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THE MOUNT LYELL MINING AND RAILWAY CO. LTD.

72-880

ANNUAL REPORT

ON

HENTY-YOLANDE E.L. 41/71

1971 - 72

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Copies To: General Office (1)
Exploration Department (2)
Department of Mines (1)

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1. INTRODUCTION

The original area of E.L. 41/71, totalling 31 square miles, was granted to The Mount Lyell Mining and Railway Company Ltd. on August 4, 1971. This area had previously been held by Pickands Mather and Company, International as E.L. 12/65.

The current area (refer Map 1) of Henty-Yolande E.L. 41/71 was formed by amalgamating 17 square miles of E.L. 10/69 Part I with the original E.L. 41/71, thus giving a total area of 48 square miles.

Investigations in the licence area during the 1971-72 year have consisted almost entirely of regional geological mapping and compilation of data. Expenditure during the year totalled $9,777.

The writer arrived in Tasmania on October 31, 1971 and commenced duties with The Mount Lyell Mining and Railway Company Ltd. on November 1, 1971.

2. GENERAL FEATURES

The following accounts of the landforms and glacial features of E.L. 41/71 are based upon work by Bradley (1954) and those on vegetation and soils on articles in the Atlas of Tasmania (Davies, 1965). These references have been supplemented by personal observation and data from local sources.

2.1 Physiography

The main feature of the eastern section of the licence area is the north-south trending West Coast Range of mountains averaging 3,500 feet ASL. These mountains are composed of hard, siliceous Owen Conglomerate. To the west of the range lies the undulating erosional surface of the Henty Peneplain, broken only by the monadnock of the Sisters Hills, a faulted block of Owen Conglomerate. The Henty Peneplain, underlain by Mt. Read Volcanics and Dundas Group sediments, slopes gently from 1,200 ft. in the east to 900 ft. on the western side of the licence area. It has undergone fairly recent uplift in the early Pleistocene and has been incised to a depth of more than 400 ft. by the rejuvenated Henty and Yolande Rivers. This uplift has resulted in extremely steep V-shaped river valleys over much of the licence area.

The minor drainage, including the upper reaches of Pearl Creek and East Queen River, is mature and of an older cycle. The tributary junctions of the Henty and Yolande Rivers are therefore discordant - a good example can be seen from halfway down the haulage incline at the Lake Margaret lower power station. The Henty River is graded upstream from Sisters Hills, whilst the Yolande River is still actively degrading.

2.2 Glaciation

The landscape has been modified by the effects of Pleistocene glaciation. Erosional glacial forms can best be seen in the West Coast Range whilst depositional features consist of spreads of glacial till and numerous, often very large, erratics of Owen Conglomerate. Glacial material occurs in three main areas - the Henty and Yolande moraines and in the Basin Lake area north of Lake Margaret, forming a cover which is, in places, of considerable thickness (127 ft. in Pickands Mather D.D.H. BL 801). The moraine cover obscures much of the Owen Conglomerate contact in the Lake Margaret area and northwards and consequently represents a strong hindrance in the search for mineral deposits in this area.

2.3 Soils

Soils in the licence area are predominantly yellow podzolics, with some skeletal soils and moor podzol peats. Because of the high rainfall and relatively low temperatures, the soils are generally high in organic matter and moderately to highly leached - they are therefore strongly acid in character.

The yellow podzolics consist of greyish, sandy or silty A horizons and yellowish, often mottled, clay B horizons. Skeletal soils are characteristic of steep slopes on the more siliceous rocks - in the licence area such soils may be found on the slopes of the West Coast Range and on quartz porphyries and acid volcanics. The soils are shallow and sandy with abundant rock fragments, and are interspersed with frequent exposures of bare rock.

The moor podzol peats occur on plains and lower slopes, forming shallow, very strongly acid peats which overlie grey, less organic, sandy A horizons and a darker organic B horizon.

2.4 Vegetation

The vegetation cover consists of three main types - sedgeland, rain forest and wet sclerophyll forest. Moorland consisting of open buttongrass plains occurs on the higher parts of the West Coast Range.

Sedgeland is characterised by varying proportions of button-grass, tea-tree, Bauera and bottle brush sometimes occurring as almost impenetrable thickets. Sedgeland covers most of the country south of the Yolande River and in the north eastern section of the licence area.

