

# USSC, ACP Join Forces to Present Symposium on Earthquakes and Other Disasters

or the first time, the Utah Seismic Safety Commission and the Utah Chapter, Association of Contingency Planners, combined their talent, energy, and people

power to present a one-day symposium on earthquakes and other disasters. The meeting, which attracted more than 150 planners and emergency preparedness professionals from along the Wasatch Front,

was held at the Marriott University Park Hotel in Salt Lake City on September 22.

The keynote speaker was Lawrence Reaveley, Ph.D., professor and chair of the Civil Engineering Department at the University of Utah. His research has focused on seismic rehabilitation and repair processes. He is co-director for the ATC-33 Project, Rehabilitation Guidelines for Existing Buildings, an effort funded by the Federal Emergency Management Agency to develop guidelines for the improvement of existing buildings to resist earthquake loads.

Long a proponent of earthquake preparedness, Reaveley told the attendees the Wasatch fault is "an elongated bullet" waiting to go off — to produce a major earthquake of magnitude 6.5 or higher.

"We know it's a very dangerous, big fault, and it's been breaking for centuries," he said. "If we use just simple averages, we're getting closer to when one of these things will happen."



The Wasatch fault produces a major quake about every 350 years, research shows, and the last big one occurred about 600 years ago in the vicinity of present-day Provo.

Reaveley encouraged his audience to be prepared, since most injuries, deaths, and

ASSOCIATION OF CONTINGENCY PLANNERS

economic loss in an earthquake are the result of damage to man-made structures. A hazard assessment is the first step to reduce destruction.

"If you're in a position to have an influence, please don't drive costs into the ground and sacrifice quality," Reaveley said. "I'm looking for some champions. I'm looking for some people who will make a difference in their communities."

Other speakers included Kevin McSweeney, city planner for the City of Filmore, California, and Chris Purcell, a claim attorney with State Farm Insurance. McSweeney described how his community survived the 1994 earthquake in southern California. Purcell talked about disaster insurance for the new millennium.

Breakout sessions highlighted business recovery planning, disaster management plans, and preparing for all manner of natural hazards.



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Earthquake epicenters, located by the University of Utah Seismograph Stations, superposed on a map of Quarternary (geologically young) faults compiled by the Utah Geological Survey. The Wasatch fault is shown in bold. Earthquakes of magnitude 4.0 and larger are specially indicated. Legend:

M\_ 0.0+

M 1.0+

M 2.0+

A M. 3.0+

# Earthquake Activity in the Utah Region January 1 - June 30, 1998

### by Susan J. Nava University of Utah Seismograph Stations



uring the six-month period January 1 through June 30, 1998, the University of Utah Seismograph Stations located 576 earthquakes within the Utah region. The total includes nine earthquakes in the

magnitude 4 range, 24 earthquakes in the magnitude 3 range, and 259 earthquakes in the magnitude 2 range. Earthquakes which have magnitudes of 3.0 or larger (plotted as stars; magnitude 4.0 and larger shocks are specifically labeled on the epicenter map) are described below. There were 10 earthquakes reported felt during the report period. (Note: Magnitudes listed are coda magnitude, Mc. All times indicated below are local time, which was Mountain Standard Time through April 4, and Mountain Daylight Time for the remainder of the period.) Additional information on earthquakes within the Utah

region is available from the University of Utah Seismograph Stations.

M. 4.0+

### Significant Main Shocks and Clusters of Earthquakes, 1/1 - 3/31

Eastern Wasatch Plateau-Book Cliffs area near Price (coal-mining related): Seismic events in this region (magnitude 1.5 to 2.8) make up only 21 percent of the shocks that occurred in the Utah region during the period January 1 to March 31. Significant shocks include:

M<sub>c</sub> 4.0 ----- February 4, 10:19 p.m., 5 miles N of Helper. Felt in Helper, Martin, Price, and at the Willow Creek Coal Mine.

#### Significant northern Utah earthquakes

M<sub>c</sub> 2.2 ----- January 2, 5:43 p.m., 2 miles SW of Malad City, ID. Felt in Malad City, ID.

### Significant central Utah earthquakes

M<sub>c</sub> 3.2 ---- February 11, 2:15 p.m., 11 miles SW of Levan

### Significant southwestern Utah earthquakes

A swarm of 72 earthquakes occurred about 11 miles NNW of Panguitch throughout the report period. The largest shock of the sequence was a magnitude 4.5 earthquake that occurred on February 1st. Earthquake swarms similar to the sequence observed in the Panguitch area have occurred in southwestern Utah in the past.

