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## MARKET RELEASE

## 28<sup>th</sup> October 2013

## **ROCKLANDS COPPER PROJECT (CDU 100%)**

## **PICTORIAL 16 - COMPREHENSIVE PROJECT UPDATE**

Process Plant construction is accelerating with significant activity across key areas including;

Ball Mill High Pressure Grinding Rolls Power Station Tailings Thickener Gravity Separator Gravity Jigs De-agglomerator Spirals Tables Cyclones Flotation Cells ROM Slab

Test-work at the Crushing Circuit is now concentrating on calibration and optimisation requirements of the ore sorter, which is currently being assembled in preparation for trial batch processing of first ore.

Whilst the plant is being constructed, the goal is to produce two interim Direct Shipping Ore (DSO) concentrate types, including a very high-grade native copper only concentrate, and a separate native copper dominated multi-species concentrate suitable for DSO, to generate early cash flows.



Figure 1: View of the Rocklands Process Plant site from the east waste dump.

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Figure 2: Process Plant construction from left to right; Crushing Circuit (far background), Flotation Cells (blue), Power Station (white steelwork), Ball Mill, Gravity thickener (blue) and Table foundations (right)...see Figure 7 for location details



Figure 3: Power Station (left) and Ball Mill (right)...see Figure 7 for location details



Figure 4: Ball Mill construction with Cyclones atop (right) and Flotation Cells in far background (left)...see Figure 7 for bcation details





21 - Rainden Pit

Figure 5: General Arrangement plans (and location references.

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## **Key Project Milestones**

## Major Copper Discovery - 2006

Discovery RC drill hole DORC078 skirts the top of Las Minerale intersecting 67m @ 1.08% Cu. The follow-up RC drill hole DORC079 intersected 71m @ 2.38% Cu, confirming a major discovery.

### Resource Drill-out - 2007 to 2011

Over 340,000m of drilling completed at Rocklands, some 305,000m of which used for resource estimation.

#### **Resource Estimate - May 2011**

Independent resource estimate prepared by Mining Associates Pty Ltd.

#### Mine Planning, Pit Optimisation and Mining Schedules

Numerous independent consultants engaged for preliminary studies on all aspects of mining.

#### Purchase of majority of mining fleet during global financial crisis (GFC)

The GFC provides one-off opportunity to purchase the majority of our mining fleet at significant discount to market prices, including dump trucks and large-scale excavators, dozers, graders, etc...

### Mining Leases granted, including Infrastructure Corridor for 30 years

Mining Leases ML90177 & ML90188 granted in November 2011 with No Objections

#### **Environmental Impact Statement and Plan of Operations approved**

CuDeco received Environmental Impact Statement Approval August 2011

#### Compensation agreements with the landowner and the Cloncurry Shire Council

Agreement signed by Landowner, Cloncurry Shire and CuDeco Ltd November 2011

#### Native Title and Heritage agreements in place

Completed and signed off by all relevant parties including State and Federal Authorities in mid 2009

#### Rail-load Facility in Cloncurry - access to national markets secured

Joint memorandum of understanding with Xstrata Copper and Minmetals Group for the joint development of the Company's Multi-user Rail Load-out Facility, significantly reducing CuDeco's up-front development costs.

#### Ship-loading Facility at Port of Townsville - access to international markets secured

Lease signed with Port of Townsville Limited for 1.506 ha of land at the Port of Townsville, allowing for the construction and operation of a bulk materials receipt, storage and export facility. Development Permit received from Queensland Department of Environment and Resource Management (DERM) for Ship-loader and Concentrate Storage Facility at the Port of Townsville - currently under development.

#### Exhaustive metallurgical test-work completed with high metal recoveries achieved

Significant time, effort and expenditure allocated to metallurgy, resulting in high metal recoveries and premium concentrate grades

#### Key off-take agreements in place

60% off-take agreement with Oceanwide

#### Project development plans approved and site activities commence

On schedule

Completed



Progress of Development Activity	Completed
Water Storage Facility (WSF)	
Water Storage Facility capable of holding 980 mega litres and meeting all site water requirements.	_
Morris Creek Diversion (MCD) channel and Diversion Dam	
Completed	
Pit Dewatering	
Bore Holes installed diverting water to two temporary water storage facilities and over flow going to WSF	_
Las Mineral Open-cut, Las Minerale Stage-1 DSO Pit & Rocklands South Extension Pit	
Major strip-backs and preparations have been completed and mining has commenced.	_
Long-Term Ore Stockpiles	
Major drainage and site construction completed, stockpiles on-going	
Waste Dump Drainage Infrastructure	
Major drainage and site construction completed	
Infrastructure Corridor & Haul and Major Access Roads	
Major access roads internal and external to site have been completed	
Tailings Facility (TSF)	
Construction commenced, awaiting approval of upgrade - ongoing	
Mining Offices	
Completed to a level sufficient for current use, upgrade as required	_
Service Workshops	
Completed and in use	-
Explosive Magazine	
Magazine storage facility development	
Mobile Crushing Circuit	
Fully commissioned - waste rock being crushed for infrastructure, test-work on producing DSO ore	_
Office & Accommodation Complex, Housing	
Cloncurry township - 38 cabin Office Complex and accommodation cabins, houses built and owned by CuDeco	•
Engineering, Procurement and Construction contract awarded to Sinosteel	
The contract includes also incudes supply and installation of a 28 Megawatt (MW) "peak load" Cummins Power station.	•



## Progress of Process Plant Construction

## Crushing Circuit (3mtpa)

Commissioning ongoing...

