
APPENDIX 1-A: HAZARD LESSON PLANS

This appendix includes lesson plans for:

- Natural Hazards.
- Technological Hazards.

Refer to page 1-A-1 for a complete list of hazards.

APPENDIX 1-A

This appendix includes lesson plans for the most common natural and technological hazards that present a risk to the United States. These lesson plans include:

NATURAL HAZARDS:

- Earthquakes
- Fires and Wildfires
- Floods
- Excessive Heat
- Hurricanes and Coastal Storms
- Landslides and Mudflows
- Severe Thunderstorms
- Tornadoes
- Tsunamis
- Volcanoes
- Winter Storms

TECHNOLOGICAL HAZARDS:

- Nuclear Power Plant Emergencies
- Hazardous Materials Incidents (includes household chemical emergencies)

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EARTHQUAKES

An earthquake is a sudden slipping or movement of a portion of the Earth's crust or plates, caused by a sudden release of stresses. Earthquake epicenters are usually less than 25 miles below the Earth's surface and are accompanied and followed by a series of vibrations.

The reason that earthquakes are such a risk is because shaking ground can:

- Cause buildings to move off of their foundations or collapse.
- Damage utilities, structures, and roads.
- Cause fires and explosions.
- Cause structural instability, such as dam failures that can trigger flash floods.

Earthquakes can also trigger landslides and avalanches or tsunamis. After an earthquake, it is important to listen for emergency instructions.

Together, all of these types of damage threaten lives, property, and the environment.

The greatest likelihood of a major earthquake is in:

- The Western United States, particularly along the San Andreas Fault in California and up the Alaskan coast.
- The New Madrid Fault Zone in Missouri.
- A few pockets on the east coast.

Some statistics about earthquakes include:

- Fifteen percent of the population lives in the zones of potential major disaster.
- California's 17 million people face the highest risk, followed by the residents of Washington State.
- Four million people are within the destructive reaches of the New Madrid Fault.
- Residents of Massachusetts, North Carolina, and South Carolina are also at risk.

EARTHQUAKES (CONTINUED)

Hundreds of tremors are felt each year, particularly in California. Major earthquakes are rare, however. Five major earthquakes have occurred in the last century in the United States. They occurred in:

- San Francisco, 1906 (2,000 lives lost).
- Alaska, 1964 (131 lives lost).
- San Fernando, California, 1971 (65 lives lost).
- Loma Prieta (Northern California), 1989 (66 lives lost).
- Northridge (Southern California), 1994 (61 lives lost).

There is no seasonal or yearly cycle of earthquake occurrence; earthquakes can happen at any time. Major earthquakes appear to occur in cycles of between 50 and 275 years. It is likely that an earthquake will hit California and perhaps other parts of the United States in the next decade or two.

An earthquake may last for seconds or minutes, while aftershocks may occur for months after the main earthquake.

Earthquakes are classified, based on the Richter Scale, as:

- Small: 5.0-5.9.
- Moderate: 6.0-6.9.
- Major: 7.0-7.9.
- Great: 8.0 or greater.

The Richter Scale has a logarithmic base, so each increment on the scale is multiplied by a factor of 10. For example, an earthquake of magnitude 8.6 would not be twice as violent as one of 4.3, but rather would be 10,000 times worse.

EARTHQUAKES (CONTINUED)**EARTHQUAKE SAFETY**

It is recommended that you:

- Develop a home earthquake plan so that you know what to do during and after an earthquake.
- Conduct earthquake drills with your family or coworkers. Locate safe spots (e.g., under a sturdy table), and identify danger zones (e.g., near windows).
- Develop a plan for reuniting all family members after an earthquake occurs.
- Identify an out-of-state contact for family members to phone.
- Keep supplies on hand, including food and water for 3 days, a flashlight with extra batteries, a portable radio, a fire extinguisher, and tools.
- Store heavy and breakable objects on low shelves. Weed killers, pesticides, and flammable products should be stored on bottom shelves or in closed cabinets with latches. Chemicals will be less likely to create hazards if they are stored in lower, confined locations.
- Secure bookshelves, water heaters, and tall furniture to wall studs. Install latches on all cabinets, and anchor overhead lighting fixtures. Secure items that might fall, such as televisions.
- Have a licensed professional install flexible pipe to avoid gas or water leaks.
- Move beds away from windows.
- Move or secure hanging objects over beds, couches, and other places where people sit or lie.
- Keep shoes and a flashlight under the bed. Keeping shoes under the bed ensures quick access to prevent cutting feet on glass and reduces the risk that glass could fall into them.

You should hire a structural engineer to evaluate your home. Ask questions about home repair and strengthening for exterior features, such as porches, decks, sliding doors, canopies, carports, and garage doors.

EARTHQUAKES (CONTINUED)

To stay safe during an earthquake, you should:

- Drop, cover, and hold. Move only as far as necessary to reach a safe place. Most persons injured in earthquakes move more than five feet during the shaking.
- If indoors, stay there. Many fatalities occur when people run outside, only to be killed by falling debris from collapsing walls. It is safer to stay indoors until the shaking stops and it is safe to exit. When going outdoors, move quickly away from the building to prevent injury from falling debris.
- If outdoors, find a spot away from buildings, trees, streetlights and power lines, and overpasses. Drop to the ground and stay there until the shaking stops. Injuries can occur from falling trees, street lights and power lines, or building debris.
- If in a vehicle, pull over at a clear location and stop. Stay in the vehicle with seatbelt fastened until the shaking stops.

Provide the following tips based on the area in which you live:

- If in a high-rise building, expect the fire alarms and sprinklers to go off during an earthquake. Check for and extinguish small fires. Do not use the elevators.
- If in a coastal area, move to higher ground. Earthquakes often generate tsunamis.
- If in a mountainous area or near unstable slopes or cliffs, be alert for falling rocks and other debris that could be loosened by the earthquake. Also, watch for landslides that could be triggered by the earthquake.

EARTHQUAKES (CONTINUED)

After you have taken care of yourself, you should:

- Look for and extinguish small fires. Fire is the most common hazard following earthquakes. Extinguishing small fires and eliminating fire hazards will minimize the risk of a fire getting out of control.
- Clean up spills. By cleaning up medicines, bleaches, flammables, and other spills, it is possible to prevent many small but potentially dangerous hazardous-materials emergencies.
- Inspect the home for damage. Aftershocks can cause additional damage to unstable buildings. If there are major cracks in the chimney or foundation or if the home or utilities have been moved by the earthquake, get everyone out of the home. Take photographs of the home and its contents to document insurance claims.
- Help neighbors who may require assistance.
- Tune to the Emergency Alert System (EAS) for emergency information and instructions.
- Expect aftershocks. Aftershocks often occur minutes, days, or weeks following an earthquake. When aftershocks occur, drop, cover, and hold.

Earthquake Myths and Facts

Myth:	Use a doorway for protection during an earthquake.
Fact:	<p>While doorways can provide adequate protection during small earthquakes, doorways should not be used for protection because:</p> <ul style="list-style-type: none"> ▪ Not all doorways are built into the physical structure of a building. ▪ Many doorways are too large for children or shorter adults to use correctly for protection. ▪ Even if they are part of the building's structure, doorways can provide protection for only one person. ▪ Earthquakes with moderate to extreme ground motion can cause a person using a doorway to fall out of the doorway or become injured when attempting to get to the doorway.
Myth:	Animals can sense earthquakes and give advance warning.
Fact:	Animals may be able to sense the first low-frequency waves of an earthquake that occur deep within the Earth, but the damage-causing primary and secondary waves follow just seconds behind. Animals do not make good earthquake warning devices.
Myth:	Big earthquakes always happen in the early morning.
Fact:	Although several recent earthquakes have occurred in the early morning, others, including the 1990 Upland earthquake and the 1989 Loma Prieta earthquake, occurred in the afternoon. It's easy to remember earthquakes that fit the morning pattern and forget those that don't.
Myth:	Beachfront property in Arizona . . .
Fact:	The motion of the plates is horizontal, not vertical. California will not drop into the ocean, even following a great earthquake.
Myth:	Good building codes mean safe buildings.
Fact:	The tragedy of Kobe, Japan, is a good reminder that the best building codes in the world do nothing for buildings that were built before the codes were enacted. Fixing problems in older buildings is the responsibility of the building's owner.

Earthquake Myths and Facts

Myth:	Scientists can predict earthquakes.
Fact:	No scientist or university has successfully predicted an earthquake's time within days, nor do they expect to be able to do so in the near future.

Source: Southern California Earthquake Consortium, University of Southern California.

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FIRE

Fire is the sixth leading unintentional cause of injury and death in the United States. Fire ranks as the highest cause of death for children under the age of 15 at home.

The dangers that fires pose, include:

- Asphyxiation: Asphyxiation is the leading cause of death in a fire, by a 3-to-1 ratio over burns.
- Heat: A fully developed room fire has temperatures over 1,100 degrees Fahrenheit.
- Smoke: Fire generates black, impenetrable smoke that blocks the vision, stings the eyes, and clogs the lungs. It may be impossible to navigate through such smoke.

FIRES IN THE HOME

Roughly 85 percent of all fire deaths occur where people sleep, such as in homes, dormitories, barracks, or hotels. The majority of fatal fires occur when people are less likely to be alert, such as nighttime sleeping hours.

Nearly all home and other building fires are preventable, even arson fires. The majority of arson fires are caused by juveniles, who often respond to counseling, and the rest can be deterred in a number of ways. No fire is inevitable.

In 2000, 3,420 people died in reported home fires in the United States—about 9 people per day. In addition, thousands of people were injured in home fires, many with severe burns.

Fire victims are disproportionately children or the elderly. Two out of every five fires that kill young children are started by children playing with fire. Approximately 900 senior citizens die in fires annually.

