Fault Line Forum

Volume 15, Number 2 ✦ 1999

Earthquake Preparation 101: Making Disaster Planning Fit a School's Curriculum

One of the major problems with incorporating disaster planning into a school's educational mission is finding some way to make it fit the curriculum. The administration of Pleasant Grove High School in Utah County has found a novel approach: use mock disasters to give students exposure to a wide variety of professional careers.

Students at Pleasant Grove High School's Health Occupation Academy received training in triage from the Pleasant Grove/ Lindon City paramedics during a mock-earthquake drill.

Ileen Strasburg, Applied Technology Education Coordinator at PGHS, said the School-to-Careers Program in the Alpine School District was used to justify a recent earthquake preparedness drill that involved the entire 1,500-person student body. Professionals from the local hospital and fire department, police and sheriff's agencies, ambulance companies, local government, newspapers, and radio stations took part in the exercise. As an added bonus, students in the Health Education Academy Program gained experience in triage efforts and first aid, while students in the Drama Department used their make-up skills to insure that the "injured" students really looked injured.

Everybody had a role, Strasburg said. The school even used the drill to have the school district evaluate the building itself, which was constructed in 1959. Some of the problems found are being addressed now, she said.

"With job-shadowing, we were able to keep everybody interested and everybody learned from it. The students were able to follow health-care providers, police officers, reporters, emergency medical technicians and fire department personnel from Pleasant Grove and Lindon City, and government officials as they did their jobs in a stressful setting. Plus, as a school, we learned a great deal about what it takes to deal with an earthquake. Basically, we

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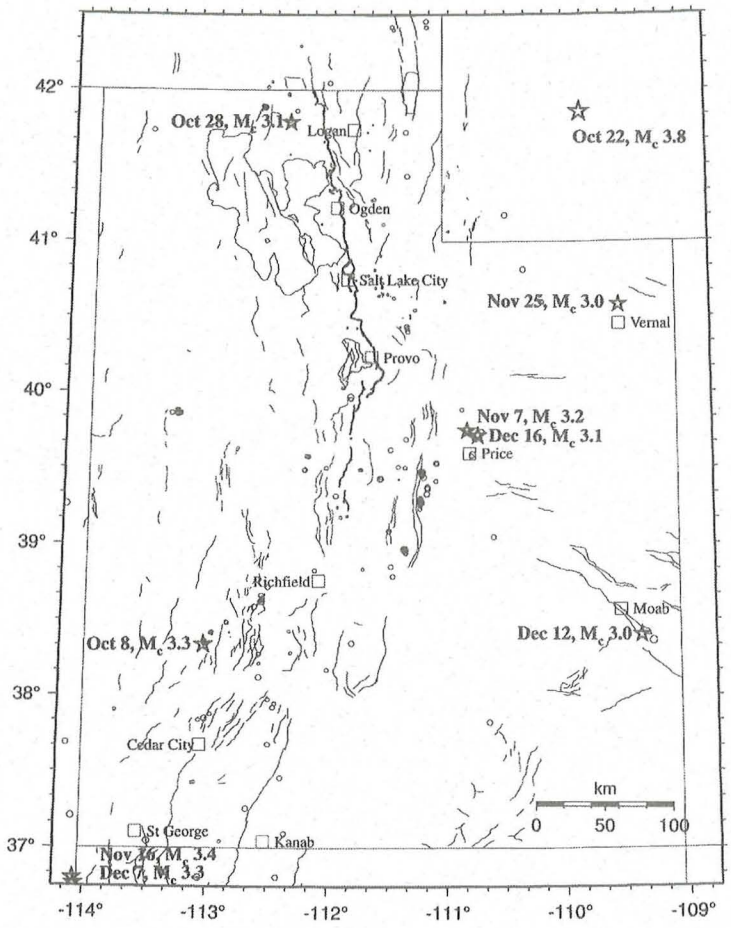

