure of a building's safety, do not enter until it has been inspected by a qualified person.

Check utilities. Earth movements may have broken gas, electrical, and water lines. If you smell gas, open windows and shut off the main gas valve. Shut off electrical power if there is damage to your house wiring. Leave the building and report damage to the appropriate utility companies; follow their instructions. Do not use matches, lighters, or open-flame appliances until you are sure there are no gas leaks. Do not operate electrical switches on appliances if gas leaks are suspected.

Do not eat or drink from open containers near shattered glass.

Immediately clean up spilled medicines and potentially harmful materials.

Check to be sure that sewage lines are intact before permitting toilets to be flushed.

Do not use your telephone except for genuine emergency calls. Turn on your

battery-operated radio for damage reports and information.

Check closets and all storage shelf areas. Open closet and cupboard doors carefully, watching for objects falling from the shelves.

Check your chimney over its entire length for cracks and damage. First check from a distance, and then move closer if it appears to be safe. Check particularly in the attic and at the roof line. Unnoticed damage could lead to a fire. Always approach chimneys with extreme caution.

Be prepared for additional earthquake shocks (called aftershocks). While the aftershocks are usually smaller than the main shock, some may be large enough to cause additional damage.

Have damage to your home assessed by your property insurance claims adjuster.

Do not go sightseeing; stay away from beach and water front areas where seismic sea waves (tsunamis) may strike. Keep the streets clear for passage of emergency vehicles. Stay out of severely damaged buildings. Aftershocks can shake them down.

Execute repairs that will increase the structure's ability to withstand future quakes.

RELATED EMERGENCIES

Keep in mind that natural disasters, such as earthquakes, have the potential to trigger other emergency conditions such as tsunamis, fires, major landslides, dam failures, power plant ruptures, and hazardous materials spills. Be certain you are prepared for all of these disasters if you live in an earthquake-prone area.

TSUNAMI

SIGNS AND WARNINGS

If you live near a coastal area and have experienced or heard of a recent earthquake or volcano, listen to your radio for a tsunami warning. The Pacific Tsunami Warning System in Honolulu issues tsunami warnings to affected coastal areas.

Tsunamis can be detected before they strike land. If you hear of a tsunami warning, do not go down to the beach to look for the tsunami. If you can see it, you will be too close to escape it.

Approaching tsunamis usually are preceded by a pronounced rise or fall of coastal water. This action is nature's tsunami warning and should be heeded. Many people have been trapped while exploring the newly uncovered sea bottom in the aftermath of a rapid retreat of ocean water beyond the normal low-tide line.

The Pacific Warning System in Honolulu monitors disturbances that could trigger a tsunami. Local warning systems, developed for Alaska and Hawaii, augment the Pacific system. When a tsunami is spotted, it is tracked and a tsunami warning is issued to the threatened area. This warning should be heeded.

Your community may be warned by radio or television announcements. Local police, fire, or emergency officials may go door-to-door in threatened areas. Outdoor sirens may sound to warn of the dangers.

IMMEDIATE DANGERS

Immediate dangers from tsunamis are drowning, flooding, and widespread property damage.

LONG-TERM DANGERS

Associated risks include broken sewage lines, polluted water supplies, damaged gas lines, and downed power lines.

MITIGATION

The most effective mitigation measure to avoid property damage is not to build or live in buildings within several hundred feet of the Pacific coastline. Even the strongest buildings can be damaged or undermined by a powerful tsunami.

If you must live in a coastal building, purchase flood insurance to assure that you will be financially protected in the event of a flood-related loss.

PREPAREDNESS

Plan several escape routes to high ground. Your primary escape route might be damaged or destroyed if a local earthquake strikes. Be prepared to evacuate low-lying coastal areas immediately.

Learn the warning signs and signals and heed them.

Stay off the beach during unusual tidal action.

RESPONSE

Upon hearing an official tsunami warning or detecting signs of a possible tsunami, move inland to higher ground as quickly as possible. Tsunamis can travel at such tremendous speeds that any warning must be acted upon immediately.

Since a tsunami is not a single wave but a series of waves, stay out of dangerous areas until an "all clear" is issued by an authorized official.

