Compositions of Indicator Minerals; a Fingerprint of the Kittilä Gold Mine, Kittilä, Finland

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Abstract

Located in Northern Finland, the Kittilä gold mine is one of Europe's largest gold deposits. The deposit is situated in the 2.0 Ga greenschist-facies Kittilä group rocks and is adjacent to the major north-south Kiistala shear zone. This group comprises mostly mafic lavas and volcanoclastic rocks together with sedimentary units. Gold in that orogenic deposit is found as inclusions within arsenopyrite and arsenic-rich pyrite. The objectives of our research are to proceed to a detailed study of the chemical and isotopic compositions of indicator minerals recovered from drill cores and overlying tills in order to determine the fingerprint of the deposit. The indicator minerals of interest for this work are: magnetite, rutile, scheelite, arsenopyrite, tourmaline and hematite. Fieldwork has been done during the summer of 2013 which included the sampling of 36 different drill holes for a total of 108 samples within the 4.5 km long deposit. In addition to the core samples, 42 till samples have been processed to recover the heavy minerals. Core logging of more than 8,000 m provides a description of the different lithologies and alteration found at the Kittilä mine. Albitisation, and possibly dolomitisation, are located in proximity of the ore zones. Portable XRF analyses gave high values in Ti and W, which could be associated to rutile and scheelite, respectively. Further work includes the petrographic studies on thin sections, and in-situ analyses (EMPA, MLA, LA-ICP-MS) on the different indicator minerals.

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