

# Liberation characteristics of comminuted ore types of the Per Geijer iron-oxide apatite deposits

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## ABSTRACT

The Per Geijer iron oxide apatite deposits display significant potential resources for Luossavaara-Kiirunavaara AB (publ), known as LKAB. The Swedish iron ore producer continuously mines magnetite/hematite ores in northern Sweden for almost 130 years. The Per Geijer deposits reveal a high phosphorus content and vary from magnetite-dominated to hematite-dominated ores, respectively. Furthermore, they show a large variation in texture, mineral composition and relation to wall rocks. The high phosphorus concentration of these ores results from highly elevated content of apatite as gangue mineral. Reliable, robust and qualitative characterization of the mineralization is required as these ores inherit complex mineralogical and textural features. For this purpose, comminution tests at laboratory scale in combination with scanning electron microscopy-mineral liberation analysis (SEM-MLA) were carried out. Based on this work, significant information on the modal mineralogy and degree of liberation of minerals of economic interest (e.g. magnetite, hematite and apatite) were obtained. Results show that the degree of liberation of magnetite and hematite differs between ore types. It is dependent both on the particle size fractions and the dominance of each iron oxide in the individual ore type. The amount of gangue minerals seems to have no significant effect on the degree of liberation after comminution. Apatite is generally best liberated in ore types associated with silicates, regardless of magnetite or hematite dominance. From the results it can be inferred that a good degree of liberation of the minerals of economic interest can be achieved. However, results need to be verified with further beneficiation steps such as magnetic separation, apatite flotation and possibly reverse silicate flotation.