Pure Minerals Limited

21 January 2019

ASX Announcement

POSITIVE SCOPING STUDY RESULTS DEMONSTRATE POTENTIAL OF MODERN BATTERY MATERIALS REFINERY IN TOWNSVILLE

Highlights:

- **Annual primary product production of approximately 25,400 tpa nickel sulphate and 3,000 tpa cobalt sulphate (contained nickel 5,670t and contained cobalt 630t)**
- **Annual co-product production of approximately 221,000 tpa hematite, 8,700 tpa alumina and 4,600 tpa magnesium oxide**
- **Construction capital cost of US$297M, which includes a contingency of US$65M**
- **Annual operating cost of A$108M (US$77M)**

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 has secured an option to acquire, has completed a Scoping Study with positive results on its proposed battery materials refinery in Townsville ("**the Project**").

The purpose of the Scoping Study was to assess the feasibility of constructing a battery materials refinery that will process nickel-cobalt ore sourced from third parties via an ore supply agreement (imported from New Caledonia) to produce battery grade nickel and cobalt sulphate for use in the emerging battery market, as well as other valuable co-products. The Scoping Study was compiled by QPM, with assistance from lead consultant Boyd Willis Hydromet Consulting ("**BWHC**"), which undertook a review of potential capital and operating costs.

The Scoping Study was based on a throughput of 600,000 wet tonnes per annum ("**wtpa**") for a refinery that could produce approximately 25,400 tpa nickel sulphate hexahydrate, 3,000 tpa cobalt sulphate heptahydrate and other valuable co-products, including hematite, alumina and magnesium oxide. *****

Based on the assumptions and concept level design work undertaken in the Scoping Study, QPM has confirmed the commercial potential of the Project, providing QPM with the confidence to proceed towards undertaking further feasibility studies, completing an extensive metallurgical test-program and obtaining the necessary environmental and other regulatory approvals for the Project.

Cautionary Statement: The Scoping Study referred to in this announcement has been undertaken to assess the technical and financial viability of the Project. Further evaluation work, including a Pre-Feasibility Study and a Bankable/Definitive Feasibility Study ("**DFS**") is required before PM1 will be in a position to provide any assurance of an economic development case. The outcomes of the Scoping Study are also reliant on whether PM1 exercises the Option to acquire QPM, successful completion of the acquisition of QPM (which is subject to regulatory and shareholder approval), and subject to the terms and conditions of the Ore Supply Agreement. Please refer to the further cautionary statement on page 3 below.

The key results of the Scoping Study include:

- **Annual primary product production of approximately 25,400 tpa nickel sulphate and 3,000 tpa cobalt sulphate (contained nickel 5,670t and contained cobalt 630t)**
- **Annual co-product production of approximately 221,000 tpa hematite, 8,700 tpa alumina and 4,600 tpa magnesium oxide**
- **Total capital cost of US$297M which includes a contingency of US$65M, (accordingly, QPM may look to consider various funding pathways and engage with future potential financiers at the appropriate time and after completion of successful pre-feasibility studies and bankable feasibility studies).**

***** *The assumptions and results of the Scoping Study set out above and elsewhere in this announcement ("**Scoping Study Parameters**") have been developed through concept level work and the use of macroeconomic assumptions.* ***For the avoidance of doubt, investors are advised that the Scoping Study Parameters do not constitute a production forecast or target in relation to any mineral resources associated with any project owned by PM1 or QPM****. PM1 and QPM wish to expressly clarify that the Scoping Study Parameters are based on an expected grade of nickel-cobalt ore to be imported by QPM under an ore supply agreement with third party New Caledonian ore suppliers. The Scoping Study Parameters have been disclosed by PM1 and QPM in order to provide investors with an intended scale and nature of the Project, and have been undertaken at scoping level work.*

Key Findings of the Scoping Study

The Scoping Study highlighted the economic potential and merits of locating a battery materials refinery that would process nickel-cobalt ore in Townsville.

1. **Townsville is a region that is well supported by existing infrastructure:**
   - Available port infrastructure that can handle, and has had prior experience with imported nickel-ore from New Caledonia;
   - Existing road and rail infrastructure that could be utilised to transport ore to the refinery;
   - Available power generation and transmission infrastructure;
   - The Scoping Study identified a number of locations which are potentially suited to the construction of a refinery.
2. **Townsville has direct access to consumables required to operate the refinery and skilled labour:**
   - Nitric acid supply is available from nearby Gladstone and sulphuric acid is produced locally in Townsville;
   - Other industrial chemicals and consumables required for refinery operation are available in Townsville;
   - Townsville hosts a skilled labour workforce with significant engineering support.
3. **The Project can be constructed using readily available industrial materials, minimising lead times and capital:**
   - The Direct Nickel Process ("**DNi Process™**") utilises nitric acid which is suited to standard grades of stainless steel. This is of significant benefit as many of the components in the refinery can be constructed from stainless steel which is readily available, as opposed to complex metal alloys required for High Pressure Acid Leach ("**HPAL**") plants which are more expensive, difficult to fabricate and have long lead times;
   - Subject to financing and approvals being secured, construction of the refinery could be completed within 12 months from the date of commencement of construction.
4. **The product suite that can be produced has a positive market outlook and adds diversity to the refinery's revenue stream, reducing exposure to any single commodity price:**
   - Nickel and cobalt sulphate are important chemicals for the burgeoning battery industry and electric vehicle market;

- The majority of the world's cobalt is currently supplied from the Democratic Republic of Congo. QPM plans to market its products from a stable platform within Australia;
- Co-products add significant value to the Project, in particular hematite and alumina.

5. **The Scoping Study identified other potential opportunities to improve project economics that should be investigated in future feasibility studies:**
   - Capital and operating cost optimisation work including areas of logistics and energy consumption;
   - Potential production of High Purity Alumina ("**HPA**") to improve cashflow stream from alumina product;
   - Upgrading hematite product to produce pig iron;
   - Recovery of scandium;
   - Capital contingency can be reduced with further feasibility work to improve the accuracy of the capital cost estimates.

QPM Director John Downie said:

"The decision to progress towards completing a Scoping Study was driven by a combination of positive metallurgical testwork outcomes completed by Core Resources and CSIRO, the recent mine site inspection carried out by Xenith Consulting and due diligence report identifying no fatal flaws associated with importing high grade ore suppled from New Caledonia.

We were very pleased to have Boyd Willis from BWHC review the Project and work with QPM to firm up the key capital and operating cost parameters as applied within this Scoping Study.

We are confident that the Project economics can be improved further, especially in the areas of transport, processing, power and energy costs by optimising the process flowsheet, utilising heat recovery, and investigating other co-products not considered in the Scoping Study including pig iron, high purity alumina and scandium which could add considerable value to the bottom line."

PM1 Chairman Eddie King said:

"I am very excited with the results of QPM's Scoping Study which highlights potentially significant value for PM1 shareholders. Combining this study with the recent appointment of Top Resources Group, the team can now begin to market the project's investment metrics to potential offtake parties and strategic parties."

Further details of the Scoping Study can be found in Annexure A.

Further information:

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Cautionary Statement

The Scoping Study is based on the material assumptions set out in Annexure A. These include assumptions about the availability of funding and the pricing received for the Project's products. While PM1 and QPM consider all of the material assumptions to be based on reasonable grounds, there is no certainty that they will prove to be correct or that the range of outcomes indicated by this Scoping Study will be achieved. To achieve the outcomes indicated in this Scoping Study, pre-production capital in the order of US$297 million, additional capital for feasibility studies and working capital is likely to be required. Investors should note that there is no certainty that the Company will be able to raise this amount of funding required when needed. It is also possible that such funding may only be available via equity funding which may have a dilutive effect on the Company's share value. In the event the Company's potential acquisition of QPM is successful, the Company may also pursue other strategies in order to realise the value of the Project, such as a sale, partial sale or joint venture of the Project. If this occurs, this could materially reduce the Company's proportionate ownership of the Project. Accordingly, given the uncertainties involved, investors should not make any investment decisions based solely on the results of the Scoping Study.

