

# QUARTERLY ACTIVITIES REPORT

## For the quarter ended 30 June 2019

### HIGHLIGHTS

#### CORPORATE

- Receipt of Mt Marion sale proceeds (A\$103.8 million) and declaration of 2 cents per share dividend - 4<sup>th</sup> consecutive return to shareholders in as many years; and
- Cash \$113.7 million, receivables and investments at \$8.9 million.

#### CORE DEVELOPMENT ACTIVITIES

##### *Lithium-ion Battery Recycling Project*

- Scoping study indicates potentially robust recycling process with estimated operating costs of less than US\$7/lb of cobalt recovered as cobalt sulphate, before by-product credits;
- Lithium-ion battery pilot program nearing completion with Stage 2 leaching and recovery test-work drawing towards completion; and
- Commercialisation activities focussed on engagement with potential partners to support provision of recycling services to the electric vehicle and battery manufacturing supply chains.

##### *Lithium Refinery Project*

- Binding MOU signed with leading Indian power conglomerate to jointly fund the evaluation for the development of the first lithium refinery in India using Neometals annual offtake option from Mt Marion, the world's second largest producer of spodumene concentrates;
- MOU contemplates the production of primarily lithium hydroxide ("LiOH") at a minimum rate of 10,000tpa LiOH equivalent; and
- Successful production of multiple types of commercial quality synthetic zeolite products from refined Mt Marion spodumene leach residue waste. Production of synthetic zeolite could eliminate significant waste disposal costs and generate significant co-product revenue from a market multiple time larger than the lithium market.

##### *Barrambie Vanadium and Titanium Project*

- DFS update indicates primary vanadium production from the vanadium-rich Central Bands of the Barrambie VTM deposit is technically feasible and economically viable; and
- Pilot scale beneficiation test-work continues to generate concentrates ahead of pilot plant test work on the all-hydrometallurgical flowsheet for the dual recovery of both high-purity titanium and vanadium chemicals. Aim to exploit Central and titanium-rich Eastern Bands with a 'whole of deposit' processing solution.

#### EXPLORATION ACTIVITIES

- New pegmatite target areas (lithium) identified at Mt Edwards and a 15-hole reverse-circulation drilling program (nickel) was completed during the quarter. Drilling represents part of an evaluation of options to build and realise value from the Mt Edwards nickel resource inventory (123,000 tonnes contained nickel metal).

## COMPANY OVERVIEW

Neometals Ltd (“**Neometals**” - ASX:NMT) innovatively develops opportunities in minerals and advanced materials essential for a sustainable future. The Company strategy focuses on de-risking and developing long life projects with strong partners and integrating down the value chain to increase margins and return value to shareholders.

Neometals has three core projects:

- **Lithium-ion Battery Recycling Project** – a proprietary process for recovering cobalt, nickel, lithium and other valuable materials from scrap and end-of-life lithium batteries. Pilot plant testing currently underway with commercial development decision expected in the March Q 2020;
- **Lithium Refinery Project** – Progressing evaluation activities for the development of India’s first lithium refinery with Manikaran Power Limited to supply lithium hydroxide to the battery cathode industry. Project underpinned by a binding life-of-mine annual offtake option for 57,000 tonnes per annum of Mt Marion 6% spodumene concentrates. Commercial development decision expected in the 1H CY2021; and
- **Barrambie Titanium and Vanadium Project** - one of the world's highest-grade hard-rock titanium-vanadium deposits, working towards a development decision by end of 2020.

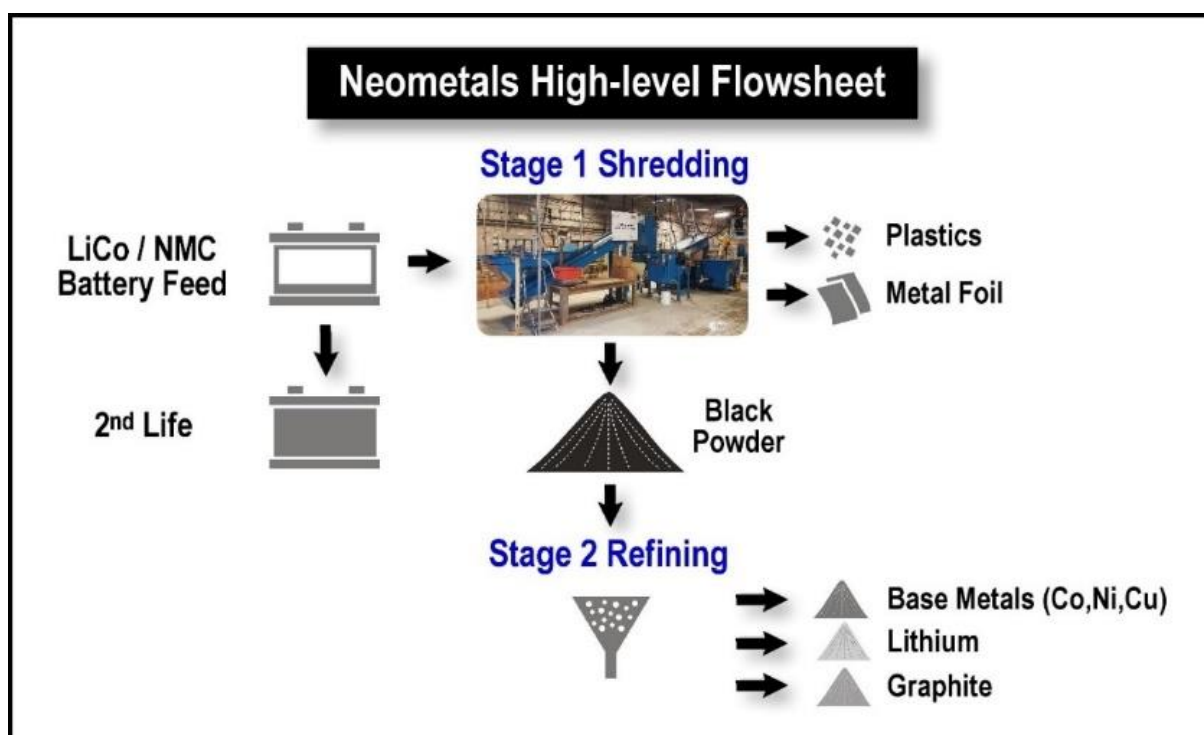


**Figure 1** – Location map of Neometals’ JORC 2012 Mineral Resource Estimates

## CORE PROJECTS

### Lithium Battery Recycling Project (Neometals 100%)

Neometals has developed a process flowsheet targeting the recovery of >90% of all battery materials from end-of-life lithium-ion batteries (**LIBs**) that might otherwise be disposed of in land fill or processed in energy-intensive pyrometallurgical recovery circuits. Neometals' process flowsheet targets the recovery of valuable materials from consumer electronic batteries (devices with lithium cobalt oxide (**LCO**) cathodes), and nickel-rich EV and stationary storage battery chemistries (lithium-nickel-manganese-cobalt (**NMC**) cathodes). The flowsheet is designed to recover cobalt, nickel, lithium, copper, iron, aluminium, manganese into saleable products and is being validated currently in a pilot plant at SGS Lakefield in Ontario, Canada (**Pilot**).



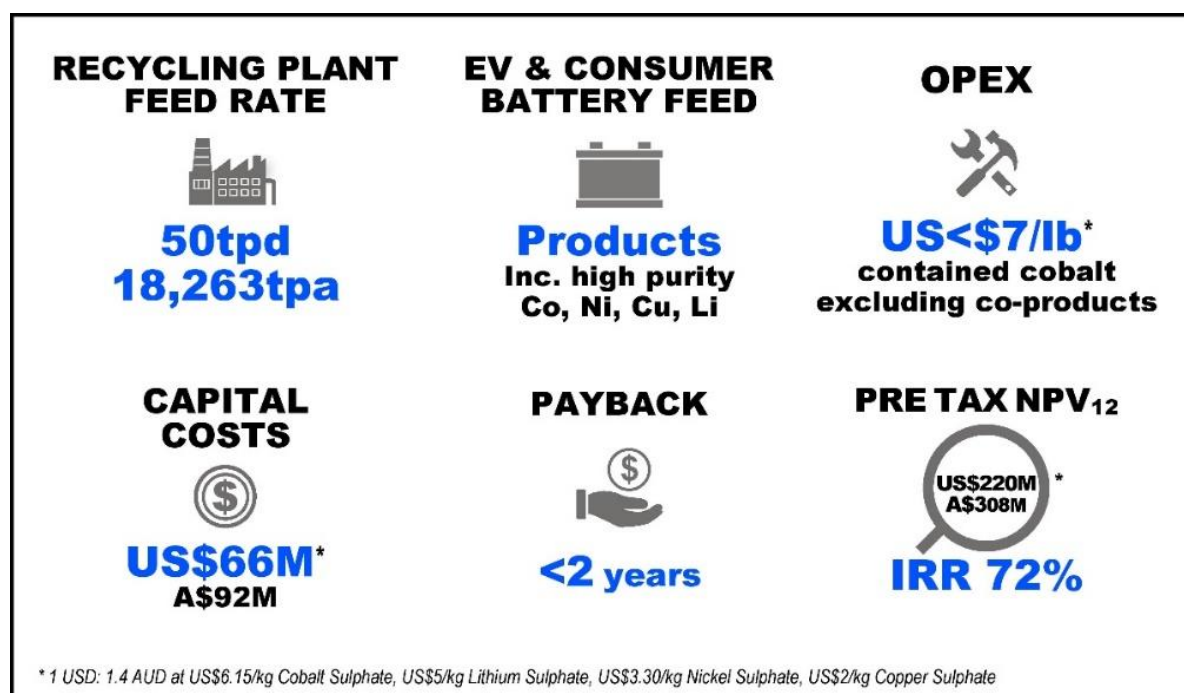
**Figure 2 - High level flowsheet showing the materials generated from Feed Preparation and Hydrometallurgical Processing facilities**

### Scoping Study

During the quarter, Neometals announced the result of a Class 5 scoping study ("**Study**") to Association for the Advancement of Cost Engineering ("**AACE**") standard. Primero Group Ltd ("**Primero**") was engaged to complete the Study which determined operating and capital costs based on Neometals' bench-scale validation and optimisation test work. Process design criteria and mass/energy balances were prepared by Strategic Metallurgy Pty Ltd ("**Strategic Metallurgy**") and financial modelling was undertaken by Azure Capital.

