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Geology, Mineral Alteration and Mineralization of the Santa Cecilia Porphyry Au-Cu Deposit, Maricunga Belt, Northern Chile

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The Santa Cecilia porphyry gold-copper deposit is located within the Maricunga gold-silver-copper belt in northern Chile. Santa Cecilia presents a complete porphyry copper system alteration column, from potassic alteration at depth to shallow advanced argillic and silicic assemblages near the surface, and it has not been clear where the highest ore grade is located. Therefore, part of this study aims to narrow down this information and identify the specific location within the alterations. Adjacent to Santa Cecilia is the Caspiche porphyry Au-Cu deposit (proven and probable mineral reserve of 1,091 million tonnes (Mt) averaging 0.55 g/t Au), separated by a 250-m-wide valley. The deposit formed in the latest Oligocene (~24 Ma) during the first of two volcanic and corresponding metallogenic epochs that define the Maricunga belt. The main objectives are: (1) identify the mineral assemblages and timing of each of the magmatic-hydrothermal alteration and veining stages present in the deposit; (2) evaluate the grade of Cu and Au mineralization within different alteration assemblages or stages; and (3) study the relationship between the different alteration and mineralization centers existing within the Santa Cecilia property. These objectives will be addressed through petrographic, mineralogical, geochemical, and isotopic techniques, including XRD, micro-XRF and radiometric dating. Preliminary results indicate that this deposit has different alteration zones: (1) potassic alteration consisting of biotite-magnetite (at ~1,400 m); (2) chlorite-sericite alteration with chlorite-muscovite-albite (at ~550 m), (3) sericitic (white mica) alteration with quartz-muscovite-albite (at ~1,100 m), and in the lithocap (4) quartz-pyrophyllite alteration is present with advanced argillic alteration which comprises quartz-alunite with alunite ledges and vuggy residual quartz. Finally, further work will involve generating a model of the deposit and understanding the genesis of the mineralization with an emphasis on the magmatic and structural setting and evolution of this sector of the Maricunga Belt.