Stable Isotope, Fluid Inclusion, and Geochemical Constraints on Mineralization at the Buritica Gold Deposit, Antioquia Department, Colombia

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Abstract

Epigenetic gold mineralization occurs in the Western Andes of Colombia, near the village of Buriticá, located about 75 km north of Medellin and 5 km west of the Cauca-Romeral Fault System (CRFS), in the Antioquia department. The mineralization is hosted in a set of east-west steeply dipping quartz veins cutting the Buriticá Andesite (Álvarez & González, 1978), the Buriticá Stock (a microdioritic body intruding an older tonalitic pluton; González, 2001), and mid-Cretaceous tholeiitic basalts and associated mudstones and cherts of the Barroso Formation (Castro & Feininger, 1965; Etayo et al., 1980). The basalts of the Barroso Formation are of volcanic arc to continental margin affinity (Ortiz, 1979), and are interpreted as being part of the Choco Arc, accreted during the Miocene along the CRFS (Cediel et al., 2003). Gold mineralization Buriticá is expected to be related to the reactivation of the CRFS, dated by Vinasco (2001) at 5.6 ± 0.4 Ma. Step heating ^{40}Ar-^{39}Ar dating on hornblende from the two different intrusions and on muscovite from the alteration halo are underway to see if these magmatic events are related to the mineralizing event.

Ore minerals are pyrite, sphalerite, and galena, with subordinate chalcopyrite, tetrahedrite/tennantite, native gold, and stibnite. The vein paragenesis is characterized by early precipitation of native gold along with fine-grained quartz, followed by precipitation of sulfides, then late precipitation of coarse-grained quartz. Typical alteration associated with the mineralizing event is characterized by a thin adularia and sericite alteration zone within 50 cm of the veins with localized zones of silicification, overprinting a deposit scale propylitic alteration zone of chlorite, epidote, and magnetite. The mineralogy of the deposit is concordant with an intermediate-sulfidation-type epithermal deposit (Hedenquist et al., 2000; Sillitoe & Hedenquist, 2003).

Sulfur isotope analyses from coeval galena-sphalerite pairs yield temperatures from 294° to 410°C, which is slightly higher than would be expected from an intermediate-sulfidation deposit. Fluid inclusion analyses in quartz and sphalerite are underway to verify the temperature data from the sulfur isotopes, and to assess the salinity of the mineralizing fluid. Geochemical data show a significant Sb enrichment in propylitised rocks for both the Buriticá Stock, and the Barroso basalts. The presence of antimony-bearing minerals throughout the vein paragenesis, such as tetrahedrite and stibnite, support the idea that the mineralizing event is responsible for the unusually high concentration of Sb.

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