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THE MT. LYELL M. & R. CO. LTD.

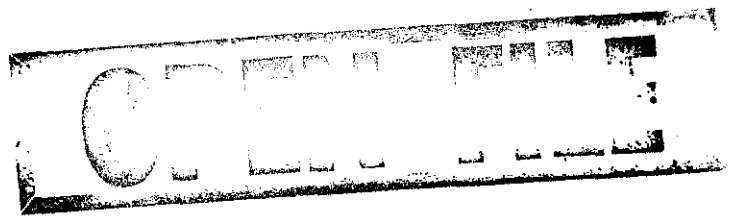
PRELIMINARY EXPLORATION PROPOSALS

FOR E.L. 21/76

(JUKES DARWIN AREA)

P. BROPHY

JANUARY 1977



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THE MOUNT LYELL MINING AND RAILWAY COMPANY LIMITED

PRELIMINARY EXPLORATION PROPOSALS FOR EL21/76 (JUKES-DARWIN AREA)

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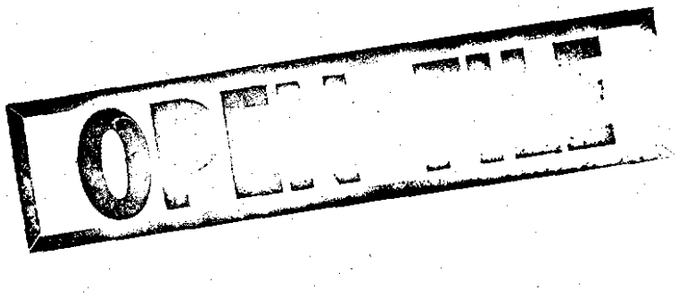

28th January, 1977

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PRELIMINARY REPORT MT. JUKES - MT. DARWIN AREA EL21/76

1. INTRODUCTION:

On 21st June, 1976, Mt. Lyell Mining and Railway Company Limited marked out an area of 144 square kilometres covering the Mt. Read Volcanic belt immediately to the south of EL10/69 (Dora-Huxley area). Application for an exploration licence was made to the Director of Mines on the 2nd July, 1976, which was subsequently granted on 1st September, 1976, as EL21/76.

2. PREVIOUS WORK:

2.1 EXPLORATION: Pre 1965

Mining in the Jukes-Darwin area commenced in 1897 following the initial discovery of copper mineralisation at Lake Jukes. Further mineralisation was located at East Darwin in 1898, and by 1890 several small prospecting companies were operating in the area. However, most activity had ceased by 1903 following the closure of the Crotty Smelters.

Various Mt. Lyell personnel worked in the area between 1901 and 1918, essentially on adit sampling and detailed investigation of specific prospects. In 1904, T. Batchelor and W. Cundy both inspected the area in general and they were followed by W. Morley in 1905-06, L. Williams in 1908, T. B. More in 1912 and finally R. Murray in 1918. At the same time a number of Government geologists had also reported on the area including Twelvetrees (1901) and Loftus-Hills (1914).

Little work was carried out between 1918 and the early 1950's apart from detailed sampling by G. Douglas for Mt. Lyell during 1940. Between 1953 and 1956, Mt. Lyell recommenced work in the area which included detailed investigation at the Lake Jukes Pty and East Darwin workings. However, further work was not recommended due to inadequate access and a greater priority for drilling on the Mt. Lyell Mine Lease.

In August, 1956, the Mt. Lyell Mining and Railway Company Limited with the Electrolytic Zinc Company A/Asia Limited (E.Z.) combined to form Lyell-E.Z. Explorations (L.E.E.) and between 1956 and 1962 undertook field work in the area as a part of a regional exploration programme in S.W. Tasmania. A complete reassessment of the Jukes-Darwin area was then undertaken due to the ability of E.Z. to carry out a drilling programme and the availability of a helicopter to transport drilling equipment and personnel.

Detailed exploration undertaken by L.E.E. between 1956 and 1962 included:

(i) two drill holes in the Lake Jukes mine area, neither of which intersected significant mineralisation (L1-659ft, L7-491ft)

(ii) a detailed ground E.M. (turam), magnetic and S.P. survey in the East Darwin area carried out by the Bureau of Mineral Resources (B.M.R.)

(iii) a helicopter-borne E.M. survey over Prince Darwin

(iv) an airborne magnetic and scintallometer survey over the complete Jukes-Darwin area.

(v) detailed ground magnetic survey at the Jukes Pty mine

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FIG. 1

AMG 385350E
5378800N

AMG REFERENCE POINTS ADDED

JUKES DARWIN AREA
E.L. 21/76

AMG 357500E,
5280600N

N

0 10 20 30
KILOMETRES

5 cm

HOLOCENE TO LATE CARBONIFEROUS		PERMIAN SEDIMENTS, JURASSIC DOLERITE AND YOUNGER SEDIMENTS.
EARLY DEVONIAN TO LATE ORDOVICIAN		ORDOVICIAN GORDON LIMESTONE AND SILURO - DEVONIAN ELDON GROUP SEDIMENTS.
		ORDOVICIAN OWEN CONGLOMERATE.
LATE CAMBRIAN		VOLCANOCLASTIC MUDSTONE SEQUENCES.
LATE CAMBRIAN TO EARLY CAMBRIAN		FOSSILIFEROUS MIDDLE AND LATE CAMBRIAN GREYWACKE SEQUENCES INCLUDING DUNDAS GROUP (1); UNFOSSILIFEROUS BEDS, INCLUDING CRIMSON CREEK FORMATION (4); DOMINANTLY ACID - INTERMEDIATE VOLCANIC AND ASSOCIATED ROCKS (2); DOMINANTLY BASIC - INTERMEDIATE VOLCANIC AND ASSOCIATED ROCKS (3).
PRECAMBRIAN		MASSIVE DOLOMITE/LIMESTONE SEQUENCES, QUARTZITE/MUDSTONE OF SUCCESS CREEK GROUP AND CORRELATES.
PRECAMBRIAN		METAMORPHIC ROCKS OF DOMINANTLY PELITIC AND ORTHOQUARTZITE SEQUENCES.

