



Fault Line Forum

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Improved Earthquake Safety for the Wasatch Front

Utah Earthquake Symposium

By: Fault Line Forum Staff

A symposium on Utah's earthquake hazard was held at the University of Utah's Olpin Union Building on March 23. The symposium's theme, "Living on the Fault Line: Earthquake Ground Zero in Utah," was vividly illustrated by the keynote speakers who presented a comparison between damage from a major earthquake in Utah and the terrorist attack that destroyed the World Trade Center.

Dr. Steven Joyce, an emergency physician at the University Hospital and a member the Utah's Urban Search and Rescue, spoke of his experiences at the World Trade Center collapse. He was followed by Mike Stever, Salt Lake City Emergency Manager, who drew from his experience with the Northridge Earthquake, to speak of similarities



Dr. Steven Joyce addressing the participants at Olpin Union Building. Photo courtesy of Janet Roemmel

between quake damage and the World Trade Center.

The keynote lectures were followed by concurrent sessions that included Family Preparedness for the Big Earthquake, Local Government Response to Seismic Disaster, The Quake Hazard in Utah, Buildings and Earthquake Shaking, State and Federal Government Earthquake Response, and Recovering from Seismic Disaster. A Red Cross emergency preparedness course was also offered.



S.L. Emergency Manager Mike Stever speaks to problems encountered in the Northridge earthquake. Photo courtesy of Janet Roemmel

The symposium was sponsored by the Utah Seismic Safety Commission, Utah Geological Survey, Utah Division of Emergency Services and Homeland Security and three departments at the University of Utah: the Department of Geology and Geophysics, the University of Utah Seismograph Stations and the Department of Civil and Environmental Engineering. The Utah Geological Association also contributed to the conference.

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Utah Seismic Safety Commission



The Commission held its quarterly meeting on October 12, 2001 at the State Office Building in Salt Lake City. The Commission's leadership spoke about their goals for their upcoming term. Peter McDonough, Chair, spoke to his desire to build on past successes and revive committees. Barry Welliver, Vice-Chair, would like to complete the work described in the strategic plan with future tasks appearing to be difficult, but potentially more rewarding.

Frank Ashland, Commission staff, gave a budget report showing Commission expenditures on the development and publication of the "2000 Progress Report" to the Legislature, publication costs for newspaper insert, and conference reimbursements. Funding was also allotted for the Research Grant Program and for web site maintenance.

Barry Welliver lead a discussion on the International Building Code lack of provisions for existing buildings as are present in the Uniform Code for Building Conservation. The issue for existing buildings was "what triggers" rehabilitation. Representative Don Bush recommended that a priority list of existing building types be created to establish a hierarchy for review. Walter Arabasz suggested that a white paper be drafted on the existing building questions, and concerns be carried to the appropriate legislative committee.

With regard to current events, Commission leadership lead a discussion of seismicity in western Utah. Topics included active faults in the region, recurrence intervals, and which faults posed the most danger to the built environment. Hazardous facilities and their relative safety were questioned followed by possible solutions for the built environment to these natural and technological hazards.

Significant motions:

- Limit USSC budget contributions to \$1000 for the "Research in Seismic Safety and Awareness" projects. Passed unanimously.
- Create a generic letter to be mailed to non-profit organizations requesting data to be use in HAZUS. Passed unanimously.
- Endorse and sponsor the symposium on seismic hazards and contribute up to \$1000. Passed unanimously.

The Commission held its first 2002 quarterly meeting on January 11 in the State Office Building in Salt Lake City. Peter McDonough, Chair, solicited the Commissioners for agenda items for the upcoming year. Issues that were being considered include survivability of lifelines, hazard analysis of the Salt Lake Valley, implementing the IBC, affects of and lessons learned from the Nisqually earthquake, and UGS 's earthquake scenario. The Commissioners decided that the next meeting would concentrate on lifeline issues.

The Commission presented a plaque to Walter Arabasz for his outstanding leadership as past Chair of the Commission.

Bob Carey, Commission staff, spoke about the 2001 Western States Seismic Policy Council Conference held in Sacramento. The theme of the conference was "Communicating Risk." A joint California-Western States Post-Earthquake Technical Clearinghouse meeting was held at the end of the conference. Two issues that were discussed were meeting the needs of response and recovery agencies and mutual aid agreements between states.

Roy Adams spoke to the commission on his progress with the Earthquake Hazards Conference. He indicated that the conference would be held at the University of Utah on March 23, 2002. Keynote speakers would speak to their experiences at the World Trade Center and Northridge disasters. The Commission is one of the sponsors of this event.