Competent Persons Statement

Information in this announcement relating to the processing and metallurgy (including the JORC table in Annexure C) is based on technical data compiled by Mr Boyd Willis, an Independent Consultant trading as Boyd Willis Hydromet Consulting. Mr Willis is a Fellow and Chartered Professional of The Australasian Institute of Mining and Metallurgy (AusIMM). Mr Willis has sufficient experience which is relevant to metal recovery from the style of mineralisation and type of deposits in New Caledonia where the ore will be sourced (from third parties pursuant to an ore supply agreement) and to the activity which they are undertaking to qualify as a Competent Person under the 2012 Edition of the 'Australasian Code for reporting of Exploration Results, Mineral Resources and Ore Reserves'. This includes over 21 years of experience in metal recovery from Laterite ores. Mr Willis consents to the inclusion of the technical data in the form and context in which it appears.

Forward Looking Statements

This Announcement contains certain forward-looking statements with respect to the financial condition, results of operations, and business of the Company, and certain plans and objects of the management of the Company. These forward-looking statements involved known and unknown risks, uncertainties and other factors which are subject to change without notice, and may involve significant elements of subjective judgement and assumptions as to future events which may or may not occur. Forward-looking statements are provided as a general guide only and there can be no assurance that actual outcomes will not differ materially from these statements. Neither the Company or its directors, QPM or its directors, nor any other person, gives any representation, warranty, assurance or guarantee that the occurrence of the events expressed or implied in any forward-looking statement will actually occur. In particular, those forward-looking statements are subject to uncertainties and contingencies, many of which are outside of the control of the Company. A number of important factors could cause actual results or performance to differ materially from the forward-looking statements. Accordingly, Investors should consider the forward-looking statements contained in this Announcement in light of these disclosures.

ANNEXURE A – SCOPING STUDY SUMMARY

Key Parameters

The key parameters used to form the Base Case of the Scoping Study are detailed in the figure below:

Parameter	Value
Project life	25 years
Annual ore throughput	600,000 wtpa
Average feed-grade Ni, Co, Fe, MgO, Al_2O_3 (%)	Ni 1.6% Co 0.18% Fe 46% MgO 5% Al_2O_3 3%
Ni, Co overall recovery	91%
Project capital cost (Including contingency of US$65M)	US$297M
Average annual operating cost (Ore Supply, Transport, Processing, Refining, Royalty, Export)	A$108M
Nickel price	US$6.50/lb
Nickel sulphate premium	US$2.0/lb
Cobalt price	US$30.00/lb
Cobalt sulphate premium	Nil
Hematite price	US$75/t
Alumina price	US$200/t
Magnesium oxide price	US$100/t
AUD:USD exchange rate	0.71

Figure 1: Scoping Study parameters

Key Outputs

Per the Base Case parameters detailed above, the key outputs of the Scoping Study are detailed below:

Parameter	Value
Annual production – Nickel Sulphate hexahydrate tpa	25,400tpa (Contained nickel 5,670t)
Annual production – Cobalt Sulphate heptahydrate tpa	3,000 tpa (Contained cobalt 630t)
Annual production – Hematite (Iron) tpa	221,000 tpa
Annual production – Alumina tpa	8,700 tpa
Annual production – Magnesium Oxide tpa	4,600 tpa

Figure 2: Scoping Study outputs

Scope of Works

The Scoping Study Report was commissioned by QPM and prepared by BWHC in order to establish the technical and economic aspects of the Project at a preliminary stage, and to determine whether to proceed with further feasibility studies and engineering work, obtain project approvals and conduct further metallurgical test work.

The scope of the Scoping Study was as follows:

- Outline of the Project opportunity;
- Establish Project metrics;
- Evaluate Townsville as the preferred location for the Project and assess/identify various land opportunities;
- Evaluate the DNi Process^{TM} for its suitability to process the New Caledonian nickel-cobalt ore sourced from QPM's third party ore suppliers;
- Determine the infrastructure logistics requirements for the Project;
- Prepare for environmental and other regulatory approval processes;
- Evaluate capital costs of constructing the Project to an accuracy of ±30%;
- Evaluate operating costs for running the refinery to an accuracy of ±30%;
- Establish the forward work plan through to construction and commissioning of the Project;
- Identify key risks to the Project.

Project Overview and Summary of Physicals

The Scoping Study considered an operation of the Project as detailed below:

Area	Project Operation
Ore Supply	• Governed by 600,000 wtpa ore supply agreement with Societe des Mines de la Tontouta ("**SMT**") and Societe Miniere Georges Montagnat S.A.R.L ("**SMGM**") (refer to PM1's announcement of 15 October 2018). • Assumed estimated average feed grade of 1.6% Ni; 0.18% Co; 46% Fe, 5% MgO, 3% Al_2O_3 which is line discussions with SMT and SMGM and historical exports to Townsville. • Purchased on FOB terms ex New Caledonia. • The Terms of the ore supply agreement are set out in the Modifying Factors in Annexure B.
Ocean Logistics	• Geared Ocean Going Vessels (Ultramax ~61,000t capacity) would be loaded in New Caledonia and transport ore to Port of Townsville. • QPM will utilise existing berths at Port of Townsville, with ore being discharged using existing ship unloader or actual ship's cranes.
Townsville Logistics	• Imported ore will be temporarily stockpiled at a laydown area at the Port of Townsville. • B-Double/ Triple haul trucks will transport ore from the Port of Townsville to refinery. • Estimated haul distance of identified potential refinery locations ranges from 6km to 40km.

Area	Project Operation
	• Utilisation of Port Access Road and Bruce Highway (bypass) which permits such haul trucks.
Ore Processing plant (DNi Process^{TM})	• Ore is processed utilising DNi Process^{TM} technology "atmospheric leach incorporating acid recycle". • Intermediate product produced here is a nickel/cobalt concentrate known as a mixed hydroxide precipitate ("**MHP**") along with Magnesia, Iron oxide and Aluminium hydroxide.
Refinery (Nickel and Cobalt Sulphate)	• The nickel/cobalt MHP is digested in sulphuric acid. • This liquor is then subjected to solvent extraction to separate the nickel and the cobalt and remove impurity elements. Further purification and crystallisation steps are then utilised (CSIRO Flowsheet) to produce the final high purity nickel sulphate hexahydrate and cobalt sulphate heptahydrate products. In addition, a raw manganese dioxide by-product will be extracted.
Co-Product production	• Hematite (~59% Fe) 221,000 tpa; Magnesium oxide 4,600 tpa; Alumina 8,700 tpa. • Further co-products to be investigated including HPA, scandium and pig iron.
Labour	• Approximately 100 full-time employees will be required to manage and operate the process plant and refinery on a 24 hour by 7 days continuous basis. • Additional contractors, specialist support, corporate office and service providers are also required.
Acid Supply	• Nitric acid sourced from Gladstone. • Sulphuric acid sourced locally from Townsville.
Environmental	• Initially a small residue storage facility will be included in the Project. The total residue will not exceed 200,000 tpa as majority of the ore is converted to saleable products. There is no requirement for acid neutralisation as 97% of the acid is recycled and the residue is dried prior to discharge. QPM will work with local authorities to develop potential land fill opportunities using this inert residue.

Figure 3: Scoping Study Project overview

A summary of physical input and outputs is detailed in the figure below:

Input / Output	Quantity	Unit	Transportation Method	Source
Process Inputs				
Imported Ore	600,000	wtpa	Seaborne /Road	New Caledonia
Plant Operating hrs	7,884	hrs pa		
Project Life	25+	yrs		
Nitric Acid	7,400	tpa	Trucking	Gladstone (60% HNO_3)
Process Water	1.8	GLpa	Pipe	Townsville
Power	10	MW	Grid	Regional

Input / Output	Quantity	Unit	Transportation Method	Source
Diesel	43,000	L pa	Trucking	Regional
Coal	207,500	tpa	Rail	Queensland
Process Outputs				
Nickel Sulphate hexahydrate	25,400	tpa	Seaborne /Road	
Co Sulphate heptahydrate	3,000	tpa	Seaborne /Road	
Hematite	221,000	tpa	Seaborne /Road	
MgO	3,600	tpa	Road	
Al_2O_3	8,700	tpa	Road	

Figure 4: Summary of physicals

Townsville

The Project is configured to an enabling project with the development of the product suite potentially providing a basis for the establishment of other downstream processing and value-adding initiatives within North Queensland.

