



29 July 2022



**Neometals**  
All the right elements

# QUARTERLY ACTIVITIES REPORT

For the quarter ended 30 June 2022

## HIGHLIGHTS

### CORPORATE

- Cash balance A\$60.4 million, receivables and investments of A\$32.1 million and no debt; and
- Multiple on-market share purchases by Company Directors and Officers during the quarter.

### CORE BATTERY MATERIALS BUSINESS UNITS

*Lithium-ion Battery ("LIB") Recycling Project (50% NMT via Primobius GmbH, an incorporated JV with SMS group GmbH)*

- Commenced operations at the commercial 10 tonnes per day (**tpd**) shredding and beneficiation ("**Spoke**") plant in Hilchenbach, Germany, following receipt of operating permit. Cornerstone LIB feedstock supply and intermediate 'black mass' product off-take agreements secured;
- Cooperation agreement signed with Mercedes-Benz recycling subsidiary for the engineering, equipment supply and installation of a 10tpd Spoke and hydrometallurgical refinery ("**Hub**") plant in Kuppenheim, Germany. First purchase order for engineering received post quarter end and agreement now legally binding;
- First stage front-end engineering studies completed for the Stelco 50tpd Spoke plant in Hamilton Canada under a technology licensing and JV 'buy-in' option agreement; and
- Appointment, post quarter end, Merrill Gray, as Head of Recycling.

*Vanadium Recovery Project ("VRP") (earning into 50:50 JV with Critical Metals Ltd)*

- Potential for lowest quartile operating costs confirmed via AACE<sup>1</sup> Class 3 Engineering and Cost Study ("**ECS**") announced post the quarter end;
- Feasibility study, including ECS findings, is being advanced in parallel with negotiations for additional slag volumes from Swedish Steel AB ("**SSAB**"); and
- Offtake, financing and permitting activities advanced during the quarter with a decision on the environmental permit expected from Finnish regulators in September 2022.

*Lithium Chemicals Project (earning into 50:50 JV with Bondalti Chemicals SA via Reed Advanced Materials Pty Ltd ("**RAM**") (NMT 70:30 Mineral Resources Ltd)*

- Commenced AACE<sup>1</sup> Class 3 ECS for ~20,000tpa lithium hydroxide production using RAM's ELi<sup>®</sup> Process at Bondalti's Estarreja chlor-alkali operation in Portugal. Scheduled for completion in the DecQ 2022;
- Commenced engineering activities for proposed Pilot Plant to be located at Estarreja. Equipment supply contract to be awarded in SepQ 2022 with installation and commissioning expected in the MarQ 2023; and
- Multiple feedstock sourcing negotiations (lithium brine and spodumene concentrates) in progress to secure material for test work trials (bench and pilot).

### UPSTREAM – MINERAL EXTRACTION

*Barrambie Titanium and Vanadium Project ("**Barrambie**") (100% NMT)*

- 40 tonne sample of mixed gravity concentrate arrived at Jiuxing ahead of commercial smelting trials planned to commence in July 2022; and
- AACE<sup>1</sup> Class 4 pre-feasibility study advanced with completion expected in DecQ 2022.

<sup>1</sup> Association for the Advancement of Cost Engineering (AACE<sup>®</sup>)

## COMPANY OVERVIEW

Neometals' focus is the continuous development and commercialisation of our proprietary innovative technologies with strong global partners to generate value through sustainable production of battery materials.

Decarbonisation, sustainability and resilient supply chains are the key challenges for the energy storage and electric vehicle supply chain. Our technologies, particularly those in battery materials recycling and recovery, reduce reliance on traditional mining and processing, and support circular economic principles.

Neometals has three core battery materials businesses commercialising proprietary, low-cost, low-carbon process technologies:

- Lithium-ion Battery ("LIB") Recycling (50% equity) – to produce nickel, cobalt and lithium from production scrap and end-of-life LIBs in an incorporated JV with leading global plant builder SMS group. The Primobius JV is operating a commercial disposal service at its 10tpd Shredding 'Spoke' in Germany and is the recycling technology partner to Mercedes Benz. Primobius' first 50tpd operation will be in partnership with Stelco in Canada is expected to reach investment decision in Dec 2022;
- Vanadium Recovery (earning 50% equity) – to produce high-purity vanadium pentoxide via processing of steelmaking by-product ("Slag"). Finalising evaluation studies on a 300,000tpa operation in Pori, Finland and a potential JV with Critical Metals, underpinned by a 2Mt, 10-year Slag supply agreement (together with potential availability of a further 1.1Mt) with leading Scandinavian steelmaker SSAB. Investment decision expected end Dec 2022. MOU with H2Green Steel for up to 4Mt of Slag underpins a potential second operation in Boden, Sweden; and
- Lithium Chemicals (earning 35% equity) – to produce battery quality lithium hydroxide from brine and/or hard-rock feedstocks using RAM's patented ELi<sup>®</sup> electrolysis process. Co-funding pilot plant and evaluation studies on a 20,000tpa operation in Estarreja, Portugal in a 50:50 JV between RAM (70% NMT, 30% Mineral Resources Ltd) and Portugal's largest chemical producer Bondalti Chemicals S.A. Investment decision expected Dec 2023.



Figure 1 – Location map of Neometals' Core Projects together with partner developments

## CORE BATTERY MATERIALS BUSINESS UNITS



### Lithium Battery Recycling Project

Neometals 50% via Primobius GmbH, a 50:50 incorporated JV with SMS group GmbH  
(NMT 100% Intellectual Property ownership, SMS earning 50%)

Primobius is commercialising a sustainable, proprietary, LIB recycling process, originally developed by Neometals. The process recovers materials contained in LIB production scrap and end-of-life cells that might otherwise be disposed of in land fill. Current LIB recycling processes predominantly rely on high emission pyrometallurgy. Primobius' two stage, Spoke and Hub, process flowsheet ("LIB Recycling Technology") is designed for sustainable recovery of nickel, cobalt, lithium, copper, manganese and carbon (amongst other) into saleable products that can be reused in the LIB supply chain.

