Content Next

The Landers / Big Bear Earthquakes of June 28, 1992 (20 Images)

Set 1: Community of Northridge

This presentation is based on a 35mm slide set with the same title published by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Geophysical Data Center, Boulder, Colorado 80303, USA (Product No. 647-A11-017)

Statistics:

20. The historic Los Angeles Memorial Coliseum (built in 1923 and expanded in 1932) sustained extensive damage. This row of arches suffered serious cracking. Another crack extended around the circumference of the structure and was visible throughout much of the lower bowl. Reinforced concrete beams and columns supporting the seating of the upper concourse were also damaged. Photo Credit: M. Celebi, U.S. Geological Survey.

Seismicity and Geology:

The first shock was the most powerful earthquake in the contiguous 48 states in forty years. The initial earthquake was reported felt throughout Southern California from San Luis Obispo to the Mexico Border. It was felt outside California in Idaho, Colorado, New Mexico, and Nevada. The first shock occurred on the north-northwest striking Camp Rock, Emerson, and Johnson Valley faults. It produced a forty-three mile-long surface rupture zone. In the Landers area there was about ten feet of right-lateral strike slip movement. The second shock occurred on a separate, previously unknown northeast trending left-lateral strike-slip fault that intersects the Camp Rock-Emerson fault. Scientists are investigating the possibility that these earthquakes may be related to a future event on the San Andreas fault, which together with the faults involved in this series of earthquakes form a triangle of faults.

Damage:

Both earthquakes caused buildings to collapse, ignited fires, buckled roads, damaged water tanks and crippled water delivery systems, produced numerous rock slides in the San Bernardino Mountains, and derailed standing railroad boxcars near Barstow. The Landers earthquake was directly responsible for the death of a small child who was killed by the collapse of a rock fireplace. Together, the twin earthquakes caused two fatal heart attacks, more than 400 injuries, and left 750 people homeless. The preliminary estimate of property damage in San Bernardino County by officials of the State Office of Emergency Services for the two earthquakes was nearly $100 million, with more than half of the damage occurring in the Big Bear Lake region. The earthquakes and aftershocks damaged 4,446 homes and 166 businesses, and destroyed 77 homes and 10 businesses. Total damage to private property was estimated at $64.5 million; public facilities reported $25.5 million damage. Roads and bridges in San Bernardino and Los Angeles counties sustained $500,000 in damage according to California Department of Transportation. In Riverside County, the losses were estimated at $950,000; most all of the damage was reported from the City of San Jacinto. Electricity was knocked out for several hours in the Landers area; in other communities power and communication links performed well with temporary outages. The damage to the water storage tanks and the breaks in the distribution system caused water shortages in many areas. A number of fires resulted from the earth shaking. Two residences burned down completely in Landers. In Yucca Valley two mobile homes caught fire and one burned down completely.

Earth Effects:

Preliminary field measurements of movement along the fault line of the 7.5 magnitude earthquake indicate that sections of the fault slipped a maximum of eighteen feet horizontally and six feet vertically. The width of the rupture zone was reported to range from eleven feet at the narrowest point to 140 feet across at the widest point. Cracks in a dirt road about a mile from the South Fork campground entrance occurred as a result of the 6.7 magnitude earthquake. Small water spouts may have occurred in Santa Ana Creek at the South Fork Campground (2 miles north of Baron Flats). Liquefaction was also observed in the South Fork Campground on a dirt camp road that ran parallel with Santa Ana Creek.

The low death toll and structural damage for this series of earthquakes may be attributed to strengthened building code standards, firm ground, and wide-open spaces. A single factor that contributed to the low property damage and casualties was the fact that the force of the earthquake ruptured away from the major population centers. The Landers-Big Bear earthquake sequence shows that an earthquake on one fault system may trigger large tremors on other faults in the same area.

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