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# Copper Mines of Tasmania Pty Ltd

## Proposed Exploration Program & Budget Mt Lyell, Queenstown

ML 1M/95  
EL(s) 27/95, 52/94, 5/98, 16/98  
May 1, 2001 to April 30, 2002

Vol 1 of 1  
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HELD BY: Copper Mines of Tasmania Pty Ltd

MANAGER & OPERATOR: Copper Mines of Tasmania Pty Ltd

AUTHOR(s): Ken Morrison & Craig Miller

10<sup>th</sup> April 2001

**PROSPECTS:** Comstock, Cape Horn, Anaconda, North Jukes, Burbury, Glen Lyell

**MAP SHEETS:** 1:100,000: Map 6, Mt Read Volc's Darwin      1:25,000: Gormanston, Owen,

**GEOGRAPHIC COORDS**      Min East: 370,000mE      Max East: 390,000mE  
    Min North: 5,310,000mN      Max North: 5,350,000mN

**COMMODITY(s):** Cu, Au, Pb, Zn

**KEY WORDS:** VHMS Deposits, Diamond Drilling, CSAMT, DHEM

**Distribution:**

- 1 Thalanga Copper Mines Pty Ltd, Exploration Office, Charters Towers
- 2 Copper Mines of Tasmania Pty Ltd, Mt Lyell, Queenstown

MINERAL RESOURCES		
FILE REF:		
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1M/95	See folio 36	
PT 4		
EL 27/95 PT 1		
See folio 95		
EL 52/94 PT 2		
RESUBMIT DATE	See folio 65	
EL 5/98 PT 1		

See folio 69  
EL 16/98 PT 1  
See folio 44

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## EXECUTIVE SUMMARY

Copper Mines of Tasmania holds a large Mine Lease and four Exploration Licences in the Queenstown region over ground considered highly prospective for copper-gold and several other styles of base and precious metal mineralisation.

With the current development strategy at Mt Lyell aiming at a major expansion of mining and milling, the need to establish a Cu-Au resource base in addition to the Prince Lyell and Western Tharsis ore bodies is critical. This resource base must be continuously replenished by on-going exploration, well ahead of mine development. Generation of drill targets by surface exploration and the drill testing of those targets must become an integral part of the business plan at Mt Lyell if the mine production goals are to be sustained.

A recent review of the exploration potential of the Mt Lyell Mine Lease confirms there is excellent potential to increase the resource base of large tonnage-low grade Prince Lyell style Cu-Au mineralisation. The first stage in the exploration process can immediately be achieved by drill testing deep extensions to known ore bodies at Prince Lyell, Western Tharsis and Cape Horn. Likewise, a drill hole at Comstock should result in discovery of additional moderate tonnage-high grade North Lyell style Cu-Au resources.

Quality exploration targets have also been identified at; Queen Lyell, Anaconda, and Glen Lyell-South Lyell. Work programs for each prospect are set out in the report and a budget of **\$872,000** is recommended to advance all these targets to the next decision point.

The Mine Lease budget includes provision for innovative, new technology geophysical and geochemical screening techniques, which should locate the next generation of sub surface exploration targets. CSAMT has proven to be by far the most successful geophysical tool to date for detecting Cu-Au ore at Mt Lyell and a program to infill the CSAMT grid commenced by GMA in 1997 is strongly recommended. Similarly, an opportunity exists for CMT to take advantage, via collaborative funding with the Federal Government, of a 3 year PhD study currently proposed to investigate the zonation of trace elements and oxygen and sulphur isotopes across the Mt Lyell mineral field and alteration system. Such a study has the potential to target and model sub-surface locations of undiscovered ore bodies and to discriminate between sites prospective for Prince Lyell or North Lyell styles of ore mineralogy.

The four CMT Exploration Licences have until now been covered by a two year Ministerial Exemption from expenditure commitments, which expired on the 30<sup>th</sup> of March 2001. To retain these properties in good standing CMT needs to recommence exploration immediately. These properties have high potential to contribute to the Mt Lyell resource base in the medium term.

A thorough review of existing data and the results of the previous GMA regional exploration program has produced a strategy for CMT to maximise the chances of cost effectively discovering Cu -Au and copper ore bodies having both favourable metallurgy and location with respect to existing road infrastructure for mining and transport to the Queenstown operation. The following recommendations are made for the four exploration licences.

- EL 27/95 Yolande River - Negotiate a JV with Goldfields Exploration as soon as possible, for the total licence area, requiring a free carry and no further expenditure by CMT.

- EL 52/94 Linda - Explore the Burbury, Gormanston, King Lyell and Chamounix prospects by spending \$130,000 to reach the pre drill decision point on the four prospects, then evaluate the outcome.
- EL 5/98 Queenstown - Explore the North Jukes prospect by spending \$95,000 including one drill hole to reach the next decision point. Explore the North Huxley trend with a CSAMT survey by spending \$105,000, then review. Relinquish 40 km<sup>2</sup> of ground considered non-prospective, in the southwest corner of the licence. This will reduce future expenditure commitments by 42%.
- EL 16/98 Mt Darwin – Explore the eastern margin of Mt Darwin for the conceptual target of Mt Lyell style ore bodies located in the hangingwall of a major north-south fault hidden below cover rocks. \$55,000 will take this project to the next decision point.

The best prospects for discovering copper sulphide ore metallurgically similar to current production are; North Jukes, Gormanston and Burbury. Ore grades are known in the old Jukes workings and an excellent drill target based on coincident potassic-magnetite-barite alteration and a chargeability anomaly remain untested immediately north of the workings. At Gormanston, strong silica mica pyrite alteration intersected in three previous drill holes appears to be the edge of a larger system which may continue to the South Lyell prospect inside the Mine Lease. Burbury is a new prospect discovery. Its surface expression includes copper- gold mineralisation and it meets the stratigraphic and possibly the structural criteria for a high-ranking prospect. Further geology, geophysics and geochemistry are needed to determine whether a convincing drill target exists at Burbury. Real potential exists to discover additional Cu-Au deposits along the North Huxley trend.

East Mt Darwin is considered the best opportunity in the Queenstown region for a greenfields Mt Lyell style discovery because the target is completely hidden at the surface by younger rocks.

There is high potential to drill out a substantial resource of ore grade copper in the copper clays deposits. The major uncertainty on this prospect is the economic and environmental viability of a stand alone copper clays mining and milling operation.

A budget of **\$385,000** is required to achieve the recommendations for the Exploration Licences.

The total Mine Lease plus Exploration Licences budget proposal is: **\$1.26M.**

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## INTRODUCTION

Copper Mines of Tasmania (CMT) holds a large Mine Lease (ML) and four Exploration Licences (ELs) in the Queenstown region (Figure 1), over ground considered highly prospective for several styles of mineralisation:

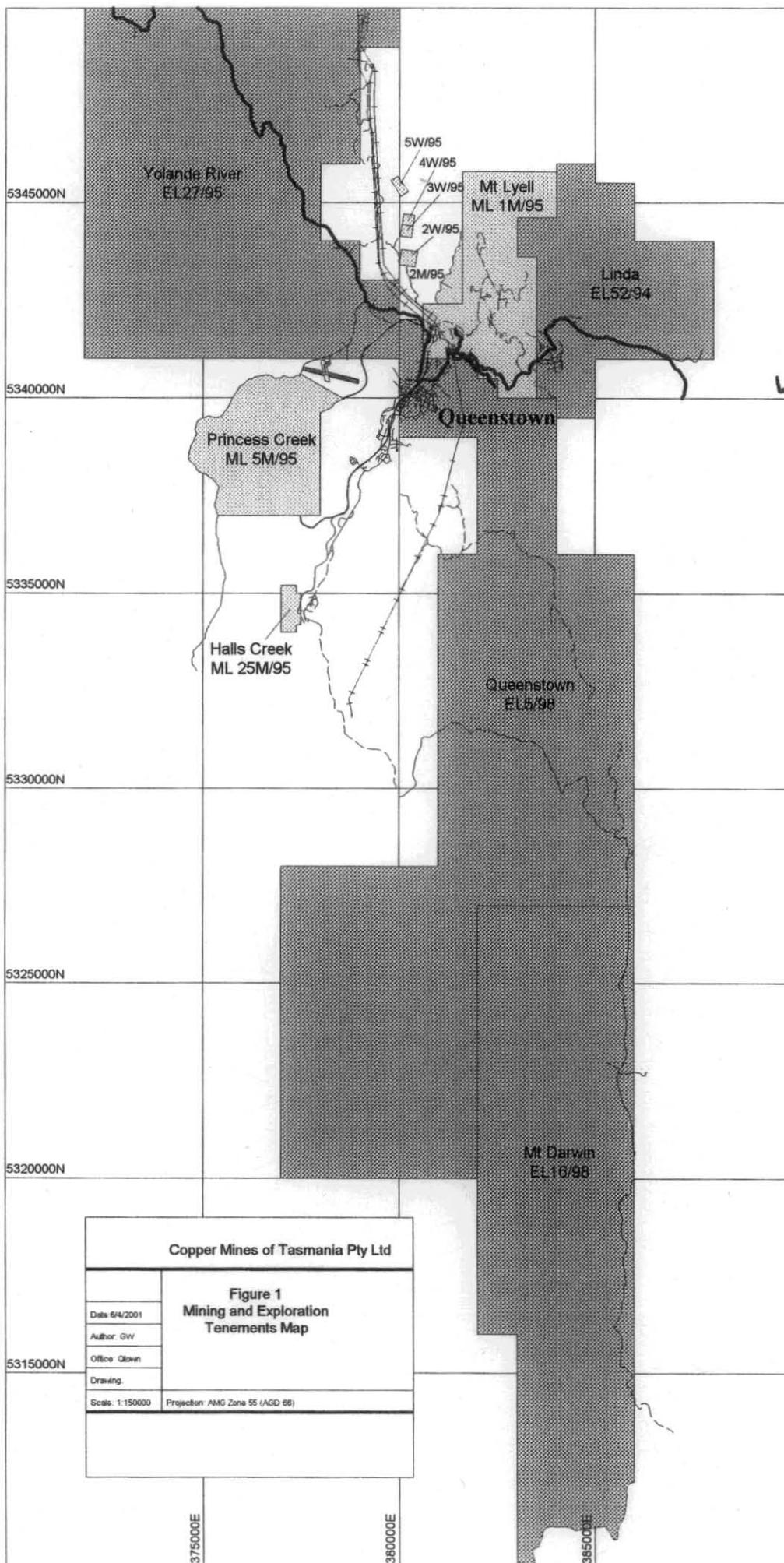
1. Prince Lyell style – large tonnage low grade disseminated chalcopyrite-pyrite Cu-Au.
2. North Lyell style – moderate tonnage high grade disseminated bornite-chalcopyrite Cu-Au.
3. Supergene native copper - moderate tonnage moderate grade native copper in limonitic clays.
4. Henty style – moderate tonnage high grade volcanic hosted gold.
5. Rosebery style – large tonnage high grade VHMS Pb-Zn-Ag-Au.
6. MVT/Irish style – moderate tonnage moderate grade carbonate hosted Pb-Zn-Ag.

With the current development strategy at Mt Lyell aiming at a major expansion of mining and milling, the need to establish a Cu-Au resource base in addition to the Prince Lyell and Western Tharsis ore bodies is critical. This resource base must be continuously replenished by on going exploration, well ahead of mine development. Generation of drill targets by surface exploration and the drill testing of those targets must become an integral part of the business plan at Mt Lyell if the mine production goals are to be sustained.

In order to prepare a detailed exploration program, CMT geologists (Ken Morrison & Craig Miller) have reviewed and re-compiled the exploration data set, utilising the substantial on site archive library and the knowledge base of exploration geologists previously involved in the Gold Mines of Australia (GMA) exploration effort at Mt Lyell. The specific aims of this work were:

- A complete and detailed review of historic exploration.
- Identification and retrieval of missing exploration data.
- Compilation of all available digital exploration data into a coherent GIS database.
- Identification and ranking of exploration targets on the Mine Lease and ELs.
- Proposals for detailed Mine Lease and EL exploration programs and budgets.

This document is presented as a two-part report that analyses the exploration potential of the Mine Lease and Exploration Licences respectively and sets out work programs to most effectively test that potential.



5 cm

## **PART A: NEW RESOURCE POTENTIAL ON MINING LEASE 1M/95 AND RECOMMENDED WORK PROGRAM**

Of the six styles listed above, the Prince Lyell and North Lyell styles of Cu-Au mineralisation should be the principal targets of the CMT exploration program on 1M/95. The location and geological setting of the main prospects is shown on Figure 2 and their exploration potential is described below. The geology on Figure 2 is currently being updated from a new compilation of the Mt Lyell mineral field geology, recently completed by Corbett (2000).

Most of the currently recognised prospects are remaining resources or projected deeper extensions of previously mined ore bodies. However, there is significant potential to discover new sub-surface ore bodies on the Mt Lyell Mine Lease, by utilising modern geochemical research methods combined with the highly successful Controlled Source Audio Magneto Tellurics (CSAMT) geophysical method, which GMA had commenced using prior to their demise in 1998.

### **1. PRINCE LYELL STYLE – LARGE TONNAGE LOW GRADE CU-AU**

The potential for the definition of additional tonnages of this style of mineralisation is considered very high because the Prince Lyell, Western Tharsis and Cape Horn ore bodies are all open at depth with strong indications that mineralisation will continue below currently tested RLs.

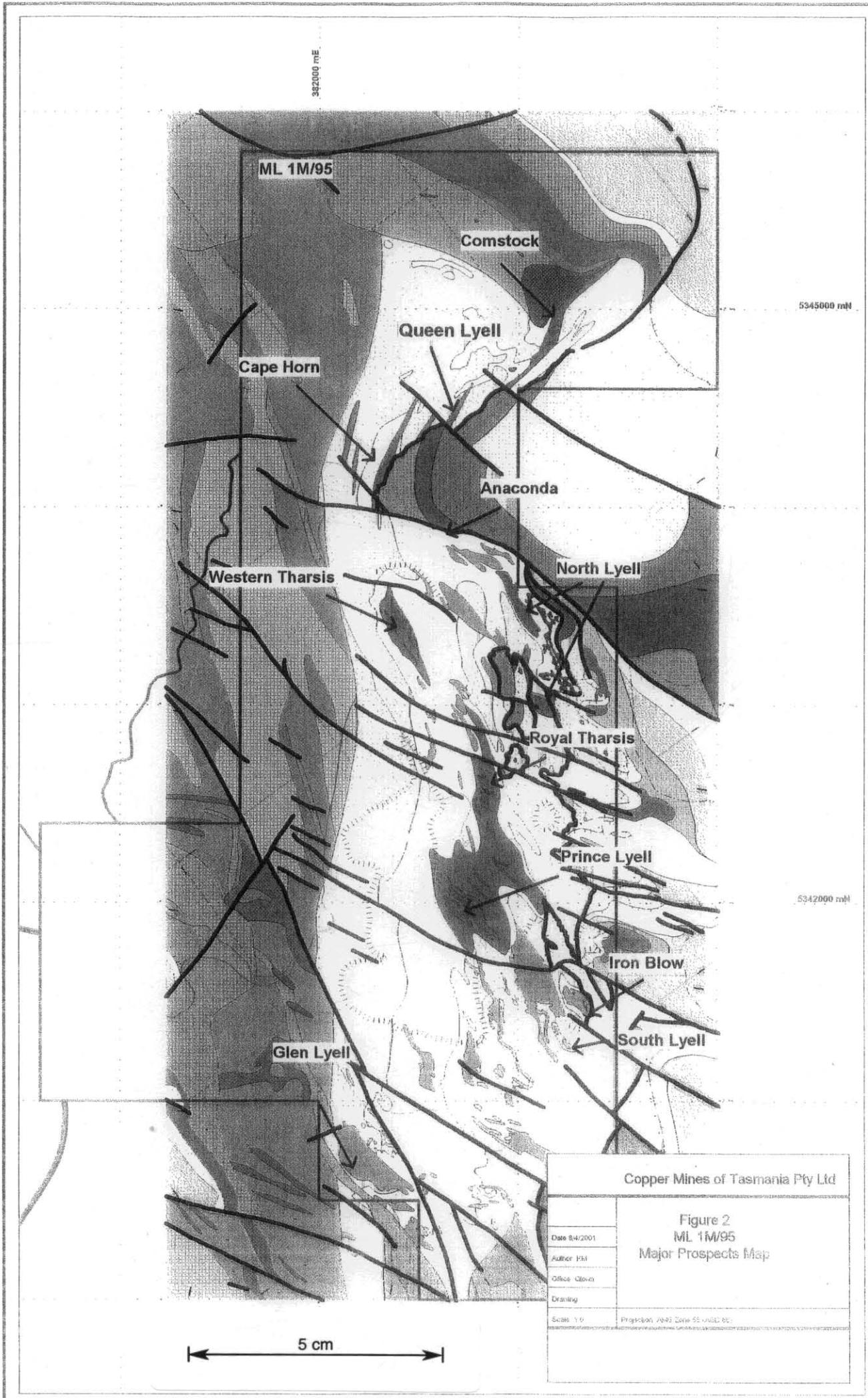
#### ***Prince Lyell Deeps***

Deep drilling of the Prince Lyell orebody was undertaken by GMA in the 1990's. The four holes completed were drilled to test the depth extension of the mineralisation between 1400 RL and 1100 RL. Results show that mineralisation persists at least down to the 1100 RL and remains open below this RL. The mineralisation is not truncated by the Great Lyell Fault as previously anticipated. A best result of 220 m @ 1.49% Cu was returned from drill hole 98PLD0122 at the 1300 RL. Extensive exploration infill drilling is required between the 1400 –1100 RLs. This work is not recommended until some understanding of depth extension (of the current orebody) vs economics has been studied. Deep drilling of the depth extension of Prince Lyell would be conducted from underground and would normally be undertaken by the CMT mining department.

