Fault Line Forum

Volume 15, Number 1 ✦ 1999

Creating Prepared Schools

by
Bob Carey
Utah Division of Comprehensive Emergency Management

The Schools Subcommittee of the Utah Seismic Safety Commission has taken on the challenge of preparing every school, public and private, for the effects of natural or man-made hazards. To help determine the direction of the subcommittee, a survey was developed to gather information about the current emergency-preparedness activities of schools.

The survey focused on four areas: (1) written emergency-response plans, (2) awareness education and response training, (3) reducing the earthquake risk, and (4) assistance needed to become better prepared. The subcommittee received responses back from half of the 731 public schools and a quarter of the 102 private schools. The survey results showed that even though many schools have been working on preparedness measures, plenty of work is still needed for schools to be prepared to handle an emergency.

Using the survey results, the subcommittee went to work developing a plan of action. The plan was to begin with an activity that would be a precursor to the

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Governor Mike Leavitt signs the proclamation designating April as "Earthquake/Disaster Preparedness Month." Witnessing the ceremony are (from right) Cathy Bledsoe, Chair, Utah State PTA Emergency Preparedness Committee; Deedee O'Brien, Vice Chair of the Utah Geological Survey Board; and Val Wiltsey, Emergency Preparedness Coordinator, State Office of Education. Bledsoe, O'Brien, and Wiltsey are all members of the Schools Subcommittee of the Awareness and Education Standing Committee, USSC.

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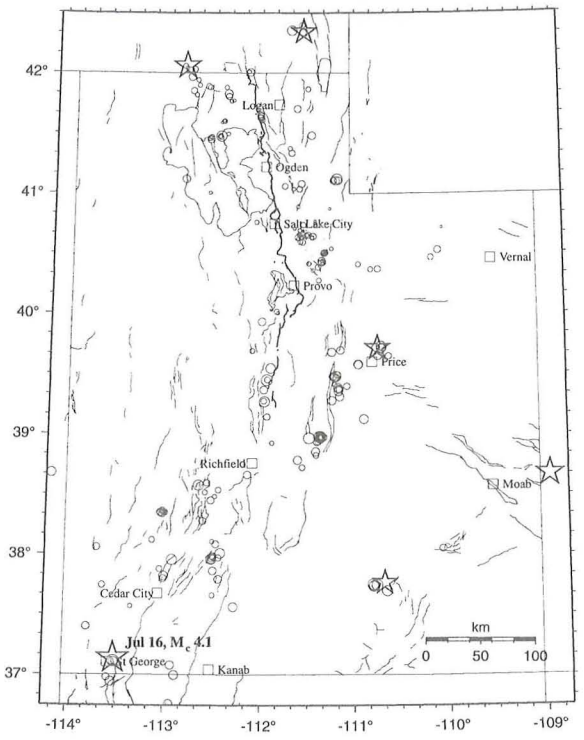

UTAH EARTHQUAKES
July — September 1998

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 July 1 - September 30, 1998

by
Susan J. Nava
University of Utah Seismograph Stations

During the period July 1 through September 30, 1998, the University of Utah Seismograph Stations located 260 earthquakes within the Utah region. The total includes one earthquake in the magnitude 4 range, three earthquakes in the magnitude 3 range, and 75 earthquakes in the magnitude 2 range. Earthquakes that have magnitudes of 3 or larger (plotted as stars; magnitude 4 and larger shocks are specifically labeled on the epicenter map) are described below. There was one earthquake reported felt during the report period. *(Note: Magnitudes listed are coda magnitude, M_C. All times indicated are local time, which was Mountain Standard Time during the report period).* Additional information on earthquakes within the Utah region is available from the University of Utah Seismograph Stations.

Significant southwestern Utah earthquakes

M_C 4.1 July 16 ..... 7:11 a.m. 1 mile NNW of Washington. Felt in St. George, Santa Clara, and Washington, Utah.

