

# ASSOCIATION OF ENGINEERING GEOLOGISTS

*"Serving Professionals in Engineering, Environmental, and Ground-Water Geology"*

## THE ROCKY MOUNTAIN SECTION NEWSLETTER

[www.aegrms.org](http://www.aegrms.org)

### MEETING DATE

THURSDAY  
APRIL 8, 2004

### TIME

5:45 p.m. Social Hour  
6:30 p.m. Dinner  
7:30 p.m. Presentation

### LOCATION

**BERTHOUD HALL**  
**2<sup>nd</sup> Floor**  
Colorado School of Mines  
Golden, CO  
See map below

### COST

\$20 Members  
\$22 Non-members  
Free for Students first  
time, \$10 then after

### RESERVATIONS

c/o AEG Reservation Line  
(303) 790-2161 x 243 or  
[meetings@aegrms.org](mailto:meetings@aegrms.org)  
**BY NOON, TUESDAY**  
**APRIL 6<sup>th</sup>**

## Engineering Geology Mapping in the Information Technology Age

By Dr. Jeff Keaton, PE of AMEC

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.

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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.

## **Words From the Chair**

As spring is upon us, all of our schedules I'm sure have become nothing short of crazy and as such, this seasons meetings are almost over. If you missed last meeting, you missed the first talk given by Dr. Vince Matthews as our new State Geologist. Congratulations Dr. Matthews. Just goes to show you that you don't want to miss any meeting because you don't ever know what other surprises AEG may have in store. Don't miss the next meeting because we are proud to have Mr. Jeff Keaton, PhD, PE of AMEC, as the 2004 Richard H. Jahn's Distinguished Lecturer presenting on Engineering Geology in the Information Age.

We have changed caterers. The previous caterer has gone out of business and we are now using Paul's Catering out of Englewood. Your comments on the quality of the food would be greatly appreciated.

Last meeting I forgot to bring the card for Susan Steele Weir (sorry Susan). The card will be available at the April meeting for all to sign, I promise.

## **Webmaster Wanted!**

Ed Friend is retiring as webmaster. We are in need of a willing and able body to fill the position. Everything is set-up with the website, so the commitment level would be a few hours a month updating the site. Please contact Ed Friend at [webmaster@aegrms.org](mailto:webmaster@aegrms.org), Kristi McQuiddy at [newsletter@aegrms.org](mailto:newsletter@aegrms.org), or Darin Duran at [chair@aegrms.org](mailto:chair@aegrms.org) if you are interested or have questions. We would like to get someone lined up in the next month or so before Ed heads out to the field.

## **RMS 2003-2004 Speakers**

May 13, 2004 - *Rex Loesby, Yule Quarry  
Marble Colorado (possible field trip to follow in  
May or June)*

### **David J. Varnes Memorial Medal**

At a recent meeting of the International Consortium on Landslides (ICL) in Vancouver, B.C., Bob Schuster was awarded the first David J. Varnes Memorial Medal for outstanding international work in the field of landslide studies. Congratulations!!

### **An Engineering Geologist's Experiences by Charles Robinson**

From 1965 on, I continued to consult for the Colorado Division of Highways and to serve as a consultant on the Eisenhower Tunnel. In 1968, I was retained to do the geology for the I-70 Beaver Tail tunnel in Debeque Canyon. Dick Proscence of District 3 of the Highway Department hired an Engineering Geologist, Bob Barrett, who on his first professional job assisted me on the geology of the Beaver Tail tunnel. Bob went on to have a distinguished career as an Engineering Geologist for the Highway Department.

The Highway Department considered a 750-foot tunnel through a ridge west of Frisco and east of Wheeler Junction. James E. Sharp, who had worked part time for me on the Straight Creek Pilot bore while in school, was a geologist on the exploration of the Henderson ore deposit and had learned how to do directional drilling. He, with Arthur F. Brunton, then Executive Director of AIPG, and I formed a company called Directional Drilling, Inc. We bought a "single-shot" borehole survey instrument, and were in business. For the proposed tunnel west of Frisco, the Highway Department proposed to drive a pilot bore. I convinced them that I could drill a core hole, guarantee its accuracy to within one percent, and take oriented core. The cost for the pilot bore would be about \$200/foot, while the cost for the controlled core hole would be about \$50/foot. I

thought we would get about 75% of the data from the core that we would get from the pilot bore and the Highway Department accepted the idea. The U.S. Forest Service insisted that we not start work until winter so the swamp that we would have to cross to access the site was frozen. Our access vehicle was a D-4 Cat. Temperatures dropped to as low as -35°, and with that all the accompanying problems of frozen equipment and water lines. A summary of the program was published, "Horizontal Drilling with oriented core, Wheeler Junction, Colorado": Transportation Research Board, Transp. Research Record 783, 1980.

In 1969, the Highway Department considered a route for I-70 up Willow Creek in Summit County with a tunnel under Red Buffalo Pass to the head of Gore Creek in Eagle County. I explained to them that the north side of Vail Pass had many landslides, and therefore they retained me, assisted by R. V. Lord and Associates, Soil Engineers, to map the engineering geology from Wheeler Junction on the south to the junction of Gore Creek and Black Gore Creek on the north. To my knowledge, this was the first time the Highway Department had geology done in advance of design.

