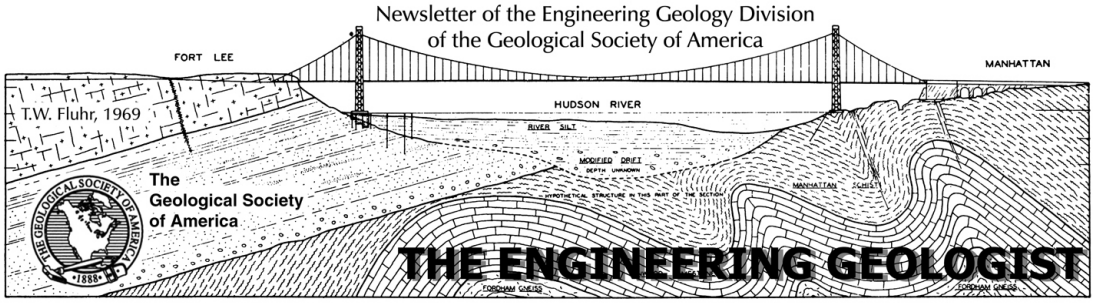
Newsletter of the Engineering Geology Division
of the Geological Society of America



VOLUME 37 NUMBER 3 OCTOBER 2003

Chair's Message

By Judy Ehlen

As Chair of EGD, I attended the Division Chairs' meeting at GSA headquarters in Boulder last February. I'd like to take this opportunity to tell you of some of the issues that were discussed and some changes that may be occurring in the near future. Jack Hess, GSA's Executive Director, told us that there will be more combined meetings, like the one in Edinburgh, Scotland co-sponsored with the Geological Society of London several years ago. GSA will co-host the Geological Society of Australia meeting in Australia next year and co-sponsor a field forum in South Africa also in 2004. There are also plans for a joint meeting in the United States with the Soil Science Society of America. These meetings provide opportunities for our membership to expand their horizons and cooperate with others by co-sponsoring sessions, as well as presenting papers, in an international forum. In addition, discussions are ongoing with respect to hosting specialty meetings separate from the annual and section meetings – one on wildfires is planned for October 2003, and topics under consideration for future specialty meetings include medical geology and paleoclimates. The purpose of these meetings is to bring scientists and practitioners together. Ideas for these meetings are being solicited, so put your thinking caps on!

Clark Burchfiel, GSA's President, is particularly interested in bringing more applied geology into GSA's traditional program, and GSA sent out a survey last fall asking for input. He received an astounding number of responses, nearly 200, with many suggestions as to what GSA – thought of by many as an academic organization – might do to encourage more applied geologists to join and participate in our Society. Many of the suggestions he received are things EGD and GSA are already doing, but as he pointed out, we're obviously not doing them well enough. One of his suggestions was a new Division of Applied Geology, but fortunately from our perspective, this suggestion was not favorably received. As an alternative, he is setting up a committee whose purpose will be to develop closer ties between the academic and applied communities. Because of the strong applied nature of many of our Division members, we will be heavily involved in this effort. If any of you have ideas of suggestions along these lines, please pass them on to me <jehlen@tec.army.mil>. I would appreciate hearing from you.

Finally, I would like to encourage all of you to attend the 2003 GSA Annual Meeting in Seattle November 2-5 and attend as many of the EGD-sponsored sessions as you can. I think it will be a very interesting program. And I can strongly recommend Skip Watt's Jahns lecture, which will be presented on Tuesday morning just before the EGD Luncheon and Awards Ceremony. I would also like to take this opportunity to congratulate our Division Award winners for 2003 – Ellis Krinitzsky for the Burwell Award, Perry Rahn for the Distinguished Practice Award, and Helen Delano for the Meritorious Service Award. In addition, two Shlemon Scholarships were awarded, and there will be three Shlemon meeting awards. Please plan on coming to the EGD Luncheon and Award Ceremony at the annual meeting on November 4 to see the awards being presented. Lastly, I'd like to thank all of you for giving me the opportunity to serve as your Division Chair this past year. It's been great!