Rain forest occurs mainly on the steep slopes of the Henty and Yolande valleys, to the north of the Yolande River and west of the Yolande and Basin Lake moraines. Where mature and with good soils present, as on the slopes of the Henty River, the rain forest has little undergrowth developed - exposure is good and access easy. However over much of the forested sections of the licence area scrub rain forest and wet sclerophyll forest predominates - it consists mainly of myrtle, sassafras, leatherwood, celery top pine and horizontal scrub or a mixture of eucalytus, dogwood native laurel, cheese-wood with man-ferns. In such areas exposure is generally very poor and access is difficult except along timber tracks.

In the extreme south and south east section of the licence area vegetation is sparse or absent due to the poisonous smelter fumes which previously emanated from the Mt. Lyell smelter.

3. HISTORY OF PREVIOUS WORK

3.1 General

During the first 70 years or so of the existence of the Mount Lyell mining field, geological studies on the Henty-Yolande licence area were scattered and brief - this work is adequately summarised by Wade and Solomon (1958).

More recent work includes petrological studies of the Cambrian volcanics, pyroclastics and their alteration products from north-west and west Tasmania (Scott, 1954) and on the "metasomatised porphyroids" from the same area (Bradley, 1957).

Bradley (1956) has given a structural interpretation of the West Coast Range, partially based on a regional mapping study (Bradley, 1954) supplemented by aerial photographic interpretation. Solomon (1960) mapped an area of Cambrian sediments, lavas and pyroclastics around Queenstown, and has made an extensive study (Solomon, 1964) of the Mt. Read Volcanics and Dundas Group rocks, particularly the spilites and keratophyres, and their associated mineralisation at Mount Lyell and Rosebery.

Both Bradley's and Solomon's work were in the nature of reconnaissance surveys - consequently sub-division of the Mt. Read Volcanics was not attempted apart from outlining a number of porphyry bodies.

Bradley (1954) delineated zones of regional metasomatism; however these are now regarded (Solomon, 1960) as areas of low grade regional albite-grade metamorphism with strong hydrothermal alteration occurring locally at Mt. Lyell on certain horizons and along shear zones. The main alteration minerals are sericite, chlorite, quartz, carbonates and various clays.

Groves (1964) undertook a survey of the Madam Howard Plains barytes deposits which were worked sporadically between 1910 and 1920. As a result of this work, the Tasmanian Department of Mines drilled three diamond drill holes (maximum length 230 ft.) to test the extent of the mineralisation. These holes showed that the barytes bodies were lenticular in both section and plan and of limited tonnage.

During the past two years some scattered mapping traverses have been undertaken by Mount Lyell personnel, especially R.A. Poltock and K. Wells. In the same period Department of Mines geologists (K. & E. Corbett) have mapped parts of the area between the Lake Margaret track and Mt. Sedgwick and an area west of the Zeehan Highway between the Henty and Yolande Rivers.

The south-east corner of the exploration licence which overlaps the Consolidated Mining Lease has been partially mapped in recent years by B. Dandy and K. Wells from 1970-71 and by Green (1971). The only previously known work in this area was that undertaken by Wade and Solomon who made a detailed stratigraphic and structural study of much of the Consolidated Mining Lease between 1953 and 1957. They divided the volcanics into mineralised quartz-sericite and quartz-chlorite schists and

non-mineralised and undifferentiated schists. The approximate limits of silicification, alteration and mineralisation were also recorded.

Company geologists B.C. Dandy and K. Wells mapped portions of the Comstock Tramway, Burmah Road and the area between them. In this area the volcanic sequence trends in a N.W.-S.E. direction and consists mainly of a variety of tuffs and breccias with acid lavas and feldspar and pyroxene porphyries. A major N.W.-S.E. trending fault cuts this area.

Green (1971) studies an area north and north east of Cape Horn and subdivided the Mt. Read Volcanics into a number of individual units. He presents convincing evidence to show that the bulk of the mineralisation at Cape Horn, Comstock and Tasman Shaft is contemporaneous and penecontemporaneous with the deposition of the volcanics.

Meates (1972) carried out detailed mapping, soil sampling and magnetics in a restricted area on the S.W. slopes of Mt. Sedgwick.

3.2 Pickands Mather's Investigations

During the period 1965 - 1971, Pickands Mather and Company International held an exploration licence (E.L. 12/65) over an area embracing that currently comprising E.L. 41/71.