UTAH EARTHQUAKES
October — December 1998

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_c 0.0+
- ○ M_c 1.0+
- ○ M_c 2.0+
- ☆ M_c 3.0+
- ☆ M_c 4.0+

Earthquake Activity in the Utah Region October 1 — December 31, 1998

by Susan J. Nava

University of Utah Seismograph Stations

(with significant contributions by Jeff Fotheringham and Lorraine Nelms)

During the three-month period October 1 through December 31, 1998, the University of Utah Seismograph Stations located 341 earthquakes within the Utah region (see accompanying epicenter map). The total includes nine earthquakes in the magnitude 3 range, and 136 earthquakes in the magnitude 2 range. Earthquakes which have magnitudes of 3.0 or larger (plotted as stars and specifically labeled on the epicenter map) are described below. There were two earthquakes reported felt during the report period. (Note: magnitudes listed are coda magnitude, M_C. All times indicated below are local time, which was Mountain Daylight Time through October 25th and Mountain Standard Time during the remainder of the report period.) Additional information on earthquakes within the Utah region is available from the University of Utah Seismograph Stations.

Significant Main Shocks and Clusters of Earthquakes

Southwestern Utah/southeastern Nevada earthquakes include: A cluster of 13 shocks ($0.3 < M_C < 3.3$), located within 10 miles of Milford (~45 miles N of Cedar City), occurred throughout the report period. Significant shocks include:

M_C 3.3	Oct. 8	11:19 a.m.	4 miles SSW of Milford, UT
M_C 3.4	Nov. 16	5:06 p.m.	1 mile SW of Mesquite, NV
M_C 3.3	Dec. 7	1:32 p.m.	3 miles SSE of Mesquite, NV

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Earthquake Preparation 101

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learned that, in the event of an earthquake, we are on our own, and we better be prepared to deal with things ourselves," Strasburg said.

Pleasant Grove High School has an evacuation plan in place, and the exercise tested that plan. But the exercise was still "a real eye-opener for the students, who tend to be blase' about fire drills. But here, they quickly learned that, in an earthquake, they may not be able to just walk out of a structure . . . hallways may be blocked, doors may be jammed. This was an opportunity to train them to a level of self-sufficiency. They had to learn to be creative about something as simple as getting out of a schoolroom."

The exercise also showed school officials how their plan interfaced with plans of local hospitals, city and county governments, and police agencies. The drill tested evacuation and transportation capabilities, involving ambulance companies, school buses, and even Utah Army National Guard paramedic vehicles to get students to the closest hospital.

"One important thing we learned," Strasburg said, "is that an earthquake affects more than just the immediate vicinity. We realized we had to be ready to care for even the most severely injured people on-site, because there may not be a way to get them to a hospital if a really strong earthquake strikes. So we had to come up with a central location that was accessible – a place where people could gather and be accounted for, and where we could care for the injured. We used the football field."

Afterwards, participants were asked to fill out evaluations of the drill. Some of the comments will be used by school officials to modify the plan and take to other schools in the region. The next target: Pleasant Grove Junior High School.

"This drill involved the community, kept the students interested, and taught us all a great deal," Strasburg said. "Plus, as part of the curriculum, the earthquake preparedness drill can be refined and reused every year."

Earthquake Activity

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Northern Utah/western Wyoming earthquakes: A cluster of 15 shocks ($0.7 < M_c < 2.3$), located about 25 miles WNW of Garland (~40 miles WNW of Logan), occurred between November 27th and December 2nd. Significant shocks include:

M_c 3.8	Oct. 22	3:18 p.m.	25 miles SW of Eden, WY
M_c 3.1	Oct. 28	1:29 p.m.	12 miles W of Garland, UT
M_c 3.0	Nov. 25	12:01 a.m.	8 miles N of Maeser, UT
M_c 2.8	Dec. 12	7:04 p.m.	3 miles WSW of Santaquin, UT. Felt in Payson.