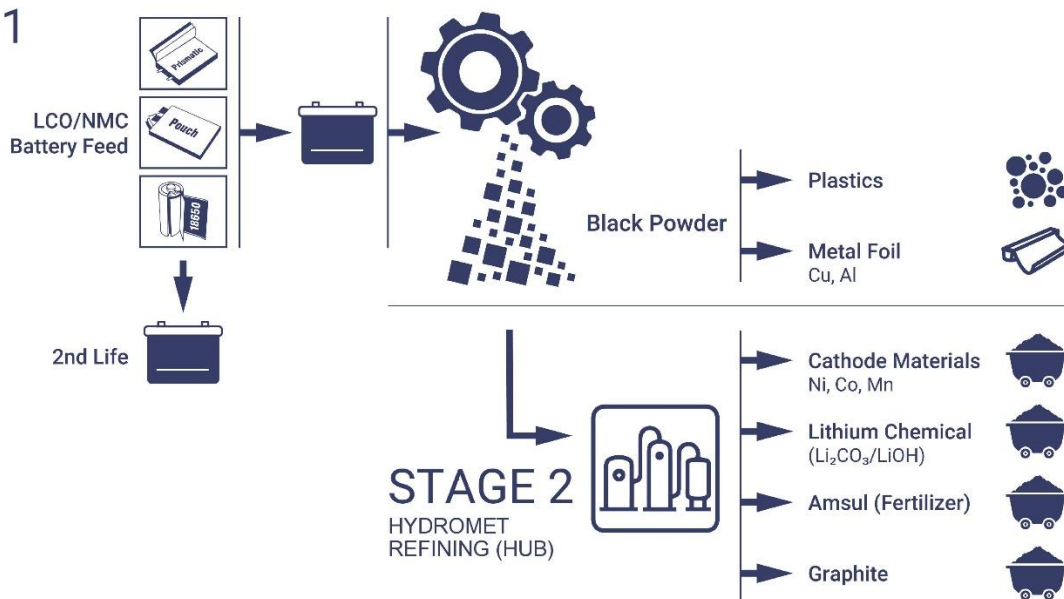
The LIB Recycling Technology process prioritises maximum safety, environmental sustainability and product recoveries, to support the circular economy and decarbonisation.

A pilot trial ("Pilot") at SGS Lakefield, Canada in 2019/2020 successfully produced cathode-grade nickel and cobalt sulphate products which collectively represent approximately 80% of the value of the basket of products recovered. Demonstration trials in Hilchenbach, Germany have been conducted with the Spoke currently being commercially ramped up for disposal facility operations with up to 10tpd LIB feedstock capacity. Data generated during ongoing Hub trials is being used as the basis in ongoing process and product development.

### Neometals High-Level Flowsheet

#### STAGE 1

SHREDDING & BENEFICATION (SPOKE)



**Figure 2 - High level flowsheet showing the movement of materials from Shredding and Benefication through to Refining stages for the LIB Recycling Technology**

The LIB Recycling Technology, comprises two stages:

1. Spoke - LIB receipting, sorting, discharging, disassembly together with shredding and beneficiation to physically separate all of the components of LIBs received, by metal casings, electrode foils, plastics and active materials; and
2. Hub - Leaching, purification and crystallisation of the active materials to produce refined chemical products suitable for use in production of LIB precursor, via a hydrometallurgical processing facility.

## Primobius GmbH, incorporated JV with SMS

Neometals entered into an incorporated 50:50 joint venture (“JV”) with SMS group GmbH (“SMS group”), called Primobius GmbH (“Primobius”) in 2020. Primobius was incorporated to co-fund and complete the commercialisation of the LiB Recycling Technology.

Neometals will contribute its recycling technology as well as its share of Primobius funding required under the various business models targeted i.e. JV partnership, provision of recycling services and technology licensing. SMS group will co-contribute funds equally and will perform the engineering design and cost studies for Primobius. SMS has the right of first offer to provide engineering, procurement and construction services for each recycling plant Primobius undertakes. On a best endeavours basis, SMS will also procure debt financing for no less than 50% of the capital expenditure on projects (for full details refer to Neometals ASX announcement entitled “Neometals and SMS create Lithium Battery Recycling JV” released on 3<sup>rd</sup> August 2020).

## Project Activities

During the quarter, Primobius further progressed technical and commercial work across the business. The quarter also marked the commencement of commercial disposal operations at Hilchenbach, Germany.

### Demonstration Plant (“DP”)

The Hilchenbach DP Spoke is now being operated as a commercial LIB disposal facility with a permit secured to process up to 10tpd (“Hilchenbach 10tpd Spoke”). The hydrometallurgical refining Hub at Hilchenbach continues as a test circuit for product evaluation and Primobius flowsheet optimisation. DP trials have been completed on the Spoke with data generated feeding into evaluation studies (“Spoke ECS”) that will inform the JV shareholders investment decisions on in Primobius’ first, large scale recycling plant, with a throughput capacity at 50tpd (~20ktpa) as part of the Stelco agreement (for full details refer to Neometals ASX announcement entitled “Li Battery Recycling - MOU with Stelco for North America” released on 27th May 2021).

Significant progress was made during the quarter:

- Commercial LIB recycling permit secured for up to 10tpd;
- Black Mass commercial production commenced with ramp-up to 10tpd underway;
- LIB feedstock processing through the Hilchenbach 10tpd Spoke supported by cornerstone LIB feedstock supply and intermediate ‘black mass’ product off-take agreements;
- Completion of energy recycling system at Hilchenbach that re-directs residual energy from LIB cell discharging into the SMS group facility grid;
- Primobius operational team expanded in line with commercial requirements;
- Multiple discrete customer and flowsheet optimisation trials undertaken at the Hilchenbach Hub;
- Cooperation agreement formalised with Mercedes-Benz recycling subsidiary LICULAR GmbH (**LICULAR**, for design, equipment supply and construction of a 10tpd LIB Spoke and integrated Hub in Kuppenheim, Germany (together “**LICULAR 10tpd Plant**”). The LICULAR Plant essentially replicates the Hilchenbach 10tpd Spoke with the latest development improvements;
- Strong progress on engineering studies for LICULAR and Stelco to underpin the provision of supply agreements in DecQ22. Offer of plant supply contracts to Stelco will trigger a one-month option period in which Primobius can choose to exercise its buy in of up to 50% Stelco SPV equity and financial investment decision (“**Stelco FID**”) on Primobius’ first 50tpd (~20,000tpa) Spoke (“**Stelco 50tpd Spoke**”);
- ECS nearing completion for the Stelco 50tpd Spoke LIB Spoke inclusive of plant and equipment and all infrastructure;
- Appointment, post quarter end, of executive, Merrill Gray, as Head of Recycling; and
- Ongoing business development activities in relation to commercial partner pipeline opportunities.





Figures 3 and 4 – LIB storage container at Primobius' Hilchenbach facility. Graffiti art by lackaffen.de.