- M<sub>c</sub> 4.9 ----- January 2, 12:28 a.m., 8 miles ESE of Beaver. Felt in Beaver, Circleville, Henrieville, Marysvale, Panguitch, Richfield, and at Elk Meadows Ski Resort.
- M<sub>c</sub> 4.4 ----- January 30, 2:53 p.m., 11 miles NNW of Panguitch
- M<sub>c</sub> 3.1 ----- January 31, 1:03 a.m., 11 miles NNW of Panguitch. Felt in Panguitch.
- M<sub>c</sub> 4.1 ----- January 31, 7:09 p.m., 11 miles NNW of Panguitch
- M<sub>c</sub> 3.8 ----- February 1, 1:53 a.m., 11 miles NNW of Panguitch
- M<sub>c</sub> 4.1 ----- February 1, 2:29 p.m., 11 miles NNW of Panguitch
- M<sub>c</sub> 4.5 ----- February 1, 5:49 p.m., 11 miles NNW of Panguitch
- M<sub>c</sub> 3.8 ----- February 3, 5:44 a.m., 10 miles NNW of Panguitch
- M<sub>c</sub> 3.7 ----- February 4, 12:35 p.m., 10 miles NNW of Panguitch
- M<sub>c</sub> 3.7 ----- February 4, 4:51 p.m., 10 miles NNW of Panguitch
- M<sub>c</sub> 3.0 ----- February 6, 6:11 a.m., 10 miles NW of Panguitch
- M<sub>c</sub> 3.6 ----- February 11, 7:29 a.m., 11 miles NNW of Panguitch
- $\rm M_{\rm c}$  3.0 ----- February 21, 4:23 p.m., 11 miles NW of Cedar City
- M<sub>c</sub> 4.2 ----- March 15, 10:27 p.m., 11 miles NNW of Panguitch. Felt in Kanarraville and Panguitch.
- M<sub>c</sub> 3.0 ----- March 18, 3:13 a.m., 10 miles NW of Panguitch
- $M_c$  3.6 ----- March 29, 5:12 a.m., 20 miles ESE of Loa

### Significant Main Shocks and Clusters of Earthquakes, 4/1 - 6/30

Eastern Wasatch Plateau-Book Cliffs area near Price (coal-mining related): Seismic events in this region (magnitude 0.6 to 3.2) make up only 28 percent of the shocks that occurred in the Utah region during the period of April 1 to June 30. Significant shocks include:

 $M_c$  3.2 ----- May 4, 6:00 a.m., 8 miles WNW of Emery  $M_c$  3.0 ----- May 8, 6:36 p.m., 7 miles WNW of Emery

# Significant northern Utah, southern Idaho earthquakes

Several clusters of earthquakes occurred during the report period in the region located north of Great Salt Lake. A cluster of 10 shocks (0.7 < MC < 3.6), located about 12 miles WNW of Garland (~25 miles WNW of Logan), occurred throughout the report period. A separate cluster of 39 shocks (0.5 < MC < 3.3), located 10-20 miles SW of Corinne (~25 miles SW of Logan), occurred throughout the report period. Significant shocks include:

- M<sub>c</sub> 3.6 ----- April 231, 1:05 p.m., 12 miles WNW of Garland, UT. Felt in Fielding, Garland, Portage, and Tremonton
- M<sub>c</sub> 3.3 ----- April 26, 9:36 p.m., 18 miles WSW of Corrine, UT
- M<sub>c</sub> 3.3 ----- May 14, 6:26 a.m., 11 miles SW of Georgetown, ID

### Significant eastern Utah earthquakes

M<sub>c</sub> 3.4 ----- May 8, 1:45 p.m., 20 miles ESE of Moab

### Significant southwestern Utah earthquakes

A swarm of earthquakes located about 11 miles NNW of Panguitch that began in January 1998 continued during the report period. The largest shock of the sequence was a magnitude 4.7 earthquake that occurred on June 18th. A total of 114 shocks have occurred in the vicinity of Panguitch between January and June 1998. Earthquake swarms similar to the sequence observed in the Panguitch area have occurred in southwestern Utah in the past. A separate cluster of 27 earthquakes occurred about two miles NE of Milford (1.2 < MC < 4.1). Significant southwestern Utah shocks include:

