Improved Earthquake Safety for the Wasatch Front

Volume 21, Number 1-2005

Fault Line Forum

USSC

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Calendar of Events

APRIL 2005

22
USSC Quarterly Meeting
Salt Lake City, Utah

MAY 2005

20
Emergency Services Quarterly Leadership Workshop
Ogden, Utah

SEPTEMBER 2005

11-14
WSSPC Annual Conference
Boise, Idaho

Utah Earthquake Working Groups Meet to Develop 2006 research Priorities

BY Gary E. Christenson, Utah Geological Survey

The Utah Geological Survey (UGS), Utah Seismic Safety Commission, and U.S. Geological Survey (USGS) again convened Utah's earthquake working groups on March 2-4, 2005, to discuss 2004 research results and upcoming 2005 projects, and set priorities for 2006 research. These were the third annual meetings of these working groups which first met in 2003. The Ground Shaking, Quaternary Fault Parameters, and Liquefaction Working Groups each met for a day; the Earthquake-Induced Landslide Working Group did not meet this year. The long-term goals of the three working groups that met, respectively, are to:

- Develop large-scale ground-shaking maps for the Wasatch Front incorporating improved characterization of shallow site effects and deep basin effects on ground motions.
- Characterize recurrence intervals and slip rates for Quaternary faults in Utah.
- Develop maps depicting liquefaction hazards and likely lateral spread displacements for the Wasatch Front.

At the March 2005 meetings each working group set specific priorities for research in 2006 to achieve these goals. The priorities of the Ground Shaking Working Group are to:

- Collect data to better characterize the deep shear-wave-velocity structure (greater than 150 m) along the Wasatch Front.
- Finalize development and testing of the Wasatch Front "community velocity model" that can be used to estimate site shear-wave-velocity profiles.
- Continue laboratory soil testing of dynamic soil properties of Lake Bonneville clays when subjected to ground shaking.

The Quaternary Fault Parameters Working Group completed their 2004 final report establishing their consensus on recurrence intervals and slip rates for trenched faults in Utah. At their meeting this year they set specific priorities for detailed paleoseismic fault studies in 2006. The list includes, in order of priority, the:

- West Valley fault zone (Salt Lake County)
- Weber segment of the Wasatch fault zone (Weber and Davis Counties)
- Faults and folds beneath Utah Lake (Utah County)
- Washington fault (St. George area)
- The Richmond and Paradise sections of the east Cache fault zone (Cache Valley)

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Utah Earthquake Working Groups Meet to Develop 2006 research Priorities Continued

The working group also discussed developing a multi-segment rupture model for the Wasatch fault, and began initial planning to convene a Basin and Range Earthquake Working Group to consider fault behavior issues common to faults in the Basin and Range Province.

The Liquefaction Working Group plans to apply GIS methods developed in their pilot project begun in 2003 in northern Salt Lake County to southern Salt Lake County and elsewhere along the Wasatch Front. Their priorities are to:

- Produce a probabilistic liquefaction hazard map for southern Salt Lake County.
- Complete a probabilistic lateral spread hazard map for northern Salt Lake County.

They also plan to continue gathering subsurface data, develop correlations between cone penetrometer (CPT) and standard penetration resistance (SPT) data to allow lateral spread analysis using SPT data, and investigate mapped prehistoric ground displacements in Salt Lake County using CPT methods.

The earthquake working group meetings are organized by the UGS and cooperatively funded by the UGS and USGS under the National Earthquake Hazards Reduction Program. Working group leaders are Ivan Wong, URS Corporation/University of Utah (Ground Shaking Working Group); Bill Lund, UGS (Quaternary Fault Parameters Working Group), and Steven Bartlett, University of Utah (Liquefaction Working Group). The working groups now play a primary role in setting priorities and coordinating earthquake research in Utah.