FIRE (CONTINUED)

Every family fire plan should include:

- Smoke alarms on every level of the home and near all sleeping areas.
- Two escape routes from every room in the home. Escape ladders should be a consideration for sleeping areas on upper floors. These ladders should be stored near windows.
- Practice the escape plan at least twice each year. Practice getting out both day and night. Practice escapes should include low-crawl escapes, ensuring that all family members' heads are one to two feet above the floor. As part of escape planning, select a safe area outside the home for the family to gather after escaping the fire. Ensure that all know to meet at that place so, when firefighters arrive, they can be notified quickly of family status.
- Practice alerting family members by yelling "Fire!" several times. In a real fire, this alert may help family members escape.
- Learn the fire department's emergency number, especially if the community does not have 9-1-1 service. Make sure that all family members know to escape the fire first, then call the fire department from a neighbor's home.

It is important to discuss with the entire family what to do in a fire. Every family member needs to know what to do in case the entire family is not together when a fire occurs. Also, awareness helps to reduce fear and ensures that all family members know what to do.

If you see a fire or hear the smoke alarm, you should:

- Yell "Fire!" several times and exit quickly. Never use an elevator when escaping a fire. Other points to remember include:
 - If escaping through smoke, crawl low, under the smoke.
 - If escaping through a closed door, feel the door with the back of the hand, as well as the space between the door and its frame and the doorknob before opening the door. Never open a door that feels hot.
 - If smoke, heat, or flames block exit routes, stay in the room with the door closed. Open the window a few inches at the top and bottom for ventilation, and hang a sheet outside the window so that responders can see it when they arrive. If possible, seal around doors and vents with wet towels, sheets, or clothes to help keep smoke from the room.
- Go to the agreed upon meeting place, then send one person to call the fire department. Gathering at the meeting place first will quickly indicate who is outside and allow family members to advise firefighters immediately when they arrive.

FIRE (CONTINUED)

It is impossible to escape, you should:

- Stop up areas where smoke could come in using wet towels, sheets, or clothes under doors and in vents.
- Call the fire department and tell them where you are—even if the fire department has already been called.
- Open windows slightly at top and bottom to allow smoke to exit and fresh air to enter the room.
- Stay low and near a window to breathe fresh air.
- Wave a bright-colored cloth at the window to signal the fire department.

To prevent fires you should:

- Conduct a home hazard hunt. Many items and conditions around the home can present fire hazards. Taking time to look for and eliminate hazards will reduce the risk.
- Inspect wood stoves and chimneys annually. Burning wood leaves creosote deposits, which are flammable, in the firebox, flue, and chimney. These buildups must be removed professionally to minimize the risk of fire.
- Purchase heaters only if they have been laboratory tested and approved. Follow the manufacturer's directions for use. Keep blankets, clothing, curtains, furniture, and any other flammable items at least three feet away from heat sources. Plug heaters directly into a wall socket, and unplug them when they are not in use.
- Keep matches and lighters away from children. Children are fascinated by fire and will play with matches and lighters if they are available.
- Check electrical wiring, and replace frayed extension cords, exposed wires, or loose plugs. Ensure that all outlets have cover plates, and avoid overloading outlets or extension cords.
- Keep combustible materials away from the stove, including towels, clothing, curtains, bags, boxes, and other appliances. Combustible materials near stoves can catch fire quickly while the cook's attention is elsewhere.

These are only a few suggestions for preventing fires. Additional suggestions, including how to select and use fire extinguishers, will be covered in Unit 2, Fire Safety.

FIRE (CONTINUED)

WILDFIRES

There are three classes of wildfires:

- A surface fire is the most common type of fire and burns along the floor of a forest, moving slowly and killing or damaging trees.
- A ground fire is usually started by lightning and burns on or below the forest floor in the humus layer down to the mineral soil.
- Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees.

Wildfires often begin unnoticed and that many fires can spread quickly, igniting brush, trees, and homes.

Because more people are choosing to make their homes in woodland settings in or near forests, rural areas, or remote mountain sites, a greater percentage of the population is becoming vulnerable to the hazards of wildfire.

More than four out of every five forest fires are started by people. Negligent human behavior, such as smoking in forested areas or improperly extinguishing campfires, is the cause of many forest fires.

Improper design, combustible materials and landscaping, and lack of attention to weed abatement in woodland residential areas contribute to the hazard to humans and animals.

Many of the strategies for wildfire preparedness are the same as for fires in the home, and that developing a family fire escape plan will be helpful for wildfires as well as fires in the home. In the case of wildfires, some additional strategies are required.

You should:

- Keep a garden hose that is long enough to reach any area of the home and other structures. Buy a ladder that is high enough to reach the roof.
- If a pool, lake, or stream is available, consider obtaining a portable gasoline-powered water pump.
- Equip chimneys and stovepipes with spark arresters.
- Keep fire tools handy. Fire tools include shovels, rakes, axes, chain or handsaws, buckets, and one or more fire extinguishers.
- Use proper building and landscape design. Wildland fire experts recommend that flammable vegetation be cleared to a distance of at least 30 feet around the home.

FIRE (CONTINUED)

Additional strategies for wildfire preparedness include:

- Marking all driveway entrances so that firefighters are aware that the home is there and can find it quickly during a fire.
- Following all local burning laws. Never burn during dry weather or within 75 feet of a structure or combustibles. Never leave a fire unattended, not even a cigarette.

Despite best efforts, wildfires will still occur.

There are several measures that you should take inside the home to prevent damage from wildfire.

Keep in mind the following measures:

- Listen for emergency information on radio or television stations or EAS. If advised to evacuate, do so immediately. Delay increases the risk of being trapped by the fire and can interfere with fire department response.
- Confine pets to one room or arrange for them to stay with a friend or relative.
- Move flammable furniture to the center of the home, away from windows and sliding glass doors.
- Remove flammable drapes and curtains. Close venetian blinds and noncombustible window treatments.
- Close all doors and windows to reduce air flow.

If trapped by a wildfire, you should try to find a body of water to crouch in. If possible, cover the head and upper body with wet clothing. If a body of water is not accessible, look for shelter in a cleared area or within a rock bed. Breathe the air close to the ground, preferably through a wet cloth.

FIRE (CONTINUED)

After a wildfire, you should:

- Use caution when reentering the area after a wildfire. Hazards may still exist, including hot spots, which can flare up without warning.
- Inspect the roof immediately and extinguish sparks or embers that could reignite the fire.
- Have propane or heating oil tanks inspected by the supplier before using the system. Tanks may shift or fall from their stands or fuel lines may have kinked or weakened. Heat from the fire may have caused the tank to warp or bulge (especially if the tank is not vented).
- Check the stability of trees around the home. They may have lost stability as a result of fire damage. Also, identify and mark ash pits (created by burned trees and stumps). Falling into a hot ash pit can cause serious burns.
- If there is no power, check the main breaker. Fires may cause breakers to trip. If the breakers are on and power is still not available, call the utility company.

You should take precautions while cleaning the property following a fire by:

- Wetting down debris to reduce dust in the air.
- Using a particulate mask with nose clip and coveralls. Wear leather gloves to protect the hands.
- Checking with local authorities before disposing of household hazardous materials.

FLOODS

A flood occurs any time a body of water rises to cover what is usually dry land.

Floods are the most frequent and costly natural disasters in terms of human hardship and economic loss. As much as 90 percent of the damage related to all natural disasters (excluding droughts) is associated with flooding.

Floods have many causes:

- Heavy rain, which may occur over several days or as intense rainfall over a short period of time.
- Spring snowmelt or ice or debris jams that cause a river or stream to overflow its banks and flood the surrounding area.
- Dam and levee failure. While dam and levee failure occurs relatively infrequently, it can be a risk, especially following prolonged heavy rain, such as occurred throughout the Midwest in 1993.
- Low absorption or no soil percolation. As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization increases runoff two to six times over what would occur on natural terrain. In areas with rocky geology, rainfall or snowmelt cannot be absorbed. The result can be flash flooding with little or no warning.

Each of these causes can be factored to several key elements.

- Rainfall intensity is the rate of rainfall (in inches per hour).
- Duration is how long the rain lasts.
- Topography is the overall configuration of the of the Earth's surface, including natural and manmade features.
- Soil conditions include the type of soil, the amount of moisture in the soil, and the amount of soil relative to the amount of rock.
- Ground cover includes vegetation as well as manmade covers. Ground that includes larger amounts of vegetation can also absorb greater amounts of water. Ground that is paved or has structures on it will cause runoff.

FLOODS (CONTINUED)

The reasons floods pose such a risk are that:

- Heavy rainfall can exacerbate problems with runoff, absorption, and flood-control measures.
- Riverine flooding can potentially inundate a city or downstream areas when protection fails.
- In rocky areas, lack of absorption can cause flash flooding.

Every major drainage basin in the United States has a floodplain surrounding it. Two areas where inundation is very likely are:

- Along the Mississippi River.
- The central valley of California.

Most areas of the United States are subject to some degree of flooding.

Floodplain areas are widespread in the South Atlantic, the Gulf Coast, and the Missouri and Arkansas River basins.

Note that there are almost 4,000 communities that are at risk of flooding, and more than 100 million people are exposed.

The costs associated with flooding are increasing as more development occurs in coastal areas and floodplains. Each year, flood losses and damages reach into the billions of dollars. During the 10-year period from 1992 to 2001, floods cost, on average, \$4.1 billion annually. The long-term (1971 to 2000) annual average lives lost is 127 per year, primarily as a result of flash floods.

Floods are measured according to the height that the waters reach. Their magnitude is based on the chances that water levels will equal or exceed a certain point on a recurring basis. Intervals of probability are classified into hazard zones.

