



California Earthquake Authority



Session C22
The Next Big One



CEA Research Initiatives

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Chief Financial Officer

November 13, 2007

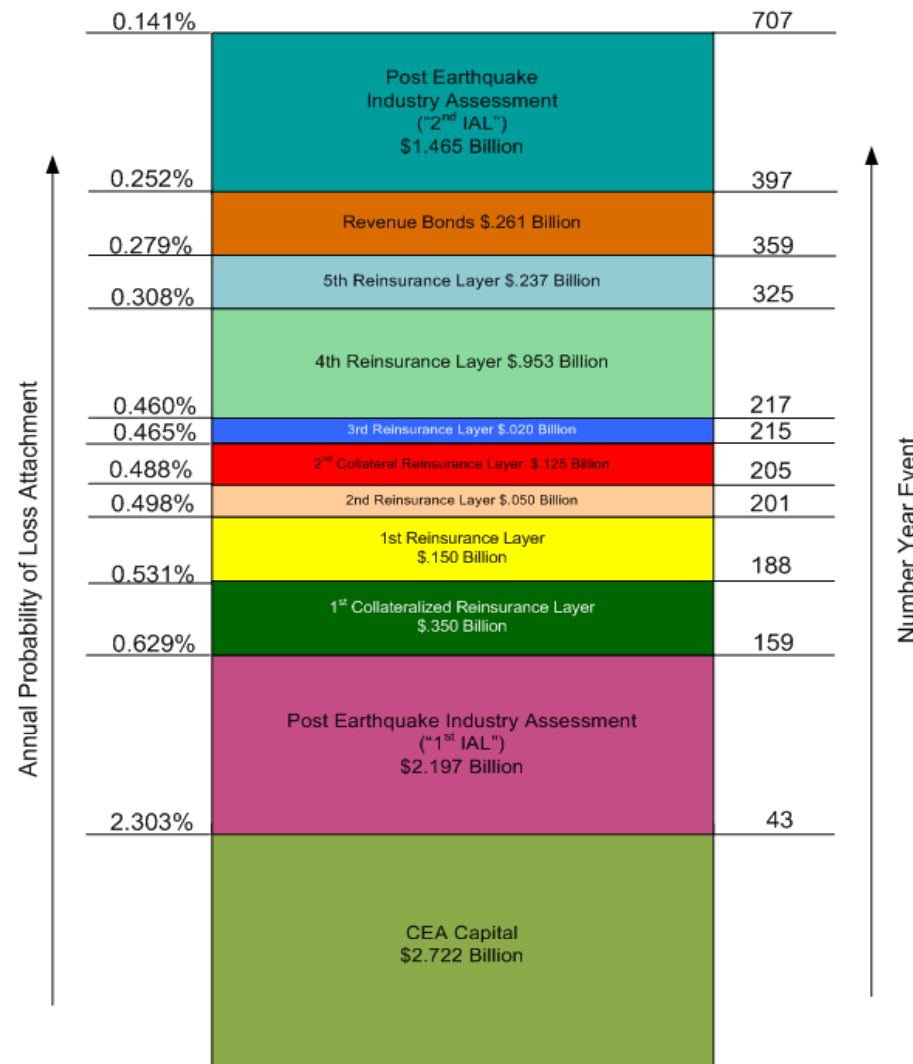


Problem Facing California in 1995

- California Insurers stung by \$12.5 Billion in losses in Northridge
- Rating Agencies demanded that Insurers reduce their exposure to catastrophe losses
- 95% of voluntary homeowner's insurance market stopped selling new policies in state; residual market out of control
- 1 Million policyholders threatened with non-renewal

2007 Financial Structure

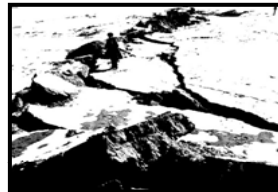
California Earthquake Authority Claims Loss Attachment/Exhaustion As of 6/30/07