Bob Carey provided the Commission with some of the details of this years Earthquake/Disaster Preparedness Month. The Commission asked him to prepare the proclamation and set the time for the signing with the governors office. The tentative date for the state-wide school earthquake drill is April 3. Bob also updated the Commission of his progress with the acquisition of databases for HAZUS from the different religious organizations in the around the valley.

Ron Ivie, Park City building official, gave a presentation to the Commission on implementing the

Governor Signs Proclamation



On March 14, 2002, Governor Michael Leavitt signed a proclamation declaring April 2002 as “Earthquake and Disaster Preparedness Month”. Prior commitments prevented the governor from being present, however Lt. Governor Olene Walker presented the Commission with the proclamation. Present at the signing (from left to right): Commissioners Ann VonWeller and Dave Nazare, Dave Kreifeldt from the Association of Contingency Planners representing Commissioner Kerry Baum, Vice-Chair Barry Welliver, Commissioner Scott Behunin, Chair Peter McDonough, Lt. Governor Olene Walker, and Commissioners Barry Smith, Rich Allis, Cathy Howick, and Walter Arabasz.

USSC cont.

International Building Code. One area of concern is getting usable maps that will illustrate spectral response. Bob Carey mention that he have been contacted about developing these maps.

Scott Behunin, director of DES, spoke to the states overall preparedness for the Olympics and his agencies readiness for a damaging earthquake. Kris Pankow with the University of Utah Seismograph stations spoke of their preparations for the Olympics and the development of ShakeMap capabilities.

Significant motions: None

The Evolution of a Bill

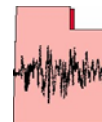
By Bob Carey

In 1983, the Alfred E. Alquist Hospital Seismic Safety Act was passed into law in California. The Alquist Act established seismic safety building standards program for hospitals built on or after March 7, 1973. The Alquist Act was initiated as the result of the loss of life due to the collapse of hospitals during the Sylmar earthquake of 1971. The act emphasizes that essential facilities, such as hospitals, should remain operational after an earthquake. Hospitals built in accordance with the Alquist Act resisted the January 1994 Northridge earthquake while several facilities built prior to the Act experienced major structural damage and had to be evacuated. These newer more resistant facilities, however did not totally escape the effects of the earthquake. Certain nonstructural components of the hospitals did incur damage, even in facilities built in accordance with the structural provisions of the Alquist Act.

With an old problem now on center stage, the California Senate introduced legislation, Senate Bill 1953, in February 1994, just five weeks after the Northridge earthquake. The Bill, signed into law in September 1994, was an amendment to and furtherance of the Alquist Act. The provisions and subsequent regulation language of SB1953 were developed to address the issues of survivability of both nonstructural and structural components of hospital buildings after a seismic event. The regulations developed are deemed to be emergency regulations and became effective upon approval by the California Building Standards Commission and filed with the Secretary of State in March 1998.

Therefore, the public safety benefit of the Alquist Act and SB 1953 is to have general acute care hospitals that not only are capable of remaining intact after a seismic event, but also capable of continued operations and provision of acute care medical services after a seismic event.

The next issue will look at the regulations that were developed as mandated in SB 1953.



University of Utah Quarterly Seismicity Summary

Earthquake Activity in the Utah Region

January 1– March 31, 2001

By Susan J. Nava with significant contributions by
Jeff Fotheringham and Fabia Terra

During the three-month period January 1 through March 31, 2001, the University of Utah Seismograph Stations located 2948 earthquakes within the Utah region (see accompanying epicenter map). The total includes one earthquake in the magnitude 4 range, five earthquakes in the magnitude 3 range, and 80 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 four earthquakes reported felt during the report period. (Note: All times indicated below are local time, which was Mountain Standard Time during the report period. The reporting of a larger than usual number of earthquakes during this three month period is due to special recording of mining related seismicity in east-central Utah with a temporary local array, explained in the text.) Additional information on earthquakes within the Utah region is available from the University of Utah Seismograph Stations.

Earthquakes of Magnitude 3.0 or Larger (or Felt)

ML 3.4 Feb. 10 3:56 a.m. 8 mi SW of Kanosh, UT

ML 2.9 Feb. 12 6:40 p.m. 5 mi WNW of Montpelier, ID
(felt in Montpelier, Bern, and Paris)

ML 2.5 Feb. 22 9:56 p.m. 2 mi NW of Payson, UT (felt
in Payson, Spanish Fork, and Salem)

ML 4.0 Feb. 23 2:43 p.m. 8 mi SW of Kanosh, UT (felt in Richfield, Cove Fort, and Kanab)

ML 3.6 Feb. 24 3:54 a.m. 8 mi SW of Kanosh, UT

ML 3.0 Feb. 24 3:55 a.m. 7 mi SW of Kanosh, UT

ML 3.6 Feb. 27 9:09 p.m. 8 mi SW of Kanosh, UT

MC 2.7 Mar. 6 10:48 p.m. 8 mi N of Colorado City, AZ (felt in Mount Carmel Junction and Springdale)