#### ***Western Tharsis***

Western Tharsis has an indicated and inferred resource of 11.77 Mt @ 1.26% Cu between the 2300 and 1500 RLs. In general the orebody has a horizontal thickness of 30-60 metres, which is somewhat thinner than Prince Lyell. The levels between 1800 –1520 RL have the best grade and tonnage. CMT is currently evaluating Western Tharsis as a second source of ore for the Mt Lyell milling operation. The portion of the orebody between 1800-1500 RL will require additional infill drilling.

Western Tharsis has been drill tested to the 1500 RL. The deepest hole (95WTD090) returned an intercept of 44 m @ 1.22% Cu. The deposit is currently open at depth below 1500 RL, with good potential for continuation of mineralisation at depth. Deep exploration drilling is required to increase the tonnage of Western Tharsis. Again this work is not recommended until some understanding of depth extension (of the current orebody) vs economics has been



342000 mE

ML 1M/95

Comstock

5345000 mN

Queen Lyell

Cape Horn

Anaconda

Western Tharsis

North Lyell

Royal Tharsis

Prince Lyell

5342000 mN

Iron Blow

Glen Lyell

South Lyell

Copper Mines of Tasmania Pty Ltd

Figure 2  
ML 1M/95  
Major Prospects Map

Date 8/4/2001

Author PSL

Office GLO/CH

Drawing

Scale 1:0

Projection: WGS 1984 Zone 55 UTM ED 80

5 cm

studied. Deep drilling of the depth extension of Western Tharsis would be conducted from underground and would normally be undertaken by the CMT mining department.

### *Anaconda*

The Anaconda prospect is the belt of highly pyrite-silica-sericite altered Lyell Schist adjacent to the North Lyell Fault, between Cape Horn and Crown Lyell 3 in the North Lyell group of deposits. It is adjacent to the northeast of, and in structural conformity with, Western Tharsis (Figures 2 & 3).

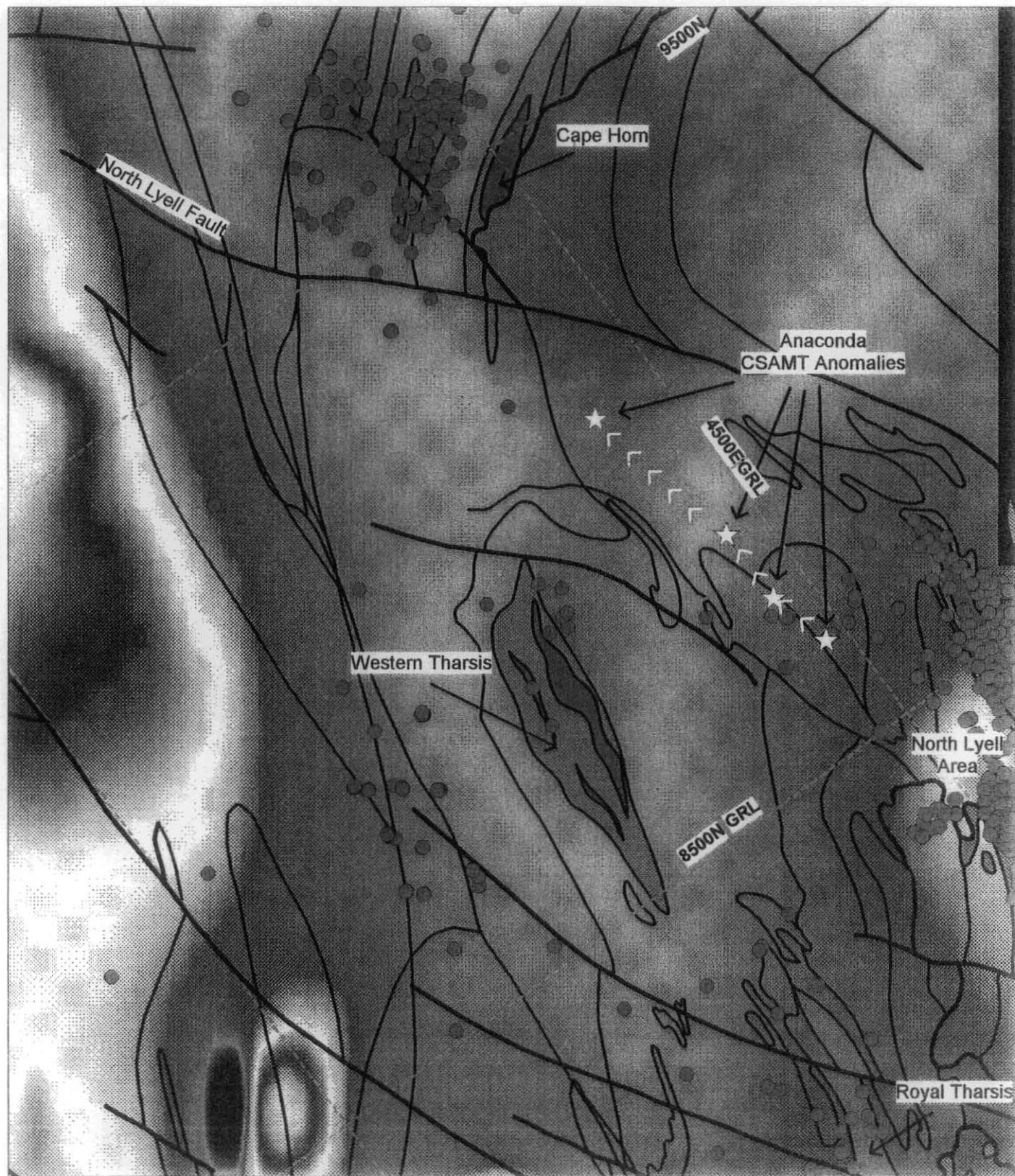
The geological setting and exploration history of the area was reviewed by Corbett (1997, T1997-061). Anaconda has never been mined for continuous ore production. A 195 metre exploration tunnel was developed in mineralised schists, from Anaconda to the North Lyell Fault, circa 1899. The portal is now collapsed and covered with scree and waste but 1935-36 sampling of the Anaconda Tunnel reported an average grade of 0.15% Cu. Several historic electrical and EM surveys and at least six deep drill holes, down to 00 RL, have been completed since 1934. Although widespread low grade copper has been intersected, with patchy occurrences up to 1% Cu, the drilling has been essentially poorly targeted due to a lack of convincing geophysical targets prior to the recent application of grid based CSAMT. There remains sufficient space within the mapped zone of intense alteration to host a substantial untested ore body.

### *Recommended Work Program*

In 1998 a GMA CSAMT survey generated a strong apparent resistivity low on line 9100N, located between 2400 RL and 2000 RL and coinciding with a shallow conductor interpreted on earlier EM and IP surveys. A 300 metre drill hole is proposed to test this feature on section 9100N (Figure 4). The target anomaly is untested for at least a strike length of 250 metres. A further Anaconda anomaly may warrant drilling on section 8750N though a compilation of all geophysics, including a CSAMT strike section from 8600N to 9200N, needs to be first completed to confirm or downgrade this target.

### *Direct Costs:*

Item	\$ AUS
1 x 300 metre DDH on 9100N target (including site prep, assays, geologist, field assistant)	\$45k
Geophysical compilation and sections (review infill CSAMT + historic geophysics)	\$10k
1 x 300 metre DDH on 8750N target	\$45k
<b>Total</b>	<b>\$100k</b>



5 cm

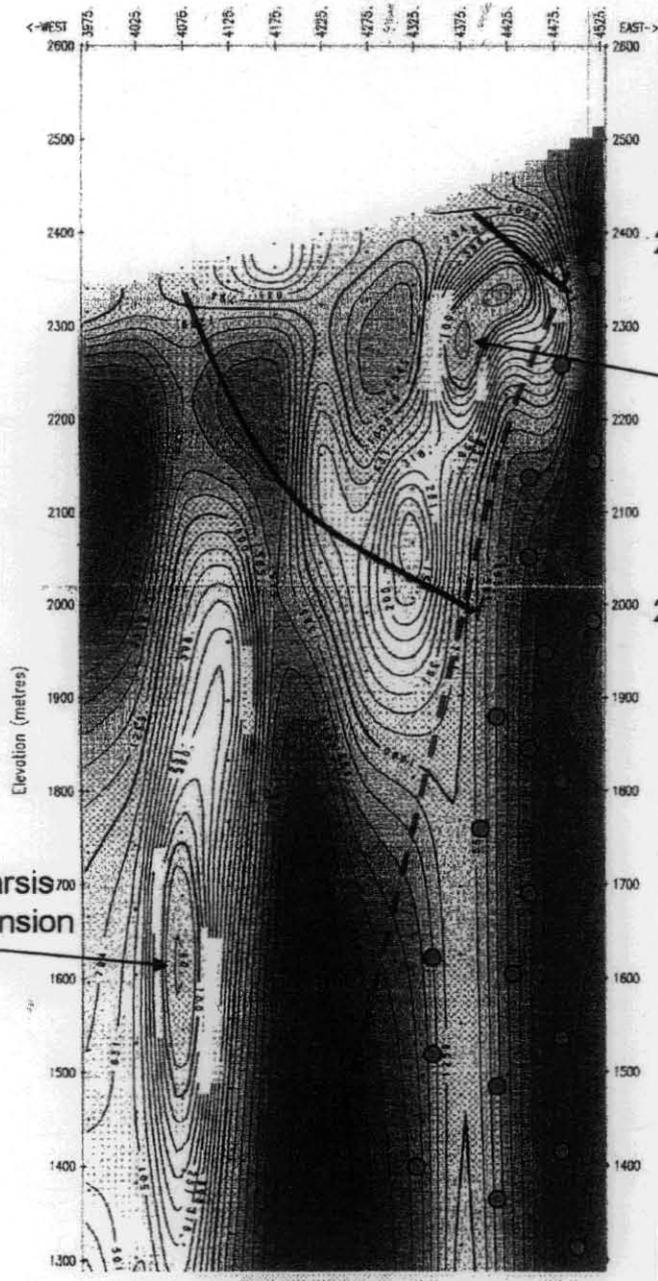
Copper Mines of Tasmania Pty Ltd	
Figure 3 Anaconda Prospect Map	
Date 04/2001	
Author PH	
Office Olova	
Drawing	
Scale 1:10	Projection UTM-East-False



# Mine Lease Exploration

## CSAMT\* GEOPHYSICAL SURVEY

**DATA ACQUISITION/PROCESSING**  
Contractor: Zonge Engineering  
Date: Senior CSAMT  
Zonge Field Job: 573  
Method: E-polyanuclear  
E-field Orientation: Grid East  
Transmitter Length: 1300 m  
Transmitter Orientation: Grid East  
Transmitter Location: 2200E, 18337N  
Receiver Length: 50m  
Receiver Spacing: 50m  
Local Grid Coordinates: 2200E, 8800N  
MAG Coordinates: 382100mE, 5340442mN  
Grid Bearing: 326  
Processing: Standard Zonge  
Date: Not strictly corrected  
Method: 1D Simultaneous Model Iteration - v122f



Western Tharsis  
Northern Extension

CSAMT target

5 cm

• 9100N Anaconda

Figure 4

### *Cape Horn*

This deposit is located in the northern portion of Mt Lyell Mine Lease. Cape Horn is a pyrite-chalcopyrite disseminated sulphide deposit similar to Prince Lyell. Historic production from Cape Horn amounts to 4.01 Mt @ 1.43% Cu, 0.42 ppm Au. The deposit is open below the 2000 RL with strong indications the mineralisation continues at depth. Drill testing of the depth extension of the Cape Horn orebody and surface exploration for a possible northerly extension to the mineralisation was proposed by GMA (refer Will Godsall CMT memo 18 April 1998), though not undertaken.

### *Recommended Work Program*

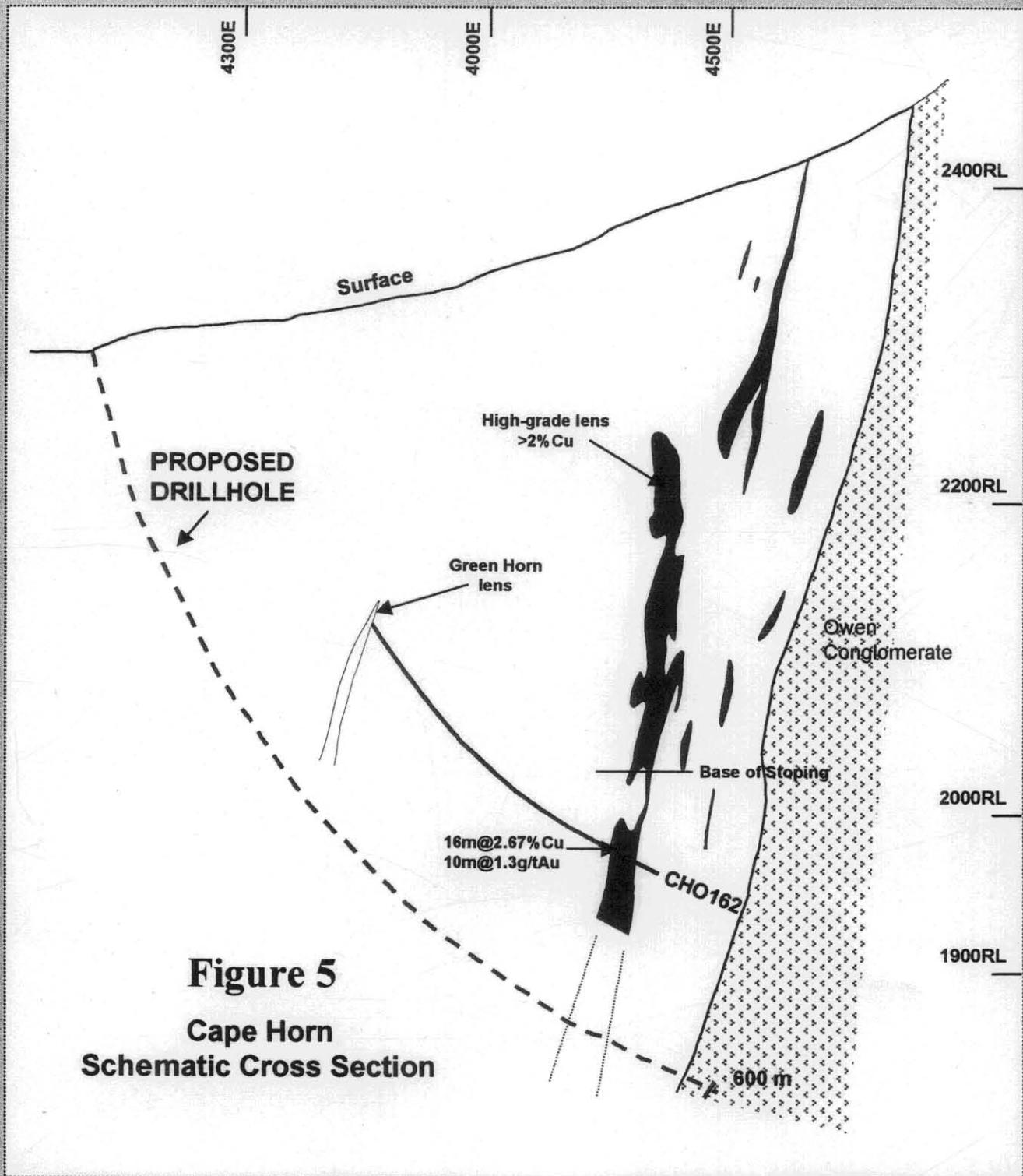
The GMA drilling proposal certainly has merit and Cape Horn is considered one of the outstanding ready to drill targets on the mine lease. A 650 metre easterly directed hole would effectively test the plunge extension of the main high grade core of Cape Horn and also test the structurally conformable Green Horn lens at a shallower depth, in the stratigraphic footwall (Figure 5).

The hole is proposed to test three targets:

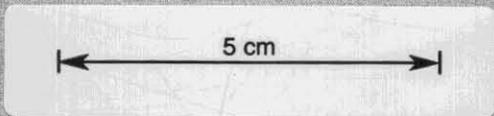
- To test below an intercept of 16m @ 2.67% Cu (including 10m @ 1.3 ppm Au) returned from historic hole CH0162. Target depth is 500 metres down hole at the 1880 RL.
- CH0162 was terminated in altered volcanics with weakly disseminated chalcopyrite. It is interpreted to stop short of testing the 'Hanging Wall Lens' that is developed at higher RLs at the base of the Tyndall Group. The proposed hole will also test this stratigraphic position.
- The proposed diamond drill hole will also test the depth extension of the Green Horn stratigraphic footwall lens. This mineralisation is weak-moderately developed in CH0084 at the 2040 RL and may increase in tenor and thickness with depth. The proposed hole will test this target at 300 metres down hole at the 1940 RL.

### *Direct Cost:*

Item	Rate	\$ AUS
RC Precollar 50m	\$40/m	2,000
Diamond Core 600m	\$110/m	66,000
Core Trays 100	\$15ea	1,500
Field Assistant 20 days	\$250/day	5,000
Senior Geologist 20 days	\$450/day	9,000
Assays 150 (Cu, Au)	\$15/ea	2,250
Sample Bags 200	\$0.5ea	100
Site Preparation	\$1000	1000
PVC Casing Class 12, 650m	\$20 per 6m length	2,170
DHEM	\$3600 per survey	3,600
	<b>Total</b>	<b>\$92,620</b>



**Figure 5**  
**Cape Horn**  
**Schematic Cross Section**



\*\*CMT management has already approved drill hole proposals for Cape Horn and Comstock and a CER has been issued. Consequently, more detailed costings are available for these two budget items. General experience in drilling around the Queenstown area is that drilling costs should be budgeted at approximately \$150 per metre which includes; mobilisation, site preparation, drilling, work time, geology, consumables, assaying and DHEM.