Total \$8.530 Billion

Insurance Earthquake Model Process

Faulting, shaking,
liquefaction, landsliding,
tsunami



Extent & density of built
environment



Structural and non-
structural vulnerability

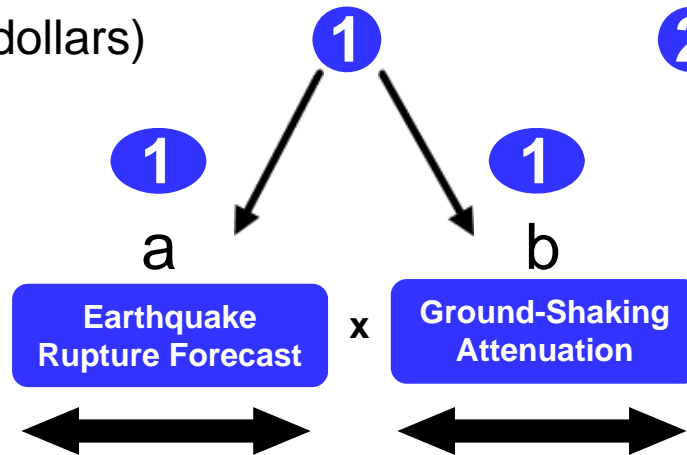


Emergency response,
Insurance



$$\text{Loss (dollars)} = \text{Hazard} \times \text{Exposure} \times \text{Fragility} \div \text{Resiliency}$$

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②
③
④

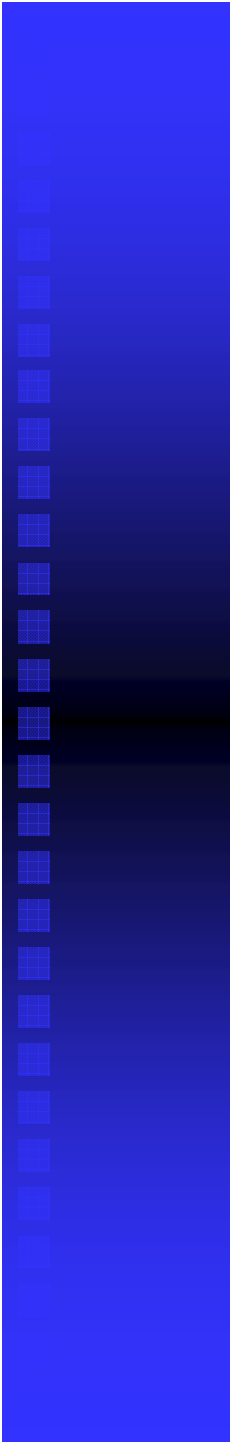


Seismic hazard analysis can be factored into (1a) earthquake rupture forecasting, and (1b) prediction of ground-shaking attenuation.



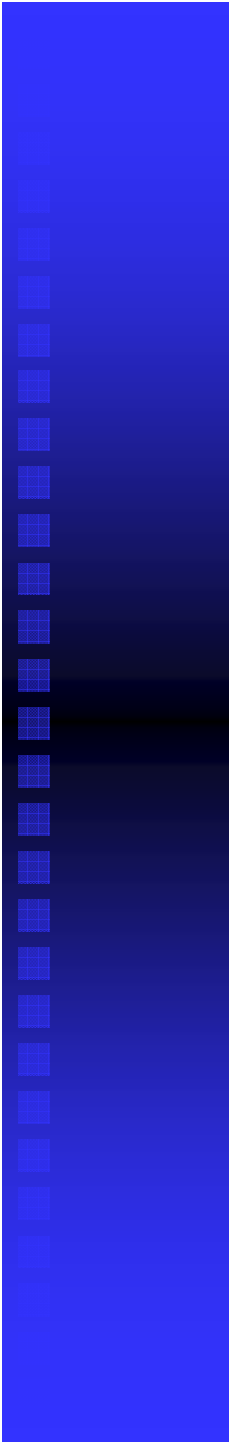
Objectives and Benefits to CEA Policyholders

The most important element of this seismic hazard analysis is a statewide earthquake rupture forecast. A partnership of three organizations—Southern California Earthquake Center (SCEC), the U. S. Geological Survey (USGS), and the California Geological Survey (CGS)—proposes to establish a Working Group on California Earthquake Probabilities (WGCEP) that will develop a uniform California earthquake rupture forecast (UCERF) through a carefully managed, consensus-building process.