The Study indicated potentially robust economic outcomes with estimated operating costs of less than US\$7/lb of contained cobalt as cobalt sulphate, before by-product credits, from the processing of 50 tonnes per day of an equal amount of lithium-cobalt ("**LCO**") (consumer electronic) and lithium-nickel-manganese-cobalt ("**NMC**") (electric vehicle) batteries.

Primero completed the Study considering both a 10 tonnes per day ("**tpd**") and a 50tpd battery shredding and hydrometallurgical processing circuit ("**Recycling Plant**"), with AACE Class 5 order of magnitude ( $\pm 35\%$ ) capital cost and ( $\pm 35\%$ ) operating cost estimates.



**Figure 3 - Key highlights of the Study**

The Recycling Plant flowsheet, which is being optimised at pilot scale, comprises two sections:

1. Shredding, removal of metal casings and plastics in the feed preparation facility (“**Feed Preparation Facility**”); and
2. Leaching, recovery and refining to deliver chemical products via the hydrometallurgical processing facility (“**Hydrometallurgical Processing Facility**”).

The Study estimate was based on a development scenario characterised by:

- Establishing a green-fields operation for an integrated shredding and processing plant nominally located in Kwinana (chosen as an assumed site for accuracy and estimation conservatism);
- Modular plant with a throughput capacity of 18,250tpa; and
- LIB feedstock comprising 50:50 LCO and NMC batteries.

**Table 1 - Study Financial Highlights**

Scoping Study Highlights	
Annual Production	9,623 t Cobalt Sulphate 5,635 t Copper Sulphate 1,544 t Lithium Sulphate 2,020 t Nickel Sulphate
Life of Plant (LOP)	10 years
Life of Plant (LOM) Revenue	US\$ 850 million
Pre-tax Cashflow	US\$ 502 million
Pre-tax NPV (12% discount rate)	US\$ 220 million
Average Net Operating Cost of recovered cobalt as cobalt sulphate excluding by-product credits	US\$6.65/lb (US\$14.65/kg)
Total initial capital costs	US\$66 million
Payback of capital costs	<2 years

For full details refer to ASX announcement entitled “Neometals Completes Lithium Battery Recycling Scoping Study” released on 4 June 2019.



## Pilot Plant

Neometals successfully commissioned its Stage 1 Feed Preparation Pilot in February 2019 then shredded approximately 2 tonnes of spent LIBs ready for subsequent leaching in the Stage 2 Hydrometallurgical Processing Pilot. During the June quarter, Neometals advanced the following aspects of its Pilot:

- Feed Preparation Facility design was improved based on lessons learned during the Feed Preparation Pilot;
- Pilot leaching of approximately 1,100kg of shredded and cleaned LIBs ("**Black Mass**") producing 2,500 litres of pregnant leach solution for subsequent product recovery in the Hydrometallurgical Processing Facility; and
- Bulk Hydrometallurgical Processing test-work commenced with successful copper recovery via solvent extraction.



Figure 4 - Pilot leach test-work in Lakefield



Figure 5 - Copper Crystallisers (left) and Copper Sulphate Product Filter (right)

## Market Development

Neometals continued to advance its engagement with potential partners to commercialise the recycling project. Dialogues with brand name plant operators have been run in parallel with maturing feed supply dialogues with electric vehicle and battery manufacturers who have scrap and end of life LIBs to recycle now. The key takeaway from Neometals discussions with industry and extensive due diligence is that consensus forecasts on LIB demand,

predominantly from electric vehicle applications, continue to predict sustained strong growth with LIB materials supply side deficits predicted to be the major constraint on growth. With internal combustion engine powered vehicles predicted to be phased out, the increase in LIB-powered electric vehicles means sustained increase in production scrap and in end of life cells that will require mandated disposal through recycling.

During the quarter Neometals has used its Montreal laboratory facilities to evaluate more than 70 LIBs with a range of cathode chemistries from vehicle OEMs and electronic manufacturers. With the Pilot now progressing to recovery from solution and purification, it will soon be possible to commence end user market evaluation of finished chemical products from the Hydrometallurgical Processing Facility.

Post Pilot completion, Neometals will look to demonstrate its Recycling Plant in advance of commercial deployment. Sites will be considered either in Montreal at the Neometals industrial facility or at the site of a commercial partner. Contemporaneous with the pilot program, preparations are underway for a feasibility study to commence based on Pilot data.

### **Lithium Refinery Project** **(Neometals 100%)**

During the quarter, Neometals continued development of its downstream lithium chemical production strategy. Key activities included:

- Execution of a MOU with Manikaran Power Limited to jointly fund the evaluation of developing the first lithium refinery in India; and
- Further process development and evaluation of a proprietary process to produce a synthetic zeolite co-product to potentially enhance revenues of, and minimise residue disposal costs, from residues produced in the lithium refining process.

### **Lithium Refinery (LR)**

The key driver of the LR Project is to realise value from the conversion of future spodumene concentrates purchased under the Company's Mt Marion Spodumene Concentrate Offtake Option ("**Offtake Option**"). The annual Offtake Option provides a fixed volume of up to 57,000tpa of 6% spodumene concentrate for conversion into battery grade lithium hydroxide (**LiOH**) and lithium carbonate (**LC**) for supply to LIB cathode and cell makers. The LR has been designed to produce lithium hydroxide and lithium carbonate in a plant with capacity of approximately 10,000tpa lithium hydroxide equivalent.

Neometals previously completed a capital cost study on a proposed lithium refinery operation in Kalgoorlie, WA, which indicated a higher than anticipated capital intensity for the 10,000t LiOH capacity. Neometals decided to delay further evaluation on the Kalgoorlie site but continues to advance the engineering and approvals processes. The Company has confidence in the medium-to-long term spodumene concentrate supply from existing and emerging mining projects in the Eastern Goldfields region to support consideration, in due course, of a larger (~20,000t LiOH capacity) conversion facility located in Kalgoorlie. Discussions with potential project and offtake partners are continuing.

The near term LR priority lies with joint development activities for a potential Indian project – see below.

### **MOU with Manikaran Power**

Neometals and Manikaran Power Limited have agreed to contribute their respective skills, resources and know-how to evaluate development of a lithium refinery in India and to share the costs of the evaluation equally (*for full details refer to ASX announcement entitled "MOU – Lithium Refinery in India" released on 20 June 2019*). Upon completion of the feasibility study analysis, and subject to agreement on terms, a final investment decision ("**FID**") will be considered for a 50:50 joint venture ("**JV**") to progress and develop the LR in India.

A positive FID and formal JV commitment would see Neometals contributing to the venture its 'life-of-mine' offtake option volume (i.e. up to 57,000t per annum of 6% spodumene concentrate) ("**Offtake Option**") retained as part of the Mt Marion equity sale agreement (*for full details refer to ASX announcement entitled "Completion of Mt Marion Sale and Strategy Guidance" released on 19 March 2019*). Additional spodumene feed would be sourced as required from external sources to meet the LR's needs depending on its nameplate capacity. In the event of a positive FID and formation of a JV, Manikaran will take the lead role in procuring project financing for not less than 50% of the capital expenditure required, securing regulatory approvals and Indian government subsidies (as available), securing a suitable site for the LR and securing necessary utility and reagent supplies.

The MOU represents a significant step forward for Neometals in its downstream lithium processing strategy. It allows the realisation of value from its Offtake Option to participate in higher value, higher margin lithium chemical production for electric vehicles, stationary energy storage and a more sustainable future.

It is estimated that the feasibility study, which needs to be completed irrespective of site, will take approximately 18 to 24 months, with an FID on whether to proceed with a potential JV likely to be considered thereafter.

## Zeolite

Zeolites are advanced industrial materials used for water treatment, gas adsorption and green chemistry applications. Manufacturing zeolites from LR waste (spodumene leach residue) could eliminate residue disposal and associated costs from lithium chemical production and generate significant co-product revenue.

Zeolite materials are produced as both naturally occurring and synthetic materials. Synthetic zeolites such as the specifications now produced by Neometals at bench-scale, are typically used in more demanding industrial applications such as molecular sieves for air and hydrocarbon purification. According to Markets and Markets (2017), the global zeolite market was approximately 2.4Mtpa with a total estimated value in excess of US\$13B per annum.

Late 2018 feedback from early engagement with market participants on the Company's 'Type A' zeolite led to bench-scale process optimisation and the subsequent manufacture of a higher value 'Type X' zeolite product.