### **Royal Tharsis**

The Royal Tharsis orebody is located at the northern end of the West Lyell open pit (Figure 2). Open pit and underground mining between 1901 and 1991 targeted the higher-grade mineralisation, with historic production of 2,02 Mt @ 1.53% Cu and 0.47 ppm Au (refer Paul Harbon CMT memo 29 October 1998, including references). Grade control and reconciliation were plagued by 30% dilution from hanging wall failure. An area of lower grade, poorly defined mineralisation known as North Tharsis, exists immediately north of the Royal Tharsis area.

The remaining Royal Tharsis resource is estimated to be in the order of 19 Mt @ 0.71% Cu (Wills 1996). A portion of this deposit may have potential to be developed as an open pit. Drilling into the North Tharsis area (northern extension of Royal Tharsis) may be required to follow up mineralisation previously intersected by GMA drilling as part of the West Lyell Super Pit concept evaluation (refer Godsall et al, 1997, T1997-024). Additional mineralisation at North Tharsis could have a positive impact on the economics of a Royal Tharsis pit.

A preliminary pit optimisation study has been recommended for the Royal Tharsis area. This work is in progress and is currently being managed by the CMT mining department.

### ***Queen Lyell***

The Queen Lyell prospect is located midway along the Comstock - Cape Horn trend (Figure 2), in the area of fault displacement of the Great Lyell Fault (GLF). The prospect has sparse drill hole coverage but encouraging indications of Prince Lyell/Western Tharsis styles of mineralisation (refer Godsall and Quayle, 1998, T1998-024). Hole QL0018 returned 22.9 m (horizontal width) @ 0.91% Cu from the 2300 RL and significant potential exists for follow up drilling down dip of this intercept. Dufty and McKeown (in Dufty et al., 1991, T1991-004) predicted a 'potential resource of 2 Mt @ 0.9% Cu' in the Queen Lyell area.

Historic prospect workings include a tunnel developed to test the Lyell Schist-Owen contact (Queen Lyell Tunnel) but the main phase of past exploration comprised 22 drill holes on EM and IP anomalies during 1968-69. All intersected some alteration and mineralisation, establishing a general pattern of a discontinuous copper sulphide zone close to the GLF/Owen contact position, and another zone of mineralisation approximately 50 metres into the structural hangingwall.

*Recommended Work Program*

Two CSAMT lines from the GMA 1997 survey (5100E and 5400E) produced anomalies that warrant drill testing. In a 1998 GMA review of exploration targets along the Cape Horn – Comstock trend (refer Will Godsall CMT memo 18 April 1998) 3 x 300 metre diamond drill holes were tentatively proposed to test CSAMT anomalies but it was recommended that drilling be held back until a program of mapping (including establishing the location of the historic adits and the main tunnel) and sampling is undertaken, so that the prospect geology can be better defined. The current study also recommends infill CSAMT lines to supplement existing data in the Queen Lyell area (Figure 6). Assuming that the results of the mapping, CSAMT and data compilation were positive, the following program should proceed.

*Direct Costs:*

Item	\$ AUS
Mapping, GPS surveying, rock chip sampling and data compilation to produce a prospect status report	\$10k
Infill CSAMT and interpretation (cost covered by total mine lease infill survey outlined below)	
Drill 3 x DDHs (total 1200 metres)	\$180k
<b>Total</b>	<b>\$190k</b>

*Glen Lyell and South Lyell*

The Glen Lyell and South Lyell areas are large pyrite-sericite-silica alteration systems located in the southern sector of the mine lease (Figure 2) and they are particularly prospective for Prince Lyell style mineralisation. The Glen Lyell prospect is characterised by locally intense pyrite development (examples are well exposed in the Lyell Highway road cuttings on the Queenstown side of Gormanston) but to date no strong copper intersections have been encountered.

Generally drill coverage is sparse. The most recent drilling comprised two deep holes (GL 13 and GL 14, total 1,849 metres) completed by RGC Exploration in 1991-92, subsequent DHEM generated EM anomalies indicating possible off hole conductors (Deakin, 1991, T1991-036). No copper mineralisation was intersected in these holes (Halley, 1992, T1992-001) although GL014 has two down-hole EM anomalies at 370 and 700 metres. The prospect warrants further geophysical evaluation and may require follow-up drilling to test the off hole conductors.

The GL 14 drill trace is almost parallel to CSAMT line 6600N and given that infill CSAMT is required to better define the anomaly on line 6850N, the next logical step in following up the GL 14 DHEM anomalies is the infill CSAMT survey shown on Figure 6.

At South Lyell 324,000 tonnes of pyrite were mined from two lenses between 1899 and 1922 and used as smelter flux for North Lyell ore at Crotty. The pyrite grade is reported as 0.4% Cu and a surprisingly high 1.1 ppm Au (Bird, 1984, T1984-008). If this gold grade is correct and representative of South Lyell pyrite, then gold will have a major role in the any future economics of the prospect. Bird makes the analogy with the Iron Blow ore body to speculate that the gold and silver grades in the deeper unmined parts of the South Lyell lenses may increase as mineralisation approaches the Owen contact/Great Lyell Fault. In support of this premise, gold grades up to 5-8 ppm are quoted from near the junction of the Proprietary and Owen Spur Splay faults (refer Fig 1 in Bird, 1984, T1984-008).

CSAMT Line 6,600N produced a strong apparent resistivity low over the centre of the South Lyell massive pyrite body. The anomaly is centred at 2150 RL and is coincident with the base of the massive pyrite shown on sections by Bird (1984). The data suggests there is little or no depth potential below the base of the historic South Lyell workings at 2173RL.

#### *Recommended Work Program*

Figure 6 shows the proposed infill CSAMT lines between existing lines 6250N and 6600N. These new lines will give adequate coverage to generate any worthwhile conductivity drill targets on the prospect. The cost for this work is covered by the total mine lease infill survey outlined below.

Follow-up drill testing of the Glen Lyell off hole EM anomalies is recommended and two 800 metre diamond holes are proposed. Targeting of these drill holes will be assisted by the results of the infill CSAMT survey.

It is also recommended that a small program of outcrop rock chip sampling, supplemented with fillet sampling of existing drill core, be conducted on the Glen Lyell – South Lyell area to assess the potential for a gold ± copper play at the southern edge of the Mt Lyell mineral field. This program would also have implications for future exploration in the northern part of EL 5/98 (Queenstown).

#### *Direct Costs:*

Item	\$ AUS
Mapping, GPS surveying, rock chip and core sampling and data compilation to produce a prospect status report	\$10k
Infill CSAMT and interpretation (cost covered by total mine lease infill survey outlined below)	
Drill 2 x DDHs (total 1600 metres)	\$240k
<b>Total</b>	<b>\$250k</b>

## 2. NORTH LYELL STYLE - MODERATE TONNAGE HIGH GRADE CU-AU.

Exploration targeted specifically for smaller tonnage high grade deposits will be difficult and ultimately has higher risk than searching for Prince Lyell style mineralisation. Nevertheless it is clear that CMT would benefit significantly from a high-grade supplementary feed source and North Lyell style targets should be pursued. Potential high-grade targets/prospects are as follows:

### *Comstock*

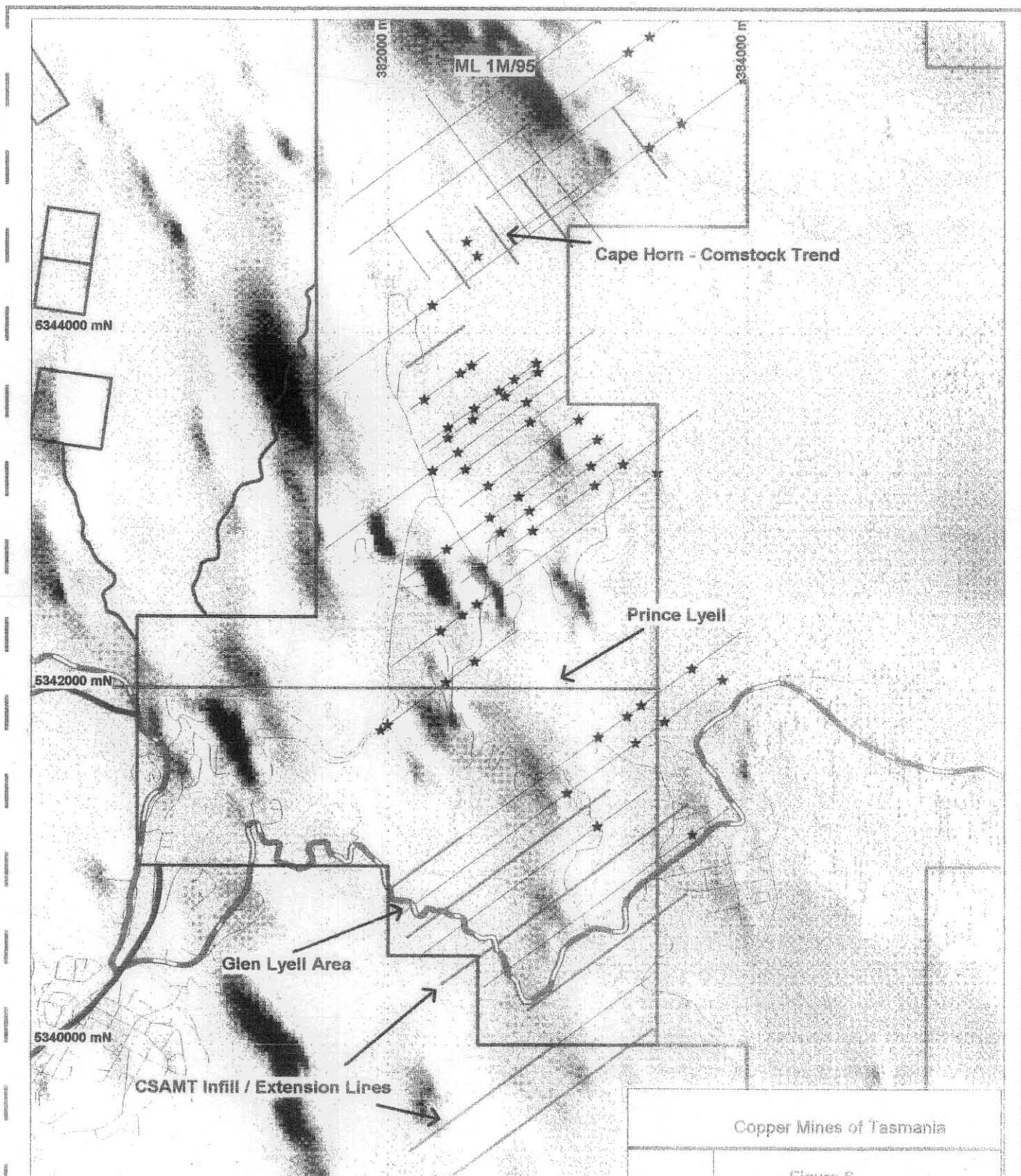
The Comstock deposit is located 1 km northeast of Cape Horn on the edge of the Comstock Valley, in the northeastern corner of the Mt Lyell Mining Lease. The Comstock mine produced 1.34 Mt @ 2.36% Cu, 0.67 ppm Au, before closure in 1944. The ore consists essentially of disseminated chalcopyrite with pyrite in sericite-pyrite-quartz schist. The chalcopyrite-pyrite lodes were tectonically elongated in the down plunge direction, parallel to lineation, during Devonian deformation.

Some bornite was reported from Nos 1 and 4 orebodies. The Nos 3 and 4 lodes continue below the deepest mine level (11 level at 2180 RL). Estimates of remaining resources above 11 level range between 125,000 to 286,000 tonnes (Corbett, 1997, T1997-005). The potential for the discovery of additional resources by drilling below 11 level is considered high.

### *Recommended Work Program*

Initially a 650 metre diamond drill hole is proposed to test the depth extension of the No 3 and 4 lens below the 2180RL (Figure 7). The proposed drill hole is designed to undercut historic hole C0036 which returned horizontal intercepts of 22 m @ 1.84% Cu (No 4 lens at 2150 RL) and 12.5 m @ 2.08% Cu (No 3 lens at 2110 RL). The proposed drill hole will test the depth extension of these lenses at the 2000 RL.

Immediately northwest of the old Comstock mine, pervasive silica alteration replacing andesite and the development of a massive exhalative hematitic silica cap (Comstock Chert) has many geological features in common with the Henty gold deposit (Halley, 1994, T1994-001). Detailed mapping and sampling followed by deep drilling is required to test the potential of Comstock to host another "Henty-type" deposit (NB Goldfields Ltd have recently approached CMT to JV into the Comstock area to test for Henty-type gold mineralisation). There are also untested DHEM anomalies in several previous Comstock drill holes and it is equally likely that an exploration program on this ground could discover a North Lyell style bornite-chalcopyrite high-grade copper system. A single 650 metre diamond drill hole with DHEM is also recommended to test the EM target for a Henty style or North Lyell style orebody.

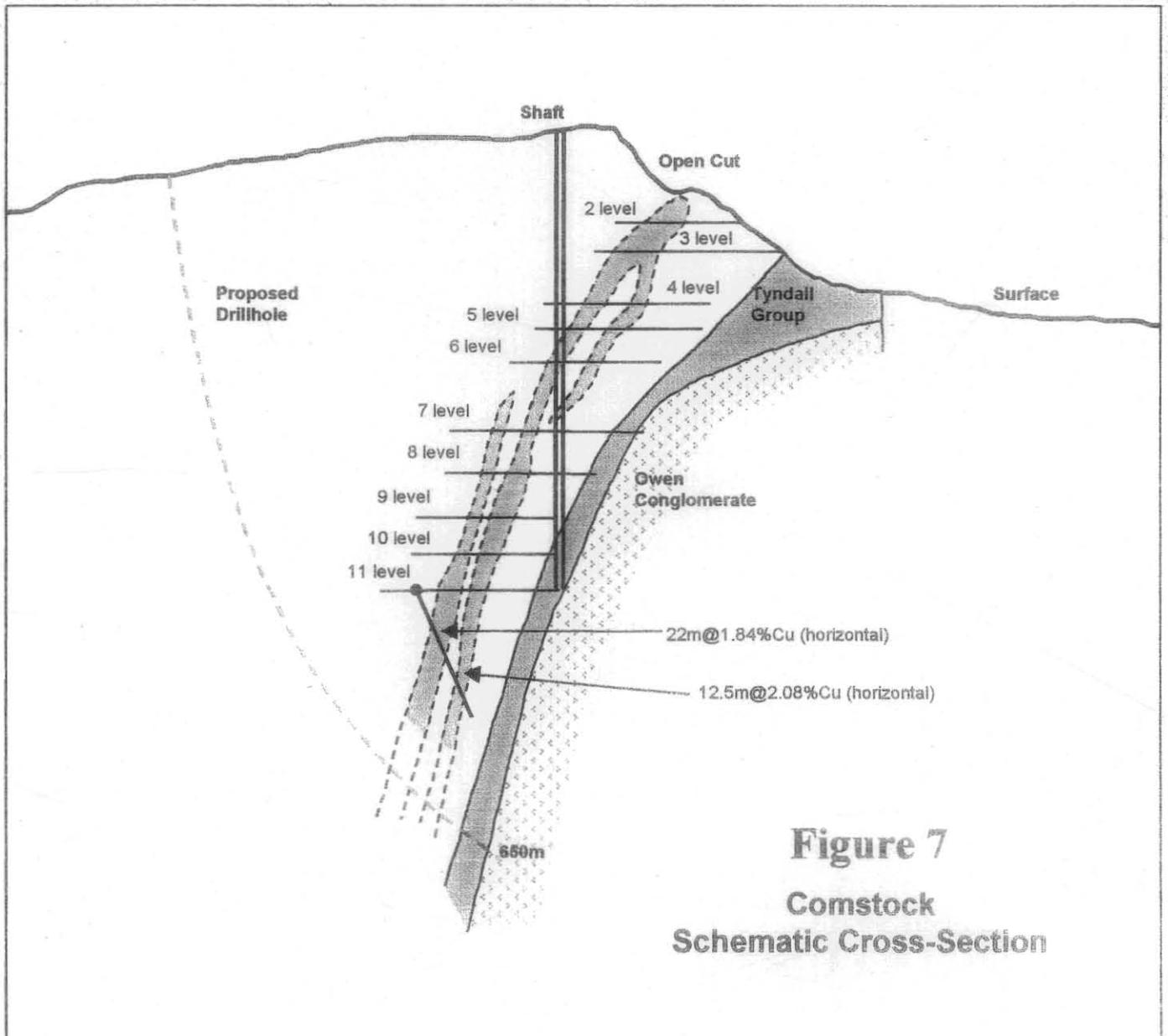


Copper Mines of Tasmania

Figure 6  
Mine Lease  
Proposed Infill CSAMT lines

Date: 19/02/2001	
Author: CAG	
Office: Geosciences	
Country:	
Scale: 1:0	1:1000000 (Scale 1:1000000)

5 cm



**Figure 7**  
**Comstock**  
**Schematic Cross-Section**

5 cm

*Direct Costs:*

Item	Rate	\$ AUS
RC Precollar 100m	\$40/m	4,000
Diamond Core 1200m	\$110/m	132,000
Core Trays 200	\$15ea	3,000
Field Assistant 40 days	\$250/day	10,000
Senior Geologist 40 days	\$450/day	18,000
Assays 300 (Cu, Au)	\$15/ea	4,500
Sample Bags 400	\$0.5ea	200
Site Preparation	\$1000	2000
PVC Casing Class 12, 1300m	\$20 per 6m length	4,333
DHEM	\$3600 per survey	7,200
	<b>Total</b>	<b>\$185,233</b>

Both the Comstock and Cape Horn drill holes will be cased with 40mm Class 12 PVC and surveyed with three component down hole EM (DHEM) to test for off hole mineralisation (off hole conductors).