## Commercial Activities

### Mercedes Cooperation

During the quarter, Primobius announced formalisation of its cooperation with Mercedes-Benz. Firstly, it executed a conditional, binding agreement ("**Mercedes Co-operation**") with LICULAR GmbH ("**LICULAR**"). Early in July the Mercedes Co-operation became legally binding through the execution of a LICULAR purchase order for delivery by Primobius of Spoke engineering services.

LICULAR is a wholly-owned subsidiary of Mercedes-Benz AG ("**Mercedes-Benz**") which was founded specifically to manage a specialist consortia-based research programme to develop holistic and sustainable LIB recycling approaches for Mercedes-Benz. As part of its global strategy for automotive battery systems, Mercedes Benz's first LIB recycling plant is planned for Kuppenheim in Southern Germany.

Primobius will be responsible for the plant engineering, equipment supply and installation at Kuppenheim ("**LICULAR 10tpd Spoke**" followed by "**LICULAR 10tpd Hub**"), under a non-exclusive technology licence, together with participation in long-term research collaboration activities (for full details refer to Neometals ASX announcement titled "**Cooperation Agreement with Mercedes Benz**" released on 13<sup>th</sup> May 2022).

The proposed LICULAR 10tpd Plant marks Mercedes-Benz's first entry into the field of LIB recycling. Neometals expects the LICULAR 10tpd Spoke will have a nominal capacity of 2,500 tonnes per annum (up to 10 tonnes per day) and will be built in two stages with the LICULAR 10tpd Spoke commencing production in 2023.

### Stelco

Stelco is a wholly-owned subsidiary of Stelco Holdings Inc. ("**Stelco**"), a Toronto Stock Exchange-listed steelmaking company headquartered in Hamilton, Ontario. Stelco and Primobius entered into a MoU in 2021 to evaluate future joint LIB recycling operations

The parties have worked together towards outlining a North American LIB recycling business plan and have entered into binding formal arrangements where Stelco will accelerate its sourcing of LIB feedstock ahead of processing operations. Primobius has an option to secure equity ownership of the Stelco battery recycling special purpose vehicle ("**Stelco SPV**").

Specifically, Primobius has exclusively licenced the LIB Recycling Technology to Stelco SPV ("**Licence**") in the field of end-of-life vehicle battery processing in North America. This has enabled Stelco to advance commercial LIB feedstock sourcing agreements and advance its permit approvals processes for construction and operation. Under the Stelco option agreement ("**Option**"), Primobius can elect to acquire between 25% and 50% equity in the Stelco SPV by contributing its pro-rata share of Stelco SPV's sunk evaluation and development costs, as a condition of exercise. If the Option is not exercised by Primobius, the Licence conditions award Stelco the exclusive rights to utilise the Recycling Technology in North America to recycle LIBs removed from end-of-life electric vehicles. Primobius will be entitled to a gross revenue royalty from these activities

The Stelco agreements contemplate a 50tpd (18,250tpa) integrated Spoke and Hub facility located at Stelco's Hamilton Works, Canada. Primobius is capable of supplying to the Stelco SPV, a network of 50tpd Shredding Spokes across the licenced territories (Canada, USA, Mexico) to feed a larger scale, centralised Hub, as and when required.

#### Pipeline

The Primobius business development pipeline is gaining significant momentum. Several potential project partners are currently conducting diligence under commercial-in-confidence arrangements.

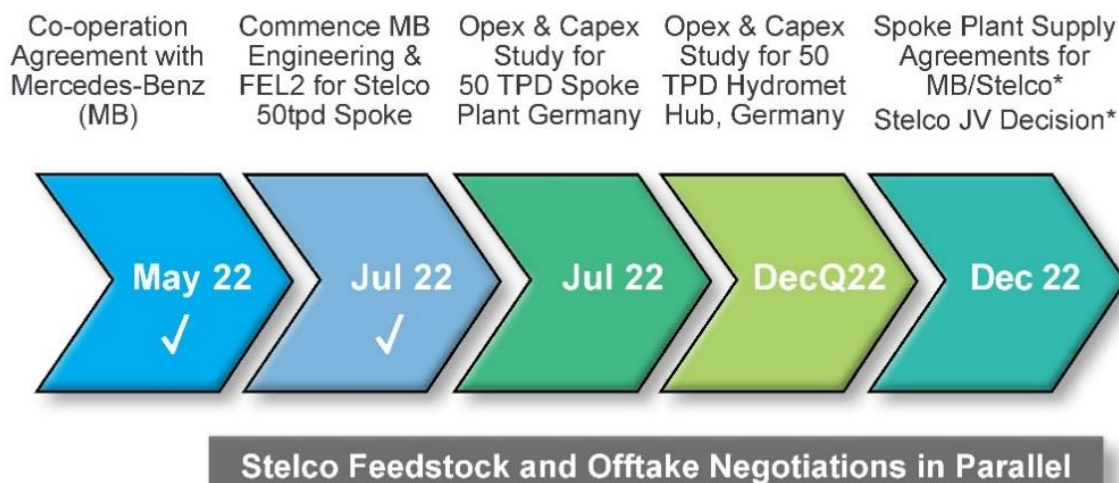
Primobius' rollout of Spokes addresses the immediate need for safe disposal and recovery of LIB materials, ahead of a truly closing-the-loop with integrated Hubs producing products to manufacture LIB precursors. Primobius is actively prosecuting its flexible approach through its three business models – as principal in Hilchenbach, a potential 50:50 joint venture with Stelco and a licensed plant supply to LICULAR.

#### Indicative Commercial Rollout Timeline

Primobius' focus on the ramp-up of the Hilchenbach 10tpd Spoke and its engineering obligations under its commercial agreements have been managed in conjunction with increased commercial inquiries. As a result, Primobius has seen delays to completion of its internal 50tpd Spoke ECS. Primobius' previous indicative study timeline contemplated the construction and operation of a 50tpd integrated Spoke and Hub LIB recycling plant at a greenfield site in Kaiserslautern, Germany, with the results forming baseline financial metrics to consider future investment decisions globally. The ECS will now be delivered in two parts, aligned to Primobius' staged commercial rollout plan. The 50tpd Spoke ECS will be completed shortly, in August, and the 50tpd Hub ECS is targeted for delivery in the December quarter 2022.

As set out below, completion of front-end engineering will precede the offer of equipment supply agreements for both 10tpd LICULAR and 50tpd Stelco Spokes in December 2022.

