

SUMMARY
Utah Quaternary Fault Parameters Working Group Meeting
Tuesday, February 15, 2012
Utah Department of Natural Resources Building, Room 1040-1050
1594 West North Temple, Salt Lake City

WELCOME AND INTRODUCTION

Bill Lund (Utah Geological Survey [UGS]) called the 2012 Utah Quaternary Fault Parameters Working Group (UQFPWG) meeting to order at 8:00 a.m. After welcoming Working Group members and guests (attachment 1), Bill summarized the UQFPWG's past activities and outlined the Working Group's purpose and goals for the future.

UQFPWG Purpose and Goals

- Helps set and coordinate the earthquake-hazard research agenda for the State of Utah.
- Reviews ongoing paleoseismic research in Utah, and updates the Utah consensus slip-rate and recurrence-interval database as necessary.
- Provides advice/insight regarding technical issues related to fault behavior in Utah and the Basin and Range Province.
- Identifies and prioritizes future Utah Quaternary fault paleoseismic studies.

TECHNICAL PRESENTATIONS

The following presentations were made on current paleoseismic research and related activities in Utah:

- Paleoseismicity of the Salt Lake City segment—Results from the Penrose Drive trench investigation; Chris DuRoss, UGS
- Update on fault trenching at the Baileys Lake site, West Valley fault zone; Mike Hylland, UGS
- Searching for evidence of seismic events in lacustrine sediments in Utah Lake; Quincy Nickens, Brigham Young University
- Hurricane Cliffs hydropower and Lake Powell pipeline preliminary Quaternary fault investigation; Dean Ostenaar, Fugro, Inc.
- Blue Castle licensing project; Dean Ostenaar, Fugro, Inc.

- Summary of preliminary investigations of the Paunsaugunt fault, Utah; Bob Kirkham, RJH Consultants (no Power Point, hard copy handout)
- Utah Geological Survey Nephi segment trenching project, June 2012: Chris DuRoss, UGS
- Characterizing the central Wasatch fault zone for the Working Group on Utah Earthquake Probabilities; Chris DuRoss, UGS
- Comparison of moment rates from GPS observations and late Quaternary earthquakes on the Wasatch fault, Utah; Christine Puskas, UNAVCO
- The Working Group on Utah Earthquake Probabilities (WGUEP)—Background, goals, and progress; Ivan Wong, URS Corporation
- Basin and Range Province Earthquake Working Group II; Bill Lund, UGS

TECHNICAL DISCUSSION ITEMS

- East Cache fault zone study; discussion leader Bill Lund, UGS

A long-standing question exists regarding the status of the National Earthquake Hazard Reduction Program (NEHRP)-funded investigation titled *Earthquake Timing on the Southern Segment of the East Cache Fault Zone, Utah* by Utah State University (USU). Originally approved by NEHRP in 2007 as a one-year investigation, results of the study are not yet available to the public. Cache Valley is one of Utah's most populous regions off the Wasatch Front, and as such, the results of the USU investigation are important to seismic-hazard reduction for that area.

Dr. Jim Evans, USU Geology Department, is Principal Investigator for the study. Dr. Evans has been unable to attend past UQFPWG annual meetings to provide the UQFPWG with project updates, and did not attend this year's meeting as well. Dr. Suzanne Janecke, USU Geology Department, did attend this year's meeting, and stated that it was her understanding that Dr. Jim McCalpin, GEO-HAZ Consulting and project co-Principal Investigator, had assumed responsibility for completing the Final Technical Report, and that the report had been submitted to the U.S. Geological Survey (USGS). Tony Crone, USGS, checked the list of the Final Technical Reports submitted to the USGS External Grants Program office, and reported that the East Cache report was not among them. Bill Lund stated that he would contact Dr. McCalpin to determine the project's status.

Contact was subsequently made with Dr. McCalpin, who stated that the report is not yet finished. The graduate student who was working on the project for her MS thesis left USU without completing the project/degree, which resulted in incomplete data for the project. Dr. McCalpin indicated that he is aware that a Final Technical Report is over due to the USGS, and

that he is attempting to pull together a report based on the limited available information. It is his hope that the report will be finished in the near future.

