

**SUMMARY
TWELFTH MEETING
WORKING GROUP ON UTAH EARTHQUAKE PROBABILITIES
Wednesday, February 11, 2015
Utah Department of Natural Resources Building, Room 2000 (2nd floor)
1594 West North Temple, Salt Lake City, Utah**

WELCOME AND INTRODUCTION

Working Group on Utah Earthquake Probabilities (WGUEP) Chair Ivan Wong called WGUEP Meeting Twelve to order at 8:00 a.m. on Wednesday, February 11, 2015. After welcoming the Working Group members, Utah Geological Survey (UGS) staff, and invited guests (attachment 1), Ivan reviewed the meeting agenda (attachment 2), which consisted of three principal items: (1) final draft report status and the U.S. Geological Survey (USGS) review process, (2) unresolved technical issues surfaced by the WGUEP internal review process, and (3) when and how the final WGUEP report will be released (rolled out) to the public.

The input data and results of the earthquake recurrence and probability calculations in the draft report submitted to the USGS for review are proprietary and are not part of public records under the Utah Government Records Access and Management Act until released in the WGUEP final report. Therefore, those preliminary results and other information relevant to the input data and preliminary recurrence and probability calculations are not posted on the WGUEP website at <http://geology.utah.gov/ghp/workgroups/wguep.htm>.

REPORT REVIEW

Steve Personius (USGS) stated that because the WGUEP report is the first regional probability-based earthquake forecast prepared outside of California, the USGS has decided to conduct a more extensive technical review than is otherwise normal for this type of document. Rich Briggs (USGS) will coordinate the review, and will organize the reviewer's comments into a single synthesized document to which the WGUEP can respond. For purposes of their review, the USGS has divided the WGUEP report into five sections and will assign a pair of subject matter experts to review each section. The sections and reviewers are:

Faulting	Ryan Gold and Kate Scharer
Geodesy	Wayne Thatcher and Bill Hammond
Seismicity	Jim Dewey and Chuck Mueller
M_{max}	Mark Stirling, second reviewer not yet identified
Probabilities	Reviewers not yet identified

Rich hopes the reviews will be finished by the first week of March, and to have the synthesized review document ready for the WGUEP's consideration by the end of March.

Discussion then turned to whether WGUEP should request the National Earthquake Prediction Evaluation Council (NEPEC) to review the WGUEP earthquake forecast, and whether the review should be formal (detailed and time consuming) or informal (quicker and less rigorous). Walter Arabasz stated that a NEPEC review, whether formal or informal, should only occur after WGUEP has received and responded to the USGS review comments. Tony Crone and Dave Schwartz both stated that an informal NEPEC review would be helpful and would lend credibility to the WGUEP earthquake forecast, but that a formal NEPEC review could substantially delay release of the WGUEP report. Dave noted that the Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3) report received an informal review and subsequent NEPEC endorsement. It was agreed that WGUEP would seek an informal NEPEC review, provided that the review could be completed in time to allow release of the WGUEP earthquake forecast before the end of 2015.

Walter stated that he is pleased that the USGS has decided to perform a rigorous expert review of the WGUEP report. Rigorous reviews are necessary to provide validation of the WGUEP report by the informed technical community.

Ivan outlined the process for replying to the USGS review comments:

- (1) The WGUEP only has to respond to comments in Rich Brigg's synthesized review document, although section authors will also receive the original USGS comments. It is important to note that section authors may disagree with reviewer comments and not change the report as long as there is a sound technical basis for our response.
- (2) Each section author is responsible for responding to the review comments in his/her section(s).
- (3) Because the USGS review process requires authors to respond in writing to each review comment, Ivan will create a review comment and response form for use by section authors.
- (4) Authors will make all revisions in the document in Track Changes mode.
- (5) All WGUEP authors will receive a copy of the final WGUEP report showing all Track Changes and the other author's responses to USGS comments in their sections. Section authors will then have an opportunity to determine if changes in other sections of the report affect their section(s), and if so, make any necessary revisions.

TECHNICAL ISSUES

Jim Pechmann reported that he had received several technical comments from Mark Petersen and Yuehua Zeng on the Geodetic section, particularly regarding use of Kostrov's equation. Jim prefers waiting for the USGS review comments before responding to Mark and Yuehua, so he can address all comments at the same time.

Discussion then turned to report figure 7.1-2 (*Mean and $\pm 2 \sigma$ cumulative magnitude-frequency relationships for the WFZ, OGSLFZ, background seismicity and Other faults*) and figure 7.1-4 (*Mean incremental magnitude-frequency relationships for the WFZ, OGSLFZ, background seismicity and Other faults*). Walter and Jim noted that figure 7.1-2 does not look like a typical Gutenberg-Richter recurrence curve as was expected, but more closely resembles a Youngs and Coppersmith truncated exponential curve with a pronounced “characteristic earthquake” bump. The WGUEP discussed possible reasons for the bump including (a) the WGUEP’s Wasatch Front study region is a relatively small area and seismicity may be dominated by characteristic earthquake recurrence on the Wasatch fault, and (b) that the “Other” faults in the WGUEP study area are not behaving as anticipated in the current WGUEP fault model, and instead are behaving characteristically rather than exhibiting a maximum magnitude distribution. Dave commented that he thought that the “bump” may be real, and that it needs to be acknowledged and explained in the report, but that extraordinary (artificial) measures should not be taken to try and make the bump go away as was the case in UCERF3. Patricia Thomas indicated that based on figure 7.1-4, it appears to her that the study region’s “Other” faults may be the chief cause of the bump: she will investigate the sensitivity of the curve to changes in “Other” fault behavior. Ivan took responsibility for explaining the bump in the final report.

