

Earthquakes are sudden slips on a fault, and the resulting ground shaking and radiated seismic energy caused by the slip, or by volcanic or magmatic activity, or other sudden stress changes in the earth.

- Earthquakes are one of the most frightening and destructive disasters
- Earthquakes strike suddenly, without warning at any time of the year, day or night
- Smaller earthquakes (aftershocks) often follow the main quake
- U.S. Geological Survey estimates that several million earthquakes occur in the world annually
- All 50 states and all U.S. territories are vulnerable to earthquakes
- California experiences the most frequent damaging earthquakes; however, Alaska experiences the greatest number of large earthquakes—most located in uninhabited areas
- Largest earthquakes in U.S. were along the New Madrid Fault (Missouri); three-month-long series of quakes (1811 to 1812) included three larger than 8.0 on the Richter Scale felt over the entire eastern U.S.
- Annual damages amount to more than 200 billion dollars in the U.S.
- Ground shaking from earthquakes can collapse buildings and bridges; disrupt gas, electric, and phone service
- Where earthquakes have occurred before, they will happen again

Earthquake Hazards: Secondary or cascading effects associated with earthquakes that may affect people.

- Surface faulting is displacement that reaches the earth's surface during slip along a fault
- Ground shaking is the movement of the earth's surface from earthquakes or explosions
- Landslides is a movement of surface material down a slope
- Liquefaction is a process by which water-saturated sediment temporarily loses strength and acts as a fluid
- Tsunami is a sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes, major submarine slides, or exploding volcanic islands
 - 2004 Indian Ocean earthquake spawned the biggest tsunami on record
- Seiche is the sloshing of a closed body of water from earthquake shaking
- Fire may be caused by violent disruptions to electrical, natural gas and gasoline lines
 - 1906 San Francisco, California spawned three days of structure fires throughout the city

Earthquake Risk: Probable building damage, and number of people that are expected to be hurt or killed if a likely earthquake on a particular fault occurs.

Earthquake Severity: Expressed in terms of both *intensity* and *magnitude*. However, the two terms are quite different, and they are often confused.

- Intensity is based on the observed effects of ground shaking on people, buildings, and natural features
 - Modified Mercalli Intensity Scale measures intensity values on 12 levels – I to XII
 - Lower numbers are based on what people felt / higher numbers on observed structural damage
- Magnitude is related to the amount of seismic energy released at the hypocenter of the earthquake
 - Richter Scale measures magnitude values with whole numbers and decimal fractions on 10 levels
 - Lower numbers (less than 2.0 to 5.9) create micro to moderate effects and higher numbers (6.0 to 10.0+) create strong to epic effects
 - Valdivia, Chile (1960) largest recorded earthquake in the world was measured at 9.5
 - Anchorage, Alaska (1964) largest recorded earthquake in USA was measured at 9.2 caused more than a billion dollars of damage and spawned a devastating tsunami
 - Indian Ocean (2004) was measured at 9.1 and caused a catastrophic tsunami
 - Great San Francisco Earthquake (1906) was measured at 8.3
 - Earthquake of magnitude 10.0+ has never been recorded

Be Prepared: *Before the Quake*

Take Protective Measures: Secure your property whether you evacuate or stay at home to minimize damage.

- Earthquake (seismic)retrofit home to increase resilience to quakes
- Secure home (foundation straps and clips)
- Secure property items that may be shaken out of place (bookcases, appliances, water heater, heavy furniture)
- Install automatic shut-off valves on utilities (especially natural gas)

Develop Emergency Plans: Early preparation will save lives, fear and panic. Families, schools and workplaces should develop written plans for natural hazards as well as technological hazards and terrorism. Plans should be easily accessible and practiced regularly. Family plans should be shared with other friends and extended family members.

Create Emergency Supply Kits: Families, schools and workplaces should build supply kits. At home, include all family members and pets for three days that is portable in case of evacuation. Kits should include:

- Food and water
- Medicine and copies of prescriptions, personal hygiene items and first aid supplies
- Important documents, personal identification, copies of insurance, etc.
- Cash or travelers checks
- Other essential supplies (flashlights, extra batteries, blankets, seasonal clothing, cash, a battery operated or crank radio, a weather radio, cell phones and chargers) that your family may need

In Your Home or at the Workplace:

- Know the safe spots in each room: under sturdy desks, tables or against interior walls
- Use a doorway only if you know it is a bearing wall
- Know the danger spots in each room: avoid windows, hanging objects, fireplaces and unsecured furniture
- If in bed when the earthquake starts, stay in bed and protect your head with a pillow
- Conduct practice drills for your family and employees

During the Quake: *Take Action*

- If Indoors: Take cover under sturdy objects, crouch and cover your head with your arms; do not use elevators
- If Outdoors: Move to open areas, away from trees or tall buildings; avoid windows and outside walls
- In Vehicles: Stop as quickly as possible, avoid stopping by large buildings, trees, or overpasses; proceed cautiously watching for road and bridge damage
- If Trapped: Do not light a match, move or kick up dust; cover your mouth with a handkerchief or clothing. Tap on a pipe or wall so rescuers can locate you; use a whistle if available and shout only as a last resort, it can cause you to inhale dust

After the Quake: *Be Cautious*

- Open cabinets cautiously
- Check for gas and water leaks, broken electrical and sewer lines
- Check for cracks and damage in your home
- Turn on your portable radio for reports
- Do not use your vehicle; keep streets clear for emergency vehicles
- Be prepared for aftershocks
- If you evacuate, leave a note for family and friends
- Stay calm and lend a helping hand to others

Information Sources:

www.eden.lsu.edu; www.fema.gov; www.ready.gov; www.earthquake.usgs.gov; www.redcross.org