



ASSOCIATION OF ENGINEERING GEOLOGISTS

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

THE ROCKY MOUNTAIN SECTION NEWSLETTER

www.aegrms.org

MEETING DATE

**THURSDAY
FEBRUARY 12, 2004**

TIME

5:30 p.m. Social Hour
6:30 p.m. Dinner
7:30 p.m. Presentations

LOCATION

CSM Student Center
Golden, CO
See map below

COST

\$20 Members
\$22 Non-members
FREE FOR STUDENTS

RESERVATIONS

c/o AEG Reservation Line
(303) 790-2161 x 243 or
meetings@aegrms.org
**BY NOON, TUESDAY
FEBRUARY 10th**

Student Night 2004!

There will be four student presenters this year, two from South Dakota School of Mines and two from Colorado School of Mines. The meeting will start 15 minutes earlier to give the students and exhibitors time to visit. The doors will be open at 5:00 for exhibitors to setup.

Student Abstracts

Slope Stability Analysis and Industrial Mineral Resource Assessment of the Nez Perce Mission Creek Quarry, Lewis County, Idaho

Benjamin A. George, B.Sc., E.I.T.
Colorado School of Mines

The Nez Perce Mission Creek Limestone quarry has been operated periodically for the past 80 years. As a result of past mining practices and the loss of market share, the quarry was forced to shut down. Due to the recommendations from a market study in 2001, the Nez Perce Tribe is exploring the option of re-opening the quarry for limestone and basalt production. The current condition of the quarry requires rehabilitation of the head wall and surrounding area if production is to continue.

Mission Creek quarry is on the eastern edge of the Columbia Plateau. It lies on the border of the Craig Mountain and Lewiston Plateau physiographic divisions. The region is therefore dominated by volcanic and igneous rocks with local inliers of sedimentary and metamorphic units. The limestone at the site is entirely surrounded by sub-horizontal basalt rocks of Miocene age.

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newsletter@aegrms.org

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These Late Triassic carbonates have been uplifted and severely folded and faulted. Faulting has also been observed within the volcanic units as well.

This project began in May of 2002 and has two main focuses:

- 1) First, a preliminary study of the headwall slope stability through the use of scanline surveys and kinematic analysis, and
- 2) Second, an economic assessment of the limestone and basalt resources.

The project is a cooperative effort between the Nez Perce Tribe, Bureau of Indian Affairs – Division of Energy and Mineral Resources Management, and the Colorado School of Mines Department of Geology and Geological Engineering.

Several reconnaissance samples were gathered from the surface for preliminary testing. The calcium carbonate content of those limestone samples ranged from approximately 93 to 98 percent indicating high quality as compared to chemical-grade specifications. The basalt samples also showed promising aggregate testing results passing Federal Highway Administration specifications for freeze/thaw resistance and degradation resistance.

During the summer of 2003 discontinuity data along four scanlines were collected. The data is being used to perform kinematic analyses on the headwall so that a safe geometry can be estimated. This information will be useful for a redesign of the mine headwall.

Over the past summer a core drilling program was also completed with the following objectives:

- Determine the three-dimensional relationship of the basalt and limestone,
- Develop zones depicting limestone quality, and
- Collect samples to determine quality of limestone and basalt.

Approximately 1500 ft. of basalt and 2400 ft. of limestone core were collected from a total of eight drill holes. The limestone was sampled at 5-foot intervals so that detailed geochemical makeup could be determined. Once a distinction can be made on the geochemical grade of the limestone, a “grade” map will be developed for quantity estimations. Likewise, the basalt was sampled at 25-foot intervals for aggregate testing. Once the aggregate quality has been determined, a “quality” map will be produced so that quantity estimations can be made.

Hydraulic Geometry Relationships and Process Controls for Select South Dakota Rivers

