

Preparedness

The primary dangers to workers result from: being struck by structural components or furnishings, inadequately secured stored materials, burns resulting from building fires resulting from gas leaks or electrical shorts, or exposure to chemicals released from stored or process chemicals. Many of the hazards to workers both during and following an earthquake are predictable and may be reduced through hazard identification, planning, and mitigation.

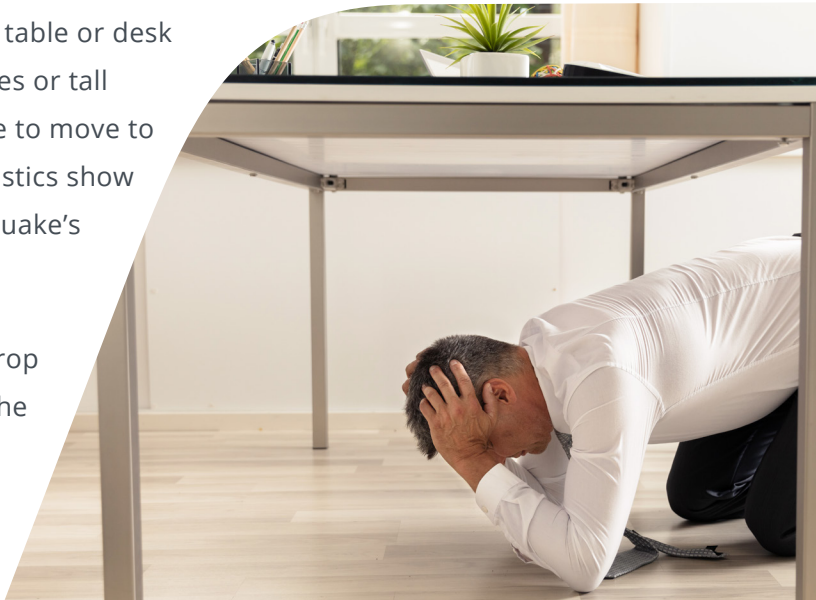
There are many things you can do to prepare your workplace before an earthquake occurs:

Pick "safe places." A safe place could be under a sturdy table or desk or against an interior wall away from windows, bookcases or tall furniture that could fall on you. The shorter the distance to move to safety, the less likely that you will be injured. Injury statistics show that people moving as little as ten feet during an earthquake's shaking are most likely to be injured.

Practice **drop, cover, and hold-on** in each safe place. Drop under a sturdy desk or table and hold on to one leg of the table or desk. Protect your eyes by keeping your head down. Practice these actions so that they become an automatic response.

Practice these safe earthquake procedures

(i.e., drop, cover, and hold-on) at least twice a year. Frequent practice will help reinforce safe behavior. When an earthquake or other disaster occurs, many people hesitate, trying to remember what they are supposed to do. Responding quickly and automatically may help protect you from injury.



Make a plan for workers to follow in the event of an earthquake and be sure that it includes the following precautions:

- + Wait in your safe place until the shaking stops, then check to see if you are hurt. You will be better able to help others if you take care of yourself first, and then check the people around you. Move carefully and watch out for things that have fallen or broken, creating hazards. Be ready for aftershocks.
- + Be on the lookout for fires. Fire is the most common earthquake-related hazard, due to broken gas lines, damaged electrical lines or appliances, and previously contained fires or sparks being released.
- + If you must leave a building after the shaking stops, use the stairs, not the elevator, and look for falling debris. Earthquakes can cause fire alarms and fire sprinklers to go off. You will not be able to rule out whether there is a real threat of fire, and the elevators may have been compromised. Always use the stairs.
- + If you're outside in an earthquake, stay outside. Move away from buildings, trees, streetlights and overhead lines. Crouch down and cover your head. Many injuries occur within ten feet of the entrance to buildings. Bricks, roofing and other materials can fall from buildings, injuring persons nearby. Trees, streetlights and overhead lines may also fall, causing damage or injury.

What are aftershocks?

Aftershocks are smaller earthquakes that follow the main shock and can cause further damage to weakened buildings. After-shocks can occur in the first hours, days, weeks, or even months after the quake. Be aware that some earthquakes are actually foreshocks, and a larger earthquake might occur.

Inform workers of the plan and discuss earthquakes with workers. Everyone in your workplace should know what to do if an earthquake occurs. Discussing earthquakes ahead of time helps reduce fear and anxiety and lets everyone know how to respond.

Get training. Take a first-aid class from an organization such as the American Red Cross, American Heart Association, or National Safety Council chapter. Get training on how to use a fire extinguisher. Keep your training current. Training will help you to keep focused and know what to do when an earthquake occurs.