The results of much of Pickands work relating to the licence area are sketchy but may be summarised as follows:

Reconnaissance stream sediment geochemical sampling was carried out in several areas around Queenstown. Geochemically anomalous zones were gridded, geologically mapped, geochemical soil sampled and covered by geophysical surveys. The only known anomaly in the Henty-Yolande licence area that was so investigated is situated between the East and West Queen Rivers. Mapping revealed a sequence of tuffs, sediments and agglomerates with porphyries striking N.N.W.-S.S.E. and dipping steeply east. The anomaly is believed to have been caused by smelter contamination.

From that stage, Pickands Mather's exploration philosophy appears to have been based on the often stated, but invalid, premise that the Lyell orebodies are related genetically to the volcanic-conglomerate contact. To this end mapping and geochemical stream sediment sampling was carried out along the contact zone - however the presence of a large thickness of moraine hampered this work in many places.

A grid line was cut parallel to the contact over a length of about 11 miles both north and south of the Mount Lyell Consolidated Mining Lease. Reconnaissance dipole-dipole frequency domain induced polarisation (I.P.) was carried out along this line by McPhar Geophysics in 1968. This survey indicated several anomalous zones, the strongest occurring north-east of Basin Lake.

A grid was established north of Basin Lake and a detailed dipole-dipole I.P. survey was carried out by McPhar and Pickands personnel. A weak anomaly was outlined beneath extensive surface moraine.

Two vertical diamond drill holes (BL 801 and BL 802) were drilled to test this anomalous I.P. zone. D.D.H. BL 801 was drilled to a total depth of 750 ft., passing through grey slates from 70 to 431 ft. and porphyritic hornblende andesite from 431 to 750 ft. D.D.H. BL 802 was drilled with extreme difficulty through 127 ft. of moraine to intersect highly weathered volcanics containing minor pyrite, chalcopyrite and galena from 207 to 222 ft. This section assayed 410 ppm Cu, 4700 ppm Pb, 1870 ppm Zn. Difficulties with drilling and the drilling contractor lead to the abandonment of this hole, prior to completion, at a depth of 222 ft.

At the end of 1970, shortly before Pickands Mather relinquished their exploration licence, a Turam electromagnetic survey was conducted over the Basin Lake grid by Seigel and Associates (Howland-Rose, 1970). The survey detected a Turam axis paralleling the I.P. anomaly and a recommendation was made for the extension of the Turam survey to the north and the drilling of two inclined holes. However the latter recommendation was later withdrawn after resistivity tests on black shales, intersected by D.D.H. BL 801, indicated that the shales could adequately explain the Turam anomaly.

In a report written in February, 1971 Wuerch (1971) recommended an extension of the I.P. coverage north of Basin Lake and a detailed geological, geochemical and geophysical survey of the area around the Madam Howard Plains barytes deposit. However, shortly afterwards Pickands Mather terminated its Australian exploration activities and consequently relinquished the licence area without carrying out these recommendations.

4. ACCESS

Highways, vehicular and foot tracks and grid lines are plotted on Map 2. Many of the foot tracks and grid lines are old, very overgrown and difficult to follow.

The following areas are poorly served as regards access:

(i) All the licence area to the west of the Zeehan Highway.

(ii) The area north of the Yolande River around the Langdon River Valley.

(iii) The steep gorge of the Henty River.

5. GEOLOGICAL MAPPING

During 1971-72, geological mapping was undertaken by the writer in a number of areas of E.L. 41/71. This mapping project will be continued during the coming field season. A preliminary geological map (Map 3) has been compiled from all available information - however no attempt has been made to show the detailed stratigraphy and structure within the Cambrian rocks as a uniform interpretation over the entire area is not feasible at this stage. It is envisaged that the completion of the current mapping project will enable a much more complete geological map to be compiled.

5.1 Geology

5.1.1 Superficial Deposits

Glacial deposits (refer 2.2) have been mapped around Lake Margaret township and north of the Loftus-Hills Memorial in the Henty River area. Numerous erratics of Owen Conglomerate give a surface indication of the extent of the former ice sheets.

The wide extent of the glacial deposits is a serious hindrance in elucidating the geological succession and structure, and hence the economic potential, of the areas so covered. However streams and rivers have in places cut down through the moraine into solid bedrock and consequently allow a partial picture to be obtained especially in areas where the glacial cover is patchy or thin. Sections through the glacial deposits consist of Owen Conglomerate boulders of varying sizes in a pebbly or grey silty unsorted matrix.