Townsville is approximately 1,100 nautical miles from New Caledonia. This relatively short seaborne distance will assist to minimise ocean freight costs, supporting a refinery that is utilising imported ore. Locating the Project in Townsville provides it with a competitive advantage over other potential locations, in particular Asia.

Location	Distance from New Caledonia (nm)
Townsville	1,100
Indonesia	1,800
Philippines	2,500
China	4,200

Figure 5: Comparison of seaborne distance from New Caledonia

Townsville has been a long-term supporter of the Queensland Nickel business. The Port of Townsville offers valuable and existing infrastructure that can handle the Project's ore import requirements. The existing port infrastructure could also support Project growth and could comfortably support a 2.0-2.5 Mtpa refinery.

The Scoping Study has identified a number of suitable site locations within close proximity to the Port of Townsville, supported by road infrastructure and access to power and water. These sites are also within industrial locations, which will assist in obtaining requisite regulatory approvals.

The closure of Queensland Nickel significantly affected Townsville's economy and the greater North Queensland region. Townsville's unemployment rate was 8.8% compared with the Australian national average of 5.4% (*Source: ABS* June quarter 2018). During construction and operation, these factors should ensure that a skilled workforce can be sourced at competitive labour rates.

As an industrial city, Townsville also has significant engineering capability and access to the raw materials and consumables required to support construction and operation of the Project.

The factors above support Townsville as an ideal location for the Project.

Process Flowsheet

The proposed flowsheet to be utilised by the Project can be separated into two parts:

Part 1: DNi Process™

The DNi Process™ is a modern processing technology that utilises nitric acid to digest, at atmospheric pressure, a range of minerals found in lateritic ores. The nitric acid is then recycled.

The process begins with material being crushed to around 1-2mm before being conveyed to leaching tanks where it remains for approximately four hours at 110°C 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 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. The nitric oxide gas is converted to nitric acid and returned to the first leaching tank for reuse.

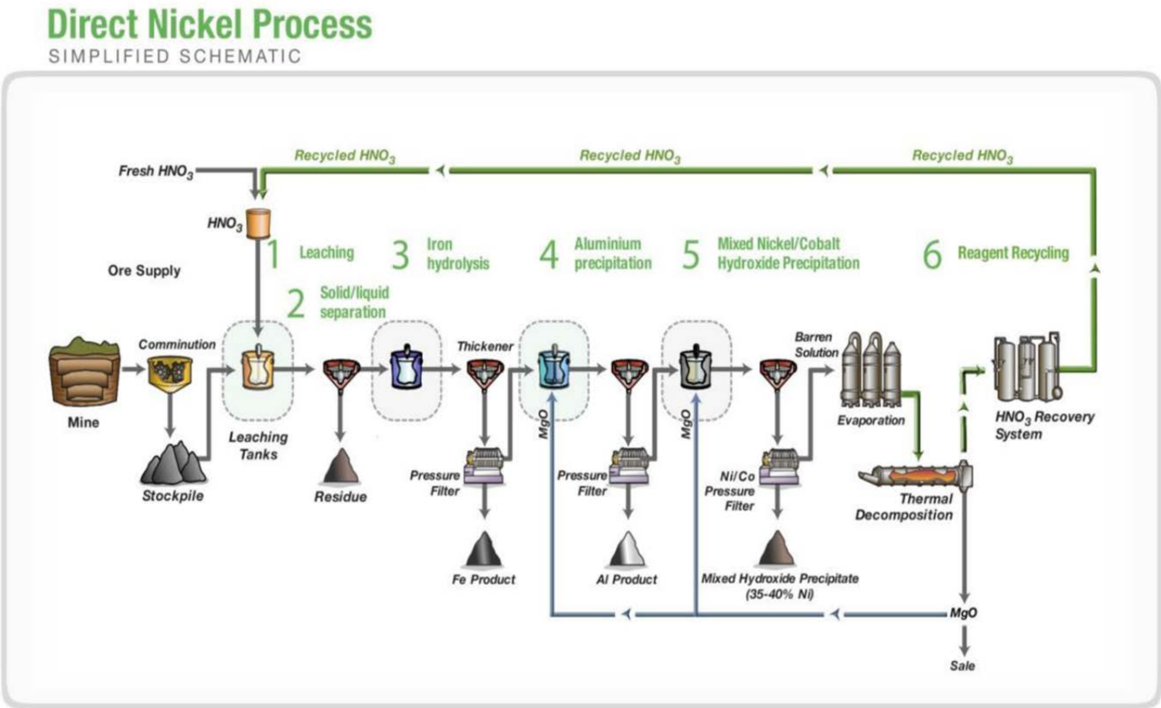


Figure 6: Simplified Direct Nickel process flowsheet

Traditionally, HPAL plants have been used to process lateritic nickel ore. 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 (which requires 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 removal of iron as a hematite product, 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.
6. Logistics for major consumables are significantly reduced due to acid recycle (minimal acid make-up) and the internal recycle of MgO for pH adjustment and precipitation, which removes the need to supply limestone and/or lime.

Part 2: CSIRO Process

The primary product output of the DNi Process™ is a nickel-cobalt MHP, which is a commonly traded product. The emergence of the battery market has increased demand for nickel and cobalt sulphate. Therefore there is economic rationale for MHP producers to upgrade this intermediate product to a product that is suitable for battery manufacturers.

The proposed flowsheet to be used by the Project to achieve this has been developed in conjunction with CSIRO. Starting with MHP from the DNi Process™, the CSIRO process will employ selective dissolution to create a nickel and cobalt-rich liquor. This liquor is then subjected to solvent extraction to separate the nickel and the cobalt and remove impurity elements. Further purification and crystallisation is then utilised to produce the final nickel sulphate and cobalt sulphate products. In addition, a raw manganese dioxide product (one of the co-products) can also be produced.

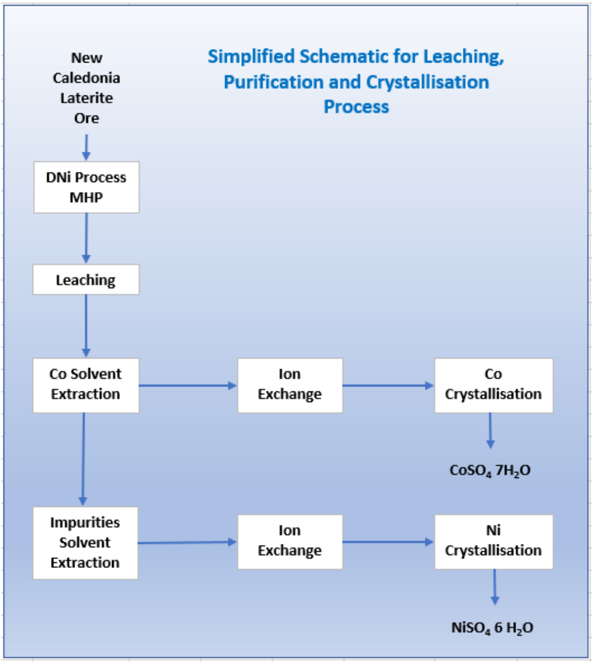


Figure 7: Simplified CSIRO process flowsheet

Figure 8: Sample products produced using Project flowsheets

Capital Cost Estimate

Project capital costs have been developed to an accuracy of ±30% and include plant wide capital costs, construction estimates, EPCM costs, contingency and owner's costs. The capital costs are presented below:

Cost Centre	Capital Cost US$M
Direct Costs	
Ore treatment plant	100.5
Metal refinery (sulphate plant)	25.2
Reagents and plant services	48.9
Supporting infrastructure	8.8
Indirect Costs	183.4
Construction Distributables	9.1
EPCM and Specialist Consultants	23.7
Owners' costs	16.5
Contingency	64.7
Total Capital Cost	**297.4**

Figure 9: Capital cost summary

Accordingly, QPM may look to consider various funding pathways and engage with future potential financiers at the appropriate time and after completion of successful pre-feasibility studies and bankable/definitive feasibility studies.

The basis of the capital cost estimates is detailed below:

General

The equipment estimates are based on BWHC and QPM database information and first principles calculations.

Accuracy

The engineering study and design incorporated sufficient detail to generate a capital cost estimate to an accuracy of ±30%.