Businesses can use the Federal Emergency Management Agency [How to Series](#) for protecting people/property during emergencies. Perform a workplace survey, especially if you are in an area with a high risk of earthquakes, to identify potential hazards to workers if an earthquake occurs. Look for furniture or materials that could fall and strike workers or block means of egress, or cause a release of hazardous materials, or otherwise affect the health and safety of workers as a result of utility loss or system/structural failure. Follow mitigation techniques recommended by FEMA for [equipment](#) and furniture.

Employers whose workers will be involved in emergency response operations for releases of, or substantial threats of releases of, hazardous substances regardless of the location of the hazard must comply with OSHA's [Hazardous Waste Operations and Emergency Response](#) (HAZWOPER) standard, [29 CFR 1910.120](#). This may include emergency response following an earthquake. [Instruction CPL 02-02-073](#) describes OSHA enforcement procedures under the relevant provisions of the HAZWOPER standard.

The U.S. Environmental Protection Agency (EPA) has promulgated a standard applying OSHA's HAZWOPER standard to state and local government workers in states where there is no [OSHA-approved State Plan](#). See [40 CFR Part 311](#).

[OSHA's HAZWOPER Safety and Health Topics](#) page explains requirements of the OSHA HAZWOPER standard, including required worker training.

Equipping

Get emergency supply kits and keep them in shelter locations.

[Basic Disaster Supplies Kit](#)

Ready.gov - Federal Emergency Management Agency (FEMA). Lists supplies needed for a disaster kit.

[Workplace Plans](#)

Ready.gov - Federal Emergency Management Agency (FEMA). Provides basic information on developing an emergency management plan for the workplace.

[Emergency Supplies for Earthquake Preparedness](#)

Centers for Disease Control and Prevention (CDC). Lists supplies needed for an earthquake preparedness kit.

Training and Exercises

- + Ensure that all workers know what to do in case of an earthquake.
- + Practice earthquake and evacuation plans on a regular basis.
- + Update plans and procedures based on lessons learned from exercises.

[OSHA's Disaster Site Worker Outreach Training Program](#) is a training program for workers who provide skilled support services (e.g., utility, demolition, debris removal, or heavy equipment operation) or site clean-up services. The program highlights the differences between disaster sites and construction sites, and emphasizes the need for workers and employers to have pre-incident training.

[ShakeOut](#) is an annual global earthquake drill supported by FEMA, the U.S. Geological Society (USGS), the National Science Foundation, and others. Businesses and other organizations can register and participate for free. ShakeOut provides an earthquake [Drill Manual for Businesses](#) with lessons for workers and employers.

Develop an Emergency Action Plan

A disorganized evacuation can result in confusion, injury and property damage. An [emergency action plan](#) is critical. An [emergency action plan checklist](#) can assist this process.

When to evacuate:

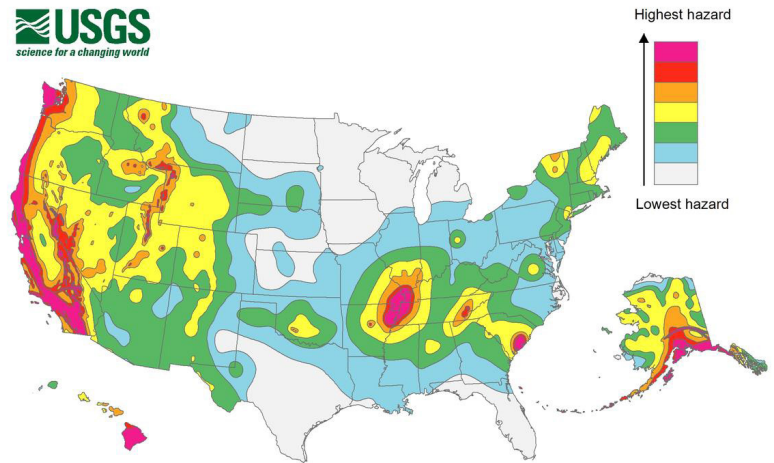
- + If emergency response authorities indicate specifically to do so.
- + If emergency response authorities indicate there is time to do so.
- + If you can reach a safe location before an event is expected to occur.
- + When environmental conditions would not expose evacuees to a dangerous environment.

Evacuation plans should include:

- + Conditions under which evacuation would be necessary (considering the above information);
- + When sheltering in place may be a better alternative;
- + A clear chain of command and designation of the person in workplace authorized to order an evacuation;
- + Specific evacuation procedures, including routes and exits;
- + Specific procedures for employers and workers in high-rise buildings (if applicable);
- + Procedures for assisting visitors and workers in evacuating, particularly those with disabilities or who do not speak English;
- + Designation of which, if any, workers will remain after an evacuation alarm to shutdown critical operations or perform other duties before evacuating; and
- + Special equipment for workers, including personal protective equipment and respiratory protection (e.g., escape respirators), if needed.

