

Test processing of Seafloor Massive Sulphide (SMS) ore with VMS ore

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The green shift and the electrification of society have triggered discussions on metal supply adequacy, environmental concerns surrounding land-based mining, and geopolitical implications tied to mineral extraction. Marine minerals, within the Norwegian jurisdiction, offer a potential solution to these challenges. As Norway contemplates opening up its waters for mineral exploration, it must glean insights from prior endeavors, bridge the gap between environmental and geological research, and adopt a holistic approach to the marine minerals' value chain. Green Minerals, in pursuit of a commercially viable venture, has embarked on a comprehensive metallurgical study of SMS samples, demonstrating a commitment to sustainable and efficient marine mineral exploration and production.

In the downstream part of the value chain, mineral processing is a very significant investment and an important factor in the generation of revenues. Mineral processing must therefore be considered at an early stage. In 2022 Green Minerals initiated a metallurgical study of SMS samples from the Mid-Atlantic ridge (TAG area). The samples were provided by the University of Southampton (UoS). The study, performed by the Finnish Geological Survey (GTK), was divided into two phases. The results from the first phase showed that the re-crystallized SMS sample exhibits a simple mineralogy where pyrite, chalcopyrite, and chalcocite are the main minerals representing 99.8 wt% in content.

In the second phase of the study initiated this year, flotation tests of two SMS ores in addition to a VMS ore were performed. The flotation tests were performed by varying the grinding size, pH, and reagent type and dosage.

The following samples were studied for the initial SMS flotation test:

- one low-grade sample that was analysed in the first phase,
- and one high-grade sample additionally provided by the University of Southampton

Further flotation test work was performed to test the combined floatation of the SMS samples with samples of a Volcanogenic Massive Sulphide (VMS) onshore analog ore. The VMS ore used in the test was a low-grade copper-nickel ore from the Kevitsa mine in Finland. These floatation tests at various ratios were performed to understand the possibility of integrating SMS ore in the VMS processing flowsheet. Such a blending strategy may enable the use of existing mineral processing facilities which would significantly decrease the CAPEX of deep-sea mining operations and prove itself as a key enabler for this new industry. As for the onshore activity, blending in high-grade SMS ore into existing conventional, land-based operations with decreasing ore grade, has the potential to significantly extend the life-of-mine for the onshore mine.