Battery Limits to Capital Cost Estimate

The capital cost estimate includes:

- Ore preparation
- Process plant
- Metal refinery
- Utilities and Services such as coal handling, steam boilers, power distribution, compressed air, reagents and associated equipment
- Water services
- Residue filtration and storage
- Plant and general infrastructure

Additional costs include:

- Construction facilities
- Project costs
- EPCM costs
- Contingency

Direct Costs

- The purchase, delivery and installation of plant equipment
- Process packages
- Services for water, air, power distribution, coal handling etc
- Earthworks
- General construction costs

The equipment estimate is based on BWHC and QPM database information, and first principles calculations. Escalation factors were applied to each item to provide the current cost.

Indirect Costs

Indirect costs were assessed as a percentage of relevant costs based on established estimating conventions. Indirect costs include:

- Construction distributables (5% of direct costs)
- Specialist consultants (0.36% of direct costs)
- Spare parts (2% of direct costs)
- Owners Costs including pre-production and first fills (7% of direct costs)
- EPCM (12.5% of direct costs)

Contingency

The contingency is intended to allow for any unexpected increases in capital costs such as:

- The escalation in purchase costs of equipment
- Increase in construction labour costs
- Industrial disputes
- Detailed engineering
- Project variations
- Construction schedule over runs
- Exchange rate variations

A contingency of 30% of direct equipment costs plus EPCM and construction distributables has been applied for this estimate (equivalent to 21.7% of the total capital cost). A contingency of this magnitude has been considered appropriate on the basis of Scoping Study level accuracy to the estimates. A further feasibility work is undertaken, the level of contingency can fall as estimates are undertaken with a higher level of accuracy.

Capital Cost Exclusions

A number of areas have been excluded from the scope of works in the Scoping Study, which will be included in future feasibility studies. These include:

- Detailed working capital estimate
- Sustaining / replacement / deferred capital
- EPCM assistance following introduction of ore to the plant, during commissioning and ramp-up
- Government charges, licence fees, environmental bonds (as there is no mining operation and the process plant will not be determined as a hazardous facility costs are expected to be minimal)

<u>Capital Cost Funding Assumptions</u>

The Scoping Study estimates US$297M plus working capital required for the Construction of the Project. Accordingly, QPM may look to consider various funding pathways and engage with future potential financiers at the appropriate time and after completion of successful pre-feasibility studies and bankable feasibility studies.

Although no funding decisions have occurred, at this stage, potential funding sources may include:

- **Strategic Funding** – The expected growth in the battery manufacturing sector will require increased levels of supply of raw materials, including nickel and cobalt sulphate. It is not unusual for end users to invest or provide funding to providers of raw materials in order to secure supply. Battery manufacturers are a potential source of debt or equity funding for the Project.

- **North Australian Infrastructure Fund ("NAIF")** – NAIF has been set up by the Australian government to provide loans to infrastructure projects in Northern Australia. With the Project being located in Townsville, NAIF funding has been identified as a potential source of debt funding.

- **Project Finance** – The positive economic results highlighted in the Scoping Study demonstrate that the Project may be of appeal to traditional project financiers. Further detailed feasibility work would be required including a Bankable Feasibility Study.

- **Equity** – The positive economic results highlighted in the Scoping Study may allow a significant portion of the capital costs to be funded by the equity markets. PM1 and QPM recognise that equity investor appetite is cyclical and there is no guarantee that market demand will be sufficient to meet funding requirements.

Operating Cost Estimates

The operating cost estimate for the reagents and consumables, maintenance materials, and labour has been prepared based on vendor quotations, and BWHC and QPM database information. Other operating costs that were excluded from the BWHC scope of work, including ore supply, seaborne/road transport and port handling costs, have been sourced directly by QPM.

The operating cost estimates are detailed in the figure below:

Cost Centre	Annual Operating Cost (A$M)
Ore supply, seaborne logistics, port handling and importation costs and road logistics	46.3
Reagents and consumables	35.7
Maintenance, tailings remediation	8.6
Labour and other overheads	11.8
Export, sales and royalties	5.4
Total Operating Cost	**107.8**

Figure 9: Operating cost summary

The basis of the operating cost estimates are detailed below:

General

The operating cost estimate is based on vendor quotations, BWHC and QPM's database information, and first principles calculations including reagents, consumables, utilities, labour, general expenses and maintenance required to run the Project.

Accuracy

The accuracy of the operating cost estimates are considered to be ±30%.

Consumables

Consumables costs are built up from reagent consumption rates generated by the METSIM® model, calculated energy consumption rates and power demand, and calculated consumption of replacements such as grinding media, mill liners and filter cloths. Unit costs are based on vendor quotations, and BWHC and QPM database information.

Maintenance Materials

The cost of maintenance spares has been estimated based on an industry standard approach of using a percentage of installed equipment costs for each plant area.

Labour

Labour costs are developed from a line by line manning list, anticipated annual wages, and allowances for leave (annual, sick, long service), superannuation, workers compensation, payroll tax and training.

Labour costs include:

- Ore preparation
- Process plant and residue storage area (RSA)
- Metal refinery

- Process services
- Maintenance personnel
- Technical staff including engineers and laboratory personnel
- Administration
- Management

The Project requires an estimated 102 personnel.

Base Case Results

The results of the Base Case, although early stage, highlight the economic potential of the Project and warrant further work programs to be undertaken by QPM to further advance the Project. The key Base Case results are presented in the figure below:

Parameter	Value
Annual production – Nickel Sulphate hexahydrate	25,400t
Annual production – Cobalt Sulphate heptahydrate	3,000t
Annual production – Hematite (Iron)	221,000t
Annual production – Alumina	8,700t
Annual production – Magnesium Oxide	4,600t

Figure 10: Scoping Study Base Case results

Key Risks

The Scoping Study included an assessment of Project risk, and contemplation of risk mitigation strategies. The key risks are described below.

Risk	Effect of Risk	Risk Mitigation Strategy
Security of ore supply	Production output will be decreased if there is insufficient ore available to operate the plant at its capacity	Working group has been established with third party ore suppliers SMT and SMGM to progress technical and commercial arrangements along with the Project. Identify other potential sources of ore supply including those in Australia.
Quality management	Production output will be decreased if the grade of ore supplier is lower than anticipated	Parameters of ore quality to be governed by ore supply agreements to ensure specification is met.
Environmental permitting and performance	Potential delay to project construction if there are issues with obtaining approvals. Potential for project to never be permitted.	Designated officer from Queensland State Development has been appointed to assist QPM in obtaining regulatory approvals. Environmental considerations have been factored when assessing potential plant locations in Townsville.
Processing technology	Potential that Project recoveries and subsequent production output is lower than forecast	Pilot plant and other detailed metallurgical test work will be

		undertaken to confirm viability of DNi Process™
Capital and operating costs	Potential increase to capital and operating costs based on further feasibility work, change in macroeconomic conditions, exchange rate movements and other factors	Further feasibility work, competitive tender processes, project optimisation and other cost saving initiatives will be implemented to manage costs.

Annexure B – SUMMMARY OF MODIFYING FACTORS

<table>
<tr><th>Aspect</th><th>Discussion</th></tr>
<tr><td>Study Scope and Status</td><td>QPM proposes to build a metals processing plant at Townsville in North Queensland. The Project will be built to supply into the emerging demand for Nickel and Cobalt chemical products whilst enabling further downstream processing of QPM's products within the North Queensland region.

The key components of the Project include the following:

• Purchase and supply of 600,000 wtpa of lateritic ore from New Caledonia through the Port of Townsville (sourced from third parties pursuant to an ore supply agreement);
• Transport of ore to site on road and/or rail;
• Construction and operation of a new hydrometallurgical metals processing facility and associated infrastructure at Townsville producing:
    o 18,400 wtpa of wet concentrate to be converted to 25,400tpa of Nickel Sulphate hexahydrate;
    o 3,000 tpa of Cobalt Sulphate heptahydrate
    o 221,000 dtpa of Hematite
    o 8,700 dtpa of Alumina
    o 4,600 dtpa Magnesium Oxide
• Transport of products to the Port of Townsville by road for export.