Significant northern Utah/southern Idaho earthquakes

A cluster of 14 shocks ($0.6 \leq M_C \leq 2.6$), located 20 miles WSW of Corinne (~25 miles SW of Logan), occurred principally in July and August. Significant shocks include:

M_C 3.5 ... July 24 ..... 3:14 a.m. 32 miles WSW of Malad City, Idaho

M_C 3.2 ... Aug. 15 ..... 8:14 p.m. 11 miles NW of Paris, Idaho

Significant east-central Utah earthquakes

Seismic events in the eastern Wasatch Plateau-Book Cliffs area near Price, Utah (coal-mining-related), magnitude 1.2 to 3.3, make up 19 percent of the shocks that occurred in the Utah region during the period. Significant shocks include:

M_C 3.3 ... Sept. 26..... 11:01 a.m. 6 miles NE of Helper, Utah

Significant southeastern Utah/western Colorado earthquakes

M_C 3.2 ... August 30 .... 6:41 p.m. 50 miles E of Escalante, Utah

M_C 3.6 ... Sept. 24..... 11:39 p.m. 2 miles ESE of Gateway, Colorado

Prepared Schools

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"Prepared Schools Project," a yet-to-be-finalized multi-level program that progressively prepares schools as they complete each level. This precursor activity is the "1999 Preparedness Schools Certificate for Effective Drills and Safe Surroundings." To qualify for the certificate, schools need only complete four simple tasks: (1) conduct a school-wide earthquake/disaster drill, (2) have the school safety committee evaluate the drill, (3) conduct a school-wide hazard hunt, and (4) conduct the required number of fire drills during the school year. To assist with these tasks, the subcommittee provided all schools with a binder of activities, curriculum materials, a disaster video, maps, and posters. Upon successfully completing the tasks, schools will be presented with a certificate suitable for framing and book marks imprinted with earthquake-response procedures. The subcommittee was also able to have Governor Leavitt designate April as "Earthquake/Disaster Preparedness Month."

When finalized, the "Prepared Schools Project" will be an incremental approach to assist schools in achieving the highest levels of preparedness. There are five areas in which schools will need to demonstrate competency: (1) awareness and education, (2) reducing risks before the event, (3) emergency response, (4) longer-term emergency response, and (5) recovery. As each school reaches the highest level of preparedness, the Utah Division of Risk Management will offer it an insurance premium incentive.

FEMA Funds *Project Impact* for Salt Lake City

by
Michael W. Stever
Salt Lake City Emergency Management

Salt Lake City is subject to flooding, earthquakes and related hazards, blizzards, debris flows, wildfires, droughts, and urban fires. In addition to natural disasters, the community is at risk from technological and human-caused events such as hazardous materials incidents, mass casualty transportation accidents, chemical stockpile incidents, and terrorism.

> ***Salt Lake City has a history of successful hazard mitigation and preparedness efforts.***

But the city has a history of successful hazard mitigation and preparedness efforts. Quick-thinking city officials saved millions of dollars in damages by routing flood waters onto sandbagged city streets in 1983. Flood-control projects (debris basins, enlarged culverts) have been built throughout the city to mitigate the effects of future flooding. Building codes have been strengthened over the years to ensure that structures are built to perform better should an earthquake strike. The historic City & County Building has been retrofitted to increase its earthquake resistance.

While it is impossible to eliminate the occurrence of these events, Salt Lake City has proven that it can reduce its vulnerability because of its strong infrastructure and the willingness of representatives from the public, private, and non-profit sectors to work together to mitigate hazards, both natural and human-caused. For that reason, the Federal Emergency Management Agency (FEMA) has given Salt Lake City a grant of up to $300,000 to implement *Project Impact: Building a Disaster-Resistant Community.*

Project Impact is a nationwide effort aimed at protecting families, businesses, and communities by reducing the effects of disasters. All sectors of a community are affected when disaster strikes; therefore, all sectors must work together as partners to be prepared before disaster strikes, to cope during the event, and to recover from it.

The FEMA grant will be used to sustain the city's cooperative initiatives in the long term by continuously engaging and leveraging the resources of the city's *Project Impact* partners. To strengthen and develop that partnership, each party agrees to:

- **identify** the benefits and incentives of being a *Project Impact* partner;
- **ensure** that public- and private-sector needs are being shared across the partnership;
- **establish** effective techniques for assessing, planning, reducing, and managing losses;
- **leverage** technical and financial assistance to facilitate loss-reduction projects;
- **share** success stories and emergency management/business recovery plans;
- **support** the statement of values and principles to guide the partnership's efforts in defining and implementing the actions that must be taken to make

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Project Impact

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the community more disaster-resistant; and

- **strategically link** the *Project Impact* initiative to overall community goals and long-term development.

