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30 March 2023

ASX:RRR

# **ASX RELEASE**

# **Dianne Copper Cathode Potential**

Process engineering work outlines potential to process oxide and sulphide ores to produce A grade copper cathode on site.

## **Highlights**

- Initial engineering designs completed for on-site heap leach processing at Dianne completed.
- A purpose built SX-EW processing facility demonstrates site-based solution for production of A Grade copper cathode at Dianne.
- Plant construction and commissioning estimated to be less than 12 months from commencement.
- Comprehensive Dianne Scoping Study is well progressed.

Revolver Resources Holdings Limited (ASX:RRR) ("Revolver" or the "Company"), has completed initial engineering design for a site-based copper processing facility at the Dianne Project in North Queensland. Based on earlier quantified results obtained from both Metallurgy¹ and Mineral Resource Estimate² from late 2022, the Company has commenced a full Scoping Study to outline the commercial viability of recommencing operations at the historic Dianne Pit. This initial process design forms the central piece to any subsequent evaluations into the potential of re-commencing operations at Dianne, the highest-grade copper mining operation in Australian history. The potential to process ore onsite removes the reliance on multiple processing solutions as well as any reliance on direct shipped ore deliveries or transport of any concentrate products.

<sup>&</sup>lt;sup>1</sup> RRR ASX Release 5 December 2022, Initial Metallurgical Test Work Completed at Dianne.

<sup>&</sup>lt;sup>2</sup> RRR ASX Release 12 December 2022, Revolver Reveals Maiden Copper Mineral Resource at Dianne Mine



# Revolver Managing Director, Mr Pat Williams, said

"Revolver is committed to resourcing into the global copper deficit. Our work on the Dianne Project keeps delivering very compelling upside potential for our shareholders. The preliminary results from this process design study illustrates how a small-scale processing plant leads to the potential to produce copper on site. A simple application of proven technology brings the potential for a lower project execution risk profile as well as a short construction duration.

The work programs completed, and results achieved with funds from our IPO in late 2021 have been judiciously deployed and have delivered a remarkable foundation on which to add significant value to the Company. We are faced with outstanding exploration discovery potential at both Osprey and Dianne projects, and the Company in parallel has prioritised activities to further investigate a near term production potential at Dianne."

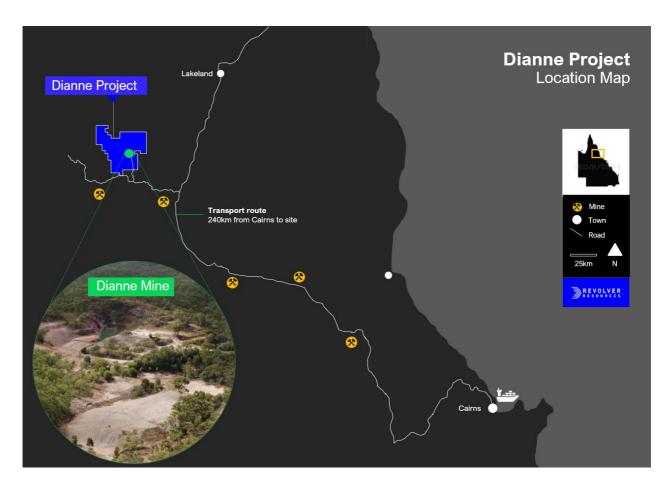


Figure 1: Dianne Project location showing historic mine



# PROJECT DESCRIPTION

#### **Overview**

Revolver Resources Holdings Limited's (ASX:RRR) ("**Revolver**" or the "**Company**") Dianne Copper Project ("**Dianne**") is centered on the historical Dianne copper mine located in Southern Cape York Peninsular approximately 265km northwest of Cairns. Revolver has consolidated a tenement package to form its greater Dianne Project which comprises six granted mining leases ("**MLs**") (ML 2810, ML 2811, ML 2831, ML 2832, ML 2833, and ML 2834), and three granted exploration permits for minerals ("**EPMs**") (EPM 25941, EPM 27411 and EPM 27291) resulting in an integrated land area of 545km² (refer Figure 2). Revolver listed 100% of the Dianne project in September 2021 after having been 50% owner and operator since late 2019.

Dianne commenced development in 1979 with a small-scale underground and open pit mine operating until 1983 when mining was suspended. Production over a four-year period from the chalcocite enriched sulphide mineralisation from the massive zone totalled 63,758 tonnes of high-grade direct shipping ore at an average grade of 22.7% Copper<sup>9</sup>.

