

000

68 001

THE MOUNT LYELL MINING AND RAILWAY COMPANY LIMITED

ADDITIONAL MINE LEASE EXPLORATION PROGRAMME

(ROYALTY - PROJECT 293 - 1980/81 & 1981/82)

ML 30M/80

FINAL REPORT

Date: 14/7/82

R. M. D. Meares
(Chief Geologist)

M. J. Bird
(Senior Mine Geologist)

M. J. Bird.

T. T. Carswell.
for R.M.D.M.

CONTENTS

1. INTRODUCTION
2. PHASE I EXPLORATION - ANACONDA DRILLING
 - 2.1 Introduction
 - 2.2 Surface Drilling
 - 2.3 Underground Drilling
3. PHASE II EXPLORATION
 - 3.1 Introduction
 - 3.2 Gridding
 - 3.3 Geophysics
 - 3.4 Geochemistry
 - 3.5 Drilling
4. EXPENDITURE
5. CONCLUSIONS

REFERENCES

1. INTRODUCTION

During early 1980, discussions were held with the Tasmanian Government regarding the possibility of carrying out additional Mine Lease exploration during 1980/81 and 1981/82 with total expenditure equivalent to the assessable royalty for 1979/80 (\$385,000), in place of paying the amount to the state as royalty.

This proposal was accepted by the State Government and the approved programme included:

- (i) 2000m of diamond drilling in the Anaconda area, budgetted at \$165,000 including \$17,000 of capital equipment purchases.
- (ii) A reconnaissance exploration program to complete the initial evaluation of near-surface targets on the Mine Lease with emphasis on the Western section of the lease, followed by diamond drilling of resulting targets. Work approved for this program included establishment of reconnaissance grid (\$25,000), geophysical survey (\$39,000), analytical geochemical costs (\$6,000), and 2500 metres of diamond drilling (\$185,000).

The approved program totals \$420,000 the estimated 1979/80 royalty at the time the program was proposed. The final budget was subsequently reduced to \$385,000 based on the actual royalty payable.

Details of the proposed program are outlined in a Mount Lyell internal report titled "The Proposed Additional Mine Lease Exploration Programme at Mount Lyell" by K. O. Reid, dated 8th July, 1980.

2. PHASE I EXPLORATION - ANACONDA DRILLING

2.1 Introduction

The Anaconda drilling program consisted of 1998m of diamond drilling comprising 2 surface holes (total 1202.9m), and 4 underground holes (total 795.1m). No significant mineralisation was intersected in this program.

2.2 Surface Drilling

The surface drilling program was carried out by Associated Diamond Drillers between December, 1980 and February, 1981. Both holes were collared from sites adjoining the Cape Horn road, intersected the Western Thar's mineralised zone in their copper sections, and terminated in Owen Conglomerate. Only trace disseminated pyrite and chalcopyrite were intersected in each hole. Hole numbers are WT 48 (496.3m) and WT 50 (706.6m):

D. D. H. WT 48

Collar co-ordinates: 6214.741mN, 4747.946mE AMG 392 NS 0, 534 3564 N
 Collar R. L. : +342.019m In Doris
 Collar bearing 44° : dip-75°
 Depth : 496.3m
 Drilling dates : 2.12.80 - 12.1.81
 Purpose : To test the Western section of the Anaconda zone on section 12 at R. L. 00m.
 Brief log: 0-490.2m: Altered volcanics (Hematitic 447.5-490.2m)
 490.2-496.3m: Owen Conglomerate

D.D.H. WT 50

Collar co-ordinates: 5942.33mN, 4851.729mE AM6 381379E 5343564M
 Collar R.L. : +341.489m
 Collar bearing 46°, dip -69°
 Depth : 706.6m
 Drilling dates : 13.1.81 - 25.2.81
 Purpose : To test the Western section of the Anaconda zone
 on section 20 at R.L. 50m.
 Brief Log: 0-702.4m: Altered volcanics, including Western Tharsis zone
 702.4-703.4m: North Lyell Fault
 703.4-706.6m: Owen Conglomerate

2.3 Underground Drilling

Mount Lyell drilling crews carried out the Anaconda underground drilling program from cuddies in the Crown 11.2.8 drive between August, 1981 and March, 1982. The program was designed to test the Eastern section of the Anaconda zone. Only trace disseminated pyrite and chalcopyrite were intersected. Four holes totalling 795.1m were completed: NL 1094 (211.1m), NL 1095 (205.0m), NL (213.3m) and NL 1097 (162.0m).

