

Establishing the Geometallurgical Flow Sheet for Industrial Mineral Operations

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Industrial minerals play an important role in the Norwegian mining industry. In 2013 the total turnover of industrial minerals amounted to NOK 2,400 million (USD 300 million). Among the industry goals set by the government through the Strategy for the Mineral Industry (NHD 2013) are “a productive and profitable mineral industry with strong value-creation and good growth potential” and that the “Norwegian mining industry shall actively seek future-oriented solutions.”

The InRec project (Increased Recovery in the Norwegian Mining Industry by Implementing the Geometallurgical Concept) was established in 2014, through funding by the Norwegian Research Council, as a co-operation between three industrial mineral companies and the Norwegian University of Science and Technology. The main objective of the project is to implement aspects of the geometallurgical concept as an integrated part of the planning, control, and execution of activities within the Norwegian mining industry.

This presentation discusses the first part of the InRec project, where the main goal is to define the geometallurgical flow sheet. The term “geometallurgical flow sheet” refers to the visualization and description of the relationship between in situ raw material variations and processing performance in downstream working processes. This is necessary in order to identify and localize the key processing parameters along the value chain from the deposit to the processing plant. The main problems to be addressed are as follows: What are the components of the designed flow sheet? Which raw material properties are important for the downstream processes? How do these parameters influence the process?

In contrast to the ore deposits where the most important factor is element grade, within industrial minerals there are usually additional requirements or sets of requirements for the product, for example, mechanical strength and whiteness. These parameters can create a broad source of variation and, thus, the geometallurgical approach is needed. In order to establish the main parameters of the geometallurgical flow sheet, a case-specific study of VerdalskalkAS' calcite deposit at Tromsdalen, mid Norway, has been conducted. The company's main products are quicklime and slaked lime. The facilities are investigated in order to check the possibilities of improving the value chain productivity in the terms of the geometallurgical concept. This means that the value chain from the deposit to the processing plant is treated as a chain of related working processes. The quality of the processes and the communication between facilities can then be investigated. Further work aims to establish a link between data from blasted material, kiln performance, and final product properties and to evaluate the data flow and accessibility within the mine.