- M<sub>c</sub> 3.8 ----- April 5, 2:14 p.m., 11 miles NNW of Panguitch
- M<sub>c</sub> 3.2 ----- April 9, 3:39 p.m., 2 miles NE of Milford. Felt in Milford
- $\rm M_{\rm c}$  2.6 ----- April 9, 3:40 p.m., 3 miles NE of Milford. Felt in Milford
- M<sub>c</sub> 3.2 ----- April 9, 6:04 p.m., 2 miles NE of Milford
- M<sub>c</sub> 4.1 ----- April 10, 2:07 p.m., 2 miles NE of Milford. Felt in Milford
- M<sub>c</sub> 3.9 ----- April 18, 10:51 p.m., 11 miles NW of Panguitch
- M<sub>c</sub> 3.3 ----- April 20, 2:47 p.m., 11 miles NNW of Panguitch
- M<sub>c</sub> 3.8 ----- May 21, 8:08 p.m., 12 miles N of Panguitch
- M<sub>c</sub> 4.7 ----- June 18, 5:00 a.m., 11 miles NNW of Panguitch. Felt in Panguitch
- M<sub>c</sub> 3.1 ----- June 18, 11:54 a.m., 11 miles NNW of Panguitch



## Responsibility, Earthquake Safety in Schools Stressed by USSC

by Janine L. Jarva and Barry Solomon Utah Geological Survey



ssues of membership responsibility, I-15 instrumentation, and earthquake safety in new school construction topped the agenda for the Utah Seismic Safety Commission's second and third quarterly meetings, which were held July 17 and October 16, 1998.

At the second quarterly meeting, Walter Arabasz was unanimously re-elected to serve another year as Chair of the USSC. Committed to advancing the cause of earthquake safety in Utah, Walter again charged the members of the USSC and its committees to likewise commit their energy to the commission's issues, reminding them that there is little time to make a difference given the pace of development in Utah. He said specific targets of narrow scope offer a high likelihood of positive outcomes for the USSC to improve earthquake safety in Utah.

In other business at the second quarterly meeting, Carl H. Carpenter, a semi-retired water engineer for Provo City and a former member of the Engineering and Architecture Committee of the Utah Earthquake Advisory Board, discussed the earthquake vulnerability of the state's water and wastewater systems. The Lifelines Committee of the American Society of Civil Engineers conducted a survey of Utah's approximately 300 water-system groups and 150 sewer-system groups regarding their knowledge of earthquake vulnerability. From that information, Carl recognized the need for basic education and has developed a presentation to show how they could evaluate their own systems. The USSC volunteered to help Carl update and reproduce his presentation with the newest data gathered in Utah and voted to appropriate funds to cover Carl's travel and lodging expenses for making these presentations throughout the state.

Steve Pratt of the Federal Emergency Management Agency demonstrated HAZUS, FEMA's earthquake loss estimation methodology. It considers information about geology, seismology, lifelines, structures, and demography to predict the likely impacts of a scenario earthquake.

Impacts predicted by HAZUS include number of casualties, number of people displaced from their homes and needing shelter, building damage, impact on transportation systems, and the extent of disruption to utilities.

One of FEMA's current projects that includes HAZUS is Project Impact, an effort to help local communities become more disaster-resistant. These results can aid in the development of contingency planning measures and an anticipation of the nature and scope of response and recovery efforts that will be required after an earthquake. Centerville City in Davis County is the pilot for Project Impact in Utah.

Jan Gibbons reported for the Schools Subcommittee of the Awareness and Education Committee on the results of its emergency preparedness survey of Utah schools. The survey indicated schools need workshops on writing emergency response plans, as well as drills and exercises to test their adequacy; help identifying and mitigating non-structural hazards; activity packets to help educate students about earthquakes; and emergency-response training such as the CERT program.

Barry Welliver and Jim Bailey of the Engineering and Architecture Committee updated the USSC on their continuing efforts to improve the seismic plan review of new school construction. Members recently met with the superintendent of public instruction, who asked that the committee write a

recommendation of its plan that seismic structural review be done at the 30 percent and 90 percent completion points in the design process of new schools. The Engineering and Architecture Committee will also address the issue of plan check lists for seismic design in local municipalities and the provisions needed to deal with the unreinforced masonry building stock in Utah.