D.D.H. NL 1094

Collar co-ordinates: 6269.339mN, 5360.93mE
 Collar R.L. : 202.538m
 Collar bearing 28° dip -80°
 Depth : 211.1m
 Drilling dates : 26.8.81 - 13.10.81
 Purpose : To test the Eastern section of the Anaconda zone
 on section 25 at R.L. 00m.
 Brief Log: 0-206.0m: Sericitised felsic tuffs
 206.0-210.4m: Hematite breccia
 210.4-211.1m: Owen Conglomerate

D.D.H. NL 1095

Collar co-ordinates: 6269.277mN, 5358.752mE
 Collar R.L. : 202.564m
 Collar bearing 347°, dip -79.5
 Depth : 205.0m
 Drilling dates : 15.10.81 - 14.12.81
 Purpose : To test the Eastern section of the Anaconda zone
 on section 22.5 at R.L. 00m
 Brief Log: 0-200.3m : Sericitised felsic tuffs
 200.3-202.4m : Hematite chert breccia
 202.4-205.0m : Owen Conglomerate

D.D.H. NL 1096

Collar co-ordinates: 6265.787mN, 5357.125mE
 Collar R.L. : 203.708m
 Collar bearing 224°, dip 0° (horizontal)
 Depth : 217.3m
 Drilling dates : 16.12.81 - 9.2.82
 Purpose : To test the Eastern section of the Anaconda zone
 on section 25 at R.L. 200m
 Brief Log: 0-217.3m: Sericitised felsic tuffs and lavas.

D.D.H. NL 1097

Collar co-ordinates: 6265.787mN, 5357.125mE
Collar R.L. : 203.708m
Collar bearing 224⁰, dip 0⁰ (horizontal)
Depth : 217.3m
Drilling dates : 16.12.81 - 9.2.82
Purpose : To test the eastern section of the Anaconda
zone on section 15 at R.L. 123m.
Brief Log: 0-162.0m: Sericitised felsic tuffs and lavas.

3. PHASE II EXPLORATION

3.1 Introduction

The reconnaissance exploration program to complete the evaluation of near-surface targets on the Mine Lease consisted of gridding, extensive geophysical surveys, a local soil and rock geochemical survey, and diamond drilling. The initial reconnaissance geophysical survey (gradient array I.P. and ground magnetics) failed to locate any significant, un-tested, anomalies. Following a subsequent review of all previous geophysical survey on the Mine Lease, it was decided to carry out a program of ground E.M. surveys to follow-up previously untested anomalies, and areas considered to have ore potential. This program located several E.M. anomalies, two of which were tested by surface diamond drilling (total 508.9m). No significant mineralisation was intersected during this drilling program.

3.2 Gridding

During the period October to December, 1980 the Mine Lease was gridded on 200m line spacing by contractors J. Dart and G. and M. Freeman. The grid was laid out on A.M.G. co-ordinates with the main baseline on A.M.G. north. A subsidiary baseline, perpendicular to the main baseline, was established on A.M.G. east along the Comstock Valley. These grids are respectively referred to as the Lyell Grid and the Comstock Grid. The area gridded extends from the Mine Lease boundary in the north, west, and south, to the Owen Conglomerate contact or West Lyell dumps in the east. In the Comstock Valley, the grid extends east to the lease boundary. Total line km gridded was 13.3km.

Each baseline was slope-corrected so that the traverse lines are exactly 200m apart where they cross the baselines. However, the traverse lines were not slope-corrected for cost reasons, and consequently the A.M.G. co-ordinates on the 25m spaced grid pegs are not 'true' A.M.G. locations. Traverse lines were cut and pegged on compass bearings. Of the total 133.3km, approximately 90km was pegged, while 40km was in ti-tree re-growth in the East Queen - Comstock Valley area and required cutting before pegging. In-fill cutting and pegging totalling 15.2km was carried out to reduce the line spacing on sections of the Comstock Grid to 100m. Sections of the Lyell Grid were also in-fill pegged.

Following the review of previous geophysical surveys, small, fully surveyed and slope-corrected grids were established in the North Lyell Blocks, Batchelors Quarry, south of West Lyell open-cut, Gormanston, Copper Estates, and Conglomerate Creek areas. In addition, sections of the imperial grid in the Anaconda area were re-pegged and new in-fill lines established. This program of detailed gridding was carried out during January - March, 1982.

3.3 Geophysics

3.3.1 Reconnaissance I.P. and Ground Magnetic Surveys

Following a detailed evaluation of the geophysical characteristics of the target mineralisation style (disseminated Py-Cpy bodies) the problem of spurious 'cultural' electrical noise around the mine, and the size of the survey area, it was decided to use time domain gradient array I.P. as the primary reconnaissance search technique to define anomalous zones, which would then be followed up with more detailed I.P. of E.M. techniques. Testing of the characteristics of electrical noise on the Mine Lease indicated that the main source of the noise was the underground electrical locomotives. Consequently the survey was run at times when the locomotives were not operating i.e. between 5am and 8am on weekdays, and on Saturdays and Sundays. To maximise available noise-free time, up to 5 reading crews operated at the same time. A ground

006

magnetic survey was also carried out, to assist differentiation of the volcanic stratigraphy. These surveys were conducted by Scintrex Pty. Ltd. between November, 1980 and February, 1981. Additional follow-up gradient array I.P. surveys were conducted on in-fill lines on the Comstock and Lyell grids in May, 1981.