> ***City leadership has committed time, staff, and resources to ensure successful implementation of the initiative.***

In terms of funding, staffing, organizational structure, and policy development, there are clear links between the *Project Impact* initiative and overall community management. Those managing *Project Impact* for the city come from key governmental departments that span the scope of city responsibilities. City leadership has committed time, staff, and resources to ensure successful implementation of the initiative. In return, participants have asked to fully engage the local political leadership in the decision-making process. This exchange of information helps strategically link *Project Impact* with the overall goals of the community.

Project Impact will be managed by Salt Lake City Emergency Management in cooperation with the Utah Division of Comprehensive Emergency Management and FEMA. Committees representing the total cross section of *Project Impact* partners will be created to facilitate the coordination and accountability of projects and the creation of future endeavors. Salt Lake City Emergency Management will provide leadership for the project, oversee its day-to-day operations, and motivate public- and private-sector participation. Other organizations and their commitments are:

Salt Lake City Fire Department

- Technical leadership for Y2K compliance for dispatch.
- Community Emergency Response Team (CERT) efforts and training.

Salt Lake City Public Utilities Department

- Leadership, management, labor, and technical services for snow-pack monitoring (SNOTEL) and stream monitoring projects.

Salt Lake City Public Services Department

- Leadership, management, training, and technical services for emergency information system (EIS).

Salt Lake County Public Works Department

- Leadership, management, labor, technical services, maintenance, and upkeep for stream monitoring systems.

American Red Cross

- *Project Impact* training assistance.

Salt Lake City School District

- Identify schools that will be targeted for non-structural seismic retrofitting.
- Labor to retrofit targeted schools.

Salt Lake Community College

- Develop and help fund a Home Retrofitting Telecourse.

Association of Contingency Planners

- Develop mitigation network.
- Facilitate additional community convening sessions.
- Develop *Project Impact* web page.
- Prepare and disseminate preparedness/mitigation information.
- Host business contingency plan forum.

Utah Division of Comprehensive Emergency Management

- Guidance to other state agencies involved with *Project Impact* initiative.
- Training support.
- Technical expertise for projects.

Forestry, Fire and State Lands

- Guidance and technical assistance for Bonneville Trail and Wildfire Education projects.

Utah Geological Survey

- Technical assistance on earthquake hazards as they apply to Home Loan Retrofit and Earthquake Retrofit for Schools projects.

U.S. Natural Resources Conservation Service

- Monitor and maintain SNOTEL sites.

National Weather Service

- Assist with education, training, and awareness issues.
- Monitor and maintain rain gauges.

FEMA

- Grant of up to $300,000 to implement *Project Impact* in Salt Lake City.
- Assistance with education, training, and awareness initiatives.
- Technical assistance on the HAZUS loss-estimation model to develop a baseline for the hazard identification and vulnerability assessment component.
- Training opportunities for partners.

Private sector

- Form the foundation of all mitigation efforts.
- Multiply commitments from city-wide large and small businesses to create an overall disaster-resistant community.

Salt Palace Highlights First USSC Quarterly Meeting of 1999; Presentation by Ron Lynn, Nevada Earthquake Authority, Highlights the Second

The routine of the Utah Seismic Safety Commission's (USSC) first quarterly meeting of 1999 was altered to accommodate a presentation by the contractor and consulting geologist working on the Salt Palace expansion project. The second quarterly meeting was highlighted by a presentation by Ron Lynn, Chair of the Nevada Earthquake Safety Council.

Kenneth Ament, president of Construction Control Corporation, and David Simon, consulting geologist, outlined for the USSC the evidence suggesting that a fault line may run north-to-south directly through the site. Further investigation will be needed, but it appeared the feature may be an extension of the Warm Springs branch of the Wasatch fault.

Ament related how his company tried to address the potential for a fault on the site before construction began by drilling 12 boreholes into Lake Bonneville sediments, about 60 feet below the grade of 2nd South. The planned Salt Palace expansion will include a three-level underground parking structure with an exhibit hall above.

"We wanted to see the strata, to look for displacement," Ament said. "There was no evidence of a fault, but the geotechnical report suggested continued observation during excavation and construction.