Significant southeastern Utah earthquakes include:

M_c 3.0	Dec. 15	4:44 a.m.	15 miles SE of Moab, UT

Eastern Wasatch Plateau-Book Cliffs Area near Price (coal-mining related): Seismic events in this region (magnitude 0.9 to 3.2) make up 48% of the shocks that occurred in the Utah region during the period. Significant shocks include:

M_c 3.2	Nov. 7	9:16 p.m.	5 miles N of Helper, UT
M_c 2.8	Nov. 23	4:48 p.m.	5 miles N of Helper, UT. Felt at the Willow Creek Coal Mine.
M_c 3.1	Dec. 16	12:18 p.m.	6 miles ENE of Helper, UT

HAZUS Data Users Group to Focus on Motivation

Hazards United States (HAZUS) is a database with the capability to motivate local governments, industry, and private citizens to do more to reduce losses in the event of a damaging earthquake. For a region such as Utah, where 80 percent of the population resides along an active seismic belt, mitigation efforts should be a part of community planning. To help build up and facilitate the use of the database, the state's Comprehensive Emergency Management (CEM) office is creating a HAZUS Data Users Group (HDUG). The first exploratory meeting was held Monday, July 12, at the CEM office.

According to Bob Carey, Earthquake Preparedness Information Center (EPICenter) Manager for CEM, HAZUS is only effective if it's used regularly and its databases are current and refined.

"HAZUS is a tool that can provide helpful information for land-use planning, in creating or modifying zoning and development building codes, or in reducing the risks to utilities," he said. "But it comes with default data from national databases that are as much as 10 years out of date. Obviously, things are different now. For instance, HAZUS defaults to post-1970 construction modes for all its calculations in Utah, which shows that there are no critical structures made of unreinforced masonry. That's simply not accurate, and using that kind of information affects casualty rates, which HAZUS projects at a much lower rate than current data would suggest.

"By creating HDUG, we can update the data, which gives us a better tool to use for the benefit of individual communities."

To assist in collecting data, a contract with the University of Utah is in the works. The University will be responsible for collecting data on building stocks that do not appear on county assessor's records. This effort will involve some field work. The building stock data of interest includes hospitals, state buildings, city and county buildings, churches, and schools, including colleges and universities. Partial funding for the contract is being provided by Salt Lake City from its Project Impact funds and the EPICenter's program funds. An oversight committee has been formed to provide direction and coordination with the University. The members of the committee are representatives from the Salt Lake County Planning Division, the Federal Emergency Management Agency, the Utah Geological Survey, and CEM.

Carey said the HDUG will receive training in the use of HAZUS, develop a clearinghouse and associated security for the database, take on the responsibility of updating information with the HAZUS model, and use HAZUS analysis to encourage actions aimed at reducing future earthquake damage. The first meeting was to promote and demonstrate HAZUS, explain where databases will be stored, enlist the support of organizations as users and contributors, and form committees. The intent, he said, is to meet on a quarterly basis.

Following the initial meeting, activities will include:

- providing basic and advanced HAZUS training for participants;
- executing a Memorandum of Understanding with Salt Lake County, which has agreed to act as the clearinghouse for the data, provide users with password access so they can contribute and retrieve information, and create a firewall to protect proprietary information;
- updating default data, to include allocating funding for staffing and other expenses; and
- motivating agencies and organizations to reduce future earthquake damage.

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Capital Stock Losses

Loss Ratio: 15.91 percent

Structural damage	Non-structural damage	Contents damage	Inventory Loss
$1,059,409,000	$3,629,044,000	$1,266,371,000	$37,151,000

Income Losses

Relocation loss	Capital-related Loss	Wages lost	Rental-income Loss
$963,778,000	$707,708,000	$575,786,000	$517,868,000

Total Loss: $8,757,115,000

A typical HAZUS projection showing the economic impact in Salt Lake County, assuming a M_c 7.0 earthquake on the Wasatch Fault, based on post-1970 construction modes. HAZUS projects fewer than 200 deaths; other earthquake experts, using more up-to-date construction figures, suggest that as many as 4,000 county residents would die in a severe earthquake.