The Maiden Mineral Resource estimate used for the study was released on the 12 December 2022. The Resource estimate was undertaken by independent global consultancy AMC Consultants ("AMC") and contained 1.62 Mt @ 1.1% Cu with total contained metal of 18,000 tonnes of Cu.

The Company confirms that it is not aware of any new information or data that materially affects the information included in the previous announcements and that all material assumptions and technical parameters underpinning the Mineral Resource estimate in the previous announcements continue to apply and have not materially changed.

Process engineering and design work at Dianne was commissioned to conceptualise the development of an expansion to the historical open pit at Dianne and evaluated the option of the treatment of oxide ore and sulphide mined from the open pit through the commissioning of small-scale heap leach Solvent Extraction/Electrowinning (SX/EW) infrastructure.

Revolver engaged PPM Global Pty Ltd (PPM) to undertake the process engineering and design work as a precursor to a more comprehensive Scoping Study for the whole of the Dianne Mine mineral resource.

The design work is based on the following assumptions:

- The heap leach SX/EW facility will be constructed on site at Dianne and operate to produce grade A copper cathode.
- Copper cathode would be trucked to a storage facility located at Port of Cairns, approximately 240 km from Dianne, before shipping to market.

The development of any open pit operation at Dianne, as an expansion to the historic open cut excavation, requires minimal establishment works given that the basic infrastructure and services are already in place, appropriate incremental permitting steps are in progress and the project is contained entirely within the existing Mining Lease footprint.



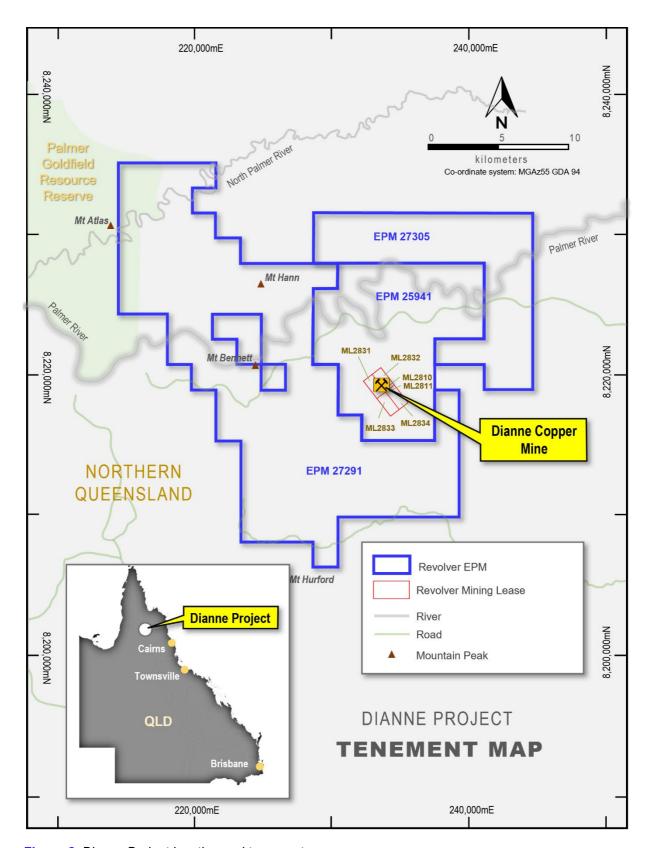


Figure 2: Dianne Project location and tenements

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# **Existing Infrastructure and Services**

The Mineral Resource and the proposed pit design at Dianne is contained wholly on six granted mining leases (ML 2810, ML 2811, ML 2831, ML 2832, ML 2833, and ML 2834), illustrated in Figure 4.

Raw water storage dams, built for the former mining operations at Dianne, remain in place and are 100% available to support future mining operations. Other significant water management and runoff infrastructure is in place to manage current environmental requirements and will likely require incremental upgrades. A small modular reverse osmosis plant will be installed to provide potable water.

Power for the duration of the mine and processing operations will be designed as a combination solar and modular diesel generation. Sufficient cleared areas exist to accommodate small scale workshop and heavy equipment facilities. The existing temporary 12-person camp location has sufficient cleared area to accommodate the necessary increase for both construction and operating personnel.

