

Slope Stability in Rock and Soil Professional Development Course September 4-6, 2002 Sudbury – Ontario – Canada

Hosted By: MIRARCO – Mining Innovation & Laurentian University

Goals and Course Contents:

This professional development course will provide the tools and knowledge needed to tackle slope instability problems both in rock and soil (tailings). This will be achieved through a series of lectures led by Erik Eberhardt, and John Krahn with case study examples by Richard Brummer, Peter Kaiser, Vahid Hajiabdolmajid, and a representative from Golders Associates. Accompanying the lectures and case studies will be a series of tutorials focusing on the different software used for slope analysis.



As economic pressures push for deeper, steeper open pit mines, open pit stability assessment becomes more important to the mining industry. Even with the improvements made to stability, landslides still exact a heavy risk on open pit mines. This course will review the processes and mechanisms responsible for landslides in soil and rock, the procedures available for investigating them, and the means to analyze and mitigate such phenomenon. Emphasis will be placed on case studies and practical tutorials involving the use of numerical stability analysis techniques.



As the scale of tailings disposal reservoirs and tailings dams increase, advanced design methods require proper site characterization and slope analysis. A greater understanding of the pressures that cause these dams to fail is required to avoid the environmental damage exacted by tailings dam failures.

Instructors:

Erik Eberhardt – Swiss Federal Institute of Technology, ETH Zurich

Dr. Erik Eberhardt completed his Ph.D. in engineering rock mechanics at the Universities of Saskatchewan and Manitoba in 1998. Prior to this he worked on pit wall stability mapping in open pit coalmines in British Columbia, and later on the use of numerical modelling to analyze complex slope failure mechanisms in such environments. In 1998, he accepted a position at the Swiss Federal Institute of Technology (ETH Zurich) as a senior researcher and lecturer responsible for rock mechanics and geotechnics. In addition to publishing over 35 journal and conference papers, Dr. Eberhardt was invited to present the keynote lecture on the use of numerical modelling at the 2002 NATO Advanced Research Workshop on Massive Rock Slope Failures in Celano, Italy. His current research interests involve the application of rock mechanics and numerical modelling to tunnelling and rockslide problems in the Swiss Alps.

John Krahn – GEO-SLOPE International Ltd.

Dr. John Krahn completed his Ph.D. at the University of Alberta in 1974, and later joined the Department of Civil Engineering at the University of Saskatchewan. In 1981, he returned to private practice consulting primarily on the construction of artificial islands in the Beaufort Sea and on large resourced-based industrial projects. In 1987, Dr. Krahn joined GEO-SLOPE International in Calgary where he is now manager and principle owner. Amongst many awards, Dr Krahn was given the honor of presenting the R.M. Hardy Keynote address at the 2001 CGS Conference in Calgary entitled *The Limits of Limit Equilibrium Analyses*. Dr. Krahn's primary professional interest and expertise is in the application of numerical modelling in geotechnical engineering practice.

Case Studies:

Vahid Hajiabdolmajid – MIRARCO-Mining Innovation

Don Welch– Golders Associates

Richard Brummer – Itasca Consulting Canada Inc.

Peter Kaiser – MIRARCO-Mining Innovation

What will the three days entail?

Program:

Day 1 – Wednesday September 4, 2002

Fundamentals of slope stability and conventional analysis techniques – Erik Eberhardt

The first day of this course will serve as an introduction to the fundamentals of slope stability and conventional analysis techniques through a series of lectures. Erik Eberhardt will discuss such areas as: *Landslide features types and processes* – Terminology & classification, types of movement, and basic failure & trigger mechanisms; *Site investigation and slope instability recognition* – Investigation procedures, surface & subsurface investigations, field instrumentation, and rock mass characterization; *Conventional rock and soil stability analysis techniques* – limit equilibrium, wedge & toppling analysis, rock fall simulation, method of slices, drained & undrained conditions, and soil liquefaction potential.

Throughout the course tutorials will follow the lectures introducing different software packages applicable for particular slope failure modes.

Day 2 – Thursday September 5, 2002

Advanced slope stability analysis techniques – Erik Eberhardt & John Krahn

Now that the fundamentals are in place, Erik and John will lead discussions on advanced slope stability analysis techniques. In the course of their lectures they will cover such topics as: *Complex slope stability analysis techniques* - methods & method selection, limitations & applicability, selecting appropriate material properties, influence of soil properties on the critical slip surface, and interpretation of results; *Water and stress factors* – seepage forces, stress & pore pressure analysis, software applications; *Stabilization of slopes* – design considerations, soil & rock reinforcement, and ground treatment; *Advanced rock stability analysis* – continuum vs. discontinuum modeling, and seismic analysis.

These lectures will again be accompanied by software application tutorials.

Day 3 – Friday September 6, 2002

Case Studies – Vahid Hajiabdolmajid, Peter Kaiser, Richard Brummer, Erik Eberhardt and Don Welch

During this final day the materials covered in this course will be reinforced by presentations on various slope stability case studies in rock and soil. Along with these cases there will be a final tutorial introducing a software package tailored for discontinuum analysis.

Course Fee:

- [Registration](#) for this course is \$850 for the full three-day package, including software access, in-room computer services, and refreshments.
- Registrants will be responsible for their own accommodations and meals while they are attending the course.

- Registrants wishing to withdraw from the course will be charged a \$50 administrative fee. No refunds will be allowed after August 26, 2002.
- As space is limited we encourage early registration to ensure a spot.

Contact Information:

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Brittle Failure of Excavations in Highly Stressed, Rockbursting Ground

November 13-15, 2002

Sudbury, Ontario