"We were supposed to excavate to 37 feet below the level of 2nd South. At 23 feet below grade, we hit geologic features that showed tectonic characteristics. We dug three trenches to give us a clearer view of the features and notified the state and county. Other indications suggested that what we were seeing was liquefaction associated with an ancient earthquake and not tectonic features. A second consulting geologist took a look and concluded that the features were tectonic. At that point, work was suspended for 30 days so we could do more trenching closer to the existing structure and study the evidence. A third consultant was called in to do some carbon dating on the deposits."

"Right now," he concluded, "we are assessing the information, looking at possibilities of redesigning the structure, building set-backs, or looking for another site. We did everything we were supposed to do. Public safety is paramount."

Simon, the first consulting geologist to be called in on the project, said he did not expect to find a fault at the site. Some maps suggest the Warm Springs branch, which manifests itself with a 30-foot downdrop about a mile directly north of the Salt Palace, could extend to about 4th South.

"The first trench showed sand dikes characteristic of liquefaction," Simon noted. "The second trench showed displacement vertically, producing a graben, which represents pulling apart. The buried soil horizons can give us the age of the movement."

In response to questions, Simon explained that the structure is a subtle feature, only 15 feet wide. He said the focus now is on collecting information from the site and to give a heads-up to other contractors working in the downtown area.

USSC Chair Walter Arabasz commended Ament and Simon for their forthrightness, noting that the technical data would enter the public domain. "This is an issue that will have to be dealt with," he said. "There is a real risk of other developments in the area glossing over findings such as this, only to pay heavily later."

In other business, the USSC heard a report from Steve Bartlett, a member of the Lifelines and Infrastructure Standing Committee, on efforts to retrofit Utah's highway bridges. He said federal funding from the National Transportation Safety Board should be available soon. A two-day symposium is scheduled for later in January to present information on the effort and hear from California experts about their experience.

Michael Stever, a member of the Awareness and Education Standing Committee, discussed *Project Impact,* a federal government initiative designed to develop "disaster-resistant communities." The Federal Emergency Management Agency (FEMA) has chosen Salt Lake City as the second Utah community it is helping to develop disaster-mitigation efforts (Centerville, with its legacy of debris flows and other hazards, was the first). FEMA has provided $300,000 toward funding a program that addresses three categories of mitigation: clear zones, rules and laws for retrofitting structures for all hazards, and public awareness *(see story on page 3).*

"We need to develop partnerships and strategic liaisons to fight for these programs, instead of just talking about them," Stever said. "Right now we're shotgunning our efforts. We need to focus on making disaster mitigation a reality."

Arabasz noted that Seattle, Washington, was the early model for instituting mitigation policies and agreed that Salt Lake City needs to accomplish the same thing. "We could have cascading impacts, with problems such as the Year 2000 potential, the Olympics, continuing freeway reconstruction," he said. *"Project Impact* is the vehicle for creating converging dialogue to engender action."

Commissioner Earl Morris, director of the Utah Division of Comprehensive Emergency Management, reported that the governor's budget will not include full funding for his agency. He said funding will have to be provided by legislative action. The USSC unanimously adopted a resolution to support CEM's funding request with the appropriate legislative committees.

Arabasz outlined efforts to create a web page for the USSC to detail its activities and promote public awareness and education. He said the web is the way to influence perceptions and practices when it comes to earthquake issues.

Barry Welliver, a member of the Engineering and Architecture Standing Committee, said engineers have no cohesive approach to address earthquake concerns in Utah. He agreed that a web page would be a natural vehicle for disseminating information, building consensus, encouraging commitment, and providing direction.

In other matters:

* Ann Becker, chair of the Awareness and Education Standing Committee, outlined the need for someone to be responsible for scheduling, transporting, setting up, and taking down the traveling earthquake education exhibits. Arabasz said he would make sure it happens.
* Commissioner Pete McDonough, representing civil engineers, suggested that the USSC issue a report to the governor on its accomplishments.
* Commissioner Jim Bailey, representing structural engineers, reported on efforts to make sure existing structures in the Gateway Project are seismically acceptable.
* Jan Gibbons, a member of the Awareness and Education Standing Committee, reported on school earthquake-awareness certification, and said more than 900 notebooks detailing the program and how to achieve certification were being prepared for distribution to every school in the state.
* Commissioner Jim Golden, representing the Utah Department of Transportation, reported on the Lifelines Standing Committee. He said the program would best be served by creating a database map of geographic information to

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Quarterly Minutes

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illustrate transportation routes and utility corridors along the Wasatch Front and the Intermountain seismic belt.

