Ni-Cu SULFIDE MINERALIZATION OF THE TRINCHEIRA MAFIC-ULTRAMAFIC COMPLEX, RONDÔNIA, NORTHWESTERN BRAZIL

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The medium-size (~50 km^2) Trincheira Complex is part of a cluster of Mesoproterozoic mafic-ultramafic bodies located at the northwestern portion of the Amazonian Craton, in the states of Rondônia and Mato Grosso. These mafic-ultramafic bodies are hosted by a volcanic-sedimentary sequence metamorphosed under amphibolite facies (Complexo Colorada). Exploration for base metals developed by Santa Elina Mineração S.A. in the Trincheira Complex, including soil geochemical survey, geophysical surveys and limited exploration drilling, led to the discovery of the Ni-Cu sulfide mineralization described in this study.

The Trincheira Complex is a mafic-ultramafic intrusion consisting mainly of medium- to coarse-grained pyroxene cumulates (orthopyroxenite and melanorite) interlayered with pyroxene and plagioclase cumulates (norite and gabbronorite). Few meters thick layers of olivine and chromite cumulates (harzburgite and olivine orthopyroxenite) were intersected during exploration drilling in the central portion of the intrusion. The layered rocks of the Trincheira Complex follow a broadly NW-SE trend with moderate dip to NE, as suggested by lamination and layering described in few outcrops and drill core. Although primary magmatic texture and minerals are largely preserved in mafic-ultramafic rocks, several scattered zones of partially to extensively transformed rocks indicate either post-magmatic tectonic-metamorphic events or crosscutting granitic intrusions. The compositional range of olivine (Fo 83-87 mol%) and orthopyroxene (En 65-86 mol%) indicate a moderately primitive parental magma. Petrographic descriptions, together with mineral and bulk-rock compositions, suggest that the Trincheira Complex originated from several magmatic injections of parental magma. The crystallizing sequence of the intrusion, consisting of olivine+chromite => Opx+chromite => Opx+plagioclase, is similar to that described for many Ni-Cu_PGE mineralized intrusions.

The Ni-Cu sulfide mineralization consists of zones of disseminated to net-textured sulfides hosted within harzburgite and orthopyroxenite (e.g., 1.5 meter at 0.9 wt.% Ni, 0.21 wt.% Cu, 0.03 wt.% Co). The sulfide assemblage (Po>>>Pn>Ccp) and textures are typical of magmatic sulfides segregated as immiscible sulfide liquids from mafic-ultramafic magmas. The plots of S vs Ni, Cu, Co, Pd, and Pt in disseminated and net-textured ore (up to 11 wt.% S) show strong positive

correlation. Moderate metal tenors (i.e., ~5 wt.% Ni, ~1 wt.% Cu, ~0.18 wt.%, ~100 ppm Pd) are indicated by linear regression of metal data against sulfur.

The thickness and Ni-Cu content of the intersected sulfide mineralization described in this study are not economically significant. Nevertheless, they provide the first report of magmatic Ni-Cu sulfide mineralization associated with the Mesoproterozoic mafic-ultramafic magmatism in the northwestern portion of the Amazonian Craton. This discovery highlights the potential for magmatic Ni-Cu-PGE deposits associated with the mafic-ultramafic magmatism in the northwestern portion of the Amazonian Craton.

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