### 3. CSAMT TARGETS

GMA initiated some innovative exploration in 1997/98 by undertaking Controlled Source Audio Magneto Telluric (CSAMT) geophysical surveys. CSAMT essentially maps the resistivity of the earth to depths of up to 1 km below surface. The method clearly detected known zones of mineralisation such as Western Tharsis and North Lyell and also produced some significant new anomalies in areas not previously known to host mineralisation.

Unfortunately the GMA exploration program was terminated in mid 1998 due to GMAs' financial collapse. Nevertheless GMA did manage to complete 24 CSAMT lines over the Mt Lyell Mine Lease. The GMA work demonstrates that CSAMT has great potential at Mt Lyell (and further south on EL 5/98) for locating new zones of mineralisation.

A particularly intense apparent resistivity low is centred on line 8,500N at 4675E 1700RL, located approximately 880 metres below surface. The anomaly appears to be located at the 'North Lyell prospective position', which is the contact between the Lyell Schist and the Owen Conglomerate. Although deep, this target is considered prospective for high-grade copper mineralisation. Follow up geological interpretation, infill/confirmation CSAMT, application of static corrections to the CSAMT data set and ultimately drill testing is required.

Numerous other CSAMT anomalies of less intensity are present throughout the lease area. These include:

- Line 7,750 (2775E, 1600RL) anomaly coincident with Glen Lyell fault – could be due to underground development.
- Line 9,100N (4425E, 2300RL) & (4075E 1600RL) Anaconda area
- Line 6,600N (3425, 2100RL) Between Philosophers ridge and South Lyell

### *Recommended Work Program*

Infill CSAMT lines and data processing is required followed by drill testing of selected targets throughout the lease area. A program of infill CSAMT lines to achieve complete coverage at satisfactory line density, over the entire alteration system within 1M/95, is shown on Figure 6.

### *Direct Costs*

Item	SAUS
Track cutting - 9.4 line km @ \$1,100 per line km	\$10k
CSAMT survey - 9.4 line km @ \$2,500 per line km	\$24k
Data inversion, static corrections, 3D modelling	\$5k
<b>Total</b>	<b>\$39k</b>

## **4. MINE LEASE RESEARCH**

An opportunity exists for CMT to take advantage of a 3.5 year PhD study currently proposed to study the zonation of trace elements and oxygen and sulphur isotopes across the Mt Lyell mineral field and alteration system. Such a study has the potential to target and model sub-surface locations for undiscovered ore bodies and to discriminate between sites prospective for Prince Lyell or North Lyell styles of ore mineralogy. The systematic use of oxygen isotope trend mapping lead to the discovery of the West 45 ore body at Thalanga and there is excellent potential for a successful application of the method at Mt Lyell.

The current PhD proposal has been put forward by the Centre for Ore Deposit Research, attached to the Geology Department, University of Tasmania. The PhD project would be a joint research project under the Australian Postgraduate Award -Industry (APA-I) scheme. The Federal Government would provide \$22,000 per year and CMT would be required to fund \$5,000 per year in cash and \$5,000 per year in kind (accommodation and on site support).

This study, in combination with the proposed infill CSAMT, will greatly assist the next generation of new target mine lease exploration and therefore the PhD proposal is strongly recommended (refer Craig Miller CMT memo 1 March 2001).

*Direct Costs***Total = \$15,000 over 3.5 years****5.TOTAL MINE LEASE WORK PROGRAM AND BUDGET SUMMARY**

<b>Prospect /Item</b>	<b>SAUS</b>
Anaconda	\$100,000
Cape Horn	\$93,000
Queen Lyell	\$190,000
Glen Lyell/South Lyell	\$250,000
Comstock	\$185,000
CSAMT Survey	\$39,000
PhD Research Project	\$15,000
<b>Total Mine Lease</b>	<b>\$872,000</b>

## **PART B: REVIEW OF EXPLORATION LICENCE PROSPECTIVITY AND RECOMMENDED WORK PROGRAM**

This part of the report reviews the exploration status of all known prospects and conceptual targets on the four CMT ELs (Figure 1) and recommends a cost effective exploration program aimed at maximising the chances of contributing to an expanded resource base at the Mt Lyell operation.

The work leading to this report has followed three basic principles.

1. The CMT priority is to find additional copper or copper-gold ore bodies to be milled at the Queenstown site and the exploration strategy for the four licences reflects this priority.
2. The Exploration Licences are company assets with maintenance costs and to optimise the economic benefit from each licence, different strategies combining; direct exploration expenditure, joint ventures with other companies and ground relinquishment may be required.
3. The moratorium on Exploration Licence expenditure ended on 30 March 2001 and licence conditions remain as per the Mineral Resources Tasmania (MRT) memo to CMT of 16 January 2001 (Appendix 1).

### **1. EXPLORATION CRITERIA**

Six world class (in terms of grade and/or contained metal) and several smaller volcanic hosted massive and disseminated sulphide base and precious metal deposits have been discovered to date within a 60 km north - south segment of the Cambrian Mount Read Volcanics (MRV) in western Tasmania (refer Geological Survey of Tasmania 1:100,000 Map 6 MRV series).

The MRVs are an arcuate belt of mainly submarine (with a significant, probably sub-aerial pumice content) intercalated lavas, volcanoclastics, intrusives and marine sediments which occupy the eastern half of a Middle - Late Cambrian rift basin; the Dundas Trough. Overall the arc is of calc alkaline composition (Crawford et al, 1992) but at the licence scale there is frequent variation in the bulk chemistry, as well as the facies architecture.

Stratigraphically the MRVs consist of two major associations. The lower association is a suite of dominantly rhyo-dacitic (but with frequent occurrences of andesites and basalts) volcanics and marine sediments, which in turn is composed of a central more felsic core (Central Volcanic Complex), an eastern more quartz rich time equivalent (Eastern Quartz Phyric Sequence) and a western belt of dominantly volcanoclastics, but with significant felsic and mafic volcanics (Western Sequence). In the Queenstown area the Western Sequence is subdivided into an eastern, more volcanic portion (Yolande River Sequence) and a western, more sedimentary portion (Dundas Group). Andesites are common around the interfingering contact between the Yolande River Sequence (YRS) and the Central Volcanic Complex (CVC).

The upper association consists mainly of rhyo-dacitic volcanoclastics, lavas, intrusives, marine sediments and stratiform andesites (Tyndall Group). Tyndall Group stratigraphy is subdivided into an upper unit of mainly polymict conglomerate and sandstone (Zig Zag Hill Formation), a middle unit of mainly crystal rich sandstones felsic lava and quartz porphyry (Mt Julia Member) and a lower unit of feldspar phyric sandstone, limestone, shale and

andesite (Lynchford Member). For an expanded account of the MRV stratigraphy see Corbett (1992).

An overview of the geological setting of the major ore bodies reveals some consistent patterns that are the basis for establishing a set of exploration criteria that high-ranking prospects should meet.

All evidence from field mapping, dating and geochemical studies shows that the ore bodies are syn-volcanic and that the whole MRV belt was deposited in a geologically brief period, with dates ranging from 504 - 493 Ma (averaging close to 500Ma).

Broadly the ore bodies occur in three groups, geographically separated by major faults, and with each group showing a distinctive dominant metal, deposit style and environmental setting. North of the Henty Fault the main ore bodies (Hellyer, Que River, Rosebery and Hercules) are high-grade zinc dominant polymetallic VHMS deposits, hosted in mass flow volcanoclastics and shales. They formed at and just below the sea floor, under deep water. In the central area, centred on the Henty Fault system, low sulphide, high grade gold - silica systems (Henty - Mt Julia and the Comstock gold anomaly) have formed at the sea floor under shallow water. Research from Henty (Halley and Roberts, 1997) shows that this style is essentially the sea floor equivalent to epithermal gold deposits.

South of the Henty Fault, deposits are dominantly lower grade, high tonnage, disseminated pyritic copper-gold systems, hosted in upper CVC volcanics. Deposits such as Prince Lyell, Western Tharsis, Cape Horn and Garfield have the form of structurally focussed stringer systems or pipe like bodies which formed below sea floor and discordant to stratigraphy. Research geochemistry around Western Tharsis (Huston and Kamprad, 1998) indicates a granitic signature and the deposit is interpreted as an acid sulphate, high sulphidation style with similarities to a porphyry system.

These three groups of deposits suggest a syn-volcanic genetic spectrum ranging from VHMS zinc to epithermal gold to porphyry copper. The same zonal pattern is apparent on a smaller scale of several hundred metres across the northern edge of the Mt Lyell mineral field. Comstock is a copper-gold pyrite / chalcopyrite pipe in a sub-sea floor position. Two hundred metres northwest, the Comstock Chert is a massive exhalative low sulphide chert/jasper body with anomalous gold, albeit with no discovery yet. Two hundred metres northeast of Comstock, small lenses of high-grade zinc rich massive sulphide (Tasman Crown) occur at the sea floor position.

All the main ore bodies are located adjacent to major faults, which are connected into a splayed spine through the core of the MRVs. At Hellyer and Mt Lyell (and probably at Rosebery and Henty) it is clear that the Jack Fault and Great Lyell Fault were active conduits during syn-volcanic ore deposition.

Where the mine stratigraphy can confidently be correlated with the regional geology of the MRVs (Hellyer and Que River remain difficult to correlate with rocks south of the Henty Fault), the ore bodies all occur either at or just below sea floor in either the basal Tyndall Group and/or the upper CVC (or its lateral equivalents). No significant hydrothermal alteration is known in rocks younger than the Mt Julia Member of the Tyndall Group. The ore deposit host horizons are usually volcanoclastics, shales or stratiform andesites which

mark a break in volcanism or a cycle boundary, often at a position where volcanic composition changes.

Although isotopic evidence points to sulphur being sourced from both sea water and magma, the restriction of ore deposition to one or a small number of narrow time breaks in volcanic eruption, combined with the lack of convincing evidence for depleted source rocks near deposits, and direct observations on the formation of modern rift basin black smokers, suggests that the ore metals are sourced from cyclic sub sea floor magmatic fractionation and not convective stripping of the volcanic pile.

In the Mt Lyell – Mt Darwin district chemical and mineralogical affinities have been interpreted between copper-gold deposits and syn-volcanic granite intrusives (Large et al, 1996, Wyman et al, 1997). Another equally well credentialed school of research (Crawford et al, 1992 and Scott Halley's work in several RGC reports in the early 1990s) points to the close chemical and spatial correlation between these same deposits and a suite of stratiform hornblende andesites and dacites with characteristic potassium, rare earth and phosphate signatures (Suite 2 andesites of Crawford et al, 1992). These andesites appear to be stratigraphically concentrated around the upper CVC / YRS and basal Tyndall Group and they host the Garfield, Cape Horn, Comstock and possibly Prince Lyell deposits. For the explorer, the Suite 2 andesites represent target horizons with anomalous magnetic and chemical signatures, even though mineralisation and alteration has locally overprinted and replaced these andesites. The granites however are consistently offset to the east of the major ore bodies so location of granite is of no exploration benefit, despite the evidence for some genetic linkage. It is more practical to consider all the igneous and hydrothermal facies of the MRVs as the fractionation products of magmatic pulses intruding, extruding and exhaling from deep crustal magma chambers, connected to the sea floor by basin forming faults in an actively extending trough.

Two post mineralisation compressional phases have produced major east – west shortening through the Dundas Trough, have reversed the sense of movement on the original graben forming normal faults and have produced the two prominent cleavages which control the foliation in the Lyell Schist at Mt Lyell. The Lyell Schist is a mappable unit across the Mt Lyell mineral field because weathering has enhanced the fabric produced by cleaving the phyllosilicate alteration minerals (ie after hydrothermal destruction of feldspars). The regional geology shows convincingly that the main cleavage forming events are Middle Devonian (Corbett and Turner, 1989, Berry, 1990). The age of the older deformation is less clear but is probably related to the tectonic control of the Dundas Trough, Owen Conglomerate deposition and the Haulage Unconformity, so is therefore constrained within Late Cambrian to Middle Ordovician time.

In detail each deposit has a unique alteration halo but in general both footwall and hanging wall alteration pervade zonally out from the feeder and the ore body respectively, presenting a much larger chemically and geophysically anomalous exploration target than the actual ore bodies. Hanging-wall alteration is typically a more stratiform plume consisting of carbonate, silica and white and green mica zones, the latter of which can be difficult to distinguish from metamorphic alteration, away from the ore body. Well preserved footwall alteration systems consist of a broad diffuse sulphide bearing halo, which can often be detected/mapped by IP chargeability, and an intense concentric zoned pattern around the feeder structure, often including stringers and veins of ore grade sulphides. Preservation of coherent alteration patterns varies surprisingly between deposits in the MRVs, due to tectonic deformation and

explorers need an open mind when attempting to fit observed alteration into models. Any evidence of pervasive fluid overprint introducing silica, sulphides, iron, manganese or carbonate and any evidence of feldspar destruction to micas or changes in feldspar cation composition, or magnetite depletion/addition, is good news and satisfies an important criteria.

In summary, the key criteria that need to be met on exploration prospects in the Queenstown region, to significantly increase the chances of a new copper sulphide discovery in the Mount Read Volcanics are:

- Stratigraphically near the Tyndall Group – Central Volcanic Complex (or its eastern or western equivalents) boundary.
- Structurally adjacent to a major syn-volcanic growth or transfer fault.
- Evidence of hydrothermal fluid alteration overprinting the volcanics.

A prospect should certainly be drilled when all three criteria are met and should probably be drilled if alteration plus either structure or stratigraphy has been demonstrated. Drill targets will be generated by a mix of on ground and airborne surveys always including some mapping, geochemistry and geophysics.

## **2. GENERAL COMMENTS ON EXPLORATION LICENCES**

Exploration Licences (ELs) are issued by the State for 5 years (10 years pre the new Mineral Resources Development Act 1995) for the purpose of exploring, but not for mining. The general conditions for ELs are set out in the Act and summarised in a brochure produced by the State Government Agency, Mineral Resources Tasmania (MRT). An EL is quite different from a Mine Lease in that mining is not permitted on an EL. The aim of an EL is to facilitate discovery of a new ore body within 5 years, leading to an application for a Mine Lease and the transfer of work from exploration to mine development. It is in the State's interest to encourage a competitive environment for access to quality exploration ground so MRT require licence holders to meet annual expenditure and exploration work commitments. Expenditure commitments increase each year according to a set formula, as outlined in the brochure.

Company performance in terms of expenditure and exploration work is reviewed each year by MRT after the EL Annual Report is submitted to MRT, as is required by licence conditions. The Minister for Mines has the power to revoke a licence if commitments are not met and would usually do so if MRT recommended that the State would be better served by releasing the ground to competition from new explorers.

Work programs on Exploration Licences should be planned to consider, as well as the economic geology of the ground, the minimum expenditure commitment to keep the tenement in good standing, and the timing of the licence anniversary and annual reporting dates, which will be different for each licence.

Therefore it is normal practice to design an EL budget to coincide with the licence year rather than the financial year.

Expenditure commitments for the four CMT ELs, once the moratorium ended on 30 March 2001, are set out in a memorandum from MRT to CMT dated 16 January 2001 (Appendix 1).

There are three main tenement management points which need highlighting.

1. The life of ELs is finite. For example, EL 52/94 Linda has almost 6 years to go but at the other end of the range, EL 27/95 Yolande River will expire in just over 2 years.
2. Any deficit in expenditure for a given year will accrue and be carried, with the expectation by MRT that the deficit as well as the current annual commitment will be met. For example, EL 27/95 Yolande River will carry a deficit of \$23,000 when it comes out of the moratorium.
3. Expenditure commitments increase each year. For example, the commitment on EL 27/95 Yolande River is  $64 \text{ km}^2 \times \$500 = \$32,000$  in Year 2, but grows to  $64 \text{ km}^2 \times \$5,000 = \$320,000$  in Year 5.

These three factors are important considerations when making decisions on exploration budgets, partial or total relinquishment options and joint venture options.