The concept study summarises the work completed to date by QPM. It presents an order of magnitude technical and economic evaluation of the potential viability of the Project.</td></tr>
<tr><td>Ore Supply</td><td>As announced by PM1 on 15 October 2018. the key terms of the ore supply agreement are:
<table>
<tr><td>Ore Suppliers</td><td>Societe des Mines de la Tontouta ("SMT")
Societe Miniere Georges Montagnat S.A.R.L ("SMGM")</td></tr>
<tr><td>Ore Source</td><td>From, but not limited to, any of three operating mines located in New Caledonia</td></tr>
<tr><td>Minimum ore grade to be supplied</td><td>Nickel > 1.4%
Cobalt > 0.15%
(From discussions with SMT/SMGM, expected grade to exceed contractual minimums, in line with export history to Townsville detailed below)</td></tr>
<tr><td>Term</td><td>5 years from the date of first ore shipping of first ore (being not before June 2020), extendable by mutual agreement</td></tr>
<tr><td>Tonnes</td><td>600,000 tonnes Ni-Co ore per annum commencing from the commencement of the Term</td></tr>
<tr><td>Price</td><td>Indexed to the Nickel and Cobalt LME price</td></tr>
<tr><td>Conditions</td><td>The ore supply agreement is conditional on the following:
1. The completion of a feasibility study to the satisfaction of QPM in respect of the development of the processing</td></tr>
</table></td></tr>
</table>

Aspect	Discussion
	plant and QPM providing a notice to SMT/SMGM regarding its decision to proceed with the development of the processing plant 2. New Caledonia regulatory export approvals Formalisation of a detailed ore supply contract based on the current agreed terms in the ore supply agreement
Risk Management	Risk Management processes have been established for the Project. Key risks identified include: • Security of Ore Supply • Quality Management • Environmental permitting and Performance • Technology • Capital and Operating Costs Following formal risk assessments, a risk register and action plan will be developed during PFS phase. Refer to the risk factors set out on page 15 above.
Geology and Mining	Ore to be sourced directly from two third party New Caledonian suppliers. QPM does not assume material will be sourced directly from individual mining operations, it will be purchased from suppliers at an agreed specification. Suppliers' capacity to supply into long term contracts has been evaluated within the Scoping Study, with Ore supply assumed to be at 600,000 wtpa at the specified grades. For the avoidance of doubt, the ore is not associated with any mineral project owned by QPM or PM1.
Metallurgical	Production of Sulphate products will be based through a 2 part process ***<u>Part 1: Processing Plant DNi Process ™</u>*** The DNi Process™ utilises nitric acid to digest, at atmospheric pressure, a range of minerals found in lateritic ores and recycles the Nitric Acid. The proposed flowsheet for the 600,000 wtpa Project consists of ore preparation, acid leaching, CCD, iron hydrolysis, aluminium precipitation, mixed nickel-cobalt hydroxide precipitation (MHP), MHP re-leach, nickel and cobalt separation, nickel and cobalt sulphate crystallisation, reagent regeneration, final neutralisation, and residue de-watering. The proposed plant will also produce a hematite product and an aluminium co-product. The key services and utilities associated with the project are: nitric acid handling and storage, bulk MgO handling and storage, reagent handling and make up, coal supply and storage, water services including water treatment plant, 32 bar coal-fired steam boiler, compressed air, and electrical power (incoming line, substation and distribution). The primary product output of the DNi Process™ is a nickel-cobalt MHP, which is a commonly traded product. Chinese incentives and regulations are steering battery producers and OEMs towards higher energy density batteries and

Aspect	Discussion
	longer-range options and nickel bearing NCM and NCA cathodes are thus expected to be dominant cathode technologies throughout the next decade. Demand for nickel in lithium-ion batteries will soon make batteries the second-largest end-use application for nickel. The supply chain is already responding to the need for new capacity for nickel sulphate production. The Process flowsheet for each part have been validated at Concept level through the following test work. **DNi Processing plant** A 1 tonne (dry) per day (ore feed) large scale pilot plant has been built to replicate the full process at the CSIRO Minerals research centre in West Australia. The Pilot Plant has successfully processed a number of ore sources and ore blends for continuous campaigns over a twelve-month period. DNI chemical and process engineering supported by CSIRO and independent consultants monitored the trials and gathered essential process data for inclusion in a full scale plant engineering and equipment selection ***Part 2: Refinery CSIRO Process*** 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. The CSIRO Refinery 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. QPM has commissioned CSIRO to test the flowsheet and a produce a sample of high purity, battery grade nickel and cobalt sulphate from Nickel-Cobalt MHP generated using the DNi Process™
Engineering and Design Management	The scoping study for the project is based on a combination of directly gathered project data together with assumptions borrowed from similar operations. The equipment estimate is based on BWHC and QPM database information, and first principles calculations. Escalation factors were applied to each item to provide the current cost.
Human Resources	Organisation structure and manning levels were determined from first principles and included in the scoping study.

<table>
<tr><th>Aspect</th><th>Discussion</th></tr>
<tr><td>Project Execution</td><td>Study work at Scoping level completed by QPM owners' team with following input:
Geology and Mining: SMT, SMSP, Xenith
Process and Engineering DNi, CSIRO, BWHC
Orica-Ikon for counsel on the Nitric Acid market.</td></tr>
<tr><td>Operations Management</td><td>Management and Staff to be recruited from a readily available pool within Queensland and Townsville, with corporate management regionally focussed.</td></tr>
<tr><td>Information Management</td><td>Off shelf IT and management systems to be used.
Estimates contained within the Scoping study capital costs.</td></tr>
<tr><td>Social, legal and governmental</td><td>Environmental and infrastructure risk has been considered as part of the overall risk assessments.
The final project location in Townsville has yet to be determined however QPM have investigated a number of suitable sites within the region.
Environmental studies and application process will commence upon selection of the project site.</td></tr>
<tr><td>Costs</td><td>The equipment estimates are based on BWHC and QPM database information and first principles calculations.
Capital Costs
The capital cost estimate is presented at an accuracy of +/-30% and includes:
Ore preparation
Process plant
Metal refinery
Utilities and Services such as coal handling, steam boilers, power distribution, compressed air, reagents and associated equipment
Water services
Residue filtration and storage
Plant and general infrastructure
Additional costs include:
Construction facilities
Project costs
EPCM costs
Contingency
Direct costs include:
The purchase, delivery and installation of plant equipment
Process packages
Services
Earthworks</td></tr>
</table>

Aspect	Discussion
	• General construction costs The equipment estimate is based on BWHC and QPM database information, and first principles calculations. Escalation factors were applied to each item to provide the current cost. *Indirect Costs* Indirect costs were assessed as a % of relevant costs based on established estimating conventions. Indirect costs include: • Construction distributable costs (5% of direct costs) • Specialist consultants (0.36% of direct costs) • Spare parts (2% of direct costs) • Owners Costs including pre-production and first fills (7% of direct costs) • EPCM (12.5% of direct costs) *Contingency* The contingency is intended to allow for any unexpected increases in capital costs such as: • The escalation in purchase costs of equipment • Increase in construction labour costs • Industrial disputes • Detailed engineering • Project variations • Construction schedule over runs • Exchange rate variations Contingency does not allow for changes to the capital cost arising from changes to the design ore feed composition to the plant or the metallurgical behaviour of the ore. A contingency of 30% of direct equipment costs plus EPCM and construction distributables has been applied for this estimate (equivalent to 21.7% of the total capital cost). *Operating Costs* The development of the operating cost estimate for the reagents and consumables, maintenance materials, and labour, with details of the criteria upon which the estimate is developed. The estimate has been prepared based on vendor quotations, and BWHC and QPM database information. Other operating costs are excluded from the BWHC scope of work, such as associated with ore supply, transport which have been sourced directly by QPM.