Gary Christenson reported on the Geosciences Committee's actions to develop and implement a coordinated, responsive realtime instrumentation program; improve involvement by engineers; integrate instrumentation into a viable state program; and get I-15 bridges instrumented.

Walter said that to rapidly produce ground-shaking maps within minutes of an earthquake event would require a \$5 million - \$10 million investment, and he received the USSC's endorsement to approach the Governor's office for seed money of \$200,000 to help acquire planning and design money for this effort. The University of Utah has already agreed to commit \$50,000. Walter also reported that Steve Bartlett, research manager for the I-15 reconstruction project and a member of the Lifelines Committee, has written a proposal to the Federal Highway Administration asking for money to incorporate realtime instruments in all the new I-15 bridges. Other Geosciences Committee priorities are to organize and sponsor a technical conference to develop a geoscience research plan for Utah; establish cooperation among geologists, engineers, and seismologists and define geoscience needs and partnerships; develop directed geoscience workshops for specific audiences such as structural engineers, geotechnical engineers, and planners; and develop guidelines to help local governments deal with geologic hazards.

The Lifelines Committee is focusing on creating a GISbased compilation of all the important lifelines in Utah, with a primary focus on the Wasatch Front area. The Intergovernmental Relations Committee will focus on developing formal presentations that can be used to

inform various governmental entities about There is little time to make a how to improve earthquake safety. At the third quarterly meeting,

Walter announced that four of the 13 USSC members were newly designated, and new appointments are pending as replacements

for the two legislative members. The new members are Dan Bauer, Governor's Office of Planning and Budget, replacing Suzanne Winters; Earl Morris, CEM, replacing Lorayne Frank; Matthias Mueller, Division of Facilities Construction and Management, replacing Bill Juszcak; and Peter McDonough, American Society of Civil Engineers, replacing Les Youd.

Jim Bailey, representing the Structural Engineers Association of Utah, and Barry Smith, representing the Utah Chapter of the American Institute of Architects, were selected by their organizations to continue for another two-year term.

Steven Bartlett of UDOT reported that a consortium was formed through the Utah Transportation Center, consisting of Utah State University, the University of Utah, and Brigham Young University. The consortium submitted a proposal to the Federal Highway Administration to fund I-15 research. The four-year research program hopes to obtain about \$2 million for the first year. One component of the program is to develop a



difference, given the pace of

plan to deploy additional strong-motion instrumentation during the four-year research program. Walter said the plan preparation is consistent with the role of the task force formed at the last USSC meeting.

Ron Dunn said the Engineering and Architecture Committee has composed a draft letter to the Superintendent of Public Education, proposing improvements of plan reviews for school construction within Utah. The Committee recommends that an additional structural review take place at the 90 percent completion phase of design, when lateral-load-resisting systems should be clearly identified and sufficient details should be present within the contract documents.

Jan Gibbons said the Schools Subcommittee of the Awareness and Education Committee has written a proclamation for the Governor's signature declaring April as Earthquake Disaster Preparedness

Month in Utah, coinciding with the national observance. In addition, the subcommittee will distribute educational material to schools in January, has designed a flyer to announce the Prepared School Program, and will issue a certificate to schools for participation. The flyer was

distributed during the recent Utah Education Association Conference, and will be added to the Health Department Nurse's PTA newsletter as well as to information packets sent to all PTA members. The program asks middle and high schools to hold an earthquake drill each month of the school year and secondary schools to hold four earthquake drills each year, with one earthquake drill consisting of a full-scale evacuation. The program also requests that schools identify and mitigate non-structural hazards in the classroom. Each school should have a working safety committee that will report activities, evaluate drills, and debrief staff.

Transformation of Utah's existing regional seismic network into a real-time earthquake information system would be an important step in promoting earthquake safety in Utah, Walter noted. Such a system, including an infrastructure of strongmotion sensors, would have many uses. Walter met with the governor's chief of staff and other staffers on August 12, 1998, to request planning and design money for this system. The Governor's staff said one or more state agencies should propose the request as a prioritized budget item in order to have it considered in the governor's budget. The current strategy is to build a multi-state-agency partnership, with participation from the Department of Administrative Services' Facilities Construction and Management, Department of Environmental Quality, UGS, Water Rights' Dam Safety program, CEM, and Department of Transportation.