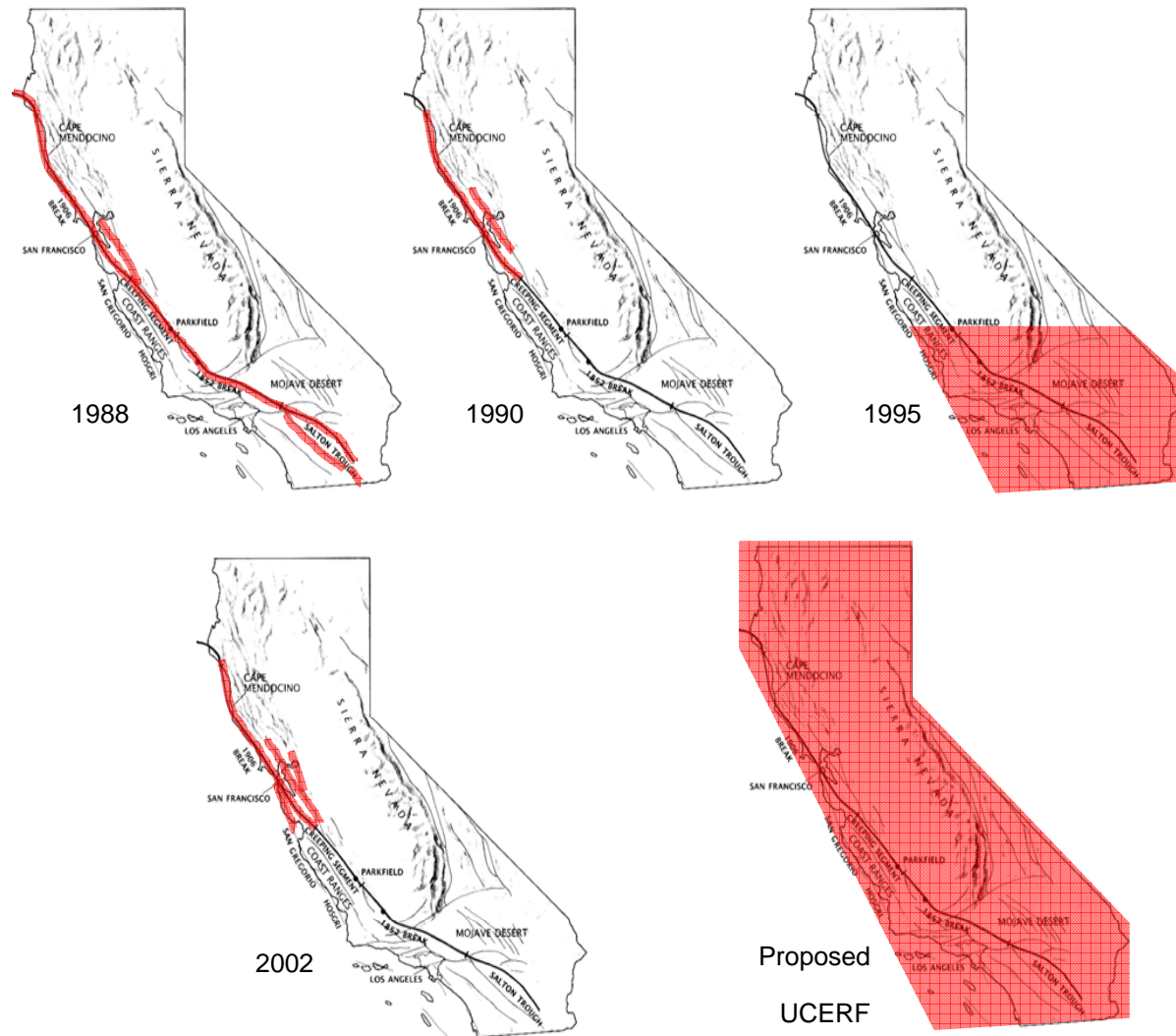
There have been four previous incarnations of the WGCEP, each with a different geographic, as illustrated.