Consider Joining the Geological Society of London, Too

Former Chair Hatheway (1980) advises EGD members to think of the advantages of also belonging to The Geological Society (London), the world's earliest geological society. These folks have a fine counterpart to EGD in the Engineering Group, and their *Quarterly Journal of Engineering Geology & Hydrogeology* is excellent and a benefit of membership. EG puts out a very useful string of Special Publications as well, and the Society publishes many other useful items, particularly for North Americans who take occasional vacations in the UK or in Europe. Their website is <www.geolsoc.org.uk> and there are a bunch of EGD folks who are GSL members and who would be delighted to stand as references toward membership applications. Contact Allen Hatheway or Robert Larson for assistance with your applications.

Please vote! The ballot for 2003-2004 EGD officers is on p. 6 of this newsletter!

Jeff Keaton Selected as 2003 Richard H. Jahns Distinguished Lecturer

Jeffrey R. Keaton has been selected to be the 2004 Richard H. Jahns Distinguished Lecturer in Engineering Geology by the committee comprised of representatives of the Engineering Geology Division of GSA and the Association of Engineering Geologists. Keaton is a past Chair of the EGD and a past President of the AEG. He has participated in numerous annual meetings of both organizations and has given presentations on a variety of topics ranging from spectral matching of earthquake time-history records to stratigraphy and geomorphology of debris-flow deposits. The main topic for his 2004 Jahns Lecture is *Engineering Geology Mapping in the Information Technology Age*. In the event that he is invited to give more than one lecture in a given location, he will be prepared to present *Earthquake Ground Motion for Design of Hoover Dam Bypass Bridge* and *Soil Stratigraphy and Surface-Water Hydrology of Part of the Hualapai Valley, Mohave County, Arizona*. Abstracts for these three topics are presented on page 3 of this newsletter.

Please invite Jeff to visit your university by contacting him at the following address:

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Jeffrey R. Keaton is a Principal Engineering Geologist and Vice President in the Anaheim office of AMEC Earth & Environmental, Inc. His education consists of a BS degree in Geological Engineering from the University of Arizona (1971), a MS degree in Engineering (Geotechnical) from the University of California, Los Angeles (1972), and a PhD degree in Geology from Texas A&M University (1988). He is registered as a Professional Engineer in California, Utah, Alaska, and Arizona. He is also registered as a Professional Geologist in California and Arizona and is certified as an Engineering Geologist in California and Washington.

Keaton served as Chair of the Utah Section of the Association of Engineering Geologists in 1980-1982 and was the President of AEG in 1992-1993. He was Chair of the GSA Engineering Geology Division in 1989-1990. He served as Chair of the Transportation Research Board Committee on Engineering Geology (A2L05) from 1991-1997, as Chair of TRB Committee on Exploration and Classification of Earth Materials (A2L01) from 1997-2002, and as Chair of TRB Subcommittee on Scour Research (A2L05-2) from 1996-2002. In 2002, he became Chair of TRB Section L, housing the six committees that deal with Geology and Properties of Earth Materials. Keaton was one of the 11 members of TRB Task Force A2T61 which produced TRB Special Report 247 *Landslides: Investigation and Mitigation* in 1996; Keaton was principal author of Chapter 9, *Surface Observation and Geologic Mapping*, and Chapter 16, *Important Considerations in Slope Design*.

Keaton specializes in quantifying hazardous natural processes for use in design and risk analysis. He has written numerous articles regarding engineering geology mapping, debris flows, landslides, collapsible soils, subsidence, fault rupture, earthquake-induced liquefaction, earthquake ground motion, and case histories.

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Abstracts for lectures by Jeff Keaton, 2003 Richard H. Jahns Distinguished Lecturer