National Seismic Hazard Map

USGS updated their U.S. National Seismic Hazard Maps, which reflect the best and most current understanding of where future earthquakes will occur, how often they will occur, and how hard the ground will likely shake as a result. All states have some potential for earthquakes, 42 of the 50 states have a reasonable chance of experiencing damaging ground shaking from an earthquake in 50 years. The hazard is especially high along the west coast, intermountain west, and in several active regions of the central and eastern U.S., such as near New Madrid, MO, and near Charleston, SC. The 16 states at highest risk are AK, AR, CA, HI, ID, IL, KY, MO, MT, NV, OR, SC, TN, UT, WA, and WY.



2014 USGS National Seismic Hazard Map, displaying intensity of potential ground shaking from an earthquake in 50 years (which is the typical lifetime of a building).

Magnitude vs. Ground Motion and Energy

Magnitude Change	Ground Motion Change (Displacement)	Energy Change
1.0	10.0 times	about 32.0 times
0.5	3.2 times	about 5.5 times
0.3	2.0 times	about 3.0 times
0.1	1.3 times	about 1.4 times

This table shows that a magnitude 7.2 earthquake produces 10 times more ground motion than a magnitude 6.2 earthquake, but it releases about 32 times more energy. The Energy Change best indicates the destructive power of an earthquake. (USGS)

As an example, the Great Alaska Earthquake of 1964 was a 9.2 magnitude quake while the recent earthquake in Chili (4-1-2014) was an 8.2 magnitude quake. The change in magnitude of 1.0 is seen in the effects as both quakes caused Tsunamis. However the 8.2 quake caused a six foot tsunami while the 9.2 quake is said to have caused 12 to 21 foot waves from Alaska to California.

Additional Resources

Earthquake Publications: Private Sector & Small Businesses

Federal Emergency Management Agency (FEMA)

Lists FEMA publications that are useful to businesses in developing a workplace program for earthquake preparedness.

Being Prepared for an Earthquake

Centers for Disease Control and Prevention (CDC)

Discusses what to do before, during and after an earthquake. Provides advice on developing evacuation plans and gathering emergency supplies.

Earthquake Terms and Concepts

U.S. Geological Survey (USGS)

The U.S. Department of Homeland Security (DHS), Federal Emergency Management Agency's (FEMA) Ready.gov site provides additional information about [worksite emergency preparedness programs](#).

The [Red Cross Ready Rating Program](#) also provides information for evaluating your workplace's level of preparedness in advance of an emergency.

The State of Alaska

The [Alaska Division of Homeland Security and Emergency Management](#) has an [earthquake website](#) with the following resources:

- + Earthquake: Drop Cover & Hold Drill
- + Emergency Supplies Checklist
- + Preparing Your Family
- + Tips for Preparing Children
- + Tips for the Physically Challenged
- + Tips for the Elderly
- + Tips for Apartment and Mobile Home Managers
- + Organizing Your Neighborhood
- + Tips for Pet Owners
- + How to Secure Your Furniture
- + How to Strap Your Water Heater



The State of California

Earthquakes can occur anywhere in California, which means all Californians live with an earthquake risk. In addition to the shaking caused by earthquakes, other things can occur such as landslides, surface fault ruptures and liquefaction--all of which may cause injury or property damage. Some areas within California are also vulnerable to tsunamis should an earthquake occur. The [California Governor's Office of Emergency Services](#) has emergency preparedness and response resources.

The state of California also has a [Department of Conservation](#) that provides services and information that promote environmental health, economic vitality, informed land-use decisions, and sound management of the state's natural resources. Specifically, the California Geological Survey (CSG) has an [earthquake website](#) which includes various tools such as ShakeMaps (which are a representation of ground shaking produced by an earthquake), probability calculators, shaking hazards, and hazard zones.

The State of Oregon

Oregon is considered a high-risk state for earthquakes. In the last 130 years, the state has experienced several earthquakes over magnitude 5. The [Oregon Office of Emergency Management's earthquake website](#) has various preparedness resources posted including an earthquake evacuation checklist, information on Oregon Shakeout (which is an earthquake drill), training videos, and other publications and presentations.

In January 2004, Oregon published an [Earthquake Preparedness and Mitigation Guidance for Oregon State Agency Offices and Warehouses](#). This document focuses on (1) what to do during an earthquake in office and warehouse settings and (2) what to do before an earthquake that will reduce casualties and non-structural damage during the earthquake. The report is for guidance only. Recommendations to create safe work environments are not requirements, except for those building code and other safety requirements that are specifically identified in the document.

To view earthquake preparedness and response for your State or Territory, please visit:

[U.S. Earthquake Information by State/Territory](#) – USGS.

Source: <https://www.osha.gov/earthquakes/preparedness>

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