Alluvial deposits are negligible in extent, occurring only at the head of a few lakes and on parts of the Henty River where meanders are developed on small floodplains.

5.1.2 Solid Geology

Work by the writer during the 1971-72 year was mainly confined to the belt of country lying south of the Yolande River between the Zeehan Highway and the Owen Conglomerate of Mt. Sedgwick. Other areas mapped include the Henty River N.E. of the road bridge and a strip of country ½ mile wide on the eastern side of the Zeehan Highway between the Yolande and Henty Rivers. Isolated traverses were undertaken on the western side of the Zeehan Highway.

The Mt. Read Volcanics and their lateral equivalents, the sediments of the Dundas Group are the formations of interest in the area. The Mt. Read Volcanics are predominantly composed of acid lavas, pyroclastics, ignimbrites (?) with thin interbedded sedimentary horizons of black shales, tuffaceous siltstones and cherts. A number of thick porphyry bodies, showing intrusive and extrusive characteristics, are known in the area. The Dundas Group is predominantly sedimentary in composition with subordinate pyroclastics. On the basis of these features a dividing line can tentatively be drawn between the Dundas and Mt. Read formations. This line lies approximately along the Zeehan Highway - however little work has so far been done to the west of the highway and it is envisaged that further mapping will define this boundary more accurately.

The main rock types present in the Dundas Group and the Mt. Read Volcanics can be divided into three categories - sediments, volcanics and porphyries.

The sediments are generally blue-grey and black shales - the latter often strongly pyritic, interbedded with tuffaceous siltstones. Graded bedding and flame structures have been observed. Erosional contacts between these sediments and pyroclastics (deposited as hot ash showers or submarine ash flows) have also been observed. These features are useful in determining "way-up" of the succession. Massive, greenish cherts occur not infrequently - they are probably largely secondary in origin and have been seen replacing tuffs. However, banded cherts of presumably primary origin have been noted in exposures in the Henty and Yolande Rivers.

The volcanics display a variation from east to west and probably reflect the position of the Mt. Read volcanic island arc and its depositional basin to the west. West of the Lake Margaret Road the sequence consists almost entirely of a thick pile of acid crystal and pumiceous tuffs (sometimes containing a minor lithic component) interbedded with thin sedimentary horizons. Some basalts or spilites may also be present. Towards the east, a change towards coarser pyroclastics, ignimbrites (?) and both acid and intermediate lavas has been recognised.

A number of massive, often porphyritic, igneous bodies have been mapped in the licence area. Most of these porphyries occur as large lenticular bodies generally conformable with the adjacent volcanics and sediments, although local cross-cutting has been observed by the writer in several exposures. Opinion is divided as to whether these bodies are of intrusive or extrusive origin - they have generally been accepted as lavas, however, the writer on the presence of the intrusive relationships mentioned above considers them to represent shallow intrusive sills.

The majority of the porphyries are rich in quartz and/or albite phenocrysts with a pink or reddish-brown aphanitic groundmass. Occasionally they appear to grade into a non-porphyritic rock with streaks and patches of ferromagnesian minerals and not infrequent vesicles and amygdules. This latter type may represent lavas.

To the east of the Lake Margaret Road several porphyry bodies of entirely different mineralogy are known (refer Map 3). They are composed of large distinctive euhedral phenocrysts of hornblende (and/or augite) in a blue-grey groundmass. They are regarded as hornblende andesite lavas by Solomon (1964) but again may be partially of intrusive origin.

Work has been conducted in a number of areas of the licence area by various people. The following notes are brief summaries of the geological information obtained from this work.

1. Geological mapping by Department of Mines personnel is in progress on the Lyell quadrangle. Results of this work are not yet available.

2. Mt. Lyell geologist C.R.J. Hall mapped an area between the West and East Queen Rivers early in 1972. The sequence is similar to that described by Pickands Mather (Smith, 1967) on their North Queen River prospect. Hall subdivided the pyroclastics into crystal and lithic tuffs, mixed and waterlain tuffs and agglomerates.

3. Mt. Lyell geologist K.J. Lee mapped an area north of the West Lyell Open Cut and has recognised a sequence of quartz-sericite, sericite-chlorite and chlorite schists and crystal and lithic tuffs together with occasional chert horizons.

