Economic Geology
Vol. 97, 2002, pp. 1829–1839

OVACIK GOLD DEPOSIT: AN EXAMPLE OF QUARTZ-ADULARIA–TYPE GOLD MINERALIZATION IN TURKEY

Hüseyin Yilmaz[†]

Dokuz Eylül University, Faculty of Engineering, Department of Geological Engineering, Bornova, İzmir, Turkey

Abstract

The Ovacık gold deposit is located 100 km north of Izmir in western Turkey. It lies adjacent to the east-northeast–trending Bergama graben, and it consists of a series of high-grade gold-bearing epithermal quartz veins hosted by subaerial andesitic-dacitic lava dome facies of lower Miocene age. The region is underlain by Paleozoic metamorphic rocks and limestone, which are cut by medium- to high-level intrusions and overlain by subaqueous and subaerial andesitic to dacitic lava domes that host the Ovacık gold deposit. Middle to late Miocene extensional tectonic activity was responsible for the formation of north-northeast–south-southwest to northeast-southwest–trending grabens. The extensional activity was accompanied by normal faulting with a later, variable sinistral strike-slip component oriented east-west and northwest-southeast. It is probable that these faults were critical in controlling the development of epithermal quartz veins, both mineralized and unmineralized.

Two of four nearly east-west–trending epithermal veins at Ovacık contain significant Au mineralized areas and display typical low-temperature epithermal textures, including crustiform banding, quartz pseudomorphs after bladed calcite, and multiphase hydrothermal breccias. Veins crop out throughout a maximum strike length of 400 m, and surface widths are up to 35 m. Mineralized areas extend down dip for at least 200 m. Gold appears to be related mainly to earlier-formed quartz-adularia veins and breccias. The gold occurs mainly in clasts of earlier vein material that has been transported from deeper levels in the vein system. Little gold is contained in the matrix of the breccias. The alteration associated with mineralization consists of secondary albite or adularia together with quartz and clays, such as smectite, interlayered illite/smectite and illite/chlorite, illite, and chlorite. Metallic minerals occur generally only in trace amounts and include chalcopyrite, pyrite, arsenopyrite, sphalerite, bornite, chalcocite, covellite, galena, and electrum. The mineralizing fluids had temperatures ranging from 150° to 250°C and salinities between 7.0 and 8.0 wt percent NaCl equiv.

The veins have a distinct trace element signature, including high Au, Ag, As, and Sb. High Au and Ag with low As and Sb contents are found in the quartz-adularia veins, whereas low Au and Ag with high As and Sb are found in the silicified hanging-wall and footwall zones. Drilling has confirmed continuity of mineralized rock to a vertical depth of 175 m. To date a resource of 2,980,000 tonnes at 9.0 g/t Au containing 862,000 ounces has been delineated.

Other deposits of this type should be sought where late Oligocene to early Miocene volcano-plutonic rocks are cut by major northeast-southeast–trending grabens with associated northwest-southeast– to east-west–oriented normal to sinistral strike-slip faults. Volcanic rocks with strong adularia-sericite alteration and silicification, accompanied by quartz veins with epithermal textures are primary targets.

[†]E-mail, huseyin.yilmaz@deu.edu.tr