### Indicative Project Timeline - LiB Recycling



\* Subject to Board Approval and Primobius Board Approvals.

**Figure 5 – LiB Recycling Indicative Timeline**



### Vanadium Recovery Business Unit

Earning into 50:50 Joint Venture with Critical Metals Ltd

NMT 100% Intellectual Property

Neometals is exploring opportunities to apply its sustainable proprietary vanadium recovery processing flowsheet (“VRP Technology”) on stockpiles of vanadium bearing steel manufacturing by-product. Neometals is currently pursuing two distinct partnership opportunities in Scandinavia and has ambitions to build a pipeline of suitable feedstock sources to increase future production:

1. VRP 1 (SSAB feedstocks, Pori – Finland location); and
2. VRP 2 (H2GS feedstock, Boden – Sweden location).

The VRP offers a compelling business case which is underpinned by:

- Access to very high-grade vanadium feedstocks without upstream mining costs/risk;
- Potentially robust economics (VRP1 AACE® Class 4 (pre-feasibility) study (“PFS”) outcomes highlighted a first quartile position on the cost curve (for full details refer to ASX announcement entitled “Vanadium Recovery Project – Outstanding PFS Results” released on 4<sup>th</sup> May 2021);
- Processing flowsheet utilises conventional equipment at atmospheric pressure mild temperatures and non-exotic materials of construction; and
- Likely very low or net zero greenhouse gas footprint given:
  - a. the absence of mining and a processing route requiring the use and potential capture CO<sub>2</sub>; and
  - b. potentially saleable carbonate by-product which sequesters CO<sub>2</sub>;



Figure 6 - Map showing potential Vanadium Recovery Plants (Pori (SSAB Feed) and Boden (H2GS Feed)) and SSAB Slag stockpiles



The two current opportunities are detailed below:

#### VRP 1 (SSAB)

Neometals and unlisted Scandinavian-focused explorer, Critical Metals Ltd (“Critical”), are jointly evaluating the feasibility of recovering high-purity vanadium pentoxide (“ $V_2O_5$ ”) from high-grade vanadium-bearing steel by-product (“Slag”) in Scandinavia. Under the formal collaboration agreement between the parties, Neometals is to fund and manage the evaluation activities, up to consideration of an investment decision. A positive investment decision will lead to a 50:50 incorporated JV with Critical.

Critical has executed a conditional agreement (“**Slag Supply Agreement**”) with SSAB EMEA AB and SSAB Europe Oy, subsidiaries of SSAB (“**SSAB**”), a steel producer that operates steel mills in Scandinavia (for full details refer to Neometals ASX announcement entitled “High-Grade Vanadium Recycling Agreement” released on 6<sup>th</sup> April 2020). Slag is a by-product of SSAB’s steel making operations. The Slag Supply Agreement is for 2 million tonnes of Slag and provides a secure basis for the evaluation of an operation capable of processing 200,000 tonnes of Slag per annum without the need to build a mine and concentrator like existing primary producers.

Critical is responsible for advancing government and environmental approvals for VRP1 and managing the SSAB and H2GS relationships.

#### VRP 2 (H2GS)

In Q3 2021, Neometals announced that Critical (via its wholly owned subsidiary, Recycling Industries Scandinavia AB (“**RISAB**”)), entered into a non-binding memorandum of understanding with H2 Green Steel AB (“**H2GS**”)(“**H2GS MoU**”). The H2GS MoU outlines an evaluation framework on a potential new source of vanadium bearing Slag that could underpin a second, larger vanadium production operation (“**VRP2**”) capable of processing 400,000tpa of Slag. The H2GS MoU also outlines key commercial terms for a potential Slag supply agreement.

H2GS is a limited liability Swedish company planning a fully integrated and automated green steel manufacturing plant to be located at Boden in Northern Sweden (located 35km from Luleå). This opportunity compliments the existing VRP1 agreement between Neometals and Critical for planned vanadium production in Finland to recycle Slag generated by SSAB. The H2GS MoU is a significant opportunity as it represents another potential source of valuable feed and highlights the growth profile for application of the sustainable Neometals VRP Technology.



**Figure 7 - Aerial schematic showing location for the proposed VRP1 processing plant at Tahkoluoto port, Pori, Finland**



## Project Activities:

### Evaluation Studies

Being the most advanced opportunity, evaluation studies are currently focussed on VRP1. Together with Nordic engineering group Sweco Industry Oy (“Sweco”), Neometals completed an AACE® Class 3 ECS (“VRP1 ECS”) during the quarter which was reviewed and announced just post the quarter end. Feasibility study (“VRP1 FS”) activities are ongoing will include the findings from the ECS (for full details refer to Neometals ASX announcement entitled “Vanadium Recovery Study Confirms Lowest Quartile Cost Potential” released on 8<sup>th</sup> July 2022).

Neometals is encouraged by the outcomes of the ECS which highlights reduced technical risk and confirms the potential for lowest quartile operating costs. This aligns with prior outcomes from the historical Neometals pre-feasibility study (“PFS”), however the VRP1 ECS has been completed to a ±15% level of accuracy compared to the previous -20% +25%. Capital and Operating cost estimates are denominated in US\$ dollars using an exchange rate of 1 Euro: 1.123 US\$.

**Table 1 - ECS and PFS Metrics**

	ECS Metrics (100% ownership basis)***	PFS Metrics (100% ownership basis)****
Annual Production	19.01 million lbs (8,642 t) V <sub>2</sub> O <sub>5</sub>	13.43 million lbs (6,091 t) V <sub>2</sub> O <sub>5</sub>
Annual Throughput*	300,000 tpa	200,000 tpa
Average Net Operating Cost	US \$4.38/lb V <sub>2</sub> O <sub>5</sub>	US \$4.25/lb
Total initial capital costs	US \$341 M	US \$183.4 M

\* Based on potential additional Slag volumes

\*\*\* Refer ASX announcement “Vanadium Recovery Study Confirms Lowest Quartile Cost Potential” released on 8th July 2022

\*\*\*\* Refer ASX Announcement “Vanadium Recovery Project – PFS Indicates Robust Potential Economics” dated 4 May 2021

The VRP1 FS will be finalised upon execution of a binding agreement with SSAB which will include potential additional Slag volumes (up to approximately 300ktpa from what was previously 200ktpa in the PFS) as contemplated under a non-binding letter of intent (“NBLI”) executed between Critical and SSAB on the 5<sup>th</sup> July 2022.