IGNEOUS ROCKS

LATE DEVONIAN	+ +	DOMINANTLY ADAMELLITE.
	+ +	GRANITE.
		COARSE GRAINED BASIC ROCKS.
CAMBRIAN		SERPENTINITE AND ASSOCIATED ROCKS.
	V V	DOMINANTLY ACID - INTERMEDIATE VOLCANIC ROCKS.
	Λ Λ	DOMINANTLY BASIC - INTERMEDIATE VOLCANIC ROCKS.

FAULT

GEOLOGICAL BOUNDARY

AFTER E. WILLIAMS, DEPARTMENT OF MINES, TASMANIA. 1978.

(vi) a regional mapping programme as a part of the general geological assessment of S.W. Tasmania.

(vii) detailed adit mapping with soil and/or rock chip sampling at selected locations within the area, but with a specific emphasis on Findons and Prince Darwin workings

Results of this exploration programme were not discouraging but full potential of the area was not adequately determined due to the need by L.E.E. to divert personnel and equipment to other parts of S.W. Tasmania.

United States Metals Refining Co. pegged the area in 1964 (EL2/64) and undertook limited field work, confined to mapping, adit sampling and S.P. surveys over the Prince Darwin, Findons and Jukes Pty mines. Main conclusions from their work were that the chloritic alteration zones were more extensive than had been originally thought and that a number of west trending faults existed which had not been mapped previously. No further exploration or diamond drilling was carried out in the area by this company.

2.2 EXPLORATION: 1965 - 1972

The Broken Hill Proprietary Company Limited (B.H.P.) acquired the area as a part of EL13/65 in 1965 which included a large area south of Macquaries Harbour. Details of work undertaken on Jukes Darwin are available only since 1969 and, at present, the assumption is made that B.H.P. concentrated their exploration effort mainly on this southern portion of the lease from 1965 to 1969.

Initial aim of the exploration programme was to construct an access road to Prince Darwin and test the extent of the mineralisation by diamond drilling. Later this programme was expanded to include the Intercolonial Spur area where known copper and baryte mineralisation outcrops at Hydes - Hal Jukes prospects and Taylours prospect respectively. Jukes Pty was also examined for possible extensions of the known pyrite-chalcopyrite mineralisation. Two holes were drilled from the same drill site south of the Prince Darwin adit. DDH1 was drilled west to test an original airborne E.M. anomaly outlined by L.E.E. which was co-incident with a rock chip copper anomaly. DDH2 was drilled east to test a zone of pyrite with a corresponding copper anomaly also from rock chip sampling.

In the Intercolonial Spur area detailed mapping, ground magnetics and rock chip sampling of adits was undertaken in addition to road construction and costeaning.

A percussion drilling programme was proposed for the Jukes Proprietary mine but was not started due to access problems. Instead, a ground magnetic and rock chip sampling programme was carried out in the area.

2.3 EXPLORATION: 1972 - 1976

Under a joint venture agreement with B.H.P., International Nickel Australia Limited (I.N.A.L.) took over exploration of the Jukes Darwin area in September, 1972. Initial investigations were carried out by I.N.A.L. to determine the regional setting and to delineate areas of interest. This involved photogeological mapping, surface mapping, geochemical orientation studies and the combined airborne electromagnetic (turair)and magnetic survey over the complete licence.

Following these initial investigations seven areas were selected for further detailed exploration. These were, in order or priority:

FIRST PRIORITY	(i)	East Darwin
	(ii)	Jukes Proprietary
SECOND PRIORITY	(i)	Intercolonial Spur
	(ii)	Allan's Creek - Snake Peak
	(iii)	Findon's
THIRD PRIORITY	(i)	Eastern slopes of Sumpters Peak
	(ii)	Lake Jukes

Work on the first priority areas included 1:5,000 scale geological mapping, 1:1,000 scale detailed mapping of proposal drilling targets, and 1:500 scale mapping of all accessible adits. Chip sampling of these adits was carried out over 2 metre sections within mineralised zones and 5 metre sections in non-mineralised zones.

Time domain, E.I.P. surveys using pole-dipole arrays were completed in both first and second priority areas over a total of 16.5 line kilometres. Results of the detailed exploration indicated that drilling was warranted at East Darwin and Jukes Proprietary but not in the second priority areas. Because of generally discouraging results it was also decided not to complete any detailed exploration in the third priority areas.