## Ball Mill (5800 diameter x 8300mm long)

Currently being installed

## High Pressure Grinding Rolls (HPGR)

Currently being Installed

## Gravity Jig (alljig ®)

Currently being installed

### **Basic Process Plant Engineering**

Basic engineering for the processing plant

### **Structural Steel**

Majority of structural steel requirements have arrived on site, balance in transit to site for the mineral processing plant. Structural steel supply agreement requires all steel to be prefabricated prior to export to Rocklands, which will reduce the expensive costs associated with the onsite fabrication, cutting and handling.

## Thickeners

Currently being installed

#### **De-agglomerator**

Currently being installed

**Flotation Cells** 

Currently on site and being assembled

### **Tower Mills**

Currently being assembled

### Process Control System

On schedule

#### **Detailed Design Engineering**

On schedule



- Crushing Circuit
- Process Plant construction, ongoing delivery of components, detailed engineering for piping electrical and other minor services, deliveries of structural steelwork
- Morris Creek Diversion Channel is complete with minor finishing touches
- Infrastructure Corridor haul roads and Tailings Storage Facility (TSF)
- Water Storage Facility (WSF) and Dam Walls
- Major Access Roads and other areas
- Site services

## Mining

- Las Minerale Open-cut and & Stage-1 Las Minerale DSO Pit
- Ore and stockpile management
- Resource update, and pit optimisation

## Other Areas of Activity

- Burke Development Road Corella Park Road Intersection Upgrade
- Environment
- Human resources



Figure 6: Aerial view of current work areas of the Rocklands Copper Project, including LM Stage-1 DSO Pit in foreground, water storage facility far left background, and ROM pad and plant site far right background.







Figure 7: Process Plant - schematic location plan with key areas noted





Figure 8: Crushing Circuit during recent commissioning ... see Figure 7 for location details

## Crushing Circuit...see Figure 7 (reference B) for location

The Jaw and Rolls crushers are available to be used for crushing of high-grade ore, with the view to generating two interim Direct Shipping Ore (DSO) native copper dominated concentrate types including;

- very high-grade large coarse native copper only concentrate (anticipated ~70-90% Cu);
- separate multi-species concentrate including mostly smaller coarse native copper, native copper in rock matrix, cuprite and chalcocite (anticipated ~20-25% Cu)

The Company looks forward to generating early cash flows well before the planned commission of the Process Plant, which is expected to be in production before this time next year.



Figure 9: Ore-sorter being assembled at the Process Plant lay-down area, prior to being lifted into a temporary location at the Crushing Circuit where it will initially process native copper dominated ore types.







Figure 10: Example of DSO suitable crushed native copper ore (wet) - sample from large 3 tonne agglomerated mass of native copper, after being processed through the coarse screen (<120mm) stage of the Company's mobile crushing circuit. The sample is estimated to contain 40% Cu from a combination of copper species including native copper (99.65% Cu), cuprite (88.8% Cu), and chalcocite (79.85% Cu) +/- malachite, azurite and minor chalcopyrite.

When the Crushing Circuit is not being used for crushing of DSO ore, additional fine-tuning will include testing optimal choke load performance of the rolls crushers, and efficiency analysis to find the cross-over point where cost-effective blasting methods (ie, drill spacing, charge strength and subsequent blasted rock size) results in maximum, yet optimised and trouble-free crushing performance.

Test-work in the immediate term however will now concentrate on meeting calibration and optimisation requirements of the ore sorter, which has arrived at site and is in the process of being assembled at the crushing circuit, in preparation for trial processing of first ore.

## Process Plant - Delivery of Components, Final Design, Site Preparation and

## Construction...see Figure 5 for location

Construction is underway at the following key areas of the Process Plant;

Ball Mill	De-agglomerator
High Pressure Grinding Rolls	Spirals
Power Station	Tables
Tailings Thickener	Cyclones
Gravity Thickener	Flotation Cells
Gravity Jigs	Screens
Tower Mills	ROM Slab

Construction contractors mobilised to site include Carmichael Builders (Civil), Walz (Structural, Mechanical and Piping), Cummins (Power station) and of course Sinosteel (Engineering and Procurement).

Foundations are ongoing at the alljig® native copper Gravity Jigs, Flotation building, Native Copper





Figure 11: Power Station structural framework being erected...see Figure 7 for location details



Figure 12: Upper platform for HPGR being prepared for lifting...see Figure 7 for location details





Figure 13: Power Station (left) and Ball Mill (right)...see Figure 7 for location details



Figure 14: From left to right; HPGR, Ball Mill, Power Station and Flotation Cells in distant background...see Figure 7 for location details



Figure 15: HPGR upper platform about to be lifted (HPGR structure in background to right)...see Figure 7 for location details





Cleaner, concentrate handling facilities, Spirals and Tables, and are completed for the Tails and Gravity thickeners, Cummins power station, Ball Mill and High Pressure Grinding Rolls (HPGR).

Mechanical installation of the Ball Mill and HPGR is progressing well, the Tails Thickener has been assembled, pre-assembly of Flotation Cells is underway and the Gravity Thickener assembly is ongoing. Significant structural steelwork has been installed at the HPGR and Ball Mill and building framework for the Power Station has commenced.



Figure 16: ...Tailings Thickener in foreground, surrounded by large heavy lift Walz cranes. In background from left to right; Deaglomerator; Ball Mill and; HPGR...see Figure 7 for location details







Figure 17: HPGR feed chute...see Figure 7 for location details





Figure 18: HPGR drive motors..see Figure 7 for location details



Figure 19: Assembly of the Gravity Thickener...see Figure 7 for location details



Figure 20: Assembly of the Gravity Thickener...see Figure 7 for location details





Figure 21: Flotation Cells being assembled...see Figure 7 for location details





Figure 22: Construction of the Power Station...see Figure 7 for location details



Figure 23: Gravity Jig foundations...see Figure 7 for location details







Figure 24: Ball Mill Construction...see Figure 7 for details







Figure 25: ... Gravity Jigs (left) and Flotation Cells (right)...see Figure 7 for location details



Figure 26: De-agglomerator foundations (foreground) and Power Station (background)...see Figure 7 for location details





The ROM loading pad was poured mid October, and after an extended period of curing will shortly be fully operational. An estimated 1.5million tonnes was required to construct the ROM Pad, primarily sourced from waste removed from early mining at the Las Minerale Stage-1 DSO Pit.

