

Banded Iron Formations and Associated Detrital Iron Deposits of the Western Congo Craton

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The northwestern portion of the Congo craton in Cameroon, Gabon, and the Republic of Congo comprises Archean rocks of the Chaillu and Ntem block, which are dominated by a complex of tonalite-trondhjemite-granodiorite (TTG) rocks and gneisses. This basement is partly obscured by the Paleoproterozoic Francevillian Supergroup and by Phanerozoic cover of the Congo basin.

Within the Archean TTG complex, large rafts of greenstone belts occur, composed of metasedimentary and metavolcanic units, and, in many cases, extensive banded iron formations (BIFs). Regionally, these BIFs can be grouped into those of the Ntem block, north, and those of the Chaillu block, south, of the Francevillian basins.

Known iron mineralization in the Ntem block includes the Nkout, Mbalam, Nabeba, Avima, Badondo, and Belinga projects. Those projects are characterized by pronounced linear magnetic features coinciding with outcropping BIF mineralization over strike lengths of several tens of kilometers. Most of these projects have developed extensive resources (multibillion tonne) in primary BIF at grades of between 30% and 35% Fe, and enriched BIF with grades >60% Fe. Mayoko-Moussondji, Mayoko, and Zanaga projects are the main iron projects within the Chaillu block. Like those in the Ntem block, these deposits are characterized by pronounced linear magnetic highs along several tens of kilometers of strike length, coincident with outcropping BIF mineralization. Each of those projects record significant primary BIF resources with components of oxidized higher-grade mineralization.

A series of new iron prospects have recently been studied in southern Gabon, focused on a series of linear magnetic anomalies immediately south of the Francevillian basins. Mapping has shown these anomalies delineate a series of greenstone belts, composed of amphibolites and BIF. Hypogene metasomatism of the rocks combined with in situ deep weathering has resulted in an enriched BIF and extensive hematite, martite ± magnetite hard cap on top of the BIF units. This is overlain by several-meter-thick colluvial or eluvial unconsolidated gravel composed of 80% coarse (>1-mm) clasts of martitized BIF in a finer matrix of limonitic sand (detrital iron deposit [DID]). Preliminary auger drilling and pitting on one prospect, Baniaka, have demonstrated that these DID deposits can attain thicknesses of more than 5 m, and can cover extensive areas (6 km² in the case of Baniaka). Preliminary test work indicates >80% recoveries using scrubbing and screening, with roughly 50% lump and 30% fine with average grades of between 52% and 61% Fe.