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PRELIMINARY INVESTIGATIONS
of
E.L. 47/70, WEST TASMANIA.

Q57, Q58
Q64, 65

13th October, 1971

by

A.M. ROBINSON

CYPRUS MINES CORPORATION.

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INTRODUCTION

The purpose of this report is to summarise existing literature, exploration reports lodged with the Department of Mines and other data available that is required for planning exploration within Exploration Licence No. 47/70.

Exploration Licence 47/70, total area of 293 miles is being prospected in a joint venture agreement with Devex Pty. Ltd. Cyprus has negotiated an Agreement by which an interest of 88% can be earned.

Mt. Lyell - Rio Tinto (L.E.E.), Broken Hill Proprietary Company and Pickands Mather International have held Exploration Licences over parts of this area. The results of their programmes and Mines Department literature obviously have not revealed any mineralization of economic interest worthy of either large or small operations. The very few past mining sections in the area were generally located for alluvial gold, with one or two listed as lead-silver.

C.M.C. EXPLORATION PROGRAMME NOW COMPLETED

1. All available literature has been reviewed and all material relevant to E.L. 47/70 has been isolated.
2. Areas close to Queenstown have been briefly examined by C.M.C. staff.
3. A member of the C.M.C. staff has spent two weeks meeting and talking to persons who may be of assistance to C.M.C. in locating any old workings and access tracks to the area.
4. A field assistant, equipped with a four wheel drive vehicle, has been initially assigned to inspect and map access tracks.
5. It is planned that a geologist examine and record any occurrence of mineral, and also map at small scale the sections of Dundas Group volcanics that may outcrop along the several good access routes through the area i.e. Kelly Basin track, Abt railway track, Strahan road etc.
6. Further exploration shall be planned according to results of exploration completed in this initial stage.

SUMMARY OF GEOLOGY OF E.L. 47/70.A. STRATIGRAPHY:

The stratigraphic column of rocks in the Queenstown area can be summarized briefly:-

Recent	Alluvium, gravels
Pleistocene	Moraine, varved clays
Tertiary	Non-marine sand, lignite, clay, marine Limestone.

Siluro - Devonian

Elden Group

Bell Shale
Florence Quartzite
Keel Quartzite
Amber Slate
Crotty Quartzite

Ordovician

June Group

Fenestella Shale
Gordon Limestone
Florentine Valley Mudstone
Caroline Creek Sandstone
Owen Conglomerate
Jukes Conglomerate

Cambrian

Dundas Group

Mt. Read Volcanics

Early Cambrian Sequences

Younger Precambrian

Rocky Cape, Carbine Groups, Oonah Formation,
(quartzite, shales and dolomites).

Older Precambrian

Franklin, Mary Groups etc.
(schist, quartzite, amphibolite).

PRECAMBRIAN

The Precambrian rocks can be divided into two main groups. Firstly, the regionally metamorphosed schists, massive quartzites, quartz schists, phyllites, and slates with amphibolites, which are common in the central west of Tasmania and outcrop in the western portion of EL 47/70. The second group consists of slightly altered sandstones, quartzites, shales, phyllites, dolomites and minor rudites which are most extensively developed in the north-west of Tasmania and do not outcrop in the area of E.L. 47/70.

CAMBRIAN

The Cambrian sediments and volcanic formations occur as a belt of very thick deposits between the Rocky Cape (to the west) and Tyennan (to the east) Precambrian elements. The geosynclinal nature of this zone has been recognised by Carey and Banks (1954), Banks (1956), Campana et al (1958), Campana and King (1963), and Solomon (1960, 1965 and 1967). It has been determined that in Cambrian times a basin of neritic sedimentation was formed, which was marked by arenaceous and carbonate deposition. The basin then evolved into a geosynclinal belt flanked to the west and east by two Precambrian geanticlines comprising the Mt. Read volcanic Arc and a deep depositional furrow (The Dundas Trough), (Campana and King 1963, and Solomon 1965).

The Dundas Group is of particular interest in that it is host to the Mount Lyell copper deposits and contains a variety of rock types. A feature of the West Coast Dundas Group is the development of a considerable thickness of dominantly volcanic material along the West Coast Range. These volcanics include -

- Spherulitic potash rhyolites, e.g. at Mt. Darwin.
- Quartz Keratophyres e.g. at Harris Reward Gold Mines.
- Sodi-potassic rhyolite e.g. at East Queen River.
- Keratophyres e.g. east of Mt. Sorell.
- Argite Trachyte e.g. east of Queenstown - Lynchford road.
- Andesites e.g. Nth of Mt. Lyell.
- Basalts e.g. Lynch Creek, east of the area.