FLOODS (CONTINUED)**FLOOD PREPAREDNESS**

It is important to:

- Know the flood risk in the area, including the elevation above flood stage and the history of flooding in the area.
- Prepare a flood evacuation plan, and practice the route. Be aware of which roads become flooded and which remain passable. The entire family should know where to go if they have to evacuate.
- Obtain flood insurance if living in a floodplain (Special Flood Hazard Area). Homeowner's policies do not cover flooding! Check with the city or county government to review the Flood Insurance Rate Maps (FIRMs). Then, check with an insurance agent to obtain coverage under the National Flood Insurance Program (NFIP).
- Keep important documents in a water-proof box. Most documents can be replaced, but some are more difficult to replace than others. Protecting them in a water- (and fire-) proof container is the safest plan of action.
- Check emergency messages using a portable radio. NWS and local officials update watches and warnings as necessary. Listen often for up-to-date information.

The best way to protect your property from flood damage is to avoid building in a flood plain unless the home is elevated and other flood protection measures are taken. If an existing home is in a floodplain, there are some steps that can help reduce potential damage.

- Elevate the furnace, water heater, and electric panel to at least one foot above the level of the floodplain (also called the Base Flood Elevation). In some areas, elevating these appliances and utilities may mean relocating them to a higher floor or even to the attic.
- Move furniture and other items to a higher level. Even if the main floor of the home is flood damaged, moving furniture and other items to a higher level will reduce flood losses.
- Install check valves in plumbing to prevent flood water from backing up into the drains of the home.
- Waterproof the basement floor and walls to prevent seepage through cracks.

FLOODS (CONTINUED)

In some cases, even these suggestions will not be enough to prevent serious damage from flooding. If you live in a floodplain, consult building professionals to see if they think they need more elaborate mitigation measures (such as elevation).

If you must evacuate, you should:

- Not walk, swim, or drive through flood waters. Learn and practice driving the local flood evacuation routes. They have been selected because they are safe and provide the best means of escaping flood waters. Flood waters move swiftly and may carry debris that can cause injuries. Remember that 24 inches of water can wash a car away and six inches of fast moving water can knock a person off his or her feet.
- Stay off bridges over fast-moving water. Fast-moving water can wash bridges away without warning, especially if the water contains heavy debris.
- Keep away from waterways. If you are driving and come upon rapidly rising waters, turn around and find another route. Move to higher ground away from rivers, streams, and creeks.
- Heed barricades. Local responders place barricades to warn of flooding ahead or to direct traffic safely out of the area. Never drive around barricades.
- Avoid storm drains and irrigation ditches. During a flood, storm drains and irrigation ditches fill quickly with fast-moving water. Walking in or near storm drains or irrigation ditches is nearly a sure way to drown.

FLOODS (CONTINUED)

Precautions to follow after a flood.

- Stay out of flooded areas. Flooded areas remain unsafe. Entering a flooded area places you—and the individuals who may need to rescue you—at risk.
- Reserve the telephone for emergencies only. Telecommunication lines (both land line and cellular) will be busy following a flood. A nonemergency call may prevent an emergency call from getting through. It is best not to use the phone unless it is necessary.
- Avoid driving, except in emergencies. Reserve the roads for those who must evacuate and for emergency vehicles.

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EXCESSIVE HEAT

A heat wave is a prolonged period of excessive heat, often combined with excessive humidity. Extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for prolonged periods of time.

Under normal conditions, the body's internal thermostat produces perspiration that evaporates and cools the body. In abnormal heat and high humidity, however, evaporation is slowed and the body must work extra hard to maintain its normal temperature. The elderly, the very young, and those who are disabled are at risk from extreme heat. Also, because men sweat more than women, they are more likely to have difficulty with extreme heat as a result of dehydration.

Studies indicate that excessive heat that continues for periods longer than 2 days causes a significant rise in heat-related illnesses. Spending several hours each day in air conditioning, however, can reduce the risk of heat-related illness.

People living in urban areas may be at greater risk from the effects of a prolonged heat wave than people living in rural regions. Stagnant atmospheric conditions can trap pollutants in urban areas, and asphalt and concrete stay warm longer. This phenomenon is known as the "urban heat island effect."

The risks associated with a heat wave can include:

- Heat cramps: Muscular pains and spasms resulting from heavy exertion. Heat cramps are often the first signal that the body is suffering from excessive heat.
- Heat exhaustion: A form of mild shock that typically occurs when people exercise heavily or work in a hot, humid place where body fluids are lost through heavy sweating.
- Heat/Sun stroke: A life-threatening condition in which the victim's temperature control system that produces sweating to cool the body stops working. The body temperature can rise to the extent that brain damage and death may result if the body is not cooled quickly.

Do the following during a heat wave:

- Seek air conditioning. If the home does not have air conditioning, persons should seek areas that do. Schools, libraries, shopping malls, community centers, and many other public places offer good refuges during extreme heat.
- Avoid strenuous activities during the hottest period of the day. Heat-related illnesses can strike quickly, especially for those who perform strenuous work during the heat of the day.
- Wear lightweight, light-colored clothing. Light colors reflect the sun's rays better than dark colors, which absorb the heat. Protect the face and head by wearing a wide-brimmed hat.

EXCESSIVE HEAT (CONTINUED)

- Check on family members and neighbors who do not have air conditioning or who have medical problems that make them particularly susceptible to heat-related illnesses.
- Drink plenty of fluids. Dehydration can occur quickly and can be unnoticed or mistaken for other illnesses. Increasing fluid intake, even if not thirsty, can reduce the risk of dehydration.

However, persons who are on fluid-restrictive diets (e.g., those with kidney disease) should consult their doctors before increasing fluid intake.

You should take the measures below to protect against excessive heat in the home:

- Install additional insulation. Insulation helps to keep heat out in the summer as well as to keep heat in during the winter months.
- Protect windows and glass doors. Consider keeping storm windows installed throughout the year.
- Use attic fans. Because heat rises, attic fans can help clear the hottest air from the home.

Excessive Heat Myths and Facts

<p>Myth:</p> <p>Fact:</p>	<p>Stay in the home during a heat wave.</p> <p>Air conditioning in homes and other buildings markedly reduces danger from the heat. If you must stay in a home where air conditioning is not available, stay on the lowest floor, out of the sunshine. If possible, however, choose other places to get relief from the heat during the warmest part of the day.</p>
<p>Myth:</p> <p>Fact:</p>	<p>Beer and alcoholic beverages are best to satisfy thirst in extreme heat.</p> <p>Although beer and alcohol appear to satisfy thirst, they actually cause additional dehydration. Unless you are on a fluid-restricted diet, drink water during a heat wave, even if you don't feel thirsty.</p>
<p>Myth:</p> <p>Fact:</p>	<p>During extreme heat, the best time to exercise is during the late morning and early afternoon.</p> <p>Many heat emergencies occur in those who exercise or work during the hottest part of the day. Reduce, eliminate, or reschedule strenuous activities. If you must do strenuous activity, do it during the coolest part of the day, which is usually in the morning between 4 a.m. and 7 a.m.</p>
<p>Myth:</p> <p>Fact:</p>	<p>A sunstroke is not life-threatening.</p> <p>A heat stroke or sunstroke <u>is</u> life-threatening. The victim's temperature control system, which produces sweating to cool the body, stops working. The body temperature can rise so high that brain damage and death may result if the body is not cooled quickly.</p>
<p>Myth:</p> <p>Fact:</p>	<p>You can only get a sunburn on really hot days.</p> <p>Sunburn (and tanning) result from exposure to ultraviolet (UV) radiation, which is distinct from the light and heat emitted by the sun. You cannot see or feel UV rays, but they can be quite damaging. UV exposure has been linked to skin cancer and other skin disorders, cataracts and other eye damage, and immune system suppression. UV exposure is a year-round issue, and clouds provide only partial protection.</p>

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HURRICANES AND COASTAL STORMS

A hurricane is a violent area of low pressure forming in the tropical Atlantic Ocean from June to November. August and September are peak months. (Similar Western Pacific Ocean storms are called typhoons.) Hurricanes have winds of 75 miles per hour or more and are accompanied by torrential rains and—along coastal areas—a storm surge.

Although coastal storms may have hurricane-force winds and may cause similar kinds and amounts of damage, they are not classified as hurricanes because they do not originate in the tropics. Coastal storms typically form along the east coast from December through March.

Hurricanes and coastal storms pose a risk because powerful and intense winds and rain can:

- Damage or destroy structures.
- Lift and move unstable structures and objects.
- Damage utility lines.
- Be accompanied by tornadoes.
- Cause coastal erosion.
- Cause floods.
- Threaten lives.

The accompanying heavy rains can inundate coastal areas and inland communities, presenting another risk to life and property.

COMMUNITY EMERGENCY RESPONSE TEAM

APPENDIX 1-A: HAZARD LESSON PLANS

Hurricane Classifications

Category	Barometric Pressure (Inches)	Windspeed (Miles Per Hour)	Storm Surge (Feet)
I - Minimal	Above 28.94	74-95	4-5
II - Moderate	28.50-28.91	96-110	6-8
III - Extensive	27.91-28.47	111-130	9-12
IV - Extreme	27.17-27.88	131-155	13-18
V - Catastrophic	Less Than 27.17	More Than 155	More than 18

HURRICANES AND COASTAL STORMS (CONTINUED)

The greatest likelihood of a hurricane striking land is along the Gulf Coast and the southeastern seaboard. However, hurricanes have also hit central Pennsylvania and the coasts of New Jersey, New York, and New England.

Each year approximately 10 “storm-strength” weather disturbances are detected in the North Atlantic. Of these, half may grow to hurricane proportion. Two hurricanes are likely to strike the U.S. coast each year.

Nearly 100 million Americans are at risk from hurricanes. Specifically:

- Almost 14 million live in the area where winds greater than 125 mph have been recorded (i.e., the tip of Florida to the North Carolina coast).
- More than 6 million live in storm surge areas.

Although deaths from hurricanes are decreasing as hurricane warning systems improve, property damage is on the rise.

Many people do not realize the threat that hurricanes can present—even if they live in hurricane-prone areas—because they have not experienced a “major” hurricane.

There are certain preparations that people who live in high-risk areas should take to prepare for a hurricane or coastal storm before one occurs.