Nine cranes are currently being utilised at site including three Walz 250 tonne heavy-lift crawler cranes, four heavy-lift truck cranes and two non-slewing cranes.

Delivery of Plant Componentry continues, with the last of 4 large container ships recently docking at the Port of Townsville and in the process, completing the stage-1 shipping of long-lead items.

At least another 3 large ships are anticipated in the coming months for short-lead items, including deliveries of structural steel, the first of which is expected to arrive at the Port of Townsville this week.

A 20 day trucking programme will transport the material from Townsville to Rocklands, to be overseen by CuDeco representatives who monitor the transfer of all deliveries from China to Rocklands as part of the deliveries audit process.



Figure 28: De-agglomerator foundations (left) and Power Station structural steel being assembled for tilt-up erection (right)...see Figure 7 for location details



## Morris Creek Diversion (MCD) Channel and Dam Wall...see Figure 5 for location

The MCD channel (see Figure 5, ref 05) is now complete and fully capable of diverting wet-season rains away from the pits to design specifications, which includes the capability to divert a 1 in 100,000 years flood event. Final touches include culverts at road crossings and will be completed in the coming weeks.

Associated with the MCD is a Diversion Dam (see Figure 5, ref 06) that has also been completed, and is the final part of the key infrastructure required to divert Morris Creek away from the pits during heavy rains, via more than 4km of diversion channel.

Diversion of Morris Creek has been a major infrastructure project at Rocklands and one of the largest uses of plant and equipment at site to date, with over 1 million tonnes of rock blasted and/or relocated during its construction.

The completion of the Morris Creek diversion activities will free up significant mining assets.







Figure 29: MCD channel and Dam Wall construction...see Figure 7 for location details





## Infrastructure Corridor, Haul Roads and Tailings Storage Facility (TSF)...see

Approval has been granted for changes and improvements to the TSF and associated infrastructure and initial ground works have commenced.

The Rocklands Project TSF is designed for a minimum storage capacity of 30 million tonnes of tailings waste to match the 30 million tonnes of ore (less removed product) scheduled to be processed through the Rocklands Process Plant during the projects current 10 year life-of-mine plan.

The TSF is located on ML90188 (see Figure 5 ref 04)

The Infrastructure Corridor haul roads are primarily completed.

## Water Storage Facility (WSF)...see Figure 5 for location

Construction of the WSF is complete, however recent upgrades include completion of additional clay-lining over more than 40% of its base as an additional water-proofing improvement measure.

Previously the WSF was completed to a stage suitable to withstand heavy rains that were expected during last years wet season (that never eventuated), and apart from ongoing maintenance was completed to design specifications.

As assets became available this year however, advantage was taken of the prolonged dry period and capacity of the Project to meet all interim water requirements from existing dewatering bores, to empty the WSF whilst it was still only partially full, and add additional clay lining over a much larger area then previously, and to also add additional thickness to the water impervious clay layer at the deepest points at base of the facility, which is a significant upgrade from design specifications.

The Company views preventative measures such as this as a prudent exercise in forward planning...its always easier to prevent than it is to fix when it comes to water!

The WSF is capable of storing 980 Mega litres.

## Major Access Roads and Other Facilities...see Figure 5 for location

Construction and maintenance of major access and heavy haulage roads is virtually complete, with supply of all required road-base met by the Company's Mobile Crushing Circuit.

Crushed material is used on the Rocklands road network, from rock types perfect for use in road-base such as dolerite, which are prolific at Rocklands. This has resulted in significant cost savings over material that may otherwise have been sourced off-site.

Flood immunity program is underway with backflow levee's, water management dams and completion of important drainage channels. Armor rock protection is also underway, predominately on water containment and catchment areas, or where there is potential for unwanted water erosion.





Figure 30: (From left to right); Site offices arrive at Rocklands, culvert construction and security gate entry upgrade...see Figure 7 for location details

## Site Services

Site services are a critical part of any mining operation, and cover a broad range of disciplines. In many ways, developing a project the size of Rocklands is not unlike building a small city...and everything that follows relies on the completion of numerous preliminary steps. From basics like water supply (potable and industrial) and ablution requirements, through to power and fuel, communication and IT, roads and traffic management, accommodation, signage, security, lighting...the list goes one.

Current site services activities include;

- Installing pipework and pumping network to take advantage of the wet season rains
- Installing cribs, ablution blocks, offices for satellite work stations including at the TSF
- Upgrading and servicing of submersible pumps (dewatering pumps) and monitoring of water levels
- Installing culverts at MCD road crossings final component of all weather access roads
- Completion of front gate security access, including installation of swipe-card in/out record systems.



Figure 31: Lay-down area for process Plant component deliveries...see Figure 7 for location details







Figure 32: Mining at LM Stage-1 DSO Pit...see Figure 7 for location details

## Las Minerale open-cut and Stage-1 DSO Pit...see Figure 5 (ref 10) for location

Two full-scale mining operations are concurrently underway at Las Minerale (LM), including strip-back of overburden in the LM Open-cut, and mining of waste and high-grade ore (including coarse native copper ore) from the LM Stage-1 DSO Pit.