HAZUS Users Group

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Potential HAZUS users who would participate in the HDUG include representatives from:

- city and county agencies such as building inspectors, emergency management teams, planning offices, public works, utilities, and water and sewer districts;
- state agencies such as Public Safety, State Lands, Utah Geological Survey, Automated Geographic Reference Center, Transportation, and the Utah Seismic Safety Commission;
- federal agencies such as the U.S. Geological Survey, Army Corps of Engineers, and Bureau of Reclamation;
- local universities;
- the private sector such as utilities, cable television providers, oil and gas refineries and pipeline companies, and other large employers; and
- other organizations, both secular and religious, such as regional planning groups, emergency-response teams, Envision Utah, the Church of Jesus Christ of Latter-day Saints, the Catholic Diocese of Utah, and the Episcopal Diocese of Utah.

"HAZUS can raise awareness and serve as a catalyst for change," Carey said. "It can identify hazards and vulnerabilities, and once communities understand their vulnerabilities *(see accompanying box on economic loss projections),* they can focus on solutions. HAZUS helps organizations explore options to prepare for and reduce the effects of earthquakes, and it can be used to compare benefits to costs on projects to ensure that dollars are spent wisely. Eventually, HAZUS can add modules that can reflect other hazards, such as wind, flood, wildfire, and landslides.

"Ultimately, HAZUS can reduce Utah's vulnerabilities to natural hazards."

Commission Conducts Half-Day Session to Generate New Ideas, Re-Energize Commitment and Participation

In what may become an annual event, the Utah Seismic Safety Commission (USSC) met in a half-day session in July to take a hard look at issues and directions and to reset priorities for the next fiscal year.

The first order of business was the election of a Commission Chair. Current chair Walter Arabasz indicated a willingness to serve another one-year term, and was nominated and re-elected unanimously.

The Commission then took a moment to recognize the contributions made by M. Lee Allison, former State Geologist and Director of the Utah Geological Survey (UGS), who is leaving to accept a position as Director of the Kansas Geological Survey. Allison spent 10 years as head of the UGS and was committed to raising public awareness of the state's earthquake hazard.

The half-day session was broken into three segments: from 10 a.m. to noon, the Commission heard reports from the standing committees and conducted other routine business. From noon to 1 p.m., the various committees broke up into small groups over lunch and discussed their plans for the upcoming year. From 1 - 3 p.m., the Commission reassembled and discussed the new ideas and resolved to recommit itself to fulfilling its obligations to the people of the State of Utah.

In the morning session, after the re-election of Arabasz, Barry Solomon of the UGS reported on the nomination of the USSC's Schools Subcommittee of the Awareness and Education Standing Committee for an Award of Excellence from the Western States Seismic Policy Council for work in carrying out a Prepared Schools initiative *(see Fault Line Forum, Volume 15, No. 1, 1999).*

Solomon, who serves as treasurer of the USSC, reported that the Commission has nearly $10,000 to begin the new fiscal year, and discussion ensued about ways to allocate the funds and supplement the budget as suggested by Ron Lynn at the last meeting. Arabasz indicated to the Commission that there has not yet been a ruling from the state Attorney General's office on how, or even whether, the Division of Comprehensive Emergency Management (CEM) or the UGS – which provide staff to the Commission – can accept money from private sources to fund Commission activities.

Bob Carey, CEM's Earthquake Preparedness Information Center (EPICenter) manager, reported on efforts to form a Hazards United States (HAZUS) Users Group *(see related story, page 4).*

Commissioner Peter McDonough reported on activities of the Lifelines Standing Committee. He noted that the American Society of Civil Engineers would be hosting a conference in Seattle, Washington, August 12 – 14, 1999, that will focus on lifeline system reliability.