Engineering Geology Mapping in the Information Technology Age

Observation remains the foundation of engineering geology mapping, but many aspects of observation are being supplemented and even revolutionized by information technology (IT). Data acquisition is being accomplished with the aid of pen-based computers, digital cameras, and global positioning system (GPS) receivers. Quantitative geophysical and geochemical field methods are being used to produce quantitative measures that can be contoured and/or combined with other forms of observations to construct useful derivative maps. Aerial and space-based spatial data provide base maps or targets for subsequent field observations. Geographic information system (GIS) and computer-aided drafting and design (CADD) software are being used to manipulate and display geospatial data, sometimes during field data collection. Numerical analysis of observational data, including calculated grids derived from vector data, is being used to produce useful derivative products. Challenges for engineering geology practitioners pertain to accuracy of field data; structure of database fields; uniformity of symbols, lines, patterns, and colors; and consistency of derived geospatial map products. Engineering geology maps produced with GIS tools have the potential to mislead even sophisticated users for two reasons: 1) the strikingly professional appearance of GIS maps implies precision even when uncertainties are specifically noted, and 2) field data can be collected as a series of seemingly independent observations and converted by a GIS technician into a professional-appearing map without the benefit of geologic principles or the repeated application of the multiple working hypothesis. Consequently, professional discipline is needed to effectively apply modern IT to engineering geology mapping. The true power IT has is its analytical capabilities which requires engineering geologic data to be in digital format.

A promising new technology is 3D Laser Scanning. Initially, this technology was applied to preparation of as-built plans of structures, such as refineries. Opportunities also exist for engineering geology and geotechnical field applications, such as orientation and spacing of joints in rock slopes and grain-size distribution of deposits that include particles too large to analyze in the laboratory. Specialized laser equipment and high-performance computers are required to manipulate huge data sets.

Earthquake Ground Motion for Design of Hoover Dam Bypass Bridge

The Hoover Dam Bypass Project is a 3.5-mile corridor on U.S. Highway 93 in Clark County, Nevada, and Mohave County, Arizona, crossing the Colorado River approximately 1,500 feet downstream of Hoover Dam. The proposed bridge will be 1,896 feet long and 88 feet wide. The main span will be a Composite Concrete Deck Arch Bridge with an overall length of 1,090 feet. Five approach spans on the Nevada side and two on the Arizona side range in length from 100 to 120 feet.

Seventeen faults within 100 miles of the site were considered to be active. Maximum earthquake magnitudes were determined for each active fault, and peak horizontal accelerations were estimated using three ground-motion attenuation relationships. The Colorado River bridge was designed on the basis of a nonlinear dynamic analysis using three-component seismograms at each abutment. The approach bridges were designed on the basis of a response spectrum analysis. The river bridge will be a flexible structure with a fundamental period longer than 1 s. A 1-s spectral acceleration of 0.139 g was selected as the target ground motion on which to anchor design earthquakes and response spectra. The target 1-s spectral acceleration would be produced by a moment magnitude earthquake of 6.2 on the Mead Slope fault at a hypocentral distance of 16 km, or by a moment magnitude earthquake of 7.0 on the California Wash fault at a hypocentral distance of 36 km.

Acceleration response spectra for both design earthquakes were calculated using an appropriate attenuation relationship. The smaller magnitude earthquake produced the maximum high-frequency motion, whereas the larger magnitude earthquake produced the maximum low-frequency motion. The recommended design response spectrum for the river bridge was the maximum of the two motions.

A Composite Source Model was used to produce synthetic, three-component seismograms at each abutment for nonlinear dynamic analysis of the river bridge. Input parameters for the Composite Source Model included specific geographic fault location, parameters pertaining to the physics of fault rupture (length, width, average displacement, rake and rupture velocity), and seismological parameters of the source (seismic moment and stress drop) and site area (Green's functions). The acceleration time history records generated with the Composite Source Model were adjusted to bring their acceleration response spectra into close agreement with the design response spectrum.

The synthetic seismograms have realistic appearances in both amplitude of motion and duration of strong shaking. The velocity seismogram for the magnitude 6.2 earthquake contains a single, prominent spike representing a 'fault fling' effect that has been observed in near-field earthquakes. *(continued on p. 4)*

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Soil Stratigraphy and Surface-Water Hydrology of Part of the Hualapai Valley, Mohave County, Arizona

The degree of calcic soil development and its influence on surface-water hydrology and scour processes were evaluated on an alluvial plain at a location in Hualapai Valley approximately 10 miles northeast of Kingman. Soils geomorphology in this part of Arizona has been studied previously only on a reconnaissance basis. Detailed soil stratigraphy evaluation in Hualapai Valley revealed remarkable similarities to calcic soil development in the well-studied Desert Project area in south-central New Mexico. Near-surface well developed argillic and calcic horizons developed in fine earth sediments of the alluvial plain probably are on the order of 100,000 years old. The calcic horizons are highly bioturbated but promote runoff into shallow channels on the alluvial plain. Discontinuous gullies are present in some areas, particularly where flow has been concentrated. Noncalcic soils backfill paleochannels eroded into the well-developed calcic horizon.

