Molyhil W–Mo–Cu project – Recent developments and expanding the broader discovery potential

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Introduction

The Molyhil deposit is located in the northeastern portion of the Aileron Province, 220 km to the northeast of Alice Springs (**Figure 1**). First discovered in 1973, historically 20 000 t at 0.5% tungsten was mined at Molyhil to produce 100 t of WO_3 at 70% concentrate (Barraclough 1979). Mineralisation occurs at the contact zone between altered Palaeoproterozoic metacarbonate rocks of the Deep Bore Metamorphics (exoskarn) and the broad-scale intrusive I-Type Marshall Granite (endoskarn). The Deep Bore Metamorphic sequence comprises metamorphosed mudstone, sandstone and carbonate rocks, which were deposited as clastic and chemogenic sediments in an extensional back-arc basin between ca 1810 Ma and 1780 Ma. Magmatism generated by mid-crustal metamorphism is interpreted to have migrated and accumulated as felsic plutons. Slow isostatic cooling and decompression by ca 1730–1710 Ma enabled the crystallisation of these melts, including the Marshall Granite, which outcrops as prominent hills near Molyhil (McGloin and Weisheit 2022). Magmatic-hydrothermal fluids associated with this felsic magmatism focused along local structures, enabling host rock alteration and the formation of tungsten mineralisation in the form of scheelite and powellite.

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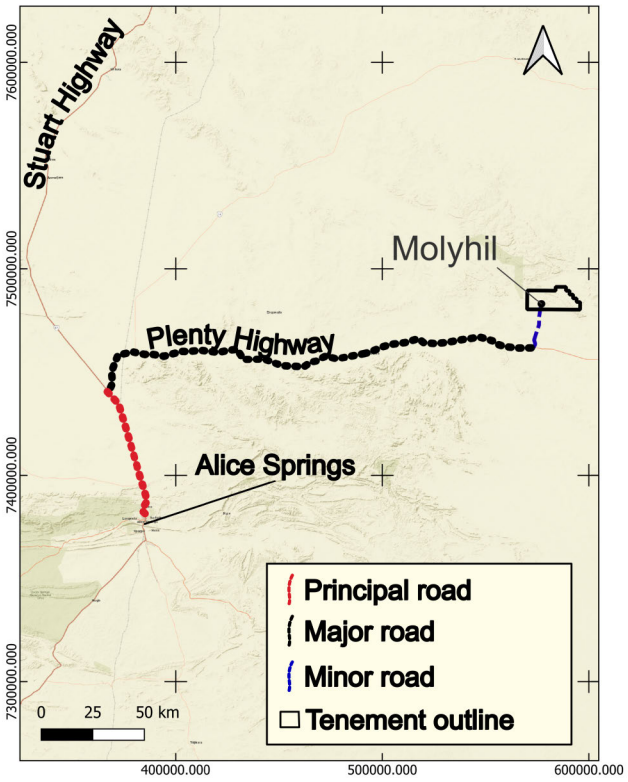

Figure 1. Molyhil Project location plan.

Background

Thor Energy PLC (previously Thor Mining PLC) via its wholly owned subsidiary Molyhil Mining has held the Molyhil tenement package since 2005. Thor Mining undertook several resource definition drill programs, mineral resource estimates (MRE), bulk sampling exercises, and metallurgical investigations, culminating in release of a definitive feasibility study in 2018 (Thor Mining 2018). The Molyhil project received Major Project Status in 2020 from the Northern Territory Government (Thor Mining 2020).

Investigator Resources Ltd (Investigator) entered into an earn-in joint venture agreement with Thor Mining PLC in 2022 to earn up to 80% interest in the Molyhil project (Investigator 2022). Investigator completed a comprehensive review of the project, identifying three key areas with potential to improve the value of the project, focusing on the existing mineral resource estimate, metallurgical and process optimisation, and near-mine exploration potential.

Investigator reviewed existing data, including geological interpretation and resource estimation processes, to identify options to improve mineral resource confidence whilst at the same time validating the existing data. Although a number of options were presented, additional density data was identified as an obvious and relatively simple initial improvement to be recommended. Another important component was evaluation of exploration potential given the relatively short mine life in existing studies.

Upon review of available data, Investigator approved and commenced a 13 hole diamond drilling program at Molyhil, undertaken in November–December 2023, designed to update of the Molyhil MRE. In addition, follow-up work to Investigator's initial assessment of the deposit led to the successful submission of a collaborative gravity survey program over the deposit and the broader tenement area held by Molyhil Mining.

