

Gold-bearing sulphides associated with the granitic wall rock alterations at the Fawakhir area, Central Eastern Desert, Egypt

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The gold mineralization at the Fawakhir area (El Sid and Fawakhir gold mines) is located at 93 km due to west from Quseir on the Red Sea coast, along the Quseir – Qift highway in the Central Eastern Desert of Egypt. The gold occurrence is related to the Younger Granite Series (early phase of the Pan – African) which are known in a number of localities in the Eastern Desert of Egypt. The gold mines area is geologically dominated by a granitoid pluton which intrudes the older serpentinites and metabasalts. The gold mineralization occurs in two distinct zones (4 km apart) at the NW (Fawakhir occurrence) and SW (El Sid deposit) contacts of the Fawakhir granitoid pluton with the ultramafic - mafic rocks. The gold – mineralized quartz veins are mainly hosted in the granitoid rocks of the Fawakhir pluton and their adjacent ultramafic – mafic rock association. They are closely associated with the ENE strike – slip faults and the NNE normal faults; whereas the NNW quartz veins trends are barren. El Sid and Fawakhir gold mines represent the largest mesothermal vein type gold occurrence in the Eastern Desert of Egypt. Long before, since the Ancient Times (Pharaonic, Roman) as well as the Recent Times until 1958, gold was exploited only from major quartz veins and some veinlets cutting the hanging and footwalls of the main ore bodies. El Sid gold mine contributed about (45%) of the gold production in Egypt in this Century.

The wall rock alterations may be used as a guide in prospecting for mineralization all over the world. The host granitoid rocks around the gold - mineralized quartz veins (the granitic hanging and footwalls of the main ore bodies) at the El Sid and Fawakhir gold mines exhibit different gradual wall rock alterations starting from the inner (phyllic alteration) to the outer (propylitic alteration), silicification (quartz veinlets and stockworks) is also commonly observed. These wall rock alterations, attributed to the gold mineralizing hydrothermal solutions which ascended along and facilitated by the deep – seated major fracture systems (closely associated with the intersections of the ENE strike – slip faults and the NNE, NNW normal faults) which have deformed the area. The phyllic and propylitic wall rock alterations are affected and superimposed by a later supergene argillic alteration due to meteoric water action. These wall rock alterations are followed outwards by the fresh granitoid rocks outside the gold mines sector.

The detailed petrographical and opaque mineralogical investigations which are supported and confirmed by SEM-EDX analyses of polished surfaces indicate that the sulphides are mainly represented by pyrite, arsenopyrite, sphalerite, galena, chalcopyrite and minor amounts of bornite and pyrrhotite, in a decreasing order of abundance. They occur as disseminated and microveinlets forms. Gold is following and filling the available microfractures in pyrite and arsenopyrite. In the phyllic wall rock alteration, Au contents (up to 8.12 %, 88.33 %, and 92.77 %) associating Ag contents (up to 5.00 %, and 7.90 %). In the propylitic wall rock alteration, Au contents (up to 38.84 %, 68.14 %, and 80.39 %) associating Ag contents (up to 4.87 %, and 14.36 %). In the silicification, Au content (up to 73.99 %) associating Ag content (up to 9.55 %). The Ag contents are not enough to form the mineral electrum (Au, Ag) in which the Ag – content is higher than 25 %.

The mechanisms of the gold mineralization as well as the associated sulphides and wall rock alterations at the El Sid and Fawakhir gold mines at the Fawakhir area may be Similar to; and comparable with that of the gold deposits such as Oriental Mine, Alleghany District at California; Charters Towers Goldfield (CTGF), north Queensland at Australia; and Samgwang mine, Cheonan Metallogenic Province at the Republic of Korea. The mineralogical composition, ore textures, and paragenetic sequence of the gold - bearing sulphides of the granitic wall rock alterations at the El Sid and Fawakhir gold mines may be the same as, and comparable with that of the gold mineralized quartz veins; suggesting their contemporaneous deposition with each other. It is recommended to assess and exploit the gold from the granitic wall rock alterations at the El Sid and Fawakhir gold mines at the Fawakhir area as well as the similar localities in the Eastern Desert of Egypt.

References:

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