

Earthquakes

Earthquakes

- How Earthquakes are Measured
- Preparing for an Earthquake
- During an Earthquake
- Responses Inside Buildings During an Earthquake
- Responses if You are Outside During an Earthquake
- After an Earthquake
- Special Considerations for Agricultural Producers

Earthquakes

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

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

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

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

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

How Earthquakes are Measured

The Richter Scale provides a measure of the magnitude of the earthquake in terms of energy released, measured in equivalent tons of TNT. Each unit represents a 10-fold energy release. An earthquake of Richter 2.5 or less is usually ignored. Dishes rattling and china shaking occur at 3. The Modified Mercalli Intensity Scale is a more subjective accounting or survey of behavior and damage based on observation at the site. Depending on the intensity of ground vibrations, the elasticity of buildings and structures, and how well structures are connected to their foundation, falling or collapsing objects and structures accompany earthquakes. Structural instability, such as dam failures, can trigger flash floods. Fires have been the greatest cause of damage in the past. Offshore earthquakes may cause tsunamis.

Preparing for an Earthquake

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

1. Become familiar with earthquake terms.

Aftershocks: Tremors that occur in the hours or days after the initial earthquake shaking is over.

Epicenter: The place on the surface of the earth directly above an earthquake's first movement (focus).

Fault: A fracture in the earth's crust along which rocks have been displaced.

Focus: The point beneath the surface of the earth where the rocks first break and move, beginning the earthquake.

Intensity: An indication of an earthquake's apparent severity at a specific location, based on its effects on people and structures.

Magnitude: Size of an earthquake determined from the size of the seismic waves it generates as recorded by seismographs.

Mercalli Scale: The scale used to measure the strength of an earthquake as determined by people's eyewitness observations.

Tidal wave: This is a misnomer for a tsunami. Tidal waves occur from the interaction of the moon and large bodies of water. Waves you see rolling into the ocean shore every day are tidal waves. **Tsunami:** A seismic sea wave. An unusually large wave (or series of them) produced by an undersea earthquake or volcanic eruption.

2. Safeguard your home by:

Bolting bookshelves, water heaters and cabinets to wall studs.

Anchoring things so that they will not move or fall during an earthquake is the most important thing you can do to make yourself safe. Keeping things in place also means they will not break.

3. There are many ways to make the contents of your home and workplace less hazardous.

Move cabinets and tall furniture so that if they fall they are not likely to hit people.

Use steel angle brackets to anchor them to studs in the wall.

Put heavy or breakable things on bottom shelves. You can even put "fences" or restraining wires to keep items from falling off open shelves.

Put child-proof or swing-hook latches on bathroom and kitchen cabinets. At work, put strong latches on cabinets where hazardous items are stored.

Use screw-eyes or tongue-in-groove hangers to mount mirrors or pictures instead of hanging them on nails.

Be sure that ceiling fans and light fixtures are well anchored or have earthquake safety wiring.

Anchor typewriters, computers, televisions, stereos and like items with heavy duty Velcro, at home and at work.

Strap your water heater to anchor it to wall studs. You can buy metal strapping, called plumber's tape or strap iron, in hardware stores. Use it to strap the heater at the top and bottom. This not only preserves your best source of water but also significantly reduces the fire hazard in your home by preventing a broken gas line.

Do not assume that anything is too heavy to move in an earthquake. When the ground is going up and down in waves, it bounces even the heaviest equipment into the air.

During an Earthquake

1. Get under a heavy table or desk and hold on, or sit or stand against an inside wall.
2. Keep away from windows.
3. If indoors, stay indoors.
4. If outdoors, stay outdoors away from falling debris, trees and power lines.
5. If in a car, stay in the car.
6. Many injuries occur when people act on their impulse to run. Train yourself to take cover where you are.

Responses Inside Buildings During an Earthquake

For most of us the biggest danger in an earthquake is not from a building collapsing, but from things inside the building falling or flying around while the building is shaking. Hazards found inside buildings include overhead lights, ceiling tiles, cabinets, windows, furniture and equipment. If an earthquake happens, the best thing to do is:

1. Drop, cover, and hold on.

Get under a table. If there are no tables, get under or down between rows of chairs or against inner walls.

2. Do not stand in a doorway. Buildings today have so much partitioning, much of which is temporary, that many doorways are actually weak points. Doorways are not a good solution in a group situation either.

3. If you have nothing to get under, sit down against an interior wall or next to a chair, holding on if possible.
4. If you are in bed, it's best to stay there, hold on, and pull the pillows over your head for protection.
5. If children are in another room, take cover in the closest safe place and call to them to do the same. Children will need you alive and unhurt after the earthquake. Avoid the urge to run to protect your children, as that puts you in more danger of being hurt or injured.

Responses if You are Outside During an Earthquake

1. Outside, get away from buildings, walls, trees and power lines. If you cannot get clear of hazards, getting back inside a building is better than staying on the sidewalk. Sidewalks next to buildings are among the worst places to be.
2. In a car, ease off the accelerator and slow down carefully. Do not stop on or under overpasses and bridges if you can avoid them. Be aware of what traffic around you is doing and act accordingly.
3. If you live in coastal areas, be aware of possible tsunamis.

After an Earthquake

1. Take basic precautions immediately after an earthquake. In addition to those outlined in the General Family Preparedness, Residential Fires and Hazardous Materials Accidents sections you should: Expect aftershocks. Avoid using vehicles except in emergencies.
2. Check yourself for injuries and protect yourself by putting on shoes, work gloves and any other protective gear at hand.
3. If the electricity is off, turn on a flashlight.
4. Once you are sure that you're all right, check the people around you for injuries. You might ask loudly, "Is everyone okay?" This will also help calm people. The types of injuries that happen most often in an earthquake include cuts, bruises, fractures and physiological shock.
5. Check the entire building for structural damage and chemical spills. Refer to the section on Hazardous Materials Accidents for further response information. Check chimneys for cracks and damage. The initial check should be made from a distance. Have a professional inspect the chimney for internal damage that could lead to fire.
6. Right after an earthquake, hang up your phone. If the receivers are shaken off the hooks, these lines register as "open" in the system and it overloads. You can help restore telephone service by hanging up your phone.

Special Considerations for Agricultural Producers

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

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

Information in this document was compiled by the Texas Agricultural Extension Service and Hazard Reduction and Recovery Center