- Possible evidence for previously unrecognized Quaternary faulting in northern Utah, Dr. Suzanne Janecke, USU

Dr. Janecke asked the UQFPWG to explain the process for reporting newly discovered Quaternary faults, and how to get them included in the USGS *Quaternary Fault and Fold Database of the United States* (USGS, 2010). To demonstrate her point, Dr. Janecke made a brief Power Point presentation illustrating several areas in northern Utah (Weber Lake Bonneville delta front, near Hyrum Dam in Cache Valley, possible fault scarps in the bottom of Cache Valley, possible faults near the Legacy Highway in Salt Lake and Weber Counties) where, chiefly using remote sensing lineament analyses, she believes there is evidence for previously unrecognized Quaternary faulting.

The UQFPWG responded that evidence for newly identified Quaternary faults in Utah should be brought to the attention of Mike Hylland, UGS liaison with the USGS Quaternary Fault and Fold Database Program. The UGS makes periodic recommendations to the USGS regarding additional faults in Utah to include in the *Quaternary Fault and Fold Database of the United States* (USGS, 2010). However, before a fault can be added to the database, it must be conclusively demonstrated to be Quaternary active, and that evidence must be documented in a referenceable publication. Mike requested a copy of Dr. Janecke's Power Point presentation so he could review the evidence for Quaternary faulting in the areas she had identified.

UQFPWG 2012 FAULT STUDY PRIORITIES

In 2005, the UQFPWG recommended that 20 Quaternary faults/fault segments in Utah be investigated to “adequately characterize Utah’s earthquake hazard to a minimally acceptable level” (Lund, 2005). Since then, the Working Group has added an additional 11 faults/fault segments to the list: five in 2007, one in 2009, one in 2010, and four in 2011 (see table 1 below). No new faults were added to the list in 2012.

The UQFPWG conducts an annual review of progress made toward investigating the faults/fault segments on their priority list. Based on that review, the Working Group establishes a short list of the highest priority faults/fault segments for future study. The list of highest priority faults/segments is published on the UGS web site, which is then referenced by the USGS in their annual NEHRP request for proposals. Following the 2012 review, the Working Group created the following highest priority list: (1) Acquire new paleoseismic information in data gaps along the five central segments of the Wasatch fault zone (WFZ) – e.g., (a) Brigham City segment rupture extent (north and south ends), (b) long-term earthquake record northern Provo segment, (c) long-term earthquake record southern Weber segment, (2) penultimate event Provo segment WFZ; and (3) West Valley fault zone – Taylorsville fault. Table 2 shows both the 2012 highest priority fault/fault segment recommendations, and the current investigation status for all faults/fault segments identified by the UQFPWG as requiring additional study.

REFERENCES

Lund, W.R., 2005, Consensus preferred recurrence-interval and vertical slip-rate estimates – Review of Utah paleoseismic-trenching data by the Utah Quaternary Fault Parameters Working Group: Utah Geological Survey Bulletin 134, 109 p., CD, online
<<http://ugspub.nr.utah.gov/publications/bulletins/B-134.pdf>>.

U.S. Geological Survey, 2010, Quaternary fault and fold database of the United States: Online,
<<http://earthquake.usgs.gov/regional/qfaults/>>.

Fault/Fault Segment	Original UQFPWG Priority (2005)
Nephi segment WFZ	1
West Valley fault zone	2
Weber segment WFZ – most recent event	3
Weber segment WFZ – multiple events	4
Utah Lake faults and folds	5
Great Salt Lake fault zone	6
Collinston & Clarkston Mountain segments WFZ	7
Sevier/Toroweap fault	8
Washington fault	9
Cedar City-Parowan monocline/ Paragonah fault	10
Enoch graben	11
East Cache fault zone	12
Clarkston fault	13
Wasatch Range back-valley faults	14
Hurricane fault	15
Levan segment WFZ	16
Gunnison fault	17
Scipio Valley faults	18
Faults beneath Bear Lake	19
Eastern Bear Lake fault	20
Bear River fault zone	2007
Brigham City segment WFZ – most recent event	2007
Carrington fault (Great Salt Lake)	2007
Provo segment WFZ – penultimate event	2007
Rozelle section – East Great Salt Lake Fault	2007
Salt Lake City segment WFZ – northern part	2009
Warm Springs fault/East Bench fault subsurface geometry and connection	2010
Brigham City segment WFZ rupture extent (north and south ends)	2011
Long-term earthquake record northern Provo segment WFZ	2011
West Valley fault zone – Taylorsville fault	2011
Handel Valley fault	2011

Table 1. List of Quaternary faults/fault segments identified by the UQFPWG as requiring additional study to adequately characterize Utah’s earthquake hazard to a minimally acceptable level.

