RESULTS OF THE FEBRUARY 15, 2006
UTAH QUATERNARY FAULT PARAMETERS WORKING GROUP MEETING

Bill Lund, facilitator

WELCOME AND INTRODUCTION

Bill Lund (Utah Geological Survey [UGS]) called the 2006 Utah Quaternary Fault Parameters Working Group (UQFPWG) Annual Meeting to order at 8:15 a.m. Following a welcome to Working Group members and guests in attendance (see attached list), Bill summarized the Working Group's activities to the present, and outlined the purpose and goals of the Working Group for the future.

Purpose

UQFPWG is one of four standing committees created to help set and coordinate the earthquake-hazard research agenda for the State of Utah

Goals

Review ongoing paleoseismic research in Utah

Provide advice/insight regarding technical issues related to fault behavior in Utah and the Basin and Range Province in general

Identify/prioritize future Utah Quaternary fault studies – NEHRP-funded or otherwise

TECHNICAL PRESENTATIONS

The remainder of the morning was devoted to summary presentations on current paleoseismic research/activities in Utah. Presentations included:

1. Provo segment megatrench update by Susan Olig, URS Corp.
2. Collinston and Clarkston Mountain segments paleoseismic reconnaissance by Mike Hylland, UGS
3. Nephi segment trenching by Chris DuRoss, UGS
4. Northern Weber segment paleoseismic study by Alan Nelson, USGS
5. Corner Canyon fault trenching by Jamie Robinson, PSI
6. Seismic-hazard research summaries by Robert Smith and Wu-Lung Chang, University of Utah
7. Basin and Range Province Earthquake Working Group update by William Lund, UGS

TECHNICAL DISCUSSION ITEMS

The Working Group considered three technical discussion items:

1. Updating the Utah Quaternary Fault Parameters Working Group consensus database by William Lund, UGS
2. Wasatch Fault multi-segment rupture model by Chris DuRoss, UGS
3. Should additional Utah faults be included in the National Seismic Hazard Maps?

Updating the Utah Quaternary Fault Parameters Working Group consensus database

Principal questions remaining regarding updating of the UQFPWG consensus earthquake-timing, slip-rate, and recurrence-interval database include (a) determining at what point new paleoseismic trenching results are considered sufficiently complete to be incorporated into the database, and (b) how often the database should be updated. For purposes of the National Seismic Hazard Maps (NSHMs), the U.S. Geological Survey (USGS) prefers that only data published after a peer-review process be incorporated into their hazard-map database. Others on the Working Group noted that a formal publication process can take considerable time (up to years) after data are finalized. Waiting that long to incorporate new, well-vetted data into the database could result in "best available" information not being accessible to those in industry and academia who require the most recent research results. Robert Smith (University of Utah [UU]) stated that the issue of categorizing the quality/confidence limits of various kinds of data has become an important issue in the California earthquake-hazard community, and offered to provide links to documents/web pages describing how they have addressed this problem. The Working Group members agreed that some form of peer-review process, ranging from an informal internal review for open-filed reports to a formal internal and external review, take place prior to review by the UQFPWG and incorporation of new paleoseismic-trenching results into the database. The Working Group also recommended that at a minimum, formal updates to the UQFPWG database be cycled with updates to the NSHMs.

The Working Group repeated their 2005 recommendation that the UQFPWG database be placed on the UGS web site. Because the UQFPWG consensus slip-rate and recurrence-interval data are used to update the Utah Quaternary Fault and Fold Database and Map of Utah, the UGS will look into the possibility of updating them simultaneously.

The Working Group suggested that once the UQFPWG database is placed on the web, it should include a link to "preliminary" research results. Such data would not yet be ready for inclusion into the UQFPWG database, but the link would provide users with access to the most recent paleoseismic trenching information. The link should include a disclaimer that the data are preliminary and may be subject to change. Authors are encouraged to submit preliminary results to UGS for posting here.

Wasatch Fault Zone Multi-Segment-Rupture Model

Chris DuRoss (UGS) presented his most recent, draft multi-segment-rupture (MSR) model for the central segments of the Wasatch fault zone (WFZ). The model includes a composite figure illustrating various aspects of fault zone complexity, surface-faulting slip distribution, and surface-faulting timing. To construct the model, Chris updated and revised the WFZ paleoearthquake space-time diagram, formulated criteria to quantify the potential for MSRs

along the WFZ and to quantify confidence in the paleoseismic data, generated multiple MSR models for the WFZ, and weighted the models to evaluate MSR probability.