- 1988 WGCEP: Provided the first consensus report on 30-year rupture forecast for the major faults of the San Andreas Fault system. The entire SAF was considered, along with the Imperial, San Jacinto and Hayward Faults. To date, two of the four highest probability segments identified in that report have failed (Loma Prieta earthquake, 1989; Parkfield earthquake, 2004).
- 1990 WGCEP: Updated 1988 WGCEP after the 1989 Loma Prieta earthquake. The report restricted

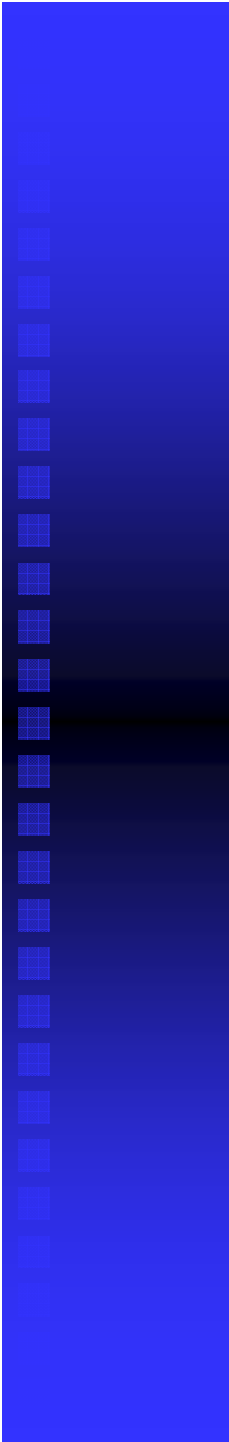


to two major faults in the San Francisco Bay Region including the northern San Andreas, Hayward, and Rodgers Creek faults.

- 1995 WGCEP: Provided an earthquake rupture forecast for all of Southern California, accounting for geodetic constraints, unidentified faults, and possibility of multi-segment ruptures. This study was sponsored by SCEC.
- 1999-2002 WGCEP: Updated the 1990 WGCEP, with the first complete treatment of earthquake sources in the San Francisco Bay Region and improved models of time-dependent effects.

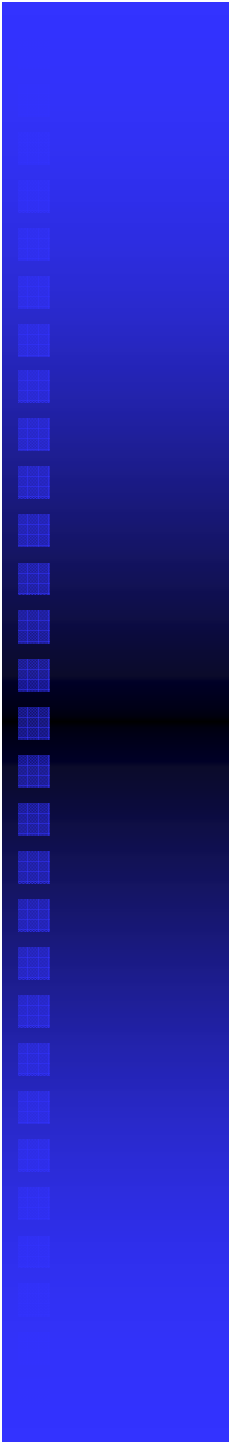


Maps comparing the faults and regions for which earthquake forecasts were provided by the four previous Working Groups on California Earthquake Probabilities. (a) 1988 WGCEP. (b) 1990 WGCEP. (c) 1995 WGCEP. (d) 2002 WGCEP.



The two most recent WGCEP reports, in 1995 and 2002, used different methodologies in their treatments of Southern California and the San Francisco Bay, and neither considered the other parts of the State.

This project, UCERP, created a uniform rupture forecast for all of California, based on an adequate (time-dependent) methodology for insurance rate setting. The California rupture forecast was used in the September 2007 National Hazards Maps.



