3D Mapping of alteration zones: An example from Cohen's Reef, Walhalla, SE Australia

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Cohen's Reef, historically the most productive gold deposit in the Walhalla-Woods Point region of Eastern Victoria, is a shear zone-associated auriferous quartz vein system, and is associated both spatially and temporally with the Mid-Late Devonian Woods Point Dyke Swarm.

Geochemical sample traverses proximal and distal to Cohen's Reef were taken from recent exploration drilling by Goldstar Resources NL. Geochemical analyses, including whole-rock and quantitative XRD, reinforce results from hand sample and thin section studies of the altered/ unaltered dyke and host meta-sediments from Cohen's Reef.

Loss on Ignition (LOI) values are a favourable initial guide to the extent of hydrothermal alteration in dyke and host meta-sediments. Based on the selected samples, broad hydrothermal alteration zones (~5% wt LOI) continue at least 15 metres from auriferous dyke margins and quartz veins.

Petrological alteration (including deuteric, propylitic, carbonisation and sericitisation) in dyke samples is collectively characterised by a decrease in weight percent of albite and chlorite, and a marked increase in ankerite and muscovite. In comparison, alteration in meta-sediments is defined by the extent of pyrite and arsenopyrite. The zone of altered and bleached sediments within 15 metres of the dyke margin exhibit an increase in SiO_2 and CO_2, and a decrease in Al_2O_3, Fe_2O_3 and K_2O.

Although visible gold is commonly found in association with arsenopyrite grains, elevated gold values (up to 1.4ppm) do not correspond with presence of arsenopyrite. Instead, the elevated gold values correspond with increased pyrite and arsenic, therefore refractory gold may be found in the arsenic-rich pyrite rims.

3D mapping of the gold system can be constrained by the input of such drillhole data, including the lithology and structural surveys and geochemical assay results. Preliminary results show that high gold values are found associated with (sheared) dyke margins, and also laminated quartz veins and quartz-rich shear zones, with alteration zones defined by the presence of arsenic (>100 ppm) of 6 metres or less.

The ability to visualise, in a 3D modelling framework, the extent of alteration superimposed on corresponding lithologies enables a better understanding and predictive targeting of the mineralised system.

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