Until recently overburden from the LM Open-cut had been predominately used for constructing of infrastructure including roads, the ROM pad and WSF areas, but with completion of most of these key areas now complete, overburden is predominately going to the waste dumps.

Ore has been left in-situ at the north-west end of the LM Open-cut (see figures 33 and 35) and is awaiting future removal. Based on significant mining already undertaken the Company is able to accurately calculate mining costs on a per tonne basis to date;

## Current mining costs = **\$1.90** per tonne

This compares extremely favourably with the projected \$3.40 per tonne from pre-development mining studies, as prepared by independent consultants.

The above mining cost includes drill and blast, operators including housing and super, site admin costs, corporate admin costs, geology & survey, fuel, repair and maintenance, insurances, and depreciation and amortisation.

The Company attributes the reduced costs to owning its own mining fleet and on running the mining operations on a 12-hour shift basis, to avoid over-working the trucks and resultant down-time periods. The 12-hour shift also facilitates a night-time repair and maintenance regime that ensures maximum asset availability during daylight hours.



# Mining



Figure 33: North-west end of LM Open-cut, with overburden and waste removed either side of the ore, which remains in-situ ready for future removal....see Figure 7 for location details

The Company has also installed its own explosives and emulsion plants, further reducing costs.

The Company plans to eventually increase the current dump-truck fleet further, to facilitate mining operations on a 12 hour, 5 day week shift, which will produce sufficient feed ore to meet the Process Plant's 24 hour shift requirements.

LM Stage-1 DSO Pit waste is currently being transported to the eastern waste dumps (see Figure 5, ref 20), and rock suitable for crushing is still being sent to the Company's mobile crushing circuit, to be used in concrete, road-base and various earthworks.

Large scale de-watering and pumping continues to reduce ground water levels in the LM pit ahead of planned mining activities. Diversion of water bores to the WSF was temporarily halted during recent upgrades to the base of the WSF, but will shortly re-commence.

Ore encountered in the pit is diverted to the long-term stockpiles.



Figure 34: Mining at LM Stage-1 DSO Pit...see Figure 7 for location details







Figure 35: Aerial view over the LM Open-cut and Stage-1 DSO Pit. Ore blasted and remaining in-situ can be seen in the middle of the pit to the left, and mining is underway at the LM Stage-1 DSO Pit (centre right)...see Figure 7 for location details

## Ore and Stockpile Management

Mining at the LM Stage-1 DSO Pit is currently replicating or improving ore grade averages achieved in the Company's Phase 1 & 2 bulk test work, which included 35 tonnes of PQ diamond drill core drilled across some 350m of strike along Las Minerale with some samples also sourced from Rocklands South. Two separate bulk testing programmes were conducted, collectively averaging around 4% CuEq.

## Oretype and grade classification

Oretype and grade is classified within the mining block model environment, based on careful investigation and interpretation of high-resolution diamond and RC drilling that virtually replicates grade control drilling resolution. Block classifications are determined based on a collective suite of geological and geochemical information that is mathematically populated into each block using ordinary kriging methods.

Data populated into the block model includes different copper species (which assists in recovery profiles), pyrite content (to assist in cobalt & sulphur recovery profiles), gold content, magnetite content, weathering profiles, specific gravity, calcite and sulphur content (used in PAF calculations) and of course the various metals and other elements for which assays results are present.

The block model data is constrained by some 36 domains (nested) that have been defined through exhaustive geological interpretation of more than 305,000 metres of drilling, and interpretation of over 160 individual cross-sections. The current resource block model took 9 months of full-time analysis by a team of independent resource experts, looking at more than 7 years of compiled data.



# Mining



Figure 36: Aerial view over LM Stage-1 DSO Pit, showing different data overlayed from the Mining Block Model, with CuEq distribution (left) and the corresponding oretype distribution for each block (right). Both images are at bench level RL205 (-5m)

The Rocklands Block Model represents the collective input and geological interpretations and investigations, of more than 50 individual geologists and other industry professionals, who have contributed to the creation of a resource model that has been compiled, validated and cross-checked by independent expert resource consultants.

The resource block model is prepared and reported according to the Joint Ore Reserve Committee (JORC) reporting guidelines, and to industry best practices.

## Managing ore in the pit

Mining and excavation cut-offs of ore zones is based on the Rocklands Project Block Model. Whilst all confidence exists in the robust nature of the block model, in-pit monitoring ensures it performs as expected on a bucket by bucket basis, with particular attention paid to copper grades in the coarse native copper areas, on the margins of ore zones, and to ore type classifications.



Figure 37: High-grade chalcocite ore (chalcocite contains 79.85% Cu) from the base of the LM Stage-1 DSO Pit, now sitting on the high-grade-chalcocite stockpiles. This boulder weighs approximately 1 tonne and is estimated at over 30% copper.



Blast-hole drilling is sampled and geologically logged by pit geologists and in areas of particular interest, channels are excavated and mapped, logged and if necessary sampled. Drilling within ore, on the boundaries of ore/waste zones, in low-grade zones within ore boundaries, and/or where mineralisation is identified outside of ore zones, are analysed with field XRF and if required samples are sent for lab analysis.

Finally, an extensive audit is also conducted on each mining bench (flitch by flitch), comparing modelled data to the extensive Rocklands drill-hole database, to identify areas that may need additional attention and/or specific pit-floor investigation. There are also many cases where mineralisation intersected outside of defined ore zones during infill drilling has not been included in the resource block model due to sample selection constraints...these areas are also highlighted for in-pit investigation.

Results from the above combination of checks are collectively compared to the resource block model, and if necessary changes are made and the mining block model is updated.

### Blasting

Prior to blasting, PVC pipe "markers" are inserted into specially located RAB holes and subsequent shifts in their locations due to heave, swell or other forms of displacement from each blast are recorded in the mining model. Once the model is adjusted, ore zone references are marked on the pit floor by the pit surveyors, and further marked out in detail by pit geologists in preparation for mining.