I hired Dale M. Cochran to work with me. The Highway Department furnished us with a topographic base map at 1:6000 and aerial photographs and we initiated the geologic mapping along, and to about a half mile to either side, of U.S. 6. The mapping showed that of the 15 miles from Wheeler Junction to Gore Creek, 7 miles of U.S. 6 was on landslides. It was thought that the surveyors in the '30s were terrible, that one curve of the highway was off by 50 feet. I explained that it wasn't the surveyors, but that the highway was on an active landslide, which had moved 50 feet laterally over the years. The Highway Department just patched the cracks each year. In June 1971, Dale began detailed maps of the landslides. There were two types of landslides, 1) older landslides along bedding planes dipping into Black Gore Creek that probably occurred during the Pleistocene glaciation (although the valley of Black Gore Creek was not glaciated), and 2) younger active landslides in colluvial materials. Several of the

landslides were instrumented with multiple unit extensometers and a series of piezometers were installed. In 1972, the data was compiled and we started working with Barton-Stoddard-Milhollin and Higging to design the highway. At the same time, Bob Barrett began designing and implementing remedial methods to stabilize the landslides.

There was good rapport between the design engineers, the geologists, and the Highway Department. As a result, an outstanding highway was designed and built that received national recognition. The Highway Department prepared a book for the U.S. Department of Transportation, Federal Highway Administration that describes the project "I-70 in a Mountain Environment, Vail Pass, Colorado" FHWA-70-208.

This project was the first highway project to seriously consider the environmental impact, and to try to mitigate the impact. In this context, I had to periodically escort interested groups along the then U.S. 6 and explain the geology and geologic hazards. In the lower reaches of Black Gore Creek were two landslides, one on either side of the creek. The design was to raise the creek bed and fill it with material to buttress the landslides against each other. On one of my escorted trips, I proudly pointed out this plan. Among the group was a warden for the State Fish and Wildlife Department. He grumbled that engineers didn't care anything about fish. I asked him what was more important, people or fish? Wrong question!

One publication resulted from the Vail Pass project: Robinson, C.S., 1979, Geologic Constraints on the Vail Pass Project: In Engineering Solutions to Environment Constraints, I-70 over Vail Pass: Transp. Research Record 717, Transp. Research Bd, p. 6-14.

Next month, retirement (sort of)...

*Note: We are still looking for individuals to provide their knowledge and experience to the AEG-RMS community through case histories and articles of interest. Please contact Kristi McQuiddy at [newsletter@aeqrms.org](mailto:newsletter@aeqrms.org).*

## Aspiring Employees

Many resumes from students graduating in the very near future have been received. Employers, please contact Tim Petz [past-chair@aeqrms.org](mailto:past-chair@aeqrms.org) for information regarding potential employees for summer part-time or full-time work. Students can drop off your information with Tim at the meetings or via e-mail.

## Your Business Card Here

The section is looking for companies or individuals who would like to advertise their products or services in the section newsletter and on the website. This is anything from a business card (\$10/month), quarter page spread (\$20/month), to a half page exposition (\$40/month). If you are interested, contact Ed Friend [webmaster@aeqrms.org](mailto:webmaster@aeqrms.org) or Kristi McQuiddy [newsletter@aeqrms.org](mailto:newsletter@aeqrms.org).

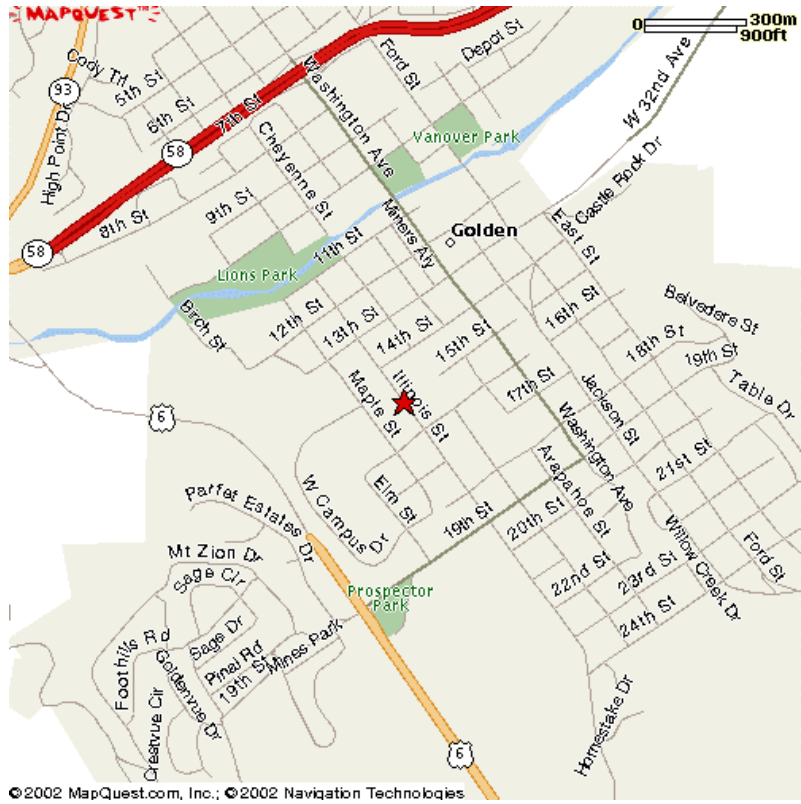
## Parting Words

This month's meeting is going to be great with Jeff Keaton, the current Jahn's Lecturer. Come on out and listen to another great talk.

The May discussion should also be interesting with Rex Loesby, presenting on the Yule Quarry Marble Colorado, something most of us are familiar with, especially the rock hounds among us.

The search for a new webmaster continues, if you or someone you know would be interested contact Ed [webmaster@aeqrms.org](mailto:webmaster@aeqrms.org) or Kristi [newsletter@aeqrms.org](mailto:newsletter@aeqrms.org), SOON if possible.

The Editors  
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