### Commercial

Much like Neometals’ other processing innovations, the VRP Technology has the ability to spawn multiple projects. At present VRP1 with SSAB is the flagship opportunity followed by VRP2 with H2GS. The Company continues however to pursue other Slag sources that could be amenable to processing using the VRP Technology.

### Offtake Partners

The key payable from application of the VRP Technology is V<sub>2</sub>O<sub>5</sub> followed, in order of importance, by a leach residue resembling limestone (Stabilised Slag Material (“SSM”)) and sodium sulphate (“Na<sub>2</sub>SO<sub>4</sub>”). The market for both V<sub>2</sub>O<sub>5</sub> and Na<sub>2</sub>SO<sub>4</sub> are well established with the former being supply constrained, particularly in Europe. While prospective for building product application, the market for SSM is more nuanced. A Critical subsidiary sign a non-binding letter of intent (“LOI”) with Finnish public limited company Betolar plc (“Betolar”), to investigate the use of SSM in the production of cement-free concrete.

Betolar has been testing SSM for approximately 12 months already with positive results and is aiming to secure a long-term SSM supply agreement. Betolar does not produce concrete itself, but using its Geoprime® solution, it believes concrete manufacturers could replace more than 10% of the cement used in Finland. This development further reinforces the opportunity for the VRP Technology to support the circular economy.

### Permitting and Approvals

Permitting activities are being managed by Critical and its local team of consultants. The initial ‘Environmental Impact Assessment’ application was made to the Finnish regulators in late November 2021. Feedback received has been overwhelmingly positive. Management was pleased that items identified by the authorities typical to most permitting projects and no unexpected issues were flagged. Permitting activities have been advanced during the quarter with a decision on the Environmental Permit expected from Finnish regulators in September 2022.



### Lithium Chemicals Project

earning into 50:50 JV with Bondalti Chemicals SA via Reed Advanced Materials Pty Ltd (“RAM”) (NMT 70:30 Mineral Resources Ltd) (NMT 70% Intellectual Property)

Neometals, through a 70% owned subsidiary, has developed a proprietary process to produce lithium hydroxide from lithium chloride solutions using electrolysis to avoid costly and carbon intensive reagents used by incumbents (ELi<sup>®</sup> Processing Technology (“ELi<sup>®</sup>”). The subsidiary, called Reed Advanced Materials Pty Ltd (“RAM”), is 30% owned by leading mining services provider Mineral Resources Limited (ASX: MIN) (“MIN” – via its wholly owned subsidiary Process Minerals International).

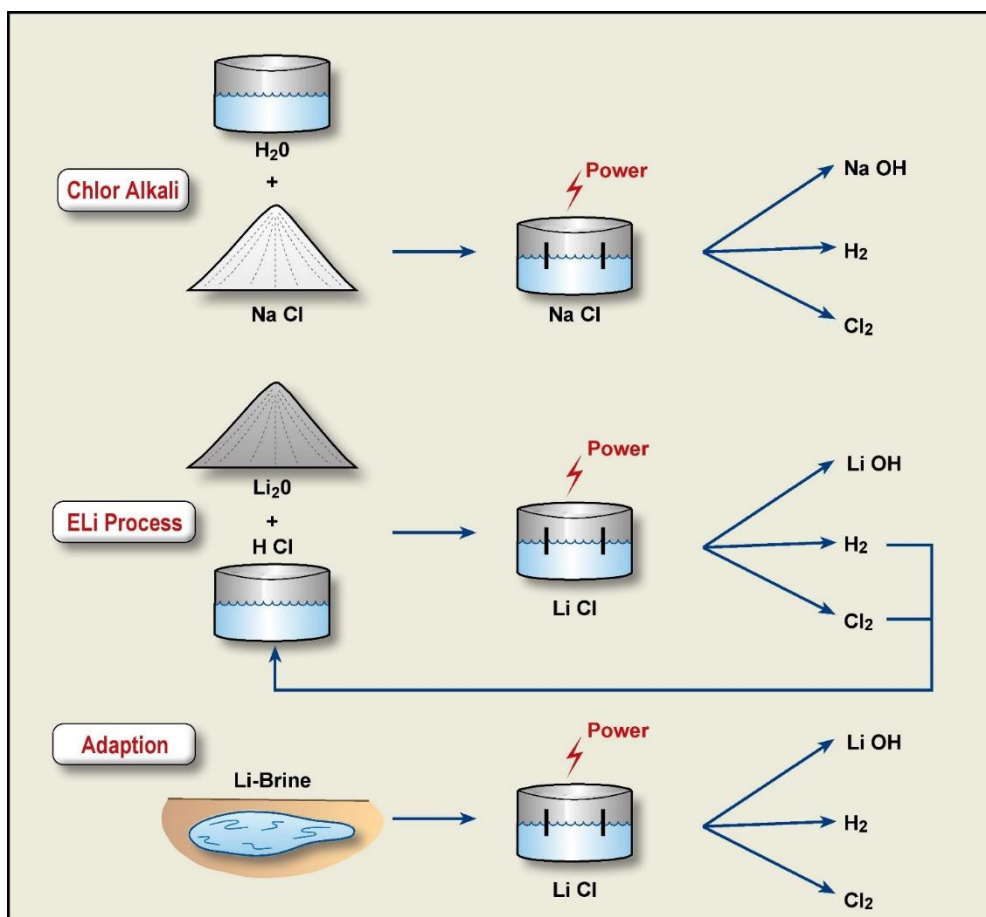
RAM developed the ELi<sup>®</sup> process from concept through to semi-pilot scale testing during the past 8 years with a view to having a competitive, reliable and low CO<sub>2</sub> footprint method of large-scale lithium hydroxide and carbonate production to decarbonise lithium chemical supply to the LIB supply chain. Sourcing lithium chemical units with a reduced CO<sub>2</sub> footprint is a high priority for the electric vehicle industry. ELi<sup>®</sup> has the potential to provide a sustainable long-term cost advantage for lithium chemical production. ELi<sup>®</sup> has been tested on synthetic and actual lithium sources, both hard rock and brine. A number of sources from South American continental brines have generated promising technical results with strong potential economics highlighted in cost studies.

ELi<sup>®</sup> development aims include:

- Building sustainable long-term cost advantage for lithium hydroxide and lithium hydroxide production;
- Adapting conventional chlor-alkali processes to produce high-purity lithium hydroxide as primary product with flexibility to produce high purity lithium carbonate at low additional cost;
- Reducing CO<sub>2</sub> footprint from processing at source with renewable electricity;
- Minimising use (and transport) of high manufacturing carbon footprint reagents; and
- Commercialisation in Portugal in partnership with Bondalti Chemicals, S.A. (“Bondalti”), and elsewhere as principal or with other partners, and generate revenue from either toll processing of lithium raw materials, sale of lithium chemicals and securing royalties from technology licensing arrangements.