An existing mine access road network is in place, including a 10km surface infrastructure lease facilitating exclusive access to the ML's from the nearby publicly maintained Whites Creek Rd. Some minor upgrade of the existing mines access road network will be necessary together with periodic ongoing maintenance. The unsealed section of Whites Creek Rd necessary for access to Dianne is 28km and is annually maintained by the local Cook Shire council. From the intersection of Whites Creek Rd and the Mulligan Highway, all remaining roads to required major or regional centers are dual lane sealed roads.



Figure 3: Dianne Mine showing historic footprint



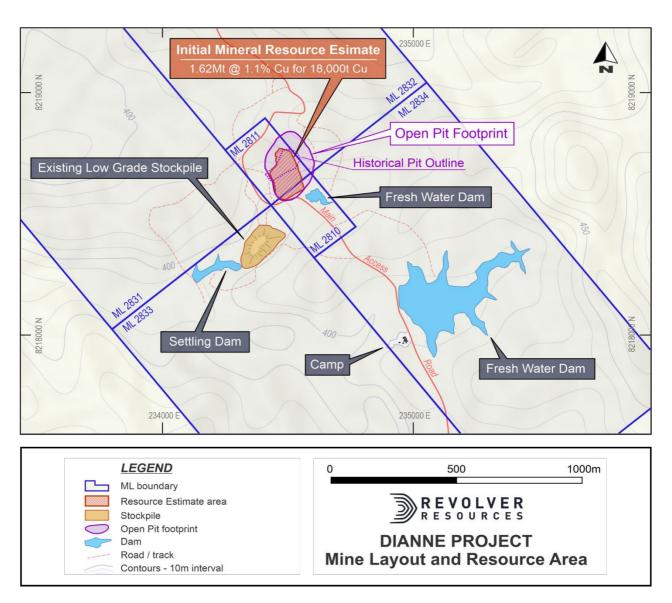


Figure 4: Dianne Project site plan



# **GEOLOGY AND RESOURCES**

#### Geology

The Dianne deposit is hosted in deformed Palaeozoic shale and greywacke of the Hodgkinson Formation. The deposit type has been interpreted by Revolver to be a strataform volcanic-hosted massive sulphide deposit.

Weathering and supergene processes of the deposit has altered the mineralisation of the deposit with three distinct styles of mineralisation occurring:

- primary massive sulphides consisting of pyrite, chalcopyrite and sphalerite;
- enriched supergene sulphide composed of pyrite and chalcocite and;
- an associated low grade mushroom shaped halo of supergene oxide copper mineralisation, the Green Hill deposit, comprising stockwork and disseminations of malachite, azurite cuprite, tenorite chalcocite and native copper.

The copper (zinc-silver-cobalt-gold) deposit was identified in 1955<sup>2</sup> with ongoing exploration leading to the development of a small-scale underground and open pit mine operated between 1979-83. Production from the chalcocite enriched sulphide mineralisation from the massive zone totalled 69,820 tonnes of high-grade direct shipping ore assaying between 18-26% Cu and approximately 359 g/t Ag.

#### **Defined Mineral Resources<sup>2</sup>**

The Mineral Resources (Table 1) have been prepared by a Competent Person and reported in accordance with the 2012 edition of the JORC Code.

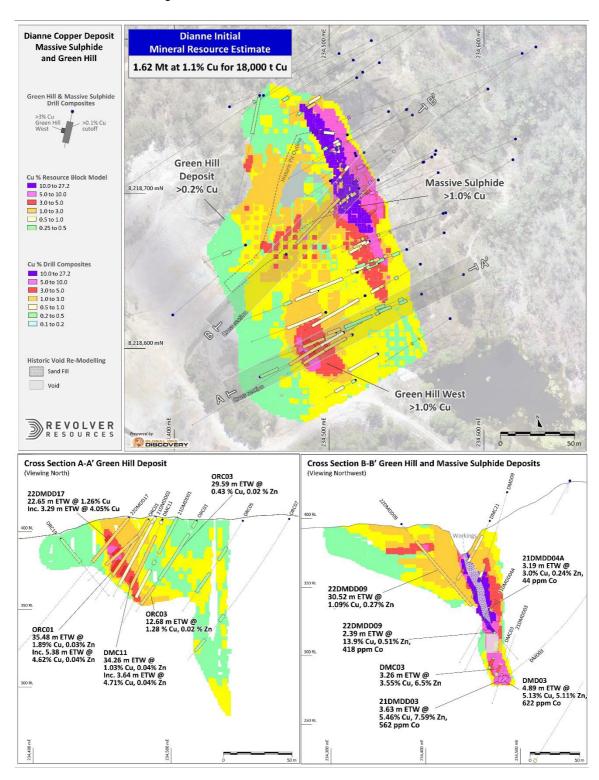
Table 1: Dianne Project Global Mineral Resource