Arabasz brought the Commission up to date on efforts in the U.S. Congress to fund real-time earthquake instrumentation. He said the Department of the Interior will be providing $400,000 each to three cities – San Francisco, Seattle, and Salt Lake City – to develop pilot programs.

Arabasz then reported on the magnitude (M_c) 3.6 earthquake that struck west of Park City on June 30, 1999. Arabasz said the quake epicenter was in a zone of clustered activity not associated with any known fault. The tremor registered on the strong-motion detector at Hailstone Junction near Jordanelle Dam some 10 miles away. Gary Christenson of the Geosciences Standing Committee reported that about 90 minutes after the quake hit, a non-engineered fill slope in a North Salt Lake gravel pit gave way. He said it's impossible to tell whether the quake caused

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Quarterly Meeting

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the slide, but said there is the possibility that the earthquake contributed to a change in ground-water conditions sufficient to alter the dynamic of the slope. The slide was 225 feet across at its scarp. There were no injuries or other damage.

Christenson said the gravel pit operators were in the process of reclaiming that area of the pit, above which a residential development is planned. Allison noted that the area north of the gravel pit is a known landslide. He said there is no impetus for developers to disclose geologic hazards to home buyers. Arabasz said it may be time to have another state conference on geologic hazards, noting that the last one was held in 1983.

On a related issue, the Commission heard from Parry Brown, President of the Structural Engineers Association of Utah (SEAU), on whether the group thought there is a need for regulations requiring the seismic retrofitting of certain classes of existing buildings in Utah, given the accelerating growth and development in seismically dangerous parts of the state. He said the SEAU board approved a draft resolution stating that the organization:

- supports the need for this type of regulation;
- recommends that certain "triggers" (age and type of structure, occupancy or use change, additions or alterations, and reroofing) be established that would require the seismic upgrade of certain buildings;
- suggests using as guidelines for the statewide code such documents as the Uniform Code for Building Conservation (UCBC), International Building Code, FEMA guidelines, and experience from other cities (notably Portland, Oregon, and San Francisco)
- recommends using either a seismic force level of 75 percent of the 1994 Uniform Building Code seismic zone forces in conjunction with the 1994 UBC or UCBC requirements, or an acceleration indicated by the national seismic hazards maps showing 10 percent probability of exceedance in 50 years in conjunction with FEMA Publication 273, or both; and
- recommends using state and property tax breaks and reduced insurance rates as incentives to make seismic upgrading attractive to owners.

Parry said SEAU "endorses and supports USSC consideration of forming an Ad Hoc committee that would include a broad base of concerned citizens who would develop resolutions to address these issues."

Carey announced that he is the interim chair of the Awareness and Education (A&E) Standing Committee, replacing Ann Becker, who is leaving. Carey reported on efforts to acquire a "shake van" to be housed at the Natural History Museum at the University of Utah. Efforts are now underway to find funding for the vehicle, which will provide education and awareness opportunities for schools and businesses statewide. He said the committee would be sponsoring a poster contest on earthquake awareness, open to elementary school children, and the winning posters would be used to illustrate a calendar on geologic hazards. Carey also said the committee was exploring ways to use lobbyists from private companies to advance the USSC agenda with the legislature. One notable issue is that of requiring complete disclosure of geologic hazards to potential buyers of real estate. Utah does not now have such a requirement.

After the lunch break, commissioners and staff returned to discuss new directions and new ideas. Arabasz said he will be writing to the UBC Commission indicating USSC's support of adoption of UCBC 2000, and would form an Ad Hoc committee with Barry Welliver, Ron Dunn, and stakeholders concerned with developing regulations regarding seismic upgrade of existing structures.

Arabasz reminded the committees and commissioners that they must always consider ways to contribute useful information and products to the USSC web page, which he noted will be a primary, ongoing task. He also directed the USSC staff to prepare a Memorandum of Understanding between USSC and WSSPC for Commission participation in the WSSPC Partners Program. The program is an effort to bring together state emergency-management directors and geologists to work on ways to improve earthquake mitigation, preparedness, and emergency response.