Aspect	Discussion
	The operating cost summary is expressed in terms of both Australian dollars (AUD) and United States dollars (USD). All costs are presented in December 2018 Australian dollar values with the principal exchange rate adopted for the estimate preparation being: AUD 1.00 = USD 0.71 *Consumables* Consumables costs are built up from reagent consumption rates generated by the METSIM® model, calculated energy consumption rates and power demand, and calculated consumption of replacements such as grinding media, mill liners and filter cloths. Unit costs are based on vendor quotations, and BWHC and QPM database information. *Maintenance Materials* The cost of maintenance spares has been estimated based on an industry standard approach of using a percentage of installed equipment costs for each plant area. *Labour* Labour costs are developed from a line by line manning list, anticipated annual wages, and allowances for leave (annual, sick, long service), superannuation, workers compensation, payroll tax and training. Labour costs include: • Ore preparation • Process plant and residue storage area (RSA) • Metal refinery • Process services • Maintenance personnel • Technical staff including engineers and laboratory personnel • Administration • Management The Project requires an estimated 102 personnel. *Sensitivities* Sensitivity cases were considered by flexing the key model inputs, primarily product sale price, operating and capital costs and foreign exchange rate. Sensitivities were reported in NPV and IRR.

Annexure C – JORC Tables

1.1 Section 1 Sampling Techniques and Data

Criteria	JORC Code explanation	Commentary
Sampling techniques	• *Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.* • *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* • *Aspects of the determination of mineralisation that are Material to the Public Report.* • *In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.*	• The leach sample is a grab sample sourced from a shipping stockpile by laterite supplier SMT in New Caledonia. • The sample was packed into sealed plastic bags. • The sample grade was requested by QPM to be indicative of the specification required under the terms outlined an ore supply MoU between QPM, SMT and SMGM. It did not need to be representative of any specific location and is not considered to be an insitu sample.
Drilling techniques	• *Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	• No exploration drilling was undertaken
Drill sample recovery	• *Method of recording and assessing core and chip sample recoveries and results assessed.* • *Measures taken to maximise sample recovery and ensure representative nature of the samples.* • *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	• No exploration drilling was undertaken
Logging	• *Whether core and chip samples have*	• No exploration drilling or logging was

Criteria	JORC Code explanation	Commentary
	been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies. • *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* • *The total length and percentage of the relevant intersections logged.*	undertaken
Sub-sampling techniques and sample preparation	• *If core, whether cut or sawn and whether quarter, half or all core taken.* • *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* • *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* • *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* • *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.* • *Whether sample sizes are appropriate to the grain size of the material being sampled.*	• No exploration drilling or logging was appropriate, required or undertaken. • The sample was supplied to Core on 19/06/18 and was classified as being type SMT by QPM. • It was received from the mine site as a moist, lumpy material ranging from extremely weathered rock to hard clay and silt consistency. • Prior to delivery to Core, the sample was irradiated in accordance with Australian Quarantine requirements. • The sample was dried and stage-crushed to -2 mm to enable homogenisation by a rotary splitter and a representative sub-sample was collected and pulverised for test work. • The sample size is considered appropriate for the test requirements.
Quality of assay data and laboratory tests	• *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* • *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* • *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	• The method used to assay solid and leach liquor samples is included in Core's NATA certifications SS-4AD-MEICP and LA-MEICP. • No geophysical tools were used for assay purposes. • Quality control and assay procedures covered by Core's NATA accreditation.
Verification of sampling and assaying	• *The verification of significant intersections by either independent or alternative company personnel.* • *The use of twinned holes.* • *Documentation of primary data, data*	• No exploration drilling or sampling was undertaken

Criteria	JORC Code explanation	Commentary
	entry procedures, data verification, data storage (physical and electronic) protocols. • *Discuss any adjustment to assay data.*	
Location of data points	• *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* • *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• No exploration drilling was undertaken
Data spacing and distributio n	• *Data spacing for reporting of Exploration Results.* • *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* • *Whether sample compositing has been applied.*	• No exploration drilling was undertaken.
Orientatio n of data in relation to geological structure	• *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* • *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	• No exploration drilling was undertaken.
Sample security	• *The measures taken to ensure sample security.*	• The laterite sample was collected, secured and sent in closed plastic bags via either a registered transport company, or were hand delivered directly to the laboratory.
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• No external audits have been completed.

1.2 Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	• *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* • *The security of the tenure held at the*	• Not Applicable • Sample was sourced from third party supplier SMT in New Caledonia.

Criteria	JORC Code explanation	Commentary
	time of reporting along with any known impediments to obtaining a licence to operate in the area.	
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• Not Applicable
Geology	• *Deposit type, geological setting and style of mineralisation.*	• Not Applicable.
Drill hole Information	• *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* o *easting and northing of the drill hole collar* o *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* o *dip and azimuth of the hole* o *down hole length and interception depth* o *hole length.* • *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.*	• No exploration drilling or sampling was undertaken.
Data aggregation methods	• *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.* • *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* • *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	• No exploration drilling or sampling was undertaken. • Metal equivalents were not used or reported.
Relationship between mineralisation widths and	• *These relationships are particularly important in the reporting of Exploration Results.* • *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* • *If it is not known and only the down hole*	• No exploration drilling was completed.

Criteria	JORC Code explanation	Commentary
intercept lengths	*lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').*	
Diagrams	• *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	• No exploration drilling was completed.
Balanced reporting	• *Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	• No exploration results have been reported sampling was carried out on insitu laterite.
Other substantive exploration data	• *Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	• Exploration drilling was not carried out.
Further work	• *The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).* • *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	• No drilling or exploration work is planned.

1.3 Section 3 Estimation and Reporting of Mineral Resources

(Criteria listed in section 1, and where relevant in section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Database integrity	• *Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* • *Data validation procedures used.*	• QPM does not intend to source ore from a single mine or deposit, instead will purchase ore from suppliers at an agreed specification and price. • QPM does not own the supplying mines. • Commercial arrangements between QPM and suppliers contain quality controls.
Site visits	• *Comment on any site visits undertaken by the Competent Person and the outcome of those visits.*	• No site visit required as ore to be purchased under commercial terms.

Criteria	JORC Code explanation	Commentary
	• *If no site visits have been undertaken indicate why this is the case.*	
Geological interpretation	• *Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.* • *Nature of the data used and of any assumptions made.* • *The effect, if any, of alternative interpretations on Mineral Resource estimation.* • *The use of geology in guiding and controlling Mineral Resource estimation.* • *The factors affecting continuity both of grade and geology.*	• Continuity of supply to specification responsibility of suppliers.
Dimensions	• *The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	• Not applicable.
Estimation and modelling techniques	• *The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.* • *The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.* • *The assumptions made regarding recovery of by-products.* • *Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation).* • *In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.* • *Any assumptions behind modelling of selective mining units.* • *Any assumptions about correlation between variables.* • *Description of how the geological interpretation was used to control the resource estimates.* • *Discussion of basis for using or not using*	• Not applicable.

Criteria	JORC Code explanation	Commentary
	grade cutting or capping. • *The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.*	
Moisture	• *Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	• Commercial supply arrangements specify purchase of wet tonnes and moisture content limits are defined.
Cut-off parameters	• *The basis of the adopted cut-off grade(s) or quality parameters applied.*	• Not applicable.
Mining factors or assumptions	• *Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.*	• Ore will be sourced from existing third party owned mining operations.
Metallurgical factors or assumptions	• *The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.*	• Leach kinetics test work completed by Core Resources (ref Section 1 of this table). This work confirmed extraction and leach time of nickel and cobalt for the process with the ore as specified (refer PM1 announcement 26 Oct 2018). • Synthetic MHP produced by the Direct Nickel process was processed by CSIRO at a laboratory scale producing samples of Nickel and Cobalt Sulphate and confirmed potential suitability of process route (refer PM1 announcement 29 Nov 2018).
Environmental factors or assumptions	• *Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be*	• Residue from the process plant will be washed, acid recovered and recycled. Residue is then dewatered using belt filters and dry stacked. Assumptions with respect to residue storage are based on similar residue disposal project parameters. • Process residue from the CISRO process (Nickel and Co Sulphate production) will be disposed via registered waste contractors.

