



Pure Minerals Limited

22 October 2018

ASX Announcement

QPM ENTERS INTO FRAMEWORK AGREEMENT WITH DIRECT NICKEL FOR USE OF PROCESSING TECHNOLOGY

- Queensland Pacific Metals Pty Ltd (“QPM”) has entered into a framework agreement (“Agreement”) with Direct Nickel Projects Pty Limited (“DNP”)
- DNP owns the intellectual property related to the DNi Process™, which uses nitric acid to digest, at atmospheric pressure, a range of minerals found in lateritic ores
- QPM plans to utilise the DNi Process™ to extract nickel and cobalt from its imported high grade New Caledonian ore to produce nickel sulphate and cobalt sulphate for the emerging EV battery market
- QPM will also explore opportunities to produce other valuable co-products including iron oxide for the steel/pigment industry, magnesium oxide, scandium oxide and alumina using the DNi Process™
- Compared with traditional High-Pressure Acid Leach (“HPAL”) processing plants, the DNi Process™ offers the potential for lower capital and operating costs, has a reduced tailings footprint and is able to extract a range of acid soluble minerals
- 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 entered into a framework agreement (“Agreement”) with Direct Nickel Projects Pty Limited (“DNP”).

DNP owns the intellectual property behind the DNi Process™, a modern processing technology that utilises nitric acid to digest, at atmospheric pressure, a range of minerals found in lateritic ores and recycles the Nitric Acid. It is envisaged that QPM will apply the DNi Process™ at its proposed nickel-cobalt processing facility in Townsville, north Queensland.

Nickel laterites are commonly processed using High Pressure Acid Leach (“HPAL”), but this technology has proven to be capital intensive, consumes significant amounts of sulphuric acid and generates large quantities of waste.

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Advantages of the DNi Process™ against HPAL include:

1. The leaching reagent (nitric acid) used to extract payable metals from laterite ores is recycled – this reduces operating costs as acid consumption is minimal;
2. Nitric acid does not attack stainless steel and as such, the materials used to construct a DNi Process™ plant are lower cost, and easier to fabricate and source compared with HPAL (utilising high-grade titanium);
3. The DNi Process™ has a tailings footprint approximately one-third the size of the tailings footprint of a HPAL plant of the same capacity (principally due to the recycling of nitric acid and the addition of fewer neutralising agents);
4. Besides nickel and cobalt, the DNi Process™ can extract other valuable co-products from nickel laterite ores including hematite, magnesia and alumina which would further improve project economics; and
5. The DNi Process™ can be used to extract remaining nickel and cobalt, as well as other co-products, from tailings.

QPM has a binding ore supply agreement to purchase high grade nickel-cobalt ore from New Caledonia. QPM plans to commence feasibility studies on a 600,000 wet metric tonnes (wmt) per annum processing plant, utilising the DNi Process™ to produce a mixed hydroxide precipitate (MHP) containing nickel and cobalt, as well as magnesia, hematite and alumina. QPM has also engaged CSIRO to assist with upgrading the MHP product to meet the purity requirements for battery grade nickel and cobalt sulphate. With a plant of this scale, QPM expects to produce approximately 25,000tpa of nickel sulphate and 3,000tpa of cobalt sulphate a year.

Under the terms of the Agreement, QPM and DNP have agreed the basic commercial terms for licensing the DNi Process™, subject to execution of a definitive agreement, and will co-operate and collaborate to develop the feasibility studies. QPM and DNP will also work towards the execution of a definitive agreement that will formalise QPM's right to utilise the DNi Process™ at the planned Townsville processing plant and their commercial relationship to deliver the proposed nickel-cobalt processing facility. DNP will primarily be remunerated based on a percentage of revenue earned by QPM in respect of the operation of the proposed processing plant and that remuneration will be linked to the underlying commodity price of nickel and cobalt. It is important to note that because QPM will process ore from New Caledonia, no royalties are payable to the Queensland government as the ore will not have been mined in the state.

QPM has obtained 60kg of ore samples from its ore supply partners in New Caledonia that will be representative of ore to be supplied under the Ore Supply Agreement. QPM is currently undertaking preliminary laboratory testwork to test how this ore leaches with nitric acid under atmospheric conditions to demonstrate amenability to the DNi Process™.

Additional information about the DNi Process™ can be found in Annexure A.

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QPM Director John Downie said,

“We look forward to working closely with Direct Nickel and the CSIRO to advance the development of a new and modern processing plant in Townsville. The DNi Process™ will assist us in reducing the amount of capital required compared with traditional nickel HPAL operations. In addition to producing nickel and cobalt, we must not underestimate the value that could be realised from the other co-products and QPM will work towards developing sales opportunities for these to further improve project economics.”

DNP Chairman Andrew Vickerman said,

“We welcome the opportunity to work together with QPM on the use of the DNi Process™ in a new plant in Queensland. The DNi Process™ provides a lower cost and more environmentally sympathetic route for the production of nickel and cobalt for the expanding battery market.”