Neometals' zeolite development work is running in parallel with continued evaluation of the optimal design scale for its LR. During the quarter, Neometals advanced the work on its zeolite program and successfully produced commercial grade samples of 'Type X' zeolite from both Mt Marion and third-party sourced spodumene leach residue via its patent pending technology (*for full details refer to ASX announcement entitled "Neometals Zeolite Production Evaluation Results" released on 24 June 2019*). Benchmarking studies indicated Neometals product quality to be comparable to industry leading zeolite products from a leading Japanese manufacturer.

Demonstrating that Type A and Type X zeolites could be produced from lithium refinery residue represented a proof of concept breakthrough. Subsequent production of synthetic zeolite, from various sources of lithium refinery residue, at or close to commercial benchmarks is extremely encouraging. Neometals has engaged global engineering company Exyte to complete a Class 4 Engineering Cost Study (pre-feasibility level) based on the current test-work.

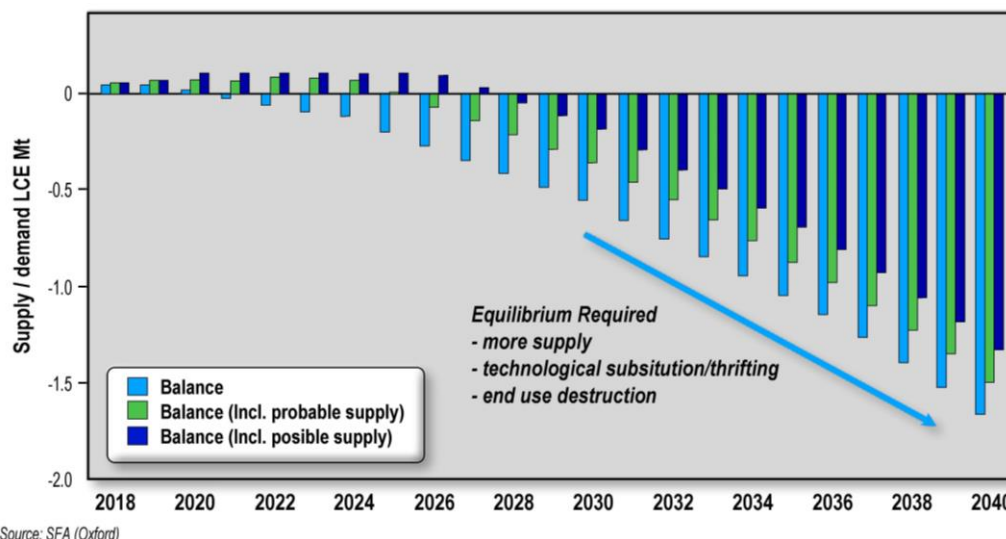
Exyte completed a preliminary economic assessment study for a zeolite manufacturing facility located adjacent to the KLR. Neometals has since engaged Queensland University of Technology to perform further bench-scale process testing, validation and pilot testing. A Class 3 Engineering Cost and Feasibility Study is planned to follow successful completion of the pilot plant demonstration of the process. The pilot plant will also generate customer evaluation samples of the zeolite products.

## Lithium Market Commentary

The demand side of the lithium market is continuing to grow in line with consensus forecasts. However, the high rate of growth on the supply side through capacity expansions and committed new production facilities for raw materials and lithium compounds has exceeded the rate of demand growth.



The global lithium market is reported to be oversupplied currently and is forecast to remain oversupplied until 2024 due to the cumulative capacity of new conversion plants, particularly those under construction in Australia. The projected lithium market supply/demand balance (in LCE units) is described in the SFA Oxford chart below (Figure 6). A supply deficit from 2025 is probable at which time market conditions will once again support and stimulate the commissioning of new production capacity.

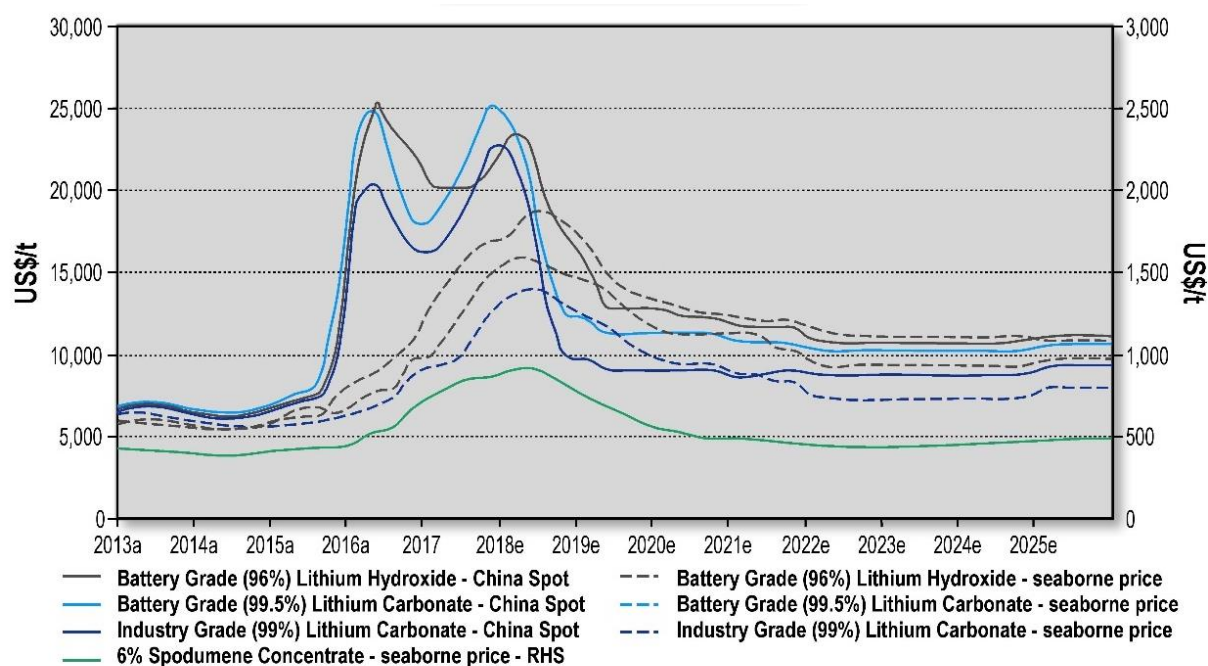


Source: SFA (Oxford)

Figure 6 – Projected lithium market supply/demand

The Deutsche Bank price forecast (Figure 7) for the most commonly traded lithium chemicals, lithium carbonate and lithium hydroxide, and the main hard rock lithium mineral, spodumene, shows a trend for convergence between Chinese spot prices and international prices. Both Chinese spot prices and international prices have peaked and are trending down to more stable levels expected to prevail for the next five years. Deutsche Bank is not forecasting any price increases before 2025.

This price forecast is supported by the ‘probable’ supply/demand balance scenario forecast by SFA Oxford (Figure 7), which indicates that the market will once again move into a supply deficit at this time.



Source: Deutsche Bank

Figure 7 – Deutsche Bank price forecast



### Forecast Lithium Prices

Prices for lithium chemicals and mineral concentrates continued to soften in the June quarter and are now considerably lower than they were in 2018. According to Fastmarkets, Chinese domestic prices for battery grade lithium carbonate were in the range US\$10,000 – 11,000/t ex works and in North Asia (i.e. Japan & Korea) at the end of June. Cost Insurance freight (“CIF”) prices were in the range US\$11,000 - 12,500/t. In the case of battery grade lithium hydroxide Chinese domestic prices were US\$11,500 – 12,300/t ex works in June and in North Asia. CIF prices were US\$14,000 – 15,000/t. Prices for industrial grades of these chemicals traded at slightly lower levels. The spread of prices results from a range of product qualities offered by different suppliers in the market.

Fastmarkets reported the CIF China price for spodumene (5 - 6% Li<sub>2</sub>O) to be US\$585 – 650 per tonne at the end of June. This market has moved into surplus as a result of the commissioning of four spodumene mining operations in Western Australia during 2018. In addition, Talison is expanding its Greenbushes production to satisfy demand for spodumene from the Tianqi lithium hydroxide plant in Kwinana and the Albemarle lithium hydroxide plant at Kemerton. Spodumene concentrates are expected to be in surplus supply for some years if current new entrants achieve their design capacities and the Greenbushes expansion proceeds as planned.

