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Base metal mineral-bearing shear zone in the Tandilia System, Precambrian Basement of Eastern Argentina

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The southernmost Proterozoic rocks of South America are exposed in the Tandilia System, Buenos Aires province, Eastern Argentina. These rocks have an extended geological evolution, essentially within the Transamazonian cycle (2.2 to 1.8 Ga). Tandilia crystalline rocks (Buenos Aires Complex) are mainly granitic to tonalitic gneisses, migmatites, amphibolites, and granitic plutons, with very scarce schists, marbles and dykes of acid and mafic composition. Wide mylonitic belts are conspicuous, and metavolcanics are also present in the central area. Low grade metamorphic rocks (metacherts, metagreywackes and metabasites) are interpreted to represent a slice of oceanic crust. The Tandilia basement is partially covered by three sedimentary units towards the west and southeast: the Neoproterozoic Sierras Bayas Group, and the Lower Paleozoic Cerro Negro and Balcarce Formations.

Hydrothermal mineralization was identified within a granitoid basement of granitic, granodioritic and tonalitic rocks, in the central region of the Tandilia System. It is located in the San Luis quarry, and is associated with granitic mylonites along a small shear zone about 10-15 m thick, with N10°E strike. It consists of quartz-calcite veinlets, about 0.10-0.15 m thick, with scarce fluorite accompanied by minor base metal sulfides (chalcopyrite, sphalerite and galena) and pyrite. Breccia textures are also observed. Quartz represents the first mineral event associated with the base metal sulfides. Calcite, the subsequent event, is present as large rhombohedral crystals, of pink to whitish colour, surrounding quartz and filling cavities. Chalcopyrite appears like a fine dissemination as anhedral grains with sizes between 20 and 1000 microns. Sometimes it is altered to covellite. Pyrite occurs in two distinct generations: an early stage, as idiomorphic cubic crystals of approximately 25 microns size included in sphalerite grains; and a late stage, as xenomorphic crystals of up to 1000 microns in size. Sphalerite, as grains up to 4000 microns, also contains chalcopyrite and galena inclusions. The mineralized zone is affected by moderate hydrothermal alteration. It consists of chloritization \pm calcitization \pm sericitization \pm silicification.

Hydrothermal fluids may have originated in deep parts of the belt from metamorphic dehydration and decarbonation reactions in basement rocks, associated with intense compression processes. This mineral occurrence represents the first discovery of base metal sulfides associated with shear zones in the Tandilia System and may represent an interesting exploration target for precious metals.