The following are preparations:

- Know the risk and evacuation routes. Being aware of the risk and how to get out of the area as quickly as possible should an evacuation order be issued is one of the key preparedness steps to take. Driving the evacuation routes to ensure familiarity before a storm and identifying shelter locations will make an evacuation smoother.
- Develop an action plan. When will you begin preparing your home for possible high winds and storm surge? How much time will it take you to evacuate, if necessary? Does your evacuation route change based on the direction of the storm? Will you go to a shelter or a hotel? These are all questions that anyone who lives in a high-risk area should answer as part of hurricane or coastal storm planning.
- Secure needed supplies. If you assemble your disaster supply kits as suggested in this unit, you will have everything that you need for hurricane and coastal storm preparedness.

HURRICANES AND COASTAL STORMS (CONTINUED)

- Floodproof property. Floodproofing can range from using a water sealer in areas that have basements to sandbagging to elevating utilities to moving furniture to the second floor.
- Secure mobile homes and any outdoor items that could be picked up by the wind or washed away.

These are the steps that everyone who is at risk should take before a hurricane strikes:

- Board up all windows and glass doors. Studies have shown that if the wind can be kept out of a structure, the structure will withstand high winds relatively well. If wind is allowed inside, however, additional structural and nonstructural damage will occur very quickly. The best way to prevent wind from getting into a structure is to cover all windows and glass doors with plywood or to close hurricane shutters.
- Check batteries. Often electricity is disrupted by hurricanes (and coastal storms) and, depending on the extent of damage, may not be restored immediately. Check batteries for flashlights and portable radios to ensure that they are fresh. Replace old batteries, and have extra on hand.
- Stock up on nonperishable food. A 3-day supply of food and water for each family member is a must.
- Listen to EAS for local emergency information. Local officials will have the most current emergency information about the storm (including watch and warning information from the National Weather Service) and will provide information and instructions via EAS.

During a hurricane:

- Stay indoors. If advised to evacuate, do so. However, do not assume that because an evacuation order is not issued that the situation is safe. Even Category 1 hurricanes are dangerous. Stay indoors and listen to EAS for up-to-date information.

If advised to shelter in place:

- Take the family disaster supply kit.
- Go to an interior “safe” room, if possible.
- Stay in the safe room and listen to EAS for additional instructions.
- Stay away from flood waters. If the home begins to flood, go to a higher level, if possible.
- Be aware of the “eye.” The “eye” of a hurricane is typically 20 to 30 miles wide in relation to the storm, which may have a diameter of 400 miles. During the “eye,” there are very few clouds, but it is important to remember that the storm is not over.
- Be alert for tornadoes. Tornadoes are frequently associated with hurricanes, and are most common in the right-front quadrant of the storm.

HURRICANES AND COASTAL STORMS (CONTINUED)

After a hurricane or coastal storm:

- Do not reenter the area until it is declared safe. Reentry to the area too soon may cause unnecessary risk—and may keep first responders and utility workers from doing their jobs.
- Use a flashlight to inspect for damage. Do not assume that utilities are undamaged following a hurricane or coastal storm. Checking for damage with a flashlight reduces the risk of injury, especially from a damaged electric supply.
- Stay away from downed power lines. The only sure way to limit risk from downed power lines is to avoid them completely.
- Turn off utilities, if necessary. If there is a gas smell or a fire, turn off the gas valve. If there is damage to electric lines or supply, shut off the electricity by turning off small circuit breakers (or unscrewing fuses) first, then turning off the main breaker (or fuse).

Note: If you turn off the gas valve, only the gas company can restore the service.

- Reserve the telephone for emergency use. Telephone lines are invariably overloaded following a disaster or emergency. Reserving telephone use (both landline and cellular) for emergency use helps to ensure that those calls that must go through do so.
- Listen to EAS for updated information. Local officials will use EAS extensively to provide emergency information and instructions. Be sure to tune in often for updates.

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LANDSLIDES AND MUDFLOWS

A landslide is a rapid shift in land mass that is typically associated with periods of heavy rainfall or rapid snowmelt. Landslides tend to worsen the effects of flooding that often accompanies them. In areas that have been burned by forest and brush fires, a lower threshold of precipitation may initiate landslides.

While some landslides move slowly and cause damage gradually, others move so rapidly that they can destroy property and take lives suddenly and unexpectedly.

Areas that are generally prone to landslide hazards include:

- Existing old landslides.
- The bases of steep slopes.
- The bases of drainage channels.
- Developed hillsides where leach-field septic systems are used.

Debris flows—sometimes referred to as mudslides, mudflows, lahars, or debris avalanches—are common types of fast-moving landslides. Flows usually start on steep hillsides as shallow landslides that accelerate to speeds that are typically about 10 miles per hour, but can exceed 35 miles per hour.

The consistency of debris flows range from watery mud to thick, rocky mud that can carry away items such as boulders, trees, and cars. When the flows reach flatter ground, the debris spreads over a broad area.

The most destructive types of debris flows are those that accompany volcanic eruptions.

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SEVERE THUNDERSTORMS

While all thunderstorms are dangerous, the National Weather Service (NWS) defines a severe thunderstorm as one that:

- Produces hail at least three-quarters of an inch in diameter.
- Has winds of 58 miles per hour or greater.
- Produces a tornado.

Thunderstorms may occur singly, in clusters, or in lines. Some of the most severe weather occurs when a single thunderstorm affects one location for an extended time.

The risks associated with severe thunderstorms include:

- Lightning. Although most victims of lightning strikes do survive, 75 to 100 people in the United States are killed each year by lightning—more than are killed each year by tornadoes. Lightning also causes an estimated five billion dollars in economic losses each year in the United States.
- Hail. Hail can be smaller than a tear or as large as a softball, and can cause destruction to automobiles, glass surfaces, roofs, plants, and crops. Pets and livestock are particularly vulnerable to hail.
- Downbursts and straight-line winds. Thunderstorms can produce winds as high as 150 miles per hour, strong enough to flip cars, vans, and trucks.
- Flash floods. Heavy rain from thunderstorms can cause flash flooding.
- Tornadoes. Some thunderstorms may spawn tornadoes.

The National Weather Service (NWS) Storm Prediction Center issues watches and warnings of hazardous weather, including severe thunderstorms.

SEVERE THUNDERSTORMS (CONTINUED)

LIGHTNING

Lightning often strikes outside areas of heavy rain and can occur as far as 10 miles away from any rainfall.

You are in danger from lightning if you can hear thunder. In fact, more than 50 percent of lightning deaths occur after the thunderstorm has passed.

These are the key steps in thunderstorm preparedness:

- Understand the risk. Severe thunderstorms can occur year-round and at any hour. Take time to learn about the severe thunderstorm risk in your area—including whether and how often severe thunderstorms are accompanied by tornadoes.
- Learn to make a small target. Practice squatting low to the ground, making the smallest target possible while minimizing contact with the ground.
- Pay attention to warnings. Use a NOAA weather radio with a tone-alert feature or listen to local radio or television for EAS broadcasts. Learn the community's warning system and never ignore warnings.

You should avoid:

- Water sources. If boating or swimming, get to land immediately. Stay away from bodies of water and wet sand. If indoors, stay away from running water. Electricity from lightning can travel through plumbing.
- The telephone. Electricity from lightning can also travel through phone lines.
- The outdoors. A sturdy building is the safest place to be during a severe thunderstorm. Avoid unprotected areas and unprotected shelters in open areas.

You should turn off air conditioning and appliances. Electricity from lightning can enter a room through appliances. Also, turning off and unplugging appliances can eliminate the risk of damage from surges that accompany lightning strikes in close proximity to the home.

SEVERE THUNDERSTORMS (CONTINUED)

You should also take measures to protect your property, including those measures that are required for high wind:

- Bring outdoor furniture inside or otherwise secure it to keep it from blowing. Small objects can become deadly projectiles in a high wind.
- Remove dead or overhanging limbs from trees and shrubbery. Strategically remove branches to allow the wind to pass through. Strong winds can break weak limbs and carry them at high speed, causing damage to property or injury to humans and animals.

If your community is at high risk for severe thunderstorms or if sections of the community are particularly vulnerable, and you live in those areas, it is suggested that you purchase and install lightning rods.

If caught outdoors in a severe thunderstorm, you should:

- Avoid water sources. Get out of pools or lakes. Get off the beach.
- Seek shelter in a substantial, permanent, enclosed structure. Avoid unprotected shelters, such as golf carts and baseball dugouts. Remember that isolated shelters in otherwise open areas are a target for lightning. Temporary shelters, such as gazebos, are subject to being blown in a strong wind and offer little protection from hail.
- If there are no permanent shelters within reach, take shelter in a car. Keep all windows closed and do not touch anything that is metal. If in the woods, find an area that is protected by low trees (not a single tall tree in the open). As a last resort, go to a low-lying area, away from trees, poles, and metal objects. (Avoid areas that are subject to flooding.) Squat low to the ground, and place your hands on your knees with your head between them. Make as small a target as possible. Do not lie flat on the ground.
- Avoid natural lightning rods, such as golf clubs, tractors, fishing rods, and camping equipment. Lightning is attracted to all of these items.

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TORNADOES

Tornadoes are powerful, circular windstorms that may be accompanied by winds in excess of 250 miles per hour. Tornadoes typically develop during severe thunderstorms and may range in width from several hundred yards to more than a mile across.

Tornadoes pose a high risk because the low atmospheric pressure, combined with high wind velocity, can:

- Rip trees apart.
- Destroy buildings.
- Uproot structures and objects.
- Send debris and glass flying.
- Overturn cars and mobile homes.

While tornadoes have been reported in every State, they are most prevalent east of the Colorado-Wyoming-New Mexico area. Most frequently, tornadoes are found in the area from Kansas to Kentucky, the Great Plains, and the Upper Midwest. "Tornado Alley" includes Texas, Oklahoma, and Kansas.

More than 1,000 tornadoes are reported yearly.