A four hole diamond drilling programme was commenced at the Jukes Proprietary and East Darwin during October 1973. Results of this programme are detailed later in the report (Sections 4.1.1, 4.3.1). However the main conclusions reached by I.N.A.L. as a result of their drilling were:

(i) copper mineralisation did not extend in depth and that surface mineralisation represented secondary enrichment of a leaner primary mineralisation

(ii) gold and silver assays were consistently below 5 dwts per ton

(iii) zones of mineralisation occur close to the base of a sequence of welded pyroclastic flows laid down on the flanks of the Central Core Lavas.

It is considered that (i) is not a valid conclusion from the geological and minerological evidence available at present. Complete detailed information of mapping, sampling, geophysical data and drilling results are given in International Nickel Australia Ltd. Final Report EL13/65 Jukes Darwin (Ruddock 1974). In March 1974 I.N.A.L. withdrew from the joint venture agreement. Electrolytic Zinc Co. of A/Asia Ltd. (E.Z.) entered into a joint agreement with B.H.P. in December 1974 to explore the Jukes Darwin and at the same time pegged a Special Prospectors Licence (S.P.L. 140) in the Garfield River area to the north-west of Mt. Sorrell. 74-1010.

The main aim of their exploration programme was to test the area to the west of the main Central Core Lavas for possible Rosebery type lead-zinc deposits. Some regional mapping was undertaken in association with a stream sediment programme. However results of the mapping indicated that fairly extensive lava sequences occured in the area and the geological environment was considered not to be suitable for the development of lead-zinc ore bodies. This major factor, and the need to spend exploration funds elsewhere caused E.Z. to withdraw from the joint venture and relinquish S.P.L. 140 in August 1975.

3. GENERAL GEOLOGICAL APPRAISAL:

The most valuable source of data in the Jukes Darwin area has been the final report by I. Ruddock (1974) of I.N.A.L. This report provides the only comprehensive compilation of all the data up to 1974 and although the final assessment of the potential of this area is not totally acceptable, it does provide a basis for future exploration planning. For this reason the general geological appraisal has been taken directly from that report. The only alteration in the text has been the use of the phrase "Central Core Lavas" instead of "Central Core Rhyolites" to confirm with existing Mt. Lyell terminology. The general geology of EL21/76 is shown in Map 1.

3.1 MAJOR REGIONAL STRUCTURES

Similarities in the geological setting of Jukes-Darwin and Mt. Lyell areas were noted during the air-photo examination of regional structures. Major north-west trending lineaments, defined by fold axes and major faults are believed to be related to large subcrustal fractures ("geofractures"), which affect Pre-Cambrian basement rocks and Lower Palaeozoic rocks of the "West Coast Anticlinorium".

The two most prominent lineaments in the region are:

(i) the Linda Disturbance, which intersects the belt of Mount Read Volcanics at Mount Lyell

(ii) the Andrew River Lineament, which intersects the Mount Read Volcanics in the Intercolonial Spur area at Jukes-Darwin.

Such structures may have been active lines of weakness since the late pre-Cambrian and may have controlled the site of significant mineralisation in the Mount Read Volcanics at Mount Lyell. They may also have controlled the location of similar deposits (not yet exposed) in the Jukes-Darwin area.

3.2 REGIONAL STRUCTURAL AND STRATIGRAPHIC ELEMENTS

The Queenstown-Macquarie Harbour region may be considered to consist of four major north trending elements:

(i) pre-Cambrian Tyennan Block in the east, composed of highly deformed metasediments, dominantly quartzites and quartz-muscovite schists.

(ii) King Synclinorium, lying west of the Tyennan Block, in a complex structural trough containing a thick sequence of Ordovician to Devonian limestones, shales, sandstone, quartzites and slates.

(iii) West Coast Anticlinorium (forming the West Coast Range) lying west of the King Synclinorium, consists essentially of Cambrian Mount Read Volcanics, capped in many places by thick sequences of Ordovician Owen Conglomerate.

(iv) Dubbil-Barril Synclimorium, lying west of the West Coast Anticlinorium, consisting of broadly folded Ordovician to Devonian limestones, sandstones, and shales.

3.3 JUKES-DARWIN AREA

3.3.1 General Stratigraphy

The area consists of Cambrian and Ordovician rocks which form the

West Coast Anticlinorium. The Cambrian rocks are dominantly rhyolitic lavas and pyroclastics, (referred to as the Mount Read Volcanics) which indicate a sub-aerial type of deposition. They are probably of Lower to Middle Cambrian in age and formed along a probable islandarc system which developed west of the Tyennan Block. In the south of the area a Cambrian subvolcanic granite (Darwin Granite) has intruded the volcanic pile as a broadly concordant body.

Upper Cambrian Jukes Conglomerate unconformably overlies the volcanics volcanics in the north and south of the area. It is a volcaniclastic conglomerate containing clasts of Mount Read Volcanics and Darwin Granite.

Ordovician Owen Conglomerate unconformably overlies all Cambrian rocks. Clasts are almost entirely of pre-Cambrian quartzites and quartz-mica schists. Most of the Conglomerate appears to lie within north west trending, fault-bounded grabens, except for a narrow overlapping sequence in the east which appears to overlie conglomerates within the grabens.

3.3.2 Mount Read Volcanics

The economic potential for stratabound copper mineralisation lies with the north trending belt of volcanics.

Observations indicated that the Mount Read Volcanics may be considered as two sequences:

(i) Inner, Central Lava Core: massive rocks, predominantly lavas and air-fall tuffs and agglomerates, characterised by ubiquitous hematite-magnetite veins.

