Major losses projected for earthquake on little-known fault under Los Angeles

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A new estimate of the effect of an earthquake along the Puente Hills fault shows that damage could occur on an unprecedented scale. An earthquake of magnitude 7.2 to 7.5 would result in 3,000 to 18,000 deaths, 142,000 to 735,000 displaced households, and up to $250 billion in property damage, according to research by the U.S. Geological Survey and the Southern California Earthquake Center at the University of Southern California. The disaster would be the costliest in U.S. history.

The damage would be especially severe due to the fault's location under Los Angeles County and adjacent to Riverside and San Bernardino counties. In addition the fault runs under older, more vulnerable commercial and industrial structures.

By contrast, the most heavily shaken areas in the 1994 Northridge earthquake consisted mainly of wood-frame residential structures.

Estimated damages would also be greater than for a repeat of the historic 1857 San Andreas Fault earthquake.

The USGS and SCEC researchers developed hazard analysis software and used existing models from the Federal Emergency Management Agency to calculate losses. Their study appears in the May issue of Earthquake Spectra.

"One of the main goals of this study was to use our improved knowledge of seismic hazards in Southern California to evaluate – and hopefully

reduce – the uncertainties in this type of risk analysis," said Thomas Jordan, director of SCEC and a study co-author.

The study analyzed 18 scenarios depicting potential shaking levels throughout the region. The loss estimates range widely because of the many variables involved, including the extent of a rupture on the fault, which was discovered in 1999.

The authors emphasize that a full Puente Hills fault rupture is a rare event. In 2003, a USC-led SCEC research team found that the fault had ruptured in earthquakes of magnitude 7.2 to 7.5 at least four times in 11,000 years.

"As an individual your odds of dying of a heart attack or an auto accident are much greater than of dying from this earthquake," says USGS researcher and lead author Ned Field.

"That being said, there are other sources of earthquakes throughout the region, and it's not a question of if, but when, so everyone should take necessary safety precautions."

Field added that because a Puente Hills earthquake would have widespread impact, emergency and public policy officials should plan accordingly.

The loss projections assume that no efforts will be made to reduce the vulnerability of structures in the area.

"If society chooses to invest in mitigation, many of these losses could be avoided," said Jordan.

The research team, which also included Hope Seligson of ABS Consulting Inc. and Kenneth Campbell of EQECAT Inc., arrived at its

estimates by averaging losses predicted under each scenario and model. The scenarios all assumed an earthquake occurring at 2 p.m. during a weekday, when many people are at work. The number of casualties would be significantly less if an earthquake were to occur on the fault at night, when most people are at home.

Among the findings:

-- The estimated number of deaths could range between 3,000 and 18,000, with an average of 7,600. The Mw 6.7 Northridge quake resulted in 33 direct deaths, and the 1995 Mw 6.9 Kobe, Japan quake resulted in 6,348 deaths.
-- The total number of injuries could range between 56,000 and 268,000, with an average of about 120,000.
-- The number of displaced households would range from 142,000 to 735,000, with an average of 274,000.
-- Relief agencies would have to provide short-term public shelter for 42,000 to 211,000 individuals, with an average of 80,000.
-- The quake would create between 30,000 and 99,000 tons of debris, with an average of 51,000 tons.

Source: University of Southern California