Tornado season lasts from March to August, but can occur year-round. More than 80 percent of tornadoes occur between noon and midnight, and one quarter occur from 4:00 p.m. to 6:00 p.m. Tornadoes are most likely to occur between 3:00 p.m. and 9:00 p.m.

9,000 deaths have been attributed to tornadoes in the past 50 years. Each year about 100 people are killed. Annual damage from tornadoes can run into the hundreds of millions of dollars.

The population in the ten tornado-prone States is increasing because of more rapid urban development, which increases the likelihood of injuries and deaths.

COMMUNITY EMERGENCY RESPONSE TEAM

APPENDIX 1-A: HAZARD LESSON PLANS

Fujita Wind-Damage Scale

Wind-Damage Level	Wind Speed and Anticipated Damage
F0	<ul style="list-style-type: none">▪ Winds: Up to 72 miles per hour (mph)▪ Damage: Light
F1	<ul style="list-style-type: none">▪ Winds: 73–112 mph▪ Damage: Moderate
F2	<ul style="list-style-type: none">▪ Winds: 113–157 mph▪ Damage: Considerable
F3	<ul style="list-style-type: none">▪ Winds: 158–206 mph▪ Damage: Severe
F4	<ul style="list-style-type: none">▪ Winds: 207–260 mph▪ Damage: Devastating
F5	<ul style="list-style-type: none">▪ Winds: 261 mph or greater▪ Damage: Incredible

TORNADOES (CONTINUED)

Although the Midwest and sections of the Southeast have the highest risk of tornadoes, with the help of sophisticated radar and other measures, meteorologists are now able to predict when conditions favorable for tornado formation exist and are able to warn the public better. However, many tornadoes (usually F0 and F1) are still unreported or unconfirmed.

Do the following to prepare for a tornado:

- Know the risk for tornadoes in the area. Although tornadoes have been reported throughout the United States, some areas are clearly at higher risk than others.
- Identify a “safe” room where family members can gather during a tornado.
 - In a home, the safest place to be is in the basement, away from all windows. If the home has no basement, the safest place is an interior hallway or room on the lowest floor.
 - In a high-rise building, the safest place is in a hallway in the center of the building.
 - Mobile homes are not safe during a tornado. Those who live in mobile homes should seek shelter in a nearby sturdy building.
- Learn the community’s warning system. Broad areas use EAS to warn of imminent hazards. Within these areas, though, communities may have other warning systems for tornadoes, including sirens that are also used to signal fires and other hazards. For those who live in communities that use sirens, it is critical to learn the siren warning tone to ensure recognition. Also, when severe weather threatens, NOAA weather radio carries current information and instructions.
- Conduct periodic tornado drills with your family to ensure that all family members know what to do and where to go during a tornado emergency.

The most obvious clues that a tornado may be forming or has formed are high winds and very large hail. Be alert for these clues and to take protective action, even if no tornado warning is issued.

- Damage often occurs when wind gets inside a home. Keep all windows and doors closed. Houses do not explode because of air pressure differences.
- Go to the “safe” room or area. Stay away from windows to avoid flying debris and glass.
- Listen to EAS or NOAA Weather Radio for current emergency information and instructions.

If you are driving and see a tornado, go to a nearby sturdy building and seek an area on the lowest level, without windows. If there are no buildings nearby, get out and away from the vehicle and lie down in a low spot on the ground. Protect the head and neck.

TORNADOES (CONTINUED)

Following a tornado, citizens should continue listening to EAS or NOAA weather radio for updated information and instructions. As with many other hazards, post-tornado actions include:

- Avoiding fallen power lines or broken utility lines and immediately reporting those you see.
- Staying out of damaged areas until told that it is safe to enter.
- Staying out of damaged buildings.
- Using a flashlight to look for damage and fire hazards and documenting damage for insurance purposes.
- Turning off utilities, if necessary.
- Reserving the telephone for emergencies.

Tornado Myths and Facts

Myth:	Areas near lakes, rivers, and mountains are safe from tornadoes.
Fact:	No place is safe from tornadoes. A tornado near Yellowstone National Park left a path of destruction up and down a 10,000-foot mountain.
Myth:	The low pressure with a tornado causes buildings to explode as the tornado passes overhead.
Fact:	Violent winds and debris slamming into buildings cause most structural damage.
Myth:	Windows should be opened before a tornado approaches to equalize pressure and minimize damage.
Fact:	Windows should be left <u>closed</u> to minimize damage from flying debris and to keep the high wind out of the structure.
Myth:	If you are driving and see a tornado, you should drive at a right angle to the storm.
Fact:	The best thing to do is seek the best available shelter. Many people are injured or killed by remaining in their vehicles.
Myth:	People caught in the open should seek shelter under highway overpasses.
Fact:	Do <u>not</u> seek shelter under highway overpasses or under bridges. If possible, take shelter in a sturdy, reinforced building.

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TSUNAMIS

Tsunamis are ocean waves that are produced by earthquakes or underwater landslides. The word is Japanese and means “harbor wave,” because of the devastating effects that these waves have had on low-lying Japanese coastal communities. Tsunamis are often incorrectly referred to as tidal waves.

Tsunamis, which pose the greatest risk to areas less than 25 feet above sea level and within one mile of the shoreline, can cause:

- Flooding.
- Contamination of drinking water.
- Fires from ruptured tanks or gas lines.
- Loss of vital community infrastructure.

Most deaths caused by tsunamis result from drowning.

Since 1945, six tsunamis have killed more than 350 people and caused 500 million dollars worth of property damage in Hawaii, Alaska, and the West Coast. Twenty-four tsunamis have caused damage in the United States and its territories during the past 224 years.

Tsunamis can travel upstream in coastal estuaries and rivers, with damaging waves extending farther inland than the immediate coast. A tsunami can occur during any season of the year and at any time, day or night.

The first wave of a tsunami is usually not the largest in a series of waves, nor is it the most significant. One coastal community may experience no damaging waves, while another, not far away, may experience destructive deadly waves. Depending on a number of factors, some low-lying areas could experience severe inland inundation of water and debris of more than 1,000 feet.

Tsunami warnings originate from two agencies:

- The West Coast/Alaska Tsunami Warning Center (WC/ATWC) is responsible for tsunami warnings for California, Oregon, Washington, British Columbia, and Alaska.
- The Pacific Tsunami Warning Center (PTWC) is responsible for providing warnings to international authorities, Hawaii, and U.S. territories within the Pacific basin.

The two Tsunami Warning Centers coordinate the information that is being disseminated.

TSUNAMIS (CONTINUED)

Do the following to prepare for a tsunamis:

- Know the risk for tsunamis in the area. Know the height of your street above sea level and the distance of your street from the coast or other high-risk waters. Evacuation orders may be based on these numbers.

If you are visiting an area at risk from tsunamis, check with the hotel, motel, or campground operators for evacuation information.

- Plan and practice evacuation routes. If possible, pick an area 100 feet or more above sea level, or go at least two miles inland, away from the coastline. You should be able to reach your safe location on foot within 15 minutes. Be able to follow your escape route at night and during inclement weather.
- Discuss tsunamis with your family. Discussing tsunamis ahead of time will help reduce fear and anxiety and let everyone know how to respond. Review flood safety and preparedness measures with your family.
- Talk to your insurance agent. Homeowners' policies do not cover flooding from a tsunami. Ask your agent about the National Flood Insurance Program (NFIP).
- Use a NOAA Weather Radio with a tone-alert feature to keep you informed of local watches and warnings.

Ways to protect property:

- Avoid building or living in buildings within several hundred feet of the coastline. These areas are most likely to experience damage from tsunamis, strong winds, or coastal storms.
- Elevate coastal homes. Most tsunami waves are less than 10 feet high.
- Follow flood preparedness precautions. Many of the precautions that are appropriate for floods are also appropriate for tsunamis.
- Consult with a professional for advice about ways to make your home more resistant to tsunami and water. Also, there may be ways to divert waves away from your property.

TSUNAMIS (CONTINUED)

If a strong coastal earthquake occurs:

- Drop, cover, and hold. You should protect yourself from the earthquake first.
- When the shaking stops, gather your family members and evacuate quickly. Leave everything else behind. A tsunami could occur within minutes. Move quickly to higher ground away from the coast.
- Avoid downed power lines, and stay away from buildings and bridges from which heavy objects might fall during an aftershock.

Actions to take:

- If you are in a tsunami risk area and you hear an official tsunami warning or detect signs of a tsunami, evacuate at once. A tsunami warning is issued when authorities are certain that a tsunami threat exists, and there may be little time to get out.
- Follow instructions issued by local authorities. Recommended evacuation routes may be different from the one you planned, or you may be advised to move to higher ground than you had planned.
- Get to higher ground as far inland as possible. Officials cannot reliably predict either the height or local effects of tsunamis.
- Listen to a NOAA Weather Radio or Coast Guard emergency frequency station for updated emergency information.
- Return home only after local officials tell you that it is safe. A tsunami is a series of waves that may continue for hours. Do not assume that after one wave, the danger is over. The next wave may be larger than the first one.

Following a tsunami, citizens should continue listening to a NOAA Weather Radio or Coast Guard emergency frequency station for updated emergency information and instructions. As with many other hazards, post-tsunami actions include:

- Avoiding fallen power lines or broken utility lines and immediately reporting those that you see.
- Staying out of damaged areas until told that it is safe to enter.
- Staying out of damaged buildings.
- Using a flashlight to look for damage and fire hazards, and documenting damage for insurance purposes.

TSUNAMIS (CONTINUED)

- Turning off utilities, if necessary.
- Reserving the telephone for emergencies.