### 3. EL 52/94 - LINDA (18.5KM<sup>2</sup>)

#### Status

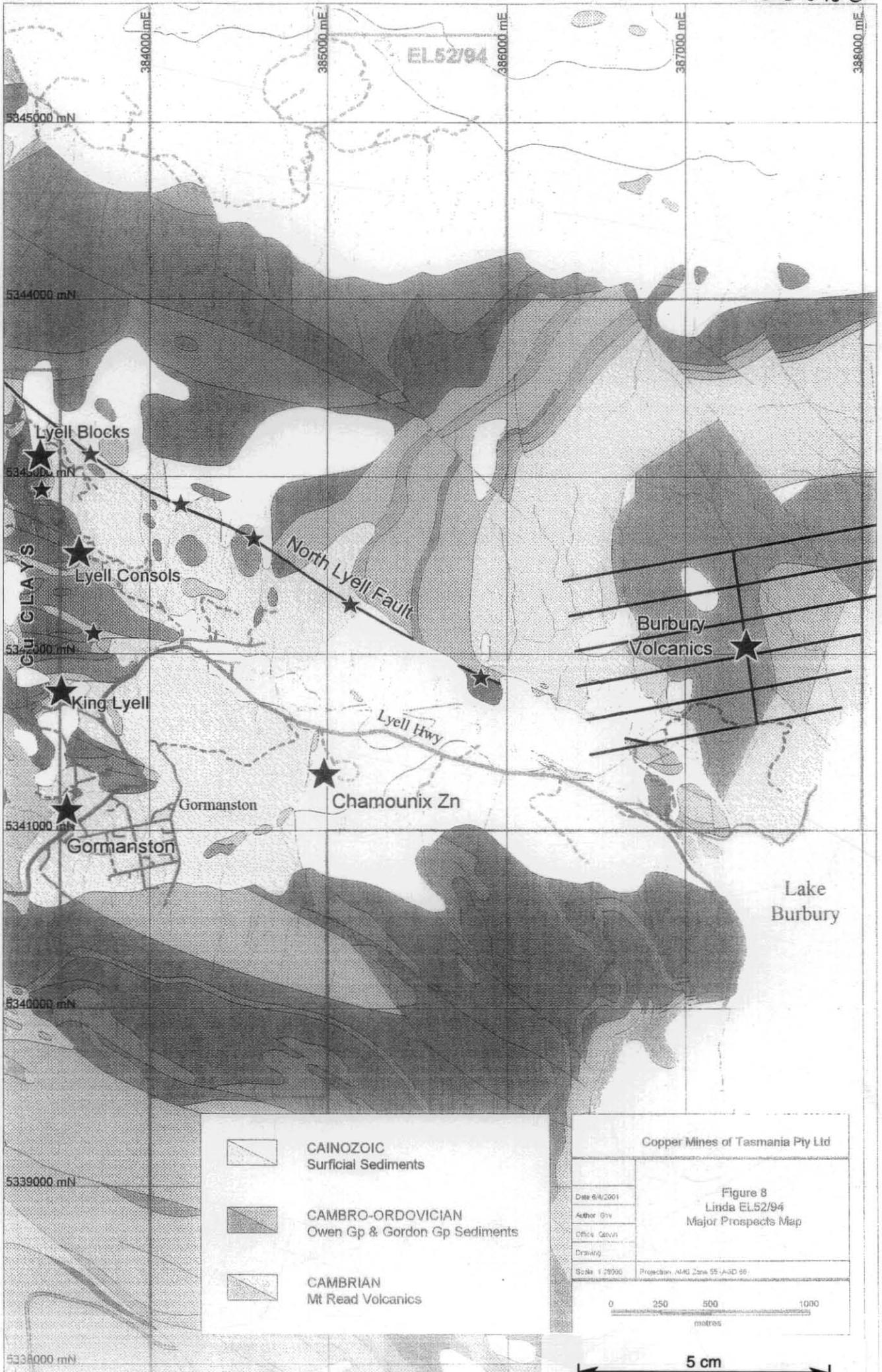
- 10 year licence, Year 5 ends 13 January 2002 (report due 13 December 2001).
- Current expenditure deficit = \$0.
- Potential for partial relinquishment of non-prospective ground = low (50% relinquishment made in December 1998).
- Potential for JV = good if combined with other ELs for a significant regional base and precious metal search, poor as a stand alone EL (no advanced project).
- Minimum expenditure requirement to next anniversary (13 Jan 2002, report due 13 Dec 2001) = \$37k

#### *Prospects and Leads*

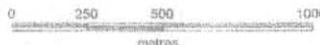
##### *a) Identified Cu/Au Cu Prospects*

##### *Burbury Volcanics*

Outcropping alteration and low-grade mineralisation was discovered in 1996 by CMT reconnaissance mapping and chip sampling in Tyndall Group volcanoclastics (Figure 8, 1:25,000 Geological Series Queenstown map). A grid was cut and soil, stream sediment and ground magnetic surveys completed. Mapping was about to start and electrical geophysics planned when the program stopped. The prospect appears to be strata bound and is possibly fault focussed. It is defined by a combination of surface chip sampling (max 0.5% Cu/Pb + 0.6 ppm Au), B/C horizon soil anomalies in Au and Pb and ground and air magnetics (refer Morrison, 1996 Year 2 Report T1996-122, Morrison, 1997 Year 3 Report T1997-054). No old workings or drill holes are known. Outcropping bodies of silica, chlorite, pyrite, magnetite and magnetite, silica, tourmaline, feldspar, pyrite alteration occur 40 metres apart. Although both bodies occupy small areas at surface they appear to plunge steeply within the dominant S2 Devonian cleavage and are likely to be elongated, pipe like bodies. We have not yet proven that the faults are Cambrian or syn-volcanic but prospect mapping may solve this



	CAINOZOIC Surficial Sediments
	CAMBRO-ORDOVICIAN Owen Gp & Gordon Gp Sediments
	CAMBRIAN Mt Read Volcanics

Copper Mines of Tasmania Pty Ltd	
Figure 8 Linda EL52/94 Major Prospects Map	
Date 6/4/2001	
Author G/v	
Office G/v	
Drawing	
Scale 1:25000	Projection: MGA Zone 55 - AGD 85
	
metres	

5 cm

problem. Clearly the presence of mineralised alteration confirms the third criteria - that metal bearing fluids have overprinted the rocks.

All evidence to date points to an exploration target comprising a potential copper /gold body with a geological setting similar to Cape Horn or Comstock.

*Future work:*

The prospect needs to be advanced to the drill target stage by a program of grid refurbishing, geological mapping, ground electrical geophysics and close spaced soil geochemistry. If a convincing target is generated then a drilling program will be recommended.

*Direct Costs:*

Item	\$AUS
Refurbish and extend grid - contract line cutters, geology time	\$10k
Field mapping, sampling, drafting - geology, drafting time, assays	\$10k
IP survey - design, contractor field survey, data presentation	\$40k
Close spaced soil survey - contract sampling, assays, geology time	\$10k
Reporting - geology, drafting time	\$5k
Total	\$75k

*Copper Clays*

The prospect is based on three early mine sites at Lyell Blocks, Lyell Consols and King Lyell with residual resources which straddle the EL Linda / 1M95 boundary (refer Figure 8 and the comprehensive Kevin Wills compilation of copper clays potential T1995-50). The deposits outcrop in disturbed abandoned mine workings, as highly deformed, weathered limonitic clays and concretionary iron hydroxides derived from Gordon Group limestone and shale. The deposits are confined to tight Devonian synclines along the eastern margin of the Mt Lyell mineral field and they plunge east. Mineralisation is mainly native copper and cuprite (copper oxide), complicated locally by cavities in the host clays filled with Cainozoic till and scree, including primary sulphides from Mt Lyell. In terms of mining and metallurgy, copper clays are quite different from the primary sulphide ores.

From 1892 - 1902, 243,000 tonnes @ 1.6% Cu were mined from the three deposits, producing a 69% Cu concentrate by gravity separation which achieved 72% recovery. In 1957 MLMR Co assessed that a resource of 1.99 Mt @ 1.92% Cu remained, with additional potential for 6 Mt at unspecified grade. The 1995 Kevin Wills study for CMT concluded an inferred recoverable resource in the three deposits of 6.9 Mt @ 0.6% Cu and an overall stripping ratio of 2.3 : 1 (Wills, 1995).

King Lyell currently has the best access and exposure and is the only deposit with some modern exploration. In 1996-97 CMT conducted mapping, chip sampling, 3 vertical percussion holes (best intersection 96KLC-2, 8 m @ 3.47% from 29 - 37 m (refer Morrison, 1996 drilling report 1996-106, Year 2 Report 1996-122, Year 3 Report T1997-054) and a resource estimate (Morrison and Knight, 1997, T1997-028). In the western half of King Lyell, ie the high grade, low strip ratio portion, a resource of 600,000 tonnes @ 2.0% Cu is identified, with a stripping ratio of 1.3 : 1. It is likely that this is the superior part of the

known copper clays, where topography, ground conditions and environmental considerations (mainly run off and slope stability) would allow the most effective low cost open cut mining. There is certainly high potential to drill define further resources at Blocks and Consols and two additional clay bodies which have not yet been tested at all. King Lyell itself needs several infill holes to better define the resource.

Preliminary metallurgy and mine studies were undertaken by CMT in 1998 by Nick Clarke and Tony Weston (refer Year 3 Report T1997-054, Morrison, 1998 Year 4 Report T1998-051). The mine study assumed a gravity separation circuit and concluded that a project with a resource base of less than 5 Mt was likely to be uneconomic. The conceptual project was based on 750,000 tpa for 10 years. The concept of high grading King Lyell, and possibly portions of Blocks, Consols and the unexplored gullies between them, as low cost pits (and perhaps with heap leach instead of gravity separation) has not been studied. Likewise the possibility of combining copper clays heap leaching with the SXEW treatment of acid mine water appears not to have been considered to date.

The drilling results at King Lyell to date are consistent with the 1957 estimate of a total copper clays high grade resource in the order 2 Mt @ 2%. When the Kevin Wills high tonnage scenario is considered, a realistic expectation is that a modern drilling program could identify a total resource in the range of 2- 6 Mt at an average grade in the range 1 - 2 % Cu. This resource would exist in 3 - 5 deposits, depending on results in the two untested clay bodies.

*Future work:*

Initially, a company decision is required on the worth of copper clays as a target before any further drilling or bulk sampling is justified. Major issues of metallurgical compatibility, mining and milling methods, minimum deposit size, waste disposal and environmental impact in Linda Valley exist.

*Direct Costs:*

Item	\$AUS
Mining and metallurgy study on King Lyell high grade model by consultant	\$10k

If the outcome of this study were positive, a program of vertical percussion drill holes would be designed to upgrade King Lyell to a Measured/Indicated Resource and test the two gullies prospective for new discoveries between King Lyell and Blocks. A positive result at this point would lead on to total resource definition drilling.

**b) Identified Zn, Au Prospects**

*Chamounix Zinc*

Outcropping disseminated sphalerite/pyrite/galena was located in 1995 by CMT in Cemetery Creek, Linda Valley, hosted in weathered Gordon Group limestone and shale (Figure 8). The prospect is defined by a combination of; literature records, reconnaissance mapping, chip, channel and costean sampling and 3 percussion drill holes (best intersection 12 metres @ 2.4% Zn (refer Morrison, 1995 Year 1 Report T1995-024, Year 2 Report 1996-122, drilling report 1998-048). Several outcrop samples of 1-2% Zn align along a 1000 metre NW-SE

trend, parallel to the main Devonian structural trend in Linda Valley, suggesting a fault or syncline hinge control to mineralisation. A strong CSAMT anomaly drilled in 1998 encountered no significant mineralisation and the anomaly has not yet been explained by follow up work (Year 4 Report T1998-051).

The evidence to date shows similarities to Irish style carbonate hosted zinc-lead-silver deposits, which are characterised by high zinc to lead ratios, low total sulphide and alteration of the host carbonate dominated by dolomite-siderite replacement. They are metallurgically attractive because of the simple mineralogy and the low jarosite waste and acid generating potential. Major basin forming faults control deposit locations and both stratiform and fault fill ore bodies occur in most deposits. The main modern day discoveries in the Irish Carboniferous limestones are Navan (70 Mt @ 10.1% Zn and 2.6% Pb) and Lisheen (22 Mt @ 11.5% Zn, 1.9% Pb and 26 ppm Ag). A 1995 drill intersection in the Gordon Limestone correlate at Beaconsfield intersected 2 metres @ 21% Zn, 3% Pb and 20 ppm Ag, confirming that ore grades do exist in this stratigraphic unit.

Widespread low-grade mineralisation has been established in Linda Valley and the next stage in exploration must be to generate drill targets with high tonnage and grade potential.

*Future work:*

Depends initially on the company priority for zinc, specifically carbonate hosted zinc. Detailed (50 metre station spacing) gravity should work well on the flat floor of Linda Valley, in limestone and shale with uniform background density. In contrast, the high water table, abundance of black shale and clays and the variable thickness of glacial gravel cover are unreliable/poor conditions for IP and soil geochemistry.

*Direct Costs:*

Item	\$AUS
Gravity survey, Linda Valley: design, contractor field survey, data presentation	\$40k

*Comstock Valley*

This target has dubious prospect status for Gordon Group carbonate hosted Zn-Pb, as the ground is covered by 5 electrical surveys and 4 diamond drill holes (3 by MLMR Co + 1 by BHP) have produced a best result of 1 m @ 0.26% Zn (refer BHP report Wilde and Kerr, 1990 T1990-032, Year 1 Report 1995-024, Year 4 Report T1998-051 including Wendy Peace petrography report). This is in stark contrast with Linda Valley where mineralisation outcrops but only one line of modern ground geophysics and no deep drill holes exist. Part of the Comstock Valley is covered by about 100 metres of glacial gravel, adding further to the challenge of generating real anomalies and drilling them.

No further work is recommended for this prospect.

*North Lyell Fault gold prospect*

The NLF is a major NW-SE Devonian structure (with probable Cambrian precursor as evidenced by the geology of the Pearl Creek Fault) forming the northern margin of Linda

Valley (refer Figure 8, 1:25,000 Geological Series Queenstown map). The fault zone hosts small alluvial and quartz vein workings at Idaho, Watsons and McDowells. CMT chip sampling of quartz veins in Owen Conglomerate at McDowells mine and well developed quartz stockworks outcropping at the SE end of valley found no gold, although a pan concentrate anomaly was detected on the Tyndall - Owen contact at the latter site (refer Year 1 Report T1995-024, Year 2 Report 1996-122).

*Future work:*

Lack of encouraging results combined with the general small, patchy nature of Devonian vein gold downgrades the prospect. It should remain a low priority unless the new government funded airborne EM survey or a CMT interest in gold changes that.

**c) Conceptual Cu/Au Targets**

*Gormanston*

The concept involves a probable segment of the Great Lyell Fault, hidden below glacials and Gordon Group sediments in the Gormanston area and straddling the EL - 1M95 boundary. This blind segment of the GLF is long enough (600 metres) to include at least one hidden ore body. Several electrical surveys covered Gormanston between 1934 and 1981 but a review of Mt Lyell geophysics by John Bishop in 1982-1984 concluded that no convincing anomalies were recognised at <500 metres and only weak features at >500 metres depth were possible anomalies. Seven angled DDHs have been attempted to date from within the EL and 5 from the Mine Lease, the deepest to 434 metres, but only 3 (all in the lease) have reached the Lyell Schist, where some encouraging intense alteration was encountered towards South Lyell (refer Year 1 Report T1995-024, Morrison, 1997 Gormanston prospect review T1997-047).

Therefore the target remains largely untested. In 1998 Keith Corbett was conducting detailed mapping of the contact area and re-logging the Gormanston core to improve understanding of the 3D geometry, which is complicated by embayments in which wedges of the Owen and Lyell Schist are tectonically mixed. Keith has confirmed by phone that he has the data but it is not compiled into a report.

*Future work:*

Potentially good drill targets exist, once 3D geology is modelled and the new MRT EM survey is interpreted. It may be that the prospective ground is entirely inside 1M/95 and the prospect can be evaluated as part of a larger South Lyell program but the first step is clearly to collate all existing data.

*Direct Costs:*

Item	\$AUS
Keith Corbett to compile a report on his Gormanston work	\$5k

*Summary of new work program – EL 52/94 (Linda)**Direct Costs:*

Item	\$AUS
Mapping, IP and soil survey at Burbury Volcanics	\$75k
Investigate option for high grade King Lyell mine	\$10k
Compile existing data on Gormanston	\$5k
Gravity survey at Chamounix Zinc	\$40k
Total	\$130k

#### 4. EL 27/95 - YOLANDE RIVER (64 KM<sup>2</sup>)

##### Status

- 5 year licence, Year 3 ends 24 May 2001 (Year 3 Report to May 1999 has already been submitted to MRT so next report due 24 April 2002).
- Current expenditure deficit = \$23k (assumes no expenditure since 31 Dec 1998).
- Potential for partial relinquishment of least prospective ground = high (refer CMT memo 1 Nov 1999 regarding the rationale for dropping 27 km<sup>2</sup> in the west of the EL - this plan assumes that funding was unavailable for regional surveys in the remote west of the EL, where some of the Tyndall Group looks magnetically interesting).
- Potential for JV with Goldfields = high (CMT work to date highlights the Diamond Hill - Pearl Creek Fault - Madam Howards area as prospective for gold only and the regional basal Tyndall Group play in the area of the South Henty Fault should also be attractive to them because of the Henty-Comstock horizon analogue). Therefore if the farm out option is accepted, no ground should be relinquished.
- Minimum expenditure to next full year anniversary (24 May 2002) = \$151k full size or \$97k with partial drop (both numbers include \$23k deficit).

