

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 13, 2003**

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 11th**

Student Night 2003!

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.

Mineralogy Truth-Testing Mars Analogue Soil

John Keefner
SD School of Mines & Technology

The 2005 Mars Reconnaissance Orbiter Mission will acquire remotely sensed data from the Martian surface. Research conducted for this project involved analysis of soils from the slopes of Mauna Kea, Hawaii for use as Martian analogue soils. Samples were analyzed using X-ray diffraction (XRD) and X-ray fluorescence (XRF). Tephra and soil samples were collected from various locations near Puu Poliuhu based on Airborne Visible Infrared Imaging Spectrometer (AVIRIS) data. Sample preparation for XRD analysis included separation of ten sand, silt, and clay particle size fractions and the determination of corresponding masses for each fraction. The weight percent of water and XRF bulk chemistry and were also determined for each sample. The major mineralogy was determined for each size fraction using XRD analysis. Phyllosilicates were identified by Mg and K-saturated oriented slides x-rayed after glycerol and temperature treatments. The initial results compare favorably with AVIRIS data and ground identification. The AVIRIS instrument was used for its similar spatial and spectral resolution to CRISM (Compact Reconnaissance Imaging Spectrometer for Mars) instrument specifications. Implications from the comparison of spectral data with truth testing will be applied to mineral identification on Mars.

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Geotechnical Characterization of Heaving Bedrock in the Colorado Front Range Urban Corridor: Case Study of the Upper Pierre Shale

By Jessica Pence Humble
Colorado School of Mines

During the last quarter century, increasing population growth along the Colorado Front Range has influenced residential developments to proceed westward onto a belt of steeply dipping sedimentary bedrock. Some of the bedrock consists of expansive clays and are commonly referred to as "heaving bedrock." Variability of expansive clay content causes damaging differential deformations to residential and light commercial structures. The conventional geotechnical practice for characterizing expansive soils and bedrock in the Denver metropolitan area was designed for flat-lying deposits and includes the use of vertical drill holes and laboratory tests (Atterberg limits and one-dimensional swell-consolidation) to evaluate their potential to swell. The strategy of using one vertical boring at each new home site is not effective for locating and sampling highly expansive strata in steeply dipping bedrock because the probability of identifying all the critical strata is exceedingly small.

The purpose for this study is to determine the best available approach for differentiating and characterizing swelling potential of geotechnical units in the steeply dipping bedrock of the Pierre Shale and compare this with conventional practice. A trench was excavated in the Upper Pierre Shale in late May 2002. The geology was logged and approximately 252 samples were taken. A comparison of several conventional swelling potential indices and emerging swelling potential schemes are currently being made and evaluation of their advantages and limitations for estimating swell potential in the steeply dipping bedrock zone will be performed.

To accomplish this, clod tests and filter paper suction tests are currently being performed at Colorado School of Mines. A local geotechnical testing company is performing Atterberg limits, one-dimensional swell tests, and grain size / hydrometer analyses. Mineralogy data for the samples is also available. Each sample is being classified according to three classification schemes and the percent swell derived from the consolidation-swell test. Mineralogy data for each sample will be compared with percent swell results and scheme classifications to determine the accuracy of each swell potential ranking. In addition, it is expected that the variability of swelling potential indices within and between the strata will be useful as a guide for determining the number of samples and geotechnical tests necessary to accurately characterize the swelling potential. Therefore, by examining and correlating the data, it is anticipated that a more efficient sampling and testing program to correctly

characterize the geologic units and identify the variability of properties within the strata will be determined as a result of this work.

Evaluation of the Geologic and Hydrogeologic Conditions of the North Jacobs Ranch Amendment Area (NJAA) Campbell County Wyoming

Jonathan Brinson

SD School of Mines & Technology

Jacobs Ranch Mine is a surface coal mine located 15 miles east of Wright, Wyoming. A recently acquired tract of land known as the North Jacobs Amendment Area (NJAA), extends the property northward and westward. A geologic assessment of the NJAA was conducted to collect available surface and subsurface information to allow an evaluation of potential geologic and hydrogeologic impacts that may affect present and future mining activities. Geologic units of interest within the study area include the Paleocene Ft. Union and Eocene Wasatch Formations, particularly paleo-sand channels within the Wasatch. This assessment used available geologic boring logs (cutting and geophysical) to interpret the location, continuity, and extent of the sand channels within the Wasatch formation (mining overburden). The paleo-sand channels were modeled using contours of thickness and elevation of the continuous units. Contours also included saturated thickness within the water-bearing units. Detailed cross-sections of the subsurface lithology were produced to give a further representation of the depth of sands within the NJAA. These water-bearing units were tested for hydraulic conductivity using slug-tests, and well drawdown techniques. Data from these tests are currently being analyzed. Model results of test data will be used to define the location and extent of saturated sands in the NJAA. This data can then be used to assess the types of groundwater control measures that may be necessary to implement prior to mining activity to insure highwall stability and

minimal impact to the groundwater flow on adjacent properties.

