

MINING WASTE

NEWSLETTER FROM RAMBOLL

MARCH 2010

RAMBOLL

SERVICE AREA ENVIRONMENT AND NATURE

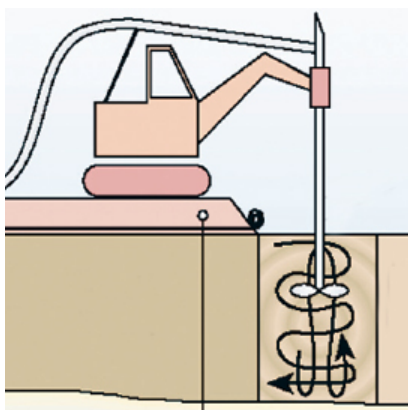
The Service Area of Environment and Nature aims at positioning Ramboll as a leading provider of sustainable solutions, protecting nature and environment.

Thus, the Service Area for Environment and Nature's objectives are to bring best global practice and expertise to our customers in order to provide sustainable solutions and protecting nature and environment. Ramboll is a truly multidisciplinary company providing various water and environmental services under the Service Area.

**OLA LINDSTRAND,
RAMBOLL SWEDEN, STOCKHOLM**



REMEDIATION PLAN FOR LØKKEN MINE IN NORWAY



More about the Ramboll Stabilization and Solidification (STSO)-method

SEE LINK FOR MORE INFO:

<http://www.ramboll.se/news/viewnews.aspx?newsid=98466483-EDA2-496D-8F1C-52AAE091FD14>

By conducting an environmental impact assessment, Ramboll specialists from Norway, Finland and Sweden have proposed innovative techniques for minimizing sulphuric acid, mine water and heavy metals leaching from a former mining region in central Norway at Løkken 70 km south of Trondheim.

After more than 300 years, the mining activity in this region was closed in 1987. Since early 1900 methods have been used to minimize the leaching of metals caused by a number of mining activities.

In the environmental impact assessment (2009), Ramboll described a number of alternatives on how to satisfy demands from The Norwegian Pollution Control authorities. The main target for the project, owned by the Directorate of Mineral Manage-

ment, is to hamper metals and sulphuric acid mine water leaching from the spoil dumps and other contaminated areas through the surrounding areas to the nearby salmon rich river.

Two of the three main remediation alternatives includes preservation of spoil dumps, also being a major source of contamination regarded having museum value and thus worthy to preserve. The proposed methods include the Ramboll Stabilization and Solidification (STSO)-method. The different concepts are described and remediation cost is calculated. The Norwegian Pollution Control authorities will provide the final concept, hopefully during 2010. Remediation cost is estimated to 20 Mi€.

**JAN ERIK BUAN,
RAMBOLL NORWAY, TRONDHEIM**

MINING WASTE REMEDIATION USING REST PRODUCTS FROM THE PAPER INDUSTRY

Ramboll initiated a master thesis where Green liquor dregs (GLD) a rest products from the paper industry were tested for the treatment of Cu-tailings. The thesis was performed by Ms Lucile Villain.

GLD has similar hydro-geotechnical properties as tailings paste and may be used as an amendment to tailings to reduce the leachate generation, improve the leachate quality, and improve the geotechnical properties of the mixture.

Addition of a 30% mixture of GLD and fly ash (FA) to tailings reduced the hydraulic conductivity by more than one order of magnitude.

Thanks to its alkaline properties, addition of 10% GLD has a direct effect on the metal leaching from tailings reducing copper leaching by a factor of 4 to 10 and reduced leaching of elements such as Co, Cd, and Ni.

An article can be found at: <http://www.proceedings-stfandicard-2009.com/>

CHRISTIAN MAURICE,
RAMBÖLL SWEDEN, LULEÅ



MATTIAS VON BRÖMSEN,
RAMBÖLL SWEDEN, STOCKHOLM

CHEMICAL STABILISATION OF MINE WASTE WITH SEWAGE SLUDGE AND CALCIUM CARBONATE RESIDUES FROM PAPER MILLS

Ramboll initiated a master thesis where chemical stabilisation of mine waste was tested with sewage sludge and calcium carbonate residues from paper mills. The thesis was performed by Ms Linda Höckert. The stabilisation of the mine waste succeeded in maintaining a near neutral pH in the leachate, compared to a pH value of 3 in the leachate from untreated waste.

The average concentration of copper and zinc in the leachate from untreated waste exceeded 100 and 1000 mg/l respectively, while these metals were detected in concentrations around 0.1 and 1 mg/l, respectively, in the leachate from the treated wastes. The added sludge contributed to immobilise metals at neutral pH. Future work should be focused on assessing the sustainability of this and similar remediation.

CONTACT

OLA LINDSTRAND

Service area coordinator
ola.lindstrand@ramboll.se

MATTIAS VON BRÖMSEN

Stockholm
mattias.bromssen@ramboll.se

HENRIK BERGSTRÖM

Umeå
henrik.bergstrom@ramboll.se

CHRISTIAN MAURICE

Luleå
christian.maurice@ramboll.se

JAN ERIK BUAN

Trondheim
janerik.buan@ramboll.no

Ramböll Sweden AB

Head Office
Krukmakargatan 21
104 62 Stockholm
Phone +46 (0)10 615 60 00

www.ramboll.se

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