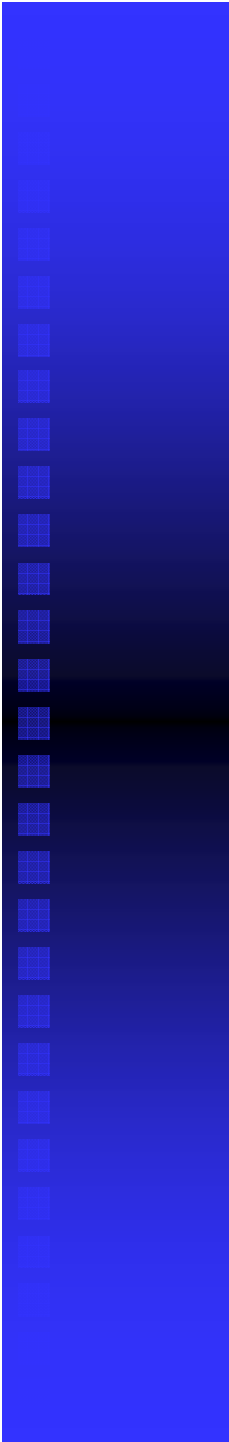
Components of CEA Project Uniform California Earthquake Rupture Forecast (UCERF)

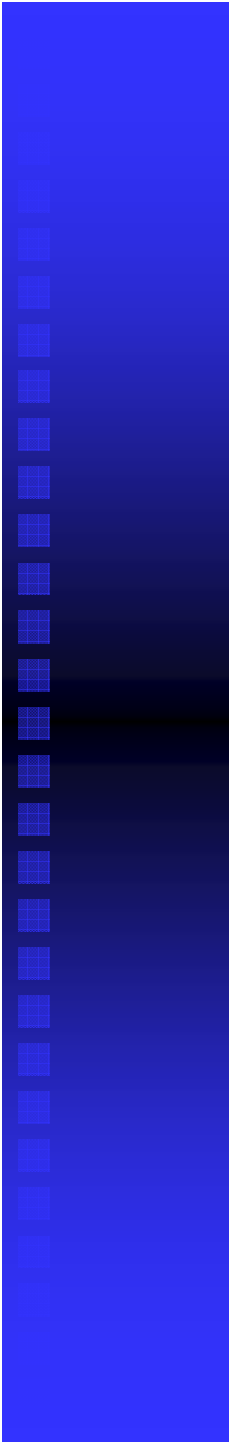
1. Fault trace/dip database
2. Neotectonic database containing slip rates
3. Crustal motion map based on geodetic data
4. Instrumental earthquake catalog
5. Historical earthquake catalog
6. Paleoseismic database



A number of leaders and experts participated in the project.

- Thomas H. Jordan, SCEC Director, University of Southern California (USC)
- William L. Ellsworth, Chief Scientist, Earthquake Hazards Team, USGS, Menlo Park
- Jill McCarthy, Chief Scientist, Geologic Hazards Team, USGS, Golden
- Michael Reichle, Acting State Geologist, CGS, Sacramento
- Chip Groat, USGS Director, Reston
- David Applegate, Senior Science Advisor of Earthquake and Geologic Hazards and Co-Chair of WG02, USGS Headquarters, Reston

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- Michael L. Blanpied, Associate Earthquake Hazards Program Coordinator, USGS, Headquarters, Reston
 - Lucile M. Jones, Southern California Coordinator and Chair California Seismic Safety Commission, USGS Pasadena
 - Edward H. Field, Research Scientist, USGS, Pasadena, and Leader, SCEC Seismic Hazard Analysis Focus Group
 - Mary Lou Zoback, Northern California Coordinator and Co-Chair of WG02, USGS, Menlo Park
 - James Dieterich, Senior Scientist and Chair of WG90, USGS, Menlo Park
 - Mark D. Petersen, Chief, National Seismic Hazard Mapping Project, USGS, Golden
 - Arthur D. Frankel, Senior Scientist, USGS, Golden

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- Robert L. Wesson, Senior Scientist, USGS, Golden
 - Chris J. Wills, Supervising Geologist, CGS, Sacramento
 - Jerry Treiman, Senior Geologist, Sacramento
 - Tianqing Cao, Senior Seismologist, Sacramento
 - Lloyd Cluff, Chair, Scientific Earthquake Studies Advisory Committee to USGS and Chair of WG88, Pacific Gas and Electric Company, San Francisco
 - SCEC Board of Directors (comprising 16 representatives of SCEC-affiliated institutions)
 - Ralph Archuleta, SCEC Deputy Director, University of California Santa Barbara
 - John McRaney, SCEC Associate Director for Administration, USC
 - Philip Maechling, SCEC Information Architect, USC