Conglomeratic and breccia lenses are a feature of the Dundas Group in the Queenstown area. When the constituents are entirely of igneous origin, the rock is probably the result of autobrecciation although in part it may be a true agglomerate, particularly where associated with lavas. There are also good examples of water sorted tuffs.

The ratio of sediments to volcanics is variable and the determination of this ratio is difficult because of the difficulty of making positive field identifications. Solomon (1960) suggested an approximate ratio of 50:50.

The sediments can be summarized viz:

- a) Conglomerates. Poorly sorted conglomerates are found with pebbles of "slate", "chert", quartzite and sandstone which have presumably been fed into the geosyncline from the Precambrian quartzites. The rocks are very similar to the overlying Jukes Breccia or Conglomerate, and to the even younger "Owen" conglomerate.
- b) Sandstones. Greywacke sandstones outcrop east of Lynchford.
- c) Mudstones and Slates. These outcrop as isolated lenses over a wide area e.g. Lynch Creek, in the Queen River gorge, along South Owen Creek (east of Queenstown) and around the junction of the Garfield and Currie rivers.

The Mount Read Volcanics are defined by a type sequence seen in a section at Mt. Read, near Rosebery. The age of the Mt. Read Volcanics is disputed; particularly in relation to its part equivalent, the Dundas Group. Although the volcanics described earlier have been included with the Dundas Group, many previous workers have considered them to be older or partly equivalent. It would appear that the volcanic sequence at Mt. Lyell is generally considered Mt. Read volcanics, which are of a different type, perhaps because of strong regional metamorphism. The classification is, in part, confusing. For the purpose of field work, it has been decided to recognise units individually, and correlate them with known sequences described in the Queenstown area. Then it might be possible to classify the rocks.

The Lyell schists are a series of quartzose, sericitic, chloritic schists, strongly developed at Lyell but also occurring at several places along the Lyell shear where mineralization is intense. The schists gradually change in character to the west and pass into unaltered porphyries and sediments of the Dundas Group. They are extremely variable in nature but may be divided into three groups:-

1. Quartz - sericite schists
2. Quartz - chlorite schists
3. Quartz - sericite - chlorite schists.

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Quartz - sericite schists are most common adjacent to the contact between schist and Owen Conglomerate and form a quartz sericite zone.

Quartz-chlorite schists alternate with quartz - sericite schists that show pronounced banding similar to stratification. This parallels the margin of chlorite zones and suggests that they may have been basaltic tuffs or basic lavas. (Wade and Solomon 1958).

Marginal schists represent an intermediate or marginal zone between the ore zone and the unaltered rocks of the Dundas Group. All these schist types are host rocks for ore, though generally the sericitic types are more strongly developed within the ore bodies.

CAMBRIAN INTRUSIVES

The Darwin Granite is the only major intrusive in the area and is supposed to be of Cambrian age. It trends north-south and is a vertical tabular body which lies between Mt. Darwin and South Mt. Darwin. It is composed of two parallel sheets each with somewhat different compositions.

ORDOVICIAN

The Ordovician rocks are members of the June Group. In the area of the Licence, the following formations are reported to be represented.

Gordon Limestone

Owen Conglomerate

The Caroline Creek Sandstone and the Jukes Conglomerate (Breccia?) outcrop nearby and will be mentioned briefly.

Jukes Conglomerate

The Jukes Conglomerate, may be defined as a formation dominantly composed of conglomerate and breccia consisting of fragments of lava and other Cambrian rocks. One unit, the Sorell Conglomerate rests unconformably on Pre-Ordovician sediments, lavas and granite and is overlain by siliceous conglomerate in the area east of Mt. Sorell. It merges along strike into wholly siliceous conglomerate and contains fragments of hematite, magnetite, Darwin Granite and quartz chlorite rock (Hills 1914, Bradley 1954). The granite boulders decrease in grain size from Mt. Darwin westwards. The formation is 300' thick at Mt. Sorell.

Owen Conglomerate

The Owen Conglomerate is that formation of siliceous conglomerate and quartz sandstone which outcrops on Mt. Owen and nearby mountains near Queenstown. It rests unconformably on

Jukes Conglomerate or equivalents and overlaps onto older rocks unconformably. The formation is divided thus:-

Middle Owen	Pale Conglomerates, Red or Purple Sandstone
Lower Owen	Conglomerate, Sandstone, Siltstone.