Table 2. UQFPWG 2013 list of highest priority Quaternary faults/fault segments requiring additional study to adequately characterize Utah's earthquake hazard to a minimally acceptable level, and status of current paleoseismic investigations for all currently identified Utah priority faults/fault segments.

2012 Highest Priority Faults/Fault Sections For Study			
Fault/Fault Section¹	Investigation Status		Investigating Institution²
Acquire new paleoseismic information in data gaps along the five central segments of the WFZ – e.g., (a) Brigham City segment rupture extent (north and south ends); (b) long-term earthquake record northern Provo segment; (c) long-term earthquake record southern Weber segment.	No activity		
Penultimate event Provo segment WFZ	No activity		
West Valley fault zone – Taylorsville fault	No activity		
Other Priority Faults/Fault Sections Requiring Further Study			
Fault/Fault Section	Original UQFPWG Priority	Investigation Status	Investigating Institution²
Cedar City-Parowan monocline/Paragonah fault ³	10	No activity	
Enoch graben	11	No activity	
Clarkston fault ³	13	Black and others (2000)	
Gunnison fault	17	No activity	
Scipio Valley faults	18	No activity	
Faults beneath Bear Lake	19	No activity	
Eastern Bear Lake fault	20	No activity	
Carrington fault (Great Salt Lake)	2007	No activity	
Rozelle section, Great Salt Lake fault ⁴	2007	No activity	
Warm Springs fault/East Bench fault subsurface geometry and connection ⁴	2010	No activity	
Hansel Valley fault ³	2011	McCalpin, (1985), McCalpin and others (1992), Robinson (1986)	
Faults/Fault Sections Studies Complete or Ongoing			
Fault/Fault Section	Original UQFPWG Priority	Investigation Status	Investigating Institution²
Nephi segment WFZ	1	UGS Special Study 124 USGS Map 2966 New UGS study funded 2012	UGS/USGS
Long-term earthquake record Nephi segment WFZ	1a	Funded for 2012	UGS/USGS
West Valley fault zone (Granger fault)	2	Ongoing	UGS/USGS
Weber segment WFZ – most recent event	3	UGS Special Study 130	UGS/USGS
Weber segment WFZ – multiple events	4	UGS Special Study 130	UGS/USGS
Utah Lake faults and folds	5	On going	UUGG
Great Salt Lake fault zone	6	Ongoing	UUGG
Collinston & Clarkston Mountain segments WFZ	7	UGS Special Study 121	UGS
Sevier/Toroweap fault	8	UGS Special Study 122	UGS
East Cache fault zone	12	Ongoing	USU
Wasatch Range back-valley fault (Main Canyon fault)	14	UGS Miscellaneous Publication 10-5	USBR
Hurricane fault	15	UGS Special Study 119	UGS
Levan segment WFZ	16	UGS Map 229	UGS
Brigham City segment WFZ – most recent event	2007	Ongoing	UGS/USGS
Bear River fault zone	2007	Ongoing	USGS
Salt Lake City segment WFZ – north end	2009	On going	UGS/USGS

¹Not in priority order

²UGS (Utah Geological Survey), USU (Utah State University), USGS (U.S. Geological Survey), UUGG (University of Utah Department of Geology & Geophysics), USBR (U.S. Bureau of Reclamation)

³Earthquake source on the USGS National Seismic Hazard Maps

⁴Previous highest priority fault/fault segment

ATTACHMENT 1
Meeting Attendees

Quaternary Fault Parameters Working Group

Tony Crone, USGS
Chris DuRoss, UGS*
Kathy Haller, USGS
Ron Harris, BYU
Daniel Horns, UVU
Michael Hylland, UGS*
William Lund, UGS*
Susan Olig, URS Corp.
James Pechmann, UUSS
Steve Personius, USGS
Mark Petersen, USGS
Lucy Piety, USBR
Bob Smith, UUGG
Ivan Wong, URS Corp.*

Guests

Bob Biek, UGS
Steve Bowman, UGS
Jessica Castleton, UGS
Rich Giraud, UGS
Amanda Hintz, UGS
Adam Hiscock, UGS
Greg McDonald, UGS
Quincy Nickens, BYU*
Dean Ostenaar, Fugro, Inc.*
Christine Puskas, UNAVCO*
David Simon, Simon-Bymaster, Inc.
Nathan Toke, UVU
Anna Vargo, NRCS
Grant Willis, UGS

*Speaker