Gary Christenson, Chairperson of the Geoscience Committee, announced a workshop to introduce a project for creation of nine earthquake-ground-shaking maps for the Salt Lake City metropolitan area. The maps, to be published by the UGS, will show the earthquake-ground-shaking hazard both on a probabilistic basis and for a deterministic earthquake scenario. Ivan Wong, seismologist for Woodward-Clyde Federal Services, is the principal investigator for the NEHRP-funded project. Other participants include the University of Utah Seismograph Stations, UGS, and Pacific Engineering & Analysis.

Gary also reported on the 1998 Western States Seismic Policy Council Conference in Pasadena, California. Issues included earthquake insurance, the results of a national earthquake-risk assessment, new building codes, and Project Impact. There are various proposals in congress for a national earthquake insurance program; Gary recommended that the USSC monitor

the progress of these proposals to make sure the product meets Utah needs.

The national risk assessment is similar to a goal of the USSC in the Strategic Plan for Earthquake Safety to conduct a state risk assessment. A first step in satisfying this goal is to develop scenario-earthquake-hazard maps as a prerequisite for loss estimation. In the national risk assessment, Utah ranked sixth in total projected annual losses from earthquakes and fourth in percent loss.

Lee Allison said FEMA will soon release its nationwide HAZUS analysis indicating that Utah may average \$50 million dollars a year in damages due to earthquakes. He stressed the importance of distributing that information to the public and

decision-makers.

regional seismic network into a

would be an important step in

promoting earthquake safety in Utah

Lee expressed concern for the future of CEM. Earl Morris, CEM Acting Director, assured the USSC that Transformation of Utah's existing

CEM is not going away. There is some concern with the availabilreal-time earthquake information system ity of matching funds necessary for state and local assistance. Previously, FEMA provided 100 percent of those funds, but now is only providing a 50 percent match.

> CEM is seeking about \$250,000 in match money from the legislature this year. Both Earl and the Department of Public Safety have asked the governor's office that CEM not be downsized. Earl indicated that CEM will not lose people, but might re-direct people into different areas to put greater emphasis into the field. His recommendation has been to stay at a division level.

> Lee made a motion that the USSC urge the governor to include, in his fiscal year 2000 budget, funding requests from 1) CEM for matching federal funds for local assistance, 2) UGS for a one-time supplemental request to design and plan a real-time earthquake response system which would be implemented with federal funds, and 3) UGS for hiring a geologist to assist the state's school districts in inspecting and evaluating school sites for geologic hazards. The motion was unanimously approved.

Walter proposed creating a USSC web page that would provide a focus and coherence to its activities.

The next meeting will be Friday, January 8, 1999, 9 a.m., State Office Building #1112, Salt Lake City, Utah. For further details, please contact Brenda Nguyen at UGS, (801) 537-3390, fax (801) 537-3400, e-mail: nrugs.bnguven@state.ut.us.



Janet L. Gibbons, emergency manager for Davis County Schools, has earned the Certified Emergency Manager designation from the International Association of Emergency Managers. This is the highest honor of professional achievement available from the IAEM, which represents more than 1,800 emergency managers in government, industry, and the military.

Applicants for the credential must complete an extensive credentials package, pass a written examination, and complete a management essay on how they would respond to a particular emergency scenario. The credentials package includes experience, references, education, training, and contributions to the profession. Congratulations, Jan!

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## **USGS Funds Studies of Wasatch and Hurricane Faults**

by Gary Christenson Utah Geological Survey



he Utah Geological Survey has received two grants from the U.S. Geological Survey under the National Earthquake Hazards Reduction Program for work in 1999-2000. One grant is to develop a geologic scenario for a M7 earthquake on the Salt Lake City segment of the Wasatch

fault. The project will define the locations and extent of surface faulting, liquefaction, landslides, seiches, tectonic subsidence, and other geologic effects accompanying the scenario earthquake. The ground-shaking map that will be used to define these effects is presently being developed under a 1998 USGS NEHRP grant to Woodward-Clyde Federal Services, in cooperation with the UGS, University of Utah Seismograph Stations, and Pacific Engineering and Analysis. Both probabilistic and deterministic peak and spectral acceleration maps are being prepared for the Salt Lake Valley; the deterministic maps will define ground shaking for the M7-Salt Lake City segment scenario earthquake. One final product of the new 1999 grant will be maps showing the principal areas of geologic effects. These maps will be designed for use in emergency-response planning and with the Federal Emergency Management Agency's HAZUS lossestimation software. The UGS's Barry Solomon is the principal investigator on the project, which will also include UGS geologist Francis Ashland. Woodward-Clyde will assist by preparing ground-shaking maps for adjacent areas that will be affected by the scenario earthquake in counties beyond the borders of the present Salt Lake Valley project.