	Cut-	INDICATED			11	NFERRED		TOTAL			
Resource Domain	off Cu	Tonnes	Cu Grade	Cu Metal	Tonnes	Cu Grade	Cu Metal	Tonnes	Cu Grade	Cu Metal	
	(%)	(kt)	(%)	(%)	(kt)	(%)	(%)	(kt)	(%)	(%)	
Primary and Supergene Sulphide	0.50	58	6.3	3,600	77	6.0	4,600	135	6.1	8,200	
GH Supergene Oxide	0.25	395	0.80	3,200	1,093	0.61	6,700	1,488	0.66	9,800	
Total		453	1.5	6,800	1,170	1.0	11,000	1,623	1.1	18,000	

The Mineral Resource estimate for Dianne was announced by Revolver in accordance with ASX Listing Rule 5.8 in its announcement of 12<sup>th</sup> December 2022. The Dianne MRE is an Indicated and Inferred Mineral Resource (Indicated and Inferred) totals 1.62 Mt @ 1.1% Copper with total contained metal of 18,000 tonnes of Copper. The MRE was calculated based on a 0.5% Copper cut-off for primary and supergene



sulphide mineralisation and 0.25% Copper cut-off for supergene oxide mineralisation, reported above an elevation of 280m RL (approximately 130 m below surface). Plan and section illustrations of the Mineral Resource are shown in Figure 5.



**Figure 5:** Plan and cross sections of Mineral Resource Estimate for the Dianne and Green Hill Deposit



The Company confirms that it is not aware of any new information or data that materially affects the information included in the previous announcements and that all material assumptions and technical parameters underpinning the Mineral Resource estimate in the previous announcement continue to apply and have not materially changed.

# **Resource Definition Opportunities**

A review of the oxide and sulphide resource models has identified four (4) key areas of potential additional copper mineralisation, that if confirmed by drilling, could be available to additionally increase the overall resource available for future commercialisation. These include:

- Void fill material:
- In Pit low grade oxide resource:
- In Pit unclassified oxide material:
- Southern and western extensions of the Oxide material:

These potential zones of mineralisation have been identified as a high priority follow-up for subsequent drilling and resource definition during 2023.



# **METALLURGY**

#### **Metallurgical Testwork Overview**

PPM Global Pty Ltd (PPM Global) was commissioned by Revolver to review the metallurgical component of the initial process design work. A variety of ores are proposed to be processed at Dianne. The design scenarios evaluated the option of oxide, supergene and primary sulphide material produced from the resource, and above respective cut-off grades, being processed through a heap leach and SX/EW processing plant. Low-grade (>0.25% and <0.4% Cu) oxide material extracted from the resource was assumed to be stockpiled for potential later use.

#### Heap Leach Testwork<sup>1</sup>

Test work recently completed by Revolver and reported recently on 5<sup>th</sup> December 2022 returned excellent recovery of copper from conventional acid leach (via bottle role testing) processing from the oxide zone, indicating the potential to recover copper via low-cost heap leach processing.

Bottle roll acid leach test of a composited sample from the Green Hill oxide deposit showed a very favorable 90.4% copper recovery and fast leach kinetics indicating that this mineralisation is potentially amenable to low-cost heap leach processing.

While initial results from amenability tests are promising with high Copper and Zinc recoveries achieved, the work is at an early stage and column tests are required to verify the recoveries and operating costs.

Provision has been made in the financial model for placement of crushed and screened ore on the heap and associated capital and operational expenditure.

Initial bench scale metallurgical test work, which showed that the Dianne primary massive sulphide and supergene massive sulphide mineralisation are suitable for processing via flotation methods to produce potentially saleable grade copper and zinc sulphide concentrates. SX/EW process technology is proposed for treatment of both oxide and sulphide ores at Dianne. The summary of sulphide recovery results outlined below illustrates the amenability to liberate copper minerals through conventional mineral processing treatment.

- Primary MS: grind and flotation recovered a total of 95.9% copper and 97.1% zinc to rougher concentrate with predicted cleaner concentrate grades of 21.6% copper at 81.9% recovery and 48.9% zinc at 72.8% recovery.
- Supergene MS: grind and flotation recovered a total of 91.7% copper to rougher concentrate with predicted cleaner concentrate grade of 25.2% copper in concentrate at 82.5% recovery.