Tsunami Myths and Facts

Myth:	Tsunamis are giant walls of water.
Fact:	Tsunamis normally have the appearance of a fast-rising and receding flood. They can be similar to a tide cycle occurring over 10-60 minutes instead of 12 hours. Occasionally, tsunamis can form walls of water, known as tsunami bores, when the waves are high enough and the shoreline configuration is appropriate.
Myth:	Tsunamis are a single wave.
Fact:	Tsunamis are a series of waves. Often the initial wave is not the largest. The largest wave may occur several hours after the initial activity has started at a coastal location.
Myth:	Boats should seek protection of a bay or harbor during a tsunami.
Fact:	Tsunamis are often most destructive in bays and harbors. Tsunamis are least destructive in deep, open ocean waters.

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VOLCANOES

A volcano is a vent through which molten rock escapes to the Earth's surface. Unlike other mountains, which are pushed up from below, volcanoes are built by surface accumulation of their eruptive products—layers of lava, ashflows, and ash. When pressure from gases within the molten rock becomes too great, an eruption occurs.

The United States is third in the world, after Japan and Indonesia, for the number of active volcanoes. Since 1980, as many as five volcanoes have erupted each year in the United States.

Eruptions are most likely to occur in Hawaii and Alaska. For the Cascade Range in Washington, Oregon, and California, volcanoes erupt on the average of one to two each century.

Also, when Cascade volcanoes do erupt, high-speed avalanches of pyroclastic flows, lava flows (hot ash and rock), and landslides can devastate areas 10 or more miles away. Lahars can inundate valleys more than 50 miles downstream.

The island of Hawaii (the largest of the Hawaiian islands) experiences thousands of earthquakes associated with active volcanoes each year. While most of these are too small to feel, about once a decade a large quake shakes the entire island and causes widespread damage.

Volcanoes produce a wide variety of hazards that can kill people and destroy property. Large explosive eruptions can endanger people and property hundreds of miles away and can even affect the global climate.

Volcanic hazards include:

- Toxic gases.
- Lava and pyroclastic flows.
- Landslides.
- Earthquakes.
- Explosive eruptions.

Eruptions can be relatively quiet, producing lava flows that creep across the land at 2 to 10 miles per hour (mph). Explosive eruptions can shoot columns of gases and rock fragments tens of miles into the atmosphere, spreading ash hundreds of miles downwind.

VOLCANOES (CONTINUED)

Lava flows are streams of molten rock that either pour from a vent quietly or erupt explosively as lava fountains. Because of their intense heat, lava flows are also great fire hazards. Lava flows destroy everything in their path, but most move slowly enough that people can move out of the way. The speed at which lava moves across the ground depends on several factors, including the:

- Type of lava that has erupted.
- Steepness of the ground.
- Rate of lava production at the vent.

Volcanic eruptions can be accompanied by other natural hazards, including:

- Mudflows (including lahars).
- Flash floods.
- Wildland fires.
- Tsunamis (under special conditions).
- Earthquakes.

Historically, lahars have been one of the deadliest volcano hazards. Lahars are mudflows or debris flows composed mostly of volcanic materials on the flanks of a volcano. These flows of mud, rock, and water can rush down valley and stream channels at speeds of 20 to 40 miles per hour and can travel more than 50 miles.

Lahars can occur both during an eruption and when a volcano is quiet. The water that creates lahars can come from melting snow and ice, intense rainfall, or the breakout of a summit crater lake.

VOLCANOES (CONTINUED)

Volcanic ash is actually fine, glassy rock fragments that can affect people and equipment hundreds of miles away from the cone of the volcano. Volcanic ash will:

- Cause severe respiratory problems.
- Diminish visibility.
- Contaminate water supplies.
- Cause electrical storms.
- Disrupt the operation of all machinery.
- Collapse roofs.

The key steps in volcanic eruption preparedness are:

- Understanding the risk. Take time to learn about the risk from volcanic eruption in your area.
- Talking to your insurance agent. Find out what your homeowner's policy will or will not cover in the event of a volcanic eruption.
- Prepare a disaster supply kit, including goggles and dust mask for every family member.
- Developing an evacuation plan. Everyone in your family should know where to go if they have to leave.
- Following evacuation orders. Staying at home to wait out an eruption, if you are in a hazardous zone, could be very dangerous. Take the advice of local authorities.
- Avoiding areas downwind and river valleys downstream of the volcano. Debris and ash will be carried by wind and gravity. Stay in areas where you will not be exposed further to volcanic eruption hazards.
- If outside, protecting yourself from ashfall. Volcanic ash will cause severe injury to breathing passages, eyes, and open wounds, and irritation to skin.
- Being prepared for accompanying hazards. Know how to respond to reduce your risk.

VOLCANOES (CONTINUED)

Take the following measures to protect yourself from ashfall:

- Wear long-sleeved shirts and long pants.
- Use goggles to protect your eyes.
- Wear eyeglasses instead of contact lenses.
- Use a dust mask or hold a damp cloth over your face to help you breathe.
- Stay away from volcanic ashfall areas. The fine, glassy particles of volcanic ash will increase the health risk to children and people with existing respiratory conditions such as asthma, chronic bronchitis, or emphysema.
- Clear roofs of ashfall. Ashfall is very heavy and can cause roofs to collapse, especially if made wet by rainfall. Exercise great caution when working on a roof.
- Avoid driving in heavy ashfall. Driving will stir up volcanic ash that can clog engines and stall vehicles. Moving parts, including bearings, brakes, and transmissions, can be damaged from abrasion.
- If you have a respiratory ailment, avoid contact with any amount of ash. Stay indoors until local health officials advise that it is safe to go outside.

WINTER STORMS

A winter storm can range from a moderate snow over a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Many winter storms are accompanied by low temperatures and heavy or blowing snow, which can severely reduce visibility.

Some winter storms may be large enough to affect several States, while others may affect only a single community.

Winter storms are defined differently in various parts of the country. Check with your local emergency management office, the National Weather Service (NWS) office, or local chapter of The American Red Cross for terms and definitions specific to your area.

Winter storms are considered deceptive killers because most deaths are indirectly related to the storm.

- Automobile or other transportation accidents: This is the leading cause of death during winter storms.
- Exhaustion and heart attacks: Caused by overexertion, these are the two most likely causes of winter storm-related deaths.
- Hypothermia and asphyxiation: Elderly people account for the largest percentage of hypothermia victims. Many older Americans literally freeze to death in their own homes after being exposed to dangerously cold indoor temperatures, or they are asphyxiated because of improper use of fuels such as charcoal briquettes, which produce carbon monoxide.
- House fires: These occur more frequently in the winter because of the lack of proper safety precautions when using alternate heating sources (unattended fires, disposal of ashes too soon, improperly placed space heaters, etc.) Fire during winter storms presents a great danger because water supplies may freeze, and it may be difficult for firefighting equipment to get to the fire.

WINTER STORMS (CONTINUED)

The elements of winter storms include:

- Heavy snow.
- Ice.
- Winter flooding.
- Cold.

HEAVY SNOW

Heavy snow can:

- Immobilize regions and paralyze cities.
- Strand commuters.
- Close airports.
- Disrupt emergency and medical services.

Accumulations of snow can cause roofs to collapse and knock down trees and power lines. Homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of removing snow and repairing damage, and the resulting loss of business can have severe economic impacts on cities and towns.

In the mountains, heavy snow can lead to masses of tumbling snow called avalanches. More than 80 percent of midwinter avalanches are triggered by a rapid accumulation of snow, and 90 percent of those occur within 24 hours of snowfall.

An avalanche may reach a mass of a million tons and travel at speeds of up to 200 miles per hour (mph).

WINTER STORMS (CONTINUED)

The different kinds of snow fall include:

- Blizzards are accompanied by winds of 35 mph or more with snow and blowing snow, reducing visibility to less than one-quarter mile for at least 3 hours.
- Blowing snow is wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground that is picked up by the wind.
- Snow squalls are brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
- Snow showers are snow falling at varying intensities for short duration with little or no accumulation.

ICE

Heavy accumulations of ice can disrupt communications and power for days while utility companies repair extensive damage. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces.

The different kinds of ice include:

- Sleet: Raindrops that freeze into ice pellets before reaching the ground are called sleet. Sleet usually bounces when hitting a surface and does not stick to objects. Sleet, however, can accumulate like snow and cause a hazard to motorists.
- Freezing rain: Rain that falls onto surfaces with temperatures below freezing—causing it to freeze to those surfaces is called freezing rain. Even small accumulations of ice can cause a significant hazard.
- Ice storm: Ice storms occur when freezing rain falls and freezes immediately on impact. Communications and power can be disrupted for days.

WINTER STORMS (CONTINUED)**WINTER FLOODING**

Winter storms can generate flooding, resulting in significant damage and loss of life.

Winter flooding includes:

- Coastal floods: Winds generated from intense winter storms can cause widespread tidal flooding and severe beach erosion along coastal areas.
- Ice jams: Long cold spells can cause rivers and lakes to freeze. A rise in the water level or a thaw breaks the ice into large chunks that become jammed at manmade and natural obstructions. An ice jam can act as a dam, resulting in severe flooding.
- Snowmelt: A sudden thaw of a heavy snow pack that often leads to flooding.

COLD

Exposure to cold can cause frostbite or hypothermia and become life threatening. Infants and the elderly are the most susceptible.

What constitutes extreme cold varies in different parts of the country:

- In the south, near-freezing temperatures are considered extreme cold. Vegetation may be damaged and pipes may freeze and burst.
- In the north, extreme temperatures are well below zero.

When talking about cold, you should consider:

- Wind chill: Wind chill is not the actual temperature, but rather how wind and cold feel on exposed skin. As the wind increases, heat is carried away from the body at a faster rate, driving down the body's temperature.
- Frostbite: Frostbite is damage to body tissue caused by extreme cold and resulting in a loss of feeling and a white or pale appearance in extremities, such as fingers, toes, ear lobes, or the tip of the nose. Frostbite victims require immediate medical treatment. If you must wait for help, slowly rewarm the affected areas. If signs of hypothermia appear, however, warm the body core before the extremities.