Reports by Bishop (1980) and Street (1981) respectively detail the results of the orientation testing, and the gradient array I.P. and ground magnetic surveys.

These surveys failed to locate any significant, un-tested, anomalies. I.P. anomalies were delineated over the Glen Lyell and Western Tharsis areas, both being tested at the time as part of the Mine Lease broad anomalous area was defined in the SW corner of the Mine Lease, apparently caused by glacial deposits overlying Ordovician Gordon Limestone. The Western section of the Mine Lease did not produce any anomalous responses, and consequently the diamond drilling program in the initial proposal was not carried out.

3.3.2 Detail Ground E.M. Surveys

Following the failure of the gradient array I.P. survey to define anomalies and prospective areas, a comprehensive review and critical evaluation of all previous geophysical surveys on the Mine Lease was carried out by geophysical consultant Dr. J. Bishop. The results and conclusions of this review are presented in Bishop (1982a). In summary, the evaluation concluded that the initial 1934-1938 equipotential surveys were the most successful geophysical search techniques, and that detailed ground E.M. surveys over specific zones should be conducted to (i) more clearly define previously untested or partly-tested equipotential, S.P. or Turam ground E.M. anomalies, and (ii) evaluate areas considered to have ore potential. These areas and anomalies to be tested were selected following a review by M. Bird of all previous drilling on the Mine Lease. The program was designed primarily to search for small high-grade bornite deposits, similar to twelve West and North Lyell. Results of these surveys are detailed in Bishop (1982b).

Grounded-cable Turam surveys were conducted to better define previous anomalies in the Batchelor's Quarry, West Lyell South, North Lyell - Gormanston and Conglomerate Creek areas, and to evaluate the previously untested Copper Estates area. No significant anomalies were located in the Conglomerate Creek or Copper Estates areas. At Batchelor's Quarry, to the south-east of Lyell Tharasis, a -3.6° phase difference Turam anomaly was defined to the west of previous E.P. anomaly 14. The Turam anomaly was subsequently drilled with negative results. South of the West Lyell open cut, previous E.P. anomaly 24 was surveyed with Turam and a phase difference anomaly of -17.5° was located. This anomaly was subsequently drilled, intersecting pyritic felsic tuffs and lavas. No significant copper mineralisation was intersected. Turam surveys in the North Lyell-Blocks area during April - May, 1982, located a large anomaly $>-20^{\circ}$ phase difference, and several smaller more discrete anomalies. The large anomaly is considered to be a pyritic lens on strike from the Crown 3 deposit, while the smaller anomalies may be caused by bornite-rich sulphide lenses. Drilling of these anomalies is planned for 1982/83.

To investigate areas having potential for bornite mineralisation at depth (in excess of 100m), surveys were carried out using the Sirotem time domain ground E.M. system in the Anaconda and Gormanston areas. In addition, a test survey using the Crone Pulse E.M. (P.E.M.), system was conducted over Western Tharsis and at the Blocks. Both these time domain systems were found to be ineffective due to 'swamping' of true bedrock responses by cultural electrical noise (mainly from overhead power lines).

3.4 Geochemistry

As part of the reconnaissance program, a soil and rock chip geochemical survey was carried out on the Comstock grid, and the most northerly section of the Lyell grid, in conjunction with students from the University of Tasmania. Soil and rock chip samples were collected at 25m spacing on grid lines, and where possible, both the A and B/C soil horizons were sampled. All samples were assayed at the Mount Lyell laboratory by A.A.S. for Cu, Pb, Zn, Ag, Mn, Fe and Ba (sol). Although the data has not yet been plotted due to local minor grid line location problems, no significant anomalies appear to have been located.

3.5 Drilling

Two surface diamond drill holes totalling 508.9m were drilled by Mount Lyell crews during February - April, 1982, to test Turam anomalies near Batchelor's Quarry and south of the West Lyell open cut. NL 1098 (140.5m) collared west of Batchelor's Quarry in Owen Conglomerate at the south-eastern end of Tharsis Ridge. It was expected the hole would pass from conglomerate into altered volcanics hosting the source of the Turam anomaly. Due to the unexpectedly flat dip of the conglomerate contact ($< 30^\circ$), the hole remained in conglomerate to target depth, intersecting a fault in the conglomerate which appears to be the source of the Turam anomaly. WL 533 (368.4m) tested the source of a strong Turam anomaly south of the West Lyell open cut. The hole intersected a sequence of sericitised pyritic felsic tuffs and lavas. The core appears to contain insufficient sulphides to explain the Turam anomaly.

