

Beneficiation of hard rock lithium ores

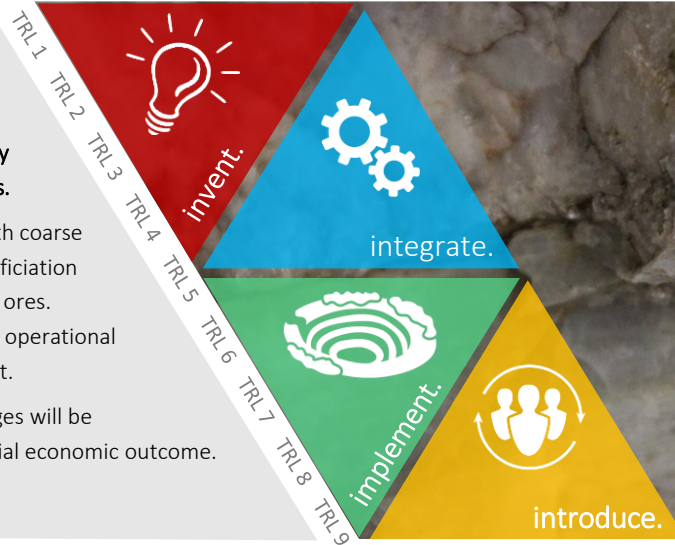
PROJECT P3-010

Processing lithium ores is complex and expensive. Maximising the grade of the material entering calcination will greatly reduce both capital and operating costs.

This project investigates the use of both coarse gangue rejection and flotation as beneficiation options for Western Australian lithium ores.

Each methodology will be assessed for operational impact across the processing flowsheet.

Variants of the mineral processing stages will be investigated to inform the best potential economic outcome.



Research collaboration

The project will be undertaken as a CRC ORE supported PhD project through Curtin University's Western Australian School of Mines, in association with the Kalgoorlie-Boulder Mining Innovation Hub.

Tawana Resources NL is providing ore samples and deposit information from their Bald Hill deposit in Western Australia. They are also accommodating research personnel on site and providing site staff to support the project.

The project aims to generate outcomes that may provide benefit to the concentration circuit recently commissioned at the Bald Hill mine site.

Positive outcomes from the project will be applicable to a broader range of deposits including other Tawana sites.

This program welcomes expression of interest from additional stakeholders in the hard rock lithium mining industry. Additional participants may be included based on agreement with the current collaborators and CRC ORE.

Program Coordinator: Paul Revell, CRC ORE
Project Leader: Dr. Laurence Dyer, Curtin University (WASM)
Timing: December 2017 – June 2021
Partners: Tawana Resources NL

Background & aims

The two major areas of focus for this project are the application of selected Grade Engineering® levers and flotation on Bald Hill material.

Grade Engineering involves an array of techniques. The main focus of this project is natural grade department by size. This involves the preferential concentration of a target element in a specific size fraction based on the geology. It also looked at how the rock breaks during blasting and primary crushing. This approach has shown significant potential value gains in other commodities such as gold and copper and will now be investigated in lithium.

Observed variation in appearance and fracturing between the lithium-bearing spodumene and gangue minerals suggest there are properties to exploit. It is of great interest to observe how the large spodumene crystals, that are easily cleaved, will report after comminution treatment. An examination of the department of other minerals will also be undertaken.

Flotation will look at alternative reagents and system modification to improve selectivity of lithium-bearing minerals over gangue. Due to the chemical similarity between the value in the lithium minerals and gangue minerals, the exploitation of minor differences requires careful assessment to determine the optimal process operation and conditions.

Focus on outcomes

The project aims to determine several key pieces of information that may be applied to the hard rock lithium industry:

- Whether lithium-bearing minerals will naturally deport to a specific size fraction after primary crushing.
- The impact of particle size and system modifications on lithium flotation.
- The manner in which variations in preparation and grade through mineral processing will impact the plant as a whole.

Image above: Lithium in situ. Photo supplied by Laurence Dyer.