(ii) Flanking Pyroclastic Rhyolites: schistose rocks predominantly ignimbritic sequences of crystal tuffs and crystal-lithic tuffs, on the west and east flanks of the massive central core.

These sequences are thought to represent two phases of volcanic activity in the Mount Read Arc:

(i) Early Pyroclastic-Fall Phase, characterised by continuous high intensity gas blast, ejecting large volumes of magma from vents to produce air fall deposits; with lavas deposited close to vents.

(ii) Later Pyroclastic-Flow Phase, characterised by ignimbrite eruptions, explosion level in vents gradually deepens (after phase (i)) so that magma just reaches over the lips of craters, then avalanches downslope as ignimbrite eruptions.

The subvolcanic Darwin Granite appears to have intruded the Central Core Lavas prior to the Pyroclastic-Flow phase; clasts of the granite occur within the overlying Flanking Pyroclastics.

3.3.3 Mineralisation

Sulphide mineralisation is thought to have occurred during fumarolic activity at the close of the Pyroclastic-Flow Phase. This was prior to the Upper Cambrian Jukesian Orogeny. Later remobilisation during the Devonian Tabberabberan Orogeny may have caused local concentrations of copper.

Chloritic alteration zones, containing disseminated sulphides (pyrite, occasional chalcopyrite and traces of galena and sphalerite) are developed in both volcanic sequences, mainly within pyroclastic units adjacent to areas of massive lava.

The most extensive alteration zones are developed in the Flanking Pyroclastic Rhyolites immediately flanking the massive Central Core Lavas:

e.g. East and west slopes of Intercolonial Spur, East Darwin area (eastern slopes of Snake Peak) and Jukes Proprietary area.

Smaller alteration zones occur in pyroclastic units within the Central Core, adjacent to lavas:

e.g. Findon's Prospect

Examinations of mineralised outcrops and old workings indicate two types of sulphide occurrence at Jukes-Darwin:

(a) Disseminated Sulphides within hematite-magnetite veins in massive central core lavas

Pyrite and chalcopyrite occur as disseminated course grains and aggregates within iron-rich veins which are confined to the lavas. These veins usually have a scattered, irregular occurrence and the sulphides are not sufficiently concentrated to be regarded as possible economic deposits of low-grade copper.

A possible exception to this was thought to be widespread disseminated chalcopyrite in large hematite-magnetite pods and lenses on the western slopes of Darwin Plateau - the Prince Darwin-Tasman Darwin Prospects. In 1957, Wade estimated that the disseminated chalcopyrite offered a potential for 4 million tonnes of 0.7% copper. The diamond drilling programme by B.H.P. in 1970, however, indicated that the mineralisation was uneconomic.

Similar copper mineralisation associated with iron rich veins occurs in massive Central Core lavas at Red Hills, to the east of Mount Read, on Mount Lyell Company leases.

(b) Disseminated Sulphides within flanking pyroclastic host rocks

Pyrite and chalcopyrite (with traces of galena and sphalerite) occur as disseminated grains and aggregates, often orientated parrallel to the foliation of the host rocks. The total sulphide content in the rocks varies between 2% and 60%.

The sulphides represent stratabound mineralisation, developed in pyroclastic sequences adjacent to the margin of massive lava, within the mineralised zone over width of 0.25 m. This can be seen in the following areas:

East Darwin, Jukes Proprietary, Eastern slopes of Intercolonial Spur, Western slopes of Intercolonial Spur, Eastern slopes of Sumpter's Peak, Findon's Prospect, Bean and Thow Prospect.

The ore bodies at Mount Lyell occur in a similar situation, as stratabound bodies developed in pyroclastics on the flanks of massive lavas. This environment was regarded as having the potential for low grade copper mineralisation at Jukes-Darwin, and all exploration has concentrated on this.

4. PROPOSED EXPLORATION PROGRAMME:

For exploration planning purposes EL21/76 has been divided into five separate areas. In the following sections each area is discussed individually and major proposals are indicated in Map 2. A four year exploration programme has been preliminary proposed for the complete licence and this has been summarized in Figure 2.

4.1 AREA 1. KING RIVER - S. JUKES PEAK

4.1.1 Jukes Proprietary

Mineralisation in the Jukes Proprietary area occurs within the Flanking Pyroclastics sequence close to the contact with the Central Core Lavas. Total Strike length of this mineralised zone and associated chloritic alteration is approximately 600m trending in a north-east direction between Proprietary Peak and the northern spur of East Jukes Peak. I.N.A.L. divided the mineralisation into:

i) southern zone

ii) central (main) zone

and iii) northern zone and tested the central zone with diamond drill hole Z 142003 below Nos. 1 and 3 adits.

Weak Sulphide mineralisation was intersected between 139.2m - 201.3m with the best intersection of 0.59%Cu, 0.019%Zn and 0.03%Pb. between 139.2 - 145.2 metres. Width of the zone varies between 10 metres and 70 metres. With an estimated dip length of 100 metres an approximate total of 7-8 million tonnes of possible mineralisation can be generated using an average width of 40 metres.
It is considered that a further two diamond drill holes are warranted on the existing data available in this area. One to the north of Z 142003 and one to the south.