4. Student geologist G.R. Meates outlined the geology of the S.W. slopes of Mt. Sedgwick during the 1971-72 summer season. He mapped a sequence of crystal/lithic tuffs overlain by andesitic lavas, tuffs and agglomerates. A hornblende-feldspar

porphyry body probably intrudes this sequence. A distinctive sequence of quartz keratophyric lapilli tuffs and agglomerates have been demonstrated to unconformably overlie the sheared volcanics. This unit trends north-south and dips steeply east. The continuation of these rocks towards the S.E. has been detailed by Green (1971).

5.2 Structure

5.2.1 Faults

A small number of faults have been mapped in the licence area to date. The only one of any consequence is a quartz-veined zone at the contact of the Owen Conglomerate and Mt. Read Volcanics situated about 1 mile E.S.E. of the Lake Margaret haulage station. This fault is probably the northern continuation of the Lyell Shear - however it has not yet been definitely proved that the whole of the contact in the licence area is faulted.

The inferred faults shown on the regional geology map (Map 3) have been compiled from a variety of sources - however further mapping is required to definitely confirm or disprove the existence of these structures.

Three different trend directions can be suggested:- the N.W.-S.E. and W.S.W.-E.N.E. trending groups are a complementary set of Tabberabberan structures possibly related to earlier structures, whilst the N.-S. striking Ewart Fault is probably Tertiary in age. The Ewart Fault may cut the Sisters Hill Fault and extend southwards to the E.-W. trending tear structure just north of Queenstown.

The major N.W.-S.E. fault in the southeastern section of the licence area appears to curve around northwards and pass into a major anticlinal axis.

5.2.2 Folds

Folding of the volcanics and sediments into fairly tight, upright or slightly overturned folds during the Tabberabberan Orogeny was accompanied by shearing, low

grade regional metamorphism, silicification and the development of slaty and fracture cleavage and schistosity. All of these factors combine to obscure the folding with the result that only occasionally have folds been observed directly.

Generally the presence of folding has been inferred by the use of "way-up" structures in shale-siltstone-crystal tuff units. These structures have revealed a major N.N.W.-S.S.E. trending anticline, the axis of which lies about halfway between the Lake Margaret Road and the lower power station. A complementary syncline is inferred to the east of the anticline with an axis running about $\frac{1}{2}$ mile east of Lake Margaret township.

Numerous minor folds probably exist on the flanks of these major structures - their presence can be inferred by way-up structures which indicate younging in the opposite direction to the majority.

Dips throughout the licence area are generally steep. As can be seen from the regional geology map (Map 3) the strike of the rock units lies between 300-260°.

5.2.3 Foliations

Slaty cleavage is only rarely well developed - a poor form is often seen in unsilicified shale horizons.

Jointing and fracture cleavages are the most common foliations and occur fairly widely in the sediments tuffs and lavas.

Schistosity is best developed in altered tuffs. In general, the various foliations trend parallel or sub-parallel to the bedding.

6. MINERALISATION

A number of occurrences of surface sulphide and ironstone mineralisation have been located during mapping. These are recorded below - in general they have not been previously recorded.

6.1 "Gossans"

Two iron-rich ironstone of "gossan" outcrops have been discovered in the N.W. section of the licence area - one rich in limonite and the other in haematite.

The limonite "gossan" was found at the end of a timber track (350,300y. E., 830,800y. N.) in dense rain forest about ¾ mile west of the Zeehan Highway, 1½ miles north of the Henty Bridge. The "gossanous" zone is about 100 ft. wide but length along strike is unknown. Glacial till covers the ground to the north and, from exposures further south, the gossan is inferred to lie at the northern end of a ridge of micaceous sandstone of Ordovician (?) age.

The haematite-rich "gossan" is situated at 352,500y. E., 828,300y. N., ½ mile south of the Henty Bridge. It forms an almost circular outcrop, slightly raised above the alluvial plain, and covered by sparser vegetation than that in the surrounding area. Micaceous impure sandstone, siltstones and shales form the general country rock. Extensive quartz veining can be seen in a greywacke just S.E. of the "gossan". This veining is probably related to the proximity of the Long (Ewart) Fault - a major north-south trending structure of Tertiary (?) age.

In both cases, haematite and limonite were the only two minerals definitely identified - they occur as massive blocks, layers, encrustations, earthy concretions and hollow nodules. The two "gossans" are probably the weathered surface expressions of small basic or ultra-basic bodies - fresh representatives of which can be seen further to the north-east in the Henty River.