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Direct Nickel Process

SIMPLIFIED SCHEMATIC

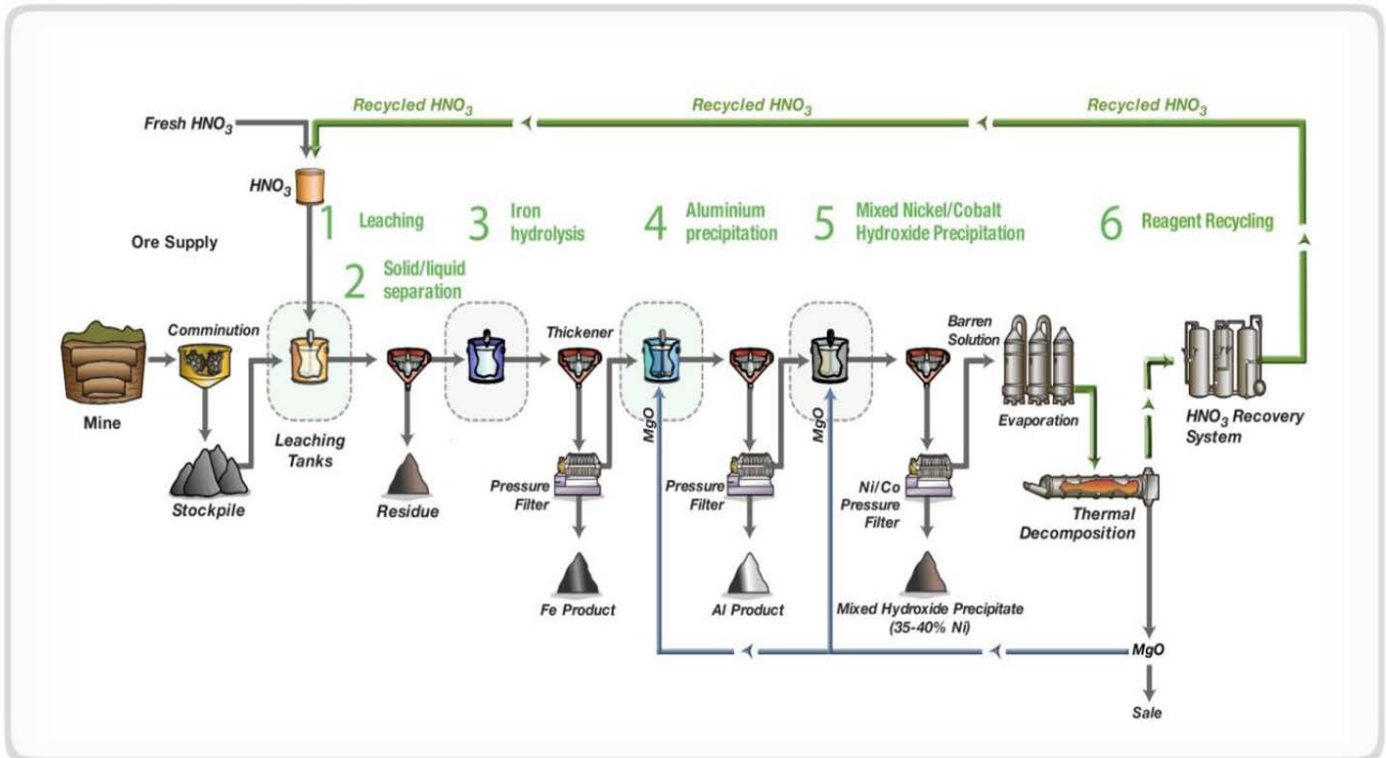


Fig 1. Simplified Schematic of the DNI Process™

Simplified Process Description

The process begins with material being crushed to around 1-2mm before being conveyed to leaching tanks where it remains for approximately 4 hours at 110 degrees Celsius before separating out anything not dissolved by nitric acid. The next series of tanks removes iron from the solution as haematite. In the next step the addition of magnesium oxide (MgO) to the solution then precipitates an aluminium product which is filtered out. The next step sees the addition of further magnesium oxide to the solution which results in a mixed hydroxide product containing 35-45% nickel and approximately 1-2% cobalt by weight. Spent solution is converted into MgO and nitric oxide gas, with most of the MgO becoming a saleable product, and the nitric oxide gas being converted to nitric acid and returned to the first leaching tank for reuse

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Summary of Direct Nickel Advantages

Recyclability: the unique feature of the DNi Process™ is the ability to recover over 95% of the leach reagent (nitric acid) and magnesia for re-use in the process, significantly reducing operating costs, minimising tailings and lessening environmental impact

Nitric acid based: a more efficient acid that leaches ore rapidly and treats both limonite and saprolite in same flow sheet (fully utilising the resource)

Atmospheric leaching: simplified processing units, no applied pressure, only moderate heat, lower operating intensity than Ferro Nickel or High-Pressure Sulphuric Acid Leach “HPAL”

Stainless steel construction: no furnaces or titanium autoclaves, reduced complexity, simplified maintainability

High Recovery: 90-95% Nickel extracted in short residence times

Environmental benefits: reduced process waste (benign insoluble materials are dry stackable) resulting in simplified and effective rehabilitation

Highly scalable: profitable from 5ktpa Nickel upwards

Saleable product: Mixed Hydroxide Product MHP (>35% nickel) or alternative product specifications

Produces valuable co-products: Hematite, Magnesia, Alumina

Comprehensive IP protection: DNP holds world-wide, perpetual Patent and IP protection for the DNi Process™ covering the nitric acid/nickel laterite space, ensuring the process is for exclusive use by DNP and its licensees

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Fig 2. CSIRO Pilot Plant at Minerals Research Centre in Western Australia

The CSIRO Plant was designed and built to verify the DNi Process™ design and treat 1 tonne per day of laterite ore:

- Successfully treated a range of ores types and blends from Indonesia and Brazil
- Operated for 11 months over 19 campaigns (10-28 days each) where operation was continuous for 24 hours.
- Fully tested a range of equipment in continuous service including pumps, tanks, thickeners, piping, agitators and general materials of construction.
- Majority of plant is constructed from 304L stainless steel

During the campaigns the full process (from leaching through to MHP production and nitric acid regeneration) operated in a continuous closed-cycle manner to test:

- Materials of construction (including several coupon trials in the more severe service areas)
- Possible build-up of deleterious elements in recycle streams
- Performance of equipment in specialised areas

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