Mineralogical and Structural Characterization of a Gold-Rich Porphyry Deposit in Tolima, Colombia

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The California prospect is located ca. 200 km west of Bogotá in the Central Andean Cordillera of Colombia. It lies within a gold-rich Miocene metallogenic belt of Middle Cauca. There were some mining activities in the area during the 1950s, which caught the attention of some companies for gold exploration. In 2006 the AngloGold Ashanti greenfields exploration team discovered the La Colosa, the world´s largest gold-rich porphyry deposit with inferred resources of 470 Mt tonnes with gold grade of 0.9 g/t. The California prospect is located about 8 km southeast of La Colosa.

The Ibagué Fault is a dextral SW-trending, strike-slip fault, and it is located in a transversal shear zone and acts like a lateral slope that affects the center of de Central Andean Cordillera of Colombia. The Romeral fault system is an ancient subduction zone that affects oceanic and cortical rocks. In the Miocene, some reverse displacements were identified for an orogenic phase. This allows the emplacement of magmatic bodies. The Palestina fault is dextral strike-slip fault that is striking SW-NE. It has been activated since the Miocene, affecting metamorphic and igneous rocks in the Central Andean Cordillera of Colombia.

In La Colosa, the emplacement of the porphyrytic bodies that gave rise to the mineralization was controlled by the Palestina fault zone. A similar structural control exists in California by the Ibague and Palestina faults, considering that Cauca-Romeral faults system, Ibague fault and Palestina fault is a conjugate dextral-fault set reactivated by the orogenic phase in the Miocene. This affirmation is supported taking in account the breccia zone is the shear zone in this transtensive assemblage.

The mineralization is associated with two porphyritic dacites which intruded muscovitic-quartz schists with graphite of Paleozoic age (Cajamarca Complex). The mineralization occurs as disseminated pyrite and minor chalcopyrite, pyrrothite, sphalerite, galena, and marcasite. The contact between the schist and dacite is a tectonic breccia that contains three different types of clasts: graphite quartz-muscovitic schists, dacites, and chlorite schists.

Additionally, one porphyritic dacite is accompanied by a strong phyllic (illite-bearing) alteration with the following mineral assemblage: marcasite, pyrrothite, sphalerite and chalcopyrite. It is intruded by another porphyritic dacite with a Chloritic-carbonatic alteration with pyrite, sphalerite, chalcopyrite and galena. In muscovitic-quartz schists with graphite a phyllic alteration was recognized by the presence of quartz and sericite. The host rock underwent an intense brittle-ductile deformation, which generated migration channels for the emplacement of gold-bearing pyrite veinlets. An important portion of the mineralization is hosted within fold axes of the schists.