

MINING

NEWSLETTER FROM RAMBOLL

JUNE 2011

RAMBOLL

SEMINAR ABOUT TREATMENT OF MINE TAILINGS, PART 2

The 16 and 17 November 2010, Ramboll Sweden and Luleå University of Technology organised a seminar in Luleå dealing with the issue of treatment of mine tailings.

Almost 80 participants from Sweden, Finland, UK, Norway and France gathered at Nordkalotten Hotel to attend this seminar. The seminar was structured around three key topics:

- alternative cover materials for tailings deposits
- research programs and networks in the field
- treatment to improve the geotechnical properties of tailings e.g. solidification and stabilisation, thickening, and paste.

All the presentations are available at www.ltu.se/research/Forskningsamnen/Tillampad-geologi/Forskningsprojekt/Seminarium-16-17-November-2010-Behandlingsmetoder-for-gruvavfall-1.80644

TAILINGS STABILISATION AND SOLIDIFICATION (STSO)

For the seminar's second day and third part, tailings stabilisation and solidification (StSo) as well as paste technology were the main subjects of interest.

PASTE TECHNOLOGY

Jamie Spiers from the consulting company SRK started with a presentation of the applications of paste technology. He first showed the different advantages of paste technology for mining industries, especially due to the fact that paste induces less water to treat and less environmental impacts. He then presented how the process works and what are the rheological and geotechnical characteristics of the paste. The presentation was concluded by a presentation of an actual field test in Esperanza, of the in-situ pilot disposal and of the results obtained by computer simulation.

RESEARCH PROGRAMS AND NETWORKS

The second part of the seminar was dedicated to the research programs and the different networks that work with tailings.

- Lars Lövgren from Umeå University opened the floor with a presentation of the *Georange program*, a non profit organisation for the development of the mining and minerals industry. (<http://www.georange.se/>)
- Lotta Sartz presented the project *Bergskraft Bergslagen*, an organisation involving Kopparberg and Örebro University and helping the growth of Bergslagen through working on cost efficient low-maintenance methods for remediation of historic mines. (<http://www.bergskraft.se/>)
- Thomas Liljedahl from Umeå University introduced the *MCN program*, the northern Sweden soil remediation centre which is the result of collaboration between universities, consulting companies, entrepreneurs, laboratories and industries. (<http://www.mcnio.com/>)
- Christin Jonasson from Ramboll Sverige presented *Nätverket Renare Mark*, a Swedish network for soil and groundwater remediation. The network then had its yearly meeting. The day was concluded by a dinner. (<http://www.renaremark.se/>)

STABILISATION AND SOLIDIFICATION OF TAILINGS AND SEDIMENTS

The second speaker of the day was Merja Autiola from Ramboll Finland who talked about her work with stabilisation and solidification of tailings and sediments. She explained the advantages of this method that uses recyclable industrial by-products and presented several examples of projects with stabilisation such as the mine of Pyhäsalme and Helsinki harbour.

SWELLING AND SHRINKAGE OF UNSATURATED CLAYS

The following presentation by Farimah Masrouri, professor at the French national school of geology and researcher at the research centre in geomechanics and geoenvironmental engineering, dealt with swelling and shrinkage of unsaturated clays. After having presented cases of shrinkage and swelling that damage light buildings, she presented first the influence of several suction cycles (wetting and

drying cycles) on the hydromechanical behaviour of the soils and then the hydromechanical behaviour of swelling soils under shallow foundations.

LONG TERM PERFORMANCE OF LIME AND CEMENT STABILISED SOILS

Olivier Cuisinier, also from the French national school of geology and researcher at the same centre, carried on with the subject of stabilisation with his presentation of short and long term performance of lime and cement stabilised soils. He first presented the basic principles of stabilisation as a mixing of soil and binder and how lime addition can increase shear strength. He then showed the short term performance and how the presence of some chemicals can alter the efficiency of the stabilisation. He finally presented the long term performance and how water circulation and successive wetting and drying cycles can influence the efficiency of the stabilisation.

Swelling and shrinkage of unsaturated clays

FREEZING AND THAWING ON MECHANICAL AND HYDRAULIC PROPERTIES OF TAILINGS

The last speaker was Sven Knutsson from Luleå University of Technology who talked about the effect of freezing and thawing on mechanical and hydraulic properties of tailings. The presentation exposed the consequences of frost and how the soil structure change because of freezing and thawing. Frost penetration should be addressed as it may alter the function of the sealing layer. Mineral protection layers such as till have relatively low insulation properties compared to e.g. layers with organic matter.

ELODIE BENAC, CHRISTIAN MAURICE



Individual house in Tunisia



Small building in Senegal

Expansive soils damage foundations by uplift as the soils swell with moisture increases.

PREFEASIBILITY STUDY TO DESIGN THE OPTIMAL MINING PROJECT

Ramboll has signed a framework agreement with Nordic Iron Ore AB regarding the planning of 'the optimal mining project'. The ambition is to once again make Sweden a major player in the international iron ore market. The plan is to reopen two mines in the city of Ludvika. Ludvika was an important site for iron ore mining in Sweden until the late 1970s. However, increased international competition resulted in decreasing iron ore prices and the closure of the mines.

Nordic Iron Ore AB investigates the possibility of reopening two mines in Ludvika. Ramboll will conduct an early prefeasibility study aiming at designing 'the optimal mining project'. The first part of the study

includes investigations regarding ore quality as well as the potential earnings from a reopening of the mines. The study will also estimate the investment cost of reopening the mines; early projections point to costs of about SEK 2 billion.

NEW EXPERTISE IN DAM SAFETY ISSUES IN BODEN

Mårten Jakobsson and Hans Häggström will join the geotechnical group in Boden. Both are experts in dam safety and geotechnical engineering e.g. control of filling material in dam project, dam safety in embankment dams in waterpower corporation and tailings dams, dam measurements evaluation and stability- and groundwater calculations in Geo/SLOPE and Geo/SEEP.

CONFERENCES

Come and visit our stand at:
FEM 2011 - 8th Fennoscandian
Exploration and Mining Conference
November 1-3, 2011
Levi, Finland

<http://fem.lappi.fi/en>

We all wish you a very nice summer!

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