WINTER STORMS (CONTINUED)

- **Hypothermia:** Hypothermia occurs when the body temperature drops below 95 degrees Fahrenheit. Hypothermia can kill. For those who survive, there are likely to be lasting kidney, liver, and pancreas problems. If you suspect hypothermia, take the victim's temperature. If it is below 95 degrees Fahrenheit, seek medical care immediately! If medical care is not available, warm the person slowly, starting with the body core. Warming the arms and legs first drives cold blood toward the heart and can lead to heart failure. Dress the person in dry clothing and wrap him or her in a warm blanket, covering the head and neck. Do not provide alcohol, drugs, coffee, or any hot beverage or food. Warm broth is the first food to offer.

Warning signs of hypothermia include:

- Uncontrollable shivering.
- Memory loss.
- Disorientation.
- Incoherence.
- Slurred speech.
- Drowsiness.
- Apparent exhaustion.

The National Weather Service (NWS) Storm Prediction Center issues watches and warnings of hazardous weather, including winter storms.

The key steps in winter storm preparedness are:

- **Understanding the risk.** Take time to learn about the winter storm risk in your area.
- **Preparing your home** with insulation, caulking, and weatherstripping. Learn how to keep pipes from freezing and how to thaw frozen pipes. Store sufficient fuel (or emergency heating equipment). Install and test smoke alarms on all levels of your home.
- **Servicing snow removal equipment** before the winter storm season. Maintain the equipment in good working order, and ensure that you have an adequate supply of gas.
- **Keeping your car's gas tank full** for emergency use and to keep the fuel line from freezing.
- **Paying attention to warnings.** Use a NOAA weather radio with a tone-alert feature or listen to local radio or television for EAS broadcasts.
- **Staying indoors and dress warmly.** Wear layers of loose-fitting, lightweight, warm clothing. When necessary, remove layers to avoid perspiration and subsequent chill.

WINTER STORMS (CONTINUED)

- Eating and drinking regularly. Food provides the body with energy for producing its own heat. Drink liquids such as warm broth or juices to prevent dehydration. Avoid caffeine and alcohol. Caffeine, a stimulant, accelerates the symptoms of hypothermia. Alcohol is a depressant and hastens the effects of cold on the body. Alcohol also slows circulation and can make you less aware of the effects of cold. Both caffeine and alcohol can cause dehydration.
- Conserving fuel. Great demand may be placed on electric, gas, and other fuel distribution systems (fuel oil, propane, etc.). Suppliers may not be able to replenish depleted supplies during severe weather. Lower the thermostat to 65 degrees Fahrenheit during the day and 55 degrees at night. Close off unused rooms, stuff towels or rags in cracks under doors, and cover windows at night.
- If outside, protect yourself from hazards. Dress warmly, keep dry, and watch for signs of hypothermia and frostbite. Avoid overexertion. Walk carefully on snowy, icy sidewalks, and use public transportation, if possible.

Take measures to protect yourself if you must drive during a winter storm:

- Winterize your car before the winter storm season. Have a mechanic check your car's systems and install good winter tires with adequate tread. Keep snow and ice removal equipment in the car.
- Keep a cellphone or two-way radio with you when traveling in winter weather. Make sure that the batteries are charged.
- Keep a disaster supplies kit in the trunk of each car used by household members.
- Plan long trips carefully and notify someone of your destination, route, and expected time of arrival.
- If you get stuck, stay with the vehicle, display a trouble sign, and occasionally run the engine to keep warm, keeping the exhaust pipe clear of snow and a downwind window open slightly for ventilation. Use available material, such as newspapers, maps, and removable car mats for added insulation. Avoid overexertion, drink fluids, and watch for signs of frostbite and hypothermia.

Check the forecast when venturing outside. Major winter storms are often followed by even colder temperatures.

NUCLEAR POWER PLANT EMERGENCIES

The construction and operation of nuclear power plants are closely monitored and regulated by the Nuclear Regulatory Commission (NRC). Accidents at these plants are possible, however.

An accident could result in dangerous levels of radiation that could affect the health and safety of the public living near the nuclear power plant.

Radioactive materials are composed of unstable atoms. These atoms give off excess energy until they become stable. The energy emitted is radiation.

Each of us is exposed daily to radiation from natural sources, including the sun and the Earth. Small traces of radiation are present in food and water. Radiation also is released from manmade sources, such as x-ray machines, television sets, and microwave ovens.

Nuclear power plants use the heat generated from nuclear fission in a contained environment to convert water to steam, which powers generators to produce electricity.

Radiation has a cumulative effect. The longer a person is exposed to radiation, the greater the risk of adverse effects. A high exposure to radiation can cause serious illness or death.

The potential danger from an accident at a nuclear power plant is exposure to radiation. This exposure could come from the release of radioactive material from the plant into the environment, usually characterized by a plume (cloud-like) formation of radioactive gases and particles.

The area affected by radioactive material release is determined by:

- The amount of radiation released from the plant.
- Wind direction and speed.
- Weather conditions.

NUCLEAR POWER PLANT EMERGENCIES (CONTINUED)

The major hazards to people in the vicinity of the plume:

- Radiation exposure to the body from the cloud and particles deposited on the ground.
- Inhalation of radioactive materials.
- Ingestion of radioactive materials.

If an accident occurred involving a radioactive release at a nuclear power plant, local authorities would:

- Activate warning sirens or another approved alert method.
- Provide instructions through the Emergency Alert System (EAS) on local television radio stations.

Local and State governments, Federal agencies, and the electric utilities have emergency response plans in the event of a nuclear power plant emergency. The plans define two Emergency Planning Zones (EPZs):

- One EPZ covers an area within a 10-mile radius of the plant where it is possible that people could be harmed by direct radiation exposure.
- The other EPZ covers a broader area, usually up to a 50-mile radius from the plant, where radioactive materials could contaminate water supplies, food crops, and livestock.

Exposure can be minimized by:

- Time. Limit your time exposed to radioactive material. Most radioactivity loses its strength fairly quickly. In a nuclear power plant accident, local authorities will monitor any release of radiation and determine when the threat has passed.
- Distance. The more distance between you and the source of the radiation, the better. In a serious nuclear power plant accident, local authorities will call for an evacuation to increase the distance between you and the radiation. (Evacuation also reduces the period of time of exposure.)
- Shielding. The more heavy, dense material between you and the source of the radiation, the better. This is why local authorities could advise you to remain indoors if an accident occurs. In some cases, the walls in your home would be sufficient shielding to protect you.

NUCLEAR POWER PLANT EMERGENCIES (CONTINUED)

It is important to know the terms that are used to describe nuclear emergencies:

- Notification of Unusual Event: A small problem has occurred at the plant. No radiation material release is expected. Federal, State, and county officials will be told right away. No action on your part will be necessary.
- Alert: A small problem has occurred, and small amounts of radiation material could leak inside the plant. This will not affect you, and you should not have to do anything.
- Site Area Emergency: A more serious problem has occurred, and small amounts of radiation material could leak from the plant. If necessary, State and county officials will act to assure public safety. Area sirens may be sounded. Listen to your radio or television for safety information.
- General Emergency: This is the most serious problem. Radiation material could leak outside the plant and off the plant site. The sirens will sound. Tune to your local radio or television station for emergency information reports. State and county officials will act to protect the public. Be prepared to follow instructions promptly.

You should:

- Learn the community's warning system. Nuclear power plants are required to install sirens and other warning systems (flashing warning lights) to cover a 10-mile area around the plant.
 - Find out when the warning systems are tested.
 - When the systems are tested in your area, determine whether you can hear sirens or see flashing warning lights from your home.
- Obtain emergency public information (EPI) from the power company that operates the power plant or from the local emergency services office. If you live within 10 miles of the plant, you should receive these materials annually from the power company or your State or local government.
- Learn the emergency plans for schools, day care centers, nursing homes, and other places that members of your household frequent. Learn where people would go in case of evacuation.

NUCLEAR POWER PLANT EMERGENCIES (CONTINUED)

Citizens should be prepared to evacuate.

Key points during an emergency:

- Listen to the warning. Not all incidents result in the release of radiation. The incident could be contained inside the plant and pose no danger to the public.
- Stay tuned to local radio or television. Local authorities will provide specific information and instructions.
 - The advice given will depend on the nature of the emergency, how quickly it is evolving, and how much radiation, if any, is likely to be released.
 - Local instructions should take precedence over any advice given on national broadcasts or in books.
 - Review the public information materials that you received from the power company or government officials.
- Evacuate, if you are advised to do so.
 - Close and lock doors and windows.
 - Keep car windows and vents closed. Use recirculating air.
 - Listen to the radio for evacuation routes and other instructions.
- If you are not advised to evacuate, you may be advised to shelter in place.
 - 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.
 - Keep a battery-powered radio with you at all times.
- Shelter livestock and give them stored feed, if time permits.
- Do not use the telephone unless it is absolutely necessary. Lines will be needed for emergency calls.
- If you suspect exposure, shower thoroughly.
 - Change clothes and shoes.
 - Put exposed clothing in a plastic bag.
 - Seal the bag, and place it out of the way.
- Put food in covered containers or in the refrigerator. Food not previously covered should be washed before being put in containers.

NUCLEAR POWER PLANT EMERGENCIES (CONTINUED)

Key points after an emergency:

- If told to evacuate, return home only when local authorities say that it safe to do so.
- If advised to stay in the home, remain inside until local authorities indicate that it is safe.
- Get medical treatment for any unusual symptoms, such as the rapid onset of vomiting, that may be related to radiation exposure.

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HAZARDOUS MATERIALS INCIDENTS

From industrial, chemical, and toxic waste to household detergents and air fresheners, hazardous materials are part of our everyday lives.

Hazardous materials are substances that because of their chemical nature, pose a potential risk to life, health, or property if they are released or used improperly.

Hazards can exist during:

- Production.
- Storage.
- Transportation.
- Use.
- Disposal.