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td>well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.</td><td><table>
<tr><th>Parameter</th><th>Value</th></tr>
<tr><td>Residue discharge rate (wet)</td><td>364,000tpa</td></tr>
<tr><td>Insitu dry density</td><td>1.15t/m3</td></tr>
<tr><td>Insitu moisture content</td><td>35%</td></tr>
<tr><td>Project Life</td><td>25 years</td></tr>
<tr><td>Discharge method</td><td>Dry Stacked</td></tr>
<tr><td>Residue volume capacity</td><td>$6.5Mm^3$</td></tr>
<tr><td>Ultimate Height including 1m freeboard</td><td>10m</td></tr>
<tr><td>Overall slope (H:V)</td><td>10:1</td></tr>
<tr><td>Area Required</td><td>75ha</td></tr>
<tr><td>Area Available</td><td>125-175ha</td></tr>
</table></td></tr>
<tr><td>Bulk density</td><td>Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.
The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.
Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.</td><td>Not applicable, ore supply will be purchased on a wet tonnes basis.</td></tr>
<tr><td>Classification</td><td>The basis for the classification of the Mineral Resources into varying confidence categories.
Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).
Whether the result appropriately reflects the Competent Person's view of the deposit.</td><td>Not applicable.</td></tr>
<tr><td>Audits or reviews</td><td>The results of any audits or reviews of Mineral Resource estimates.</td><td>No audits have been completed on the ore suppliers' resource.
Xenith consultants were engaged by PM1 and QPM to undertake due diligence investigations (including site visits) into the current ore supply operations (mining and logistics) in New Caledonia. (refer PM1 announcement 11 Dec 2018).</td></tr>
</table>

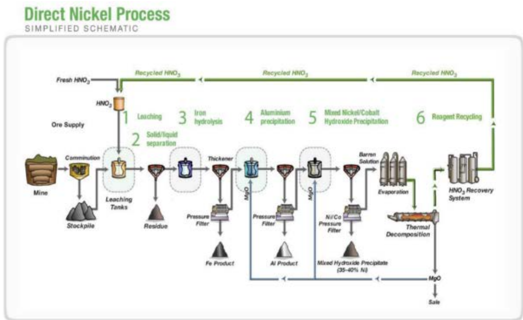
Criteria	JORC Code explanation	Commentary
Discussion of relative accuracy/ confidence	• *Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.* • *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* • *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	• Not applicable.

1.4 Section 4 Estimation and Reporting of Ore Reserves

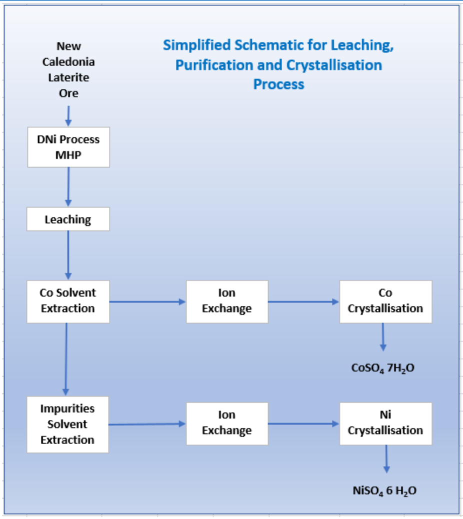
(Criteria listed in section 1, and where relevant in sections 2 and 3, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral Resource estimate for conversion to Ore Reserves	• *Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve.* • *Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserves.*	• Not applicable.
Site visits	• *Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* • *If no site visits have been undertaken indicate why this is the case.*	• Not applicable.
Study status	• *The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves.* • *The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert*	• Not applicable.

Criteria	JORC Code explanation	Commentary
	Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that material Modifying Factors have been considered.	
Cut-off parameters	• *The basis of the cut-off grade(s) or quality parameters applied.*	• Not applicable.
Mining factors or assumptions	• *The method and assumptions used as reported in the Pre-Feasibility or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimisation or by preliminary or detailed design).* • *The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.* • *The assumptions made regarding geotechnical parameters (eg pit slopes, stope sizes, etc), grade control and pre-production drilling.* • *The major assumptions made and Mineral Resource model used for pit and stope optimisation (if appropriate).* • *The mining dilution factors used.* • *The mining recovery factors used.* • *Any minimum mining widths used.* • *The manner in which Inferred Mineral Resources are utilised in mining studies and the sensitivity of the outcome to their inclusion.* • *The infrastructure requirements of the selected mining methods.*	• Not applicable. • Assessment of project at Scoping level. • Ore supply is planned to be through commercial supply agreements only. • QPM does not have an equity participation in the supplying mines.
Metallurgical factors or assumptions	• *The metallurgical process proposed and the appropriateness of that process to the style of mineralisation.* • *Whether the metallurgical process is well-tested technology or novel in nature.* • *The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors*	**Process Flowsheet** The process was developed by DNi for a range of lateritic ores. Pilot Plant test work completed by DNi and CSIRO have indicated the process is robust across a range of limonite and saprolite ores. Test work carried out by QPM at scoping level has indicated that the process is suited to the proposed New Caledonian ore feed at the proposed specification. The proposed flowsheet to be utilised by the Project can be separated into two parts:

Criteria	JORC Code explanation	Commentary
	applied. • *Any assumptions or allowances made for deleterious elements.* • *The existence of any bulk sample or pilot scale test work and the degree to which such samples are considered representative of the orebody as a whole.* • *For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the specifications?*	*Part 1: DNi Process™* The DNi Process™ is a modern processing technology that utilises nitric acid to digest, at atmospheric pressure, a range of minerals found in lateritic ores. The nitric acid is then recycled. The process begins with material being crushed to around 1-2mm before being conveyed to leaching tanks where it remains for approximately four hours at 110°C 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 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. The nitric oxide gas is converted to nitric acid and returned to the first leaching tank for reuse.  *Simplified Direct Nickel process flowsheet* Traditionally, HPAL plants have been used to process lateritic nickel ore. 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 (which requires high-grade titanium); 3. The DNi Process™ has a tailings footprint approximately one-third the size of the

Criteria	JORC Code explanation	Commentary
		tailings footprint of a HPAL plant of the same capacity (principally due to the removal of iron as a hematite product, 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. 6. Logistics for major consumables are significantly reduced due to acid recycle (minimal acid make-up) and the internal recycle of MgO for pH adjustment and precipitation, which removes the need to supply limestone and/or lime. *Part 2: CSIRO Process* The primary product output of the DNi Process™ is a nickel-cobalt MHP, which is a commonly traded product. The emergence of the battery market has increased demand for nickel and cobalt sulphate. Therefore there is economic rationale for MHP producers to upgrade this intermediate product to a product that is suitable for battery manufacturers. The proposed flowsheet to be used by the Project to achieve this has been developed in conjunction with CSIRO. Starting with MHP from the DNi Process™, the CSIRO process will employ selective dissolution to create a nickel and cobalt-rich liquor. This liquor is then subjected to solvent extraction to separate the nickel and the cobalt and remove impurity elements. Further purification and crystallisation is then utilised to produce the final nickel sulphate and cobalt sulphate products. In addition, a raw manganese dioxide product (one of the co-products) can also be produced.

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td></td><td>

Simplified CSIRO process flowsheet</td></tr>
<tr><td>Environmen-tal</td><td>The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterisation and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.</td><td>A number of sites are being evaluated by QPM.</td></tr>
<tr><td>Infrastructure</td><td>The existence of appropriate infrastructure: availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided, or accessed.</td><td>Project to be located within established industrial region of Townsville that has a 30 year history in handling imported nickel and cobalt ore thought the port of Townsville.
At scoping level labour, accommodation, power, water and consumables have been identified as available within the region.</td></tr>
<tr><td>Costs</td><td>The derivation of, or assumptions made, regarding projected capital costs in the study.
The methodology used to estimate operating costs.
Allowances made for the content of deleterious elements.
The source of exchange rates used in the study.
Derivation of transportation charges.
The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc.</td><td>Capital Cost Estimate

Project capital costs have been developed to an accuracy of ±30% and include plant wide capital costs, construction estimates, EPCM costs, contingency and owners costs. The capital costs are presented below:

<table>
<tr><th>Cost Centre</th><th>Capital Cost US$M</th></tr>
<tr><td>Direct Costs</td><td></td></tr>
<tr><td>Ore treatment plant</td><td>100.5</td></tr>
<tr><td>Metal refinery (sulphate plant)</td><td>25.2</td></tr>
<tr><td>Reagents and plant services</td><td>48.9</td></tr>
<tr><td>Supporting infrastructure</td><td>8.8</td></tr>
<tr><td>Indirect Costs</td><td></td></tr>
<tr><td>Construction Distributables</td><td>9.1</td></tr>
<tr><td>EPCM and Specialist Consultants</td><td>23.7</td></tr>
<tr><td>Owners' costs</td><td>16.5</td></tr>
</table></td></tr>
</table>