## 12 Long-term Stockpiles

In its simplest form ore at Rocklands is separated into three classifications including oxide, chalcocite and chalcopyrite oretypes. These simple categories are then split into high and low grade versions of each, and further subdivided into native copper bearing ore or not, resulting in the following stockpile categories designed to match optimised process plant performance ranges;

- 1. High-grade oxide
- 2. Low-grade oxide
- 3. High-grade chalcocite
- 4. Low-grade chalcocite
- 5. High-grade chalcopyrite
- 6. Low-grade chalcopyrite

- 7. High-grade oxide +native copper
- 8. Low-grade oxide +native copper
- 9. High-grade chalcocite + native copper
- 10. Low-grade chalcocite +native copper
- 11. High-grade chalcopyrite +native copper
- 12. Low-grade chalcopyrite +native copper

The native copper stockpiles (numbered 7-12) will not exist after the native copper ore has been depleted.



Figure 38: Left image; ground conditions after a low-level blast in the LM Stage-1 DSO Pit (evidence can be seen of the blast holes - field of view ~15x20m) and right; marked up compacted ore zones.



# Mining



Figure 39: Dark ore zones are easily distinguished from waste in the LM Stage-1 DSO Pit

Ore sent to stockpiles is recorded in "batches" that are used to generate the reconciliation model, which is the final record of mined material. This is compared to both the original resource block model and the adjusted mining block model on a regular basis, for comparative analysis and look for possible trends.

Once native copper is removed from a block of ore, it reverts to its secondary ore type...for example, after passing through the gravity jigs, high-grade native-copper-chalcocite ore becomes either high-grade or low -grade chalcocite ore, depending on how much of the block's original grade consisted of native copper species.

## Spotters on the ground

During mining "ore spotters" are assigned to each excavator, to confirm the oretype and grades of each block as it is mined, and if required, changes are noted and recorded in the stockpile reconciliation model.

Zones either side of cut-off boundaries are visually inspected and if necessary, field tested with XRF to confirm the locations of ore/waste boundaries.

A senior experienced geologist is available at all times to advise and makes calls in marginal areas.

### Mining dilution

Mining dilution typically occurs when waste finds its way into ore on the stockpiles. This is common at all mining operations due to the nature of the mining process...so the goal is to minimise it as much as possible.

Whilst most structurally controlled ore/waste zones tend to have hard boundary interfaces, at Rocklands numerous cross-cutting structures result in mineralised "fingers" penetrating the wall rock adjacent to ore zones. Also, the geochemical boundaries of the suite of minerals being recovered through the Rocklands Process Plant do not necessarily align, resulting in "soft" grade boundaries (typically from 2-4m wide), on the margins of ore zones using a copper equivalent cut-off.

The net effect is that dilution is minimal because it occurs with "mineralised waste" only slightly below the cut-offs being used, rather than being diluted with "zero-grade waste". Where hard boundary ore/waste grade interfaces are identified, additional care is taken during the mining process, to limit dilution.

Stockpiles are audited on a regular basis to investigate if the right material is going where it should and truck logs are investigated weekly and compared to the spotters logs for ore and waste movements.



# Mining

### Mining loss

Mining losses are typically caused by ore being mined with waste during the mining process and ending up on the waste dumps, or from ore that is accidently placed on the waste dumps.

Mining losses are expected to be very low at Rocklands, as there are numerous smaller mineralised zones that parallel Las Minerale that have NOT been included in the current resource estimate. These will ultimately add additional ore to inventory and are expected to more than offset any mining losses.

Waste dumps are audited on a regular basis to ensure no ore is ending up in the wrong place and truck logs are investigated weekly and compared to the spotters logs for ore and waste movements.

### Mining rate

The current mining schedule employs a mining rate 1.5 times that required, (ie. 4.5m tonnes of ore per annum is mined instead of 3mt), which facilitates high-grading the front end of the mill feed process. Extensive economic studies show this approach results in a net increase in revenues even after the higher costs of mining, but in doing so also results in the added bonus of leaving "free ore" at surface on the stockpiles for later processing, resulting in significantly reduced mining costs in later years.

In essence, mining is being timed to provide high -grade ore for when the plant becomes fully operational.

Some of the highest grade ores at Las Minerale occur between 50-100 depth, and these are the depths planned to be sitting on the top of the stockpiles by the time they are required.

Accelerated aging studies show negligible loss in recoveries of stockpiled ore for the anticipated timeframes with a simple adjustment of the flotation regime for sulphide ore types, and native copper and oxide ore is not affected by aging for the planned mining periods.

The higher mining rate and stockpiling scenario also provides additional benefits, including maintaining a contingent ore supply at surface,



Figure 40: First stage of mining at Rocklands concentrates on the Las Minerale Stage-1 DSO Pit - stages 1, 4, 9 and 13 are shown above. The LM Stage-1 DSO Pit will eventually finish at RL 95 (50m deeper than shown in the bottom image - period 13), at which point the larger LM Main Pit will commence.





and/or alternative monetisation options such as crushing and simple beneficiation of stockpiled ore to DSO concentrate grades as a separate programme to ore being directly fed into the process plant.

### The accelerated mining schedule indicates copper output will almost double in the initial years.

The current strategy, based on the increased mining rate, is to mine the first 30mt of ore in just over 6 years instead of 10 years. After high-grading the ore-feed to the mill, remaining ore will be stockpiled, resulting in between 9-12mt tonnes of ore sitting on the stockpiles at the end of year 6.