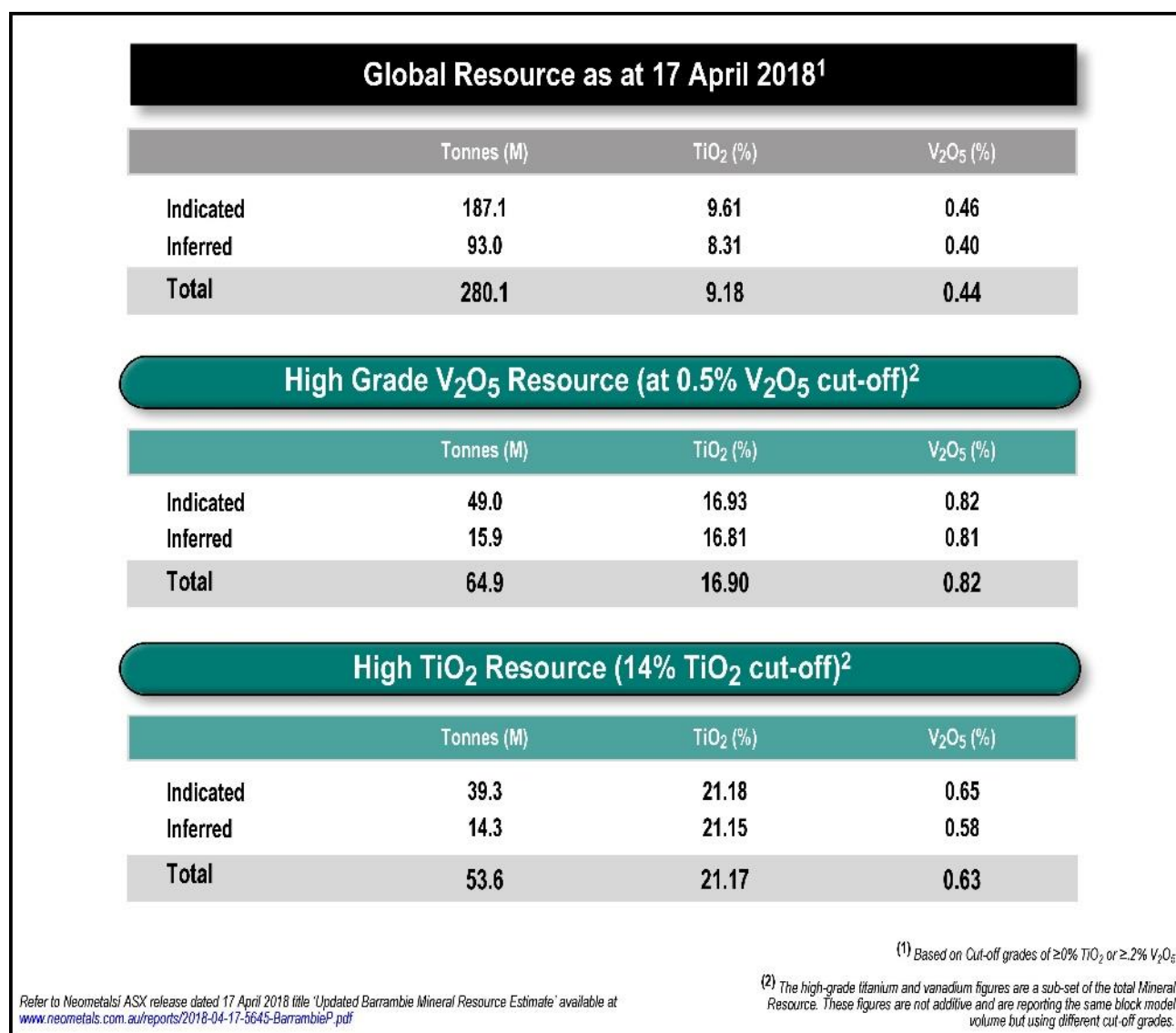
SQM has recently reported it will postpone a planned capacity expansion of its lithium brine operations in Chile in response to the current lithium supply surplus and softer pricing outlook.

Notwithstanding pressure on the lithium market in the near term, the longer-term outlook remains robust. This is primarily due to the world’s motor vehicle industry transitioning to the manufacture of electric vehicles and lithium-ion battery technology being the most suitable technology for this industry. Industry participants are making large investments and changing strategy to position for this transition. Notable investments announced during the quarter include, but were not limited to:

- Volkswagen (VW) committing approximately €1 billion to help finance Europe’s first lithium-ion battery mega factory and establish joint battery production with Northvolt AB, a Swedish lithium-ion battery manufacturer. In addition, VW will set up a joint venture company with Northvolt for the development of VW’s own cell manufacturing facility in Germany;
- SVOLT Energy Technology Co, a major Chinese lithium-ion battery supplier to the Chinese automotive sector, announcing plans to build its first overseas lithium-ion mega factory in Europe;
- Jaguar Land Rover (JLR) investing close to £1 billion to re-equip its factory in Birmingham and begin production of electric vehicles in the UK;
- Wesfarmers \$AUD534m takeover offer for Kidman Resources Limited at a 47.3% share price premium;
- SK Innovation broke ground at its first US based cell manufacturing plant in Georgia following plans for further expansions in Hungary and Asia; and
- France and Germany announced their role as leaders in an EU alliance to invest up to €6b building lithium ion cell capacity. Pilot scale production is earmarked to commence in France later this year, with the ultimate goal of opening two production sites in Germany following development of the project.

### **Barrambie Vanadium/Titanium Project (Neometals 100%)**

The Barrambie Vanadium and Titanium Project in Western Australia (“**Barrambie**”) is one of the largest vanadiferous-titanomagnetite (“**VTM**”) resources globally (280.1Mt at 9.18% TiO<sub>2</sub> and 0.44% V<sub>2</sub>O<sub>5</sub>)\*, containing the world’s second highest-grade hard rock titanium resource (53.6Mt at 21.17% TiO<sub>2</sub> and 0.63% V<sub>2</sub>O<sub>5</sub>)\* and high-grade vanadium resource (64.9Mt at 0.82% V<sub>2</sub>O<sub>5</sub> and 16.9% TiO<sub>2</sub>) subsets based on the latest Neometals 2018 Mineral Resource Estimate (\*for full details refer to ASX announcement entitled “Updated Barrambie Mineral Resource Estimate” released on 17 April 2018 and Figure 8 below).



**Figure 8– Barrambie Mineral Resource Estimate, April 2018**

Barrambie is located approximately 80km Northwest of Sandstone in Western Australia, has a granted mining permit and has been the subject of approximately AUD\$30 million in Neometals exploration and evaluation expenditure since 2003.



Figure 9– Barrambie project location map and Mineral Resource Estimate, April 2018

During the quarter, Neometals completed an update to its 2009 definitive feasibility study (“**Updated DFS**”) which considered primary vanadium production from a conventional salt roast-leach process at Barrambie. The Updated DFS focused on production of high purity vanadium pentoxide and ferrovandium, primarily from Barrambie Central Band ore, which was confirmed to be technically feasible and economically viable. The Updated DFS did not consider the impact to project economics of exploiting the considerable quantity of contained titanium through a whole of deposit processing solution. This represents the next stage of project evaluation.

The Updated DFS used the latest Neometals 2018 Mineral Resource Estimate\* as a basis. The Updated DFS establishes Ore Reserves, estimated using the guidelines of the 2012 edition of the Australian Code for Reporting Exploration Results, Mineral Resources and Ore Reserves “(**JORC Code (2012)**)”.

Key highlights from the Updated DFS are shown in Figure 10 below:

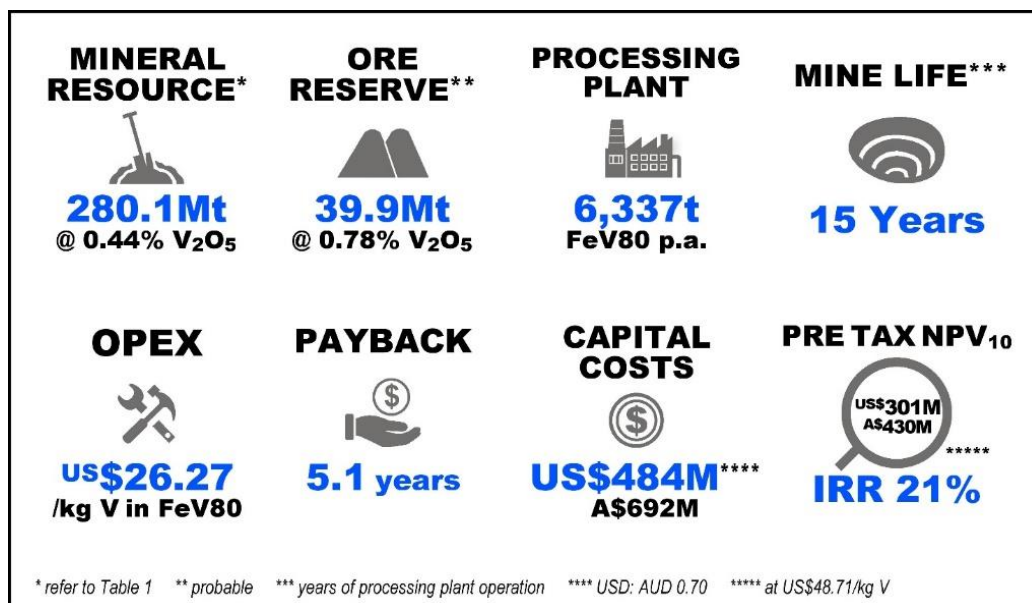
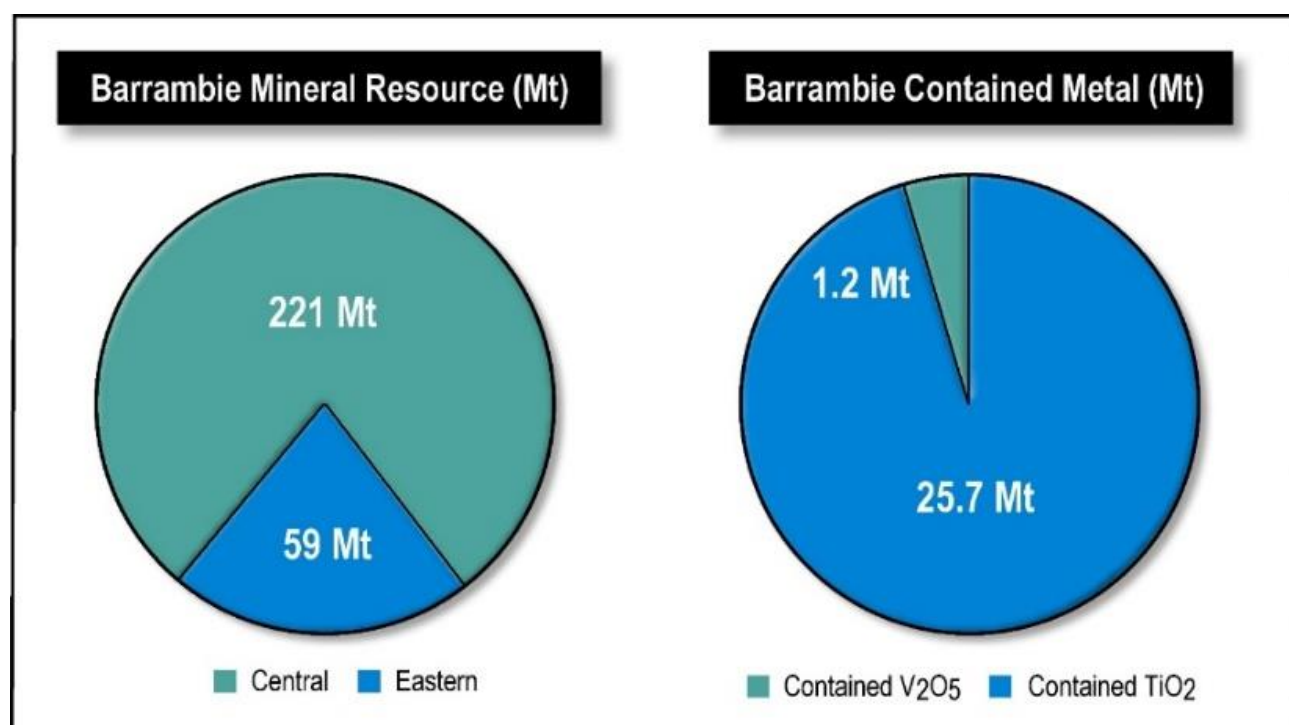