The second grant to the UGS is for continued paleoseismic work on the Hurricane fault in southwestern Utah. Under a 1997 NEHRP grant to the Arizona Geological Survey and the UGS, Bill Lund of the UGS's Southern Regional Office in Cedar City studied the part of the fault in Utah to identify trench sites for detailed paleoseismic investigations. This new grant is to perform those trenching studies as well as a variety of other paleoseismic work in cooperation with the AGS, University of Utah, Richard Stockton College of New Jersey, and Southern Utah University. Bill is again principal investigator on the 1999 grant, and has identified several trench sites along the northern part of the fault just south of Cedar City. Work should begin in summer 1999.

GEO-HAZ Consulting, Inc., of Estes Park, Colorado, has received a 1999 NEHRP grant to perform paleoseismic investigations on the Salt Lake City segment of the Wasatch fault to try to push the record of paleoearthquakes back beyond 5,000 -6,000 years ago. There is a good record of earthquakes over the past 5,000 - 6,000 years that indicates a regular recurrence interval of about 1400 years, with the most recent earthquake over 1200 years ago. To determine whether this regular recurrence during the late Holocene is characteristic of the longer term behavior of the fault, GEO-HAZ Consulting will dig a deep trench in the vicinity of Little Cottonwood Canyon to try to extend the record back as far as possible, hopefully into the Late Pleistocene. James McCalpin, GEO-HAZ, is the principal investigator on the project. The UGS and Salt Lake County will cooperate in the work. Excavation of trenches is planned for summer 1999. This proposal included a second year of funding, pending approval in 1999, to perform similar investigations on the Provo segment of the Wasatch fault in Mapleton.



### **CEM Director Retires** By Bob Carey Earthquake Program Manager

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orayne Frank, Director of the Division of Comprehensive Emergency Management, retired on August 24, 1998, after more than 34 years of state service. Earl Morris, director of the Criminal Identifications and Technical Services of the Department of Public Safety, was ap-

pointed interim director.

Lorayne started work in the State Planning Coordinator's Office and worked there for 13 years, leaving as the Associate State Planning Coordinator. She then moved to the Governor's Office as the Governor's Advisor on Intergovernmental Relations. Four years later, she was asked by Gov. Scott Matheson to become Director of CEM, a position she held for over 18 years.

During her tenure at CEM, Lorayne developed an agency nationally recognized for its programs in training and natural and technological hazards preparedness. She continued to bring the state to the forefront on national emergency issues by serving on the Board of Directors of the National Emergency Management Association for 13 years. She was Chair of the Utah Earthquake Advisory Board and the Western States Seismic Policy Council, on the board of the Utah State Fire Training School, Advisory Board Vice Chairperson and Executive Management Committee Chairperson of the Hazardous Material Institute, member of the Utah Seismic Safety Commission, co-Chairperson of the State Emergency Consultation and Coordination Board and Local Inter-Governmental Consultation and Coordinating Board, Chairperson of the 1994 FEMA Emergency Management Institute Board of Visitors, member of the Senior Associate Faculty of the Senior Executive Policy Center for the National Emergency Management Center for FEMA, member of the National Search and Rescue Association, member of the International Association of Emergency Managers, and member of the State Olympic Planning Committee.

Lorayne received many professional awards, including the 1983 American Spirit Award for responding to the floods in that year, and the Outstanding State Employee Services Award from the Salvation Army in 1983. Under her leadership, CEM received seven Unit Citations from the Utah Department of Public Safety for outstanding programs and work performance.

She will be missed in the emergency management community.

