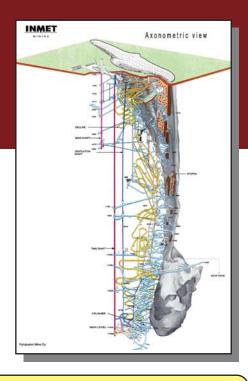


Factsheet providing a brief summary on one of the model sites in ProMine

Pyhäsalmi (Finland) October 2010

Pyhäsalmi is the ProMine model site for the production of metallised fibres in which the high metal content of acid mine water is used for the metallization of waste cellulose fibres in the paper and pulp industry, and will be applied as a conductive component in antistatic abrasive paper.



Pyhäsalmi Mine, Inmet Mining Co

Inmet Mining Co, a Canadian-based global mining company has been operating the Pyhäsalmi mine since 2002. The mine is located in a sparsely populated area in the municipality of Pyhäjärvi in western Finland. The mine produces Copper, Zinc and Pyrite concentrates from a volcanogenic massive sulphide deposit, and is the oldest metal mine in Finland and the deepest in Europe. The Cu-Zn-S-ore body was discovered in 1958 and operation in the mine started in 1962 by Outokumpu Oy. Ore exploitation began as open pit mining and continued as underground mining from 1967 onwards. Ore excavation from the open pit was ceased in 1975.

Current Situation

Based on current reserves, the Pyhäsalmi mine is expected to continue production till 2018. Underground workings currently reach a depth of 1.4 km. Following automated underground crushing and screening, the ore is hoisted to a mill where ore concentrates are separated using flotation. Four central pumping stations ensure that the mine workings are kept dry. Remotely controlled ventilation shafts bring in air and remove gases from blasting with explosives and machinery.



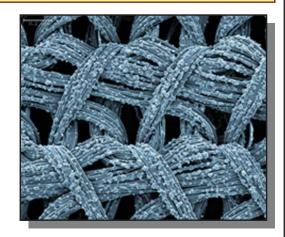
Due to the limited amount of waste rock, additional rock is excavated from a surface quarry for the backfilling of exploited galleries. Coarse-grained tailings are mixed with blast furnace slag and lime, and also used as backfill. Drained mine water, mill process water, surface drainage from the industrial estate and seepage water from the tailings area are pumped into tailing ponds for treatment. By adding lime to the water, heavy metals are precipitated in two tailing ponds. After settling, the water is discharged to a third pond where more lime may be added before the water is pumped into Lake Pyhäjärvi.

The Pyhäsalmi mine uses state-of-the-art technology: a 1,450-metre, fully-automated hoisting shaft, a direct conveyor-to-skip loading system, and a tele-remote loader operation. As a result of Finnish heavy metal band Agonizer's new CD-release in the category "Deepest Concert Underground", Pyhäsalmi entered the Guinness Book of World Records.

ProMine Model Site - Finland More information can be found on promine.gtk.fi

Expected Outcome from ProMine Research

The envisaged product is essentially based on the precipitation of copper contained in the acid mine water as nano-particles onto cellulose fibres. The process utilises two waste streams: water drained from the mine and paper and pulp industry waste, while creating a high value product.



Some facts

Mine Pyhäsalmi Mine OY **Owner Inmet Mining Co**

Start of operation 1962 Expected closure 2018	Employees 218
Type of Mining Sublevel stoping or bench blasting or blasting with explosives	Host rock Volcanogenic massive sulphide deposit
Ore-genetic type Copper-Zinc-Pyrite	Product applications Base metals
Ore tonnage mined (end 2009) 45.5Mt Production (end 2009) 1.4Mt	Percentage of recycled input materials Sulphuric acid: 27% Backfill materials: 28% Water: 19%
Total amounts of overburden, rock, tailings, and sludge Total amount of permanently disposed tailings and sludge from effluent treatment: 14.4Mt	Total volume and percentage of water recycled and reused 1.037Mm³ - 19%
Land owned/land disturbed 442ha/275ha	Distance from nearest town(s) The closest housing of Ruotanen village is 1km from the mill, while Pyhäjärvi town is 4km from the mine
Philanthropic contributions to the community 50k€	Main activities in region Agriculture, forestry and small industry

Core Team at Pyhäsalmi Model Site

Pyhäsalmi Mine Oy (PMO), Finland

Mine owner/R&D provider

Geologian Tutkimuskeskus

(GTK), Finland

R&D provider

Valtion Teknillinen Tutkimuskeskus

(VTT), Finland

R&D provider, Process Development

KWH-MIRKA

(MIRKA), Finland

New Product Manufacturer

ProMine Partners



GTK, GEOLOGIAN TUTKIMUSKESKUS PMO, PYHÄSALMI MINE OY VTT, VALTION TEKNILLINEN TUTKIMUSKESKUS MIRKA, KWH-MIRKA



BŖGM, BUREAU DE RECHERCHES GÉOLOGIQUES ET MINIÈRES INPL, INSTITUT NATIONAL POLYTECHNIQUE DE LORRAINE



BOLIDEN, BOLIDEN MINERAL AB KEMAKTA, KEMAKTA KONSULT AB LTU, LULEA TEKNISKA UNIVERSITET



IGME ES, INSTITUTO GEOLÓGICO Y MINERO DE ESPAÑA



CUPRUM, KGHM CUPRUM SP ZOO CENTRUM BADAWCZO-ROZWOJOWE ECOREN, KGHM ECOREN S.A IMN, INSTYTUT METALI NIEZELAZNYCH



AGCMP, AGC MINAS DE PORTUGAL UNIPESSOAL LIMITADA

LNEG, LABORATORIO NACIONAL DE ENERGIA E GEOLOGIA, I.P.



GEOS, G.E.O.S. INGENIEURGESELLSCHAFT MBH TU BAF, TECHNISCHE UNIVERSITÄT BERGAKADEMIE FREIBERG WOLA, WOLA CHEMISCH-TECHNISCHE ERZEUGNISSE GMBH



SELOR, SELOR EEIG TU/e, TECHNISCHE UNIVERSITEIT EINDHOVEN CALDURAN, CALDURAN



HG, HELLAS GOLD S.A IGME GR, INSTITOUTO GEOLOGIKON
KAI METALLEFTIKON EREVNON GM, ELLINIKI LEFKOLITHI ANONYMOS METALLEFTIKI VIOMIHANIKI NAFTILIAKI



UNI WAR, THE UNIVERSITY OF WARWICK BANGOR, BANGOR UNIVERSITY



IRMCo, INTEGRATED RESOURCES MANAGEMENT (IRM) COMPANY LIMITED