ML 3.3 Mar. 13 6:43 a.m. 8 mi SW of Kanosh, UT

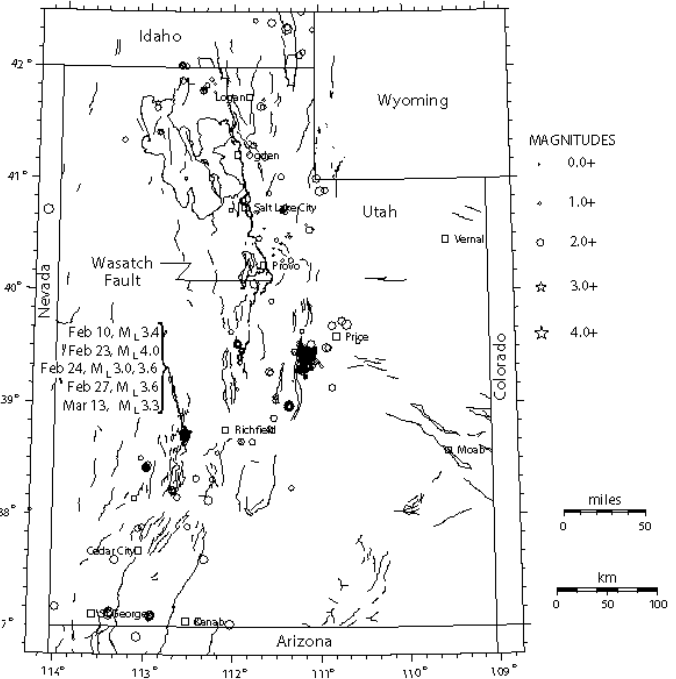
Other Notable Seismicity (see map)

South-Central Utah: The felt earthquake near Richfield, Utah, on February 23 (see table above) and the 5 others above magnitude 3.0 on February 10, 24, 28, and March 13 were part of a cluster of 81 recorded shocks ($0.8 \leq M \leq 4.0$) that occurred between February 10 and March 27 a few miles to the southwest of Kanosh. Similar clusters of small earthquakes (including felt shocks) have episodically occurred in the Sevier Valley area near and to the south-southwest of Richfield since April 1999.

Central Utah: Seismic events that are densely clustered to the southwest of Price and scattered immediately to its north spatially coincide with sites of active underground coal mining in the eastern Wasatch Plateau and Book Cliffs, respectively, and are interpreted to be mining-related. These include a total of 2726 located shocks. During the report period, the University of Utah Seismograph Stations conducted a special project, sponsored by the Utah School and Institutional Trust Lands Administration, to study mining seismicity in the vicinity of Trail Mountain (~30 mi SW of Price). A 12-station portable seismograph array was locally deployed for continuous monitoring. As a result, the number of small mining-related seismic events detected and located in this region increased significantly compared to earlier report periods.

UTAH EARTHQUAKES January 1– March 31, 2001

UTAH EARTHQUAKES
January 1 - March 31, 2001



Earthquake epicenters, located by the University of Utah Seismograph Stations, superposed on a map of Quaternary (geologically young) faults compiled by the Utah Geological Survey. The Wasatch fault is shown in bold. Earthquakes of magnitude 3.0 and larger are specially indicated.

University of Utah Seismograph Stations
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Tele: (801) 581-6274 FAX: (801) 585-5585
email: nava@seis.utah.edu URL: <http://quake.utah.edu>

University of Utah Quarterly Seismicity Summary

Earthquake Activity in the Utah Region April 1— June 30, 2001

During the three-month period April 1 through June 30, 2001, the University of Utah Seismograph Stations located 731 earthquakes within the Utah region (see accompanying epicenter map). The total includes three earthquakes in the magnitude 3 range, and 157 earthquakes in the magnitude 2 range. There were two earthquakes reported felt during the report period. **Earthquakes of Magnitude 3.0 or Larger (or Felt)**

ML 3.5 May 9 4:13 a.m. 8 mi SW of Kanosh, UT

ML 3.2 May 20 4:35 a.m. 12 mi SE of Washington, UT

ML 3.3 May 23 8:40 p.m. 4 mi WSW of Lehi, UT (felt in Lehi, Saratoga Springs, Eagle Mountain, and Cedar Hills)

ML 2.4 Jun. 5 9:56 p.m. 7 mi WNW of Park City, UT (felt in Park City, Salt Lake City, and Brighton)

