



## 2016 UTAH EARTHQUAKE WORKING GROUP MEETINGS UTAH GROUND SHAKING WORKING GROUP SUMMARY

Tuesday, February 9, 2016

Utah Department of Natural Resources Building, Room 2000 (2nd floor)  
1594 West North Temple, Salt Lake City, Utah

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### WELCOME AND INTRODUCTION

The meeting began at 8:15 am with introductions. Ivan Wong gave a brief overview and summary of objectives for the Utah Ground Shaking Working Group (UGSWG). Mark Petersen gave a brief history of the UGSWG and summarized its accomplishments and objectives:

- The UGSWG was formed to assess and collect the necessary information to produce urban seismic-hazard maps (USHMs) for the Wasatch Front region. The U.S. Geological Survey (USGS) will likely release Wasatch Front (Salt Lake area) USHMs in the next year or two.
- The UGSWG needs to determine what is needed at this point to produce USHMs and what components from the different models should be incorporated into the maps.
- Once USHMs are produced, they should be updated and expanded as new data become available.
- How the maps are to be presented to, and vetted by, users is important (such as via hard-copy maps, web-based, interactive capability, and location coordinate input/output).

### TECHNICAL PRESENTATIONS

The following presentations were made on current ground shaking research and related activities in Utah, and are available at: ([http://geology.utah.gov/ghp/workgroups/pdf/ugswg/UGSWG-2016\\_Presentations.pdf](http://geology.utah.gov/ghp/workgroups/pdf/ugswg/UGSWG-2016_Presentations.pdf)).

- Active Faulting, Soil and Rock Type, and Groundwater Elevations beneath Salt Lake City –  $V_p$ ,  $V_s$ , and Reflection Images from a Seismic Land Streamer System: Lee Liberty, Boise State University
- Numerical Simulations of Wasatch Fault Earthquakes: Daniel Roten, San Diego State University (SDSU)
- Earthquake Ground Motion Modeling with Kinematic Source Models: Morgan Moschetti, USGS
- How ShakeMaps are produced for Utah/Wasatch Front: Kris Pankow, University of Utah Seismograph Stations
- Ground Motion Issues in Site-Specific Probabilistic Seismic Hazard Analyses for the Central Wasatch Front Region: Ivan Wong, AECOM

## **TECHNICAL DISCUSSION ITEMS**

### **USGS Wasatch Front USHM Discussion: Mark Petersen/Ivan Wong**

The USGS recently released updated National Seismic Hazard Maps (NSHM) and would like to revive interest in the more detailed, community-specific USHMs. Past research for Wasatch Front USHM has focused on the Salt Lake basin and thus, the initial USHM for the Wasatch Front region will focus on a Salt Lake segment of the Wasatch fault zone source model and ultimately expand north and south along the Wasatch Front corridor. To facilitate production of USHMs and promote interest in updating and expanding the maps, Ivan Wong proposed generating a UGSWG priorities list, similar to that done by the Utah Quaternary Fault Parameters Working Group, emphasizing short and long-term work needed to support Wasatch Front USHMs.

The USGS plans to release the Wasatch Front/Salt Lake basin USHM in the next one to two years. Allowing the user community to vet the USHMs and provide feedback is important, prior to their incorporation into the NSHMs. Significant changes to the maps need to be understood by the engineering community and well-justified, as they are ultimately incorporated in building codes.

Mark Petersen proposed using the ground motion models developed by the USGS and SDSU for the Salt Lake basin USHM. The dynamic model developed at the University of California, Santa Barbara (UCSB) needs additional work and refinement before it can be considered for use. Eventually, incorporating both kinematic and dynamic models, may improve high-frequency components. Comparing different models is also useful for producing a probabilistic map and improves understanding of epistemic uncertainties. Ultimately, modeling incorporating the West Valley fault zone and non-linear behavior is needed to improve ground-motion predictions for the Salt Lake basin. Elsewhere along the Wasatch Front, there is a need for additional shear-wave velocity and basin structure data.

### **2016 USGS NEHRP External Program UGSWG Priorities**

1. Perform geophysical or geological investigations to characterize the potential connection (tear fault?) between the north end of the East Bench fault and the southern end of the Warm Springs fault along the Salt Lake City segment of the Wasatch fault zone.
2. Collect either shallow or deep shear-wave velocity data in basins outside the Salt Lake basin along the central Wasatch Front to help characterize shallow site response and/or basin effects on ground motions. The heavily populated Weber-Davis and Utah basins are the highest priority basins.
3. Update the Wasatch Front Community Velocity Model (CVM) with shear-wave velocity data collected since 2008. The CVM is needed for ground motion modeling.
4. Perform ground motion modeling of earthquake scenarios along major faults, such as the Wasatch, Great Salt Lake, and Oquirrh fault zones, to characterize ground shaking along the Wasatch Front. Example investigations may include modeling of coseismic rupture of the Salt Lake City segment of the Wasatch fault zone and West Valley fault zone to characterize ground shaking in the urban center of Salt Lake basin. Modeling should aim to characterize rupture effects such as directionality, basin effects, and shallow site response, including non-linear soil behavior to the extent possible.

**MEETING ATTENDANCE**  
**Working Group Members**

Ivan Wong*	AECOM (UGSWG Chair)
Greg McDonald	Utah Geological Survey (UGSWG UGS Liaison)
Morgan Moschetti*	U.S. Geological Survey
Kim Olsen	San Diego State University
Jim Pechmann	University of Utah Seismograph Stations
Kris Pankow*	University of Utah Seismograph Stations
Mark Petersen*	U.S. Geological Survey
Daniel Roten*	San Diego State University

**Guests**

Lee Liberty*	Boise State University
Chris DuRoss	U.S. Geological Survey
Adam Hiscock	Utah Geological Survey
Emily Kleber	Utah Geological Survey
Tim Stahl	University of Michigan
Rich Giraud	Utah Geological Survey
Michael Hansen	RB&G Engineering

\* Speaker