At the second quarterly meeting, Ron Lynn, a structural engineer and the Assistant Director of the Clark County, Nevada, Building Department, delivered an impassioned presentation on ways for seismic safety organizations to "get real."

Unlike the USSC, the Nevada Earthquake Safety Council is an independent organization that "hustles for its money," Lynn said. "In your region, unlike in California and other areas of the world, you are trying to educate the public about a low-occurrence/high-impact event. You need to bring your message down to real issues: building and retrofitting to mitigate earthquake damage is smart and increases property values; educating school children about the potential for earthquakes and ways to survive them is good for the future; enforcing building codes that require setbacks from fault lines is good business. Trust your constituents, and remember: all building codes — in a very real sense — are written in blood."

In other matters before the USSC, Commissioner Earl Morris reported that CEM was fully funded by the state legislature, and thanked Arabasz and others for their support. He said legislators clearly heard and appreciated the message that the state emergency management structure must be retained.

Commissioner Lee Allison, State Geologist and Director of the UGS, clarified a budget issue for the panel. He said there was an item in the budget that indicated the Survey was getting $110,000 to fund geologic hazard investigations of school sites. Actually, significant funds were transferred out of the UGS budget in one area, then returned in the guise of the school geologic hazards studies. The net impact on the agency's budget was a 5 percent reduction, which meant that no additional staff could be hired to conduct the school studies.

Bob Carey of the Mitigation and Planning Section of CEM reported on the Awareness and Education Committee's efforts to bring schools up to standards in understanding, preparing for, and surviving earthquakes. The Prepared Schools Project *(see story on page 1)* offers public and private schools an incentive to become fully prepared: a reduction in insurance premiums.

Arabasz updated the USSC on efforts to gain funding for seismic-instrumentation needs for the Wasatch Front urban corridor *(see Fault Line Forum, v. 14, no. 2, 1998).* He said that the state legislature did not fund the program, but that there may be a way to secure up to $400,000 from the federal fiscal year 2000 budget. The money could be used to begin placing strong-motion sensors and developing a system that could process earthquake information in real time, send pager broadcasts to report on earthquake locations, and produce maps showing areas of strong ground motion within seconds or minutes of the event.

Ex-officio member Steve Pratt of FEMA reported that a team has been set up to implement HAZUS — Hazards U.S. — and is upgrading and updating the information needed to estimate potential losses.

Commissioner Jim Bailey, Allen and Bailey Engineers, reported that the Structural Engineers Association of Utah is concerned about the extensive remodeling taking place in the Gateway region of Salt Lake City. He said no requirement exists to upgrade remodeled structures to seismic standards, and no requirement to notify potential buyers of the risks involved. He said the city of Portland, Oregon, recently dealt with the same issues by imposing local building-code requirements. Roger Evans, Director of Salt Lake City's Building Services Department, reminded the USSC that Utah state law prevents any municipality from enacting local building-code requirements.

The USSC and staff were reminded that nominations are due for the Western States Seismic Policy Council's Awards of Excellence, which will be presented in August. Arabasz said the competition will likely be very strong this year.

Before adjourning, Arabasz suggested that the third quarterly meeting be scheduled for a half-day to "take stock of where we are, where we are going, and what we need to do." The USSC agreed and set the meeting for Friday, July 9, from 10 a.m. to 3 p.m. The site will be determined later.

For further details, please contact Brenda Nguyen at UGS, (801) 537-3390, fax (801) 537-3400, e-mail: **nrugs.bnguyen@state.ut.us.**

Ron Lynn Hosts Earthquake Forum

Utah can learn a great deal from the controversies surrounding earthquakes and building-code issues in California and Nevada, according to Ron Lynn, who hosted a special luncheon forum following the quarterly USSC meeting.

