



ASSOCIATION OF ENVIRONMENTAL & ENGINEERING GEOLOGISTS
Serving Professionals in Groundwater, Environmental, and Engineering Geology

Section Meeting

You are invited to attend the AEG KC/O Section's September 11, 2008 meeting. Dr. Jejung Lee, UMKC, will be our guest speaker.

Date: Thursday, September 11, 2008

Time: 5:30-6:30 Registration and Dinner-BBQ by Jack Stack
6:30 Speaker Presentation

Topic: Quantitatively Directed Exploration and Permeable Reactive Barrier Remediation

Speaker: Dr. Jejung (JJ) Lee

Cost: \$15/person
Students \$7.50

Location: Diastole, 2501 Holmes, Kansas City, MO

Diastole is a prominent fixture in the Hospital Hill area. It was built as Dr. E. Grey Dimond's residence which he later donated to UMKC. It contains valuable displays of 100s of artifacts that he had collected during his overseas travels. A picture and directions are available at: <http://www.umkc.edu/virtualtour/diastole.asp>

Eligible for 1.0 Professional Development Hour (PDH) for attending.

For reservations, please call Blane Wood at (913) 563-1452 or email blane.wood@pacelabs.com. Reservation **deadline is noon September 10, 2008.**

To access this information on the internet, please go to our section web page at www.vocshop.com/aeg/aegkco.html.

Quantitatively Directed Exploration and Permeable Reactive Barrier Remediation

Abstract: A quantitatively directed exploration (QDE) approach using the most contributing input parameter to output covariance is presented for a Permeable Reactive Barrier (PRB) remediation. As PRBs are being employed for in-situ site remediation of groundwater that is typically flowing under natural gradients, site characterization is of critical importance to the success of a PRB. It is suggested that a design phase of site exploration be employed to select an appropriate remediation technique which is then followed by a design-specific site exploration. The additional information from the design-specific site exploration can be used to optimize the design parameters to avoid potential failure. The QDE approach is demonstrated on the Kansas City Plant in Kansas City, MO, a case study where a PRB was installed. The Largest Variance (LV) and Most Contributing Input to output covariance (MCI) were applied in this PRB example. The LV identifies the location of the largest output uncertainty produced from input parameters. The MCI approach to direct exploration chooses the location where input parameter uncertainty contributes the most to output uncertainty. It is shown that additional QDE during the design phase could have prevented the remedial failure that was caused by missing a geologic body having high hydraulic conductivity at the one end of the barrier. This case study demonstrates the MCI approach clearly indicates where the next sampling should be made to reduce the uncertainty of the model prediction. In addition, sampling at the location that most reduces overall site uncertainty improves the reliability of a design.

Biography of Jejung “JJ” Lee

Ph.D. Civil Engineering, Northwestern University, Evanston, Illinois	2001
MS Geophysics, Seoul National University, Seoul, Korea	1996
BS Geology, Seoul National University, Seoul, Korea	1992
Postdoctoral Fellow, Civil Engineering, University of Alabama, Tuscaloosa, AL	2001
Postdoctoral Fellow, Chemistry, Indiana University, Bloomington, IN	2001 - 2003
Assistant Professor, Geosciences, University of Missouri – Kansas City	2003 - present

My research interest is to develop geostatistical and geo-computational methodologies to obtain reliable hydrologic models for ground water remediation and water resources managements. Since the hydrologic process is non-linear and geologic structure is highly heterogeneous, predicting groundwater flow and contaminant transport is inherently uncertain. This uncertainty gives rise to potentially erroneous models and may increase the risk of remedial failure. To overcome this problem, I have developed various geostatistical techniques that merge hydrologic and geologic data into a stochastic framework to characterize uncertain site conditions and to predict remedial performance. The present study is my recent effort to link uncertainty-based site exploration with permeable reactive barrier designs. Our research team presented this study at the American Geophysical Union Joint Assembly 2008 at Fort Lauderdale, Florida in May 2008, and submitted a journal article to the Journal of Hazardous Materials (currently in press).