### **PUBLICATIONS OF INTEREST**

- Earthquake Engineering Research Institute, 1998, Incentives and impediments to improving the seismic performance of buildings, 92 p., \$15 plus \$5 shipping. Contact EERI, 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905; fax (510) 451-5411; e-mail eeri@eeri.org.
- **EERI**, 1998, *The Proceedings of the 6th U.S. National Conference on Earthquake Engineering*, CD-ROM, \$200 plus \$5 shipping. Contact EERI.
- **EERI**, 1998, *The EERI Golden anniversary volume, 1948-1998:* Past, present, and future issues in earthquake engineering, \$40 plus \$5 shipping. Contact EERI.
- **EERI**, 1998, *Reducing earthquake damage through quality construction*, 47 slides, 8-page script, \$70 EERI members, \$80 nonmembers plus \$5 shipping. Contact EERI.
- EERI, 1998, Slides From Umbria-March, Italy, earthquakes, 60 slides, \$88 EERI members, \$100 non-members plus \$5 shipping. Contact EERI.
- Federal Emergency Management Agency, 1998, NEHRP recommended provisions for seismic regulations for new buildings and other structures: Part I - Provisions, 355 p., 16 maps depicting earthquake risks for the entire U.S. and for seismically active regions, free; Part II - Commentary, 370 p., free. Contact FEMA, Publications Distribution Facility, P.O. Box 2012, Jessup, MD 20794-2012; (800) 480-2520.
- Page, Robert A., Mori, Jim, Roeloffs, Evelyn A., and Schweig, Eugene S., 1998, Earthquake hazards program five-year plan:

*1998-2002*, 36 p., \$9.25 plus \$3.50 shipping. Contact U.S. Geological Survey Information Services, P.O. Box 25286, MS 517, Federal Center, Denver, CO 80225; (800) 435-7627 or (303) 202-4700; fax (303) 202-4188; e-mail infoservices@usgs.gov.

- Quarantelli, I.L., editor, 1998, What is a disaster? Perspectives on the question, 326 p., \$27.99 plus \$4 shipping. Contact Routledge, 7625 Empire Drive, Florence, KY 41042; (800) 634-7064; fax (800) 248-4724; e-mail cserve@routledge-ny.com.
- Shinozuka, M., Rose, A., and Eguchi, R.T., editors, 1998, Engineering and socioeconomic impacts of earthquakes: An analysis of electricity lifeline disruptions in the New Madrid area, 190 p, \$25. Contact Multidisciplinary Center for Earthquake Engineering Research, University of Buffalo, Red Jacket Quadrangle, Buffalo, NY 14261; (716) 645-3391; fax (716) 645-3399; email nceer@acsu.buffalo.edu.
- Vukazich, Steven M., 1998, The apartment owner's guide to earthquake safety: A handbook for owners to identify seismic hazards in low-rise apartment buildings, 24 p., free to public agencies, \$5 all others. For single copies contact Frances Winslow, City of San Jose Department of Emergency Services, 855 North San Pedro Street, San Jose, CA 95110.
- Youd, T.L. and Idriss, I.M., editors, *Proceedings of the NCEER* Workshop on Evaluation of Liquefaction Resistance of Soils, 12/ 31/97, NCEER-97-0022, 324 p., \$20.



### **MEETINGS AND CONFERENCES**

- Through April 1999: "NEHRP Guidelines for the Seismic Rehabilitation of Buildings and Commentary, hosted by the Building Seismic Safety Council and Applied Technology Council. Two-day regional seminars in 19 cities, including Charleston, Los Angeles, New York, Portland, St. Louis, Salt Lake City, San Diego, San Francisco/Oakland, and Seattle. For information contact ATC-33-1 Project, Applied Technology Council, 555 Twin Dolphin Drive, Suite 550, Redwood City, CA 94065; fax (650) 593-2320; e-mail atc@atcouncil.org.
   Mail
- February 3-6, 1999: Earthquake Engineering Research Institute 51st Annual Meeting, San Diego. For information contact EERI, 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905; fax (510) 451-5411; e-mail eeri@eeri.org.
- February 8-10, 1999: Disaster Asia '99: Asia-Pacific Conference and Exhibition on Disaster Management, Manila, Philippines. Hosted by Philippine Futuristics Society with UN International Decade for Natural Disaster Reduction Secretariat. Contact Disaster Asia '99, c/o Infinity Plus Inc., Penthouse B, Windsor Tower, 163 Legaspi Street, Legaspi Village, Makati Central Post Office, 1200 Makati City, PI; (632)810-6751; fax (632) 812-7739; e-mail infinity @portalinc.com.
- February 8-10, 1999: 14th Annual State and Local Emergency Management Data Users Group Conference, New Orleans. Contact Steve Burr, Program Chair, SALEMDUG Annual Conference, Louisiana Office of Emergency Preparedness, P.O. Box 44217, Baton Rouge, LA 70804; or Sue Krogman, President, SALEMDUG, Nebraska Emergency Management Agency, 1400 Military Road, Lincoln, NE 68508-1090, Internet address www.salemdug.dis.anl.gov.
- March 24-27, 1999: EMS Today '99, Denver. Contact Ms. Kevin Flanagan, JEMS Communications, P.O. Box 2789, Carlsbad, CA 92018-2789, (800) 266-5367 or (760) 431-9797; fax (760) 431-8135; Internet address www.jems.com.