At this point we have several options;

- Decommission the mining fleet, retaining only required plant to shift the remaining "free ore" from the stockpiles to the ROM pad, resulting in significant cost reductions.
- Keep mining past year 6 and continue to high-grade the mill feed as per the first 6 years requires amendment to the EA.
- Increase the process plant capacity to 5 million tonnes per annum or more and subsequently extend mining beyond 10 years based on our measured and indicated resource of 97.9 million tonnes @ 0.96% CuEq (0.4% CuCoAu cut-off see notes to the resource statement from page 36) requires amendment to the EA.

## Resource update, and pit optimisation

Based on an updated resource estimate which is nearing completion, new pit optimisation studies will be generated to investigate benefits from possible changes to pit shapes and subsequent mining schedules.



Figure 41: May 2011 Resource 3D model with orebody names highlighted and current 10-year pit outline shown.





The new study will include Life of Mine (LOM) schedules that include the entire Rocklands Resource, and will focus on splitting future development of the Rocklands Project into several stages:

**Stage 1:** Update current 10-year open-cut mine plan, incorporating any changes that may result from the new resource estimate and subsequent pit-optimisation and mining schedule update.

**Stage 2:** Extend current open-cut mine plan (+/- 30 years) and incorporate options for expanding the mineral process plant capacity from the current 3mtpa throughput. Studies will consider the financial feasibility of upgrades to the process plant ranging from 6-15mtpa throughput, depending on the most profitable scale/cost configuration that results from the optimisation study.

**Stage 3:** Prepare an underground component to long-term mine planning, to be implemented at a time in the future when open-pit economics give way to more attractive underground options.

An expanded mine plan will consider all or part of the following resource statements for Rocklands;

## **Rocklands Resource Estimate May 2011**

(see accompanying notes and details from page 36)

Measured and indicated

**30.3 Mt** @ **1.70% CuEq** 1.14 billion lbs CuEq (515,000 tonnes) using 0.80% CuCoAu cut-off

Measured and indicated

**97.9 Mt @ 0.96% CuEq** 2.08 billion lbs CuEq (944,000 tonnes) using 0.40% CuCoAu cut-off Measured and indicated

**169.2 Mt @ 0.74% CuEq** 2.75 billion lbs CuEq (1,247,000 tonnes)

using 0.20% CuCoAu cut-off

Measured, indicated and inferred

**272.9Mt (2) 0.62% CuEq** 3.70 billion lbs CuEq (1,680,000 tonnes) using 0.20% CuCoAu cut-off

Note; copper equivalent (CuEq) is a **net recovered metal calculation** (ie, recovered grade) based on the copper grade, with expected recoveries of cobalt & pyrite (includes sulphur credit) and gold and magnetite to be processed through the Company's Process Plant, converted to an "equivalent" copper grade for ease of reporting. See Notes to the Resource Estimate (from page 36) for full details of calculation.

## Rocklands South Extension Pit & PAF cell...see Figure 5 for location

Construction of the Rocklands South Extension (RSE) pit to be used as a Potential Acid Forming (PAF) drainage retention pond continues.

Construction of the PAF draining retention pond is located in the RSE orebody, resulting in ore being mined that not only covers costs of its construction and development, but also results in additional income for the project...an example of yet another significant net saving on development costs.

The RSE pit takes advantage of both the scale and orientation of the RSE orebody, which results in a final optimised pit size suitable for use as a drainage pond.

The RSE ore zone includes high quantities of calcite, which is an acid neutralising rock type.



## **Other Areas of Activity**



Figure 42: Upgrade of Corella Park Road and Burke Development Road intersection.

## Burke Development Road - Corella Park Road Intersection Upgrade

Initial groundwork at the Burke Development Road intersection upgrade has commenced.

Streamlining this entry and exit point will improve access for Road Trains coming and going from the Rocklands Group Copper Project and will significantly increase safety at the existing intersection.

When completed it will set the benchmark for future Main Roads upgrades.

## Environment

Environmental Authority (EA) for Plan of Operations for the period September 2013 - November 2014 has been approved for site activities including infrastructure works, mining, construction and commissioning of the Process Plant.

It is a requirement that up-to-date Plan of Operations are submitted and approved on an ongoing basis throughout the mine life.

With receipt of approval of the revised Tailings Storage Facility (TSF) designs, rehabilitation of the original western TSF cell that was previously cleared to be used for TSF Cell-1, has commenced. Rehabilitation activities have also commenced in historic exploration areas across Rocklands that are no longer required for use.

Environmental monitoring is ongoing and includes monitoring of;

- ambient air quality
- surface water
- dust deposition
- stream sediment
- stream sedir
- noise
  - drill and blast (noise and vibration)

- groundwater quality
- soil
- An environmental awareness programme designed to educate all CuDeco employees and contractors is being implemented through the Rocklands site induction program, toolbox talks, information posters and site inspections.

The Company held its second community information night for the year in mid October, with 6 of CuDeco's key personnel in attendance to present and answer community questions. The community nights provide



## **Other Areas of Activity**



Figure 43: From left to right; groundwater monitoring bore and sensing equipment and solar powered dust monitoring system .

the local community with up-to-date and relevant information on the status of the project and provides an avenue for valuable feedback from community members.

The Cultural Heritage Management Plans (CHMP) has also been implemented.

## Human resources

The company's decision NOT to adopt a fly-in fly-out policy in favor of encouraging a residential workforce has proven highly successful and the policy appears to have been embraced not only by our key people, but by the vast majority of staff who collectively have indicated a preparedness to reside in Cloncurry, and to make the most of the opportunities being offered by the Company

### Participation;

Residential = 70% (Cloncurry based) Non residential = 30% (includes Mt Isa, Julia Creek and other staff not based in Cloncurry)

## Demographics;

Diversity = 8% Indigenous Participation = 20%

Importantly, the no fly-in fly-out policy encourages greater local participation, with benefits to the local community at many levels, including the obvious benefits of income being spent within the town, rather than being flown out.