Lynn's presentation was *A Rational Approach to Building Codes: Practical Issues and Local Challenges Relating to Seismic Codes, Retrofit, and Fault-Setback Ordinances.* A lively discussion followed, particularly among structural engineers regarding retrofit requirements and the role of Utah's Uniform Building Code (UBC) Commission in setting statewide standards.

The Gateway Project was of particular interest, since it will involve extensive remodeling of older buildings. The project will also provide an opportunity for seismic retrofitting.

Eric Kankainen, who represents structural engineers on the UBC Commission, urged continued open discussion so that specific recommendations can be developed and acted upon.

Lynn stressed that this kind of communication needs to continue until a consensus is reached, and that contractors and building officials must be involved.

Geologic-Hazards Investigations for New Schools

The Utah State Office of Education (USOE) and individual school districts have begun working with the Utah Geological Survey (UGS) to help ensure that no new school buildings are placed in geologically hazardous areas without proper protection. Under USOE Rule R277-455-4, the UGS must inspect proposed school sites for geologic hazards prior to final USOE approval. To implement the intent of this rule, school districts' consultants are now performing geologic-hazards investigations as part of their geotechnical studies for new school sites and submitting their reports to the UGS for review. In addition, during early phases of site selection, the UGS is assisting school districts by performing preliminary site evaluations so that the districts can avoid acquiring sites with significant geologic problems that would increase costs significantly.

The program is intended to have a long-term positive impact on school safety in Utah and is just beginning. As part of a larger effort headed by Larry Newton of the USOE, the investigations will help ensure that all new schools are properly inspected from initial site selection to final building approval. To date, the UGS has done a general pre-purchase screening for over 35 sites and reviewed more than 10 site-specific consultant's reports, mostly for the Alpine, Davis, and Washington School Districts.

Contrary to media reports on the state's budget, the 1999 Legislature did not allocate additional funds for this purpose.

Recent Publications of Interest

Basoz, N., and **Kiremidjian, A.,** 1998, Evaluation of bridge damage data from Loma Prieta and Northridge, California, earthquakes: MCEER-98-0004, $20.

Binder, Denis, 1998, The duty to disclose geologic hazards in real estate transactions: Chapman Law Review, v. 1, no. 1, spring. Free reprints may be requested from the author at the School of Law, Chapman University, 1240 South State College Boulevard, Anaheim, CA 98206; (714) 517-0380.

Bolin, Robert, and **Stanford, Lois,** 1998, The Northridge earthquake — vulnerability and disaster: 288 p. $110 plus $4 shipping. Routledge Customer Service, 7625 Empire Drive, Florence, KY 41042; (800) 634-7064; fax (800) 248-4724; e-mail cserve@routledge-ny.com.

Comerio, Mary, and **Gordon, Peter,** 1998, Pacific earthquake engineering research invitational workshop proceedings, May 14 - 15, 1998 — defining the links between planning, policy analysis, economics and earthquakes: 84 p. $15. Publication #98-04. Pacific Earthquake Engineering Center, 1301 South 46th Street, Richmond, CA 97804-4698; (510) 231-9468; fax (510) 231-9461; e-mail eerclib@eerc.ce.berkeley.edu.

CUREe, 1998, Proceedings of the NEHRP conference and workshop on research on the Northridge, California, earthquake of January 17, 1994: 1,800 p. Four volumes, 160 professional presentations. $195. CUREe, 1301 South 46th Street, Richmond, CA 94804; (510) 231-9557; fax (510) 231-5664; e-mail curee@curee.org.

Davis, Mike, 1998, Ecology of fear: Los Angeles and the imagination of disaster: 498 p. $27.50 plus $3 shipping. Von Holtzbrinck Publishing Services, 16365 James Madison Highway, Gordonsville, VA 22942; (888) 330-8477; fax (800) 672-2054; e-mail info@hholt.com.

Dutta, A., and **Mander, J.B.,** 1998, Capacity design and fatigue analysis of confined concrete columns: MCEER-98-0006, $20.

Federal Emergency Management Agency, 1998, Seismic rehabilitation of buildings — strategic plan 2005: 160 p. Free. FEMA Publications Distribution Facility, P.O. Box 2012, Jessup, MD 20794-2012; (800) 480-2520.