Modeling Phosphorus Transport and Fate to Evaluate the Effects of Onsite Wastewater Systems on the Lake Dillon Watershed,

Colorado Paula Jo Lemonds

Colorado School of Mines

Onsite wastewater systems (OWS) are considered a viable method for treating wastewater, particularly in locations where connection to a centralized wastewater treatment facility is not feasible. In the Lake Dillon watershed located in Summit County, Colorado, there are many OWS in use. Concerns about the loading of nutrients, particularly phosphorus (P), to Lake Dillon from various sources within the watershed have prompted the formation of a large research project, involving several entities, to assess the cumulative effects of OWS at the site- and watershed-scales. This specific study focuses primarily on the transport and fate of phosphorus and the relative contribution of numerous sources of P within the watershed.

Numerical models are powerful tools for improving knowledge of wastewater flow and pollutant transformations. Watershed-scale models provide the ability to predict the impacts of various sources on surface water and groundwater quality. The Soil and Water Assessment Tool (SWAT) was chosen for the project. SWAT utilizes primarily physically based data to simulate chemical loadings to streams. Parameters associated with snowmelt and orographic effects were adjusted to create a rigorous match to observed streamflow by improving the magnitude and timing of streamflow hydrograph peaks along the Blue River, one of three tributaries of Lake Dillon.

To simulate the nutrient contributions from OWS in the watershed, a fertilizer procedure was

defined in SWAT in areas of high OWS density because SWAT does not contain explicit algorithms for simulating OWS. Calculations were completed to determine the correct amount and chemical composition of the added fertilizer. In addition, a sensitivity study was conducted to determine the importance of numerous SWAT variables related to P transport and fate. Based on results of the study, several sensitive parameters were adjusted to create a match to limited observed P data along the Blue River.

The modeling effort revealed that SWAT could be customized to simulate hydrology in the Lake Dillon watershed. The sensitivity study indicated that uncertainty of the values of several chemical and hydrologic SWAT input parameters inhibits the assignment of relative contributions of P to specific sources in the watershed, including OWS. Additional measurement of several hydrologic parameters is essential if the distribution of P sources within the watershed is to be accurately simulated by the model.

New Mexico Subsection Meeting

Yes, that is right, the New Mexico Subsection is off and running, they will have their inaugural meeting in April, see the bulletin below for more information.



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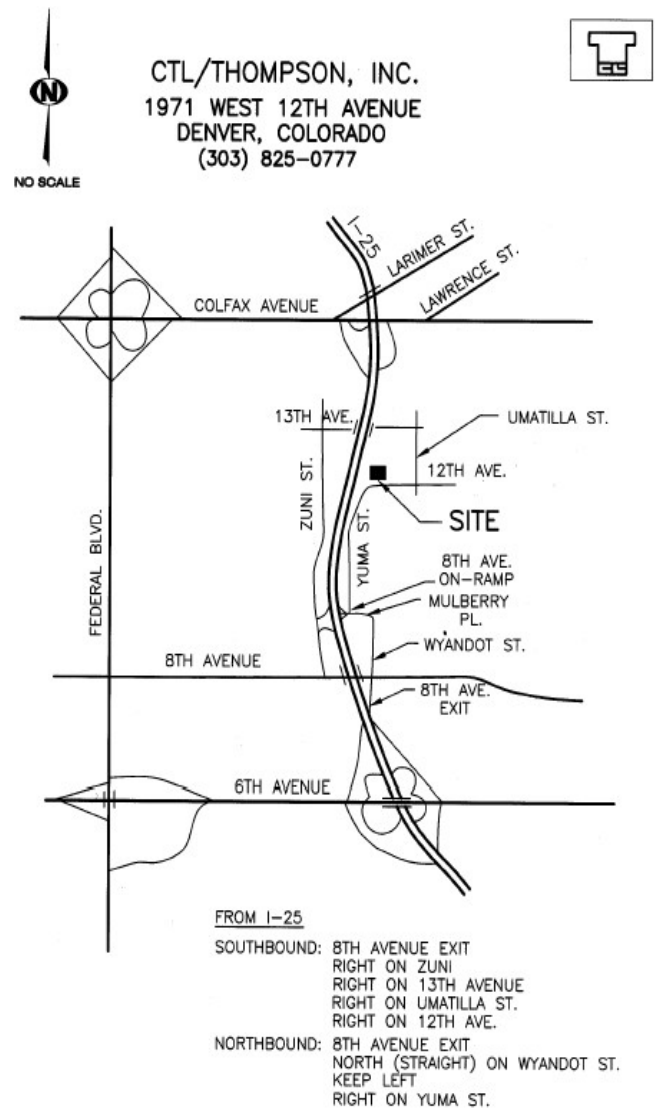
Case Histories

This is a guest column we hope to continue with contributions from AEG members. Harry Siebert has again offered a column. We are looking for other professionals to share their insight and knowledge with their peers through this medium.