##### *Prospects and Leads*

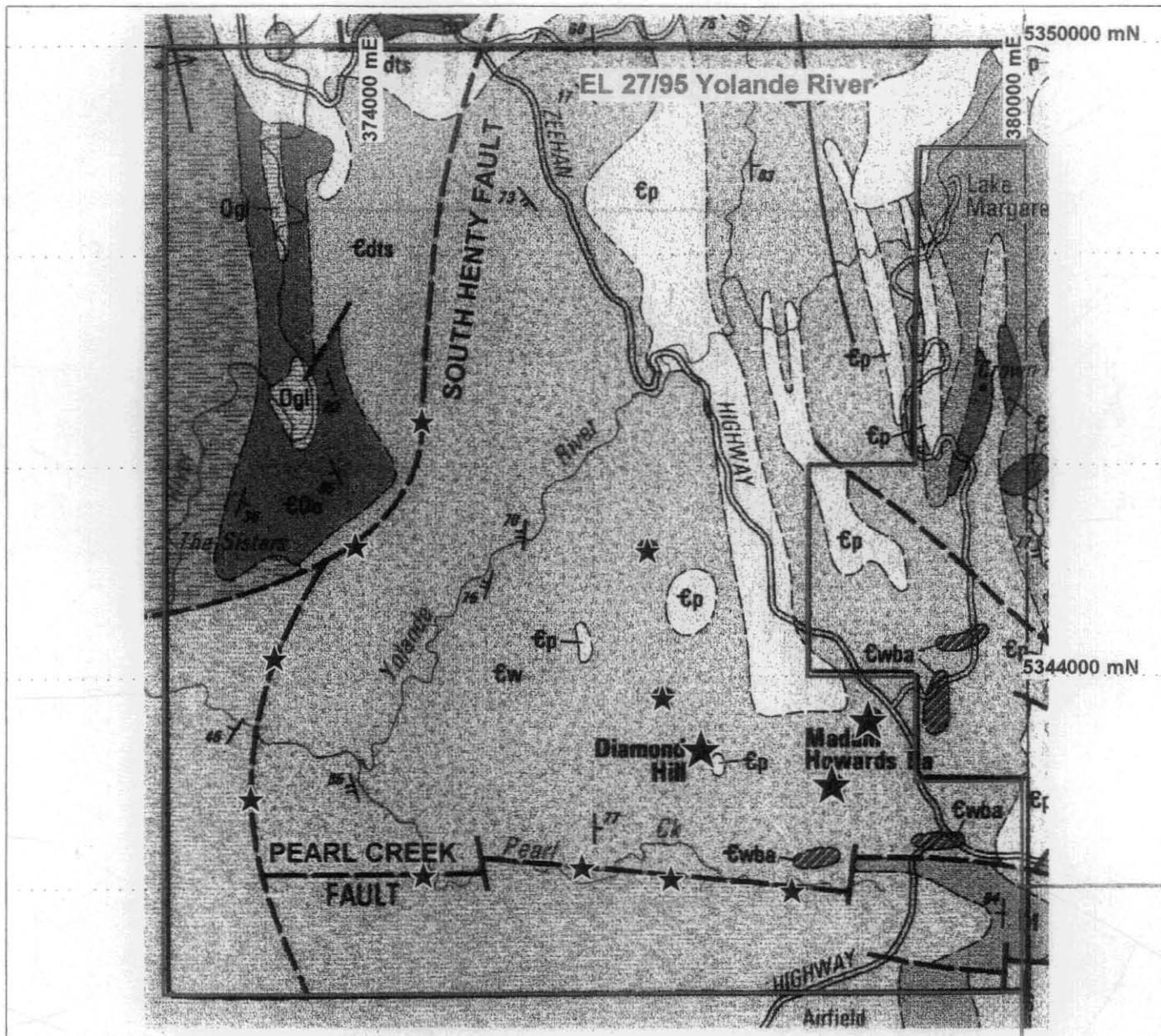
##### a) *Identified Au prospects*

##### *Diamond Hill*

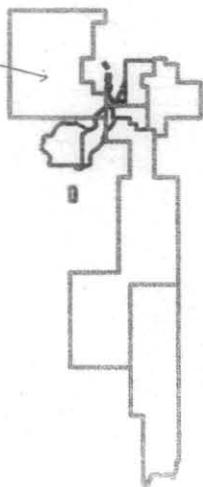
The prospect is a quartz-feldspar porphyry intrusion within the Yolande River Sequence of the MRV (Figure 9, 1:25,000 Geological Series Queenstown map) cut by several mostly thin quartz veins carrying patchy gold near surface. Vein orientation, style and regional context near the major E-W Pearl Creek - Firewood Siding Fault system suggest Devonian veining and gold, although the focus on a Cambrian porphyry and the nearby presence of Madam Howards barite veins are enigmatic and increases the chance of Cambrian mineralisation. The three main vein strike directions at Diamond Hill (ENE, N-S, E-W) conform to the South Henty, Pearl Creek sinistral offset and Pearl Creek faults respectively. Four hand dug adits (circa 1890 - pre Mt Lyell discovery) and adjacent shallow alluvial workings were located by CMT reconnaissance in 1997. The prospect is defined by a pan concentrate drainage anomaly and rock chips on outcropping vein quartz (max value 18 ppm but very patchy, refer Morrison, 1997 Year 1 Report T1997-012, Morrison and Griffiths, 1998 Year 2 Report 1998-010). In 1998 Ashley Griffiths did his BSc Honours project around Diamond Hill and limited soil sampling across porphyries north of Diamond Hill did not reveal any new anomalies (refer Harbon, 1999 Year 3 Report, including AG thesis, T1999-001).

##### *Future work:*

Diamond Hill needs drilling to test whether mineralisation develops into something significant at depth. Sufficient data exists to site the first holes. If CMT are interested in systematic gold exploration on the EL, then Diamond Hill should be the first drill target. Similarly this should enhance the JV potential of the EL to a gold company.



EL 27/95



Copper Mines of Tasmania Pty Ltd

Figure 9  
Yolande River EL 27/95  
Major Prospects Map

Date: 8/4/2001

Author: KMI

Office: Qtown

Drawing:

Scale: 1:0

Projection: AMG Zone 55 (AGD 86)

5 cm

A horizontal scale bar with arrows at both ends, labeled "5 cm".

### *Pearl Creek Fault - Firewood Siding Fault*

A predominantly Devonian structure, with probable Cambrian heritage, linking the mineralised major Cambrian South Henty and Great Lyell faults (refer Figure 9, 1:25,000 Geological Series Queenstown map). The Pearl Creek Fault (PCF) may have extended into the North Lyell Fault prior to Devonian F2 sinistral wrench movement on the Great Lyell Fault (we know that both sinistral and dextral offsets occur on the PCF within the EL). Small quartz vein gold workings occur within 2 km south of the PCF, hosted in Eldon Group sediments and this appears to mirror the positions of the Diamond Hill and Madam Howards (barite) veins, north of the fault. Base metal stream sediment anomalies were defined by MLMR Co near the fault in 1983 and the presence of Cambrian basalt pods near the fault suggests structuring with some control on volcanism back to the Cambrian. No work has been done specifically on this prospect by CMT, though it was proposed in 1997 (refer Ken Morrison CMT memo 25 September 1997).

#### *Future work:*

The MRT EM survey will cover the PCF in the EL, presenting a method of screening for possible base metal prospects. The fault contact needs detailed mapping/prospecting with pan concentrate gold sampling in all drainage entering Pearl Creek (ie an extension of the Diamond Hill survey).

### *Madam Howards - (barite/gold)*

NNE and NE striking barite / quartz veins outcrop 1.5 km east of Diamond Hill (Figure 9, 1:25,000 Geological Series Queenstown map). Barite was mined in trenches from 1910 - 1920 and the Mines Department drilled 3 DDHs in 1962, showing that the barite pinched out at shallow depth. The core from these holes was assayed for gold by CMT in 1997 with poor results (max 2.13 m @ 0.13 ppm Au). A traverse of chip samples from outcrop/sub-crop of quartz and barite veins detected no gold, however the 1998 pan concentrate survey defined a drainage anomaly on the southern margin of the southern barite veins, which is interpreted to align E-W, parallel to the PCF (refer: Morrison, 1995 ETA 389 review T1995-020, Year 1 Report T1997-012, including Mines Department report on Madam Howards 1964, Year 2 Report 1998-010).

#### *Future work:*

The prospect is less attractive than DH and PCF, although the origin of the barite veins remains uncertain and should attract interest from a company focussed on gold.

### *Gold Creek*

A small abandoned alluvial gold working exists in the northwest corner of EL, against an acid porphyry body, and is therefore a possible analogue of Diamond Hill (refer 1:25,000 Geological Series Queenstown map). No work has been done by CMT and again the future of the prospect depends on the company strategy for gold on this EL.

### *Sisters Hills*

In the NW of the EL a prospect was defined by MLMR Co, where the South Henty Fault splays into the Firewood Siding Fault by wrapping around a tight N-S syncline containing Owen Group and younger sediments. This position also represents the western extent of the

MRVs (they finger out to Dundas Group marine sediments west of the belt of porphyries including Diamond Hill). The prospect consists of some old diggings on a zone of iron oxide development. Reconnaissance work by MLMR Co detected no mineralisation and chip samples in the ironstone gave maximum assays of 1400 ppm Pb, 900 ppm Zn and 200 ppm Cu (refer MRT library reports TCR82-1791 Meares et al, 1982, TCR 83-2029 Purvis et al 1983, and the CMT ETA 389 review T1995-020).

*Future work:*

This is a remote area, has weak evidence of mineralisation but is conceptually a good location on structural grounds, especially if basal Tyndall Group can be demonstrated against the eastern contact of The Sisters Hills syncline. The Sisters Hills prospect itself is a low priority site, which should be re-evaluated when the MRT EM survey is available and field checked before dropping the ground. This recommendation applies equally to CMT or a managing JV partner.

*Other Leads*

Several base metal drainage anomalies were detected by MLMR Co adjacent to main roads where truck spill of mineralised rock was likely. These represent a very low priority unless the new EM data shows a coincident anomaly.

***b) Conceptual Au, base metal targets***

Reconnaissance regional mapping and aeromagnetics during the 1995 (Selley and Meffre, 1995 T1995-020, Quayle, 1995 Pasmenco magnetics survey in TCR95-3746) indicate a NNE trending contact between the Tyndall Group and Yolande River Sequence in the SW of the EL, where the earlier MRT mapping shows only Yolande River Sequence - Dundas Trough rocks. The presence of Upper Tyndall Group at the Pearl Creek - Yolande River junction was confirmed by CMT in 1997 and the magnetic character along a band of rocks approximately 500 metres east (down section) suggests that a correlate of the Lynchford Member (basal Tyndall) may possibly be present. This concept creates an opportunity for greenfields exploration modelled on the Henty and Comstock styles of gold mineralisation.

*Future work:*

The basal Tyndall concept would be confirmed or eliminated with several days of mapping supplemented by rock chip lithogeochemistry. Such a program falls outside the current CMT aims but substantially adds to the EL's farm out potential to a gold company.

***Summary for new work program***

- Option 1 (preferred option) - Negotiate JV with Goldfields for the total EL over its final 2 years. CMT incurs no further costs, including the \$23k deficit, but retains a free carried interest in the event that the new partner makes a discovery.

- Option 2 (CMT gold exploration)

*Direct Costs:*

Item	\$AUS
Drill under Diamond Hill	\$60k
Extend pan concentrate survey SW to cover Pearl Creek Fault	\$10k
Map Tyndall Group rocks in Yolande River Valley, using existing magnetics to locate possible Henty-Comstock horizon	\$5k
Review previous Dighem data anomalies near base Tyndall positions	\$3k
Review MRT EM survey then drop western and southern portions if sterile	\$5k
Field check Gold Creek prospect	\$2k
Reporting	\$5k
<b>Total</b>	<b>\$90k</b>

## 5. EL 5/98 - QUEENSTOWN (96 KM<sup>2</sup>)

Status

- 5 year licence, year 1 ending 1 May 2001.
- Current expenditure deficit = \$0
- Potential for partial relinquishment = good (approximately the southern third could be dropped and the Cu-Au potential of the Jukes prospect and North Huxley trend preserved).
- Potential for JV = fair, improved if tied to adjoining ELs but high expenditure commitment and lack of advanced prospects are negatives.
- Minimum expenditure to next report anniversary (assumes program would run to end Year 2 so report date is 1 April 2002) = \$497k without partial relinquishment. The importance of a partial relinquishment option is obvious as it could save around \$200,000 from the commitment in the first 2 years. If this option prevails it should be done immediately or as soon as the EM survey has been assessed.

### *Prospects and Leads*

#### *a) Identified Cu-Au Prospects*

##### *Garfield*

The prospect was discovered by RGC Exploration in 1992, by reconnaissance field mapping and sampling which revealed a patchily quartz-sericite-pyrite altered andesite with rock chips assaying up to 0.5% Cu and 0.1 ppm Au, and located near a fault (cf Burbury prospect).

A program of grid based mapping, soil surveys, ground magnetics and gradient array IP in 1993 revealed an 800 x 700 metre anomalous zone of coincident alteration, chargeability and magnetic high. The anomalous zone is offset by a fault. Twelve holes were drilled from a helicopter-supported camp between 1993 and 1995, delineating a body of approximately 12 Mt @ 0.3% Cu, of Prince Lyell style mineralisation which was deemed sub-economic (Vicary

and Denver, 1998 T1997-076). A review of the program showed that the key exploration techniques for this deposit were:

- mapping to locate altered Suite 2 andesites and fault structures
- aeromagnetics as an aid to mapping and to identify anomalous highs within the high background of the andesite.
- IP and ground magnetics to refine drill targets.

Notably both soil geochemistry and surface and down hole EM were ineffective.

The best intersections were 105 m @ 0.38% Cu (GAR-1) and 21 m @ 0.89% Cu + 0.29 ppm Au (GAR-3). The highest grades are close to the fault and drilling can be interpreted to suggest a possible (not confirmed) increase of grade with depth, at least near the fault.

RGC considered the prospect adequately drilled to 200 metres below surface but the target is open below that depth. Magnetism modelling suggests a limit to the magnetic high at -250 metres but there is no proof that high grades correlates with high magnetite. A 500-600 metre hole beneath GAR-1 and -2 would solve the depth/grade question and is probably the only window of opportunity open on the prospect.

Any further intercepts would need to be much higher grade than the previous known mineralisation.

Patchy alteration in the Garfield andesite north of the known body could be explored for additional bodies of mineralisation – this would require a scenario where higher grades than discovered to date correlate with weaker geophysical and mapped responses and are discrete from the declining northerly grade trend known in the existing body, and perhaps sourced from a fault not yet discovered. Such a fortunate coexistence of factors is extremely unlikely and expenditure is not warranted.

Perhaps the most attractive conceptual play at Garfield is to determine the sea floor position (base of Tyndall Group) with a view to locate a gold silica ± copper systems (Comstock, Henty) or a polymetallic VHMS deposit (Rosebery, Tasman Crown). This would require additional gridding and mapping and should be helped substantially by the upcoming airborne magnetics and EM surveys. This concept is outside the current CMT aims and is high risk.

The remote location of Garfield, with access limited to a 3 hour walking track or helicopter, adds considerably to exploration cost and to the minimum ore body discovery size needed to trigger development. Garfield is considered the lowest ranking of the three prospects currently recognised on the EL and no further work is justified. Due to the high expenditure commitment on this EL, it is recommended that the 40km<sup>2</sup> southwestern block be relinquished as soon as possible (ie the 8 x 5 km block north of 5,320,000 mN).

### *North Huxley Area*

A 6 km north-south belt of minor base metal and gold prospects and leads extends from the northern flank of Mt Huxley to Great Lyell and Little Owen at the EL-1M/95 border (Figure 10).

From south to north the significant prospects and leads within this district are; Mountain Maid, Mount Ellen, Nasty Nob, Duke Lyell, Conglomerate Creek, Empress Lyell, Little Owen, Great Lyell and Hematite Tunnel (Harbon, 1999 T1999-002).

The N-S trend is prospective for the following reasons.

- Existence of a zone of sericite-chlorite alteration associated with the Nasty Nob Mn gossans carrying patchy base metal anomalies on a GLF type contact between volcanics and the Owen characterised by complicated imbricate wedges of volcanics overlying Owen (?like Gormanston).
- At Whip Spur Suite 2 andesitic volcanoclastics in a probable syncline core implies closeness to a VHMS favourable horizon, ie a Comstock analogue.

HX-1 is the only recent drill hole in the area. It was drilled in 1985 beneath a dipole-dipole IP anomaly adjacent to a soil geochemical anomaly, but found only black shales.