Check for injuries and seek medical help if necessary.

RECOVERY

If your home, apartment, or business has been damaged, immediately call your insurance agent, who will advise you what to do next.

Do not use fresh food that has come in contact with floodwaters. Have all drinking water tested by your local health department before use wells should be pumped out and the water tested before drinking.

Before entering a building air it out for several minutes to remove foul odors or escaped gas.

Upon entering the building, do not use a match or a lantern as a source of light because of the danger of gas build-up; use a battery-powered flashlight instead. Check for electrical shorts and live wires. Make certain power is turned off, and do not use any appliances or lights until an electrician has checked your electrical system.

Open all doors and windows to help the building dry. Shovel out mud while it is still moist to give walls and floors an opportunity to dry.

VOLCANIC ERUPTION

SIGNS AND WARNINGS

A volcano may show signs of erupting weeks or months in advance. Earthquakes, earth tremors, and steam vents around a volcano can signal an eruption.

Volcanoes can erupt with a force that makes the earth tremble and fills the air with a deafening roar.

The U.S. Geological Survey assesses all information related to the development of impending geological disasters. They inform the public and appropriate local, State, and Federal authorities. Warnings include information about the approximate time, place, and extent of the effects, as well as the uncertainties involved in making the prediction.

Communities located near active volcanoes should have warning sirens to be sounded if a major erupt on occurs.

IMMEDIATE DANGERS

The degree of hazard to human life and property resulting from a volcano depends upon the type and distance from the eruption. Hazards include lava flows, rock falls, earthquakes, mudflows, and flash floods.

LONG-TERM DANGERS

Secondary eruptions and lava flows can occur days, weeks, or months after a volcanic eruption.

Hazards within the immediate vicinity of the volcano come from heavy ash fall, which can darken the sky as if it were nightfall. The increased demand for electric lighting could result in power failures. The ash may be carried by winds for thousands of miles and affect distant areas long after the eruption.

The ash is actually pulverized rock. A one-inch layer weighs ten tons per square foot. Ash can clog waterways, reservoirs, and machinery, and its weight can cause roofs to collapse.

PREPAREDNESS

Learn methods of protecting your family and home from ash fall from your local emergency office.

Have emergency lighting and heating supplies available in case of a power failure.

RESPONSE

Heed official warnings of imminent volcanic eruption. If told to evacuate, do so immediately.

If caught in a small rock fall (not a landslide); roll into a ball and protect your head!

Immediately following an eruption, flash floods resulting from glacier out bursts can overflow dams and reservoirs. Avoid stream beds and valleys in the vicinity of a volcano. If caught in a low area, run uphill to avoid a flash flood or mudflow.

During ash fall, close all windows, doors, and dampers in your home. Put all machinery inside a garage or barn. Bring animals and livestock into closed shelters. If ash is falling, stay indoors until the ash has settled.

If caught outside during ash fall, keep your mouth and nose covered to avoid inhalation of ash. Cover your eyes and keep your skin covered to avoid irritation or burns.

Do not attempt to drive in, heavy ash fall. Driving will stir up more ash and ultimately clog and stall your vehicle.

RECOVERY

Clear roots of ash fall as soon as possible to avoid collapse from too much weight.

RELATED EMERGENCIES

Volcanic eruptions can generate mild to moderate earthquakes, mudflows, flash floods, and huge ash clouds, which can create intense lightning storms.

DAM FAILURE

SIGNS AND WARNINGS

Your area may have an outdoor warning signal. Warnings may be issued by sirens, horns, radio, television, or door-to-door canvassing by local emergency personnel.

Federal agencies conduct stream-flow monitoring to provide advanced warning of a flash flood.

IMMEDIATE DANGERS

The immediate dangers the powerful torrent of rushing water that causes injuries, drowning, and property damage from collapsed buildings and bridges.

The potential for catastrophic loss of life and property damage is great because of the speed and devastating power of such large amounts of rushing water.

LONG-TERM DANGERS

Associated risks include the potential for the spread of disease, animal deaths, and a contaminated water supply. Utility equipment can be damaged, resulting in power outages and possible fires and explosions. Buildings may be dangerously weakened.