Figure 10– Barrambie Updated DFS Key highlights

For full details refer to ASX announcement entitled “Barrambie Vanadium Production and Commencement of Titanium Pilot Plant Program” released on 22 May 2019.

Neometals has made significant investment in the acquisition, exploration and evaluation of Barrambie since 2003. Given the size and scale of the titanium and vanadium resources, the Company continues to evaluate a range of metallurgical processing routes seeking how best to realise value from both minerals. The Company has maintained its focus on recovering a titanium co-product to maximise the probability of developing Barrambie and realising maximum value for shareholders. Going forward, subject to final board approval, this focus will see the 2015 titanium pre-feasibility study (“PFS”) (for full details refer to ASX announcement entitled “Barrambie Pre-feasibility Study Results” released on 25 August 2018), updated using data from a newly designed hydrometallurgical pilot test-work program. The aim is to identify the optimal ‘whole of deposit’ flowsheet to recover the maximum value from this globally significant VTM resource before moving to a Hydrometallurgical Definitive Feasibility Study and subsequent Front-End Engineering and Design (“FEED”) Study.

The abovementioned titanium PFS was completed on a proprietary hydrometallurgical process which showed titanium chemical production to yield the highest returns). Forward work programs will focus on advancing towards pilot-scale evaluation of a hydrometallurgical flowsheet utilising atmospheric acid leaching to recover titanium, vanadium and iron products in combination with conventional and proprietary acid regeneration equipment.



**Figure 11 - Barrambie Mineral Resource by Size and Contained Metal.**

As can be seen in Figure 11 above, more than 95% of the contained metal in the Barrambie resource is Titanium and as a result, it is important to look at opportunities to extract value from it.



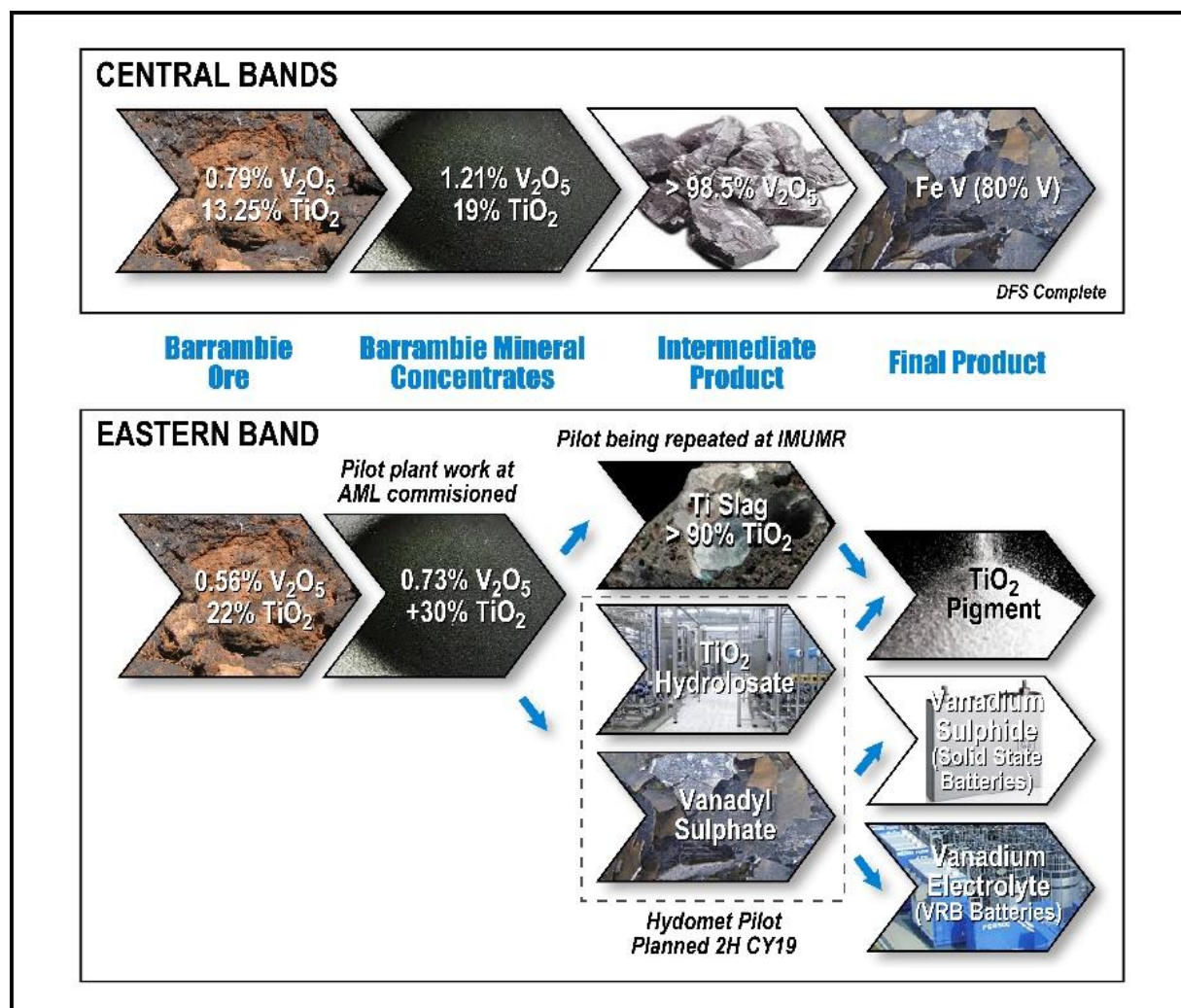


Figure 12 - Barrambie Processing Options

### Evaluation Activities

The Barrambie project is unique owing to its exceptionally high titanium resource grade coupled with high vanadium content and the weathered nature of the orebody. Extracting value from both minerals is nuanced and has required Neometals to evaluate a range of metallurgical processing routes. The comprehensive approach has also been necessary to accommodate fluctuations in the markets for vanadium and titanium. At completion of the proposed hydrometallurgical feasibility process, Neometals will have a complete and extensive data set to choose the best processing path from which to base its FEED study.

Three conventional options exist for Barrambie processing:

1. Pyrometallurgy – electric arc smelting to produce slag precursors for titanium and vanadium chemical production;
2. Salt Roast Leach – production of vanadium chemical/s and a titanium-iron residue; and
3. Hydrometallurgy – multi-stage leaching coupled with acid regeneration to generate both titanium and vanadium products.

As part of the 'pyrometallurgical' path evaluation, Neometals commenced drilling in 2017 of Barrambie's high-titanium Eastern Bands bulk sample mining, beneficiation and pilot scale testing to recover titanium slag and pig iron with an associated vanadium product. The work was undertaken in China by the Institute of Multipurpose Utilisation of Mineral Resources – Chinese Academy of Geological Sciences ("IMUMR"). These evaluations were designed to establish the

possibility of staged development at Barrambie with a potential direct ship ore (“DSO”) product being available for toll beneficiation and sale in China to generate early cashflow. Results from this test-work and associated marketing studies have identified that, while low risk, alternative domestic feedstocks in China are being placed on market at prices that place unacceptable margin pressure on Australian producers. Neometals has now discontinued its DSO evaluations and is focused on higher margin flowsheets.