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Following presentation of the model, the Working Group recommended that Chris expand the model to incorporate the methodology of Weldon and others (2005) to (a) use existing WFZ displacement-per-earthquake data to compute estimated rupture lengths to determine if the displacement data support surface ruptures long enough to have included multiple fault segments, and (b) moment balance his model. Some Working Group members recommended that the model include earthquakes that "spill-over" onto adjacent segments; however, other members stated that in general, minor spill-over ruptures do not contribute to major earthquake moment release. Robert Smith recommended that the model focus on moment-balanced earthquakes rather than one- or two-segment ruptures.

Mark Petersen (USGS) stated that for the next NSHMs update, he requires a simplified time-independent MSR model for the WFZ. Examples of potential models discussed by Working Group members include infrequent two-segment ruptures defined using geological information (e.g., earthquake timing and displacement), and a floating, two-segment earthquake. Some Working Group members proposed that the recommendation of a preferred time-independent MSR model for the NSHMs be made after the Basin and Range Province Earthquake Working Group meeting which will be held on March 8-10, 2006, in Salt Lake City.

Should additional Utah faults be included in the National Seismic Hazard Maps?

Ivan Wong (URS Corp.) noted that the Salt Lake County Seismic Hazard Maps prepared by URS Corporation and UGS incorporated a number of Quaternary faults as potential seismic sources that are not included on the NSHMs for Utah. Mark Peterson stated that the upcoming urban seismic hazard maps and the NSHMs should use the same set of faults, and indicated that the UGS should make a recommendation to the USGS regarding which, if any, additional faults should be added to the NSHMs. A discussion ensued among the Working Group members regarding what criteria should be used to select additional faults. The UGS took the issue under advisement and will look at faults with known slip rates and latest Quaternary surface faulting and make a future recommendation to the Working Group and the USGS.

PALEOSEISMIC RESEARCH PRIORITIES FOR 2007

The Working Group reviewed their research priorities for 2006 regarding faults requiring additional paleoseismic study in Utah. Since no work has been accomplished on any of the faults over the past year, the Working Group reiterated the same priorities for 2007.

1. West Valley fault zone
2. Weber segment – most recent event
3. Weber segment – multi-event trench
4. Faults beneath Utah Lake
5. East Cache fault zone

Ivan Wong stated his preference to give priority to the Weber segment studies, particularly to the multi-event trenching study, over investigation of the West Valley fault zone. Other suggestions for future work coming from earlier discussions included (1) looking for the new ~1,600-yr Provo segment penultimate earthquake at the American Fork, Hobble Creek, or other suitable site, (2) looking for trench sites between the Kaysville and South Fork Dry Creek sites on the Weber-Salt Lake City segments, (3) performing a reconnaissance of lesser known Utah faults outside the Wasatch Front that may be important to the NSHMs, (4) making a comprehensive review of new geologic literature, and if necessary conducting aerial photograph analysis and field reconnaissance studies, to ensure that all major Utah Quaternary faults have been identified, and (5) excavating another trench on the Brigham City segment to confirm the timing of the most recent surface faulting.

Jim Pechmann (UU Seismograph Stations [UUSS]) indicated that the University of Utah would likely submit a 2007 National Earthquake Hazards Reduction Program (NEHRP) proposal to begin investigating the faults beneath Utah Lake. The UGS likewise plans to submit a 2007 NEHRP proposal to better define the MRE and long-term chronology of surface faulting on the Weber segment of the WFZ. No other proposals for 2007 NEHRP funding were identified by the Working Group.

The Utah Quaternary Fault Parameters Working Group Meeting was adjourned at 4:30 p.m.

MEETING ATTENDEES

Quaternary Fault Parameters Working Group

Larry Anderson, U.S. Bureau of Reclamation (representing Dean Ostenna)
Chris DuRoss, UGS
Kathleen Haller, USGS
Michael Hylland, UGS
William Lund, UGS
Alan Nelson, USGS
Susan Olig, URS Corporation
James Pechmann, UUSS
Mark Petersen, USGS
Jamie Robinson, PSI (representing Jim McCalpin)
Robert Smith, UU
Ivan Wong, URS Corporation

Guests

Rick Allis, UGS
Bob Carey, Utah Office of Emergency Services
Wu-Lung Chang, UU
Gary Christenson, UGS
Danny Horns, Utah Valley State College

David Marble, DNR Dam Safety
Greg McDonald, UGS
David Simon, SBI-Simon-Bymaster, Inc.