4.1.2 Lake Jukes

This area extended south from Proprietary Peak to South Jukes Peak on the eastern side of the main range. Workings included Lake Jukes, Lake Jukes Proprietary, Bean and Thow, Queen Jukes and Crotty Jukes. I.N.A.L. classified this area as a third priorty and consequently undertook no exploration. Very weak but distinct turair anomalies were recorded over the Lake Jukes and Bean and Thow Workings.

In March 1958, L.E.E. drilled two diamond drill holes into the Lake Jukes mine following a detailed but restricted mapping programme. No significant mineralisation was intersected in these drill holes. The present programme proposes a complete detailed mapping of the area in order to assess the full potential before the end of Year 2. Further detailed exploration has been tentatively scheduled for Years 3 and 4.

4.2 AREA 2. JUKES PEAK - CONGLOMERATE PEAK

4.2.1 Intercolonial Spur

This area included the workings at Hydes, Hal Jukes and Taylours Reward plus a number of small gossan outcrops in the eastern flank of the ridge.

A conductive turair anomaly of major interest was detected over Hal Jukes workings but interpretation was hindered because of closeness to the primary field loop. Restricted induced polarisation was undertaken over part of the area but the results were not encouraging, isolating only weak, shallow anomolies which could be related to pyrite and chalcopyrite mineralisation seen in surface outcrops. Disseminated sulphide mineralisation and associated chloritic alteration occurs within pyroclastic phases of the Central Core Lavas to the east and west on Intercolonial Spur. Baryte is exposed at Taylours Reward workings as veins and lenses cross cutting the lava-pyroclastic contact in an east-west direction.

To evaluate existing workings and to test for additional mineralisation it is proposed to establish a grid over this area (Intercolonial Spur Grid) and to complete E.I.P. coverage before the end of Year 2. The grid consists of 22 lines with a base line on bearing 330° magnetic, giving a total of 39.6 line kilometres at 200 metre spacings.

Target definition, using soil geochemistry, should be completed before the end of Year 3 and initial proposals are for three diamond drill holes. Extra drilling may be warranted dependant upon exploration results.

4.3. AREA 3. CONGLOMERATE PEAK - MOUNT DARWIN

4.3.1 East Darwin

The East Darwin area was considered by I.N.A.L. to have the highest priority within the Jukes-Darwin area. Pyrite-chalcopyrite mineralisation occurs within the Flanking Pyroclastics close to the margin of the Central Core Lavas to the east of Snake Peak. The mineralised zone extends for at least 800 metres along strike from Darwin Proprietary adit in the north to Souters adit in the south, although chloritic alteration extends a further two kilometres south to Sumpters Peak. Turair responses, although moderate to weak, were the most significant detected by the survey and follow-up E.I.P. outlined and anomalous zone 400 metres long and 50-100 metres in width.

Three holes, Z 142000 - Z 142002 were drilled by I.N.A.L. although Z 142000 was stopped at 71.5m due to excessive deviation. Z 142001 tested the E.I.P. anomaly below Dillons No.1 adit but did not intersect significant mineralisation up to a depth of 150 metres below the adit. Z 142002 was drilled 300 metres north of the E.I.P. anomaly (500 metres north of Z 142001) and tested the depth extension of the mineralisation at the Darwin Proprietary adit.

On the present information available it is considered that one drill hole is probably warranted in this area although further detailed mapping is necessary before any specific target can be identified. Exploration of the extension of this anomalous zone to the south of Souters adit is discussed in Section 4.3.2.

4.3.2 Findons - Allans Creek

This area includes the volcanic sequences south and west of Snake and Conglomerate Peaks. Originally classified a second priority area by I.N.A.L. only a limited amount of exploration has been carried out and with generally discouraging results. However, the area does contain three of the more significant turair anomalies, extensive zones of chloritic alteration which have not been investigated in detail and distinctive horizons of sediments and coarse agglomerate within the Central Core Lava sequence.

Since existing exploration has been restricted to only Findon's workings and a small area to the south of Snake Peak it is proposed to establish a grid over the complete area extending from west of Conglomerate Peak to Mount Darwin (Mt. Darwin Grid). This grid will consist of 28 lines spaced 200 metres apart with a total distance of 54.8 kilometres. Base line bearings will be 330° magnetic and the grid lines should extend to the east to cover the southern extension of the alteration zone seen in the East Darwin area.

Cutting of the Mount Darwin grid is scheduled for Year 2 and following geophysical surveys it is proposed to have possible drilling targets defined by the end of Year 3.

4.4. AREA 4. MOUNT DARWIN - S. DARWIN PEAK

4.4.1 Darwin Plateau

This area has had no previous exploration and it will be necessary to map the area in detail in order to determine the full potential. Allowance has been made in Year 4 for further follow-up work, particularly geophysics and possibly geochemistry.

4.4.2 Prince Darwin

No significant exploration has been undertaken in this area since the drilling programme carried out by B.H.P. Ltd. in 1970. Two holes were drilled in this programme and the best assay intersections were:

D.DH 1, 150 ft. - 160 ft. 0.47% copper and D.DH 2, 460 ft. - 470 ft 0.58% copper.

Fairly extensive chloritic alteration associated with the Prince Darwin and Tasman Darwin workings and coarse fragmental rocks close to the contact with the Darwin Granite indicate that further exploration is warranted in this area. A grid is proposed (South Darwin Grid) consisting of 20 lines, 200 metres apart totalling 36.6 line kilometres. The base line is on 004° magnetic and the total area extends from north of Prince Darwin to South Darwin Peak covering the Darwin Granite - Flanking Pyroclastic contact to the east and the Central Core Lava - Flanking Pyroclastic contact to the west.