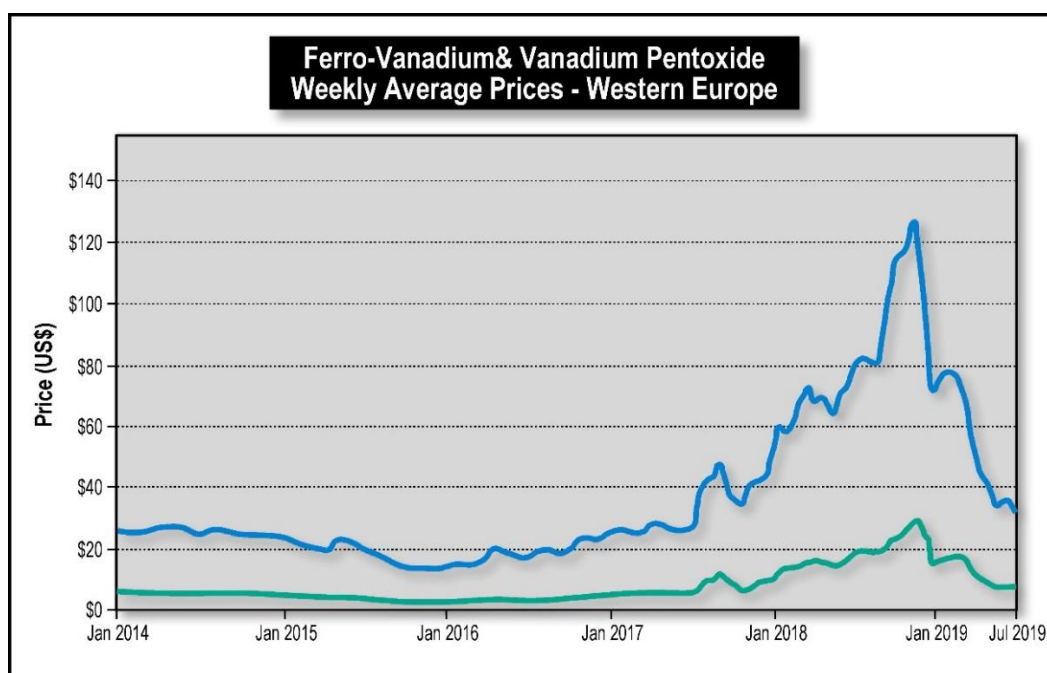
### Approvals and Permits

The Barrambie resource is contained on a Mining Lease granted in 1989. In addition, in 2012 Neometals received an environmental approval from the then Environmental Protection Authority to develop an open-cut vanadium mine and processing plant at Barrambie via Ministerial Statement 911 (the “MS”). An application (Section 46) was made by Neometals in September 2018 to extend the time limit for implementation of the MS. Approval is expected in the near future.

### Market Commentary

#### Vanadium

Ferro-vanadium and vanadium pentoxide prices continued to drift lower during Q2 2019. The average weekly ferro-vanadium price in Europe in June was US\$35.18/kg V, more than 50% down since January and more than 70% down from the November 2018 peak of US\$124.59/kg V. Vanadium pentoxide prices also fell. The prices of the two products are highly correlated. Prices are now back to their Q4 2017 levels, erasing all the 2018 gains.



**Figure 13 - Weekly Average European Ferro-vanadium and Vanadium Pentoxide Prices (Source: Fastmarkets)**

According to Fastmarkets, there were a few key factors contributing to the meteoric price rise in late 2018. On the demand side, the new Chinese rebar standards led to higher levels of demand for ferro-vanadium from Chinese steel mills. Additionally, there was an expectation of higher demand from the vanadium redox flow battery sector. On the supply side, the market was tight owing to the previous shuttering of capacity and a subsequent decline in global inventories. With approximately 70% of supply as co-product from the steel industry and with no major projects set to enter production in the near term, there were concerns over whether supply could meet demand.

Fastmarkets considers that the subsequent downturn in prices was primarily a result of two factors. Firstly, the new Chinese rebar standards, implemented to eliminate low quality rebar produced via the quenching and tempering process, have not been strictly enforced. It is not clear when monitoring of the new standards will commence, however, some industry analysts predict that the new standards will start being enforced during the second half of 2019. The second reason for the price drop appears to be that niobium is substituting vanadium in some high strength low alloy (HSLA) products and in 400MPa rebar. The evidence for this is higher levels of ferro-niobium imports into China in H2 2018 and early 2019.

Now that vanadium prices have returned to 2017 levels there does not appear to be any incentive for steel mills to continue substituting ferro-vanadium with ferro-niobium, in which case the downward price trend of the last six months is expected to end. Looking ahead, the output of the Chinese stone coal producers, who are swing producers in this industry, will be a factor in determining if the vanadium market remains in deficit or if vanadium prices resume their upward trend of recent years.

### Titanium

The main titanium raw material is the mineral ilmenite. Ilmenite is a relatively abundant mineral recovered from hard rock deposits and from heavy mineral sand deposits. The major hard rock deposits currently being exploited are in Canada, China, Norway and the Ukraine. The heavy mineral sand deposits are distributed globally, mostly in coastal regions of Australia, India, Vietnam, South Africa, Mozambique, Tanzania and Kenya. Other naturally occurring titanium minerals recovered from heavy mineral sand deposits include leucoxene and rutile. Beneficiated titanium feedstocks include chloride slag, sulphate slag, upgraded slag (“UGS”) and synthetic rutile, all of which are produced from ilmenite. The schematic below provides an overview of the titanium industry and identifies the main titanium raw materials and intermediate products in the supply chain as well as the main consumer industries. The TiO<sub>2</sub> pigment industry accounts for approximately 90% of titanium feedstock demand.

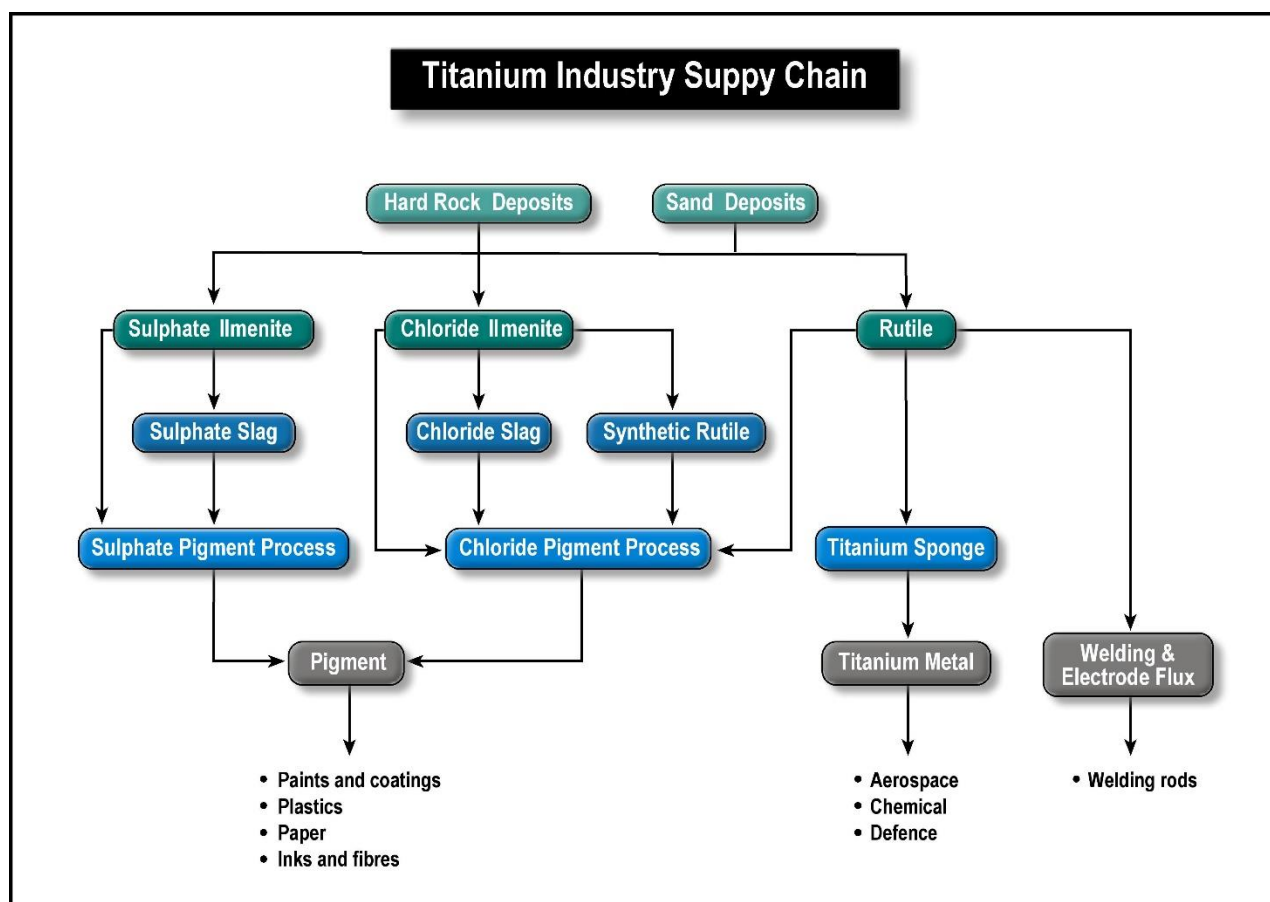
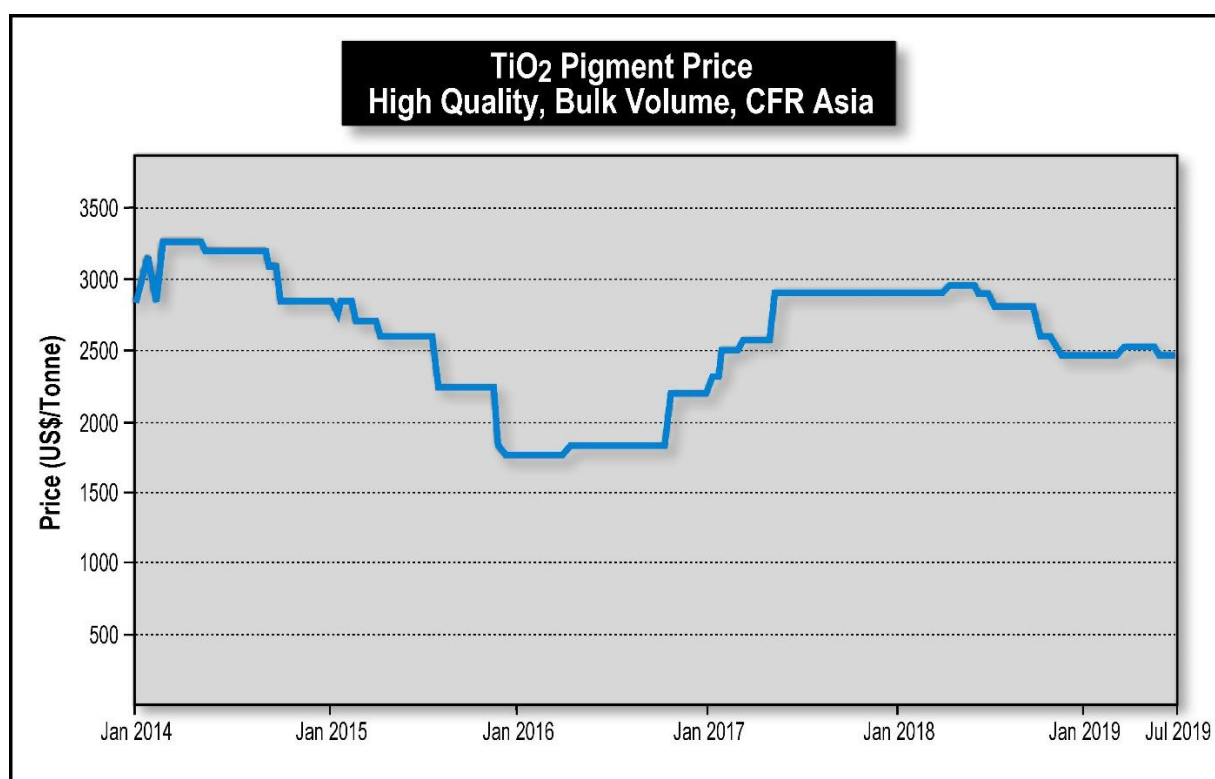


