

Located in the municipality of Sotkamo, the mine will provide a lot of employment and, eventually, yield precious metals. Finland's largest known deposit of nickel was discovered there decades ago. The mine is scheduled to begin commercial production in 2009.

Talvivaara Project Ltd is developing a leaching method not seen before in Northern Europe. This method has several benefits: it can profitably extract nickel from ore with a lower concentration of the metal than traditional processes such as autoclave leaching. The process is known as bioheapleaching, where the nickel is separated from the crushed ore using water and bacteria.

For richer ore poorer

The mine is a strip mine in the middle of the forest. The ore found there contains nickel, zinc, copper and cobalt, but it is low-grade ore, meaning that the concentrations of precious metals in it are low.

However, the basic process stages of bioheapleaching – crushing, heaping and leaching – are

relatively cheap, and thus it allows for profitable processing of low-grade ore.

“This method is used a lot in South America, and to some extent in Asia. This project is unique in the Nordic countries, and I am not aware of a similar one elsewhere in Europe either,” says **Lassi Lammassaari**, General Manager, Mine and Infrastructure, of Talvivaara Project Ltd.

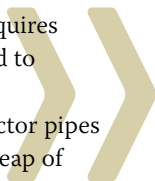
The biggest anticipated uncertainty factor is the effect that the Arctic climate will have on the process. The Nordic weather has been figured into the planning. Encouragingly, the process is already being used successfully at an altitude of 4 km and at below-zero temperatures in Chile.

“In our test area, the heap has retained its heat well, and freezing temperatures will not bring the mine to a halt,” Lammassaari notes.

Make mine KWH Pipe

This environmentally friendly method requires a huge array of pipes for the leaching fluid to circulate.

KWH Pipe is currently installing collector pipes which will be buried under the gigantic heap of



One giant heap for minekind:

**EFFICIENT
LEACHING
IN THE TALVIVAARA PROJECT**

The Talvivaara mine project is currently changing a large swathe of remote woodland in Sotkamo, Finland, into a massive construction site. The nickel mine will make use of a leaching method new in Europe, requiring huge lengths of durable piping.





KWH PIPE DOES THE FITTING

The crushed-ore heap at Talvivaara mine will be huge.

It will be a flat-topped heap 800 m across and 2,400 m long. At its maximum, it will contain a mind-boggling 22.5 million tonnes of crushed ore.

“It is a massive project and requires quality that can be relied on from all the materials used. We are delivering pipes, fittings and chambers to the construction site. We have also invested in new welding machines to make the project self-contained,” says Ari Vaarala, Operations Manager at KWH Pipe.

The leaching system requires an unbelievable amount of Weholite pipe and large chambers. The largest pipes are 1,200 mm in diameter, and the majority of the pipes are large in size.

The installations that will be buried beneath the heap are being done with particular care. The high-quality material is handled under controlled conditions throughout the process, from loading at the Vaasa plant to the welding on site.

“Come hell or high water, every step in the process will be carried out with utmost care,” says Vaarala.

“The KWH Pipe installation team has been working on site since mid-August. There are two KWH Pipe fitters there together with excavation contractors, and their supervisor is also from our company,” says Ari Vaarala, noting that KWH Pipe is prepared to commit more staff to the installation work if necessary.



crushed ore to collect the runoff fluid, which is then pumped back to the top of the heap. As the fluid trickles down, it leaches metals from the ore for recovery.

Vesa Ervasti, KWH Pipe's district manager for northern Finland, has been involved in the project for a couple of years.

"Understanding the new leaching method and the process as a whole requires constantly updated expertise and technical know-how. Fortunately, that is what we have," Ervasti says.

The people at Talvivaara have relied on the expertise of KWH Pipe from the very first.

"The sheer amount of piping required for this method is so enormous that when I drew up the

first calculations I thought that I must have misplaced a decimal point somewhere," Ervasti says of the vast scale of the project.

Pipes and the know-how to go with them

According to Lassi Lammassaari, the site places extreme demands on the materials.

"The material requirements for the pipes are strict, because the fluid that runs through them is corrosive. We decided on polyethylene, which is highly acid-resistant. We will need thousands of kilometres of piping all told," he estimates.

Because this is a pioneering project, the demands on project partners are high. Expertise was a defining criterion in the choice of supplier.

"We have had significant input from KWH Pipe experts from the very first," Lammassaari says with satisfaction and notes that it was in fact KWH Pipe which emerged from the competitive tendering as the chosen principal supplier of piping solutions.

25 years in the rock

Building of the actual production heap will begin in July 2008. The mine is expected to be in operation for at least 25 years.

There are other large deposits of low-grade ore in the northern hemisphere, for instance in Russia. The method developed here may be of interest to mining operators elsewhere in the world in the future.

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