Four samples of gossanous material were analysed. One result included a copper value of 0.28% but the remainder were well below this figure.

6.2 Quartz Veins

Two large quartz veins up to 30 ft. in width and ¼ mile in length and trending approximately N.-S. outcrop about ¼ mile east of the Zeehan Highway, ½ mile south of the Yolande River (356,400y. E., 826,000y.N.). The country rock is a quartz-feldspar porphyry showing extrusive characteristics. Smaller masses of quartz up to 6 ft. wide and 200 ft. long, mostly trending N.-S. have been mapped.

Some of these quartz masses are probably associated with faults or have been concentrated by tectonic movement during the Tabberabberan Orogeny - they are thus post-ore in age.

Assays on several of the quartz veins gave generally low copper values of average 500 ppm Cu. Gold contents were generally below the detection limit of 0.2 ppm.

6.3 Sphalerite

Massive, banded sandstones and siltstones outcrop beside the Zeehan Highway, 1 mile south of the Yolande Bridge. Sparse disseminations of iron-rich sphalerite, pyrite and chalcopyrite (?) occur on joint planes exposed in a stream at 356,200y. E., 825,400y. N. Pyrite also occurs sporadically as small grains within the rocks.

The mineralisation (apart from some of the pyrite) is obviously secondary and may have been leached from the nearby Yolande Bridge porphyry which, according to Solomon (1964) contains amygdules with cores of galena and sphalerite.

6.4 Barytes

A reconnaissance traverse located a shallow 10 ft. long trench, cut into weathered (Kaolinised ?) quartz porphyry at 357,400y. E., 822,400y. N. approximately 1 mile north west of the Strahan-Zeehan Road junction.

Small piles of massive white barytes can be seen nearby and back along the track towards the highway.

This prospect trench is believed to be a northerly working on the Madam Howard Plains barytes deposit described by Groves (1964).

6.5 Pyrite

Sparse disseminations of pyrite are present as a ubiquitous constituent of most of the Mt. Read Volcanics and interbedded black shales. In the Henty-Yolande area the pyrite content of the volcanics appears to increase from west to east - this trend is probably due either to rock type variation or alteration of the host rocks and may be more apparent than real. However in several areas pyrite occurs as concentrations well above the normal "background". These areas are described below.

The main characteristics of the pyrite rich zones within the Henty-Yolande licence area may be summarised as follows:

1. Pyrite is nearly always the only sulphide present. Normal content ranges from 2 - 10%, although values up to 30% have been recorded.

2. Chalcopyrite, galena and sphalerite are generally absent or present in insignificant amounts. Geochemical analysis of a number of samples from pyritic zones gives averages of 500 ppm Cu, 100 ppm Pb, 700 ppm Zn and maximum values of 1900 ppm Cu, 250 ppm Pb, 1500 ppm Zn.

3. The host rock is either an altered, friable whitish tuff or a schistose quartz-sericite pyroclastic.

Notable pyrite occurrences have been observed in the following localities:

1. At 357,400y. E., 823,400y. N., about ½ mile north of the Lake Margaret Road turn-off where coarse euhedral pyrite crystals occur as disseminations in a trench beside the Zeehan Highway. Individual crystals up to 5 mm in size have been observed. The country rock contains scattered phenocrysts of quartz and may represent an altered quartz porphyry.

2. A richly pyritic (30%) body occurring towards the northern end of the Lake Margaret tramway (358,600y. E., 824,700y. N.) outcrops as a lens-shaped body and may be positioned along a shear plane.

3. Pyritised tuffs occur in the Henty River at 354,300y. E., 831,200y. N. The tuffs are highly chloritic and appear more basic than normal.

4. A short adit was found on the southern bank of the Henty River at 356,800y. E., 834,400y. N. Stringers and sparse disseminations of pyrite, galena and sphalerite are present in greenish silicified siltstones or fine tuffs.

Polished and thin section examination of these pyritic rocks will be undertaken to determine their genetic characteristics.

7. GEOCHEMISTRY AND GEOPHYSICS

Pickands Mather and Company, International conducted detailed geochemical soil sampling and geophysical coverage of two grid areas (refer Map 2) within the Henty-Yolande licence area - namely the North Queen Grid and the Basin Lake Grid. Smith (1967) summarises results obtained over the North Queen Grid area whilst Howland-Rose (1970) and Wuerch (1971) give details of investigations conducted by Pickands Mather in the Basin Lake area.