If you have an article to contribute contact Kristi McQuiddy newsletter@aeqrm.org.

Vail 2003 Planning Meeting

There will be another planning meeting on February 4, 2003 at 6pm. The meeting will be at CTL Thompson (1971 West 12th Avenue - 303-825-0777). Refreshment and Pizza will be purchased. Cost will be \$8 per person.



Construction Vibrations

Harry Seibert

Sometimes vibrations, or elastic waves, from compaction, pile driving, blasting, hauling, etc. are a cause for concern. The elastic waves generated may impact structures, facilities, and slopes. Monitoring of elastic waves can be accomplished with portable seismographs that record acceleration, velocity, peak particle velocity, particle displacement, and decibels.

Some examples... Pile driving H-piles into rock on a project in an urban area caused older electro-mechanical switches to behave erratically in a telephone company's facility. The project was well known and telephone company staff attended design and pre-construction meetings. I doubt if anyone knew the sensitivity of the switches to a pile hammer. Adjustments were made to the driving criteria, however, at a higher cost. A vibratory compactor caused a barber shop to close when the floor was being deflected. The shop owner was compensated for the loss of business.

Most of the time, blasting damage is not from elastic waves - flyrock is also a problem. There are instances where damage has occurred because of elastic waves causing fill to adjust, therefore damaging the structure or facility. A recommendation for urban and suburban projects is to do a pre-construction survey of facilities and structures to obtain baseline data. In the mid-90's, a large excavation contractor was a major purchaser of crack monitoring devices. They are a help because owners and occupants see someone whose company is taking that extra step for their safety.

Number one item - engage the services of an engineering geologist prior to any land acquisition for a proposed project. It is cost effective and a good business decision. Picking up the pieces when problems occur and need to be addressed can be time consuming and expensive.

Chuck Dowding's book Construction Vibrations is a good introduction to the subject. Most construction projects are uneventful when the

design has utilized the services of an engineering geologist.

RMS 2002-2003 Speakers

March 13, 2003 - Skip Watts Jahn's Lecturer, *Geology and Politics*

April 10, 2003 - TBD

May 8, 2003 - TBD

Office for Sublet

Sub-lease in office of geotechnical engineering firm. Approx. 225 sf - private with windows on atrium. Access to high speed internet service, laser printer, copy facilities, and secretarial services negotiable. Littleton Center - Excellent location adjacent to light rail. \$500, incl utils. Call Jim at 303.810.6011

Rocky Mountain Section Outreach Program

Attempts are being made to increase member participation in the outlying areas of the section. If you have ideas for an event, contact Ed Friend at webmaster@aeqrms.org.

Aspiring Employees

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



Past AEG-RMS Section Chairs, January 24, 2003
RMS Section Meeting

Parting Words

Wow! What a January meeting! We had 54 people show up to hear Scott Burns and on a Friday night to boot. We had the opportunity to view the new Corporate Headquarters and Becky Roland was an exceptional host putting up with the exciting crowd of engineers and geologists invading her office. The above picture is the of the former RMS chairs that were on hand at the meeting.

The AIPG Legislative Reception is occurring after this newsletter is published, but AEG-RMS will be well represented with our booth that will be staffed by Tom Terry, Darin Duran and Sam Bartlett.

Student Night is just around the corner and we have four excellent presentations from students from SDSM&T and CSM. In years past, this has

been one of our most highly attended meetings. Please come out and show your support for the engineers and geologists of the future. If you have not been contacted (we apologize) and would like to contribute, the form is attached below.

In March, Skip Watts (the current Jahn's Lecturer) will be here giving his talk on Geology and Politics. It will encompass his 14 months on Senator Lieberman's personal staff.

We look forward to a huge turnout at Student Night from students, professionals and exhibitors. Don't forget to reserve your space for dinner.

The Editors

Ed Friend, Kristi McQuiddy

AEG STUDENT / CAREER NIGHT FEBRUARY 13th 2003

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

February 13th, 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:

Jim Wright (303) 662-0100

Darin Duran (303) 220-0300

Ed Friend (303) 662-0100

AEG NEW MEXICO SUBSECTION Meeting

*We are having a meeting in New Mexico!
Come join us!*

Date: April 4, 2003

Time: 5:30 pm

Location: NM Tech
Room MSEC 105
Socorro, NM

Guest Speaker: Peggy Ganse

Topic: Tunneling

Can't make it to Denver? Come to Socorro!

Our neighbors in Southern Colorado, West Texas, Eastern Arizona, or anywhere else are also invited.

For reservations and information, contact:

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