MITIGATION

Before you build or buy a home below a dam, learn as much as you can about its safety record and the safeguards followed by the owners.

When you build, follow local building codes and take extra measures to reinforce and flood proof your home or building.

Flood insurance is available through the National Flood Insurance Program. You can buy this insurance coverage through your property insurance agent before an emergency occurs.

Attend public meetings to learn your area's dam failure preparedness plans.

Support strong local and State dam safety programs.

PREPAREDNESS

Learn your community's warning systems.

If you are in a risk area, plan several alternate evacuation routes to higher ground.

RESPONSE

If an emergency flash flood warning is issued, do not hesitate. Go to higher ground immediately and stay there.

If you hear the roar of a rushing torrent of water, get to the highest ground possible. If you can hear the roar, you may have only seconds to reach safety.

Stay in your safe spot until the water has subsided or an all clear announcement is made over local media or by a local emergency official.

RECOVERY

If your home, property, or business has been damaged, Immediately call your insurance agent, who will advise you what to do next.

Do not use food that has come in contact with floodwaters. Have all drinking water tested by local health authorities before using. Wells should be pumped out and the water tested before drinking.

Avoid loose or dangling electrical wires, and report them to the utility company.

Report broken sewer lines or water mains to the water department.

Before entering a building, check for structural damage; make sure it is not in danger of collapsing.

Open the building and let it air out for several minutes before entering to remove foul odors or escaped gas.

Upon entering the building, do not use a match or lantern as a source of light because of the possibility of gas buildup; a battery-powered flashlight is recommended. Check for electrical shorts and livewires. Make certain the power is turned off; do not use appliances or lights until an electrician has checked the electrical system.

Open all doors and windows to help the building dry. Shovel out mud while it is still moist to give walls and floors an opportunity to dry.

4. Technological Hazards: Applying the Four Phases

HAZARDOUS MATERIALS

SIGNS AND WARNINGS

When an emergency occurs involving hazardous substances, people in the area will be alerted by police, fire officers, or highway patrol personnel. Warnings and instructions also will be issued through radio and television.

IMMEDIATE DANGERS

Immediate dangers from hazardous materials include fires, explosion, and the possible contamination of a community's air, land, and water.

The release of some toxic gases may cause immediate death or disablement if inhaled.

Contaminated water resources may be unsafe and unusable, depending on the amount of contaminant.

Some chemicals cause painful and damaging burns to skin if you come in direct contact with them.

Contamination of air, ground, or water may result in harm to fish, wildlife, livestock, and crops.

Many dangerous substances have little or no color or odor; other substances that do smell often will quickly disable one's sense of smell. Therefore, signals that alert the human senses are very unreliable and may be unsafe. Assume the worst when acting for your safety or on behalf of others. KEEP A SAFE DISTANCE.

A number of chemicals are skin-absorbed nerve toxins, which are often odorless and colorless. Frequently a long delay exists between exposure and the onset of symptoms. These symptoms can be agonizing and often are enhanced because the victim stayed in the danger zone while thinking there was no risk, due to the lack of smell or color. Again, assume the worst.

LONG-TERM DANGERS

The release of hazardous materials into the environment may cause debilitation, disease, or birth defects over a long period of time.

Loss of livestock and crops may lead to economic hardships within the community and to food shortages in communities supplied by the affected area.

Exactly how the loss of wildlife would affect a particular area is unknown. Certainly the economy of a community that is dependent on its wildlife would suffer.

MITIGATION

Use data accessible through Title 111 to identify companies in your community that manufacture or use dangerous chemicals and substances. Learn what the chemicals are, their hazardous properties, and their dangerous effects. Find out if antidotes are available. Ask the manufacturer for a copy of the product's safety sheet.

Try to avoid building or buying a house near potentially dangerous chemical sites.

PREPAREDNESS

Know what hazardous substances may be in your community, and by what routes they are transported.

Keep clearly labeled antidotes on hand for any hazardous substances you store at home. Family members should know when and how to use them.

Post the number of the nearest poison control center by the telephone.

Have several evacuation routes planned in case an emergency develops in your community.

Keep foam-type fire extinguishers in your home and car. Consult your local fire department for recommendations.

