Chah Zard Deposit: the First Report of Ag-Au Epithermal Mineralization with Brecciated Host in Iran

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Iran possesses some of the largest metal resources in the world, particularly in the Tethyan belt. The west-central volcanic mineral belt of Iran, the Urumieh-Dokhtar Magmatic Arc (UDMA), is one of the last highly unexplored places on Earth with the potential to produce large multi-million ounce gold deposits. Recent exploration in the UDMA has found a number of significant large porphyry copper-gold and volcanic hosted gold (silica-alunite) deposits similar to those found in the Andes. The Chah Zard Ag-Au epithermal deposit is located in Dehshir fault zone in central part of the UDMA. The country rocks consist of a circular complex of polymictic matrix-rich breccias hosted in altered Tertiary intermediate to felsic volcano-plutonic (andesite, trachy-andesite, dacite, porphyritic dacite, porphyritic rhyolite) rocks. Mapping of the area at scales of 1:20,000 and 1:1,000 indicates that the altered rocks at Chah Zard are related to a large elliptical shaped structure, and the alteration extends around the remainder of the structure. The intense alteration consists of quartz (chalcedony), clay minerals (advanced argillic), K-feldspar and jarosite (alunite) occurring in an area greater than 3×3 km. The Chah Zard Ag-Au deposit is developed where the structure cuts a pre-existing intrusive dome complex. The Ag-Au mineralization appears to be directly related to the intensity of silicified and sulfidic volcanic breccia (hydrothermal and phreatic breccia) and is accompanied by advanced argillic and jarosite (alunite) alterations. Samples collected from trenches and diamond drill holes show gold and silver values up to 21 and 92.2; and 66 and 463.2 g/t, respectively. The principal ore minerals observed in the mineralized zones are native gold, electrum, pyrite, chalcopyrite, tetrahedrite, galena, sphalerite, chalcocite, arsenopyrite, marcasite, skutterudite, loellingite, covellite, digenite; and iron oxides-hydroxides. The major associated gangue minerals are quartz, gypsum and jarosite (alunite). Based on intensity of silicification, advanced argillic and jarosite (alunite) alterations accompanied by gypsum as clasts' cement as well as gold-bearing vein; it seems likely that the Chah Zard could be a high-sulfidation (acid-sulfate) Ag-Au epithermal mineralization, making it as a model for exploration of similar deposits in the Tethyan belt.

Keywords: Alteration; Ag-Au; epithermal; breccias; alunite; high-sulfidation; Chah Zard; Urumieh-Dokhtar Magmatic Arc; Iran.