The Commission will also be hiring an intern to work on USSC projects, including preparation of a progress report on its activities and accomplishments since 1996.

Carey said the A&E and Emergency Management (EM) Standing Committees would work together to make data on geologic hazards more accessible to policy- and decision-makers. The EM committee will help drive the HAZUS effort, with cooperation from the Lifelines Standing Committee. The A&E Committee would conduct the poster contest, and both committees would work with representatives from real estate, construction, and developers to make full disclosure a reality.

Christenson said his Geosciences Standing Committee would be working to host a technical conference on geologic hazards, presenting easy-to-follow guidelines and information for local governments on ways to reduce damage from geologic hazards, pushing for progress on real-time instrumentation and strong-motion instruments for I-15 bridges, providing information to professional organizations, helping to create hot links that the general public can access on the web page to reach other sources of information on geologic hazards, committing itself to cooperate more fully with the Lifelines Standing Committee to become more effective, and revitalizing intergovernmental cooperation so that local governments and agencies can get access to information on geologic hazards.

The Lifelines Standing Committee will be working on the issue of colocation of utilities, which tends to magnify damage to lifelines during earthquakes, and will begin providing a better inventory on lifelines statewide.

The next meeting of the USSC will be Friday, October 8, 1999, at 9 a.m. in Room 1112 of the State Office Building. For further details, contact Brenda Nguyen at UGS, (801) 537-3390, fax (801) 537-3400, e-mail *nrugs.bnguyen@state.ut.us.*

Recent Publications of Interest

American Planning Association and Federal Emergency Management Agency, 1999, Planning for post-disaster recovery and reconstruction (PAS Report No 483/484). 346 p. $34. Planners Book Service, 122 South Michigan Avenue, Suite 1600, Chicago, IL 60603; (312) 786-0634; (312) 431-9985 fax; web site *www.apa.org/bookstore.*

Barker, Malcolm E., 1999, Three fearful days. 335 p. $16.95 paperback. Londonborn, P.O. Box 11246, San Francisco, CA 94107-0246; (415) 485-5433.

Bauman, Catherine, 1998, The challenge of land use planning after urban earthquakes: observations from the Great Hanshin earthquake of 1995. 52 p. Free. Report No. PF96-5. Earthquake Engineering Research Center (EERI), 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905; fax (510) 451-5411; e-mail *eeri@eeri.org;* web site *www.eeri.org.*

Central United States Earthquake Consortium (CUSEC), 1998, Achieving earthquake risk reduction through community-based partnerships. 138 p. Free. CUSEC, 2630 East Holmes Road, Memphis, TN 38118-8001; (901) 544-3570; fax (801) 544-0544; e-mail *cusec@ceri.memphis.edu;* web site *www.gandalf.ceri.memphis.edu/~CUSEC/index.html.*

Dahlhammer, James M., 1998, Rebounding from environmental jolts: organizational and ecological factors affecting business disaster recovery, Dissertation #31. 300 p. $25 plus 10 percent for postage and handling. Disaster Research Center (DRC), Publications, University of Delaware, Newark, DE 19716; (302) 831-6618; (302) 831-2091 fax; e-mail *castelli@udel.edu;* web site *www.udel.edu.*

Eidinger, John, and **Avila, Ernesto**, editors, 1999, Guidelines for the seismic evaluation and upgrade of water transmission facilities, Technical Council on Lifeline Earthquake Engineering (TCLEE) Monograph No 15. *(total pages and price not available).* American Society of Civil Engineers, Book Orders, P.O. Box 79404, Baltimore, MD 21279; (800) 548-2723; fax (703) 295-6211; web site *www.asce.org.*

Erickson, Paul A., 1999, Emergency response planning for corporate and municipal managers. 564 p. $79.95. Academic Press, Inc., Order Fulfillment Department, 6277 Sea Harbor Drive, Orlando, FL 32887; (800) 321-5068; (800) 874-6418; e-mail *apbcs@harcourtbrace.com;* web site *www.apcatalog.com.*

Farley, John E., 1999, Earthquake fears, predictions, and preparations in mid-America. 216 p. $21.95 paper, $50 cloth. Southern Illinois University Press, P.O. Box 3697, Carbondale, IL 62901.