The only geochemical and geophysical work which has been conducted by Mt. Lyell in this area is that detailed by Meates (1971). A grid, referred to as the Sedgewick Grid, was laid out on the S.W. slopes of Mt. Sedgwick over an area of pyritic andesitic agglomerates and vesicular lavas.

The grid (refer Map 2) consists of a baseline 600 ft. long running in a N.W.-S.E. direction parallel to the strike of a small pyritic body. Four grid lines were cut at right angles to the baseline; the most southerly line was extended north-eastwards to the Owen Conglomerate contact on Mt. Sedgwick flank.

The grid area was geologically mapped and a ground magnetometer survey together with geochemical soil sampling for Cu, Pb, Zn and total Au + Ag were carried out over the grid.

Only a flat response was obtained from the magnetometer survey. The geochemical results were essentially featureless apart from a zone of anomalous lead values paralleling the outcrop of altered vesicular lava. Meates (1971) stated that no galena was observed in outcrop -

the writer considers that the anomalous lead values could be due to microscopic amounts of galena occurring possibly as vesicle infillings within the lava or adjacent agglomerates. Thin section examination of several samples could possibly resolve this point.

8. SUMMARY AND RECOMMENDATIONS

Recent advances in geological knowledge of the Lyell area suggest that the Mt. Lyell mineralisation is genetically related to the vulcanism which produced the Mt. Read Volcanics and further is, to some extent, lithologically controlled. This interpretation indicates that exploration along the faulted contact between the conglomerate and the volcanics - which has been the basis for most previous exploration efforts - will not necessarily prove productive.

Extrapolation of the Mt. Lyell ore horizons northwards leads the writer to the conclusion that the lateral equivalents of these horizons are either:

(i) faulted out by the northward continuation of the Lyell Shear or lie beneath the Owen Conglomerate; or

(ii) occupy a strip about 1 mile wide immediately to the west of the Owen Conglomerate contact.

In the latter case the bedrock would be covered in places by glacial moraine of unknown, but at least in part great thickness. Nevertheless, it is recommended that future exploration for Lyell type mineral deposits should be concentrated in this area.

The remainder of the licence area, whilst not representing a potential host for Lyell type deposits, retains some potential and should not be relinquished at this stage. A study of the literature concerning the rock types and stratigraphic position, together with the general geological environment of the Rosebery-Hercules orebodies suggest that these deposits may form in an environment similar to that seen in the area west of the Lake Margaret Road, at least as far west as the Zeehan Highway. Completion of the geological mapping of this area is recommended. To facilitate the completion of this work a number of access tracks are required to permit the thickly forested, inaccessible Langdon River valley, north of the Yolande River, to be geologically investigated.

It is considered that an effective test of the potential for massive stratiform Pb-Zn mineralisation of the Rosebery-Hercules type could be gained by airborne geophysical techniques. Of the number of techniques available, airborne E.M. methods would appear most suitable. Any recommendation for such testing must rest on the results of geological mapping planned for 1972-73.

The country to the west of the Zeehan Highway is thought to possess the least economic potential of the licence area. However, in the main, the geology is very poorly known and it is recommended that geological traverses of the rivers, major streams and tracks be undertaken before this part of the licence area is relinquished.

It is anticipated that by the end of the 1972-73 field season the whole of the licence area will have been geologically mapped in sufficient detail to enable specific exploration programs to be planned over areas of potential.

In addition to the geological mapping coverage planned for the 1972-73 season it is recommended that a detailed re-evaluation of Pickands Mather's Basin Lake geophysical and drilling investigations be undertaken.

Encouraging traces of Pb mineralisation were encountered in highly weathered Mt. Read Volcanics in D.D.H. BL 802. As the core from this hole has now been acquired by this Company, detailed reanalysis for various trace elements should be conducted to confirm Pickands Mather's analytical results.

Unfortunately D.D.H. BL 802 was not completed by Pickands and it is considered that it may be necessary to extend the old hole or drill a new hole to adequately test this area. As an extensive moraine blanket obscures the area further geophysical investigations are unlikely to define drilling targets much more accurately. However detailed gradient array I.P. coverage of a small area could be considered to confirm the I.P. axis on which BL 802 was sited and to provide improved definition of the target.

The possibility of conducting borehole geophysical tests on D.D.H. BL 802 should be investigated. Further the possible application of mercury vapour analysis could be considered in this area of deep moraine cover.