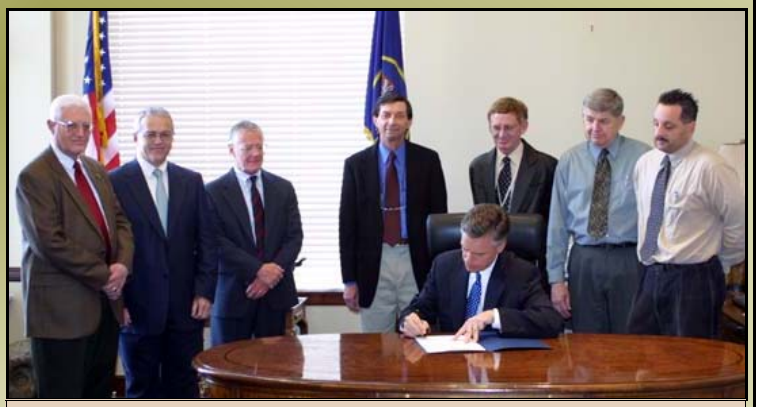
Governor Signs Proclamation

By Bob Carey, Division of Emergency Services

Governor Jon Huntsman proclaimed the week of April 3 to 9, 2005 as Earthquake Preparedness Week in a signing ceremony on March 24. In a departure from most signings, the new Governor engaged the Commission members asking about their mission. At one point, the Governor questioned how significant was the earthquake threat. Walter Arabasz responded by asking the Governor if the Utah economy could take a $20 billion hit.

The State Office of Education continued its support of Earthquake Preparedness Week activities by holding a statewide school earthquake drill. Dr. Patti Harrington, State Superintendent encouraged all district superintendents to have their schools conduct an earthquake drill on April 6th. Many new private and charter schools requested preparedness information prior to the drill.

Other activities that occurred during the week were an earthquake exercise conducted by Utah National Guard, non-structural hazard inspections of schools, a CERT exercise conducted by the Citizen Corps in Moab, media presentation in Cedar City, and presentations to LDS Hospital and Draper-Riverton Rotary.



Governor Jon Huntsman signs proclamation with Kerry Baum, Barry Welliver, Walter Arabasz, Mathias Mueller, Rick Allis, Barry Smith and Matt Cassel.

Utah Seismic Safety Commission Meeting Notes

JNAUARY 14, 2005 BY AMISHA LESTER

The Utah Seismic Safety Commission (USSC) held its January meeting at the East State Office Building in Salt Lake City, Utah.

Barry Welliver lead the Commission in an open discussion on the USSC progress report. After a brief discussion each Commissioner was tasked to write their perspective on the future direction of the Commission, keeping it simple and precise. A web-based document or brochure was given as an option for the report. Another option is to hire a student or an intern to help draft the report. The Commission has set aside $2500 for the preparation of the 2000-2004 Progress Report.

Barry Welliver held a discussion about the URM's within the State and gave a handout to the Commissioners regarding this issue. The goal is to retrofit or remove URM's and reduce liabilities in a timely manner. USSC needs to spearhead the efforts to introduce a policy statement and potential legislation to create a productive dialogue between stakeholders. An ad-hoc committee was then created and charged with developing a resolution and to write a paper on the URM building situation in the state of Utah. A strategy and resolution will be discussed at the next meeting.

Other Commission notes...Bob Carey and Barry Welliver, spoke on the Nevada Earthquake Safety Council Meeting they attended on November 17, 2004. This was a daylong meeting, much like ours, and is actively supported by the Nevada Bureau of Mines. Among the many topics that were discussed included; the Duck, Cover and Hold issue; earthquake prediction; and the URM's within both Nevada and Utah. Several technical presentations were given during the afternoon portion of the meeting. Both Utah and Nevada have many common interests and vowed to continue communion between the Commissions.

The funding for the Marriott Library will be an issue for the 2005 Legislative session. The library is ranked #2 on the State Building Board priority list. The Commission discussed taking a tour of the State Capitol Building and the funding for the Marriott Library that will be decided during the 2005 Legislative session.

Bob Carey gave an update on the student research grant program. The group out of Summit County will be going to Yellowstone for the third time and Bryant Middle School proposed a seismic project looking at homes. A $1000 request has been made for each.

The Duck, Cover and Hold issues have been a hot topic for the Commission. A news article was placed in the Salt Lake Tribune regarding this issue. Ed Yeates did a news story on KSL TV. A letter has been sent from USSC to the State Superintendent of Schools and has been distributed to all the teachers of the state.

Michael T. Morley will be the new House of Representatives member to replace Don Bush. He is from Spanish Fork on his second term.

The Pre-Disaster Mitigation Program (PDM) program is a federal mitigation program that replaces Project Impact. Most Utah projects have been earthquake related. 10-15 projects have been submitted and each project could be funded to the maximum of 2.9 million. These projects should be submitted by the next USSC meeting and Bob could have a list of how each project was ranked.

The next Seismic Safety Commission Meeting will be held on April 22, 2005, in 5110 State Office Building, Salt Lake City, Utah.

