

Early-stage Gold Mineralization and Remobilization at Wassa Mine, Ashanti Belt, Ghana – Structural Controls and Implications for Exploration

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Wassa Gold Mine (>10 Moz Au) is located on the eastern limb of the Ashanti Belt, in southwest Ghana, the most gold-endowed Paleoproterozoic belt of the West African Craton. Gold production at Wassa Mine is from advanced open pits and underground workings currently targeting known mineralization down to 1200 m below surface in the Wassa Deeps area. This study presents the results of (1) detailed structural core logging, (2) litho-structural open pit mapping and (3) robust downstream 3D geomodelling of the Au-mineralized structures and lithologies.

The mine comprises greenschist-facies metasomatized interlayered mafic volcanic and sedimentary units that have been intruded by Eoeburnean diorite and felsic porphyry dykes (2191 ±6 Ma). All units display variably intense alteration assemblages of quartz-calcite-muscovite-chlorite-ankerite.

The mineralization is centred in the hinge and along the southern limb of an ENE-WSW-trending km-scale tight synform (F4). Assay grade data and modelled mineralized structures are mostly parallel to the folded contact between mafic volcanic and clastic sedimentary units. The mineralization is largely confined to the dominant steeply-dipping S3 foliation, often marked by the preservation of intrafolial folds (F3). In the southern limb, the main ore shoot has a trend and plunge of 208°-16° and mining and exploration efforts are focussed on its extension to the south in the Wassa Deeps section. This area is characterized by a slight change in strike and dip of the fabric and mineralization.

Overall, structural interpretation is consistent with the occurrence of relatively early mineralization at Wassa (pre-D3), during the Eoeburnean deformational event with partial remobilization during the main Eburnean orogenic event. Wassa is one of the rare cases where gold-only Eoeburnean-age mineralization is recorded in the Birimian and thereby deciphering the deformational events pertaining to the mineralization is key.