

PRELIMINARY RECONNAISSANCE REPORT
MOUNT BORAH EARTHQUAKE
CUSTER COUNTY, IDAHO

At 8:07 a.m. MDT, October 28, 1983, a major earthquake rocked central Idaho. The epicenter of the quake was about 110 miles northwest of Pocatello, near the base of Mt. Borah. This peak is Idaho's tallest mountain with an elevation of 12,662 feet. Preliminary estimates have set the magnitude of the quake at 6.9 on the Richter scale. This earthquake is the largest earthquake to occur in Idaho in recorded history, and is the strongest to occur in the 48 states since the 7.1 magnitude Hebgen Lake quake of 1959. Hebgen Lake, Montana, is approximately 140 miles to the northeast of the epicenter. The epicenter is located in the center of a large zone 2 seismic area as designated in the 1982 Uniform Building Code.

The length of the ground faulting is yet to be determined but its length is over 20 miles. The maximum vertical offset of the fault is in the order of 10 feet. There may also be a small longitudinal displacement. The faulting occurred along a line of older ground displacement. Areas to the north and south show clear evidence of the extension of this older faulting. Eyewitness accounts and the observation of building contents indicate that there was a large level of vertical acceleration associated with the faulting. Observations also indicate that the level of ground acceleration dissipated quickly and was not large in the towns of Mackay and Challis. The ground motion was felt in seven states and in parts of Canada and caused minor damage in Salt Lake City, Utah and Boise, Idaho.

The Idaho National Engineering Laboratory is located approximately 50 miles southeast of the fault line. There was no apparent damage to nuclear reactors, although two were shut down. Instrumentation at the site indicated that the ground acceleration was in the range of 0.03 G's.

There were 65 aftershocks recorded in the first eight hours following the quake and they continued for days afterward. The ground water system in the area has been dramatically affected. Areas that had standing surface water became dry and other previously dry areas were submerged. At an area called Chilly Butte the hillside cracked open in three areas from which large volumes of water flowed. At the base of the Butte a large number of geysers blew water upward through the soil.

A major reservoir is located upstream from Mackay Idaho. The quake caused several cracks and fissures in the earth dam and caused the dam to be watched carefully. The cracking was considered not to be serious and at this time the level of the dam was not lowered. There was a great deal of ground subsidence over a large geographic area. Ground fissures were observed 20 miles beyond the fault line.

Two small Idaho communities are located in the geographic area of the faulting. Mackay is located approximately 15 to 20 miles south of the faulting and Challis is located approximately 35 miles to the north. These two towns are the only population centers in the near proximity, and fall generally at the ends of the fault line. Professor Bob Smith of the University of Utah indicated that the energy focus should have been generally perpendicular to the fault line and not at the two towns. The damage in the two towns supports this statement. Although there were two deaths in Challis, the amount of damage in that town was minimal. The stone front of an old building shook loose and crushed the two children that died. It should be noted that the building was being restored and the whole east edge of the roof was disconnected from the wall. This allowed the roof to impact the stone front and add to the forces causing the stones to fall. The "old" high school, which was constructed of heavy stone masonry, also had considerable exterior damage. An indication of the small intensity of ground shaking is the fact that very few chimneys in Challis were damaged. Also, there was a concrete block building under construction that had the walls standing unbraced, full height, that had no apparent damage.

The damage in Mackay was much greater than in Challis, but not as much as might have been expected. Many of the buildings in downtown Mackay were of the early minning camp vintage. The older brick and stone masonry structures all had some level of damage. The predominate type of damage was to building fronts that were oriented facing towards or away from the epicenter. Almost every brick chimney in Mackay was knocked down or severely damaged. There was no structure observed where a complete collapse had occurred. Considering the age and condition of many of these structures, the fact that the damage was not total is noteworthy.

It is expected that there will be many interesting and significant things evolve from the study of this earthquake. Any EERI member who has a contribution that he would like to make to the official reconnaissance report is invited to contact the project contact member.

Anyone interested in obtaining a set of slides is invited to write to the PCM. These slides will be made available at cost plus postage. Requests should be made prior to February 1, 1984, at which time requests will be honored.

The EERI reconnaissance team was made up of the following persons:

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