U-PB GEOCHRONOLOGY OF APATITE AND CALCITE AT THE ERNEST HENRY DEPOSIT, NW QUEENSLAND; IMPLICATIONS FOR HYDROTHERMAL EVOLUTION AND ORE GENESIS.

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The Ernest Henry deposit represents the largest known Iron Oxide Copper Gold (IOCG) deposit in the Eastern Succession of the Mount Isa inlier. The orebody consists of a structurally controlled pipe-like breccia hosted in complexly altered Proterozoic volcanics with mineralization occurring post-peak metamorphism during a regional transpressional deformational event (D_3). Ore formation was controlled by the mixing of magmatic, metamorphic and basal fluids, resulting in the precipitation of chalcopyrite, pyrite, calcite, quartz, magnetite and accessory gold. Coarse-grained apatite is present as an accessory mineral in areas of high sulphide mineralization and in shear zones adjacent to the orebody.

The paragenesis and relative timing of the alteration and mineralisation stages have been well constrained by previous workers. However, advances in U-Pb geochronology via the in-situ laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) method means that for the first time apatite and calcite from the ore body and adjacent structures may be suitable for age dating.

This project will use an established apatite dating technique and aims to develop a calcite dating technique to provide dates for individual paragenetic stages. These time constraints will improve the current understanding hydrothermal evolution and ore genesis at Ernest Henry. As calcite is a common accessory mineral in ore deposits, this technique could be widely implemented to date mineralization events and may allow hydrothermal events at different deposits to be linked.