Deep Mining Queensland (DMQ)

**Project Overview**
Deep exploration is an industry area of focus given depletion of shallow resources and the likely/predicted mineral endowment under-cover adjacent to mature mining fields. The DMQ project aims to reduce the risk profile of exploring at depth in the Cloncurry field by identifying tracts of ground, through enhanced understanding of the mineral systems architecture, which are:

- Prospective for large, mass-mineable deposits (of IOCG and/or other affinity), and
- Comprise geotechnical, geothermal, geographical conditions which are amenable to mass-mining methods.

The main aims of the project are as follows:

1. Through review of IOCG provinces both in Australia and globally, characterise:
   (a) the key structural-tectonic, stratigraphic, magmatic and fluid systematic conditions affecting deposit formation, and
   (b) geophysical responses of known deposits, with the intention of building controls and parameters for prospectivity analysis.
   (c) IOCG deposit associations as an indicator to what other styles of mineralization may be possible in the Cloncurry district.

2. Where more detailed geological data has become available, validate/update the district-scale 3D geological modelling of the project area to facilitate constrained geophysical inversion focussing on sub-regional-scale resolution of intrusive geometries at depth and hitherto-little-emphasised structural controls and geometries that may have influenced fluid systematics at the time of IOCG mineralisation. Characterisation of each deposit (style) by geochemistry and geophysical response with the aim of establishing useful vectoring toward mineralization systems.

3. Engineering scenarios will be undertaken, constrained by knowledge of the geotechnical properties of the host-rocks in the area, stress conditions, geothermal gradient, ‘mineability’, mining options available; to be used as a filter on the ‘geological’ prospectivity such that opportunities/tracts of ground may be identified which have necessary inputs, and engineering ‘potential’ to host a mass-mineable deposit.

**IOCG size & geometry**
IOCG deposits can attain suitable size and grade for extraction using underground mass-mining methods.

A compilation of global IOCG deposits and mines indicates that these deposits can attain equivalent tonnages and grades to porphyry Cu-Au deposits, commonly mined via block-cave methods. IOCG deposits, however, often have stronger structural affinities and, as a result, occur as more tabular forms rather than ‘pipe’-like porphyry-related deposits.

The opportunities, and successful targeting of underground mass-mineable IOCG deposits will therefore require prospectivity analysis which takes into account the required geoscience information to determine mass-mineability, as well as the fundamental mineral prospectivity.

**Deep mass-mining options**
A major change facing explorers is that they now require an understanding of the key drivers of project viability.

The definition of ‘ore’ will be different at depth and will be determined by mining related factors which may be unique to the deeper mining frontier.

Mining options are cost driven, and must be low to enable extraction of low-margin ore. This inevitably means that large tonnage/high volume operations are required. Underground mass-mining and extraction options require different data and expertise, and methods for early evaluation of potential during exploration.

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