No heap leach test work has been completed on the supergene or primary sulphide zones for Dianne ore. Moderate to low copper recoveries assumptions for sulphide ore are anticipated from PPM Global's specific processing experience with similar ore type performance on current heap leach – SX/EW operations.

For the basis of this study, a sulphide leach recovery of 75% has been assumed (provided by PPM Global) and subsequent work already commenced by Revolver will determine the most appropriate ongoing recovery for subsequent evaluation purposes.



# **PROCESSING**

## **Crushing, Screening, Agglomeration And Stacking**

Copper bearing ore at the Dianne Project is assumed to be mined by open pit method, with the mined ore being delivered as required to the ROM pad by haul truck. PPM Global have investigated the equipment requirements for the crushing, screening, agglomeration and stacking circuits. ROM ore will then be crushed to a P80 of approximately 25 mm by a multistage crushing and screening plant.

Figure 6 presents the process flow diagram for the crushing, screening and agglomeration components and the leach, along with SX/EW components (schematic is full end to end copper process).

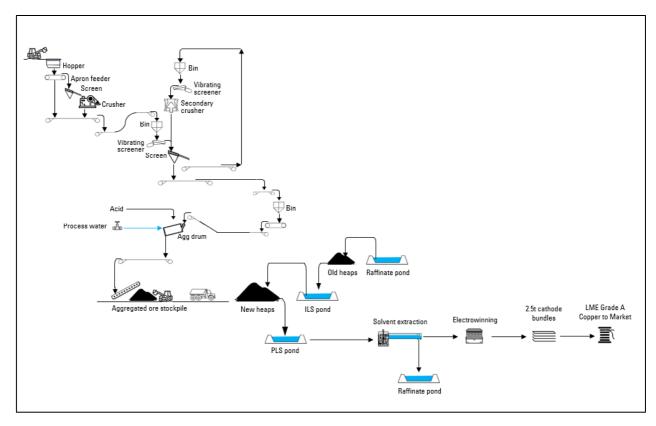


Figure 6: Dianne Processing Flowsheet

## **Heap Leach And SX/EW Plant**

For the process of heap leaching, copper bearing ore would be crushed and stacked on specially prepared and (HDPE) lined pad area with overall dimensions of approximately 300 m length by 240 m width. Heaps will be stacked on the available pad area by truck dumping the material followed by stacking and levelling with an excavator to a height of approximately 5 m.

The process design assumes heap leach activities of oxide and sulphide material in parallel with each pad constructed on a bench-by-bench blend of oxide and sulphide. The blended pad construction allows the progressive inclusion of the higher-grade sulphide on a more dispersed and regular sequence (metal



recovery timing) alleviating retention times and delayed metal recovery. Key metallurgical assumptions include:

- Copper recovery from supergene oxide ores of 85%.
- Copper recovery from supergene sulphide ores of 75%.

Moderate copper recoveries assumptions for transitional and sulphide ore are based on PPM Global's experience with similar ore type performance on current heap leach – SX/EW operations. Leaching of chalcocite ore has been successfully carried out in Australia at operations such as Girilambone in NSW. Chalcocite leaching is also carried out across a number of South American Heap Leach facilities to achieve recoveries in excess of 80% by employing leaching methods such as forced aeration and salt addition to enhance chalcocite leach kinetics and recovery.

Primary sulphide heap leaching has developed significantly over the past 10 – 15 years with both patented leach processes such as BioHeap as well as in-house developments by companies leaching a predominantly primary sulphide ore. Operations such as Wetar in Indonesia have successfully leached, to high recoveries, a predominantly primary sulphide ore by in-house development of specific leaching methodologies such as aeration and solution flow rate control to manage temperature within the heap.

Further studies and subsequent test work will inform the process design and requirement for aeration and / or leach chemistry adjustments to suit the mineralogy of the Dianne deposit.

The simple heap leach operation is constructed to produce LME Grade A Copper Cathode from an on-site solvent extraction and strip circuit and electrowinning (SX/EW) plant.



Figure 7: Diamond drill rig at the Dianne Project



# **PROJECT EXECUTION**

It is estimated that a processing plant can be established within 10 months from the project execution date and following receipt of all required statutory approvals. Figure 8 below outlines an estimated project execution schedule.

