PART 5

LESSONS LEARNED AND CONCLUSIONS

Lessons Learned No. 1

- Local government agencies have to develop coherent disaster plans, posted on the Internet for everyone to see and understand.
- Those same agencies need to conduct periodic disaster response exercises.
- Every person who will be tapped in an emergency needs to know what will be expected of them; such as bus drivers, medical personnel, law enforcement, etc.
- Disaster plans need to include contingencies for extended loss of: power, vehicle access, fuel availability, sanitation, communications, and lifeline support.
- Calling FEMA doesn't solve any of these problems immediately, it only sets wheels of support into motion

Lessons Learned No. 2

- People living within dike-protected lands are not part of the National Flood Insurance Program (NFIP) because it is assumed that the levees will never fail.
- This seems altogether to be a poor policy decision. Levees can be expected to fail under extreme events.
- Interstate highways should be maintained at a grade above the maximum probably flood level, wherever possible, so that emergency vehicle access can be provided.

CONCLUSIONS #1

- Extreme events are always treacherous because most responders don't have experience with the scale of such catastrophes
- Mass evacuations are difficult to plan for without recurring exercises and a through program of public education
- You're lucky if you get 75 to 80% of any populace to evacuate an area ahead of a natural disaster. People with children more prone to leave than those without children.

CONCLUSIONS #2

- Can we design structures with sufficient redundancy to withstand extreme events, like Category 4 or 5 hurricanes?
- Wind-driven debris weighing upwards of 10 tons can be slammed into structures like destructive projectiles; and smaller debris is blown into structures, shredding them like a massive sand blaster.
- Highways and power lines will be taken out by fallen trees and structural debris.
- High storm surges will wreak havoc on port facilities, wharves, warehouses, and tethered vessels; scattering or obliterating them.

CONCLUSIONS #3

- The more lifeline infrastructure elements that are impacted by a natural disaster; the slower the emergency response.
- Responders must be self-supporting; which is particularly difficult for water and fuel requirements.
- Only a limited amount of lifeline support can be supplied using vertical envelopment; from a modest distance.

About the presenter

J. David Rogers received his B.S. degree in geology from the California State Polytechnic University in 1976, graduating at the top of his class. He received his master's degree in civil engineering in1979 and Ph.D. in geological and geotechnical engineering in 1982, working on the Teton Dam failure and tunnel failures at Glen Canyon Dam and Zion National Park, with Professors Richard E. Goodman and H. Bolton Seed. In 1984 he formed Rogers/Pacific, Inc., a consulting firm specializing in forensic engineering, evaluation of natural hazards, and emergency mitigation of infrastructure failures, mostly for government entities. In 1986 he began a 15 year study of levee breaks in the Sacramento Valley, which came out of litigation that eventually made its way to the CA Supreme Court. In 1989 he was retained by the California Department of Transportation working on the collapse of the Interstate 880 Cypress Structure and the San Francisco Oakland Bay Bridge during the Loma Prieta Earthquake. This work was jointly funded by the National Science Foundation, U.S. Geological Survey and CALTRANS. In 1994 Dr. Rogers joined the Geoengineering faculty in the Department of Civil & Environmental Engineering at the University of California, Berkeley, where he taught courses in engineering geology and environmental geology until accepting the Karl F. Hasselmann Chair in Geological Engineering at the University of Missouri-Rolla in July 2001. He is a registered *civil engineer, geologist, engineering geologist* and *hydrogeologist* in California, all by examination.