### **Background**

ELi<sup>®</sup> is a process for purifying an aqueous lithium chloride solution to produce lithium hydroxide in conventional chlor-alkali (electrolysis) cells. ELi<sup>®</sup> uses commercially available chlor-alkali and purification process equipment and has been tested for reliability in continuous mini-pilot scale trials using synthetic and actual lithium sources, both hard rock and brine. A pre-feasibility study was completed in 2012 and a feasibility study for the application of the ELi<sup>®</sup> technology in a Malaysian plant was completed in 2016 (*for further details see Neometals announcement titled “Positive Lithium Downstream Processing Feasibility Results” dated 11th July 2016*). Under the assumptions for both studies, the ELi<sup>®</sup> project was shown to be technically feasible and economically viable. Commercialisation requires an industrial partner with chlor-alkali experience to test the process under real world conditions.



**Figure 8** - Schematic showing the similarities between traditional Chlor-Alkali (Sodium Salt) electrolysis and ELi's lithium salt electrolysis and the ELi's adaption to directly convert salar lithium feedstocks into lithium hydroxide.

### Cooperation Agreement with Bondalti

In the December quarter 2021, RAM entered into a binding Co-operation Agreement ("Co-operation") with Portugal's largest chemical producer, Bondalti.



The Co-operation contemplates the co-funding of certain evaluation activities required for a decision to form a 50:50 incorporated joint venture ("JVCo") to construct and operate a lithium refinery ("Refinery") at Bondalti's extensive chlor-alkali operations in Estarreja, Portugal. The evaluation activities will include the construction and operation of a pilot plant in Portugal and completion of an AACE® Class 2 Front End Engineering and Design Study ("FEED Study"). Completion is targeted for DecQ 2023 at a shared cost of approximately US\$4 million. Under the Co-operation, RAM and Bondalti have established a Steering Committee with equal representation from both parties to oversee the conduct of the evaluation activities and establishes a framework of terms for JVCo formation.

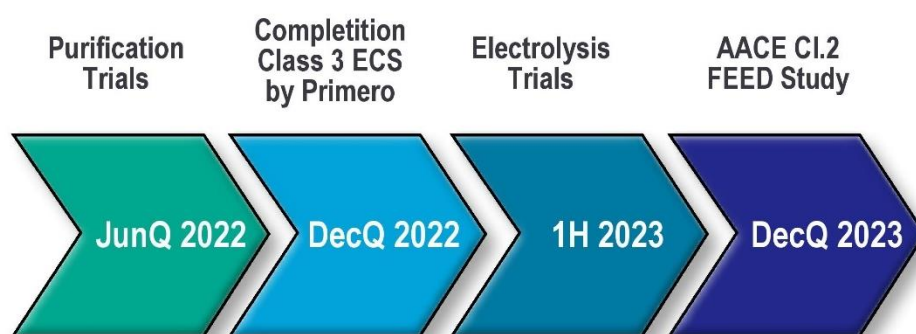
The proposed Refinery will be the first commercial operation to use RAM's ELi® Process, which has successfully produced battery-quality lithium hydroxide from operating spodumene and brine operations. This Co-operation is a significant step towards ELi® commercialisation with an industry-leading partner that operates similar equipment for producing sodium hydroxide at industrial scale. The technology, which radically reduces the requirement for (and transport of) reagents represents the opportunity for a step change in environmental sustainability, operating and capital costs for both spodumene and brine lithium projects. ELi® feedstock flexibility enables domestic production of lithium chemicals from the conversion of both European hard rock and imported brine concentrates ensuring an ethical and resilient local lithium supply chain for the EV battery industry.

### Activities Undertaken During the Quarter

During the quarter, Neometals and Bondalti cooperation activities included:

- Ongoing preparations for:
  - Bench-scale purification and electrolysis tests using synthetic (Galan-spec) brine to confirm process parameters; and
  - Larger scale purification and electrolysis piloting at Bondalti using brine and hard rock concentrate.
- Commencement of a market supply review for potential brine and spodumene providers;
- Commercial dialogues with aspiring or existing producers of lithium concentrates to investigate mutual study work towards offtake or toll treating of future lithium chloride intermediate into lithium chemicals;
- Class 3 Feasibility Study ("ELi® FS") commenced by Primero including feed supply option study, vendor requests for proposal, diligence on Bondalti site and port options, updates to 'SysCAD' modelling and process design. Stage 1 works complete;
- Bondalti/RAM/ site visit held in Vancouver to tour the fabrication facilities of Noram as due diligence for pilot plant equipment and ELi® FS engineering scoping; and
- Ongoing diligence and pricing work on major equipment vendors i.e. crystalliser, solvent extraction, purification trials.

### Indicative Timeline - Bondalti ELi® Cooperation



\* Subject to Steering Committee approvals

**Figure 9** –Lithium Chemicals Indicative Timeline for the Bondalti project.



## UPSTREAM – MINERAL EXTRACTION



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

The Barrambie Vanadium and Titanium Project in Western Australia (“**Barrambie**”) is one of the largest vanadiferous-titanomagnetite (“**VTM**”) Mineral Resources globally (280.1Mt at 9.18%  $\text{TiO}_2$  and 0.44%  $\text{V}_2\text{O}_5$ )\*, containing the world’s second highest-grade hard rock titanium Mineral Resource (53.6Mt at 21.17%  $\text{TiO}_2$  and 0.63%  $\text{V}_2\text{O}_5$ )\* and high-grade vanadium resource (64.9Mt at 0.82%  $\text{V}_2\text{O}_5$  and 16.9%  $\text{TiO}_2$ ) subsets (referred to as the Eastern and Central Bands respectively) 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 Table 1 below).