UNIVERSITY OF UTAH QUARTERLY SEISMICITY SUMMARY

EARTHQUAKE ACTIVITY IN THE UTAH REGION
July 1 – September 30, 2004

by R. Burlacu, P. M. Roberson, and M. Howell
with contributions by
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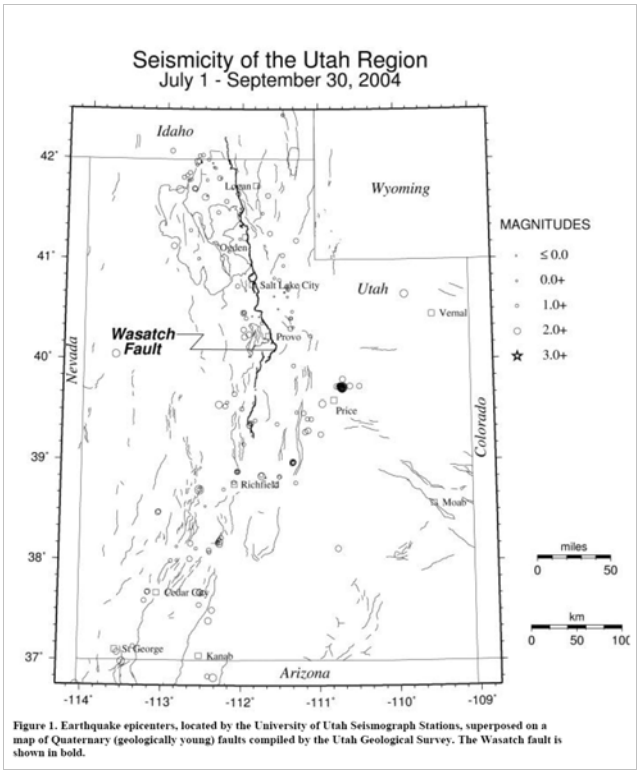

Figure 1. Earthquake epicenters, located by the University of Utah Seismograph Stations, superposed on a map of Quaternary (geologically young) faults compiled by the Utah Geological Survey. The Wasatch fault is shown in bold.

During the three-month period July 1 through September 30, 2004, the University of Utah Seismograph Stations (UUSS) located 189 earthquakes within the Utah region (Figure 1). The total includes 17 earthquakes in the magnitude 2 range and none larger than magnitude 2.7. No earthquakes in the study area were reported felt during the report period. Additional information on earthquakes within the Utah region is available from the University of Utah Seismograph Stations.

Online Information

A complete copy of this report, including maps and the earthquake catalog, is available on the UUSS Web site at *http://www.seis.utah.edu/catalog/quarterly.shtml*. ShakeMaps—computer maps of the ground shaking produced by an earthquake—are automatically produced by UUSS for earthquakes of magnitude 3 and larger within the Wasatch Front urban area. The ShakeMaps are accessible on the UUSS Web page at *http://www.seis.utah.edu/shake*. Earthquakes during 2004 for which ShakeMaps are available are indicated in Table 1. For earthquakes of magnitude 3 and larger in the Utah region, the U. S. Geological Survey automatically posts a Community Internet Intensity Map (CIIM) on its "Did You Feel It?" Web page at *http://pasadena.wr.usgs.gov/shake/imw*. We urge anyone who feels an earthquake to report their observations on this interactive Web site; felt information is available by zip code on the CIIM site or can be obtained from UUSS directly.

Seismicity

During the report period, small-magnitude earthquakes (M<3) were broadly scattered throughout Utah's main seismic belt without any notable shocks (Figure 1). The largest earthquake had a magnitude (ML) 2.7 and occurred on August 4, 9 miles SSW of Kanosh, UT (about 25 mi WSW of Richfield). The locally clustered seismic events within a radius of approximately 30 miles of Price, together with a localized cluster about 50 miles to its southwest, are associated with known areas of underground coal mining and are interpreted to be mining-related. These include a total of 55 located shocks (1.0 £ M £ 2.5) that occurred throughout the report period.