The conglomerate is siliceous with fragments of vein quartz, quartzite, quartz schist, chert and occasionally other rock types. The Lower Owen contains coarser material than the overlying Middle Owen and has fragments up to 2 feet in diameter. Coarse fragments are well rounded while sand size grains are inclined to be angular. Sorting is good and the framework is closed. The Middle Owen is more clearly bedded than the Lower Owen and shows cross bedding and cut and fill structures. The conglomerate beds are lenticular.

Caroline Creek Sandstone

This formation rests conformably on Owen Conglomerate which it overlaps.

Gordon Limestone

This formation outcrops in a thin band along the Queen and King River valleys, and in the Gordon, Bird and Nora River area. It varies from dark grey limestone to dark shales with limestone lenses. Shaley zones weather to a blue-black "pug" or clay. The limestone weathers more rapidly than contiguous formations and hence tends to occur in swampy valley floors.

SILURO-DEVONIAN SEDIMENTS

These consist of alternating quartz sandstones and quartz shales (Eldon Group of Western Tasmania). They outcrop in synclinal basins on either side of the Cambrian anticlinorium.

The Bell Shales (Devonian) in the Bull Rivulet region are pyritic, and where the water-table reaches the surface, limonite gossan formations may occur. Gold mineralization occurs in quartz veins associated with Florence Quartzites (Upper Silurian) at the southern end of the Queenstown aerodrome. The Eldon Group is thought to be over 12,000' thick near Queenstown.

OTHER

For the purposes of this report, the stratigraphy of more recent rock types is not of immediate interest and will be omitted.

B. STRUCTURE

The principal tectonic structures of the Mt. Lyell area are Tabberabberan in age. The earliest were major synclines and anticlines trending N-S to N.N.W. with wavelengths of 5-6 miles, their trend probably controlled by the physical discontinuity against the Precambrian at the western margin of the Tyennan Geanticline (Solomon 1966). The dominating structure is the West Coast Range Anticlinorium, the axis of which passes through Queenstown and continues north to Mt. Dundas.

The major factors controlling the development of the structural pattern have been:-

- a) forces acting from the southwest.
- b) the presence of the Tyennan massif to the east.
- c) the increasing thickness of the geosynclinal sediments westwards from the margin of the massif.

There is a combination of a shearing couple and a westerly directed compression. The SW-NE compression resolves into components aligned parallel and perpendicular to the margin of the Tyennan block resulting in E-W compression of the geosynclinal sediments and shearing west-side north.

The principal structural elements are:-

- a) N-S West Coast Range Anticlinorium, the King Sophia synclinorium and related secondary folds.
- b) The N-S Lyell shear and Soft-Crotty structure.
- c) The NW fault - folds and NW schistosity.
- d) The Linda Disturbance.
- e) The NE faults.

The N-S West Coast Range Anticlinorium

This structure and its flanking synclina is the major structure of the area. It has a N-S trend with the axis passing to the east of Queenstown. It is asymmetrical, the secondary "drag" folds showing vertical or overturned and commonly severely attenuated eastern limbs, and flat undisturbed western limbs. The King Sophia syncline is wedged between the West Coast Range Anticlinorium and the Tyennan block.

The Lyell Shear

This is a N-S feature paralleling the range from Comstock to South Darwin. It is associated with local overturning,

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attenuation and mineralization. Its points of conflict with cross-cutting structures are foci for ore deposition. Movement of the shear has been north with west-side up, combining vertical and trans-current movement. The main shear movement took place during the Tabberabbern Orogeny. Its control over the distribution of the Owen Conglomerate near Queenstown is significant to the origin of the ore hosts at Mt. Lyell.

The NW fault-folds and NW schistosity

The NW faults have a strong influence on ore occurrence. They occur along the steep limbs of N.E. facing folds. The down throw is to the north and the strike of these faults tends to vary from WNW to NNW. The faults tend to occur in the competent, massive Owen Conglomerate. The same dynamic pressure is expressed as N.W. schistosity in the softer more yielding Dundas rocks.

The Linda Disturbance

This is a E-W or WNW Zone of faulting that may be traced for many miles east and west of the range. The Howards Plains fault is part of the Linda Disturbance. All the large, rich copper ore bodies of the Lyell area fall within the boundaries of this feature.

