

The geology and mineralisation of the world-class Alpala porphyry copper-gold deposit in northern Ecuador.

S. Garwin (FAusIMM)^{1,2}, B. Whistler¹, S. Vaca¹, J. Ward¹, N. Mather¹, J. Silva¹, B. Rosero¹, A. Cruz¹, C. Díaz¹, A. Chafra¹, S. Mantilla¹, L. Aguilar¹, M. Chand¹, A. Guachamin¹, K. Morales¹ and N. Guerrero¹.

¹ SolGold Plc., Level 27, 111 Eagle Street, Brisbane, Queensland 4001 Australia.

² Steven L Garwin Pty. Ltd., 42 Abraham Close, Baskerville, Western Australia 6056 Australia.
Email: sgar@iinet.net.au

ABSTRACT

The recently discovered Eocene Alpala porphyry copper-gold deposit is located in the under-explored northern section of the Andean Copper Belt. The most recent resource estimate (20 November, 2018) for Alpala contains 2.95 Bt at 0.52% copper-equivalent (10.9 Mt Cu, 23.2 Moz Au) at a cut-off of 0.2% CuEq, which includes a coherent core of 420 Mt at 1.47% CuEq (3.8 Mt Cu, 12.3 Moz Au) at a cut-off of 0.9% CuEq. At a 0.45% CuEq cut-off, the deposit contains 960 Mt at 0.97% CuEq (6.1 Mt Cu, 16.2 Moz Au).

The recognition of geochemical zoning has assisted in drill-targeting within the deposit and tenement-wide exploration. This zoning is characterized by central Cu-Au; proximal Mo; proximal to distal Bi, Se and Te; and distal As, Mn and Zn. Within the Alpala deposit, variations of Au/Cu in drill-hole assist in the delineation of different intrusion stages.

The applications of the Anaconda method to geological mapping and drill-core logging have facilitated the identification of more than six major intrusion stages, a diagnostic vein sequence and sulphide-oxide mineral paragenesis that allows for the prediction of copper-gold grades. The most important indicators of high-grade include the presence of the early-stage causal intrusion(s), elevated porphyry-style vein abundance and an increased ratio of chalcopyrite to pyrite.

Radiometric U-Pb SHRIMP dates on zircons return 39.4 ± 0.6 Ma (2σ) for the early-mineralisation quartz diorite intrusion and 38.7 ± 0.6 Ma (2σ) for a late-mineralisation quartz diorite dike. A Re-Os date of molybdenite in a late-stage, sulphide-bearing anhydrite-quartz vein associated with quartz-sericite-pyrite alteration indicates 38.6 ± 0.2 Ma (2σ). The ages of the quartz diorite intrusions and late-stage molybdenite are consistent with a time-span of 800 ± 800 Ka (2σ) for deposit development.