UNIVERSITY OF UTAH QUARTERLY SEISMICITY SUMMARY

EARTHQUAKE ACTIVITY IN THE UTAH REGION
October 1 – December 31, 2004

by R. Burlacu, P. M. Roberson, and M. Howell
with contributions by
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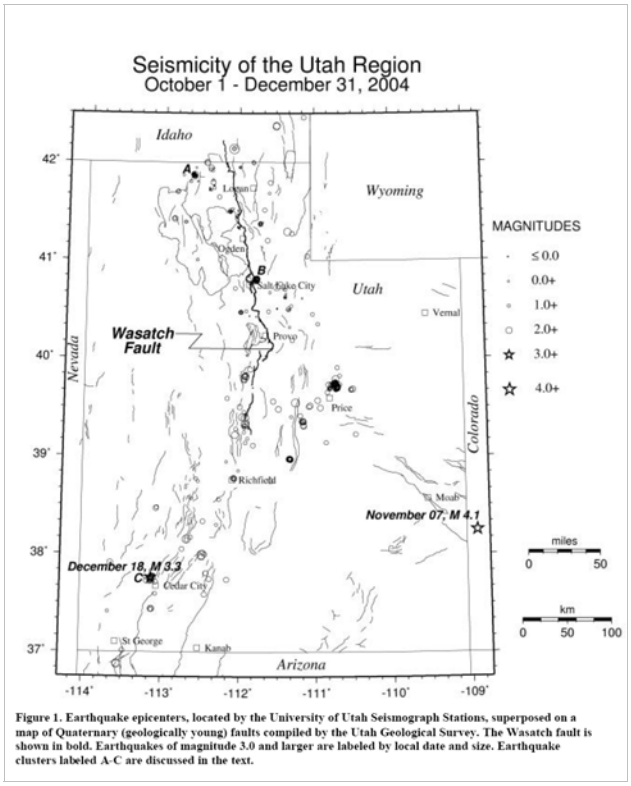

Figure 1. Earthquake epicenters, located by the University of Utah Seismograph Stations, superposed on a map of Quaternary (geologically young) faults compiled by the Utah Geological Survey. The Wasatch fault is shown in bold. Earthquakes of magnitude 3.0 and larger are labeled by local date and size. Earthquake clusters labeled A-C are discussed in the text.

During the three-month period October 1 through December 31, 2004, the University of Utah Seismograph Stations (UUSS) located 339 earthquakes within the Utah region (Figure 1). The total includes one earthquake in the magnitude 4 range, one earthquake in the magnitude 3 range, and 30 earthquakes in the magnitude 2 range. Earthquakes of magnitude 3.0 or larger (plotted as stars and specifically labeled on Figure 1) are listed below. Five earthquakes were reported felt during the report period (see Table 1, a cumulative tabulation of felt earthquakes in the Utah Region during 2004).Additional information on earthquakes within the Utah region is available from the University of Utah Seismograph Stations.

Online Information

A complete copy of this report, including maps and the earthquake catalog, is available on the UUSS Web site at *http://www.seis.utah.edu/c atalog/quarterly.shtml*. ShakeMaps—computer maps of the ground shaking produced by an earthquake—are automatically produced by UUSS for earthquakes of magnitude 3 and larger within the Wasatch Front urban area. The ShakeMaps are accessible on the UUSS Web page at *http://www.seis.utah.edu/shake*. Earthquakes during
2004 for which ShakeMaps are available are indicated in Table 1. For earthquakes of magnitude 3 and larger in the Utah region, the U. S. Geological Survey automatically posts a Community Internet Intensity Map (CIIM) on its "Did You Feel It?" Web page at *http://pasadena.wr.usgs.gov/shake/imw*. We urge anyone who feels an earthquake to report their
observations on this interactive Web site; felt information is available by zip code on the CIIM site or can be obtained from UUSS directly.

Earthquakes of Magnitude 3.0 or Larger

ML 4.1 November 06 23:54 MST 19 mi W of Naturita, CO (felt; see Table 1)
ML 3.3 December 18 10:38 MST 7 mi NW of Cedar City, UT (felt; see Table 1)

Other Notable Seismicity

During the report period, there were three notable spatial clusters of earthquake activity (labeled A–C in Figure 1). For reporting purposes, we define a cluster as ten or more earthquakes occurring within

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University of Utah Quarterly Seismicity Summary Continued

a 10-km (6-mile) radius during the report period. Referring to the epicenter map (Figure 1), these include the following—from north to south (all dates below are UTC unless otherwise noted): A. A cluster of 27 earthquakes (0.5 £ M £ 2.1) occurred about twenty five miles W of Garland, UT (~42 miles WNW of Logan). Fourteen events, including the magnitude 2.1 event, occurred between November 10 and 12. B. Twenty-six earthquakes (0.2 £ M £ 2.2) clustered about six miles NE of Salt Lake City. Twenty four events, including the magnitude 2.2 event, occurred between November 11 and 12. C. Nineteen earthquakes (1.3 £ M £ 3.3) occurred about five miles NW of Cedar City, UT. Nine events, including the magnitude 3.3 event, occurred on November 18. In Figure 1, the locally clustered seismic events within a radius of approximately 30 miles of Price, together with a localized cluster about 50 miles to its southwest, are associated with known areas of underground coal mining and are interpreted to be mining-related. These include a total of 111 located shocks (-0.1 £ M £ 2.5) that occurred throughout the report period.