Two More Join the Ranks of Roy J. Shlemon Scholars

Two Master's level students were selected as Roy J. Shlemon scholars for 2003. Mimi Diaz is the 1st place honoree. An Arizona State University student, Mimi is conducting research on the effects of wildfire interaction with surface processes to influence landscape development. In particular, she is the inherent relationships between fire characteristics and geomorphic response such as debris flow initiation. Mimi plans on taking advantage of the large natural laboratory resulting from the large 2001 Rodeo-Chediski wildfire.

Cory Zellers was selected as the 2nd place honoree. Cory recently completed his undergraduate degree at Emporia State University (Kansas) and is continuing in their Master's program. He intends to apply dendrogeomorphological analysis to date past landslides in the Leavenworth, Kansas, area in an effort to determine recurrence intervals. The Leavenworth, Kansas locality provides an opportunity to take advantage of recent landslide hazard research carried out by EGD member Greg Olmacher and others at the Kansas Geological Survey.

Roy J. Shlemon Scholarship Awards are given to graduate students with the best research proposals within the broad field of engineering geology. Scholarships are made for both Master's and Doctoral level students. No applications were received for Doctoral level scholarships in 2003. These scholarships were established thanks to a generous contribution from EGD member Roy J. Shlemon. Information on these scholarships and application forms are available on the Engineering Geology Division website.

Engineering Geology Division Sponsors Its First Pardee Symposium

EGD members attending the 2003 Annual Meeting in Seattle are encouraged to attend the first Pardee Symposium sponsored by the Division. **The Science of Lewis and Clark: Historical Observations and Modern Interpretations** was organized by EGD member Dr. Paul Santi of the Colorado School of Mines. The year 2003 marks the 200th anniversary of the Corps of Discovery led by Meriwether Lewis and William Clark initiating their historic exploration. This journey became the archetypical exploration and scientific expedition for the many later explorations of the West. This session will examine the scientific impacts of the expedition as well as the changes in our scientific understandings. As one of the first government-sponsored explorations, it will also address government support of science since the expedition. Come and join other scientists, historians, and science policy makers in a fascinating re-examination of this remarkable effort.

Update on A Past Roy J. Shlemon Scholar (2000)

In 2000, Jason M. Taylor was one of the first two Roy J. Shlemon Scholarship awardees. Jason was early in his Master's program at Portland State University with Dr. Scott Burns as his thesis advisor. Jason noted that having his field area in Mount St. Helens National Monument was great. "It was fun hiking and getting to see places there that hardly anyone else got to see," Jason said. He conducted his fieldwork in the summers of 2000 and 2001. His thesis was entitled, "Slope and seismic stability of the Castle Lake debris dam, Mount St. Helens National Monument, Washington." He completed his degree and received his Master's at the end of the spring term 2002. Jason returned to the eastern U.S. for employment. He also says he enjoys having less rain. Jason is currently employed by Groundwater Sciences of Harrisburg, PA. His work involves environmental consulting with an emphasis on assessing groundwater for remedial design. It addresses concerns primarily at Superfund sites at a number of eastern U.S. locations, notably in New York and Pennsylvania.

TO ALL VOTING MEMBERS OF GSA'S ENGINEERING GEOLOGY DIVISION:

This is the ballot for 2003-04 officers of the GSA Engineering Geology Division. Please vote immediately and mail your ballot to GSA no later than **October 20, 2003.** If you prefer, you may vote online at <**http://rock.geosociety.org/balloting/egd.asp>** by October 20, 2003. At that site, access the ballot using either your GSA member number or your e-mail address (if it is in your GSA records). If you need assistance, please contact GSA Services at gsaservice@geosociety.org or (303) 447-2020, ext. 3 or tollfree at (888) 443-4472. Biographical data for this year's candidates follow.

