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Deep Cu-Ag deposits – a chance for progress in the copper industry

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The Polish Zechstein basin with the copper-bearing shale associated with it has, along with the Udokan area in east Siberia and the Copperbelt area in south-central Africa, one of the world's highest mineral deposit potentials in terms of its metal content, referred to as Hitzman et al. [1]. The previous research on the patterns of distribution of individual metal sulphides in a vertical and horizontal profile of the copper-bearing series in the Polish Zechstein basin have proven the existence of metal zonality exhibiting a sequence of distribution of individual metal sulphides, beginning with the predominance of the Cu-S and Cu-Fe-S system in a zone proximal to the supply area of the metal-bearing salines, and of Pb-S and Zn-S in the distal zone, along with a strict relationship between the mineralisation and the oxidised facies with predominant iron oxides and hydroxides, as Oszczepalski et al. [2]. Between the oxidised facies dominated by iron oxides and hydroxides and the reductive facies there is a transitional zone characterised by the presence of gold and platinum minerals [3]. In order to identify new deposit areas, a genetic model based on the convection cell was adopted, according to which the convection of a strongly oxidising saline triggered during the early Triassic rifting has the crucial meaning in the process generating rich concentrations of metal sulphides, as Jowett et al. [4]. The areas of highest tectonic activity during the Triassic should be therefore considered as centres of the convection cells, surrounded by Cu-Ag deposits, with Pb-Zn deposits in the distal areas. This image is visible within the Fore-Sudetic Monocline, where a number of areas with the highest metal content are present in belts surrounding two regional tectonic structures which formed paleo-elevations during the Triassic. The first belt – northern – comprises the deepest deposits (between 2500 m and 3500 m below ground level) with prognostic resources amounting to 71.8 mln tonnes of Cu and approximately 25 000 tonnes of Ag. The second belt – southern, the shallowest (between 300 and 2000 m below ground level) has, apart from the currently extracted Cu-Ag deposit, the prospective resources of 101 mln tonnes of Cu and over 100 000 tonnes of Ag, referred as Speczik et al. [5]. Furthermore, one should keep in mind the high amounts of gold, platinum group elements, selenium, rhenium along with nickel, zinc and lead. By using the analogy with the distribution of rich ore in the northern and southern belts, it should be assumed that a third belt of the deposits is located in the central part of the Fore-Sudetic Monocline (2000 m to 3000 m), so far undocumented, but having a high resource potential. The calculations on the metal content are based on irregular grids of boreholes drilled mainly by the petroleum industry. It is therefore possible to considerably increase the resources calculated so far.

References:

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