The current workforce at Rocklands totals more than 132 personnel (excluding contractors) an increase of some 30% on just 5 months ago. Early next year personnel on site is expected to peak at 400 or so people, including contractors.

Access to a residential workforce also provides significant benefits to Company, with savings estimated over \$500,000 per month compared to a fly-in fly-out dominated work force, and additional savings that emanate from not having to double-up on alternate personnel in order to remain fully staffed during fly-in fly-out off-roster periods, nor do we have to cover the substantial expense of air mobilization of our entire work force twice a month, as typically occurs in isolated mining operations.

On behalf of the board.

- ends



## **Competent Person Statement**

The information in this report that relates to Exploration Results is based on information compiled by Mr Andrew Day. Mr Day is employed by GeoDay Pty Ltd, an entity engaged, by CuDeco Ltd to provide independent consulting services. Mr Day has a BAppSc (Hons) in geology and he is a Member of the Australasian Institute of Mining and Metallurgy (Member #303598). Mr Day has sufficient experience which is relevant to the style of mineralisation and type of deposits under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2004 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ores Reserves". Mr Day consents to the inclusion in this report of the information in the form and context in which it appears.

The information in this report insofar as it relates to Metallurgical Test Results and Recoveries, is based on information compiled by Mr Peter Hutchison, MRACI Ch Chem, MAusIMM, a full-time executive director of CuDeco Ltd. Mr Hutchison has sufficient experience in hydrometallurgical and metallurgical techniques which are relevant to the results under consideration and to the activity which he is undertaking to qualify as a Competent Person for the purposes of this report. Mr Hutchison consents to the inclusion in this report of the information, in the form and context in which it appears.

#### Rocklands Resource

References to the Rocklands Resource, and/or Rocklands Resource Estimate, have been sourced from the Company's Resource Estimate Report 2011 released via the ASX on the 25 May 2011 which is based on work undertaken by Mr Andrew J. Vigar, who is an employee of Mining Associates Pty and a Fellow of The Australasian Institute of Mining and Metallurgy, and qualifies as a Competent Person as defined in the 2004 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves" (JORC Code). Pursuant to the requirements of ASX Listing Rule 5.6 and clause 8 of the JORC Code, Mr Vigar included with that Report a Written Consent Statement verifying that the Report fairly and accurately reflected the information in the supporting documentation relating to Mineral Resources. A detailed description of the resource estimation methodology is included in the above mentioned Report, completed by Mining Associates Pty. Ltd. and released to ASX on 25th May 2011.

#### Rocklands style mineralisation

Dominated by dilational brecciated shear zones, throughout varying rock types, hosting coarse splashy to massive primary mineralisation, high-grade supergene chalcocite enrichment and bonanza-grade coarse native copper. Structures hosting mineralisation are sub-parallel, east-south-east striking, and dip steeply within metamorphosed volcano-sedimentary rocks of the eastern fold belt of the Mt Isa Inlier. The observed mineralisation, and alteration, exhibit affinities with Iron Oxide-Copper-Gold (IOCG) classification. Polymetallic copper-cobalt-gold mineralisation, and significant magnetite, persists from the surface, through the oxidation profile, and remains open at depth.

#### **Disclaimer and Forward-looking Statements**

This report contains forward-looking statements that are subject to risk factors associated with resources businesses. It is believed that the expectations reflected in these statements are reasonable, but they may be affected by a variety of variables and changes in underlying assumptions which could cause actual results or trends to differ materially, including, but not limited to: price fluctuations, actual demand, currency fluctuations, drilling and production results, reserve estimates, loss of market, industry competition, environmental risks, physical risks, legislative, fiscal and regulatory developments, economic and financial market conditions in various countries and regions, political risks, project delays or advancements, approvals and cost estimates.



## Resource Statement reported according to JORC guidelines

The resources for the Rocklands area at May 2011 have been estimated and are tabulated below at various cut-off grades. The tables need to be read in conjunction with the "Notes to the Resource Estimate" (see following page).

