

GEOLOGICAL FACTORS INFLUENCING THE POSSIBILITIES OF DEFORMATIONS IN THE SHAFTS OF THE LEGNICA-GŁOGÓW COPPER AREA (LGOM)

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On 23rd March 1957 the information appeared that in the Sieroszowice region copper rich shale had been discovered. Probably nobody realized how difficult the conditions of copper ores exploitation would be. On 4th April 1959 the team lead by Jan Wyżykowski presented the first geologic documentation of the Lubin-Sieroszowice deposit. Based on the results from 24 boreholes, the reserves of the deposit were estimated as more than one billion tons of the ore (Błądek et al. 2005). Decision to build a mining enterprise, consisting of four mines, was taken immediately. Nowadays the exploitation in the region of the Legnica-Głogów Copper Area (LGOM) is carried out by three units – Mining Enterprise (ME) ME “Lubin”, ME “Polkowice-Sieroszowice” and ME “Rudna”.

The deposit of copper ore is localized within a large structural unit – the Fore-Sudetic Monocline. The deposit rocks were formed in the Permian on the border between Rotliegend and Zechstein. They were formed as sandstones, carbonate rocks (limestones and dolomites) and shales (Kłapciński 1971, *Monografia KGHM...* 2007).

Mining areas are large. Geological conditions of subsequent parts of the deposit show diversity. This causes that the area of LGOM can be divided into two parts – northern and southern.

The southern part is characterized by a lower depth of the exploitations of the copper ore (ca. 600 m). The deposit is dipping in the angle of several degrees in the NE direction and its outcrops are in the southern part of the copper area (Stupnicka 1997, *Monografia KGHM...* 2007).

The southern part is situated on the border of two tectonic units (Fore-Sudetic Monocline and Fore-Sudetic Block). The dislocation system of central Odra River, of NW-SE direction (Oberc 1972, Tomaszewski 1978) forms the border of these units. Complicated tectonics of the area influences the possibility of making deformations in the rock mass and consequently in the shafts of KGHM Company.

Although faults occur in the whole area of LGOM, within the southern part they have additional meaning – make a potential way for migration of ground waters. This is significant for the discussed region because of the possibility of joining water-bearing horizons (contacting hydraulic layers of Buntsandstein, limestones and dolomites W-1). Water-bearing properties of the north region are much weaker. This is related to the occurrence of isolation layers (Wilk & Bocheńska red. 2003). Pores and caverns are filled with gypsum and calcite, and sometimes silt, which significantly limits the possibility of water migration.

Hydro-geological dichotomy of the area is also confirmed by the observations carried out during the exploitation. They show that 95–97% of general inflow to LGOM mines comes from the region of the south deposit (Wilk & Bocheńska red. 2003). Thus in the south the biggest depression funnels of subsequent water-bearing horizons (Zechstein, Cenozoic) are observed. The biggest subsidence troughs caused by mining exploitation and related drainage are also present there (Popiołek et al. 2009).

The factors mentioned above have a strong influence on the spatial distribution of the rock mass deformation. The described dichotomy of LGOM also refers to the surveying of the effects of exploitation. The results of the monitoring indicate the increased values of subsidence of vertical strains in the shafts located in the southern part of the area. Of course, the distribution and intensity of the carried out exploitation should be taken into account. Nevertheless, in majority of cases, the thesis that in the southern region the accumulation of unfavourable geologic, hydrogeologic and other conditions results is confirmed. What is the most important for the studies, these cause increased deformation in mining shafts of LGOM.

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