Molyhil resource estimate - density

The density data used in all Molyhil MREs since 2006 have employed a formulated regression equation derived from 69 pycnometer measurements obtained from pulps from just two reverse circulation holes completed in an earlier program. The regression was calculated by using the relationship between bulk density and iron content of the pulps, based on a strong association between magnetite skarn ('black rock skarn') content and tungsten mineralisation. Subsequent resource estimations completed by Thor Mining, including their latest 2021 MRE, have utilised this regression equation to derive a density value for new samples with later density modelling undertaken. (Thor Mining 2021).

Investigator identified a large volume of diamond core as a readily available resource to provide a significantly broader distribution of density data to use in future MRE.

A program to measure historic core specific gravity (SG) using Archimedes (dry/wet weight) method commenced with about 1200 measurements taken. Whilst undertaking this work, Investigator identified that, while black rock skarn was regarded as the historic host, there were instances of tungsten mineralisation outside of this unit in low iron areas but with high SG due to scheelite and powellite mineralisation; this discovery required accounting for in terms of impact on existing and future MRE.

As a follow-up, Investigator acquired additional SG measurements from 12 diamond holes drilled at Molyhil in 2023, resulting in 3138 new density measurements to add the database. This data will be utilised in the pending 2024 MRE being undertaken by Investigator.

A benefit of the new SG data was the recognition of the clear density contrast between mineralised skarn, calc-silicates of the Deep Bore Metamorphics, and the Marshall Granite. This observation was the driver for the collaborative gravity survey over Molyhil and the broader region.

Exploration potential

Since the discovery of the main mineralised tungsten and molybdenum lodes in 1973, limited exploration has occurred in the regional Jinka 1:100 000-scale map area. Reviews of the Molyhil project by Investigator show that the majority of focus since 2004 has been within the deposit itself, with smaller exploration programs limited in scale and at times, not followed up. This is presumed to be due to an overriding desire to move the project towards development.

Investigator were encouraged that exploration potential remained, as evidenced by the identification of shallow aircore and RAB drillholes some 200 m from the Molyhil deposit with bottom of hole logging of skarn and references to low level tungsten anomalism (in holes between 4 m and 13.5 m maximum depth).

A co-funding application was granted in Round 16 of the Northern Territory Geological Survey's Geophysics and Drilling Collaborations program with plans to undertake a high-resolution ground-gravity survey across the Molyhil project area. The aim was to identify positive gravity anomalies hypothesised to be associated with Molyhil style tungsten mineralisation. Previous gravity coverage in the region was at 2 km spacing; the new gravity program undertaken by Investigator reduced this to 40 m x 20 m over Molyhil deposit whilst expanding out to 200 m x 100 m and 120 m x 60 m elsewhere within the survey area (**Figure 2**).

The processed gravity data identified an extremely good fit between observed diamond core SG data and gravity over the Molyhil deposit. Additionally, at a regional level, the data has identified a number of strong gravity anomalies that present as potential Molyhil-style targets (**Figure 3**).

The highest priority gravity target is located 1 km east of Molyhil and coincides with mapped Deep Bore Metamorphic rocks abutting Marshall Granite. This is hypothesised as being the potential northern offset of the Molyhil deposit given its association with a termination in magnetics in addition to its gravity response.

Investigator drilled a stratigraphic exploration hole (IVRMHDD013) in 2023 aiming to intersect a positive magnetic anomaly 200 m west of the Molyhil pit, which had prior reported skarn observed in RAB logs. The most interesting outcome of this hole was the intersection of metadolerite (Carmencita Metadolerite). This is the first known observation of significant mafic units in the Deep Bore Domain. Grains of bornite (2–5 mm) were also observed within and on the margin on the metadolerite.

This discovery of metadolerite may explain the source of copper and sulfur within the Molyhil deposit, which are postulated to derive from leached mafic units (McGloin and Weisheit 2022). It also provides evidence for potential copper mineralisation in the Molyhil area similar in style to that at Bonya Hill and the Jervois Mineral Field to the east, given that some gravity anomalies may be associated with mafic bodies, particularly in the southwest of the deposit.