Figure 14 - Titanium Industry Supply Chain (Source: Iluka Resources Ltd)

China is the world's largest market for  $\text{TiO}_2$  accounting for more than one third of global demand. Therefore, changes in the Chinese market have implications for the wider Asian market. According to Fastmarkets, titanium dioxide availability in China is increasing as exports to the United States have slowed in response to trade measures and currency fluctuations. Titanium dioxide prices in Asia fell as higher US tariffs increased availability in China, and the weakening yuan increased the buying power of the dollar. Fastmarkets assessed the price of titanium dioxide pigment, high quality, bulk volume, CFR Asia, at \$2,350 - 2,550 per tonne on Thursday June 27, compared with \$2,700 - 3,100 per tonne a year earlier.

Market participants attributed this to three main factors. The yuan is currently trading at its lowest level in more than six months. At the end of June, the Chinese currency was trading at approximately 6.9 yuan to the dollar, down by nearly 3% since April. This means dollar-denominated purchases increase yuan-denominated receipts to sellers, improving producer margins and allowing them to consider lower offers. Chinese titanium dioxide is now subject to a 25% tariff on entry to the US. This is increasing the availability of the pigment within China because Chinese exporters are turning to the domestic market to avoid the tariffs, which puts pressure on domestic prices. At the same time US-China trade war concerns are unsettling the Chinese economy, weighing on local titanium dioxide demand.



**Figure 15 -  $\text{TiO}_2$  Pigment Price, Asia** (Source: Fastmarkets)

Whilst titanium dioxide pigment prices in Asia have softened some of the titanium mineral feedstock prices have been moving in the opposite direction. The price of ilmenite concentrate, 47 - 49%  $\text{TiO}_2$ , CIF China, was last assessed at \$180 - 200 per tonne on July 4, up by \$20 per tonne since the last quarter of 2018. Shipments to China have been steady after strengthening in the December quarter. Additional ilmenite upgrading plants, intended to serve the growing chloride pigment sector in China, are set for start-up this year and in the first half of 2020 and are likely to increase demand for certain grades of ilmenite.

Meanwhile, the supply of sulphate ilmenite from India, a traditional supplier to the international market, has been restricted. This is due to mineral-sand production in the Indian state of Tamil Nadu stalling because of a lengthy legal battle between the government and domestic miners.



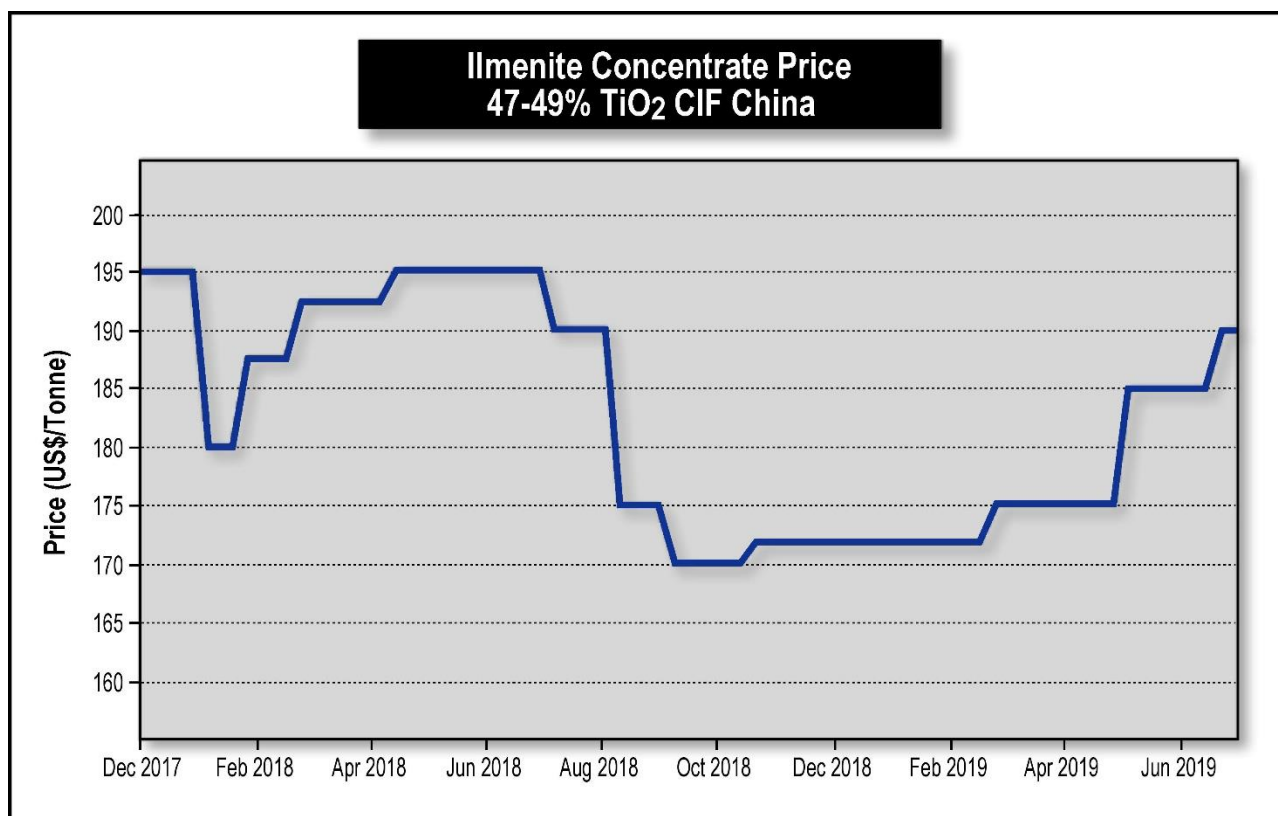


Figure 16 - Ilmenite Concentrate Price, China (Source: Fastmarkets)

In China, a new round of environmental inspections commenced in May to ensure that protection measures are being properly implemented. These inspections are being undertaken in major cities and 25 regions across the country. These protection measures include the treatment of wastewater, protection of water resources, treatment of solid or hazardous waste, and the implementation of procedures for solid waste processing. The sulphate route  $\text{TiO}_2$  pigment producers are impacted by these measures due to their high output of iron sulphate, gypsum and other waste materials.

Neometals is currently evaluating hydrometallurgical flowsheets to recover and exploit titanium and vanadium. As it relates to titanium, Neometals aims to produce a high-grade titanium feedstock from Barrambie mineral concentrate using the hydrometallurgical process. This high-grade feedstock, which is suitable for the sulphate pigment process, should assist the Chinese pigment producers in their efforts to reduce their environmental footprint and comply with the increasingly stringent environmental controls in this country.