CHAIR: William C. (Bill) Haneberg is an independent consulting geologist in Port Orchard, WA (99-present). He was with the New Mexico Bureau of Mines & Mineral Resources as Assistant Director and Senior Engineering Geologist (98-99), Assistant Director and Engineering Geologist (94-98), and Engineering Geologist (89-94). Bill has served as a Faculty Adjunct in the Dept of Earth & Environmental Science and the Dept of Mineral & Environmental Engineering at New Mexico Tech since 1990, and was an Adjunct Associate Professor of Geology at Portland State University in 2000. He earned a BS in geology from Bowling Green State University, and MS and PhD degrees, both in geology, from the University of Cincinnati. He is a Licensed Geologist, Engineering Geologist, and Hydrogeologist in Washington; a Professional Geologist in Wisconsin; and an AIPG Certified Professional Geologist. A GSA member since 1985, he was elected a Fellow in 1995. Bill has served GSA as: EGD Chair-Elect (02-03), Secretary (01-02), Member-at-Large (00-01), Joint Technical Program Committee rep (02), and Burwell Award Committee (90-92); co-advocate, Humans as Geologic Agents: A Session in Honor of George Kiersch, GSA Annual Meeting (02); GSA rep, Environmental & Engineering Geoscience editorial policy board (01-present); advocate, Nothing Ventured, Nothing Gained: Geology and Risk Assessment in the 21st Century, GSA Annual Meeting (01); GSA External Awards Committee (98); co-organizer, "Faults and Subsurface Fluid Flow" Penrose Conference (97); co-editor, "Clay and Shale Slope Instability, Reviews in Engineering Geology X (94); co-organizer, Instability of Clay and Shale Hillslopes, GSA Annual Meeting symposium (92); field trip organizer, Cincinnati's Geologic Environment: A Trip for Secondary School Science Teachers, GSA Annual Meeting (92).

CHAIR-ELECT: Robert H. Fakundiny is the State Geologist of New York and Chief of the New York State Geological Survey and has held that position for 25 years. He received his BA degree in Geology at the University of California at Riverside. He then joined a minerals evaluation program with the United States Peace Corps in Ghana, West Africa. That work evolved into an MA degree at The University of Texas at Austin, and he received his PhD and was the Will C. Hogg Fellow at The University of Texas, studying the structural geology and stratigraphy of central Honduras. He is a Fellow of the Geological Society of America and has been a member of the Engineering Geology Division since the early 1970's. He is a Fellow of the Geological Association of Canada, Geological Society (London), New York Academy of Sciences, and the American Association for the Advancement of Science. He is a member of 20 other local, national, and international geologic societies. He is President of the American Institute of Professional Geologists, Past-President of the Association of American State Geologists, and Past-Chair of the North American Commission on Stratigraphic Nomenclature, where he has been a Commissioner for 19 years. He was the Chair of the first GSA Section Committee on Geology and Public Policy and worked with the national Committee to develop the program for all sections. He has served EGD as Secretary (02-03), Member-at-Large (01-02), Awards Committee (93-94), Burwell Committee (91-94, former), and EGD management board member (87). He chaired the AGI-AASG Ian Campbell Award Committee (95-96) and was an invited participant in the GSA-AAPG-AIPG-NSF-USGS Presidents' Conference on Ethics in the Geosciences (97). He has been elected to Sigma Gamma Epsilon, Sigma Xi, and is a Chartered Geologist (Geological Society, London). He has received the John T. Galey, Sr. Memorial Service Award and President's Certificate of Merit from AIPG, and the George V. Cohee Public Service Award and Certificate of Merit from the Eastern Section of AAPG. He has authored numerous scientific papers, articles, and abstracts on the geology and seismic hazards of siting nuclear power plants and radioactive waste storage facilities, structure and tectonics of New York State, geology of the Adirondack Mountains, landslides, mineral resources, earthquake activity, and geology land-use planning, and geology and public policy. He is currently co-editing a special volume of "Tectonophysics" on Neotectonics of the Eastern Great Lakes Basin and co-editing a textbook for the American Geophysical Union on "Geoscience in the Cities." He has been a member of more than 80 advisory boards and task forces for State, regional, and Federal agencies.

