



# SUCCESSFUL VANADIUM RECOVERY MINI-PILOT AND COMMENCEMENT OF PFS

## HIGHLIGHTS

- Successful demonstration of Neometals' proprietary vanadium recovery flowsheet in continuous mini-pilot test work campaign
- Exceptional product purity of greater than 99.5%  $V_2O_5$
- Vanadium recoveries exceeding 75%
- Leach residence times reduced by 50% from Scoping Study design - positive implications for capital costs
- Preliminary feasibility study ("PFS") manager appointed, targeting completion in June 2021

Innovative project development company, Neometals Ltd (ASX: NMT) ("**Neometals**" or "**the Company**"), is pleased to announce the successful completion of its mini-pilot test work campaign ("**Mini-Pilot**") on the Company's Vanadium Recovery Project ("**VRP**"). Results confirmed excellent vanadium chemical product purity (>99.5%  $V_2O_5$ ), strong recoveries (>75%) and reduced residence time for Neometals' patent pending hydrometallurgical process for recovering vanadium from Slag.

As previously announced (refer to ASX announcement titled "*Neometals Signs High-Grade Vanadium Recycling Agreement*" dated 6<sup>th</sup> April 2020), Neometals has executed a collaboration agreement with Critical Metals Ltd ("**Critical**"), to jointly evaluate the feasibility of constructing a facility to recover and process high-grade vanadium products from vanadium-bearing steel by-product ("**Slag**") in Scandinavia ("**Slag Recovery Facility**"). Neometals will fund and manage the evaluation activities, including the completion of Class 5, 4 and 3 AACE engineering cost and feasibility studies up to consideration of a final investment decision, which, if positive, will earn Neometals a 50% interest in an incorporated joint venture with Critical ("**JV**").

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. Slag is a by-product of SSAB's steel making operations. The Slag Supply Agreement provides a secure basis for the evaluation of a potential Slag Recovery Facility capable of processing 200,000 tonnes of Slag per annum without the need to build a mine and concentrator like existing primary producers.

Neometals is pleased to report the Mini-Pilot was constructed, commissioned and operated continuously through the campaign without any safety incidents or process challenges (Figure 1). The Mini-Pilot confirmed earlier bench scale findings including vanadium recovery from leach through to solvent extraction (SX) strip liquor, demonstrated a successful process control strategy and has given invaluable insights into minor impurity deportment and their control through the circuit. Of particular significance was the achievement of chemical-grade vanadium pentoxide at high recovery rates and low residence times. Passing this major technical milestone is important and gives Neometals the strong confidence to continue its project development by commencing the PFS.



**Figure 1** - Selected images of the mini-pilot plant including (from left to right): the rod mill, the integrated leach and regrind circuit, the pressure filter, and the solvent extraction circuit

### Mini-Pilot Campaign

The Neometals vanadium processing flowsheet involves multi-stage comminution before leaching in an alkaline carbonate medium, a solid liquid separation, a 'pregnant leach solution' ("**PLS**") polishing section, and a vanadium specific solvent extraction circuit producing an alkaline vanadium solution appropriate for a conventional vanadium pentoxide ("**V<sub>2</sub>O<sub>5</sub>**") circuit. Vanadium pentoxide is primarily used in steel alloying applications as well as for next generation energy storage and aerospace alloys.

The Mini-Pilot was undertaken at a commercial laboratory in Perth, Western Australia and represents part of the pre-development activities for a proposed vanadium recovery JV to produce high-purity vanadium V<sub>2</sub>O<sub>5</sub>. Neometals milled and processed 104 kg of Slag (averaging 3.93% V<sub>2</sub>O<sub>5</sub>) from stockpiled Slag at SSAB's Luleå and Oxelösund operations through the milling and leaching circuits over an incident-free continuous period of 98 hours. During the campaign, a total of 189 litres of PLS was generated and processed through a conventional mixer-settler solvent extraction system incorporating extraction, scrub and strip stages. Strip liquor generated during the mini-pilot plant campaign has been processed through the conventional desilication, ammonium metavanadate precipitation stages and through de-ammoniation to produce V<sub>2</sub>O<sub>5</sub> with a purity exceeding 99.5%. Vanadium recoveries of over 75% were achieved from feed material to final V<sub>2</sub>O<sub>5</sub> product, with leach circuit residence times less than half of that assumed for the Scoping Study design. Shorter residence time has positive implications in reducing the potential size of the leaching circuit and associated capital cost.