FEMA, 1998, Home builder's guide to seismic resistant construction: 85 p. Free. FEMA Publications Distribution Facility, P.O. Box 2012, Jessup, MD 20794-2012; (800) 480-2520.

Fradkin, Philip L., 1998, Magnitude 8 — earthquakes and life along the San Andreas fault: 336 p. $27.50. Von Holtzbrinck Publishing Services, 16365 James Madison Highway, Gordonsville, VA 22942; (888) 330-8477; fax (800) 672-2054; www.henryholt.com.

Kious, W.J., and **Tilling, R.I.,** 1996, This dynamic earth — the story of plate tectonics: 77 p. $6. USGS Information Services, P.O. Box 25286, Building 810, Denver Federal Center, Denver, CO 80225; (303) 202-4700; fax (303) 202-4693. Text available at http://pubs.usgs.gov/publications/textdynamic.html# anchor19309449.

National Center for Earthquake Engineering Research, 1998, Case studies of liquefaction and lifeline performance during past earthquakes: a cooperative U.S.-Japan research initiative: 1,000 p. Two volumes. $50. Publications, State University of New York at Buffalo, Red Jacket Quadrangle, Box 610025, Buffalo, NY 14261-0025.

NCEER, 1996, Earthquake damage repair manual for civil engineering structures: $45.50. Research Foundation, NCEER, Publications, State University of New York at Buffalo, 118 Red Jacket Quadrangle, Box 610025, Buffalo, NY 14261-0025

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Nigg, Joanne M., editor, 1998, The Loma Prieta, California, earthquake of October 17, 1989 — recovery, mitigation, and reconstruction: 90 p. $8.50 plus $3.50 shipping. Professional Paper 1553-D. USGS, Map Distribution, Box 25286, M.S. 306, Federal Center, Denver, CO 80225; (800) 435-7627; fax (303) 202-4693.

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Schiff, A.J., editor, 1998, Proceedings of the workshop on performance criteria for telecommunication services under earthquake conditions: MCEER-98-0008, $15.

Scott, Stanley, interviewer, 1998, Connections: the EERI oral history series — William W. Moore: 145 p. $15 plus $5 shipping. EERI, 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905; fax (510) 451-5411; e-mail eeri@eeri.org.

Sieh, Kerry, and **LeVay, Simon,** 1998, The earth in turmoil — earthquakes, volcanoes, and their impact on humankind: 324 p. $24.95 plus $5.50 shipping. VHPS/W.H. Freeman, 175 Fifth Avenue, New York, NY 10010-7848, (800) 288-2131, fax (800) 818-9907, ww.whfreeman.com

Solomon, Barry J., 1999, Surficial geologic map of the West Cache fault zone and nearby faults, Box Elder and Cache Counties, Utah: UGS Map 172, 20 p., 2 plates. $7.95. Natural Resources Map & Bookstore, (888) UTAH-MAP (882-4627), fax (801) 537-3395.

Yeats, Robert S., 1998, Living with earthquakes in the Pacific Northwest: 304 p. $21.95 plus $3 shipping. University of Arizona Press, 1230 North Park Avenue, Suite 102, Tucson, AZ 85719, (800) 426-3797 or (520) 626-4218, e-mail orders@uapress.arizona.edu.

Youd, T.L., 1998, Screening guide for rapid assessment of liquefaction hazard at highway bridge sites: MCEER-98-0005, $10.

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MEETINGS AND CONFERENCES

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; (98 21) 229 5085, fax (98 21) 229 9479; e-mail *SEE3@DENA.IIEES.AC.IR*

June 13 - 16, 1999, **Eighth Canadian Conference on Earthquake Engineering,** Vancouver, B.C., Canada. Information: Department of Civil Engineering, University of British Columbia, 2324 Main Mall, Vancouver BC V6T 1Z4, fax (604) 833-6901, e-mail *8ccee@civil.ubc.ca*

August 14 - 19, 1999, **Fifth U.S. Conference on Lifeline Earthquake Engineering,** Seattle, Washington. Information: Andrea Dargush, MCEER, (716) 645-3391, ext 106, fax (716) 645-3399, e-mail *dargush@acsu.buffalo.edu.*

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, UT. Information: Julie Keaton, (520) 204-1553; fax (520) 204-5597; e-mail *aegjuliek@aol.com*

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

Department of Natural Resources
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