Elizabeth Roeser
South Dakota School of Mines and Technology

Stream restoration and urban planning have recently received tremendous attention resulting in the need for a greater understanding of stream behavior and channel evolution. Development of regional flow equations and local stream flow statistics is essential in understanding stream flow and control mechanisms necessary for proper engineering design, stream restoration, and water resource management. The objective of this project was to determine process controls for stream characteristics by development of stream flow statistics, development of a GIS database to assess regional relationships, and development of regional flow equations. Assessments were made on individual stream segments, over entire stream lengths, and for entire watersheds. Sixty-three USGS stream gaging stations were chosen for stream assessment along 34 streams and rivers within the state of South Dakota. Each of the 63 sites was visited and surveyed to determine stream profile, hydraulic geometry, and channel substrate characteristics. Specific field measurements included bankfull depth and width, flood-prone depth and width, local stream gradient, and substrate data. Stream classifications, development of hydraulic geometry relationships, and compilation of peak-flow magnitude estimates using USGS LP3 analyses were performed. Estimated bankfull flows were compared to bankfull flows calculated from field data to determine the accuracy of the estimated return periods for bank forming flows. A GIS database in conjunction with multiple linear regressions will be used to develop regional equations characterizing watershed stream behavior. The equations can then be used by engineers and planners to properly and efficiently design infrastructure.

The Influence of Geology and Geomorphology on the Lewis and Clark Expedition

Ryan J. Kowalski,
Colorado School of Mines

The bicentennial of the beginning of the Lewis and Clark Expedition is the year 2003. This expedition was the first significant exploration of the Western United States, and it crossed a variety of geologic terrains and associated landforms. It is apparent from the expedition member's journals that the geomorphology and the geology often influenced route decisions and presented difficulties that had to be overcome. Examples include geologic and geomorphic controls on river features and characteristics, and use of landforms for landmarks. Despite these obvious correlations, no studies have been done to connect the route geology and geomorphology with issues such as route selection, food supply, and daily progress.

Researchers have often studied the expedition route and its related difficulties. A new perspective is obtained by studying the geology in detail and using the natural terrain characteristics to interpret the progress and route of the expedition. To assist with this, a daily rate log for the expedition was developed. This log of the expedition rates served as a base of comparison for the river gradients and geologic-geomorphic conditions encountered by the expedition. River gradient plots, topographic profiles, and geologic cross sections were completed for the entire expedition route, and compared to noted aberrations in the expedition rate. This comparison led to identification of locations where geology and geomorphology conditions had the most impact on the expedition.

Vulnerability Mapping (1:24,000) of the Madison Aquifer near Rapid City, South Dakota.

Scott L. Miller
South Dakota School of Mines and Technology

Rapid City, South Dakota, is located within the Rapid Creek watershed in the east-central Black Hills. The City of Rapid City relies heavily on the Mississippian Madison aquifer for drinking-water supplies, utilizing several wells and springs. The Madison aquifer locally consists of limestone and dolomite and contains well-developed paleo-karst and recent karst features. Previous work indicates that surface water recharges the Madison aquifer from the adjacent Spring Creek watershed to the south and Boxelder Creek watershed to the north, with ground water converging on wells and springs in the Rapid City area several miles away. Spring Creek and Boxelder Creek lose all their flow to karst features in the Madison aquifer, except during periods of high discharge (greater than approximately 28 ft³/sec for Spring Creek and 50 ft³/sec for Boxelder Creek). Dye-tracer tests for this area indicate ground-water velocities are on the order of 300 meters per day (1,000 feet per day) and residence times can be less than 30 days. Based on this information, Rapid City's water supply is extremely susceptible to contamination. Well logs, fractures, faults, geologic structures, water-quality data, dye-tracer tests, and human influences are being analyzed to develop a geologic model that will be used to better define local ground-water flow paths and characterize vulnerability zones. Inherent aquifer susceptibility will be combined with potential sources of anthropogenic contamination to develop a vulnerability map (1:24,000) of the Madison aquifer for the Rapid City area.

RMS 2003-2004 Speakers

March 11, 2004 - TBD

April 8, 2004 - *Jeff Keaton, 2004 Jahn's
Lecturer*

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

Norman R. Tilford Field Studies Scholarships

Applications for the 2004 Norman R. Tilford Field Studies Scholarships are now available on the AEG web site at www.aegweb.org (follow the EG Foundation link to Tilford Fund information).

APPLICATION DEADLINE: FEBRUARY 16, 2004 (applications must be RECEIVED by this date to be considered) The Norman R. Tilford Field Studies Scholarships are student awards granted by the AEG and the Engineering Geology Foundation (EGF) in support of graduate and undergraduate field studies. The awards are made to qualified student members of the AEG based upon demonstrated scholarship, ability, participation, and potential for contributions to the profession. See the AEG web site for more information regarding applying for the scholarship, or contributing to the fund that supports them.

If you know a student who is not currently an AEG member, but is interested in the scholarship, membership applications may be submitted with the Scholarship Application form. Membership applications can be found on the AEG web site.