The residual material from the leach circuit was removed using a pressure filter and washed on the filter to reduce potential entrainment losses of vanadium or reagents to the solids. The solid residue ("**Residue**") from the process is expected to be a secondary product potentially suitable for use in a range of industries such as concrete and building materials. Specific Neometals market evaluation studies have commenced using residue generated from the Mini-Pilot.

Bench scale and now Mini-Pilot plant results support the flowsheet and mass balance presented in the schematic form in Figure 2. In a commercial operation, Neometals and Critical anticipate feeding 200,000 dry tonnes per annum of SSAB Slag into a circuit which will incorporate a multi-staged integrated mill/leach circuit using a weakly alkaline sodium carbonate leaching system at atmospheric pressure and only moderate temperatures.

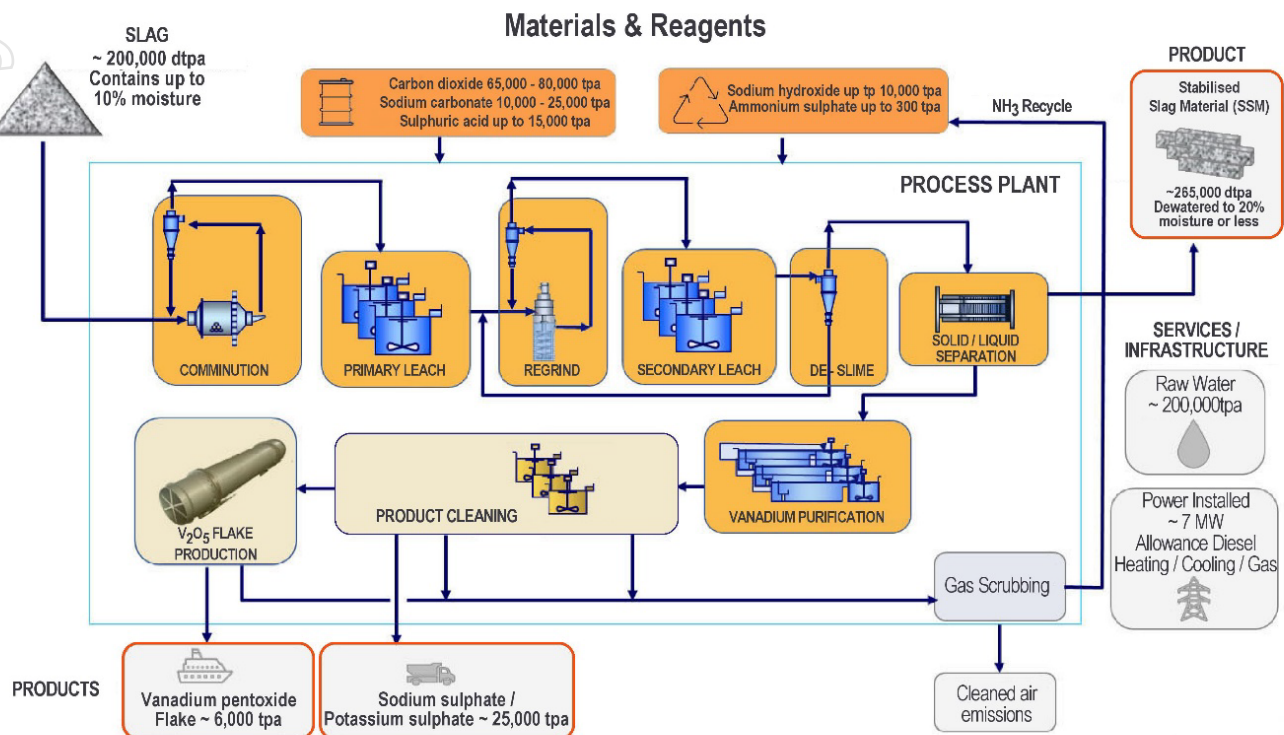


Figure 2 - Schematic description of the Vanadium Recovery Project flowsheet and high-level mass balance