Learn to recognize symbols and identifiers on placards that mark carriers containing hazardous substances.

RESPONSE

If you are at or near the scene of a chemical accident...

- Do not walk toward the spill or touch any spilled material.
- Do not inhale gases, fumes, and smoke.
- Do not assume that gases and vapors are harmless merely because there is no odor.
- Move away from the accident. Try to stay upstream, uphill, and upwind. You should go at least 10 city blocks (one-half mile) from the danger area; for many incidents. You may need to go further if so advised by emergency response personnel.
- If the wind is coming from the accident area do not move directly toward or away from the wind. Move so that you feel the wind on the side of your face to avoid the direct path of the fumes.

- If the wind is blowing toward the accident, walk away from the accident and into the wind.
- After you are safe, immediately contact emergency services: police, highway patrol, fire department, or emergency medical services. If your community has one telephone number for all emergencies, such as 911, report the nature and location of the accident, and the dispatcher will contact the appropriate service.
- DO NOT INTERVENE in any way. Lack of training in proper procedures could endanger you and others. Wait for authorities and trained personnel.

If you are at home, work, or school, local officials may ask you to evacuate or to remain indoors and seek in-place protection.

If you are asked to evacuate...

- Do so immediately; quick and efficient evacuation can greatly reduce or eliminate any danger. Information on where to go, how to get there, and what to take is discussed in Unit Six.

If you are instructed by authorities to seek in-place protection...

- Close windows and doors, and seal cracks with wet towels, blankets, or tape.
- Turn off all ventilation, including furnaces, air conditioners, vents, and fans.
- Remain in protected areas such as hallways and away from windows until danger has passed. Keep a radio with you to remain updated.

RECOVERY

Follow local instructions concerning the safety of locally available food and water.

Clean up and dispose of residue carefully. Follow instructions from emergency officials concerning clean-up methods.

State and Federal agencies are prepared to assist in the clean-up of chemical spills. Such agencies utilize containment and scrubbing equipment, special, neutralizing materials, and other apparatus specifically designed for such emergencies.

If you want to learn more about hazardous materials, take FEMA's home study course Hazardous Materials: A Citizen's Orientation(HS-5). The course addresses hazardous materials and human health, regulations governing hazardous materials, identification of hazardous materials, preparation for hazardous materials incidents, and hazardous materials in the home.

RADIOLOGICAL ACCIDENT

SIGNS AND WARNINGS

An individual cannot detect radiation by sight, smell, or any other sense. However, you should learn the emergency warning system in your community if you live near a nuclear power plant, a major shipping route, or a facility that stores nuclear materials, wastes, or spent fuels. This radiation symbol marks areas of buildings and containers where radioactive materials are used and stored.

If an accident occurs involving radioactive materials, many emergency services are likely to be involved in the response. If the radiation levels are dangerously high, the area immediately around the accident site may be evacuated. The size of the evacuated area will depend on the type and amount of radiation and on weather factors. Special warning systems such as sirens, tone-alert radios, and/or route alerting have been established around nuclear Markings on this map denote the area power plants to alert the public during time of down wind of a nuclear power plant that emergency might be evacuated in the event of an incident. The size of the evacuated area is determined by the weather and by the type and amount of radiation released.

IMMEDIATE DANGERS

Radioactive materials emit different types of radiation, each of which presents its own danger to the human body. Some types of radiation can penetrate the skin and travel through the body. If the level of radiation is high, these types are dangerous just from being close to them. This danger is called an external radiation hazard. Other types of radiation are more dangerous when the radioactive materials are taken inside the body by inhaling contaminated air, getting the radioactive material in open wounds, or eating or drinking radioactive substances. This danger is called an internal radiation hazard.

All radiological accidents will not necessarily result in radiation exposures that can cause severe health effects and possible death. Due to packaging requirements and other regulations, an accident involving the transport of radioactive material may not even result in a release of the material into the environment. The potential health effects resulting from a radiological accident will depend on the type and quantity of radioactive material released and the amount of exposure received. An accident involving the shipment of small quantities of radiopharmaceuticals to hospitals would be far less severe than an accident involving the release of a significant quantity of radioactive materials from a commercial nuclear power facility.

