



Pure Minerals Limited

9 November 2018

ASX Announcement

QPM ESTABLISHES MOST PROSPECTIVE PROCESS ROUTE FOR PRODUCING BATTERY GRADE NICKEL AND COBALT SULPHATE

- **CSIRO Minerals Research has identified the most prospective processing flowsheet to produce high purity, battery grade nickel and cobalt sulphate for Queensland Pacific Metals Pty Ltd ("QPM")**
- **The CSIRO processing flowsheet is compatible with the DNi Process™ and utilises the mixed hydroxide precipitate produced from this process and converts it to nickel and cobalt sulphate**
- **The processes and chemistry for producing battery grade metal chemicals are well understood and have been applied in various configurations at laboratory and pilot plant scale at the CSIRO Minerals Research facility**
- **QPM is confident in the purification steps involved in CSIRO process that will allow it to meet the most demanding of battery manufacturer specifications**
- **QPM has commissioned CSIRO to produce a sample of battery grade nickel and cobalt sulphate to prove the flowsheet and for future discussions with potential offtake partners**
- **Pure Minerals Limited has entered into a binding option agreement to acquire 100% of the issued capital of Queensland Pacific Metals Pty Ltd ("QPM") as announced on 15 October 2018**

Pure Minerals Limited ("PM1" or the "Company") is pleased to announce that Queensland Pacific Metals Pty Ltd ("QPM"), the privately-owned entity which the Company recently secured an option to acquire, has achieved an important milestone on its path towards becoming a producer of high purity, battery grade nickel and cobalt sulphate.

Nickel and cobalt sulphates, the predominant metal chemicals used in rechargeable battery technology, are essential components in the development of electric vehicles and have stringent specification criteria to be met. QPM plans to import high quality Ni-Co ore from New Caledonia under its binding Ore Supply Agreement and utilise the DNi Process™ to produce a mixed hydroxide precipitate ("MHP"), a commonly sold intermediate nickel and cobalt product.

QPM engaged CSIRO to review and evaluate a number of processing options which would convert MHP to battery grade nickel and cobalt sulphate. From this work, CSIRO has identified the most prospective processing flowsheet ("CSIRO Process") for QPM to utilise to produce battery chemicals.

Typically, nickel-cobalt MHP is sold for about [65-85%] of the contained nickel and cobalt value. In contrast, nickel and cobalt sulphate currently attract significant premiums to the underlying spot price

of these metals. The ability for QPM to produce battery grade nickel and cobalt sulphate will greatly improve the economics of importing New Caledonia ore and allow QPM to target offtakers in the burgeoning electric vehicle battery industry.

The CSIRO Process is composed of well understood chemical unit operations and has been applied in various configurations at laboratory and up to pilot plant scale at its Waterford research facility. The CSIRO Process uses predominately standard solvent extraction unit operations, which facilitate the production of high purity end products. The process flowsheet does not involve any complex unit operations and together with the use of field proven, low cost, readily available and stable reagents will result in a plant that is anticipated to be easier and simpler to operate with significant savings in operating and capital costs compared to alternative processes.

Following this work, QPM has commissioned CSIRO to test the flowsheet and produce a sample of high purity, battery grade nickel and cobalt sulphate from nickel-cobalt MHP generated using the DNi Process™. This work forms part of the Scoping Study which QPM plans to shortly commence on a 600,000tpa processing plant located in Townsville that will produce nickel and cobalt sulphate and other valuable co-products such as iron, high purity alumina and magnesium oxide. QPM also plans to utilise the sample for discussions with potential offtake partners for the project.

QPM Director John Downie commented,

“We are confident that the process flowsheet identified by CSIRO will produce battery grade chemicals and that it also has the ability to be scaled up at a commercial level. Establishing the optimum flowsheet is an important milestone and will allow QPM to focus specifically on this avenue as it embarks on its feasibility work.”



Figure 1: CSIRO Research Facility in Perth, Western Australia



Figure 2: CSIRO Pilot Plant for the DNi Process™

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