

Encuentro: A Cu-Au-Mo Porphyry in the Centinela District

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Located in the Andean foothills of the Antofagasta region in northern Chile, the Centinela district is a 50-km-long alignment of porphyry Cu-Mo-Au and exotic Cu deposits including open-pit operations at Esperanza, Tesoro NE, and Mirador. The Cu-Au-Mo porphyry mineralization at Encuentro (originally named Caracoles) was discovered in late 2007 and is presently undergoing feasibility study.

In 2006, after consolidation of the mineral rights, Antofagasta Minerals began an aggressive exploration program that included relogging of approximately 35,000 m of historic holes and generated a geologic map of the bedrock beneath the Miocene gravel cover. Geologic studies were complemented by induced polarization profiling. In September 2007, the first drill hole intersected the pyritic halo of the hydrothermal system to a depth of 300 m and was followed by a second hole that effectively tested the central part of the mineralized system and discovered the deposit.

The deposit is blind and covered by up to 120 m of postmineral gravels and, in common with all other deposits of the district, it is intimately associated with splays of the regional Domeyko fault system. As currently known, the porphyry system is 1,500 m long × 600 m wide, with a vertical mineralized extent of 1,000 m. Mineralization is genetically associated with a swarm of NE-trending, SE-dipping dacitic dikes that intrude a volcanosedimentary sequence of dominantly andesitic composition. The age of the porphyry dikes is middle Eocene (41.2 ± 0.6 Ma; U/Pb, zircons), similar to the Esperanza Cu-Au-Mo porphyry deposit located 12 km to the north.

Potassic alteration is dominant, with hydrothermal biotite, K-feldspar, and magnetite; this event has been partially overprinted by a chlorite-sericite assemblage. Local hydrothermal breccias are associated with quartz-sericitic alteration. At depth, the host rocks are affected by contact metamorphism with development of biotite hornfels and local zones of proximal skarns. The hypogene Cu-Au-Mo mineralization, coincident with the central potassic alteration, consists of chalcopyrite, bornite, and molybdenite contained in early quartz veinlets of conventional A and B types with variable amounts of K-feldspar, biotite, apatite, and anhydrite.

The upper part of the deposit, immediately below the gravel cover, develops an oxide profile of up to 250 m, with in situ oxidation of the hypogene sulfides and locally transported oxide copper in fracture fillings. The upper portion of this oxide zone is dominated by chrysocolla with minor amounts of black Cu-Mn mineraloids. Below the oxide zone, a weakly developed blanket of mixed mineralization (chalcocite, covellite, cuprite, and native copper) is present.

A late, composite, structurally controlled magmatic-hydrothermal event at 38 Ma, represented by igneous intrusions (felsic dome; granodiorite), diatreme-type phreatomagmatic breccias, and tourmaline breccias, intruded and truncated the deposit on its eastern flank.

As of August 2012, 238,000 m of reverse circulation and diamond drilling have been drilled and utilized to produce a resource estimate of 1,032 million tonnes with 0.44% Cu, 0.16 ppm Au, and 131 ppm Mo (0.15% Cu cutoff).

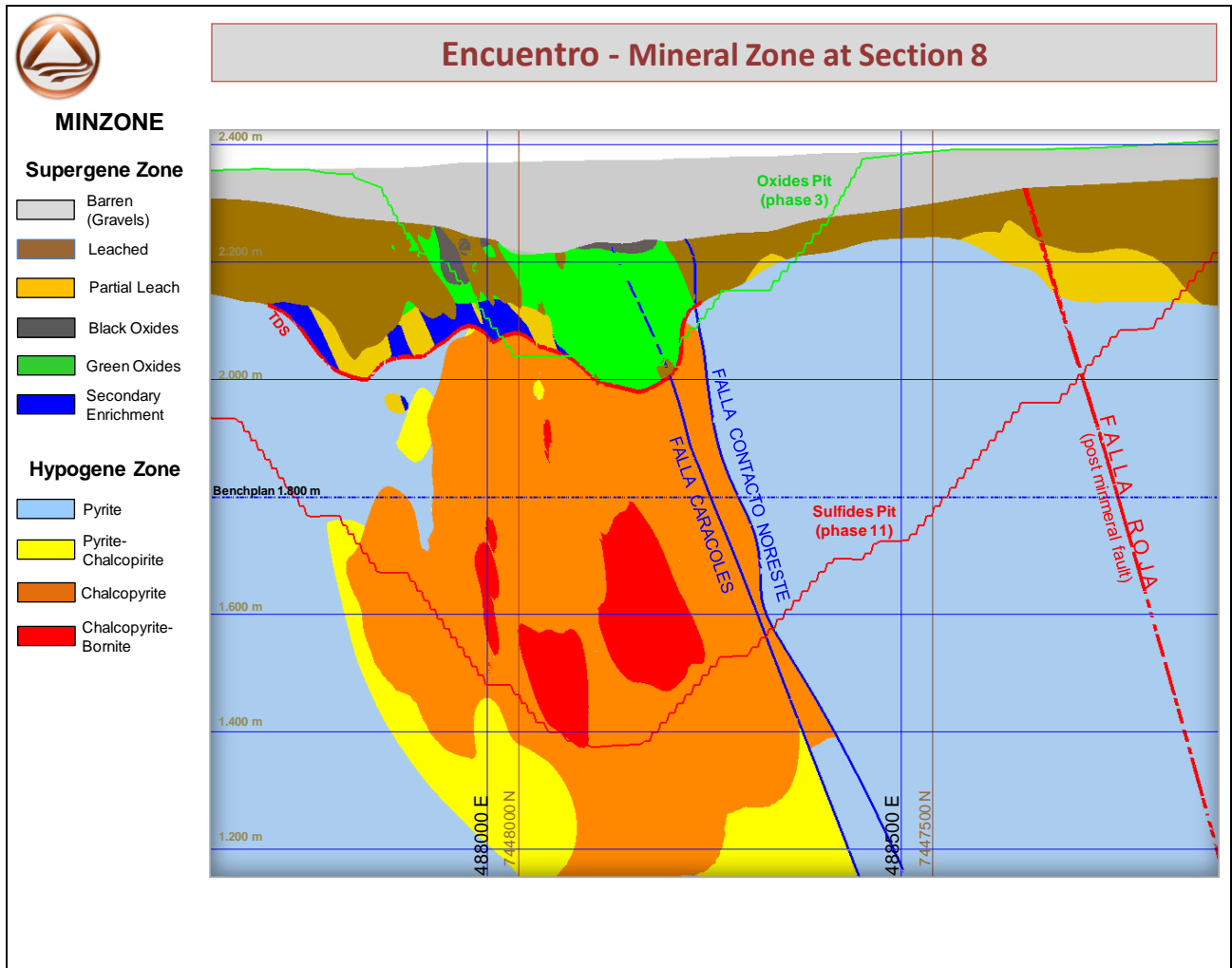


Fig. 1. Encuentro porphyry, schematic minzone section. Looking northeast.