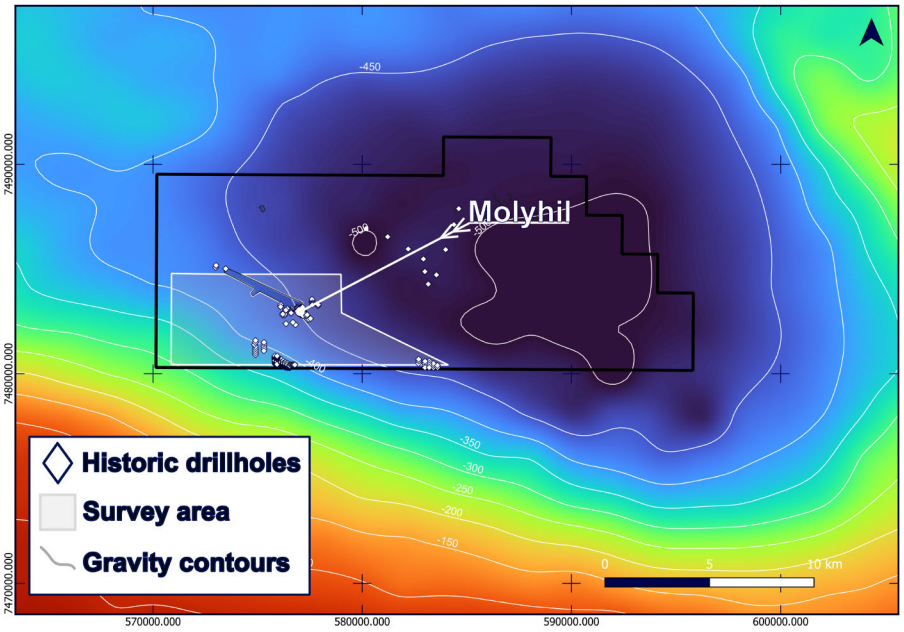

Figure 2. Molyhil co-funded gravity survey coverage.

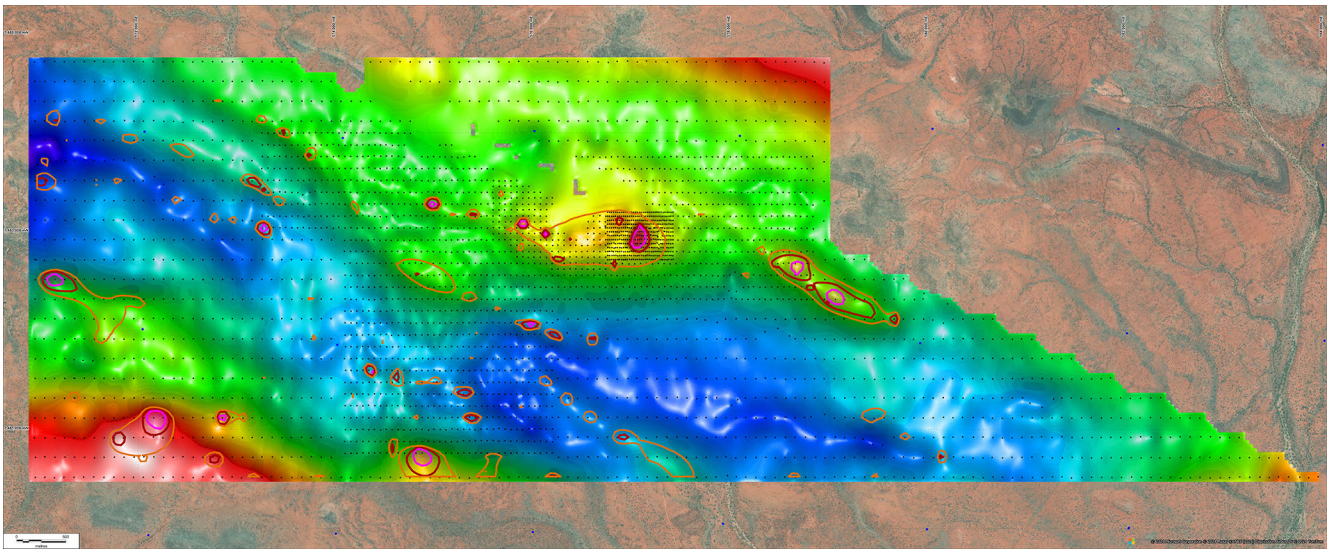

Figure 3. Molyhil and regional gravity anomaly shells.

Acknowledgement

We would like to thank co-authors Callum Crespan and Erik Fabreschi for their contribution to this project.

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