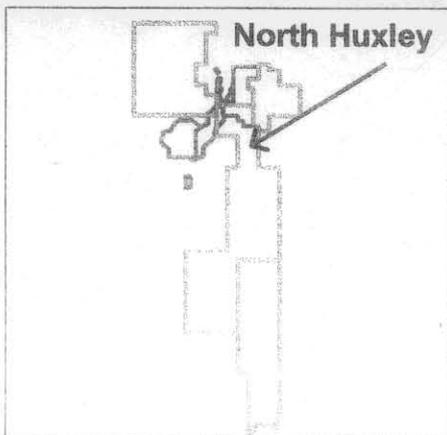
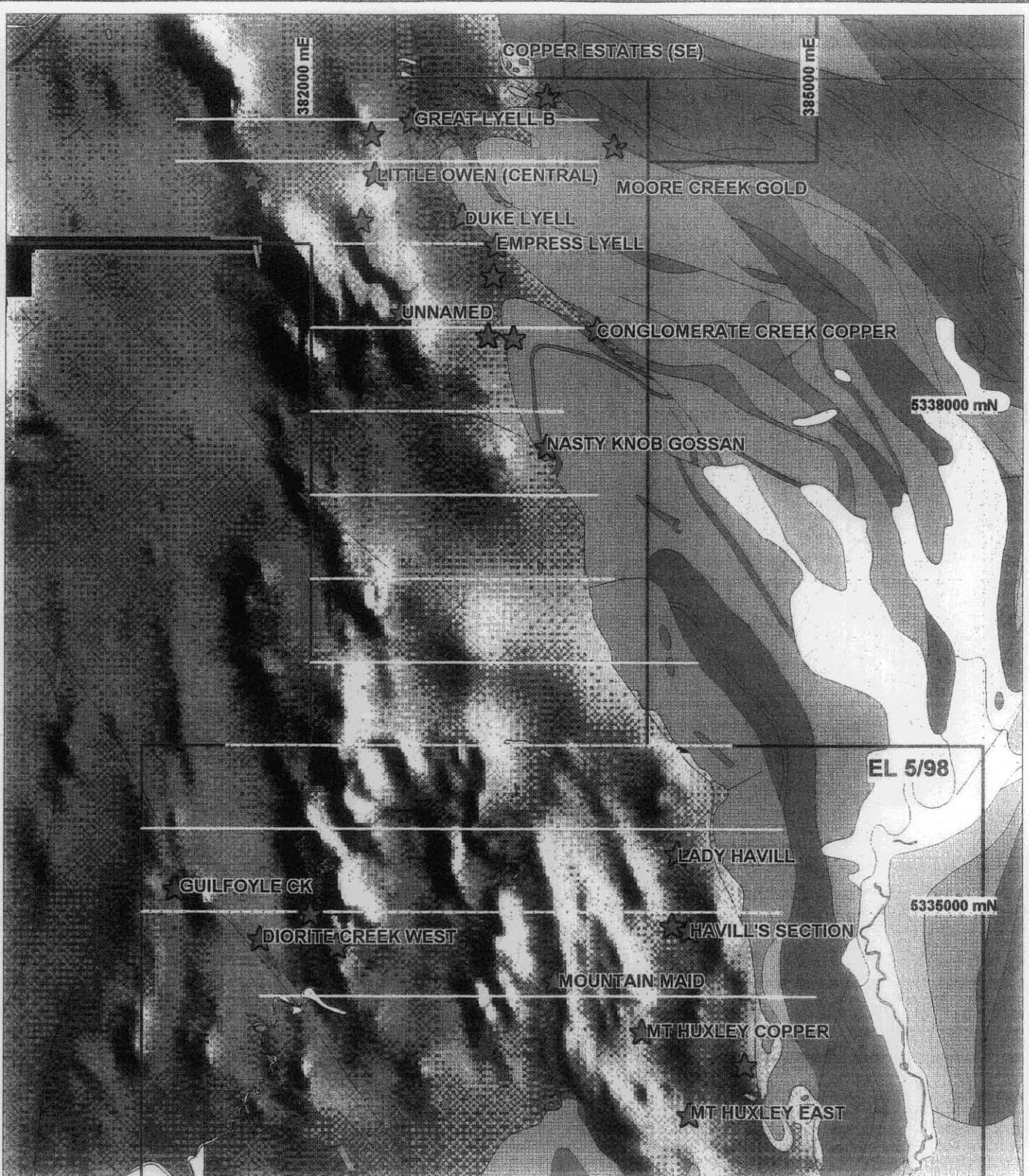
Previous BHP UTEM coverage has shown no large conductors except along the GLF / Owen contact and if the favourable Lower Tyndall horizon exists close to this contact, then the contact zone should be explored.

Three main prospect scale targets are recognised along the trend. In a review of the ground prior to relinquishment, RGC (Herrmann, 1997 in Vicary & Denwer, 1998 T1997-076), considered that Mountain Maid was the one prospect scale target that should be drilled, as a near surface gold target, because of the near surface IP anomaly and large alteration outcrop area.

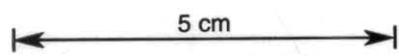
Only small prospector diggings exist at Mountain Maid but RGC work located a strong silica-pyrite alteration zone over 300 x 200 metres in CVC dacite. Best rock chip values of 0.31 ppm Au from an old trench and a strong chargeability-resistivity anomaly 100m west of trench and interpreted with a 75° east dip, are the basis for this target.

The Mount Ellen prospect consists of a 50 x 5 x 5 metre trench plus some small adits and shafts. Access and grid redeveloped were completed by CMT in 1998 and a stamp battery was located. Best RGC rock chip values from the workings are 5 m @ 2.18 ppm Au. Gold is associated with thin quartz veins and weak sericite alteration in dacitic lavas that are relatively unaltered around the workings. The Diorite Creek West alluvial workings are also considered part of the Mount Ellen prospect.

Nasty Nob is a 70m x 30m body of sericite altered CVC rocks, including cleavage parallel gossan zones. Kim Denwer (1998 review for CMT T1998 - 019) refers to a broad base metal anomaly from gossan sampling. The anomaly is 600 metres long, with best values to date of 4% Pb, 0.3% Zn, 0.1% Cu and 210 ppm Ag. This area requires re-mapping and a thorough regolith sampling program. The gossans appear to be contained in a block of volcanics surrounded by Owen Conglomerate but it is not clear whether the Tyndall-Owen contact is



Copper Mines of Tasmania Pty Ltd	
Figure 10 North Huxley Prospect Map Proposed CSAMT Grid	
Date: 2/4/2001	
Author: 194	
Office: Glavin	
Drawing:	
Scale: 1:0	Projection: AMG Zone 55 (AGD 66)



faulted or depositional. Therefore potential exists for the Comstock position to exist below Upper Tyndall cover.

*Future work:*

The area can be considered as the southern end of the Mt Lyell mineral field, with potential mineralisation under the Owen Conglomerate along the eastern edge of the trend. Given the success of CSAMT in detecting copper sulphide ore bodies at Mt Lyell, it is recommended that a 500 metre line spaced east-west survey be conducted (Figure 10). Detailed mapping and sampling and further compilation of previous data should also be undertaken to improve our understanding of the geology along the CVC – Owen contact.

*Jukes*

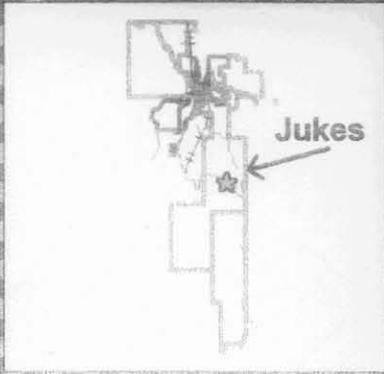
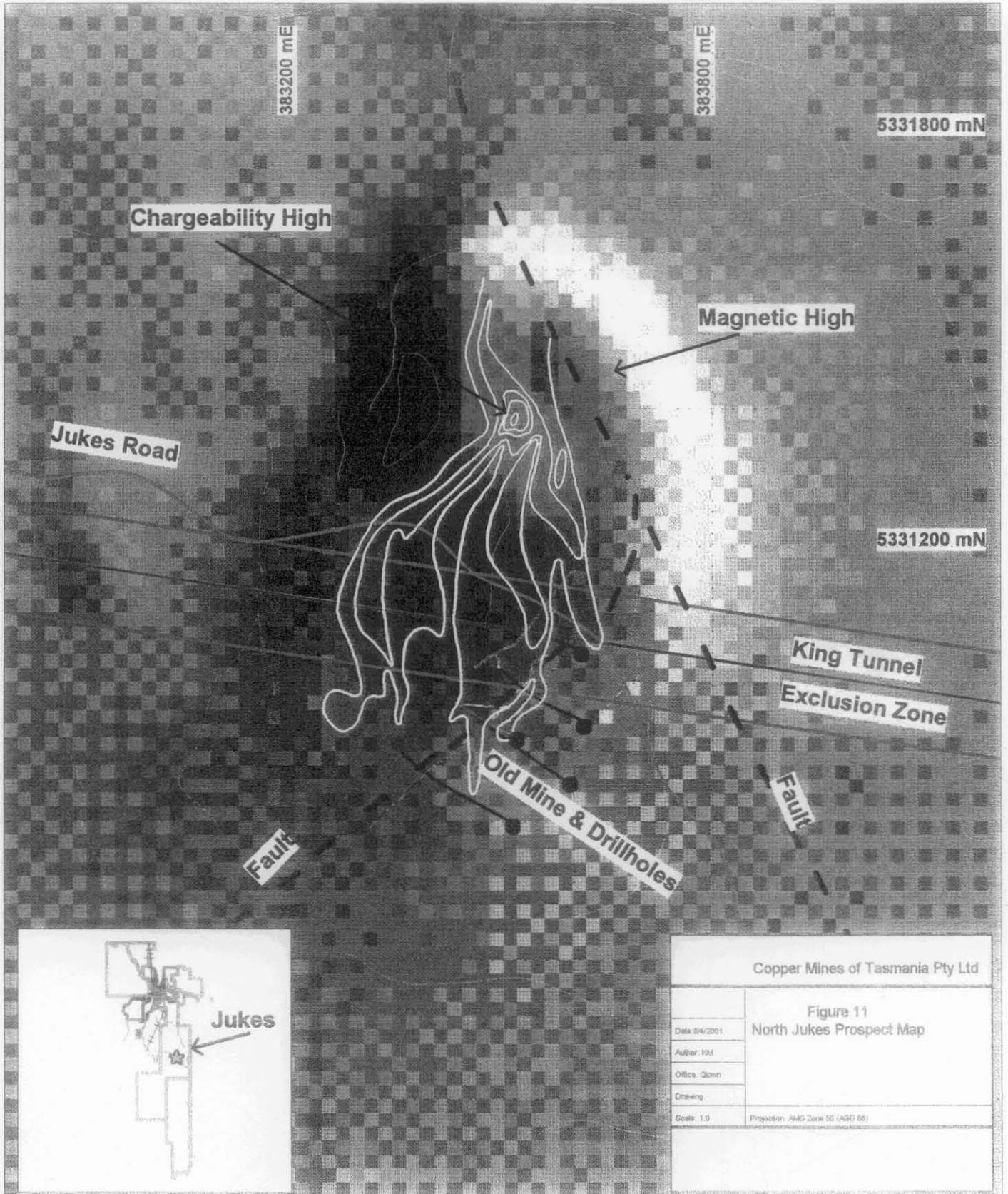
The Jukes Pty mine produced small tonnages of narrow width high-grade copper sulphide – gold ore around 1900, from two adits and a shaft. Several other exploration adits and shafts were developed in the general area (Figure 11).

Exploration between 1974 and 1997 has focussed almost entirely on chasing depth extensions under the old mine. Five DDHs (1 by INAL in 1974 and 4 by MLMR Co In 1982-84) returned one intersection of 13 m @ 1.6% Cu and 1.6 ppm Au but the other four hit only narrow widths at about 0.5% Cu (Corlett, 1996 in T1996-046). Several ore grade channel samples were also taken from the adits by MLMR Co.

2 m @ 5.68 % Cu, 5.8 ppm Au  
 5 m @ 1.7 % Cu, 1.6 ppm Au  
 16 m @ 1.7 % Cu, 1.4 ppm Au  
 14 m @ 1.03 % Cu, 1.2 ppm Au  
 9 m @ 1.55 % Cu, 1.56 ppm Au

All intersections show gold : copper ratios with about 4x the gold content of Prince Lyell ore and this characteristic is typical of mineralisation close to the Darwin Granite. It also provides a bonus in the value of exploration targets in this area.

A broad zone of alteration has been mapped along Jukes Road by RGC and PhD student Bill Wyman, containing narrow fault structures with up to 10 % Cu in spot chip samples (Wyman, 1996 in T1996-046), indicating a much broader extent to mineralisation than just around the old workings. MLMR Co and then RGC conducted grid based mapping, soil geochemistry, magnetics and electrical geophysics over the area between 1982 and 1997. An impressive anomalous zone to the north (down slope) of the workings, near the Jukes Comstock and Imperial Jukes adits was generated by CMT in this current review, using existing mapping, IP and aeromagnetics data (Figure 11). The Jukes Pty mineralisation in the old mine is contained in a magnetically low zone of chloritic alteration, whereas the untested North Jukes anomaly coincides with outcropping K feldspar-magnetite-barite alteration (Doyle, 1990). Recent reconnaissance by CMT geologists (CRM & KM) located outcropping sulphides and barite in the target area. There is also some indication from the Jukes Road sampling that high grade copper occurs with magnetite (Denwer, 1998 T1998-019), so it is possible that all previous mining and exploration drilling has been on the southern edge of the actual ore body (Figure 11).



Copper Mines of Tasmania Pty Ltd	
Figure 11 North Jukes Prospect Map	
Date: 04/2001	
Author: JSM	
Office: Queen	
Drawing:	
Scale: 1:0	Projection: AMG Zone 55 (AGD 66)

5 cm

The geophysical anomalies on the northern target comprise a strong magnetic high and coincident gradient array IP chargeability high 6x background. Genie ground EM produced no response over the old workings but a subtle anomaly coinciding with the chargeability high and a more diffuse resistivity low (Corlett, 1996 in T1996-046).

RGC recommended a drill hole (JP-5) collared at 5,331,404 mN, 383,582 mE, drilled at -60 to 250 (AMG or magnetic?), to intercept the main IP anomaly at 80 - 140 metres and an offset ground magnetics feature at 450 metres. The concept was based on a porphyry model with magnetic granite at depth. The hole was not drilled because the company sought a stand alone 10 Mt deposit, and a combination of the anomaly size and the mistaken belief that a 200 metre exclusion zone surrounds the King Tunnel (which is directly under the Jukes Pty workings but south of the North Jukes target - Figure 11) downgraded the prospect for RGC. CMT has received documentation from HECEC confirming that the exclusion zone radius is 70 metres, not 200 metres in the Jukes area, so space exists for a substantial ore body above and to the north of the tunnel. The fact that CMT have a working mill some 20 minutes trucking time from Jukes is also a major positive factor affecting the ranking of this prospect.

*Future work:*

For the reasons outlined above, the North Jukes prospect is rated as the best prospect on EL Queenstown and it is recommended that drill hole planning proceed as an exploration priority. Further interpretation of existing dipole-dipole IP, combined with prospect mapping, is needed before the drill site and azimuth is finalised

In summary, Garfield is a poor prospect for CMT, with low grades, a remote location and few opportunities for further drilling. The North Huxley trend is effectively the southern tail of the Mt Lyell field and the ground should be explored by CMT as a longer-term regional scale exploration target. North Jukes should be drilled as a priority.

It is recommended that the 8 x 5 km<sup>2</sup> block north of AMG 5,320,000 m N be relinquished immediately and that CMT concentrate all effort on this EL into exploring North Jukes and North Huxley.

**Summary of new work program**

*Direct Costs:*

Item	SAUS
Complete compilation of anomaly data - geology , drafting time	\$5k
Cut walking track, drill pad, dam, site rehab - contract cutters	\$5k
Drill 400 m DDH - drilling, geology time, core processing, assays	\$60k
Helicopter support - mob/demob, core transport (3 days)	\$15k
DHEM (2days), site rehab - contractors	\$5k
Reporting - geology, drafting time	\$5k
	<b>Total Jukes</b>
	\$95k
CSAMT survey at North Huxley - grid cutting, field survey, data processing, interpretation and reporting	\$105k
	<b>Total EL</b>
	\$200k

In the event that CMT decides to hold the entire EL, the above program would not change, as there are no other targets worthy of expenditure apparent at present.

## 6. EL 16/98 - MT DARWIN (60 KM<sup>2</sup>)

### Status

- 5 year licence, Year 1 ends 4 Sept 2001 (report due 4 Aug 2001).
- Current expenditure deficit = \$0
- Potential for partial relinquishment = fair (southern and western portions could be relinquished if focus was on East Darwin Cu-Au and blind targets beneath eastern strip of Eastern Sequence/Tyndall Group, which has had no exploration and has reasonable access. Unfortunately the new MRT airborne EM survey will cover mainly the less prospective western half of the EL so there is a strong case for not relinquishing any ground unless it is sterilised by the EM).
- Potential for JV = poor as a stand alone property (no advanced prospects, no value added by CMT and the legal issue of the Platsearch claim to a free carried interest) but fair if combined with contiguous ground from EL Queenstown and promoted as a greenfields opportunity to explore target horizons near Garfield as well as eastern Mt Darwin. Such an approach could attract a serious base metal company, pending a legal clearance on the Platsearch claim for a 15% free carry on this EL, which at the time of writing has not been finalised.
- Minimum expenditure to next licence anniversary, assuming no relinquishment (4 Sept 2001) = \$78k (an option would be to spend less this year, so long as \$163k is spent between now and the end of Year 2 = 4 September 2002).

