

TERRAFAME, SOTKAMO, NORTHERN FINLAND

# Bioleaching technology for efficient metal extraction



**Industry:** Mining  
**Application:** Heap Leach Pads and Tailing Ponds  
**Location:** Sotkamo, Northern Finland  
**Product:** **GSE® HD, FABRINET**

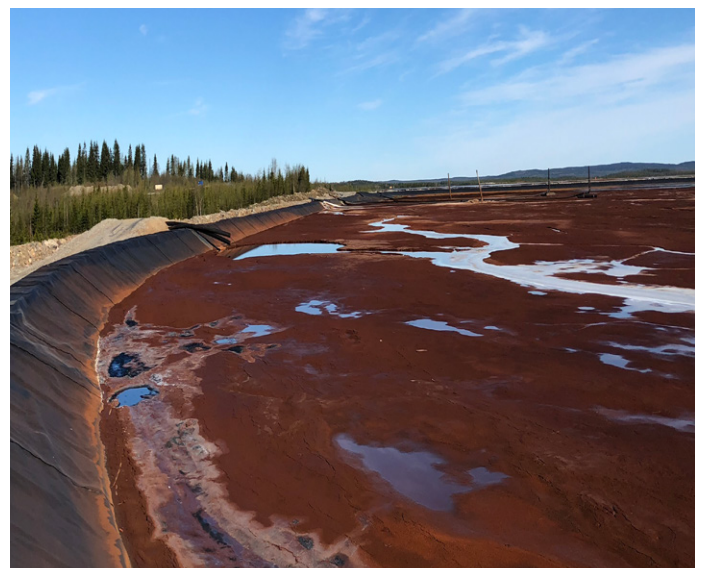
## Overview

Terrafame is a multi-metal company producing nickel, zinc, cobalt and copper at its mine and metals production plant located in Sotkamo, Northern Finland. The company utilizes one of the largest known sulphidic nickel deposits in Europe, through which a long lifetime of the mine and

metals production processes is estimated. In addition, the shift towards electric mobility is expected to trigger a strong demand for its products in the near future.

In metals production, the company has made a significant investment in the development of energy-efficient bioleaching technology. The bioleaching process utilizes microbes to extract metals from ore. Air is blown into stacks of ore and the stacks are irrigated with an acidic production solution. This creates optimal conditions for microbial activity.

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## CASE STUDY

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### Challenge

Stacked ore is first leached for approximately 18 months at a primary heap. The stack of ore is then reclaimed and conveyed onto a secondary heap for final leaching.

On September 1<sup>st</sup>, 2015 Terrafame started excavating ore and the first leaching comb was ready for irrigation in just 10 days. The entire first heap was finished in record time.

By late 2015, a total of 4.1 million tons of ore had been transferred into the primary heaps, exceeding targets by 3% and allowing the mine to make its first deliveries of nickel and zinc to customers. By 2018, the aggregate mining volume was 42.2 million tons.

Bioleaching is an energy-efficient way of extracting metals, such as nickel, from sulfide ores or concentrates. Overall, the greenhouse gas emissions of the nickel production process are around 40%, sulfur dioxide emissions 2% and energy consumption 20% lower than average.

Since operations started, the leaching of metals at the bioleaching heaps continued as expected. As the process of bioleaching takes several years, Terrafame has been developing the process with a long-term approach. This means that the geosynthetics used in construction of the heap leach pads and tailing ponds must retain their quality, durability and performance over the lifetime of the project and well after mine closure and rehabilitation.

### Solution

Solmax and its partner Geosynt OY have been working together since 2014 on the installation of the heap leach pad as well as the tailing ponds at Terrafame. Over 4,500,000 m<sup>2</sup> of Solmax high-density polyethylene **GSE HD** smooth and textured geomembrane formed the critical containment components of the project.

The material considerations for geomembrane liners in heap leach pads include very low permeability, high chemical resistance, high temperature resistance, high tensile strength and elongation, high puncture resistance, high durability and high interface friction properties.



Solmax's **FABRINET**, a multilayer, multifunctional geocomposite made from a geonet that is heat laminated on one or both sides with a nonwoven needle-punched geotextile, was installed to provide additional durability for drainage, filtration and protection in both the heap leach pads and tailing ponds.

Solmax, Geosynt and Terrafame continue to work together to solve new challenges on the continued expansion of the mine. Through our expertise and product solutions, we are proud to play our part in helping Terrafame conduct environmentally sustainable, safe and profitable operations.

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