## EXPLORATION PROJECTS

### Mt Edwards Lithium and Nickel Project (Neometals 100%)

The Mt Edwards tenements cover an area of 240 square kilometres in a historic nickel sulphide belt, located 40km south of Mt Marion and 35km west of Kambalda in Western Australia. The Mt Edwards project hosts 123,000 tonnes of contained nickel estimated across ten Nickel Sulphide Mineral Resources, within what is emerging as a highly endowed and globally significant lithium province (*for full details refer to ASX announcement entitled “Mt Edwards Project Mineral Resource Over 120,000 Nickel Tonnes” released on 22 June 2018*).

A nickel targeting study has commenced, with Newexco Exploration consultants conducting a thorough review of geochemical and geophysical datasets. Neometals plans to carry out nickel exploration in parallel with lithium efforts over the project, with soil sampling, geological mapping and geophysical interpretation conducted in the June quarter. Exploration at Mt Edwards continues to target fertile Lithium-Caesium-Tantalum (“LCT”) pegmatites.

Late in the quarter the Company has carried out a 15-hole reverse circulation (RC) drill and sample program for a total of 2,705 metres. The program was conducted on three tenements:

1. E15/989 (Lake Eaton) -  
Neometals holds Nickel minerals rights in the exploration licence; all other mineral rights are held by Mincor Resources NL. Eight RC holes are drilled at Lake Eaton area, focussed on the ultramafic–basalt contact located along strike from the Mincor’s Cassini Nickel Mineral Resource (Cassini) (*for full details refer to Mincor Resources ASX announcement entitled “Investor Presentation (by David Southam)” released on 19 February 2019*);
2. M15/97 (Zabel prospect) -  
Three holes have been drilled at the Zabel prospect to confirm targeting infill areas of the nickel Mineral Resource; and
3. M15/96 (a regional area west of the Mandilla gold prospects) -  
Four holes were drilled on M15/96 to test geophysical anomalies.

All drill holes were planned at -60 degree angles, with varying azimuth angles in order to “orthogonally” intercept the favourable geological contact zones, which are known to host nickel mineralisation and deposits in this region. Interpretation of the results will commence when all assays are available for review. 50mm PVC casing has been inserted into each drill hole to enable downhole electromagnetic (DHEM) geophysical surveys to be conducted. DHEM survey commenced on 11 July 2019.



## CORPORATE

### Human Resources

During the quarter the Company announced that it had agreed an extension of the executive services agreement with its Managing Director Chris Reed. The agreement was extended for a further 3 years until 30 June 2022. All other terms of Mr Reed's contract remain unchanged.

Immediately post the period end, Neometals also appointed experienced mining executive Matthew Read as General Manager – Lithium Projects. Matt will be responsible for driving the Company's feasibility and engineering studies in its core lithium related projects.

### Financial

#### **Hannans Limited (ASX:HNR) (Hannans) (Yilgarn Nickel/Lithium/Gold)**

As at 30 June 2019 Neometals holds 706,209,483 ordinary fully paid shares (36% of the issued capital) in Hannans on an undiluted basis. At 28 June 2019, Hannans' shares closed at 1c implying a value of \$7.1M.

#### **Critical Metals Limited (Unlisted, Scandinavian Lithium/Cobalt/Base Metals)**

Neometals holds 13.5% of unlisted public company Critical Metals Ltd, a company which now houses the Scandinavian mineral assets previously held by Hannans. Neometals will assist Critical Metals to realise lithium, cobalt and carbon opportunities in Scandinavia through a technical assistance arrangement.

### **Other Investments**

The market value of the Company's other investments as at 30 June 2019 totaled \$1.1M.

### **Finances (unaudited)**

Cash and term deposits on hand as of 30 June 2019 totalled A\$113.7 million, including \$4.0 million in restricted use term deposits supporting performance bonds and other contractual obligations. The Company's has net receivables and listed securities totalling approximately \$8.9 million.

### **Capital Management**

In keeping with the Company's strategy to deliver prudent, capital efficient returns to shareholders, on 1 May 2019 the Board declared a dividend of 2 cents per share (of which 1 cent was franked). The total dividend paid out by the Company was A\$11M.

### **Issued Capital**

The total number of shares on issue at 30 June 2019 was 543,974,269.

ENDS

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## Compliance Statement

*The information in this report that relates to Mineral Resource Estimates for the Barrambie Titanium Project, Mineral Resource Estimate for the Mt Edwards Project and Ore Reserve Estimates are extracted from the ASX Announcements below, which are available at [www.neometals.com.au](http://www.neometals.com.au):*

17/04/2018	Updated Barrambie Mineral Resource Estimate
25/06/2018	Mt Edwards Project Mineral Resource Over 120,000 Nickel Tonnes
21/05/2019	DFS Results for Barrambie Vanadium Production and Commencement of Titanium Pilot Program

*The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and that all material assumptions and technical parameters underpinning the estimates in the market announcements continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Persons' findings are presented have not been materially modified from the original market announcements.*

## About Neometals Ltd



Neometals innovatively develops opportunities in minerals and advanced materials essential for a sustainable future. The strategy focuses on de-risking and developing long life projects with strong partners and integrating down the value chain to increase margins and return value to shareholders.

Neometals has three core projects:

- Lithium-ion Battery Recycling – a proprietary process for recovering cobalt and other valuable materials from spent lithium batteries. Pilot plant testing currently underway with commercial development decision expected in the March Q 2020;
- Lithium Refinery Project – Progressing evaluation activities for the development of India's first lithium refinery with Manikaran Power Limited to supply lithium hydroxide to the battery cathode industry, underpinned by a binding life-of-mine annual offtake option for 57,000 tonnes per annum of Mt Marion 6% spodumene concentrates. Commercial development decision expected in the 1H CY2021; and
- Barrambie Titanium and Vanadium Project - one of the world's highest-grade hard-rock titanium-vanadium deposits, working towards a development decision by end 2020.

## APPENDIX 1: TENEMENT INTERESTS

As at 30 June 2019 the Company has an interest in the following projects and tenements in Western Australia.

Project Name	Licence Name	Beneficial Interest	Status
Barrambie	E57/769	100%	Live
Barrambie	E57/770	100%	Live
Barrambie	E57/1041	100%	Live
Barrambie	L57/30	100%	Live
Barrambie	L20/55	100%	Live
Barrambie	M57/173	100%	Live
Barrambie	L20/80	100%	Pending
Barrambie	G57/11	100%	Pending
Barrambie	L20/81	100%	Pending
Mt Edwards	M15/45	100% (^)	Live
Mt Edwards	M15/46	100% (^)	Live
Mt Edwards	M15/48	100% (^)	Live
Mt Edwards	M15/74	100%	Live
Mt Edwards	M15/75	100%	Live
Mt Edwards	M15/87	100% (**)	Live
Mt Edwards	M15/77	100% (^)	Live
Mt Edwards	M15/78	100% (^)	Live
Mt Edwards	M15/79	100% (^)	Live
Mt Edwards	M15/80	100% (^)	Live
Mt Edwards	M15/94	100% (^)	Live
Mt Edwards	M15/96	100% (#)	Live
Mt Edwards	M15/97	100% (#)	Live
Mt Edwards	M15/99	100% (#)	Live
Mt Edwards	M15/100	100% (#)	Live
Mt Edwards	M15/101	100% (#)	Live
Mt Edwards	M15/102	100% (#)	Live
Mt Edwards	M15/103	100% (^)	Live
Mt Edwards	M15/105	100% (^)	Live
Mt Edwards	L15/102	100%	Live
Mt Edwards	M15/478	100% (^)	Live
Mt Edwards	M15/633	100% (^)	Live
Mt Edwards	M15/653	100% (#)	Live
Mt Edwards	M15/693	100% (^)	Live

Mt Edwards	M15/698	100%	Live
Mt Edwards	M15/699	100%	Live
Mt Edwards	M15/1271	100% (#)	Live
Mt Edwards	L15/254	100%	Live
Mt Edwards	E15/989	100% (^)	Live
Mt Edwards	L15/280	100%	Live
Mt Edwards	P15/5905	100%	Live
Mt Edwards	P15/5906	100%	Live
Mt Edwards	E15/1505	100%	Live
Mt Edwards	E15/1507	100%	Live
Mt Edwards	E77/2397	100%	Pending
Mt Edwards	E15/1562	100%	Pending
Mt Edwards	E15/1576	100%	Live
Mt Edwards	E15/1583	100%	Live
Mt Edwards	E77/2427	100%	Pending
Mt Edwards	E15/1679	100%	Pending
Mt Edwards	P15/6362	100%	Pending
Mt Edwards	P15/6387	100%	Pending
Mt Edwards	E15/1665	100%	Pending
Mt Edwards	E15/1711	100%	Pending
Mt Edwards	P15/6408	100%	Pending

^Nickel rights only

\*\*Lithium rights only

# No gold interest

### Changes in interests in mining tenements

#### Interests in mining tenements acquired or increased

Project Name	Licence Name	Acquired Or Increased
Mt Edwards	E15/1711	Application
Mt Edwards	P15/6408	Application

#### Interests in mining tenements relinquished, reduced or lapsed

Project Name	Licence Name	Relinquished, Reduced Or Lapsed
Barrambie	E57/1124	Application withdrawn