Grid cutting, geological mapping and ground E.I.P. coverage is scheduled for Year 3 with target definition and diamond drilling in Year 4.

4.5. AREA 5. CLARK - GARFIELD RIVER

Existing geological data in this area is very limited. Mount Lyell Mining and Railway Company Limited explored the general area in the early 1950's and the geological map produced from that programme serves as the basis for present exploration planning. E.Z. Co. A/Asia Ltd., explored the area in 1975 (Section 2.3) but only restricted mapping was undertaken with some stream sediment sampling.

It is proposed to carry out a two year reconnaissance programme (Year 2 and Year 3) over this area in order to assess its potential for generating specific exploration targets. Initially in Year 2 major reconnaissance mapping must be completed and a basic geological map produced before further exploration can be undertaken. A regional geophysical survey probably airborne magnetic/electromagnetic should then be able to isolate areas of interest.

Proposals for Year 3 include detailed exploration, essentially geological mapping and possibly ground geophysics but exact requirements will depend on existing available data at that time.

Existing access into the area is either by walking track from the old Crotty town site, via the Jukes Proprietary area or by helicopter. Additional access will probably be required but should be subsequent to completion of the reconnaissance mapping programme.

5. BUDGET AND MANPOWER

5.1 Budget

A total cost for the four year exploration programme outlined in Figure 2 is estimated at $785,000. This includes individual costings for Areas 1-4 which total $685,000 plus an estimated cost of $100,000 for Area 5. Unit costs are itemised in Figure 3 and have been calculated using present costs plus 5% for each additional year after 1976-77. Overheads have been charged at 50% of basic salary rates.

Present day rates that have been used are:

i) Diamond drilling - $45 per metre
ii) Bulldozing - $25 per hour
iii) Line cutting - $350 per kilometre
iv) E.I.P. Surveys - $350 per day
v) Geochemical sampling - $1.35 per sample

Materials include field services, etc. and the cost of setting up a new base camp in the area. Equipment and facilities include cost of fourwheel drive vehicles and hire of any other transport that may be necessary plus cost of accommodation.

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A PROPOSED EXPLORATION PROGRAMME FOR EL 21/76 - JUKES DARWIN AREA 1976 - 1980

FIG. 2

Year/Area	Access	Grid Cutting	Geology	Geophysics	Geochemistry	Drilling	Remarks
Year 1 1976-77 Areas 1-4			1.1 Lake Jukes 1.2 Queen Jukes 1.3 Crotty Jukes 1.4 Bean & Thow				1. General compilation and drafting of all available data.
Year 2 1977-78 Areas 1-4	2.1. Extension of East Darwin Track to west of Sumpters Peak - 3 Km. 2.2. Clearing track to Intercolonial Spur. 2.3. Access track to south of Mount Darwin.	2.4. Inter-colonial Spur Grid:- 39.6Km. 2.5. Mount - Darwin Grid:- 54.8	2.6. Mapping South of Mt. Darwin. 2.7. Mapping of Intercolonail Spur Grid. 2.8. Mapping of Mount Darwin Grid.	2.9. Intercolonial Spur Grid. E.I.P. Gradient Array. 2.10. Mt. Darwin Grid. E.I.P. Gradient Array	2.11. Additional sampling of adits and dumps as necessary.	2.12 Jukes Pty - 2 holes x 300m 2.13. E. Darwin - 1 Hole x 300m ??	
Area 5.	2.14 As Required		2.15 Reconnaissance geological Mapping.	2.16 Regional geophysical programme.			??
Year 3 1978-79 Area 1-4		3.1. S. Darwin Grid- 36.6 Km. 3.2. As warranted from 1.1. - 1.4. (18 Km?)	3.3. Mapping S. Darwin Grid.	3.4. Darwin Grid - E.I.P. Gradient array.	3.5. Soil sampling Intercolonial Spur Grid. 3.6. Soil sampling Mt. Darwin Grid.	3.7. Intercolonial Spur Grid - 3 holes x 300m 3.8. Mt. Darwin Grid 3 holes x 300m.	
Area 5.	3.9. As Required			3.10. Detailed ground geophysics.		3.11. 2 Holes x 300m Specific target of Reconnaissance.	
Year 4. 1979-80 Area 1-4	4.1. As Required	4.2. As warranted from 2.6. (15Km ?)		4.3. As warranted from 3.2. and 4.1.	4.4. Soil sampling South Darwin Grid.	4.5. South Darwin Grid 3 Holes x 300m) 4.6. Other areas 4 holes x (300m).	

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BUDGET AND MANPOWER - AREAS 1-4

FIG. 3.

