

**RESULTS OF THE MARCH 2, 2005  
UTAH GROUND SHAKING WORKING GROUP MEETING**

Ivan Wong, Facilitator  
Gary Christenson, UGS liaison and recorder

Members present:

Kim Olsen  
Harold Magistrale  
Jim Pechmann  
Walter Arabasz  
Jim Bay  
Ken Stokoe  
Francis Ashland  
Wulung Chang  
Mark Petersen  
Steve Bartlett

Guests:

Greg McDonald  
Bill Lund  
Ron Bruhn  
Relu Berlacu  
Joergen Pilz  
Todd Bischoff  
Tim Carroll  
Intuorn Sasanakul  
Bob Carey

**ACTION ITEMS**

Ken Stokoe – Talk to NEESR Program Manager to determine the potential for NEESR funding of proposed Utah activities.

UGS (Francis Ashland, Greg McDonald, Gary Christenson)

- Assess depths to 760, 1000, and 1500 m/sec Vs using new USU SASW, USGS shear-wave imaging, and other existing data to test the accuracy of Arnow, Radkins, and Fox models and to help determine where we need deep Vs data.
- Help Jim Bay find rock sites for 2005 SASW profiles.
- Assist Stokoe in identifying potential sites for deep Vs.

Todd Bischoff – Contact Hill AFB to see if they have CPT or Vs data.

**PRIORITIES FOR 2006 STUDIES**

Jim Bay – Continue/expand laboratory dynamic soil testing.

Ken Stokoe – Perform deep SASW surveys (100-300 m), probably mostly in Salt Lake Valley, and coordinate with USGS (Bill Stephenson) so they can piggyback geophysical studies using Stokoe source if desired.

Harold Magistrale, Kim Olsen, Jim Pechmann – Complete development and testing of community velocity model for Wasatch Front.

## MEETING SUMMARY

### PRESENTATIONS AND SPEAKERS:

- 1) Update on Salt Lake Valley Site-Conditions Map and Wasatch Front Mapping; Francis Ashland, UGS
- 2) Preliminary S-wave Velocities to 100+ m in the Salt Lake and Utah Valleys, from S-Wave Minivibe Soundings; Mark Petersen, USGS
- 3) Determination of Low-Strain Site Amplification Factors in the Salt Lake Valley, Utah, using ANSS Data; James Pechmann, UUSS
- 4) Dynamic Properties of Bonneville Clay; James Bay, USU
- 5) SHAKEMAP in Utah, Status and New Developments; Relu Berlacu, UUSS
- 6) Effects of Shallow, Steep Shear-Wave-Velocity Contrasts on Earthquake Ground Motions; Tim Carroll, USU
- 7) Analysis/Collection of CPT Data; Todd Bischoff, USU
- 8) Utah Quaternary Fault Parameters Working Group Results; Bill Lund, UGS
- 9) Wasatch Front Community Velocity model; Harold Magistrale, SDSU
- 10) 2005 SASW Studies in Weber, Davis, and Utah Counties; James Bay, USU
- 11) Analysis of Earthquake Source, Path, and Site Parameters from ANSS Data, and PEER Next Generation of Attenuation Project; Ivan Wong, URS Corp. and UUGG
- 12) Collaborative Research: UNR, Utah, UNLV, USC: Developing Community Fault and Velocity Models for the Great Basin; Ron Bruhn, UUGG

### DISCUSSION ITEMS:

#### Amount of new shear-wave-velocity data needed for CVM

- Shallow Vs30 – We'll know if and how much more data are needed in Davis, Weber, and Utah Counties once Jim Bay completes his work this summer. Also, once we can run the data through the 1<sup>st</sup> version of the CVM, we'll see better where more data are needed. We anticipate probably one more round of data collection, perhaps in 2007.
- Deep Vs – The only intermediate/deep data we have are those recently collected by Bill Stephenson, USGS. To determine where data are needed most, we should contour existing data to see where deep, low velocity layers may exist. Evaluation of existing data indicates high velocities at shallow depths in many areas. Ultimately, we can use the CVM to help determine where more data are needed.
- At some point, we need to compare downhole, SASW, and CPT data at a few sites.

#### Adequacy of Arnow/Radkins maps

- Compare existing Vs data to Arnow/Radkins maps using 760, 1000, and 1500 m/sec depths. R1 and R2 are contacts between unconsolidated and semi-consolidated rock, and semi-consolidated and consolidated rock, respectively, and are not necessarily iso-velocity surfaces.

#### Need for NEHRP site-class map

- The CVM can use existing UGS site-conditions units with assigned mean shear-wave velocities, so we don't need to generate an IBC site-class map

#### Additional dynamic material properties testing

- We should continue testing in the laboratory. We may want to work with consultants and encourage collection of samples, and perhaps offer incentives through inclusion of consultants as co-PIs in NEHRP projects, or somehow subsidize sampling.
- We should test some of the deeper clays from pre-Bonneville lake cycles.

#### 3D modeling using CVM/ use of ANSS data

- CVM development is just getting underway; team will submit proposal for second year of funding for CVM project.
- No additional projects using ANSS data were discussed.

#### Edge effects/directivity/attenuation.

- Modeling of the pinching out of units along basin margins is important to ground motions; cross-valley Vs profiles would help visualize conditions.
- Regarding attenuation, the PEER Next Generation of Attenuation Project should yield new, up-to-date attenuation relations. Paul Somerville has a NEHRP grant to develop B&R attenuation relations.

#### Additional USGS Wasatch Front studies

- USGS has not planned internal studies for 2006 yet, but may consider additional geophysical work piggybacked using Stokoe's source if it is brought to Utah, or other work.

#### Needs to begin preparing Wasatch Front regional ground-shaking maps

- Preparation of maps is probably still 2-3 years away, given the time needed to develop and refine the CVM and USGS's other commitments in updating the NSHMs in 2007.

#### Other possible funding sources

- NEESR – NEESR may assist in a NEHRP grant to cover use of their equipment if a case is made that the work can only be done with the NEES shakers. Also, we should consider proposing a multi-year project to NEESR program for 1) intermediate and deep shear-wave-velocity profiles, 2) in-situ non-linear dynamic soil testing using NEES shakers, 3) liquefaction studies, and 4) CVM model testing. Proposals are due in March, so we're too late this year. Next year we may want to propose at the "Small Group" funding level of \$400,000 over 4 years.
- UDOT – The UTRAC program is extremely competitive (about 10% of projects funded), so it is not a likely source. Some funding may be available through specific UDOT projects rather than through UTRAC.
- FEMA – The FEMA Pre-Disaster Mitigation Program doesn't fund studies, except possibly through cooperative projects with Utah DES. Perhaps an unsolicited proposal to Doug Bausch, FEMA Regional VIII, would be considered.