



# *Association of Environmental & Engineering Geologists*

## **NORTH CENTRAL SECTION**

*"Serving Professionals in Engineering, Environmental and Groundwater Geology Since 1957"*

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### **THE NEXT AEG DINNER MEETING IS**

**Tuesday, April 17, 2012**  
**Greek Islands Restaurant**  
**300 East 22<sup>nd</sup> Street**  
**Lombard, IL**  
**Phone (630) 932-4545**

#### **PROGRAM TOPIC:**

**2012 Student Paper Competition**  
**Night**

#### **SPEAKERS:**

**Anirban Basu, University of Illinois**  
**at Urbana-Champaign**  
**Lauren Schaefer, Michigan**  
**Technical University**  
**Guoqun Zhang, Michigan Technical**  
**University**

**WHEN: Tuesday, April 17, 2012**

Cocktails @ 5:30 pm

Dinner @ 6:30 pm

Presentation following dinner

**COST: \$35 Members**

\$5 Students and Professors

\$40 Non-Members

**RSVP: You may RSVP by phone or email**

**by Monday, April 16th**

Renee Wawczak (847) 519-3430 or

[rwawczak@pec-inc.com](mailto:rwawczak@pec-inc.com)

## ABSTRACTS

### **Anirban Basu: Determination of Hexavalent Chromium Reduction Using Cr Stable Isotopes: Isotopic Fractionation Factors for Permeable Reactive Barrier Materials**

Cr stable isotope measurements can provide improved estimates of the extent of Cr(VI) reduction to less toxic Cr(III). The relationship between observed  $^{53}\text{Cr}/^{52}\text{Cr}$  ratio shifts and the extent of reduction can be calibrated by determining the isotopic fractionation factor for relevant reactions. Permeable Reactive Barriers (PRB) made of Fe<sub>0</sub> 12 and *In Situ* Redox Manipulation (ISRM) zones effectively remediate Cr contaminated aquifers. Here, we determine the fractionation factors for dominant reductants in reactive barriers and reduced sediments obtained from an ISRM zone at the US DOE's Hanford site. In all cases, significant isotopic fractionation was observed; fractionation factors (expressed as  $\epsilon$ ) for Fe(II)-doped goethite, FeS, green rust, FeCO<sub>3</sub>, and ISRM zone sediments are 17.392‰, 2.12‰, 2.65‰, 2.68‰, and 3.18‰ respectively. These results provide a better calibration of the relationship between Cr isotope ratios and the extent of Cr(VI) reduction and aid in interpretation of Cr isotope data from systems 19 with reactive barriers.

### **Lauren Schaefer: Numerical Modeling of Volcanic Slope Instability and Related Hazards at Pacaya Volcano, Guatemala**

This study uses numerical modeling to determine the possibility of an edifice collapse at the active Pacaya Volcano in Guatemala. Limit equilibrium (LEM) and Finite element methods (FEM) stability analyses were performed on the southwestern flank using the physical-mechanical material properties of Pacaya's intact rocks and rock mass characteristics based on field surveys and laboratory tests. The Hoek and Brown failure criterion was used to calculate the rock mass friction angle, apparent cohesion,

and rock mass parameters in a specified stress range. Volcanic instability was assessed based on the variability of the factor of safety using deterministic, sensitivity, and probabilistic analyses considering external forces as potential triggering mechanisms of collapse. Results indicate that a triggering mechanism such as magma pressure or seismic activity is required to destabilize the edifice, as it remains stable under gravity alone.

### **Guoqun Zhang: Analyzing the Slope Stability of the Transitional Slope Beside a Loess Platform, in Northwest China**

Loess soil is a kind of predominantly silty sediment that has been deposited by wind and covers a significant portion of northwest China. The special properties of the loess soil cause it to be highly prone to erosion and susceptible to landslides. In this study, the condition of the Zhaitou slope, at the Jingyang Platform in Shaanxi Province, was modeled using a computer program to analyze the stability of the slope. This analysis includes a simple factor of safety calculation with different groundwater table levels, and a transient analysis which can calculate the factor of safety with changing in time. The possible causes of the landslide will be discussed after comparing those results. The main suspected cause of the landslide is the long-term irrigation activities started from 1976. These activities had led to the rising of the groundwater level. The slope stability analysis showed that the irrigation would have a significant effect on reducing the loess slope stability. However, the trigger that causes the slope failure is the probably the usual heavy rainfalls of the year.

Please join us this April to support our students as they present their interesting and diverse presentations.

## **CHAIRMAN'S MESSAGE**

I am pleased to announce the North Central Section's 2<sup>nd</sup> Annual Student Paper Competition Night. Please plan on joining us in Lombard, IL this month to support our student presenters. We had many fantastic research topics submitted for our competition this year, thank you to ALL of the students that submitted a paper. The Section officers have narrowed down the submissions to two graduate finalists and the winning undergraduate submission. The students will receive their awards following the presentations. It is hard to believe how quick this year is going, just two more dinner meetings until our summer break!

## NEWS OF MEMBERS

The Newsletter Editor needs your news and stories for our newsletter. Anything you can contribute would be appreciated by all. Please send us your announcements or geo-logs, they may be related to your professional or personal milestones, or describe an interesting trip or project you have been working on. All news should be sent to **Natalie Schaefer** and will be published in our next newsletter.

## OTHER SECTION NEWS

### Corporate Sponsors Corner

*(Note: We need your support! If you are interested in becoming an AEG Section Sponsor, please contact Glenn Wittman at [glenn.wittman@va.gov](mailto:glenn.wittman@va.gov) to learn more about the various benefits and sponsorship levels, and to request a copy of our sponsorship agreement.)*

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