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Geological Setting and Mineralisation Styles of the Zəfər (Zafar) Epithermal Deposit, the Lesser Caucasus, Azerbaijan; a Newly Discovered Deposit in Western Asia

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The Zafar deposit is located in the mineral-rich Gedabek contract area in Azerbaijan. It is geologically located in association with the Gədəbəy-Bittibulaq local deep fault in the Lök-Qarabağ volcanic arc of the Lesser Caucasus. The study of the regional geology of Zafar by Azerbaijan International Mining Company (AIMC) geologists since 2018, utilising a multi-layered geological data interpretation, identified the mineral potential culminating in the Zafar deposit discovery in 2020. Spatially, the Zafar deposit is situated between two main epithermal systems hosting the Gedabek-Gadir and Ugur deposits, which were discovered by the AIMC geology team.

The igneous rocks are extrusive and mostly felsic to intermediate in composition; rhyolites, dacites, andesites, and their tuffs are distributed from the surface to depth. The host rock of main ore mineralisation is locally termed a metasomatic quartz-porphyry (rhyolite-porphyry), which starts at depths of 250 to 300 metres from the surface to more than 500 metres.

Mineral content is visual; however, further petrographic studies by polished thin section were carried out on samples taken from outcrop and drill core. Resulting from these studies, pyrite is the main mineral observed in all drill core and outcrop samples in crystal structures in the form of massive, disseminated, euhedral, anhedral, etc. Other primary sulphides include chalcopyrite, covellite, digenite, galena, and sphalerite. The genesis of covellite and digenite is open for discussion. Other copper sulfosalt minerals, tetrahedrite and tennantite, were identified by ore microscopy. Associated non-sulphide minerals including jasper, magnetite, barite, haematite, and limonite have also been defined. Quartz is the main gangue mineral in the matrix of the host rocks.

The mineral composition, textures and relationships, and chemical composition suggest a genesis of intermediate sulphidation type of epithermal system for the Zafar deposit. AIMC is the subsidiary operating company of Anglo Asian Mining