DESCRIPTION	М1	M2	М3	M4	M5	М6	М7	M8	М9	M10	M11	M12
PROCESS PLANT AND FACILITIES												
Crushing, Screening and Leach Pad												
Engineering FEED												
Procurement												
Installation												
Commissioning												
Commissioning at full load												
SX-EW Plant												
Engineering FEED												
Procurement												
Installation												
Commissioning												
Commissioning at full load												

Figure 8: Dianne Project Execution Schedule\*

# **NEXT STEPS**

Commencing with the metallurgical and resource studies released in late 2022 and now combining the outcomes of this preliminary process design work, the Company will continue to action more detailed investigations into the near-term production potential at Dianne. Dedicated scopes of work to be actioned in the 2023 exploration season include:

- Additional small amounts of resource in-fill drilling (approximately 800m of infill drilling)
- Laboratory analysis,
- Metallurgical test work for sulphide leaching and follow up oxide leach test work,
- Capital and operating cost estimates for the proposed process plant design,
- Undertake pit optimisation design work on Dianne mineral resource.
- Complete an entire Dianne Mine Scoping Study focusing on the commencement of copper production at Dianne.
- Commence any incremental administrative regulatory approvals required to support any proposed mining recommencement.

<sup>\*</sup>The above timetable is indicative and is subject to change as a result of factors both within and outside the Company's control.



This announcement has been authorised by the Board of Revolver Resources Holdings Limited.

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#### References

The information provided in the announcement refers to the following announcements to the ASX:

<sup>1</sup>Revolver Resources Holdings Ltd. ASX: RRR, ASX Release 12 December 2022, Revolver Reveals Maiden Copper Mineral Resource at Dianne.

<sup>3</sup>Revolver Resources Holdings Ltd. ASX: RRR, ASX Release 5 December 2022, Initial Metallurgical Test Work Completed at Dianne.

<sup>4</sup>Day, A.C., 1976. Summary of the Dianne Project. Mareeba Mining & Exploration P.L.

<sup>5</sup>Queensland Government, 1993. Queensland Mineral Commodity Report – Copper. In Queensland Government Mining Journal, Vol 94 No 1099\* ISSN 0033-6149, June 1993; pp16.

<sup>6</sup>Day, A.C., 1976. Summary of the Dianne Project. Mareeba Mining & Exploration P.L.

<sup>7</sup>Revolver Resources Holdings Ltd. ASX: RRR ASX Release 2 December 2021, Positive Copper Results from Historic Drilling at Dianne.

<sup>8</sup>Sainsbury, J., 2003: Dianne Mine Report, Including Mineralised Resources Estimation. Dianne Mining Corporation Pty Ltd.

<sup>9</sup>Revolver Resources Holdings Ltd. ASX: RRR, ASX Release 21 September 2020, Prospectus.



# COMPETENT PERSONS STATEMENT

## **Competent Persons Statement – Dianne Mineral Resource Estimate And Metallurgy**

This announcement contains references to a Mineral Resource estimate first announced by the Company on 12 December 2022 and metallurgy results dated 5 December 2022. Revolver confirms that it is not aware of any new information or data that materially affects the information included in the relevant market announcements. In the case of Mineral Resource estimates all material assumptions and technical parameters underpinning the Mineral Resource Estimates contained in the relevant market announcement continue to apply and have not materially changed.

#### **Competent Persons Statement – Process Design**

The information in this report that relates to mineral processing and copper production is based on, and fairly represents, information compiled by Michael Cudby, Principal Metallurgist (BSc.). Mr. Cudby is a Managing Director for PPM Global Pty Ltd, an independent mineral processing consulting company. Mr. Cudby has over 28 years' experience as a metallurgist working across a the type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves". Mr. Cudby consents to the inclusion in the report of the matters based on this information in the form and context in which it appears. Mr. Cudby does not hold securities in the Company.

<u>Disclaimer regarding forward looking information:</u> This announcement contains "forward-looking statements". All statements other than those of historical facts included in this announcement are forward looking statements. Where a company expresses or implies an expectation or belief as to future events or results, such expectation or belief is expressed in good faith and believed to have a reasonable basis. However, forward-looking statements are subject to risks, uncertainties and other factors, which could cause actual results to differ materially from future results expressed, projected or implied by such forward-looking statements. Such risks include, but are not limited to, copper and other metals price volatility, currency fluctuations, increased production costs and variances in ore grade or recovery rates from those assumed in mining plans, as well as political and operational risks and governmental regulation and judicial outcomes. Neither company undertakes any obligation to release publicly any revisions to any "forward-looking" statement.

The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements in relation to the exploration results. The Company confirms that the form and context in which the competent persons findings have not been materially modified from the original announcement.



