# Mineralogy, petrography and stratigraphic analysis of gold-hosting units, Oberon prospect, Tanami Region, N.T.

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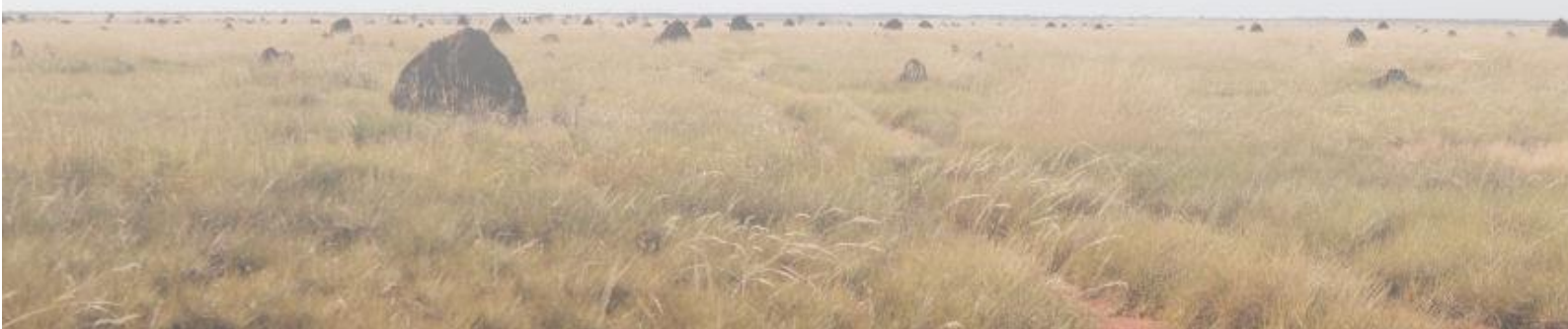

# ABSTRACT

The newly-discovered Oberon gold deposit, Tanami Goldfields, represents a Paleoproterozoic mesothermal orogenic gold deposit hosted in the Tanami Group. Recent drilling has intersected extensive mineralised zones at various positions within the lower stratigraphy. Studying drillhole TID0065 using a number of different techniques, the project set out to understand the lithostratigraphy of the sequence and its relationship with gold mineralisation, constraints on depositional environments and associated hydrothermal alteration, along with correlations to other deposits in the region.

The sequence consists of a dolomitic mudstone, grading up into a phyllite, with a siltstone protolith. This meta-sandstone represents the main host for gold mineralisation and is similar to that seen in the Coyote deposit. Conformably overlying this unit is a rapidly-deposited well-defined turbidite sequence. Gold is also hosted in the overlying Boudin Chert unit, a graphitic, pyrite rich rock that has hosts distinctive diagenetic boudin structures. The Boudin Chert represents a transition into an anoxic sediment-starved environment. Increased clastic input along with a drop in sea level further defines the rest of the sequence, with a siltstone, mudstone and sandstone package and intercalated volcaniclastics and ignimbrites noted in the upper part of the drillhole extending into the Killi Killi Formation.

Mineralisation is predominantly stratabound but thrust stacking provides a secondary control to the gold distribution pattern. Gold mineralisation is associated with Na-enrichment and K-depletion; albite is the dominant feldspar in the gold-hosting assemblage. This demonstrates a possible sodic metasomatism of an alkali assemblage. The wide variation in chlorite composition, expressed as varying proportions of chamosite and clinochlore end-members between lithologies, is suggestive of multiple fluid phases and/or alteration events, including possible ‘seafloor metamorphism’ prior to hydrothermal activity.

Primary alteration in the deposit is represented by an earlier chlorite-sericite assemblage and a later stage calcite-dolomite alteration in certain lithologies at the base of the sequence. Using chlorite thermometry, peak metamorphic temperatures were calculated to be at 366 ± 21 °C (i.e. greenschist facies); conditions reach amphibolite grade less than a kilometre away. Electron probe microanalysis suggests the mineralising fluids were volatile-rich, as demonstrated by the high F content of biotite and apatite.

Future exploration potential for deposits of this type should focus on identification of Fe-enriched turbiditc sequences, chlorite-albite-muscovite assemblages and the presence of arsenopyrite. Graphitic oxygen-deprived beds enriched in a range of trace elements with strong pyrite alteration are also good indicators of gold mineralisation.