	SALARIES (+ OVERHEADS)			DIAMOND DRILLING	ACCESS	GEOPHYSICS	GEOCHEMISTRY	MATERIALS	EQUIPMENT AND FACILITIES	TOTAL
	GEOLOGISTS	FIELD ASSISTANT	DRAUGHTSMAN							
Year 1 1976-77	1 Geologist Fulltime	1 Field assistant Fulltime	1 Draughtsman					Plan Draughting		
	$ 10,000	$ 6,000	$ 6,000	NIL	NIL	NIL	$ 1,000	$ 5,000	$ 5,000	$ 33,000
Year 2 1977-78	1 Geologist Fulltime 1 Geologist Part-time	1 Field assistant Full-time 1 Field assistant	1 Draughtsman	Jukes Pty and E. Darwin (3 x 300m) $50,000	Road bull-dozing $ 3,000 Line cutting (10km) $35,000	E.I.P. (10km) $26,000		New camp set-up		
	$ 29,000	$16,000	$ 5,000	$50,000	$38,000	$26,000	$ 2,000	$10,000	$15,000	$197,000
Year 3 1978-79	1 Geologist Fulltime 1 Geologist Part-time	1 Field assistant Fulltime 1 Field assistant Part-time	1 Draughtsman	Intercolonial Spur and Mt. Darwin grids (6x300m) $110,000	Line cutting 59km) $22,000	E.I.P. (59km) $14,000				
	$ 30,000	$18,000	$ 6,000	$110,000	$22,000	$14,000	$ 4,000	$ 5,000	$15,000	$224,000
Year 4 1979-80	1 Geologist Fulltime	2 Field assistants Fulltime	1 Draughtsman	S. Darwin Grid (3x300m) $55,000 Others (5x300m) $90,000	Line cutting (1.5km) $ 6,000	E.I.P. (1.5km) $ 3,000				
	$ 21,000	$26,000	$ 8,000	$145,000	$ 6,000	$ 3,000	$ 5,000	$ 5,000	$18,000	$237,000
SUB TOTAL	$ 90,000	$66,000	$25,000	$305,000	$66,000	$43,000	$12,000	$25,000	$53,000	$585,000
Year 2 1977-78	1 Geologist Part-time	1 Field assistant Part-time	Incorporated in Areas 1-4		As required	Regional geophysical programme				
	$ 9,000	$ 6,000	NIL	NIL	$ 5,000	$ 6,000	$ 3,000	$ 2,000	$ 4,000	$ 35,000
Year 3	1 Geologist Part-time		As above		As required	Detailed Geophysical programme				
	$ 9,000	$ 6,000	NIL	$ 30,000	$ 5,000	$ 8,000	$ 3,000	$ 1,000	$ 3,000	$ 65,000
SUB TOTAL	$ 18,000	$12,000	NIL	$ 30,000	$10,000	$14,000	$ 6,000	$ 3,000	$ 7,000	$100,000
GRAND TOTAL	$108,000 13.7%	$78,000 9.9%	$25,000 3.2%	$335,000 42.7%	$76,000 9.7%	$57,000 7.3%	$18,000 2.3%	$28,000 3.6%	$60,000 7.6%	$785,000

YEARLY TOTALS

YEAR	TOTAL COST
Year 1 1976-77	$ 33,000
Year 2 1977-78	$226,000
Year 3 1978-79	$289,000
Year 4 1979-80	$237,000
	$785,000

5.2 Manpower

One geologist and one field assistant have been budgetted for the complete four year programme with an additional geologist during Year 2 and 3. A second field assistant has also been budgetted from Year 2 until the end of the proposed programme.

Extra manpower requirements for geophysical surveys etc. have been incorporated into the appropriate unit cost.

6. SUMMARY

The Jukes-Darwin area offers a high potential for discovery of additional volcanic pyrite-chalcopyrite deposits of the Mount Lyell type and medium-low potential of locating lead-zinc deposits of the Rosebery-Hercules type.

Up to present, exploration of this area, has lacked continuity and the mass of available data indicates clearly that exploration effort has been restricted to specific zones of known mineralisation at the expense of a complete geological appraisal of the area for its mineral potential. This lack of continuity results from too many companies exploring in the area in too short a time (four companies since 1964). The difficulty of access to most parts of the area has forced companies to concentrate exploration to where mineralisation was previously known and where access already existed.

These proposals are designed to provide a complete exploration coverage between Mount Jukes and South Darwin Peak (Areas 1-4) and to evaluate the potential for further detailed exploration in the Clark and Garfield River (Area 5). A 4 year programme has been proposed initially, but this is considered to be a minimum period in which to assess the area and it is possible that further exploration may be warranted.

REFERENCES

LOFTUS-HILLS, C 1914: The Jukes-Darwin Mining Field, Tasmanian Department of Mines Geological Survey, Bulletin 16.

RUDDOCK, I 1974: International Nickel Australia Limited, Final Report E.L. 13/65 Jukes-Darwin

TWELVETREES, W 1901: Report on the Mineral Disnite of the Mounts Huxley, Jukes and Darwin. Report Sec. Mines 1900-1901. Tas. Parliament Paper No.4.

King River
qP
Eu
Ocg
O-D
E1
E2
E1'
Jcg
Proprietary Peak
East Jukes Peak
Mt. Jukes
Moraine
Central Peak
Upper Lake Jukes
West Jukes Peak
Pyramid Peak
Lower Lake Jukes
South Jukes Peak
Ocg'
Thomas Currie Rivulet
Conglomerate Peak
Hem
Snake Peak
Allans Creek
Andrew River
Kelly Basin Road
Sumpters Peak
Mt Darwin
Mt Sorell
Garfield River
Clark River
South Darwin Peak
Egr
Eis
T
Ocg-l
LEASE BOUNDARY

DATA SOURCE

M SOLOMAN 1954-55 (MT. LYELL)

I. RUDOCK 1974 (I.N.A.L.)

KEY

QUATERNARY

GLACIAL DEPOSITS.