9. PROPOSED BUDGET 1972-73

A budget of $18,000 has been proposed to allow continuation of the exploration program on Henty-Yolande E.L. 41/71 during 1972-73.

A detailed breakdown of this budget is as follows:

SALARIES		$10,700
(Includes the following personnel)		
1 geologist - whole year		
1 field assistant - Periods 6 - 13		
1 student - Periods 7 - 9		
MATERIALS		$ 1,000
Food, gas, fuel, field equipment (includes sample bags, tapes etc.)		
OUTSIDE SERVICES		$ 3,500
Trackcutters (65,000')	- $2,500	
Road maintenance and bulldozer hire	- $1,000	
GEOLOGY		$ 1,000
Thin section work by contractors		
Geochemical analysis costs		
GENERAL COSTS		$ 1,000
Vehicle maintenance and fuel costs		
HIRE OF EQUIPMENT		$ 800
Hire of 2 Mt. Lyell Caravans to provide a base for operation in the northern portion of E.L. 41/71		
TOTAL		$18,000

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840,000yN.
835,000yN.
830,000yN.
825,000yN.
820,000yN.
345,000yE.
350,000yE.
355,000yE.
360,000yE.

TO ZEEHAN

Henty River

Mt. Tyndall

Mt. Geikie

Basin Lake

Lake Huntley

Lake Margaret

Mt. Lyell

Mt. Owen

QUEENSTOWN

GORMANSTON

TO STRAHAN

AERODROME

5 cm

TRUE NORTH

MAGNETIC NORTH

LEGEND

- ORIGINAL LICENCE E.L. 41/71
- ORIGINAL LICENCE E.L. 10/69 PART I
- CURRENT LICENCE E.L. 41/71

72-880

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

E.L. 41/71
HENTY–YOLANDE
LICENCE BOUNDARIES
MAP 1

Drawn: R.G.W.
Checked: N.W.S
Date: JUNE '72
Scale: 2" = 1 mile

Co-ordinates on State Grid.

Base map by Lands and Surveys Department, Hobart. 40 chains to 1 inch sheets.

749025 001

LEGEND

- HIGHWAYS
- MAJOR VEHICULAR TRACKS
- MINOR VEHICULAR AND FOOT TRACKS
- GRID LINES

TRUE NORTH
MAGNETIC NORTH

5 cm

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

E.L. 41/71
HENTY - YOLANDE
ACCESS MAP 2
72-880

Drawn: R.G.W.
Checked: N.W.S
Date: JUNE '72
Scale: 2" = 1 mile

Base map by Lands and Surveys Department, Hobart. 40 chains to 1 inch sheets.

749026 002

Co-ordinates on State Grid.

UNDIFFERENTIATED CAMBRIAN

MORAINE ALLUVIUM AND SWAMP WITH SCATTERED OUTCROPS OF CAMBRIAN VOLCANICS AND SEDIMENTS

APPROXIMATE LINE OF VOLCANIC/CONGLOMERATE CONTACT

UNDIFFERENTIATED PALAEOZOICS

EWART FAULT

Lake Huntley

Mt. Tyndall

Mt. Geikie

Basin Lake

Lake Margaret

Mt. Lyell

Mt. Owen

GORMANSTON

QUEENSTON

AERODROME

TO ZEEHAN

TO STRAHAN

LEGEND

- ALLUVIUM AND SWAMP
- GLACIAL TILL
- ELDON GROUP
- JUNEE GROUP
  - GORDON LIMESTONE
  - OWEN CONGLOMERATE
- DORA CONGLOMERATE
- MT. READ VOLCANICS AND DUNDAS GROUP
- QUARTZ - FELDSPAR PORPHYRY
- HORNBLENDE - AUGITE PORPHYRY
- INTRUSIVES (GABBROS)
- TREND LINES
- SYNCLINAL AXIS
- ANTICLINAL AXIS
- GEOLOGICAL BOUNDARY
- FAULT
- INFERRED FAULT
- UNCONFORMITY

TRUE NORTH
MAGNETIC NORTH

5 cm

72-880

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

E.L. 41/71
HENTY - YOLANDE
GEOLOGICAL MAP
MAP 3

Drawn: N.W.S.
Checked: N.W.S.
Date: JUNE '72
Scale: 2" = 1mile

Base map by Lands and Surveys Department, Hobart. 40 chains to 1 inch sheets.

749027 003

Co-ordinates on State Grid.