Petrography and Mineralogical Characteristics of the White Pidgeon and Somerset Gold Deposits in the Vumba Greenstone Belt of Northeastern Botswana

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The 1100 km^2 Archean Vumba Greenstone Belt (VGB) is located in the southwestern part of Zimbabwe Craton in Northeast Botswana and is composed of metavolcanic and metasedimentary rocks (Bagai et al., 2002; Aldiss, 1991). The Zimbabwe Craton in Botswana is divided into three lithostratigraphic complexes, which are (1) Francistown Granite Greenstone Complex, consisting of Tati, Vumba and Maitengwe greenstone belts, (2) Mosetse Complex, consisting of Matsitama Greenstone Belt and lastly, (3) Motloutse Complex (Carney et al., 1994; Aldiss, 1991). Rocks in the VGB have been affected by several episodes of metamorphism, with conditions spanning from greenschist to upper amphibolite and granulite facies (Bagai et al., 2002; Litherland, 1975). There are various types of mineralization in the VGB including, Au, Cu and other base metals, represented by the Somerset, New Rush, White Pidgeon, Eldorado and Sheba deposits. The current study focusses on two gold deposits, Somerset and White Pidgeon. Previous geological studies conducted on these deposits have not revealed the timing of the mineralization, ore deposition mechanism and have not investigated any possible relationships between the two Au deposits. Detailed studies on these deposits can contribute to the designing of exploration models. Mineralized samples and their host rocks of amphibolite, biotite schist and garnet schist collected during preliminary field work were prepared as standard thin sections for optical microscopy in order to identify the ore minerals, alteration minerals and to assess the textural relations between ore minerals.
Amphibolite occurs as massive greenish grey-greyish black rock consisting of hornblende, actinolite, quartz, feldspar, chlorite and mica. Biotite schist is dominated by biotite along the foliation and consists of chlorite, quartz, muscovite, sericite and amphiboles. The garnet schist is characterized by elongated and rounded garnets which mostly coexist with biotite, quartz and chlorite. The garnet has a poikiloblastic texture and is aligned to the foliation together with the biotite. Folded and en-echelon quartz veins cut across the foliation plane in the biotite schist and/or garnet schist. Intercalations of quartz veins and schist layers are also observed in some biotite schists. Sulfide minerals from these two deposits occur along the foliation and as disseminations in amphibolite and biotite schist and in quartz veins. At the Somerset deposit the sulfides also occur as disseminations in the garnet schist and in some instances filling fractures and as inclusions in the garnets. The most common sulfides identified from both the deposits include pyrrhotite, arsenopyrite, chalcopyrite, pyrite, sphalerite and galena. Pyrrhotite is the most abundant sulfide and occurs as veinlets or having inclusions of chalcopyrite and arsenopyrite. Gold occurs as inclusions in the sulfides, predominantly in arsenopyrite.

References

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