- April 21-25, 1999: 5th World Congress on Stress, Trauma, and Coping in the Emergency Services Professions, Baltimore. Sponsored by International Critical Incident Stress Foundation. Contact ICISF, 10176 Baltimore National Pike, Unit 201, Ellicott City, MD 21042; (410) 750-9600; fax (410) 750-9601; e-mail wcong5@icisf.org.
- May 3-5, 1999: Seismological Society of America Annual Conference, Seattle. Contact S. Malone, Geophysics Program, P.O. Box 351650, University of Washington, Seattle, WA 98195-1650; (206) 685-3811; fax (206) 543-0489; e-mail ssa99@geophys.washington.edu.
- May 7-12, 1999: National Disaster Medical System Conference, Washington, D.C. Contact NDMS, (800) USA-NDMS, press the star key; e-mail ndms@usa.net; Internet address www.oep-ndms.dhhs.gov.
- May 16-19, 1999: **6th National Watershed Conference**, Austin, Texas. Contact John W. Peterson, Executive Director, National Watershed Coalition, 9304 Lundy Court, Burke, VA 22015-3431; (703) 455-6886/4387; fax (703) 455-6888; e-mail jwpeterson@erols.com.
- May 17 19, 1999, SEE-3, Third International Conference on Seismology and Earthquake Engineering, Tehran, I.R., Iran. Information: International Institute of Earthquake Engineering and Seismology, P.O. Box 19395/3913, Tehran, I.R., Iran; tel: (98 21) 229 5085, fax: (98 21) 229 9479; e-mail SEE3@DENA.IIEES.AC.IR
- January 29 -February 5, 2000, **12th World Conference on Earthquake** Engineering, (12WCEE), Auckland, New Zealand. Information: Conference Secretariat, 12WCEE Organising Committee, c/o Convention Management, P.O. Box 2009, Auckland, New Zealand; (649) 529-4414; fax: (649) 520-0718; e-mail: 12wcee@cmsl.co.nz; WWW: http://www.cmsl.co.nz/12wcee; also see http://www.eeri.org/ Meetings/12WCEE.html



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#### Fault Line Forum

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#### Earthquake Insurance: Public Policy Perspectives from the Western United States Earthquake Insurance Summit

This 254-page volume is a comprehensive collection of articles and abstracts from the presenters at the Western United States Earthquake Insurance Summit. This publication includes submissions by authors from many different professions, including insurance, reinsurance, government regulation, engineering, building codes, public policy, and academics.

This volume was compiled for the participants of the Western United States Earthquake Insurance Summit in Sacramento, California, held June 24-26, 1998. In an effort to address the concerns of natural hazard insurance, the Western States Seismic Policy Council and the Council of State Governments - WEST joined forces to host a summit on this important topic in order to encourage the development of public policy options. Copies are \$40 (including shipping and handling) and can be ordered through the WSSPC office by mail, phone, fax, or e-mail. Send you name, address, organization, job title, phone number, e-mail address, and fax numbers to:

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#### WSSPC/NBMG Proceedings Volume, Basin and Range Province Seismic-Hazards Summit

A coordinated effort of the WSSPC, the Nevada Bureau of Mines and Geology, and the Utah Geological Survey, this publication contains the complete text of the May 13-15, 1997, meeting in Reno, Nevada. The purpose of the summit was to characterize seismic hazards in the province and identify policies and means of communication that will effectively reduce the loss of life and property. The conference presented an overview of important issues involved in characterizing seismic hazards in the province. Participants included researchers, scientists, and users. The conference resulted in the adoption of four WSSPC policy recommendations involving active fault definition categories, guidelines for fault trace setbacks, risk mitigation priorities, and seismic monitoring networks. Copies are \$15.95 plus tax, shipping, and handling, and can be ordered from Utah Department of Natural Resources Map & Bookstore by mail, phone, fax, e-mail, or Internet. Send your name, address, organization, job title, phone number, e-mail address, and fax numbers to:

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