



2014-2015

November Meeting Notice

Minnesota Geotechnical Society

Back-Analysis of a Spoil Failure at an Open Pit Lignite Mine

Michael B. Haggerty – Barr Engineering Co.

A large spoil pile failure occurred in an open pit lignite mine during mining operations. The observed headscarp was located 200 m back from the toe of the spoil and measured 400 m in length with 9 m of vertical offset. A forensic geotechnical investigation, including the installation of inclinometers and vibrating wire piezometers, and subsequent slope stability analysis were performed. Supporting laboratory testing coupled with a back-analysis indicated that the long-term, drained shear strength of a native basal shale must have been mobilized during the failure, whereas local practice for similar applications in this geologic environment is to use the undrained shear strength for fine-grained materials. Further investigation indicated the presence of fissures and slickensides in the basal high-plasticity shale near the failure area but not as a result of the observed deformation.

The back-analysis employed limit equilibrium modeling in addition to deformation modeling using FLAC. As part of the FLAC modeling, a strain-softening constitutive model was incorporated to simulate progressive failure and complex excavation sequencing. In general terms, factors such as shale plasticity and the localized dip of the basal unit have been investigated for their possible role in the failure. Furthermore, shale permeability and thickness have been analyzed as factors influencing the apparent mobilization of the drained shear strength of this material within the time frame for which mining occurred in this area.

Date: Wednesday, November 12, 2014

Location: Rose Vine Hall (downstairs at Grumpy's Bar & Grill)
2801 Snelling Ave. N., Roseville, MN

Time: 6:00 Social Hour – TBD

7:00 Dinner: Salad, Rolls, Coffee/Soda and a choice of:

1. 10-Ounce Top Sirloin - Char-grilled and topped with bleu cheese garlic butter. Served with white cheddar mashed potatoes and a sautéed vegetable medley – \$35.00
2. Chicken Marsala - A chicken breast lightly breaded and drizzled with marsala wine sauce, mushrooms and onions– \$35.00
3. Feta Cheese and Sun-Dried Tomato Stuffed Walleye - Served over white cheddar mashed potatoes with a drizzle of lemon thyme butter sauce – \$35.00
4. Chicken Fettuccine Alfredo - Fettuccine noodles, snow pea pods, and mushrooms tossed in an Alfredo cream sauce and topped with a grilled chicken breast and parmesan cheese – \$30.00
5. Cobb Salad - Iceberg topped with turkey, ham, bacon, hard cooked eggs, avocado, diced tomatoes, bleu cheese crumbles, and black olives with choice of dressing (Ranch, FF Ranch, Bleu Cheese, French, FF French, Italian, FF Italian, Balsamic Vinaigrette) – \$25.00
6. Desert – Sponsored by Barr Engineering Co.

8:00 Presentation – Michael Haggerty – Barr Engineering Co.
(One professional development hour toward continuing education requirements for Professional Engineers is available).

Cost: Paid 2014-2015 MGS Members receive a \$5 meeting discount on the meal costs listed above.

President	Vice President	Secretary	Treasurer	Program Chair	ASCE Chair	Past President	Duluth Representative
Joel Swenson	Josh Van Abel	Kurt Schimpke	Bill Cody	Kyler Bender	Joe Bentler	Kurt Heckendorf	Marty Halvorson
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<http://www.mngeotechnicalsociety.com>

The cost for full-time students is \$5, payable to MGS at the door.

Reservations: Requested by 12 Noon, Friday, November 7, 2014

Please register via the website at <http://www.mngeotechnicalsociety.com/eventsmasterlist.asp?loc=impls>

Membership applications can be found at: <http://www.mngeotechnicalsociety.com/memberjoin.asp>

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