

Hazard / Definition

Earthquake:

A shaking or trembling of the crust of the earth, caused by underground volcanic forces or by breaking and shifting of rock beneath the surface.

Description / Frequency

The earth's crust is composed of many separate plates that are constantly pushing and moving against one another along what are known as fault lines. The energy of an earthquake is released in seismic waves when rock masses slip along a fault. A quake can also be produced by volcanic eruptions or by human-caused explosions. Earthquakes usually occur without warning, but scientists have produced risk maps which show areas where an earthquake is *likely* to occur. They do this by studying faults, measuring the tilt of the earth's crust, watching changes in the water levels of wells, and from observing the behavior of animals.

Historical Score: 3

The largest earthquake in Colorado, with an estimated magnitude of 6.5, occurred in November of 1882. The exact location of the epicenter has been disputed, but some think that it was somewhere between Boulder and Estes Park (possibly near Ward). The shock was felt as far away as Salt Lake City, Utah and Rawlins, Wyoming.

Numerous earthquakes occurred in the Denver-Boulder area from 1962 to 1967. The quakes were felt by cities and towns within a 100-mile radius of Denver. These earthquakes may have been induced by high-pressure injections of fluid wastes into deep wells at the Rocky Mountain Arsenal, although this theory has never been proven. In 1967, the magnitude 5.3 and 5.2 events occurred approximately 18 months after injections at the Arsenal ceased. Damage in Denver and northern suburbs was estimated at over one million dollars. Since 1971 there have been 12 to 15 quakes large enough to be felt in the area.

Potential Score: 2

Earthquake hazards do exist in Colorado, but they are moderate in intensity. Seismic Risk Zones (Static Earthquake Coefficients) for the area of Colorado where Boulder County is located is .05 as compared with .40 in California. The presently observed seismicity rates in Colorado are consistent with a magnitude 6 or larger earthquake occurring within the next 100 years. The only known fault in Boulder County, a 45-foot by one mile bulge along North 75th Street near Valmont Drive, has been quiet for over 10,000 years.

Mitigation Options / Strategies

- C Establish and enforce safe land use and building codes.
- C Reinforcement of structures which are not "earthquake safe."
- C Public education programs on earthquake safety.
- C Response plans for minor, moderate and major earthquakes.
- C SCC Communications and US West partnered together for a warning and evacuation system for Boulder County. It is called the Emergency Warning and Evacuation Service (EWES) and is part of the Emergency Preparedness Network (EPN). The existing 9-1-1 database of telephone numbers and addresses is used in combination with detailed maps to help determine the geographic boundaries of an area impacted. The system is capable of calling up to 2,000 numbers in one minute. It is designed to deliver recorded information to endangered people in advance of a disaster or any major event. Messages can be delivered in various languages, as well as to pagers or the Emergency Alert System (EAS). Multiple floodplain areas can be handled during a single event with priority given to the area most impacted.
- C The State of Colorado participates in the National Earthquake Hazard Reduction Program funded by the Federal Emergency Management Agency (FEMA). Mitigation activities pursued by the State include vulnerability assessments in at-risk areas, the development of a state-wide hazard map, and workshops for building officials. These activities are planned and reviewed by the Colorado Natural Hazard Mitigation Council.

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Impact on Life and Property:

The actual movement of the ground during an earthquake is seldom the direct cause of death or injury. Casualties are more commonly caused by: Partial or total building collapse; flying glass from broken windows and skylights; overturned bookcases, fixtures, and other large furniture and appliances; fires from broken gas lines and downed power lines; or a human reaction, fear. Cracks can weaken buildings, utility lines, bridges or dams. Water supplies can become contaminated. When transportation is interrupted from damage caused to roadways and other means of transportation, food and other resource shortages can occur. Fires caused from earthquakes are particularly dangerous since water may not be available to fight the fires.

Secondary hazards that might result from an earthquake are landslides, wildfires and dam failures. If any Hazard Class I Dam (there are 22 in Boulder County) should fail, people living below these dams would be threatened.

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