**Table 2 – Barrambie Mineral Resource Estimate, April 2018**

Global Resource as at 17 April 2018 <sup>1</sup>			
	Tonnes (M)	$\text{TiO}_2$ (%)	$\text{V}_2\text{O}_5$ (%)
Indicated	187.1	9.61	0.46
Inferred	93.0	8.31	0.40
<b>Total</b>	<b>280.1</b>	<b>9.18</b>	<b>0.44</b>

High Grade $\text{V}_2\text{O}_5$ Resource (at 0.5% $\text{V}_2\text{O}_5$ cut-off) <sup>2</sup>			
	Tonnes (M)	$\text{TiO}_2$ (%)	$\text{V}_2\text{O}_5$ (%)
Indicated	49.0	16.93	0.82
Inferred	15.9	16.81	0.81
<b>Total</b>	<b>64.9</b>	<b>16.90</b>	<b>0.82</b>

High $\text{TiO}_2$ Resource (14% $\text{TiO}_2$ cut-off) <sup>2</sup>			
	Tonnes (M)	$\text{TiO}_2$ (%)	$\text{V}_2\text{O}_5$ (%)
Indicated	39.3	21.18	0.65
Inferred	14.3	21.15	0.58
<b>Total</b>	<b>53.6</b>	<b>21.17</b>	<b>0.63</b>

Refer to Neometals ASX release dated 17 April 2018 titled “Updated Mineral Resource Estimate”

<sup>1</sup> Based on Cut-off grades of  $\geq 0\%$   $\text{TiO}_2$  or  $\geq 2\%$   $\text{V}_2\text{O}_5$

<sup>2</sup> The high-grade titanium and vanadium figures are a sub-set of the total Mineral Resource. These figures are not additive and are reporting the same block model volume but using different cut-off grades

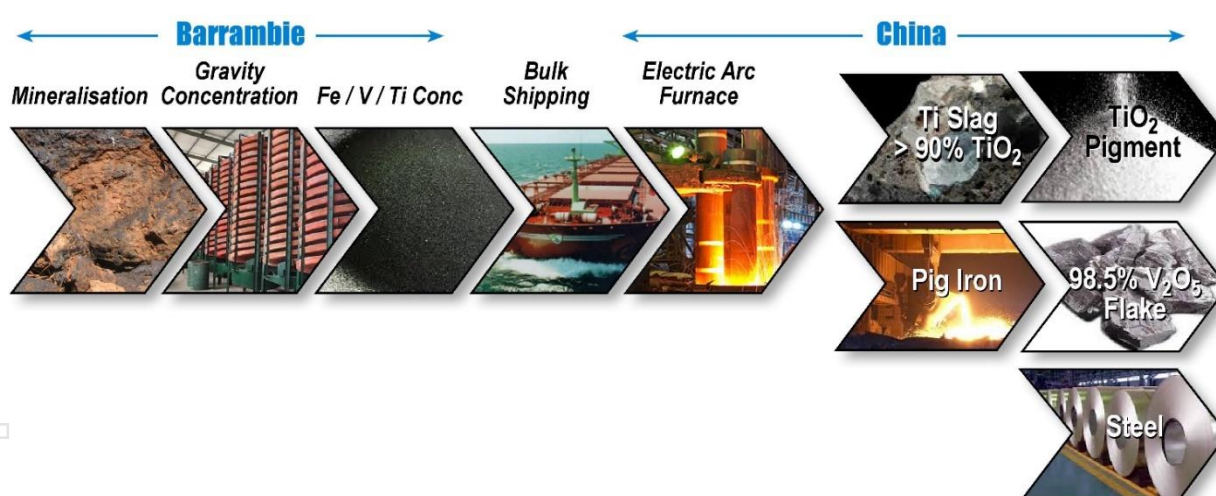
Barrambie is located approximately 80km north-west of Sandstone in Western Australia and the Mineral Resource is secured under a granted mining lease. Neometals has a granted mining proposal to extract approximately 1.2Mtpa of ore and has Ministerial Approval to construct a 3.2Mtpa processing plant.

In October 2019, Neometals entered a memorandum of understanding with Chinese research organisation, IMUMR, to jointly evaluate the development of Barrambie (“**IMUMR MoU**”). Notwithstanding that the IMUMR MoU outlines a potential pathway towards a 50:50 operating joint venture to bring Barrambie into production (for full details refer to ASX announcement entitled “MoU for JV to develop Barrambie” released on 4<sup>th</sup> October 2019), it should be noted that IMUMR has a Chinese national mandate that includes development of upstream supply chains for industries of strategic relevance to China. Specifically, IMUMR will have the right, subject to Neometals approval, to assign its interests under the MoU to a commercial Chinese chemical processing partner.

In addition to the relationship with IMUMR, Neometals also has a memorandum of understanding with Jiuxing Titanium Materials (Liaoning) Co. Ltd (“**Jiuxing MoU**”) (“**Jiuxing**”) (for full details refer to ASX announcement entitled “*Barrambie - MOU for Cornerstone Concentrate Offtake*” released on 16<sup>th</sup> April 2021). Jiuxing is one of the leading chloride-grade titanium slag producers and is the largest in north-eastern China. Importantly, the Jiuxing MoU builds on, and complements, the existing IMUMR MoU.

The Jiuxing MoU\* contemplates a path to a formal offtake agreement where Neometals supplies a mixed gravity concentrate or separate ilmenite and iron vanadium concentrate from Barrambie to Jiuxing. Specifically, the MoU outlines a product evaluation regime and contains the key commercial terms for a formal offtake agreement (i.e. pricing, volumes, price floor etc.), subject to product evaluation. Following satisfactory completion of testing and technical due diligence, the Jiuxing MoU contemplates the parties negotiating and entering into a binding formal offtake agreement for the supply of 800,000 dtpa of mixed gravity concentrate or 500,000 dtpa of ilmenite and 275,000 dtpa of iron-vanadium concentrate, on a take-or-pay basis for a period of 5 years from first production. If executed, it will potentially be the industry’s largest individual offtake agreement.

The current business plan contemplates conventional open-cut mining, comminution and gravity concentration on site at Barrambie with a mixed titanium/vanadium/iron concentrate product being shipped to China for further processing. Irrespective of whether Neometals supplies its offtake partners with a mixed gravity concentrate or separate ilmenite and iron vanadium concentrates from Barrambie, the purchasers will likely target contained ilmenite in a smelting process to produce a chloride-grade titanium slag as well as an iron vanadium product. Titanium slag is an intermediate product used to feed the fast-growing demands of the Chinese chloride pigment market as it switches towards this more environmentally sustainable product which requires high quality titanium feedstocks. The vanadium-rich iron (magnetite) concentrate is targeted for blending by steelmakers to obtain vanadium and iron units.