TERTIARY

T — MACQUARIE BEDS: SANDSTONE, QUARTZ & CLAYS.

ORDOVICIAN - DEVONIAN

O-D — LIMESTONES (GORDON LIMESTONE) SHALES AND SANDSTONES.

ORDOVICIAN

Ocg' — CONGLOMERATE: OVERLAPPING SEQUENCE OF OWEN-TYPE DEVELOPED LOCALLY IN THE EAST OF THE AREA

Ocg — OWEN CONGLOMERATE: MATERIAL DERIVED FROM PRECAMBRIAN QUARTZITES. (TO THE EAST)

Ocg-l — TRANSITION FROM CONGLOMERATES TO LIMESTONES WITH INTERBEDDED CONGLOMERATE HORIZONS.

CAMBRIAN

Jcg — JUKES CONGLOMERATE: MATERIAL DERIVED FROM CAMBRIAN VOLCANICS

E2 — FLANKING PYROCLASTICS ESSENTIALLY PYROCLASTIC FLOW DEPOSITS CRYSTAL-TUFFS (IGNIMBRITE FLOWS) AND CRYSTAL-LITHIC TUFFS AND AGGLOMERATES (COARSE BASAL UNITS TO IGNIMBRITE FLOWS); WITH MINOR AIR-FALL DEPOSIT ASHES AND LITHIC TUFFS

Egr — DARWIN GRANITE: COARSE GRAINED SUBVOLCANIC GRANITE INTRUDED PRIOR TO DEPOSITION OF FLANKING PYROCLAST? (IN SOUTH OF AREA)

E1'/Eis — CENTRAL CORE PYROCLASTICS: ESSENTIALLY AIR-FALL DEPOSITS, ASHES, LAPILLI TUFFS, LITHIC TUFFS, AGGLOMERATES; WITH SEDIMENTS Eis.

E1 — CENTRAL CORE RHYOLITE MASSIVE PORPHYRITIC LAVAS VEINED WITH HEMATITE-MAGNETITE.

Eu — UNDIFFERENTIATED VOLCANICS.

qP — QUARTZ-FELDSPAR PORPHYRY INTRUSIVE / EXTRUSIVE.

- AGGLOMERATE ZONE.
- CHLORITIC ALTERATION ZONE.
- Hem — HEMATITE-RICH ZONE. (SNAKE PEAK)
- OLD ADITS.
- UNCONFORMITY
- FAULT.

5 cm

True North

328018 77-1196 **MAP 1**

THE MOUNT LYELL M. & R. CO. LTD.

DUKES - DARWIN AREA
E.L. 21/76

GEOLOGICAL MAP 016

Drawn:	P B
Traced:	R.G.W
Checked:	
Date.	15 10 '76
Scale:	1:20,000

JUKES CONSOLS
NORTH MT. JUKES
IMPERIAL JUKES
JUKES COMSTOCK
KING JUKES
Z142003
JUKES PTY. 3
JUKES PTY. 2
JUKES PTY. 1
East Jukes Peak
King River
River
Probrietary Peak
1
CROWN JUKES
Mt Jukes
QUEEN JUKES
CROTTY JUKES
Central Peak
Upper Lake Jukes
L7
L1
West Jukes Peak
LAKE JUKES
Pyramid Peak
LAKE JUKES PTY.
Lower Lake Jukes
South Jukes Peak
INTERCOLONIAL SPUR GRID
HYDES
HAL JUKES
2
TAYLOURS REWARD
Andrew River
KELLY BASIN ROAD
Thomas Curre Creek
Conglomerate Peak
DARWIN PTY.
Z142002
FINDONS
Snake Peak
Z142001
PEARCES
DILLONS 1
Z142000
DILLONS 2
SOUTERS
Allans Creek
3
MT. DARWIN GRID
Sumpters Peak
MT. LYELL EXTENDED
MT. LYELL CONSOLS
Mt. Darwin
5
Garfield River
THOMPSONS PROSPECTING ASSOCIATION
SOUTH DARWIN GRID
Mt Sorell
PRINCE DARWIN
D.D.H.1
D.D.H.2
Clark River
TASMAN DARWIN
4
South Darwin Peak
LEASE BOUNDARY

AREA (1) KING RIVER - SOUTH JUKES PEAK.
AREA (2) SOUTH JUKES PEAK - CONGLOMERATE PEAK.
AREA (3) CONGLOMERATE PEAK - MT. DARWIN.
AREA (4) MT. DARWIN - SOUTH DARWIN PEAK.
AREA (5) CLARK RIVER - GARFIELD RIVER.

AREAS WARRANTING DETAILED MAPPING.

PROPOSED GEOPHYSICAL GRIDS.

EXISTING I.N.A.L. GEOPHYSICAL GRIDS.

E.M. TURAIR ANOMALIES (APPROX. LOCATIONS)

D.D.H. 1 - 2. - B.H.P.
D.D.H. L1, L7. - MT. LYELL.
D.D.H. Z142000 - Z142003 - I.N.A.L.

OLD WORKINGS.

FAULT.

5 cm

True North

328019

77-196

MAP 2

THE MOUNT LYELL M. & R. CO. LTD.

JUKES - DARWIN AREA
E.L. 21/76 017
PROPOSED EXPLORATION

Drawn: P.B.
Traced: R.G.W.
Checked:
Date: 27:1:'77
Scale: 1:20,000