Questions? Contact Deb Green Tilford, Chairman of the NRT Scholarship Committee, at (505) 867-0670 or tilgreen@aol.com.

Please distribute this message to your students, sons, daughters and friends who are enrolled in geology programs, who could benefit from this scholarship.

An Engineering Geologist's Experiences by Charles Robinson

In February 1965, the Chief Engineer with the Colorado Highway Department, Charles A. Schumate, talked to me about going into private practice, assuring me that I wouldn't starve to death if I did. I thought about it and about giving up the benefits from 20 years of government service. However, in March I submitted my resignation to the Survey and left on July 2, 1965.

Within a week of setting up an office, I was asked to work on a small landslide south of Colorado Springs along I-25. Shortly thereafter, a major landslide occurred along I-25 at Raton Pass. The day the governors of New Mexico and Colorado cut the ribbon to open I-25, the southbound lane in Colorado slid off the mountain (they shouldn't have cut the ribbon!). The Highway Department had constructed the equivalent of an earth-fill dam across the end of a dipping sandstone aquifer.

One of the first major projects tackled by Charles S. Robinson and Associates (and later Mineral Systems, Inc.) was doing the geology for the driving of the Henderson Tunnel. The Henderson mine being developed by Amax in Clear Creek County intended to drive a 10-mile long tunnel from below the ore deposit, ~3500 feet below the surface, to the Williams Fork. A major problem was groundwater. The tunnel was to be driven at a minus 3% grade and an inflow of 1,000 gpm would have drowned the heading crew. An estimate of the maximum potential inflow was made based on the data from the Roberts Tunnel and Straight Creek Pilot Bore. The max potential inflow was not exceeded during construction.

An outcome of the Henderson Tunnel study was a three-year study of the groundwater in the Henderson mine. Amax was pumping about 5,000 gpm from the Henderson shaft and wanted it proved as "Developed Water" so they could sell it. It worked! A summary of the results of the study was published by AIME: Mining Engineering Technical Paper, August 1978, p. 1185-1194.

Next month, concern over development and the environment.....

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 (newsletter@aeqrms.org) if you have any ideas.

2004 CO-AIPG Legislative Reception

The Colorado Section of the American Institute of Professional Geologists (CO-AIPG) is hosting the Annual Legislative Reception for our State Legislators on Tuesday, March 3, 2004, from 5 p.m. to 7:30 p.m. The Reception will be held at the University Club, 1673 Sherman Street, Denver, Colorado. CO-AIPG sponsors the Reception annually to create an opportunity for geoscientists from industry, academia, and state and federal government to meet Colorado Legislators. The event is designed to be educational for legislators. It is also an effective way of introducing them to potential sources of geoscience information for future reference and access. No lobbying is permitted at this reception.

The reception theme for 2004 will be "Natural Resources Issues in Colorado".

In addition to providing opportunities for legislators to network with constituents and gather sources of relevant geoscience information, networking also occurs between members of various participating technical societies (past ones include the Association of Engineering Geologists, Colorado Oil and Gas Association, Denver International Petroleum Society, Denver Mining Club, Friends of Dinosaur Ridge, Geological Society of America, and Rocky Mountain Association of Geologists). This event provides a stimulating social venue, outside of the typical single-society technical meeting, for geologists and engineers in the area to meet and discuss Colorado issues. Students interested in professional geology careers, jobs, and state issues also have the opportunity to network with many

professionals and legislators at this reception, something that is not possible anywhere else in Colorado.

You are invited to participate in one of several ways:

- (1) Attend as an individual;
 - * Professional - \$27.00 prepaid/\$30.00 at the door
 - * Student - \$8.00

- (2) Co-Host - \$75
 - * Includes two paid entrance fees
 - * Publicity

- (3) Exhibitor - \$150 for non-profit organizations and government agencies only (exhibits should be educational, based on a theme of "Water Resources in Colorado", and relevant to Colorado)
 - * Includes three paid entrance fees
 - * Publicity
 - * Space and table for your exhibit

- (4) PowerPoint slide ad - \$275 Intended for for-profit companies and consulting groups (contact David Abbott at dmageol@msn.com for specific information)

The registration form is attached below.

2004 Engineer's Week Annual Dinner

Attached is a flier announcing the 2004 Engineer's Week Annual Dinner on Friday, February 27, 2004. Contact Sam Bartlett if you have any questions or would like additional information at samuelbartlett@aol.com.

