Structural and Lithological Controls on Gold Mineralisation at the Wassa Mine, Ghana

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1. Introduction

Figure 1(1) - Ghana’s Ashanti Greenstone Belt hosts a number of Paleoproterozoic hydrothermal gold deposits, including Golden Star Resources’ structurally complex Wassa Mine(2).

2. Regional Structure

Structurally, the Ashanti Belt is extremely complex having undergone five deformation events during the Eoeubrenan and Eburnean Orogenies, 2187–1980 Ma, and a later D6 event ~600Ma(3)(4):

- D1 – N-S shortening and initial mineralisation
- D2 – Extensional phase
- D3 – NW-SE shortening and remobilisation of mineralisation
- D4 – NNW-SSE shortening
- D5 – Vertical shortening
- D6 – NE-SW shortening(2)

3. Aims

The main aims of this study are to:
- Use Leapfrog Mining to analyse distribution of gold grade in the assay data.
- Produce an updated lithological map and cross-sections.
- Analyse samples to clarify geochemistry and petrology of the lithologies, in particular the Banded Magnetic Unit.
- Create a paragenesis of temporal relationships between mineralisation and folding.

4. 3-Dimensional Geological Mapping

Figure 2 – Map view of the assay data taken from Leapfrog. The red represents >2g/t and blue <0.1g/t. Cross-section lines are shown.

Gold assay data analysed in Leapfrog 3D illustrates the large F4 fold present at Wassa. The assay data also highlights F3 folds refolded around F4, with higher grades concentrating along the extended limbs and hinges of F3.

Using this data 3D models were produced to show the areas of localisation of the gold mineralisation (Figure 3). In addition to assay data, lithology data was used to create a geological map and cross-sections (Figure 4).

Figure 3 – Block models of gold assay grade >2g/t looking NW of section A (Figure 3a) and section C (Figure 3b). Gold appears to be distributed mostly within the hinges of the F3 folds.

Figure 4 – a) A geological map of Wassa with lines of cross-section for Figure 3a & b and Figure 4b, b) a geological cross-section of section B.

5. Mineralisation Styles

Figure 5 – Six different examples of mineralisation styles that occur at Wassa. Current work aims to link the different styles of mineralisation seen.

6. References