D.D.H. NL 1098

Collar co-ordinates: 5444.084mN, 5750.091mE AM6 382990E 5342654N
 Collar R.L. : 488.575m
 Collar bearing 43° , dip -40°
 Depth : 140.5m
 Drilling dates : 19.2.82-16.3.82
 Purpose : To test Turam anomaly west of
 Batchelor's Quarry
 Brief log: 0-140.5m: Owen Conglomerate

D.D.H. WL 533

Collar co-ordinates: 4259.583mN, 5694.349mE AM6 382760E 5341491N
 Collar R.L. : 453.809m
 Collar bearing 275° , dip -50°
 Depth : 368.4m
 Drilling dates : 29.3.82 - 27.4.82
 Purpose : To test Turam anomaly south of West Lyell open cut.
 Brief log: 0-368.4m: Sericitised - chloritised felsic lavas and tuffs;
 trace Cpy 180-201m, massive Py 170-180m.

SUMMARY OF EXPENDITURE ON ADDITIONAL MINE LEASE EXPLORATION PROGRAMME (ROYALTY PROJECT 293 1980/81 + 81/82)

COST ITEM		ACTUAL EXP 1980/81	ACTUAL EXP 1981/82	TOTAL EXP 1980/82
PHASE 1. ANACONDA EXPLORATION	DIAMOND DRILLING + SITE PREPARATION	76,740 (1203m)	30,919 (795m)	107,659 (1998m)
	SUPERVISION AND OVERHEADS	12,708	15,506	28,214
	CORE HANDLING + ASSAYING	21,076	5,968	27,044
	TOTAL	110,524	52,393	162,917
PHASE 2a GEOPHYSICAL SURVEYS OF WESTERN AND EASTERN SEQUENCES AND COMSTOCK	ESTABLISHMENT OF GRID(S)	33,007	2,666	35,673
	GEOPHYSICAL SURVEY(S)	75,104	60,091	135,195
	SUPERVISION AND OVERHEADS	NIL	NIL	NIL
	ANALYTICAL	NIL	4,811	4,811
	TOTAL	108,111	83,074	191,185
PHASE 2b FOLLOW UP DRILLING	DRILLING AND SITE PREPARATION	NIL	24,307 (509m)	24,307 (509m)
	SUPERVISION AND OVERHEADS	NIL	15,506	15,506
	CORE HANDLING + ASSAYING	NIL	5,968	5,968
	TOTAL	NIL	45,781	45,781
TOTALS		218,635	181,248	399,883

ACTUAL ASSESSED 1979/80 ROYALTY \$385,000

CAPITAL EXPENDITURE	AQ DRILL STRING	9,400
	BORE HOLE CAMERA	8,300
TOTAL PROJECT EXPENDITURE		\$417,583

5. CONCLUSIONS

- (i) Diamond drilling of the Anaconda zone failed to locate any significant mineralisation.
- (ii) The search for near-surface indications of Prince Lyell-style disseminated pyrite-chalcopyrite deposits on the Mine Lease using gradient array I.P. was unsuccessful. Consequently the potential of the Western and Southern sections of the lease to host such mineralisation in economic concentrations has been significantly down-graded.
- (iii) The revised program, designed principally to locate small, high grade bornite deposits close to the conglomerate contact, failed to locate any significant mineralisation. However, a Turam ground E.M. survey in the North Lyell-Blocks area located anomalies that may reflect deposits of this type. Drilling in this area will commence in 1982/83.

REFERENCES

1. Bishop, J. R., 1980. Comments on the proposed geophysical surveys over the Mine Lease, and measurement of electrical noise over the Mine Lease. Mitre Geophysics Pty.Ltd., report for the Mount Lyell Mining and Railway Company Limited.
2. Bishop, J. R., 1982(a). Proposed geophysical surveys on the Mount Lyell Mine Lease. Mitre Geophysics report for Mount Lyell.
3. Bishop, J. R., 1982(b). Final report on Mine Lease geophysical surveys, 1981-82. Mitre Geophysics report for Mount Lyell.
4. Reid, K. O., 1980. The proposed additional Mine Lease Exploration Programme at Mount Lyell. Mount Lyell internal report.
5. Street, G. J., 1981. Report on Electrical Induced Polarisation and Total Magnetic Field surveys over the Mine (Lyell) and Comstock grids near Queenstown, Tasmania, on behalf of the Mount Lyell Mining and Railway Company Limited Scintrex Pty. Ltd., report for Mount Lyell.