QUANTITATIVE ASSESSMENT OF CU-ZN RESOURCES IN VMS DEPOSITS IN FINLAND

by

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Undiscovered resources of important metals in the Finnish bedrock have been systematically assessed by the Geological Survey of Finland (GTK) using the USGS three-part quantitative mineral resource assessment method. Descriptive and grade-tonnage models developed especially for the method have recently been published for VMS deposits (Mosier et al. 2009, Shanks & Thurston 2012). These were considered to also adequately characterise the Finnish VMS deposits. Representative grade-tonnage data on well-known VMS deposits within the Fennoscandian shield were gathered from various sources. This resulted in information on 134 well-known, totally delineated deposits from Finland (20), Norway (38) and Sweden (76). Statistical tests indicate that there are significant differences in ore tonnage and metal grades between the Fennoscandian and the global VMS deposit populations. Hence, in our assessment, the Fennoscandian data were used in creating felsic, bimodal-mafic and mafic VMS deposit type grade-tonnage models for our assessment.

In total, 31 permissive tracts were delineated for VMS deposits in Finland. These tracts cover approximately 41,600 km², which is 12% of the total land area of Finland. The number of possibly existing undiscovered VMS deposits was estimated for each permissive tract in a series of workshops. The mean estimate of the number of undiscovered VMS deposits within the topmost one kilometre of the bedrock in Finland is 45, of which 18 belong to the felsic, 10 to the bimodal-mafic and 17 to the mafic type.

The assessment of metal tonnages in the undiscovered deposits was performed by Monte Carlo simulation using data from the grade-tonnage models and the estimated numbers of undiscovered deposits. Metal tonnages were separately estimated for each permissive tract. Summary values were estimated for the felsic, bimodal-mafic and mafic tracts and a grand total was estimated for all the VMS tracts in Finland. The median estimated undiscovered resources in VMS deposits in Finland are 730,000 t Cu, 1.6 Mt Zn, 150,000 t Pb, 1,100 t Ag and 16 t Au. For Cu, the largest part of the undiscovered resources resides in mafic-type deposits,
whereas for Zn, Pb, Ag and Au, the majority are in felsic-type deposits. Comparison of the known remaining and undiscovered resources of Cu and Zn in VMS deposits within the topmost one kilometre of the Finnish bedrock indicate that at least 68% of their total remaining resources are in poorly known and explored or in totally undiscovered deposits. Full details of the VMS assessment for Finland will be published during 2014 in the ‘Report of Investigations’ series of GTK.

REFERENCES