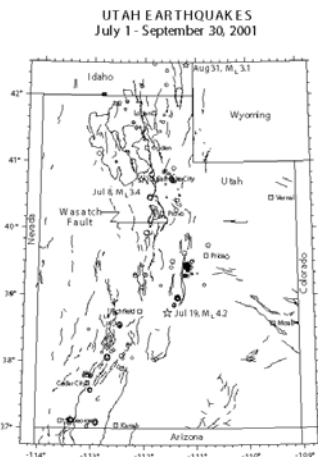
Other Notable Seismicity (see map)

Central Utah: The felt earthquake near Richfield, Utah, on May 9 was part of a cluster of 9 recorded shocks ($0.7 \leq M \leq 3.5$) that occurred intermittently during the report period, 7 miles WNW of Kanosh, UT. Similar clusters of small earthquakes including felt shocks have episodically occurred in the Sevier Valley area near and to the south-southwest of Richfield since April 1999. Seismic events that are densely clustered to the southwest of Price and scattered immediately to its north spatially coincide with sites of active underground coal mining in the eastern Wasatch Plateau and Book Cliffs, respectively, and are interpreted to be mining-related. These include a total of 546 located shocks.

Northwestern Utah: A cluster of earthquakes with epicenters in Utah Valley, 4 mi WSW of Lehi (~50 mi S of Salt Lake City), includes 7 shocks ($1.0 \leq M \leq 3.3$) that occurred between May 24 and May 27. The largest shock was felt on May 23 and was a magnitude (ML) 3.3. A ShakeMap is available for this earthquake at <<http://quake.utah.edu/shake>>.

Northern Utah: From June 12 through 30, a cluster of 33 earthquakes occurred about 5 mi E of Heber City (~30 mi SE of Salt Lake City). Seismicity is common in this locality, which coincides with the epicentral area of a magnitude (ML) 4.3 earthquake in October 1972.

Earthquake Activity in the Utah Region July 1— September 30, 2001



During the three-month period July 1 through September 30, 2001, the University of Utah Seismograph Stations located 385 earthquakes within the Utah region (see accompanying epicenter map). The total includes one earthquake in the magnitude 4 range, two earthquakes in the magnitude 3 range, and 97 earthquakes in the magnitude 2 range.

Earthquakes of Magnitude 3.0 or Larger (or Felt)

ML 3.4 Jul. 8 7:55 a.m. 3 mi NNE of Magna, UT (felt in Magna, Kearns, West Jordan, West Valley City, Hunter, Salt Lake City, and Rose Park);

ML 4.2 Jul. 19 2:15 p.m. 21 mi SW of Emery, UT (felt at 1-70 mile post 82: East of Richfield and in Torrey)

ML 3.1 Aug. 31 6:14 a.m. 11 mi E of Georgetown, ID

Other Notable Seismicity (see map)

Seismic events that are densely clustered to the southwest of Price and scattered immediately to its north spatially coincide with sites of active underground coal mining in the eastern Wasatch Plateau and Book Cliffs, respectively, and are interpreted to be mining-related. These include a total of 261 located shocks.

Northern Utah: A cluster of earthquakes occurred about 7 mi NNE of Park City (~30 mi E of Salt Lake City). These 7 shocks ($0.7 \leq M \leq 2.0$) occurred intermittently during the period.

WSSPC Passes Four Policy Recommendations

The Western States Seismic Policy Council passed several recommendations during its Annual Business Meeting held in Sacramento, California. Policy Recommendations 01-1 and 01-2 promotes the development of a complete tsunami evacuation and notification systems and to evaluate and promote new technology that rapidly identifies tsunami potential.

Policy Recommendation 01-3 encourages the establishment of a plan for a post-earthquake technical clearinghouse. Policy Recommendation 01-4 endorses prompt adoption and enforcement of the seismic provision in the International Building Code 2000 and the International Residential Code. For a more detailed look at these policy recommendations, please visit the WSSPC web site, www.wsspc.org.



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Fault Line Forum

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Calendar of Events



JUNE

21-22
DMORT Region VIII
Denver, CO
Info: [email: grefsland@attglobal.net](mailto:grefsland@attglobal.net)

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Determining and Mitigating your risk after 9-11:
Disaster preparedness and you.
Utah State Archives, SLC, UT
Info: [email: pscott@utah.gov](mailto:pscott@utah.gov)

JULY

21-25
Seventh U.S. National Conference on
Earthquake Engineering
Boston, MA
Info: www.eeri.org

SEPTEMBER

2-5
Eurodyn 2002, Munich, Germany.
Info: www.eurodyn2002.de

8-11
Dam Safety 2002, Tampa, FL.
Info: www.damsafety.org

15-18
WSSPC Annual Conference 2002
Denver, Co
Info: www.wsspc.org

23-29
Association of Engineering Geologists Annual
Meeting
Reno, NV
Info: www.aeqweb.org