The immediate danger from radiological accidents is from exposure to radiation, either internally or externally. The level of radiation that is harmful depends on the total amount of exposure. Radiation effects are cumulative. The greater your total exposure, the higher the risk of serious damage to your body.

The danger from external radiation varies depending on the type of radiation, the

length of the exposure, the distance you are from the source of the radiation, and the amount of shielding between you and the source. Your body weight and general state of health also are factors to be considered.

Radiation exposure causes damage to the cells of the body. Any exposure to radiation is likely to cause some cell damage. Your body can recover from a limited exposure to a small amount of radiation. The more you are exposed to radiation, the greater the cell damage and the more likely you are to become ill.

Radiation sickness can result from a single exposure to a large amount of radiation or from repeated exposure to small amounts. The more exposure and the more cell damage, the greater the effect on your body. If many cells are damaged, you are likely to experience more severe symptoms such as nausea, vomiting, and diarrhea. Radiation exposure can also impair the production of white blood cells and weaken the body's ability to fight infection. Therefore, a high degree of total radiation exposure makes your body susceptible to infection. The combined effect of high cell damage and lowered resistance causes severe radiation sickness and possible death. In cases of very high exposure, death is probable.

If radioactive substances are taken internally, the damaging rays continue to be emitted while natural radioactive decay occurs. The natural process of the body may get rid of some of the radioactive substances, but others may be retained.

Radiation sickness is not contagious. You cannot catch radiation sickness from someone who has been exposed to radiation. The illness is a result of cell damage and the weakening of the body's defenses. No drugs can cure radiation sickness. Medical care and antibiotics can reduce the danger from infection while the body repairs itself.

The chances of recovery depend on the amount of damage and the general state of health at the time of exposure. Children, pregnant women, and persons in poor health are likely to experience greater damage from smaller total amounts of radiation than adults in good health.

The only way to avoid radiation sickness is to avoid exposure to external hazards, avoid breathing radioactive dust particles in the air, and avoid consuming contaminated water or food. If you cannot avoid the exposure, at least limit the exposure as much as possible. Seek medical help if you know that you have been exposed or that you have consumed contaminated food or water.

LONG-TERM DANGERS

Although the effects of radiation many months or years after exposure are not clearly known, but they are thought to include leukemia, cancer, cataracts, sterility, birth defects, and genetic disorders. While radiation itself may not be the cause of these effects, scientists believe that a link exists between exposure to dangerous levels of radiation and the chances of suffering some of these effects later.

MITIGATION

Know the locations of nuclear power plants, radioactive storage sites, radioactive waste dumps, and facilities that use radioactive materials in or near your community.

If you live near a nuclear power plant, attend public information meetings to learn about radioactivity, safety precautions, and mitigation measures being taken by the utility company, the local community, and the State.

PREPAREDNESS

Public information materials are available from all nuclear power plants to tell you what actions to take in the event of an emergency at the plant. If you live within 10 miles of such a facility and have not received these materials in the mail, call the operating company or the local emergency management office and ask for a copy. You should read and retain these materials and refer to them in time of emergency.

Know which emergency broadcast radio or television stations (and station frequency or channel number) will be used to announce warnings and emergency instructions.

Keep an emergency supply of food, water, and any special medicines required by you and your family members. (Unit 6 will provide specific information on supplies you would be likely to need.)

Have several evacuation routes planned. Your routes should be consistent with those planned by emergency management officials. Know what to take, how to locate family members at anytime of the day or night, and how to close your house so that you can leave promptly.

RESPONSE

If a radiological accident occurs in your community, remain calm. Listen to local radio or television for announcements. If you or your home is in any danger, local emergency officials will advise you by radio or television of the actions you should take.

If you are told to evacuate, do so immediately. Follow the officially recommended route, even if it is crowded. You will be sent in a direction that will not put you in danger of the radioactive plume carried by the wind.

If you are told to take shelter in your home or office, stay there. Close doors and windows. Turn off fans. Do not run air conditioners unless emergency officials tell you it is safe to do so. Stay in your basement or in a central part of your house. Listen to your local radio or television station for emergency information. Do not go outside until an all clear announcement is made.

