Paper Number: 1018

Textures of Sulphides, and Association with Gold Mineralisation in the Beatons Creek Detrital Gold Deposit, Pilbara, Western Australia

Guldbrandsen, C. J.[1] Van Kranendonk, M. J.[1,2,3], Graham, I. T.[1]

[1]School of Biological, Earth and Environmental Sciences, University of New South Wales, Sydney, Australia
Email: c.guldbrandsen@unsw.edu.au
[2]The Australian Centre for Astrobiology, University of New South Wales, Sydney, Australia
[3]Australian Research Council Centre for Excellence for Core to Crust Fluid Systems, Macquarie University, NSW, 2109, Australia

---

The Beatons Creek Deposit (BCD) is an auriferous Paleoplacer deposit located in the c. 2.75 Ga Hardey Formation (HF) of the Fortescue Group, Western Australia. The Fortescue Group is at the base of the larger Mt Bruce Supergroup, which is of equivalent age to the Transvaal Supergroup of South Africa.

The BCD is an advanced near surface and underground project currently being explored and delineated for near-term exploitation by Novo Resources Corp, Canada. The BCD is typical of a high energy detrital environment, with siliciclastic boulders in conglomerate beds present up to a maximum size of 1.2 m. Metamorphic deformation in the project area has been minimal, with assemblages reaching a maximum prehnite- pumpellyite-epidote facies (<300 °C) [1][2]. The deposit is made up of three thin, yet high-grade, horizons, with mineralisation occurring in reef style, shallow-dipping beds (<20°) where grades range from 1 to >20 g/t Au. Gold at the BCD is located in the matrix of horizons containing abundant, large "buckshot" pyrite (up to 3 cm diameter), as well as small, rounded grains of carbonaceous material. The most recent Measured & Indicated and Inferred global mineral resource estimation of the project is 6.429 Mt @ 2.7 g/t Au for 612 koz [3].

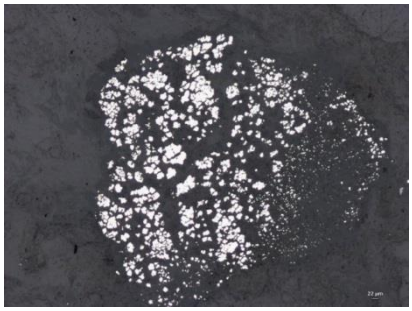

Figure 1: Spheroidal clusters of 'blooming' pyrite grains

This presentation will report on the petrographic, compositional, X-ray precession and sulphur isotopic composition of a variety of different sulphide textures observed in samples from polished drill cores, and thin sections from the BCD. Additionally, we will investigate the association of the sulphide textures in relation to gold mineralisation, as well as the role that microbial activity may have played in both the pyrite and gold precipitation. A detailed comparison of the Pilbara deposit with the Witwatersrand deposits will be conducted based on the abundant prior literature on the sulphide textures of the Witwatersrand deposits.

Preliminary observations reveal a range of sulphide textures including; framboidal pyrite, euhedral pyrite grains throughout the conglomerate matrix, and large solid-rounded pyrite grains

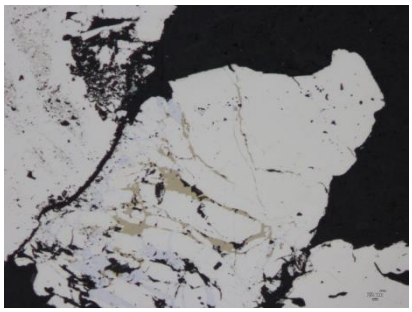

Figure 2: Gold in-filling fractured pyrite grain

displaying heavy fracturing. In addition to clear evidence of detrital transport of some buckshot pyrite, a range of textures appear to also indicate in-situ pyrite growth, as spheroidal clusters of 'blooming' grains, replacive of siliceous detrital clasts (Fig. 1). Gold occurs as small flakes in the matrix, but commonly is associated with the in-filling of fractures in pyrite (Fig. 2).

References:

[1] Smith R et al. (1982) Journal of Petrology 23:75-102
[2] Thorne A, Trendall A (2001) Geological Survey of Western Australia Bulletin 144:249
[3] Novo Resources Corp. (2015) NI 43-101 Technical Resource Report, Beatons Creek Gold Project, Tetra Tech, Colorado