**Figure 10** – Image showing potential for downstream processing of a Barrambie mixed gravity concentrate by smelting into separate ilmenite (titanium) and vanadium rich magnetite (iron) products

\*The Jiuxing MoU is a memorandum of understanding to allow Jiuxing to conduct large scale test work and negotiate a binding offtake agreement. There is no guarantee that any binding formal agreement will result from the cooperation under the Jiuxing MoU or that any binding formal agreement will reflect the key commercial terms set out in the MOU given that these arrangements are subject to the testing and evaluation work to be completed under the Jiuxing MoU. This Jiuxing MoU is effective for 24 months

## Project Development Activities

### *Pilot Trial and Offtake*

Historical pilot plant trials outcomes established that a simple Barrambie gravity mixed concentrate can be produced. This processing path supports Neometals' goal to develop Barrambie as a capital-light concentrate operation.

During the quarter, a mixed gravity bulk sample was prepared with approximately 40 tonnes delivered to Jiuxing in China on the 6<sup>th</sup> June 2022 for smelting trials. Jiuxing are planning to blend the Barrambie mixed concentrate with other commercially available ilmenites to produce a Titanium chloride slag, a well-established standard Titanium industry feedstock. The balance of mixed gravity concentrate, approximately 90 tonnes, remains in Neometals warehouse stock in Perth. The smelting trials are expected to be completed by end of August 2022.

### *Evaluation Studies*

The Neometals Barrambie contractor engagement process continued during the quarter with leading service providers and this information has been utilised in advancing an AACE® Class 4 Barrambie pre-feasibility study ("PFS"). The PFS was advanced during the quarter and is on track for completion in the DecQ 2022.

The Barrambie PFS exercise will form a large component of the due diligence required by the successful 'build-own-operate' partner. This development model was used successfully by Neometals and its partners to advance the Mt Marion Lithium Project in 2015, which is now the world's second largest producer of spodumene (hard-rock lithium) concentrates (Neometals sold its final equity position in the project in 2019 and its offtake right in 2021).

### *Barrambie Site Management*

A range of site-based activities were undertaken to maintain permits, better understand potential resource extension, reduce mine planning risk and keep tenements in good standing. These activities included:

- Passive geophysical surveys were undertaken proximal to the Barrambie mining leases as part of a water exploration exercise to support future water extraction requirements for mining and processing activities;
- Stygo/troglo-fauna surveys were completed to generate information in support of the granted Barrambie mining approval issued under the Ministerial Statement (MS) 911 in October 2012;
- Planning activities were undertaken in preparation for two diamond drill programs expected to commence mid-July. Phase 1 consists of 11 diamond holes for 540m to generate samples for mine planning and metallurgical variability test-work, to validate historical intercepts and to better understand mineralogy of the high-grade TiO<sub>2</sub> eastern load at Barrambie. Phase 2 consists of 4 diamond holes for 160m to test the depth and extent of a freely diggable titanomagnetite detrital zone as a potential resource extension for the Barrambie project; and
- Initial meetings were held with Neometals management representatives and directors of the recently formed Yugunga-Nya Prescribed Body Corporate (YNPBC) to start the process of collaboration to lead to a Heritage Agreement and eventual Indigenous Land Use Agreement (ILUA).



Figure 11 –YNPBC Directors and CEO, Ailan Tran

### Indicative Project Timeline - Barrambie Mixed Gravity Concentrate Route



\* Subject to successful Jiuxing trial, positive PFS and Board Approval.

Figure 12 – Barrambie Indicative Timeline



## CORPORATE

### Commercial / Corporate

Neometals continues to make significant development strides across its business units.

In what are now extremely volatile market conditions, Neometals remains confident in its strategy of:

- maximising exposure to the energy transition thematic through developing multiple projects in battery chemicals supply chains;
- continued investment in improving our innovative green processing technologies; and
- commercialisation with strong partners to maximise project success and scale, reduce risk and accelerate return.

During the quarter, multiple on-market share purchases were made by Company Directors and Officers.

### Financial

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

As at 30 June 2022 Neometals held 845,086,264 ordinary fully paid shares (~32.4% of the issued capital) in Hannans on an undiluted basis. At 30 June 2022, Hannans' shares closed at 2.1c implying a value of \$17.7 million.

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

Neometals holds 19% of unlisted public company Critical Metals Ltd, a company which now houses the Scandinavian mineral assets previously held by Hannans and is collaborating with Neometals on Scandinavian LIB recycling and vanadium recovery opportunities.

### **Other Investments**

The market value of the Company's other investments as at 30 June 2022 totalled \$10.5 million.

### **Finances (unaudited)**

Cash and term deposits on hand as of 30 June 2022 totalled A\$60.4 million, including \$0.2 million in restricted use term deposits supporting contractual obligations. The Company has net receivables and investments totalling approximately \$32.1 million.

Related Party payments for the quarter outlined in the ASX Appendix 5B released contemporaneously at section 6.1 total \$229,750 and are made up of Director fees and superannuation.

### **Issued Capital**

The total number of shares on issue at 30 June 2022 was 548,376,396.

Authorised on behalf of Neometals by Christopher Reed, Managing Director

### **ENDS**

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**Compliance Statement**

The information in this report that relates to Mineral Resource Estimates for the Barrambie Vanadium/Titanium Project is extracted from the ASX Announcement listed below, which is also available on the Company's website at [www.neometals.com.au](http://www.neometals.com.au)

17/04/2018	Barrambie – Updated Barrambie Mineral Resource Estimate
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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.

**APPENDIX 1: TENEMENT INTERESTS**

As at 31 March 2022, the Company has an interest in the following projects and tenements in Western Australia.

Project Name	Licence Name	Beneficial Interest	Status
Barrambie	M57/173-I	100%	Live
Barrambie	E57/769-I	100%	Live
Barrambie	E57/770-I	100%	Live
Barrambie	E57/1041-I	100%	Live
Barrambie	E57/1220	100%	Pending
Barrambie	L57/30	100%	Live
Barrambie	L20/55	100%	Live
Barrambie	L20/0080	100%	Live
Barrambie	L20/0081	100%	Live
Yellowdine	E77/2809	100%	Pending
Queen Victoria Rocks	E15/1416	100%	Live

**Changes in interests in mining tenements****Interests in mining tenements acquired or increased**

Project Name	Licence Name	Acquired or Increased
Barrambie	E20/1030	Application
Barrambie	L57/0064	Application
Barrambie	L57/0065	Application
Barrambie	L20/0080	Granted
Barrambie	L20/0081	Granted

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

Project Name	Licence Name	Relinquished, Reduced or Lapsed
Barrambie	E57/1041-I	24 blocks surrendered