There are three ways to minimize radiation exposure to your body: shielding, distance, and time.

- Shielding Heavy dense material between you and the source of the radiation can serve as protection.
- Distance The more distance between you and the source of radiation,
radiation, the less radiation you will receive.
- Time Limiting the time spent near the source of radiation reduces the amount of radiation you will receive.

When the immediate danger has passed, avoid using foods from your garden or milk from your cows or goats until these can be inspected by a local emergency

STRUCTURAL FIRE AND EXPLOSION

SIGNS AND WARNINGS

Fire alarms are installed in public buildings. Other warning devices, such as smoke detectors, can alert families to fire in their homes. Intense heat, flames, and smoke are recognizable signs of fire in a structure. Explosions usually are accompanied by a loud bang, blast waves, and flying debris.

IMMEDIATE DANGERS

Heat and smoke present the most immediate danger from structural fires. The force of an explosion may cause injury or unconsciousness. In crowded public buildings, panicked behavior may present the greatest danger.

LONG-TERM DANGERS

The spread of fire to other buildings or to fuel supplies could cause their destruction and long-term economic effects.

MITIGATION

Teach family members the proper way to handle fire. Fire safety information is available from local officials, the State Fire Marshal's Office, the U.S. Fire Administration, and the American Red Cross.

Follow fire and life safety building codes when building a home. Avoid the use of materials that have proven particularly vulnerable to fire or could foster its spread to other houses, such as many types of wooden shingles and shakes. In older homes, have wiring and fire places inspected by a fire safety inspector in a home of any age, chimneys must be cleaned regularly to avoid the possibility of a chimney fire that could spread to the roof and other parts of the house. Be sure that wood stoves are properly installed. Incorrect installation, often by home owner's is a common cause of fires in some areas.

Do not store combustible materials in closed areas or near a heat source.

Do not overload electrical circuits.

Replace frayed electrical cords.

Buy fire insurance for your home and/or business.

PREPAREDNESS

Plan alternate escape routes from all levels of your house. Review the plan with all family members.

Hold periodic fire drills.

Install metal or rope ladders as fire escapes from the upper floors of your house.

Install smoke detectors and test them every month. If you own a business, install fire alarms and sprinkler systems. Replace the batteries at least once each year, or as indicated in the instructions. Smoke detectors, alarms, and automatic sprinklers are preventive measures designed to discover and suppress fires before they spread.

Equip your home with residential fire sprinkler systems to assure a safer environment for your family and protection of your investment and irreplaceable family possessions.

Post the number for the fire department and emergency medical service by the telephone. Teach all family members how to report a fire emergency.

Teach family members what to do in various fire conditions, such as heavy smoke or blocked exits.

Keep fire extinguishers in your home and car. Learn how to use them, and teach family members. Ensure that these are inspected regularly. Read the instructions on the extinguisher for inspection details.

Learn how to treat burns; contact your local Red Cross for available first aid courses.

RESPONSE

If you see a fire, immediately report it to the local fire department. Give clear and exact information concerning the fire's location.

If a fire alarm sounds in a public building, leave immediately. Remain calm. Do not run. Use fire exits or stairs. Do not use elevators.

If possible, contain the fire. Use the correct firefighting method. If there is an electrical fire, do not use water unless the electricity is turned off. If a flammable liquid is burning, smother it; do not splatter it.

Stay low in a burning building. Heat and smoke will rise. Hot air can scorch your lungs and smoke may contain toxic fumes. Take short breaths and, if possible, cover your face with a damp cloth and breathe through your nose.

Be sure of your escape route. Do not let the fire get between you and away out.

Check doors before opening them. If a door is hot, do not open it. Open a door carefully if it is cool, keeping your head to one side to avoid any blast of hot air.

If your clothing catches fire, drop and roll.

Once you and your family safely escape a fire, do not go back inside a building for any reason.

RECOVERY

Have the damage to your home assessed by your insurance company. File a claim as soon as possible.

You may need to find temporary housing, food, clothing, and other assistance. Your insurance company may help to pay for the expense, or you can contact your local chapter of the American Red Cross or the Salvation Army.