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Carbonate alteration as identified by staining as a vector to orogenic gold mineralization

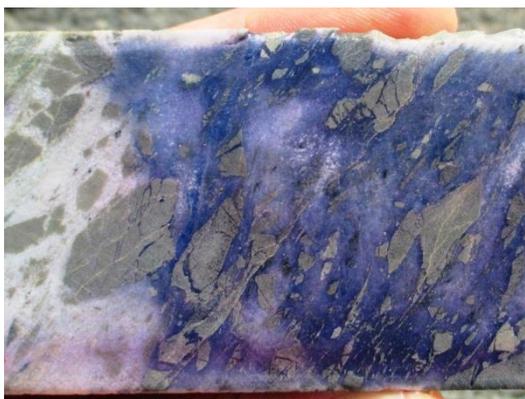
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The Nyanzaga deposit, presently owned by Acacia Mining in JV with OreCorp Limited is the most recent significant exploration project in the Neoarchaeon Sukumaland greenstone belt in Tanzania: it is also the largest undeveloped gold resource in the Lake Victoria Goldfield. The deposit is hosted by a folded sequence of chemical and clastic sediments and volcanic rocks.

The mineralization is hosted by an extensive, sub-vertical stockwork which cuts across the stratigraphy within an anticline. Deformation associated with the veins is entirely brittle. There is a distinct lithological control on gold grade: the majority of the gold is hosted by relatively brittle, iron-rich sediments.

The Nyanzaga Deposit shows the typical alteration of orogenic style mineralization, namely quartz, carbonate, sericite and pyrite. The carbonate alteration (ankerite and ferroan calcite) is pervasive and extends well beyond the mineralized system. In order to test the intensity of carbonate alteration core was selected for staining with potassium ferrocyanide (PF) and alizarin red (ARS) dissolved in dilute hydrochloric acid (HCl). The Alizarin red will produce a pink or red stain on any carbonate that will react with dilute HCl. Calcite and aragonite will stain red but less reactive minerals will, such as dolomite and siderite will remain unstained. Potassium ferrocyanide produces a precipitate of Turnbull's blue [Fe₇(CN)₁₈] when ferrous iron is released to the staining solution. When using the dual stain ARS+PF it is possible to distinguish between calcite, ferroan calcite and ferroan dolomite and particularly the textural relationship between different generations of carbonate minerals. This staining method has been described by Hutchinson [1] and was intensively used in the past but seems to have gone out of fashion with the younger generation of exploration geologists. Figure 1 shows a partially stained, brecciated and sericitized basalt with a carbonate altered matrix. The colour of the stain identifies the carbonate as ankerite.



The carbonate staining technique was systematically used on a large number of Nyanzaga drill holes in order to test if zonation of the carbonate species is observed (calcite distal – ferroan carbonates proximal) and if zonation and/or intensity can be used as a vector to mineralization. Interestingly an unusually wide zone of ferroan carbonate alteration, extending hundreds of meters from the mineralization, was identified. The intensity of the carbonate alteration was, however, found to be useful as a

vector to mineralization.

Figure 1: Stained core of brecciated basalt

A somewhat diffuse alteration front demarcating the boundary between moderate and strong carbonate alteration coincides approximately with the 1g/t Au envelope.

Reference:

[1] Hutchinson CS (1974) *Laboratory Handbook of Petrographic Techniques*. Wiley, NY, 527 pp.