Criteria	JORC Code explanation	Commentary
	• *The allowances made for royalties payable, both Government and private.*	Contingency — 64.7 **Total Capital Cost — 297.4** *Capital cost summary* The basis of the capital cost estimates is detailed below: *General* The equipment estimates are based on BWHC and QPM database information and first principles calculations. *Accuracy* The engineering study and design incorporated sufficient detail to generate a capital cost estimate to an accuracy of ±30%. *Battery Limits to Capital Cost Estimate* The capital cost estimate includes: • Ore preparation • Process plant • Metal refinery • Utilities and Services such as coal handling, steam boilers, power distribution, compressed air, reagents and associated equipment • Water services • Residue filtration and storage • Plant and general infrastructure. Additional costs include: • Construction facilities • Project costs • EPCM costs • Contingency. *Direct Costs* • The purchase, delivery and installation of plant equipment • Process packages • Services • Earthworks • General construction costs. The equipment estimate is based on BWHC and QPM database information, and first principles calculations. Escalation factors were applied to each item to provide the current cost. *Indirect Costs* Indirect costs were assessed as a percentage of relevant costs based on established estimating conventions. Indirect costs include: • Construction distributables (5% of direct costs)

Criteria	JORC Code explanation	Commentary
		• Specialist consultants (0.36% of direct costs) • Spare parts (2% of direct costs) • Owners Costs including pre-production and first fills (7% of direct costs) • EPCM (12.5% of direct costs) *Contingency* The contingency is intended to allow for any unexpected increases in capital costs such as: • The escalation in purchase costs of equipment • Increase in construction labour costs • Industrial disputes • Detailed engineering • Project variations • Construction schedule over runs • Exchange rate variations. A contingency of 30% of direct equipment costs plus EPCM and construction distributables has been applied for this estimate (equivalent to 21.7% of the total capital cost). A contingency of this magnitude has been considered appropriate on the basis of Scoping Study level accuracy to the estimates. A further feasibility work is undertaken, the level of contingency can fall as estimates are undertaken with a higher level of accuracy. *Capital Cost Exclusions* A number of areas have been excluded from the scope of works in the Scoping Study, which will be included in future feasibility studies. These include: • Detailed working capital estimate • Sustaining / replacement / deferred capital • EPCM assistance following introduction of ore to the plant, during commissioning and ramp-up • Government charges, licence fees, environmental bonds (as there is no mining operation and the process plant will not be determined as a hazardous facility costs are expected to be minimal). **Operating Cost Estimates** The operating cost estimate for the reagents and consumables, maintenance materials, and labour has been prepared based on vendor quotations, and BWHC and QPM database information. Other

Criteria	JORC Code explanation	Commentary
		operating costs that were excluded from the BWHC scope of work, including ore supply, seaborne/road transport and port handling costs, have been sourced directly by QPM. The operating cost estimates are detailed in the table below: *Operating cost summary* The basis of the operating cost estimates are detailed below: *General* The operating cost estimate is based on vendor quotations, BWHC and QPM's database information, and first principles calculations including reagents, consumables, utilities, labour, general expenses and maintenance required to run the Project.

Cost Centre	Annual Operating Cost (A$M)
Ore supply, seaborne logistics, port handling and importation costs and road logistics	46.3
Reagents and consumables	35.7
Maintenance, tailings remediation	8.6
Labour and other overheads	11.8
Export, sales and royalties	5.4
Total Operating Cost	**107.8**

Accuracy
The accuracy of the operating cost estimates are considered to be ±30%.

Consumables
Consumables costs are built up from reagent consumption rates generated by the METSIM® model, calculated energy consumption rates and power demand, and calculated consumption of replacements such as grinding media, mill liners and filter cloths. Unit costs are based on vendor quotations, and BWHC and QPM database information.

Maintenance Materials
The cost of maintenance spares has been estimated based on an industry standard approach of using a percentage of installed equipment costs for each plant area.

Labour
Labour costs are developed from a line by line manning list, anticipated annual wages, and allowances for leave (annual, sick, long service), superannuation, workers compensation, payroll tax and training. Labour costs include:

- Ore preparation
- Process plant and residue storage area (RSA)

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td></td><td>Metal refinery
Process services
Maintenance personnel
Technical staff including engineers and laboratory personnel
Administration
Management.
The Project requires an estimated 102 personnel.</td></tr>
<tr><td>Revenue factors</td><td>The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc.
The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.</td><td>Prices adopted for the study were sourced from LME and SMM price publications.
Consensus forecasts were used for long run price assumptions.
Exchange rate adopted (AUD:USD): 0.71</td></tr>
<tr><td>Market assessment</td><td>The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future.
A customer and competitor analysis along with the identification of likely market windows for the product.
Price and volume forecasts and the basis for these forecasts.
For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.</td><td>Marketing information derived from public domain information published by Roland Berger Strategy Consultants and Avicenne Energy reports presented at Israeli Power Source Conference 2015.
Top Resources is a commodity trader with vast experience in trading a wide range of commodities and has strong relationships in China and the greater Asian region.</td></tr>
<tr><td>Economic</td><td>The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc.
NPV ranges and sensitivity to variations in the significant assumptions and inputs.</td><td>Valuation Outputs
The Scoping Study valuation output presents a preliminary technical and economic analysis of the potential viability of a project. The valuation work undertaken in the Scoping Study considers a Base Case of assumptions. Further sensitivity work has been undertaken in relation to these assumptions.
Base Case Parameters
The Base Case parameters are detailed in the table below:
<table>
<tr><th>Parameter</th><th>Value</th></tr>
<tr><td>Project life</td><td>25 years</td></tr>
<tr><td>Annual ore throughput</td><td>600,000 wtpa</td></tr>
<tr><td>Average feed-grade Ni, Co, Fe, MgO, AL_2O_3 (%)</td><td>Ni 1.6%
Co 0.18%</td></tr>
</table></td></tr>
</table>

Criteria	JORC Code explanation	Commentary
		(table continued below)

	Fe 46% MgO 5% Al_2O_3 3%
Ni, Co recovery	91%
Project capital cost (including contingency of US$65M)	US$297M
Average annual operating cost (Ore Supply, Transport, Processing, Refining, Royalty, Export)	A$108M
Nickel price	US$6.50/lb
Nickel sulphate premium	US$2.0/lb
Cobalt price	US$30.00/lb
Cobalt sulphate premium	Nil
Hematite price	US$75/t
Alumina price	US$200/t
Magnesium oxide price	US$100/t
AUD:USD exchange rate	0.71

Scoping Study Base Case parameters

Base Case Results

The results of the Base Case highlight the economic potential of the Project and warrant further work programs to be undertaken by QPM to further advance the Project. The key Base Case results are presented in the table below:

Parameter	Value
Annual production – Nickel Sulphate	25,400
Annual production – Cobalt Sulphate	3,000
Annual production – Hematite (Iron)	221,000
Annual production – Alumina	8,700
Annual production – Magnesium Oxide	4,600

Scoping Study Base Case results

Criteria	JORC Code explanation	Commentary
Social	• *The status of agreements with key stakeholders and matters leading to social licence to operate.*	• Not applicable at scoping level.
Other	• *To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves:* • *Any identified material naturally occurring risks.* • *The status of material legal agreements and marketing arrangements.* • *The status of governmental agreements and approvals critical to the viability of the project, such as mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government*	• Not applicable at scoping level.

Criteria	JORC Code explanation	Commentary
	approvals will be received within the timeframes anticipated in the Pre-Feasibility or Feasibility study. Highlight and discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.	
Classification	• *The basis for the classification of the Ore Reserves into varying confidence categories.* • *Whether the result appropriately reflects the Competent Person's view of the deposit.* • *The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).*	• Not applicable
Audits or reviews	• *The results of any audits or reviews of Ore Reserve estimates.*	• Not applicable
Discussion of relative accuracy/ confidence	• *Where appropriate a statement of the relative accuracy and confidence level in the Ore Reserve estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which could affect the relative accuracy and confidence of the estimate.* • *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* • *Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have a material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the current study stage.* • *It is recognised that this may not be*	• Not applicable, study result not based on reserves.

Criteria	JORC Code explanation	Commentary
	possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.	