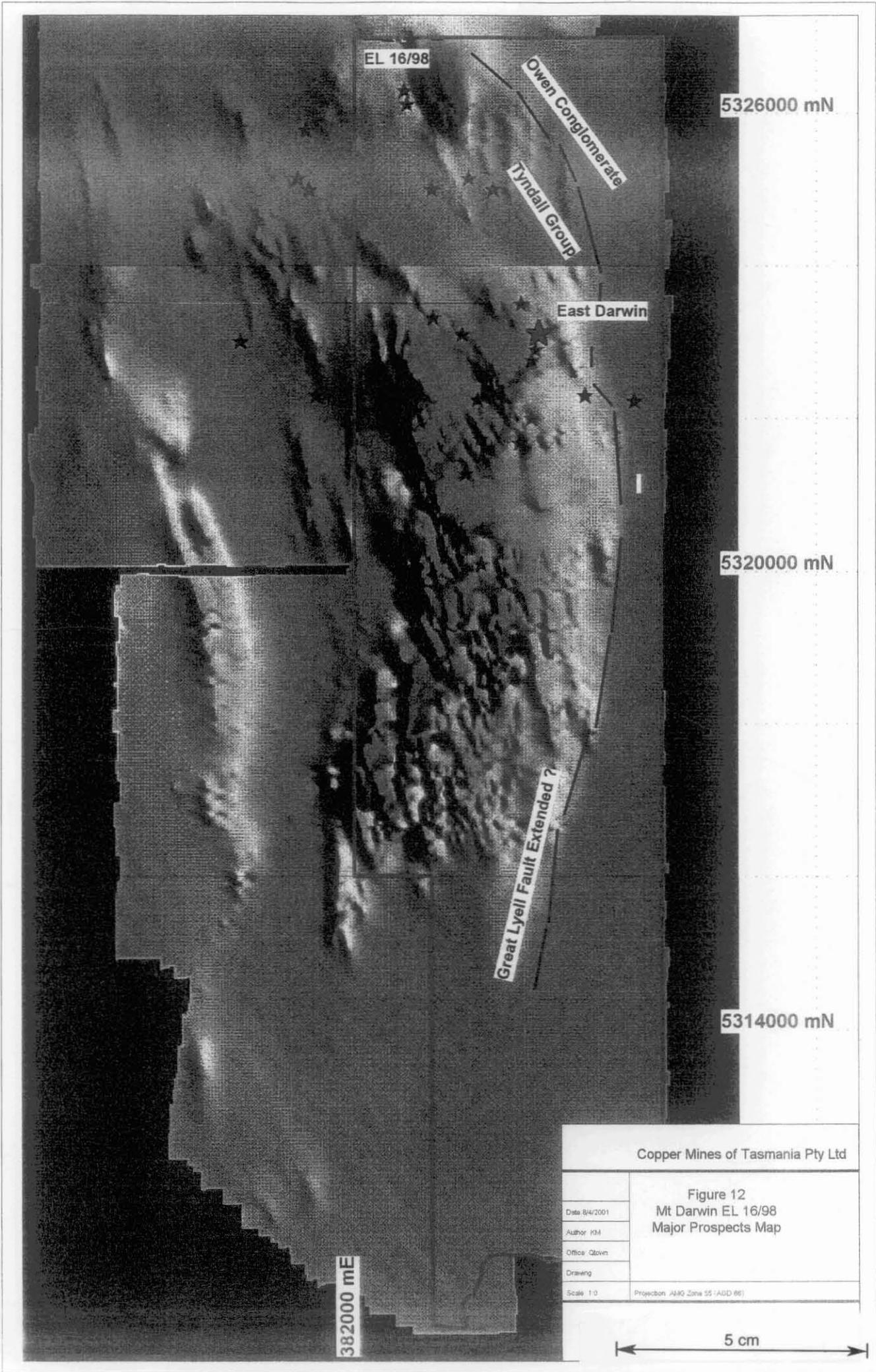
### *Prospects and Leads*

#### *a) Identified Cu - Au prospects*

A review of previous exploration by Platsearch NL identified 23 sites with known Cu-Au or Au mineralisation. All have had some ground exploration by previous companies (refer Morrison, 1997 Review of Previous Exploration T1997-046) and East Darwin is the only site, which may have sufficient potential for CMT to follow up. The EL lacks modern airborne geophysics coverage, especially for sub-surface mapping on the eastern side (refer John Bishop report T1997-043 and his 1990 review for BHP- which we don't have) and effective new exploration would definitely benefit from modern helicopter magnetic, radiometric (Kspar / albite alteration around the granite) and Dighem surveys. The 1995 Platsearch helimagnetic survey was never successfully levelled (Figure 12) and according to MRT geophysicist, Bob Richardson (who himself tried to work the data), the survey needs repeating (and of course will be by MRT - but not with sufficient EM on the eastern side). Helimagnetics and EM were flown by International Nickel (INAL), in JV with BHP, in 1972-74. This work needs reviewing.

#### *East Darwin Cu -Au prospect*

This is the most substantial abandoned working on the EL. It comprises 6 adits, some costeans and newly exposed mineralisation on modern exploration tracks. The mine was intended to supply the Crotty Smelter but production of only 9.5 tonnes @ 6% is recorded, in the 1890s. The smelter closed in 1903. The prospect is located at the CVC or EQPS -



Tyndall contact (depending on which map is used) and mapping by Gadaloff (1996) shows the prospect on a steeply east dipping structure, under Tyndall Group cover. The Bill Wyman PhD study (we don't have his thesis yet) ties East Darwin to the Jukes prospects via a genetic link to the Darwin Granite. In general this ore type carries higher gold credits than Prince Lyell style.

In 1959 the BMR did ground magnetics, SP and EM surveys and in 1973 INAL did IP surveys and 3 diamond drill holes. They concluded that the prospect was too small.

*Future work:*

East Darwin is considered a small surface analogue of the main blind targets deeper and to the east, but in itself is a low priority target. Drill core and adits (if accessible) could be remapped and previous geophysics needs collating and re-interpreting. Existing access to East Darwin and Intercolonial Spur, to the north, is good and should be used for traverse mapping and sampling for lithogeochemistry, to solve the Tyndall - EQPS stratigraphic problem.

**b) Conceptual Cu-Au Target**

The major potential on the EL is the belt of MRV rocks along the eastern margin of the Mt Darwin range. These rocks are of uncertain affinity within the MRV stratigraphy and require further mapping to distinguish boundaries between Eastern Quartz Phyric Sequence (the eastern CVC time correlate) and Tyndall Group (younger than both CVC and EQPS). Regionally this belt appears to correlate N-S with the Burbury Volcanics Tyndall Group rocks and this may explain the lack of prospects east of the contact between this belt and the CVCs to the west. The Platsearch literature review shows that only one of the 23 known mineral occurrences on the EL locates east (and only just) of the probable unit boundary.

The basic problem is that quartz porphyries are now recognised throughout the Tyndall Group and in earlier mapping some of them were assigned as EQPS. This is a positive exploration scenario because it allows potential for both a southerly extension of the Great Lyell Fault and the base Tyndall - upper CVC prospective horizon to be buried under Tyndall cover along some 15 km of strike (Figure 12).

*Future work:*

A program of reconnaissance mapping, lithogeochemistry and petrography, in combination with the new magnetics, should solve the stratigraphy question. If Tyndall Group cover and faulting exist, it is likely that helicopter EM and a combination of grid based CSAMT and deep leach geochemistry will be needed to generate drill targets. This is a 'greenfields' exploration program and it has the best potential in the region to reveal a new copper ore body from a conceptual basis.

## Summary of new work program

### Direct Costs:

Item	\$AUS
Collate and interpret previous geophysics - geology, drafting time	\$10k
Collate existing rock geochemistry data and sample traverses for regional correlation with Tyndall and EQPS - geology time, assays	\$10k
CSAMT on existing tracks – contactors (11 km)	\$30k
Review MRT EM data in early 2002 and relinquish western and southern portions of EL if sterile - geology time	\$5k
<b>Total</b>	<b>\$55k</b>

## 7. OVERVIEW AND RECOMMENDATIONS

The aims of the exploration program are to responsibly manage the companies licences and maximise the chances of cost effectively discovering copper gold or copper ore bodies having both favourable metallurgy and location with respect to existing road infrastructure for mining and transport to the Queenstown operation. With these aforementioned aims in mind, the following recommendations are made for the four CMT Exploration Licences.

**EL Yolande River** - Negotiate a JV with Goldfields as soon as possible, for the total licence area, requiring a free carry and no further expenditure by CMT.

**EL Linda** - Explore the Burbury, Gormanston, King Lyell and Chamounix prospects by spending \$130,000 to reach the pre-drill decision point on the four prospects, then evaluate the outcome.

**EL Queenstown** - Relinquish the southern 40 km<sup>2</sup> of the EL immediately. Explore the Jukes prospect by spending \$95,000 including one drill hole to reach the next decision point. Explore the North Huxley trend with a CSAMT survey costing \$105,000, then review.

**EL Mt Darwin** – Establish the stratigraphic and structural relationships of the Owen/MRV contact along the eastern margin of the licence and explore for sub-surface conductors by spending \$55,000 to reach pre-drill or down grade decision point.

**Total EL Direct Cost Budget = \$AUS 385,000**

*(NB if El Yolande River is retained by CMT, the budget increases by \$90,000 to \$475,000)*

The best prospects for discovering copper sulphide + gold ore, metallurgically similar to current production are; Jukes, Gormanston and Burbury. Ore grades are known in the old Jukes workings and a good drill target based on coincident potassic-magnetite-barite alteration and a chargeability anomaly remains untested immediately north of the workings. At Gormanston, strong silica-sericite-pyrite alteration intersected in three previous drill holes appears to be the edge of a larger system, which may continue to the South Lyell prospect

inside the Mine Lease. Burbury is a new prospect discovery. Its surface expression includes copper-gold mineralisation and it meets the stratigraphic and possibly the structural criteria for a high-ranking prospect. Further geology, geophysics and geochemistry are needed to determine whether a convincing drill target exists at Burbury.

Real potential exists to generate additional similar deposits along the North Huxley trend.

There is high potential to drill out a substantial resource of ore grade copper in the copper clays deposits. The major uncertainty on this prospect is economic and environmental viability of a stand alone copper clays mining and milling operation.

Chamounix Zinc is a high-ranking prospect on geological grounds and warrants exploring to the next decision point as discussed above. As a zinc target it obviously does not rank as highly as the other prospects in terms of meeting current company aims.

East Mt Darwin has the best potential in the region to reveal a new copper ore body from a conceptual basis.

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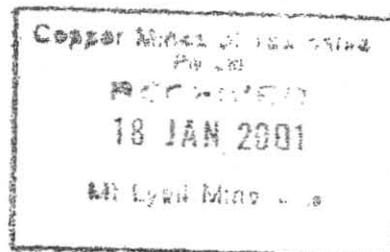
**APPENDIX 1**



## MINERAL RESOURCES TASMANIA

A Division of  
DEPARTMENT of INFRASTRUCTURE,  
ENERGY and RESOURCES

Enquiries: Dennis Burgess  
Phone: (03) 6233 8341  
Your Ref:  
Our File: ELs 52/1994, 27/1995, 5/1998 & 16/1998  
IDRB019:SK



16 January 2001

Mr Will Godsall  
Copper Mines of Tasmania Pty Ltd  
PO Box 84  
QUEENSTOWN TAS 7467

Dear Will

**EXPENDITURE COMMITMENTS  
EXPLORATION LICENCES 52/1994, 27/1995, 5/1998 AND 16/1998  
COPPER MINES OF TASMANIA PTY LTD**

Further to our recent discussion at Rosny Park I attach for your information a summary of expenditure commitment for each of the exploration licences held by Copper Mines of Tasmania Pty Ltd (CMT) in the vicinity of Queenstown.

I understand that this information was sent to Daniel Knights of CMT on 10 May 2000.

There is one comment that needs to be made in regard to EL 52/1994.

Because EL 52/1994 is a 10 year licence there would be an expectation from Mineral Resources Tasmania that a reduction of 50% in area take place at the end of the extended 5<sup>th</sup> year - i.e. at 13 January 2002.

You will note, that the last year of each licence's commitment list is in accord with a 2 year licence extension.

The manner in which the licence extension will take place is to be determined but will probably be done at the same time as some changes arising out of the agreement Act are implemented on each licence.

Please ring me on (03) 6233 8341 if you require further information.

Yours sincerely

Dennis Burgess  
REGISTRAR OF MINES

Encl.

## COPPER MINES OF TASMANIA

## EXPLORATION LICENCES - EXPENDITURE COMMITMENTS

*EXEMPTION FROM EXPLORATION ACTIVITIES GRANTED  
1/4/99 TO 30/3/2001***EL 52/94 - LINDA - ISSUED 13 JANUARY 1995 FOR 10yrs**

EXPENDITURE UP TO 31/12/1998 = \$366,968 (YR 4 OF LICENCE)

*EXPENDITURE COMMITMENTS FOR*

YEAR 5 - 18.5skm x \$2000 = \$37,000 (13/1/1999 to 13/1/2002) - incl 2yr exemption  
YEAR 6 - 18.5skm x \$2000 = \$37,000 (13/1/2002 to 13/1/2003)  
YEAR 7 - 18.5skm x \$5000 = \$92,500 (13/1/2003 to 13/1/2004)  
YEAR 8 - 18.5skm x \$5000 = \$92,500 (13/1/2004 to 13/1/2005)  
YEAR 9 - 18.5skm x \$10,000 = \$185,000 (13/1/2005 to 13/1/2006)  
YEAR 10 - 18.5skm x \$10,000 = \$185,000 (13/1/2006 to 13/1/2007)

**EL 5/98 - QUEENSTOWN - ISSUED 1 MAY 1998 FOR 5yrs***EXPENDITURE COMMITMENTS FOR*

YEARS 1 & 2 - \$570,000.00 (1/5/98 to 1/5/2002) - incl. 2yr exemption  
YEAR 3 - 96skm x \$1000.00 = \$96,000 (1/5/2002 to 1/5/2003)  
YEAR 4 - 96skm x \$2000.00 = \$192,000 (1/5/2003 to 1/5/2004)  
YEAR 5 - 96skm x \$5000.00 = \$480,000 (1/5/2004 to 1/5/2005)

SPENT UP TO 31/12/98 - \$72,918

**EL 16/98 - MT DARWIN - ISSUED 4 SEPTEMBER 1998 FOR 5yrs***EXPENDITURE COMMITMENTS FOR*

YEARS 1 & 2 - \$169,000.00 (4/9/98 to 4/9/2002) - incl 2yr exemption  
YEAR 3 - 60skm x \$1000.00 = 60,000 (4/9/2002 to 4/9/2003)  
YEAR 4 - 60skm x \$2000.00 = \$120,000 (4/9/2003 to 4/9/2004)  
YEAR 5 - 60skm x \$5000.00 = \$300,000 (4/9/2004 to 4/9/2005)

SPENT UP TO 31/12/98 - \$6206

**EL 27/95 - YOLANDE RIVER - ISSUED 24 MAY 1996 FOR 5yrs***EXPENDITURE COMMITMENTS FOR:*

YEAR 1 - \$62,000 (24/5/96 - 24/5/97)

YEAR 2 - 64skm x \$500 = \$32,000 (24/5/97 - 24/5/98)

YEAR 3 - 64skm x \$1000 = \$64,000 (24/5/98 - 24/5/2001) - incl 2yr exemption

YEAR 4 - 64skm x \$2000 = \$128,000 (24/5/2001 - 24/5/2002)

YEAR 5 - 64skm x \$5000 = \$320,000 (24/5/2002 - 24/5/2003)

*SPENT UP TO 31/12/98 - \$134,917*

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*Note – in this report all documents are referenced by author in the normal way for published scientific papers. Unpublished company exploration reports and research project reports are also indicated by their Inmagic catalogue T number (CMT Library, Mt Lyell) and/or their Mineral Resources Tasmania Open File TRC number (MRT Library, Hobart), where these numbers have been identified.*

## CMT Exploration Program - Expenditure Schedule

	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Totals
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
<b>Mine Lease</b>														
Cape Horn	50,000													93,000
Comstock		185,000												185,000
Anaconda			100,000											100,000
CSAMT								10,000	29,000					39,000
Queen Lyell					5,000									185,000
Glen Lyell - South Lyell				5,000							20,000	100,000		245,000
Data Review & Compilation														0
Annual Report														10,000
														0
<b>EL 5/98 Queenstown</b>														0
Jukes Prospect		5,000												90,000
North Huxley CSAMT									32,000	73,000				105,000
Annual Report											5,000			5,000
Data Review & Compilation														0
														0
<b>EL 27/95 Yolande River</b>														0
Farm out tenement														0
														0
<b>EL 52/94 Linda</b>														0
Burbury Prospect									10,000	20,000	40,000			70,000
Chamanoux Prospect			40,000											40,000
Copper Clays			10,000											10,000
Gormanston		5,000												5,000
Annual Report														5,000
Data Review & Compilation														0
														0
<b>EL 15/98 Mt Darwin</b>														0
East Mt Darwin Prospect	10,000	10,000									30,000			50,000
Annual Report			5,000											5,000
Data Review & Compilation														0
														0
<b>Totals</b>	<b>103,000</b>	<b>205,000</b>	<b>155,000</b>	<b>5,000</b>	<b>5,000</b>	<b>10,000</b>	<b>5,000</b>	<b>55,000</b>	<b>201,000</b>	<b>183,000</b>	<b>195,000</b>	<b>120,000</b>		<b>1,242,000</b>

CMT Exploration Program - Activity Schedule

	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01	Jan-02	Feb-02	Mar-02	Apr-02	May-02
<b>EL 5/98 Cape Horn</b>	850m DDH												
<b>EL 5/98 Cape Horn</b>		850 DDH											
<b>EL 5/98 Cape Horn</b>			Drilling										
<b>EL 5/98 Cape Horn</b>								Grid Cutting/Peg	CSAMT Survey				
<b>EL 5/98 Cape Horn</b>				Target Gen & Compl									
<b>EL 5/98 Cape Horn</b>					Compilation/evaluation of CH, CK, Ana DHS								
<b>EL 5/98 Cape Horn</b>						Reporting							Annual Review & Budget
<b>EL 5/98 Queenstown</b>													
<b>EL 5/98 Queenstown</b>		IP inversion + Planning											
<b>EL 5/98 Queenstown</b>								Site Prep & Drilling					
<b>EL 5/98 Queenstown</b>									Grid Cutting/Peg	CSAMT Survey			
<b>EL 5/98 Queenstown</b>											Annual Report		
<b>EL 5/98 Queenstown</b>													Annual Review & Budget
<b>EL 27/95 Yolande River</b>													
<b>EL 27/95 Yolande River</b>	JV Tenement												
<b>EL 52/94 Linda</b>													
<b>EL 52/94 Linda</b>													
<b>EL 52/94 Linda</b>									Grid Cutting/Peg	Geol Map + Soil	IP Survey		
<b>EL 52/94 Linda</b>		Gravity Survey											
<b>EL 52/94 Linda</b>			Mining Study										
<b>EL 52/94 Linda</b>		Data Comp (Corbett)											
<b>EL 52/94 Linda</b>							Annual Report						
<b>EL 52/94 Linda</b>													Annual Review & Budget
<b>EL 15/98 Mt Darwin</b>													
<b>EL 15/98 Mt Darwin</b>	Geophys + Litho Geochem Compilation												
<b>EL 15/98 Mt Darwin</b>			Annual Report								CSAMT on Tracks		
<b>EL 15/98 Mt Darwin</b>													Annual Review & Budget