Table 16 Measured Resource Estimate May 2011 at various cut-off grades										
cut-off	Tonnes	Estimated Grade				Copper Equivalent		Contained Metal,		
CuCoAu		Cu	Со	Au	Mag	CuCoAu	CuEq	Cu	CuCoAu	CuEq
%	Mt	%	ppm	ppm	%	%	%	Mlb	Mlb	MIb
0.2	47.2	0.41	353	0.1	2.94	0.89	1.00	425	929	1,037
0.4	34.6	0.54	407	0.11	2.97	1.1	1.20	410	838	918
0.8	13.8	1.10	597	0.19	3.53	1.93	2.06	335	589	628
Table 17 Indicated Resource Estimate May 2011 at various cut-off grades										
cut-off	Tonnes		Estimate	d Grade		Copper E	quivalent	Contained Metal,		
CuCoAu		Cu	Со	Au	Mag	CuCoAu	CuEq	Cu	CuCoAu	CuEq
%	Mt	%	ppm	ppm	%	%	%	Mlb	Mlb	MIb
0.2	121.9	0.19	241	0.08	3.10	0.53	0.64	505	1417	1712
0.4	63.3	0.32	291	0.11	2.74	0.74	0.83	448	1026	1161
0.8	16.4	0.81	367	0.19	1.32	1.36	1.40	293	491	508
Table 18 Total Measured and Indicated Resource Estimate May 2011 at various cut-off grades										
cut-off	Tonnes	Estimated Grade			Copper E	quivalent	Contained Metal,			
CuCoAu		Cu	Со	Au	Mag	CuCoAu	CuEq	Cu	CuCoAu	CuEq
%	Mt	%	ppm	ppm	%	%	%	Mlb	Mlb	MIb
0.2	169.2	0.25	273	0.09	3.05	0.63	0.74	930	2347	2750
0.4	97.9	0.40	332	0.11	2.82	0.86	0.96	858	1864	2080
0.8	30.3	0.94	472	0.19	2.34	1.62	1.70	627	1081	1136
		Table 19 Ir	nferred Res	source Est	timate May	2011 at va	arious cut-	off grades		
cut-off	Tonnes	Estimated Grade			Copper E	quivalent Contained Metal,		tal,		
CuCoAu		Cu	Со	Au	Mag	CuCoAu	CuEq	Cu	CuCoAu	CuEq
%	Mt	%	ppm	ppm	%	%	%	Mlb	Mlb	MIb
0.2	103.7	0.06	167	0.1	2.87	0.32	0.42	134	724	957
0.4	20.6	0.17	269	0.08	2.11	0.55	0.62	78	248	282
0.8	1.1	0.80	281	0.13	1.06	1.22	1.25	19	29	29
Table	e 20 Total I	Measured	Indicated a	and Inferre	d Resourc	e Estimate	e May 2011	at various	s cut-off gr	ades
cut-off	Tonnes	Estimated Grade			Copper Equivalent		Contained Metal,			
CuCoAu		Cu	Со	Au	Mag	CuCoAu	CuEq	Cu	CuCoAu	CuEq
%	Mt	%	ppm	ppm	%	%	%	Mlb	Mlb	MIb
0.2	272.9	0.18	233	0.09	2.98	0.51	0.62	1064	3070	3704
0.4	118.5	0.36	321	0.11	2.70	0.81	0.90	935	2112	2361
0.8	31.4	0.94	465	0.19	2.29	1.61	1.69	646	1109	1165



#### Notes to the Resource Estimate:

- The Rocklands tenements are owned 100% by CuDeco Limited (ASX:CDU).
- The mineral resource estimate is based on all 3,793 drill holes (306,671.2m) including 305 diamond drill holes (69,521.0m) and 1,458 RC drillholes (225,207.5m).
- MA conducted a review of the data and sample collection of the historic drilling.
- MA has reviewed the EAM Procedures and visited site on 4 occasions during the course of the current Drill Programme.
- The geological resource is constrained by domains consisting of 3D models. The mineralised domains were digitised on cross sections defining boundaries for High-grade Cu as >0.5%Cu, Low-grade Cu as >0.1% Cu and Cobalt as >100ppm Co. The domains are nested. There are a total of 36 currently defined domains.
- Drill intercepts within each lode are flagged in a database table and composited for each assay element separately to 2m downhole giving 39,157 informing two metre composites for Cu in the domained areas and 20,780 in the undomained from drillholes.
- A grade cap was applied to informing composites to remove outliers. Cu grades were capped at 23%, Co grades at 5,000ppm, Au grades at 10ppm and Magnetite% at 44%.
- Density was determined on 3,002 samples throughout the ore body using the elimmersion method. Bulk density is related to the
  oxidation state of the rock and extent of mineralisation. The geologists have logged three oxidation states between totally
  oxidised to un-oxidised fresh rock. The oxidation states of each block were defined by wireframes based on sectional
  interpretation. Density was assigned based on the weathering profile and copper and magnetite grades.
- Block model parent block size selection of XYZ 50 x 8x 20m was chosen The estimation block size was varied by resource category down to the sub-block size of 12.5 m (E) by 2 m (N) by 5 m (RL) was used against all wireframes for volumes. The model was screened for topography by block.
- Grade was interpolated into a constrained block model in 3D space by domain using Ordinary Krige estimation with parameters
  based on directional variography by domain. Estimates were validated against informing samples and with nearest neighbour
  and inverse distance squared. The block model was also checked against recent CuDeco Drilling.
- Informing samples were composited to 2 m within domains and 10 m in undomained areas. A minimum of 10 composites for both a maximum of 20 samples for domained and 10 samples for undomained.
- Resources have been classified as Measured, Indicated and Inferred for the domained areas based on the number of informing samples, average distance and the kriging variance for each block. All undomained blocks are classed as Inferred.
- Lower cutoff grade of 0.2% CuCoAu and only blocks above -250m RL were applied to blocks in reporting the resource estimates in a range of cut-off grades. Magnetite has not been included in the cut-off grade as it is not directly related to the mineralisation, but will be produced as a by-product so is included in the final Block Model report and estimates.
- Lower cutoff grade of 0.2% Cu and only blocks above -250m RL were applied to blocks in reporting the resource estimates in a
  range of cut-off grades.
- Copper equivalents have been calculated assuming average metal prices and recoveries. A copper price of USD2/lb and recovery of 95%; a cobalt price of USD26/lb and recovery of 90%; a gold price of USD900/oz and recovery of 75% and a magnetite price of \$US185/t. The CuCoAu for selection of cut-off grades does not include the magnetite, but it is included for calculation of final metal equivalents, as follows. It is the company's opinion that all the elements included in the metal equivalents calculation have a reasonable potential to be recovered.

CuCoAu% = cu\_perc\_krig + co\_ppm\_krig\*0.001232 + au\_ppm\_krig\*0.518238

CuEqu% = cu\_perc\_krig + co\_ppm\_krig\*0.001232 + au\_ppm\_krig\*0.518238 + mag\_perc\*0.035342

It is the company's opinion that all the elements included in the metal equivalents calculation have a reasonable potential to be recovered.

Reported Tonnage and grade figures have been rounded off to the appropriate number of significant figures to reflect the order of
accuracy of an inferred estimate. Minor variations may occur during the addition of rounded numbers.