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Hays, Walter, Mohammadioun, Bagher, and **Mohammadioun, Jody**, editors, 1999, Seismic zonation: a framework for linking earthquake risk assessment and earthquake risk management. 160 p. $45 plus $4 postage. Quest Editions, Presses Academiques, 1 Rue de Noe, B.P. 52106, 44321 Nantes Cedex 3, France; 3312-40-14-34-34; fax 3312-40-14-36-36.

Institute for Business and Home Safety, 1999, Insured losses from the Northridge earthquake. 8 p. Free. Request copies from Greta Ljung, Institute for Business and Home Safety, 175 Federal Street, Suite 500, Boston, MA 02110-2222; (617) 292-2003; fax (617) 292-2022; web site *www.ibhs.org.*

Lund, William R., editor, 1999, The Western States Seismic Policy Council Basin and Range Province Seismic Hazards Summit Proceedings Volume. 206 p. $15. Western States Seismic Policy Council, 121 Second Street, 4th Floor, San Francisco, CA 94105; (415) 974-6435; fax (415) 974-1747; e-mail *wsspc@wsspc.org,* web site *www.wspc.org.*

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MEETINGS AND CONFERENCES

September 6 - 9, 1999, **Western States Seismic Policy Council 21st Annual Conference,** Santa Fe, New Mexico. Information: WSSPC, 121 Second Street, 4th Floor, San Francisco, CA 94105; (415) 974-6435; fax (415) 974-1747; e-mail *wsspc@wsspc.org.*

September 22 - 25, 1999, **International Symposium on Earthquake Engineering,** Montenegro, Yugoslavia. Information: e-mail *isee99@cg.yu.*

September 25 - October 1, 1999, **Association of Engineering Geologists Annual Meeting,** Salt Lake City, Utah. Information: Julie Keaton, (520) 204-1553; fax (520) 204-5597; e-mail *aegjuliek@aol.com*

October 14 - 15, 1999, **Association of Bay Area Governments**, "Living on Shaky Ground: 10 years after Loma Prieta," Oakland, California. Information: ABAG, P.O. Box 2050, Oakland, CA 94604-2050; (510) 464-7900; (510) 464-7970 fax; web site *www.abag.ca.gov.*

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.cmsl.co.nz/12wcee;* or *www.eeri.org/Meetings/12WCEE.html.*

May 21 - 25, 2000, **Eighth International Conference of the Natural Hazards Society,** Tokushima, Japan. Information: Natural Hazards Society, P.O. Box 49511, Concord, Ontario, Canada L4K 4P6; *www.es.mq.edu.au/NHRC/NHS.*

May 31- June 3, 2000, **Earthquake Engineering Research Institute 2000 Annual Meeting,** St. Louis, Missouri. Information: EERI, 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905; fax (510) 451-5411; *e-mail: eeri@eeri.org; www.eeri.org.*

September 5 - 8, 2000, **Mid-America Post-Earthquake Highway Response and Recovery Conference,** St. Louis, Missouri. Information: Donald Neumann, Federal Highway Administration, 209 Adams, Jefferson City, MO 65101; (573) 636-6196, ext. 17; e-mail *donald.neuman@fhwa.gov.*

November 12 - 15, 2000, **Sixth International Conference on Seismic Zonation (6ICSA),** Palm Springs, California. Information: EERI, 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905; fax (510) 451-5411; *e-mail: eeri@eeri.org; www.eeri.org.*

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