Potential sources of hazardous materials can include:

- Chemical plants.
- Local service stations, which store and dispense gasoline and diesel fuel.
- Hospitals, which store a range of radioactive and flammable materials.
- Hazardous materials waste sites, of which there are approximately 30,000 in the United States.
- Transport vehicles, including trucks, trains, ships, and aircraft.

Hazardous materials incidents can range from a chemical spill on a highway to groundwater contamination by naturally occurring methane gas. Hazardous materials incidents can occur anywhere.

Contact your local emergency management office to find out if your community has Local Emergency Planning Committees (LEPCs) and the information they can provide.

HAZARDOUS MATERIALS INCIDENTS (CONTINUED)

Cover all of the preparedness points.

- Find out what could happen to you.
 - Ask your LEPC or emergency management office about community plans for responding to hazardous materials accidents at local plants or other facilities, or transportation accidents involving hazardous materials.
 - Ask your LEPC about storage and use of hazardous chemicals in your local area. Remember that some toxic chemicals are odorless.
 - Use the information gathered to evaluate the risks to your household. Determine how close you are to factories, freeways, or railroads that may produce or transport toxic waste.

- Address the hazards in your family emergency plan.
 - Be prepared to evacuate. An evacuation could last for a few hours or several days.
 - Be prepared to shelter in place; that is, to seek safety in your home or any other building you might be in at the time of a chemical release. At home, you should select an interior room to be used as a “safe room.”
 - Assemble a shelter kit to be used to seal the shelter room should a chemical release occur.

- Practice and maintain your plans for personal or family response to a hazardous materials incident.

- Learn the warning and information system for your community. Find out how local officials will notify you of a hazardous materials situation and what you should do to protect yourself and your family or coworkers.

Warning procedures could include:

- Outdoor warning sirens or horns.

- Emergency Alert System (EAS)—Information provided by radio and television.

- “All-Call” telephoning—An automated system for sending recorded messages.

- Residential route alerting—Messages announced to neighborhoods from vehicles equipped with public address systems.

HAZARDOUS MATERIALS INCIDENTS (CONTINUED)

These are the initial steps to take in case of a hazardous materials incident:

- Leave the area immediately. Report the emergency from a safe location uphill and upwind from the emergency site.
- If you witness (or smell) a hazardous materials incident, call 9-1-1, your local emergency notification number, or the fire department, as soon as possible.
- If you hear a warning signal, listen to local radio or television stations for further information. Then, follow instructions carefully.
- Stay away from the incident site to minimize the risk of contamination.
- If you are caught outside, remember that gases and mists are generally heavier than air. Try to stay upstream, uphill, and upwind. (Hazardous materials can be quickly transported by water and wind.) Try to go at least one-half mile (10 city blocks) from the danger area; for many incidents, you will need to go much farther.
- If you are in a vehicle, stop and find shelter in a permanent building, if possible. If you must remain in your car, keep car windows and vents closed, and shut off the air conditioner and heater.
- If asked to evacuate your home, do so immediately. If authorities indicate that there is enough time, close all windows, shut vents, and turn off attic, heating, and air conditioning fans to minimize contamination.
- If requested, stay indoors—shelter in place.

Additional precautions:

- Avoid contact with spilled liquids, airborne mists, or condensed solid chemical deposits. Keep your body fully covered to provide some protection. Wear gloves, socks, shoes, pants, and a long-sleeved shirt.
- Do not eat food or drink water that may have been contaminated.

You need to follow all of the instructions given by emergency authorities. The steps to take if asked to shelter in place:

- Get household members and pets inside as quickly as possible.
- Close and lock all exterior doors and windows. Close vents, fireplace dampers, and as many interior doors as possible.

HAZARDOUS MATERIALS INCIDENTS (CONTINUED)

- Turn off air conditioners and ventilation systems. In large buildings, building superintendents should set all ventilation systems to 100 percent recirculation so that no outside air is drawn into the building. If this is not possible, ventilation systems should be turned off.
- Go into the pre-selected safe room (the above-ground room with the fewest openings to the outside). Take a battery-powered radio, water, sanitary supplies, a flashlight, and your disaster supply kit (which should include pre-cut plastic sheeting for windows and vents, duct tape, modeling clay for sealing cracks, and a towel for under the door).
 - Close doors and windows in the room.
 - Tape around the sides, bottom, and top of the door.
 - Cover each window and vent in the room with a single piece of plastic sheeting, taping around all edges of the sheeting to provide a continuous seal.
 - If there are any cracks or holes in the room, such as those around pipes entering a bathroom, fill them with modeling clay or other similar material.

You should follow these additional precautions when sheltering in place during a hazardous materials incident:

- Remain in the room, listening to emergency broadcasts on the radio, until authorities advise you to leave your shelter.
- If authorities warn of the possibility of an outdoor explosion, close all drapes, curtains, and shades in the room. Stay away from windows to prevent injury from breaking glass.
- When authorities advise people in your area to leave their safe rooms, open all doors and windows and turn on air conditioning and ventilation systems. These measures will flush out any chemicals that infiltrated into the building.

HAZARDOUS MATERIALS INCIDENTS (CONTINUED)

The actions you should take after a hazardous materials incident:

- If evacuated, do not return home until local authorities say that it is safe.
 - Upon returning home, open windows and vents, and turn on fans to provide ventilation.
 - Follow decontamination procedures for persons or items that have been exposed to a hazardous chemical:
 - Depending on the chemical, you may be advised to take a thorough cool shower or to stay away from water and follow another procedure.
 - Seek medical treatment for unusual symptoms as soon as possible.
 - If medical help is not immediately available, remove all of your clothing and shower thoroughly (unless local authorities say that the chemical is water reactive and advise you to do otherwise). Cut off clothing that would normally be removed by pulling over the head.
 - Change into fresh, loose clothing and seek medical help as soon as possible.
 - Place exposed clothing and shoes in tightly sealed containers. Do not allow them to have contact with other materials. Ask local authorities about proper disposal.
 - Advise everyone who comes into contact with you that you may have been exposed to a toxic substance.
 - Find out from local authorities how to clean up your land and property.
 - Report any lingering vapors or other hazards to your local emergency service office.
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HOUSEHOLD CHEMICAL EMERGENCIES

Nearly every household uses products that contain hazardous materials. While the risk of a chemical accident is slight, knowing how to handle these household chemicals and how to react during an emergency can reduce the risk of injury.

The symptoms of poisoning include:

- Difficulty breathing.
- Irritation of the eyes, skin, throat, or respiratory tract.
- Changes in skin color.
- Headaches, blurred vision, or dizziness.
- Clumsiness or lack of coordination.
- Cramps or diarrhea.

The best way to protect yourself from household chemical emergencies is to use the L.I.E.S. procedure.

- Limit the amount of hazardous materials in storage.
- Isolate products in approved containers, store them inside enclosed cabinets, and protect them from sources of ignition.
- Eliminate products that are no longer necessary by disposing of them properly.
- Separate incompatible materials (e.g., chlorine products and ammonia).

Read the label on any product and to follow all safety precautions recommended by the manufacturer.

HOUSEHOLD CHEMICAL EMERGENCIES (CONTINUED)

To ensure the safe handling of chemicals in the household, you should:

- Read all directions before using a new chemical product. Be sure to store household chemicals according to the instructions on the label.
- Store chemicals in a safe, secure location, out of the reach of children.
- Avoid mixing household chemical products. Deadly fumes can result from the mixture of chemicals such as chlorine bleach and ammonia.
- Never smoke while using household chemicals. Avoid using hair spray, cleaning solutions, paint products, or pesticides near an open flame, pilot light, lighted candle, fireplace, wood-burning stove, etc. Although you may not be able to see or smell it, vapor could catch fire or explode.
- If you spill a chemical, clean it up immediately with rags. Be careful to protect your eyes and skin (wear gloves and eye protection). Allow the fumes in the rags to evaporate outdoors, then dispose of the rags by wrapping them in a newspaper and placing them in a sealed plastic bag in your trash can.

These are additional recommendations:

- Post the number of the nearest poison control center near all telephones. In an emergency situation, you may not have time to look up critical phone numbers.
- Learn to detect hazardous materials. Many hazardous materials do not have a taste or an odor, and some can be detected because they cause physical reactions such as watering eyes or nausea. Other hazardous materials exist beneath the ground and can be recognized by an oil or foam-like appearance.
- Learn to recognize the symptoms of poisoning.

What to do during a household chemical emergency:

- If a poisonous substance is consumed:
 - Find any containers immediately. Medical professionals may need specific information from the container(s) to provide the best emergency advice.
 - Call the poison control center at 1-800-222-1222 and, if directed, 9-1-1 or local emergency number. Follow the emergency operator or dispatcher's instructions carefully. Do not give anything by mouth until medical professionals have advised you.

HOUSEHOLD CHEMICAL EMERGENCIES (CONTINUED)

- If a chemical gets into the eyes:
 - Follow the emergency instructions on the container.
 - Continue the cleansing process even if the victim indicates that he or she is no longer feeling any pain, and then seek medical attention.
- If there is a fire or explosion:
 - Evacuate the residence immediately.
 - Move upwind and away to avoid breathing toxic fumes.
 - Call the fire department from outside (using a cellular phone or a neighbor's phone) and safely away from the danger.

These are additional measures that you should take in case of a household chemical emergency:

- Wash hands, arms, or other exposed body parts that may have been exposed to the chemical. Chemicals may continue to irritate the skin until they are washed off.
- Discard clothing that may have been contaminated. Some chemicals may not wash out completely. Discarding clothes will prevent potential future exposure.
- Administer first-aid treatment to victims of chemical burns. Follow these steps to administer first aid:
 - Call 9-1-1 for emergency help.
 - Remove clothing and jewelry from around the injury.
 - Pour clean, cool water over the burn for 15 to 30 minutes.
 - Loosely cover the burn with a sterile or clean dressing. Be sure that the dressing will not stick to the burn.
 - Refer the victim to a medical professional for further treatment.