Chris DuRoss noted that a paper he and others currently have in review with the Bulletin of the Seismological Society of America (BSSA) is essentially an update of appendix A in the WGUEP report, and asked whether once he has addressed the BSSA review comments if the paper should replace the appendix. Based on the projected schedule for the WGUEP report review and release, the WGUEP felt that Chris would have ample time to incorporate both the BSSA and USGS review comments in appendix A.

WGUEP REPORT RELEASE

Bob Carey and Joe Dougherty, Utah Division of Emergency Management (UDEM), joined the meeting to provide insight and advice regarding the most effective manner to release the WGUEP final report. Joe is the UDEM community support (public affairs) officer and is prepared to assist with preparing press releases and arranging media contacts/events. It was Bob’s opinion that the optimum time for releasing the WGUEP report is in conjunction with other planned earthquake awareness activities when the public and media are focused on earthquake issues. Given the time frame for reviewing, revising, and publishing the final WGUEP report, Bob suggested either September 2015, which is Earthquake Preparedness Month, or the 2016 Great Utah ShakeOut Exercise scheduled for April 2016. Those options remain tentative and depend on how long it takes to prepare a final publication.

It was suggested that a three- or four-page fact sheet that could be given to the media and others be prepared for the report rollout. The fact sheet would include figures and text to explain the significance of the various WGUEP probability values, faults and area covered, etc. Considerable discussion ensued regarding the kinds of figures and probabilities to include in the fact sheet. The final recommendation were figures that report priorities for (a) the Wasatch fault, (b) all other fault sources combined, and (c) for $\geq M6$ earthquakes. A Report Rollout Committee

consisting of Ivan, Walter, Steve Bowman, Mike Hylland, Bob, and Joe was formed; Steve and Mike took responsibility for preparing the fact sheet.

Chris DuRoss made a brief presentation on the USGS' Science Applications for Risk Reduction (SAFRR) Project. SAFRR was created to innovate the application of hazard science for the safety, security, and economic well-being of the nation, and to unite a broad range of disciplines to engage basic and applied researchers, practitioners, policy-makers, and the public in hazard reduction through the application of Multi-Hazard Demonstration Projects such as the first California ShakeOut Earthquake Scenario. Chris and Rich Briggs have been in contact with Dale Cox, SAFRR Project Manager, about the possibility of preparing a Multi-Hazard Demonstration Project for the Wasatch Front that incorporates the nearly complete Utah Earthquake Engineering Research Institute's Salt Lake City segment earthquake scenario and the WGUEP probabilities.

MEETING ADJOURNED

WGUEP Meeting Twelve was adjourned at 2:00 p.m. No schedule was set for a future meeting.

ATTACHMENT 1

Attendance Working Group on Utah Earthquake Probabilities Meeting 12 Wednesday, February 11, 2015

Walter Arabasz, UUSS*
Steve Bowman, UGS
Tony Crone, USGS retired**
Chris DuRoss, USGS
Mike Hylland, UGS
Bill Lund, UGS, Coordinator
James Pechmann, UUSS
Steve Personius, USGS
Dave Schwartz, USGS**
Patricia Thomas, AECOM
Ivan Wong, AECOM, Chair

Others attending
Bob Carey, UDEM
Joe Dougherty, UDEM

*University of Utah Seismograph Stations

**By phone

**ATTACHMENT 2
AGENDA
WORKING GROUP ON UTAH EARTHQUAKE PROBABILITIES
MEETING TWELVE
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7:30 – 8:00	Refreshments	
8:00 – 8:30	Final Report Status and Reviews	Ivan
8:30 – 9:30	Discussion on Report	All
9:30 – 10:00	Schedule	All
10:00 – 10:15	Break	
10:15 – 12:00	Discussion on Report (continued)	All
12:00 – 12:30	Lunch	
12:30 – 2:00	Discussion on Report Rollout	All
2:00	Adjourn	

WGUEP Members

Ivan Wong, AECOM (Chair)
William Lund, UGS (Coordinator)
Walter Arabasz, UUSS
Steve Bowman, UGS
Tony Crone, USGS*

Chris DuRoss, USGS
Mike Hylland, UGS
Nico Luco, USGS**
Susan Olig, Consultant**
Jim Pechmann, UUSS

Steve Personius, USGS
Mark Petersen, USGS**
David Schwartz, USGS*
Bob Smith, UUGG**
Patricia Thomas, AECOM

*By phone.
**Did not attend.

Other Participants

Bob Carey, UDEM
Joe Dougherty, UDEM