SECRETARY: Susan H. Cannon is a research geologist with the Landslide Hazards Program of the U.S. Geological Survey. She received her BA in Geology from Humboldt State University, and MS degrees in Geology and Civil Engineering and her PhD from the University of Colorado, Boulder. Susan has worked in the field of engineering geology for the Colorado Geological Survey and the USGS since 1981. Currently, she is the Engineering Geology Division's management board Member-at-Large (02-03); she also has served as a member of EGD's E.B. Burwell Jr. Award committee (2000) and as chair of the panel (2001). In keeping with her research interests, Susan convened a session at the 2002 GSA Annual Meeting on the Geomorphic Impacts of Wildfire.

MEMBER-AT-LARGE: Syed E. Hasan is a Professor in the Department of Geosciences at the University of Missouri – Kansas City, where his research is focused on waste management and medical geology. Syed earned his BS in Geology from Patna University, his MS in Applied Geology from Roorkee University, and his PhD in Geology from Purdue University. He worked at the Geological Survey of India as a Geologist (1965-68) and Senior Engineering Geologist (68-73) before serving as Visiting Assistant Professor in the Department of Geology at Michigan Technological University (78) and as Assistant Professor in the College of Mining and Geological Engineering at the University of Arizona (78-79). He has been with the Department of Geosciences at the University of Missouri – Kansas City since 1979, serving as Assistant Professor (79-85), Associate Professor (85-97), and Professor (98-present). He holds concurrent positions with the Univ of Missouri – Kansas City as Director of the Center for Applied Environmental Research (96-present) and as Adjunct Professor with the Department of Civil Engineering (98-present). Syed has been

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Syed E. Hasan *(continued from p. 6)*
a GSA member since 1987 and a Fellow since 1995. He is also affiliated with AGU, AEG, IAEG, and Phi Kappa Phi, and is a Life Fellow of the Geol Soc of India. He is a licensed geologist in Missouri. Syed serves GSA as a Campus Representative (88-present) and on the Engineering Geology Division's Burwell Award Committee (00-03); is also on the GSA North-Central Section Management Board (02-present). He served as the theme advocate: Environmental Justice session, GSA Annual meeting (1995); and as Technical Program Chair and Co-Chair of the 2003 GSA North-Central Section meeting. In addition, Syed has served the Kansas City-Omaha Section of the Association of Engineering Geologists as Chair (89-91) and as a member of the Advisory Board (02-03). Syed is the recipient of the U.S. EPA Region VII Educator's Environmental Excellence Award (2000) and the Assoc. of Engineering Geologists Claire P. Holdredge Award (98) for his textbook *Geology and Hazardous Waste Management* (Prentice Hall, 1996).

Ballot for the Election of 2003-2004 Officers for the GSA Engineering Geology Division

Vote for no more than **one** candidate for each office by checking the appropriate box or by filling in the write-in space to vote for an individual not listed on this ballot. Your ballot must be postmarked by October 20, 2003, must be signed in the space provided, and must include your GSA member number in order to be valid. Please return your ballot to the address below. Election results will be announced at the EGD Management Board meeting at the GSA Annual Meeting in Seattle and will be posted on the Division website at <http://rock.geosociety.org/egd/index.html>. Thank you for participating in your Engineering Geology Division election.

Chair:

❑ **William C. Haneberg**

❑ Write-In _____

Chair-Elect:

❑ **Robert H. Fakundiny**

❑ Write-In _____

Secretary:

❑ **Susan H. Cannon**

❑ Write-In _____

Member-at-Large:

❑ **Syed E. Hasan**

❑ Write-In _____

Your Name (printed) _____

Your Signature (required) _____

Your GSA Member # (required) _____

Please place your ballot in an envelope, affix first-class postage, and return it to:

Engineering Geology Division Ballot
Geological Society of America
PO Box 9140
Boulder, CO 80301-9140

Your ballot must be postmarked by October 20, 2003. If you prefer, you may vote online by October 20, 2003, at: <**http://rock.geosociety.org/balloting/egd.asp**>.