Mineralogical, alteration and fluid inclusion studies of the mineralization index at Yeylaghe Gharachi, northwest of Ahar, NW Iran

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Abstract: The mineralization index of Yeylaghe Gharachi, as part of Arasbaran metallogenic belt, is located about 25 km northwest of Ahar, East-Azarbaidjan Province, NW Iran. The host rocks of this index consist of composite intrusive rocks with lithologic compositions of granite, quartz monzonite, granodiorite and diorite of Oligocene and Oligo-Miocene age. The alteration zones in this area are mainly potassic, phyllic, argillie, propylitic, silicic and carbonate. Mineralization occurred principally as disseminations, cross-cutting veins-veinlets and replacement in two separate stages of hypogene and supergene. Pyrite is the major hypogene sulfide mineral accompanied by magnetite, chalcopyrite, molybdenite, sphalerite and galena. The main supergene minerals in this area include hematite, goethite, limonite, bornite, chalcocite, covellite and malachite that accompany the hypogene mineral assemblage. In investigation of the phase contents of fluid inclusions in the quartz- sulfide veins-veinlets along with the potassic, phyllic and argillie alterations, five types of fluid inclusions have been recognized: mono-phase liquid (L), mono-phase vapor (V), liquid-rich two-phase (L+V), vapor-rich two-phase (V+L), and multiphase (L+V+S). Homogenization temperatures of the studied fluid inclusions vary from 190 to 530 °C. Considering the last ice-melting temperature of aqueous two-phase inclusions and halite melting temperature in the aqueous multiphase inclusions, the salinity ranges between 0.4 to 59 wt.% NaCl equivalent. Based on the microthermometric results of fluid inclusions, it can be conceived that episodic boiling and dilution by underground water of meteoric origin were the main mechanisms in development and evolution of this index. The zonation pattern of the alteration, mineralization and fluid inclusion data indicate that the Yeylaghe Gharachi mineral index is the most similar to porphyry copper deposits and the associated metallic veins.

Keywords: Mineralization; alteration; fluid inclusions; Yeylaghe Gharachi; Ahar.

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