

Mineralogical and Geochemical Indicators of Large Ore Deposits*

I. N. TOMSON AND O.P. POLYAKOVA

*Institute of Geology of Ore Deposits,
Petrography, Mineralogy and Geochemistry
Academy of Sciences of the USSR
Staromonetny 35, 109017 Moscow Zh-17, USSR*

ABSTRACT

There is a great variety of factors controlling the distribution of large and unique ore deposits. The authors collected various empirical data on such mineralogical and geochemical characteristics of ore composition which correlate with the magnitude of deposits. This material allowed the authors to draw some general tentative conclusions. One of the assumptions is that some of the large ore deposits originated under rather reducing conditions, apparently with significant participation of dry mantle gases.

The topic of this paper is rather important from the viewpoint of practical applications. However, the present state of knowledge allows us rather to outline the problem than to present answers. Therefore, we feel it useful to review the different, sometimes controversial, data and use them to outline possible ways of further research.

Large and unique ore deposits represent only an insignificant part of the total number of ore deposits. The question of which ore deposit should be considered large and unique is rather subjective. If, however, the deposits are arranged in order of increasing ore reserves, the statistics show that the largest ones occupy a discrete position in the sequence, being 5-10 times more productive than the numerous non-unique ore deposits.

It is known that the real magnitudes of some ore deposits were revealed only after many years of intense exploration. To simplify the way of evaluation of the size of ore deposits and to make selection of objects for exploration with greater confidence, we need to find indirect criteria allowing us to distinguish the large deposits from all others.

Until recently, a considerable amount of different observations has been made as to the peculiarities of the composition of the large and unique representatives of the individual types of ore deposits. There are some basic observations which let us suppose that the genesis of large and unique deposits is con-

trolled by particular regularities differing from those controlling the formation of middle and small-size deposits of the same composition. For instance, the tectonic position of the large deposits appears to be controlled by the so called "*ore-concentrating structures*" (Tomson and Favorskaya, 1968). Some types of deposits are marked by specific geophysical anomalies: for instance, the pyritic deposits of the Ural region are characterized by the presence of deep seated dome-like uplifts revealed by seismic refraction sounding. Quite often, ore bodies of pipe-like form occur within the areas of large deposits. Also, a polyphase genesis is rather typical for the large deposits.

Not touching all the different characteristics of large ore deposits, we will focus on those mineralogical and geochemical features which might be used as indicators of a possible large size of ore deposits. Quite many features have been described, coming from the studies of numerous investigators performed on deposits of different, particular types. Summing up the various observations, we should emphasize that the individual features listed below may not provide reliable criteria if taken out of context of the other observational data. Therefore,

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