Neometals Managing Director Chris Reed commented:

"We are very pleased with the results of the Mini-Pilot campaign. This substantially de-risks our patent-pending processing flowsheet and gives us the confidence to commence the PFS. We now shift our attention to the design phase of the larger proposed pilot plant which will leach material from three of SSAB's steel operations in a mild carbonate solution at moderate temperatures and atmospheric pressure. The beauty of our process is that the main reagent is carbon dioxide, which we plan to capture from third-party emission to sequester some 65,000 tonnes in our leach Residue rendering it inert and available for secondary use."

### Next steps

#### Pre-Feasibility study

Neometals is pleased to announce that global engineering consultancy, Hatch, has been appointed as lead engineering study manager for an AACE Class 4 PFS for the Vanadium Recovery Project and this is expected to be completed by the end of June 2021.

#### Pilot Plant

Following the success of the Mini-Pilot plant campaign, some 30 tonnes of Slag samples from SSAB's operations at Lulea (Sweden) and Raahe (Finland) have been collected and are scheduled for despatch to Western Australia on 5<sup>th</sup> November to enable a full Pilot Plant campaign to be conducted in mid-2021 (Figure 3).





**Figure 3 - Image of Bulk Samples from Raahe prior to loading in sea containers bound for Fremantle**

*Authorised on behalf of Neometals by Christopher Reed, Managing Director*

**ENDS**

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## About Neometals Ltd

Neometals innovatively develops opportunities in minerals and advanced materials essential for a sustainable future. With a focus on the energy storage megatrend, 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 four core projects with large partners that span the battery value chain:

### Recycling and Resource Recovery:

- Lithium-ion Battery Recycling – a proprietary process for recovering cobalt and other valuable materials from spent and scrap lithium batteries. Pilot plant testing completed with plans well advanced to conduct demonstration scale trials with 50:50 JV partner SMS group, working towards a development decision in early 2022; and
- Vanadium Recovery – sole funding the evaluation of a potential 50:50 joint venture with Critical Metals Ltd to recover vanadium from processing by-products (“Slag”) from leading Scandinavian Steel maker SSAB. Underpinned by a 10-year Slag supply agreement, a decision to develop sustainable European production of high-purity vanadium pentoxide is targeted for December 2022.

### Downstream Advanced Materials:

- Lithium Refinery Project – evaluating the development of India’s first lithium refinery to supply the battery cathode industry with potential 50:50 JV partner Manikaran Power, underpinned by a binding life-of-mine annual offtake option for 57,000 tonnes per annum of Mt Marion 6% spodumene concentrate, working towards a development decision in 2022.

### Upstream Industrial Minerals:

- Barrambie Titanium and Vanadium Project - one of the world's highest-grade hard-rock titanium-vanadium deposits, working towards a development decision in mid-2021 with potential 50:50 JV partner IMUMR.

## About Hatch Ltd

Hatch is an international multidisciplinary management, engineering and development consultancy with a global network of 9,000 professionals and > 70 offices working on the world’s toughest challenges. Their experience spans over 150 countries around the world in the mining, metals, energy, infrastructure, digital, and investments market sectors. Hatch is employee-owned and independent. Their exceptional, diverse teams combine vast engineering and business knowledge, working in partnership with clients to develop market strategies, manage and optimize production, develop new game-changing technologies, and design and deliver complex capital projects.