AGI Government Affairs Program

Final Action on FY 2003 Appropriations Could Cut Geoscience Programs! For more information on this important topic, visit the AEG-RMS website www.aegrms.org and click on AGI GOVERNMENT AFFAIRS MONTHLY REVIEW.

Aspiring Employees

Many resumes from students graduating in the very near future have been received. Employers, please contact Tim Petz past-chair@aegrms.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@aegrms.org or Kristi McQuiddy newsletter@aegrms.org.

Parting Words

First off, yes, the February newsletter is being published even before we have a January meeting, because student night is fast approaching and will be here in only two weeks. Show your support for possibly some of your future employees and attend student night. It is traditionally one of our best-attended meetings, lets try to set a record this year.

Don't forget you can still buy a student dinner for \$25 the night of the meeting. It is through your generosity that we are able to provide the students with a dinner and a place to network for employment.

There are also booths still available, see attached flyer!

The Editors
Kristi McQuiddy
Ed Friend

AEG STUDENT / CAREER NIGHT FEBRUARY 12TH 2004

Please join us for this annual event and help support our section and the students

February 12th, 5:30pm in the Student Center at the School of Mines. \$20 for members.

RESERVE A BOOTH

Cost for a booth is \$100. You will receive a 6-foot booth space and a dinner.

STUDENT DINNERS

You may also sponsor a student for dinner at a cost of \$25.

Please complete below:

Company Name _____

Name _____

Address _____

Booth Reservation _____ @ \$100/each

Student Dinners _____ @ \$ 25/each

Reservation _____ @ \$ 20/each

Total _____

Mail check made out to AEG, to PO Box 280663, Lakewood CO 80228-0663

For more information or to sign up by phone please contact:

Ben Arndt (303) 781-9590

Darin Duran (303) 220-0300

Ed Friend (303) 662-0100

2004 CO-AIPG Legislative Reception Registration

Name(s) _____

Telephone _____

Number of individuals _____ X \$ 27.00 = \$ _____

Please enclose a check made out to "Colorado Section AIPG".

Co- Host _____

Telephone _____

Guests _____

E-mail _____

Please enclose a check in the amount of at least \$75.00 made out to "Colorado Section AIPG" and provide specific information for listing your name in materials for publicity.

Exhibitor _____

Telephone _____

Guests _____

E-mail _____

Please enclose a check in the amount of at least \$150.00 made out to "Colorado Section AIPG" and contact Bill Bellis concerning spaces available and publicity.

Please send registrations and checks by mail, before February 23, 2004, to:

Douglas C. Peters
169 Quaker Street
Golden, CO 80401

E-mail (petersdc@petersgeo.com or gws@qwest.net) can be used to reserve individual, exhibitor, and co-host slots in advance of receipt of mailed registrations.

Space for exhibitors is limited. Registrations for exhibitors will be accepted on a first-come, first-served basis and only can be held through receipt of the registration form and payment.

Hors d'oeuvres and beverages will be served.

Limited free parking will be at the north end of the AMPCO lot at 16th Street and Sherman. Entrance to the lot is off 16th Street.

2004 Engineers Week Annual Dinner

“Turning Ideas into Reality”

Date: Friday, February 27, 2004

Place: DoubleTree Hotel, South of I-70 at 32nd & Quebec

Program: Ken Wright, P.E.

Topic: Ancient Water System at Mesa Verde

Time: Reception: 6:00 – Dinner: 7:00 pm

Cost: \$30.00 per person

Corporate Table of 8 = \$240.00

(Includes full signage and name in program, if received by February 16th.)

Program Advertising

Size of Program – 5 ½ x 8 ½

Full Page Advertisement: \$125.00

Half Page Advertisement: \$75.00

Business Card Advertisement: \$40.00

All Engineering Societies are encouraged to bring their banners.

Please make reservations for the Engineers Week Dinner for:

Name / Contact: _____

Company: _____

Phone: _____

- Enclosed is our check for _____ people.
- Enclosed is our check for _____ Corporate Tables.
- Enclosed is our check for _____ advertisement. Call regarding ad copy.
- We plan to bring our banner.

Fax, email, or mail form to: Professional Engineers of Colorado

11166 Huron Street, Ste 27

Denver, CO 80234

Phone: 303-480-1160 Fax: 303-458-0002

Email: pec@imigroup.org



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COLORADO SCHOOL OF MINES - STUDENT CENTER
15th and Illinois St.
Golden, CO 80401