The NE faults

These are related to a N-S shearing couple and SW compression. They show vertical throw, south side up. Bradley (1956) regarded these as major factors in ore control. Wade and Solomon (1958) however, consider them as insignificant.

Notes on Some Further Structural Considerations (Bradley 1956) Which are Particularly Pertinent to E.L. 47/70

The Sorell and Clark Anticlines

"Now that the effects of the north-east faults and the Lyell Shear can be allowed for, the major structures and the sedimentary history of the area west of Mt. Darwin can be approached..

The Owen Conglomerate of Mts. Sorell and Darwin thins out markedly towards the nose of the Clark Anticline and on each mountain this conglomerate is underlain by formations which thin out in the same direction. On Mt. Sorell the underlying formation is the Sorell

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Conglomerate which is composed of granite and magnetite pebbles and on Mt. Darwin there are two formations, a fine grained conglomeratic greywacke and the stratified and conglomeratic Darwin Granite. At the nose of the Clark Anticline only the Tubicolor Sandstone continues round the end of the fold, and it is the lower and conglomeratic portion of the Owen Conglomerate which thins out. In view of the general tendency of the Owen Conglomerate and Dora Conglomerate to have sympathetic variation in thickness it is thus wholly reasonable from a structural standpoint to suppose that the Sorell Conglomerate and Darwin Granite were both originally Dora Conglomerate.

It is now structurally and historically consistent to regard the Clark Anticline as the old Dundas Ridge against which these two formations thinned. The rocks of the core of the Clark Anticline tell very little of their origin, for they consist of thoroughly mixed slates, adinoles, quartz porphyries and quartz sericite schist which cannot be mapped separately or recognised except in the broadest terms. From the large content of slaty and hornfelsic rocks involved, the complex is almost certainly made up of the Dundas Group strata, and the observed strikes of the slates are consistent with the presence of a south plunging anticlinal axis running along the Clark River. From the attitudes of the Mt. Darwin adinoles it may be inferred that the major anticline has an overturned eastern limb but this must be largely due to the Devonian folding and the Cambrian structure must have been a less acute fold. The unconformity at the base of the Dora Conglomerate must, in accord with this thesis, have been less than 60° .

The Sorell anticline follows the general pattern of folds in the region, in that it is an asymmetric fold and overturned to the east. but the degree of overturn is greater than usual and the exposure of the structure in the eastern face of Mt. Sorell is also unusual. In that face the three limbs of an overturned anticline and syncline are seen: the horizontal trace of a synclinal axial plane occurs near the base of the cliff or is buried by scree and the trace of the anticlinal axial plan occurs 500 feet to 600 feet above. The resultant triplication of the Sorell Conglomerate is not at all obvious as the formation is uniform and it led Hills to estimate the thickness of the conglomerate as much greater than is thought here. The 45° and 75° dips given by Hills (1914) show the true situation quite clearly if one interprets his 75° dip as the overturned dip of the central limb.

There is a small anomaly in the thickness of the Owen Conglomerate on Mt. Sorell, for it is found that the formation thins out or becomes sandier in every direction and it must be concluded that the site of the

Devonian fold was also the site of a thick accumulation of detritus in Tremadocian time. In brief, the Sorell Overfold is the surface expression of a rejuvenated Cambrian fault in the same way as is the Crotty Monocline, but by comparison it was only a small structure of the Porphyroid Anticlinorium and not a much larger part of the West Coast Range Anticlinorium. It is readily conceived that the Sorell Fault of Cambrian age was echeloned with the ancestral thrust of the Jukes Block and that it was prolonged far to the south as the eastern margin of the Porphyroid Anticlinorium".

Mt. Strahan

"The mountain has the structure of an asymmetric anticline overthrusting the sharp syncline of the Currie River. It is composed almost wholly of quartz sandstone and grit, but some underlying thin conglomerates are seen at Flannagans Flat Goldfield in the core of the fold. The contact is not well seen but is haematitised and pyritised, and the underlying rock is coarse foldspar porphyry. The total thickness of the Owen Conglomerate is 800 feet, and it appears that the formation becomes less conglomeratic from Mt. Sorell northwards".

SUMMARY

1. At Mt. Lyell, the tectonic control of mineralization is the intersection of the major north-south Great Lyell Fault with a west-north faulting of the Linda Disturbance.
2. A poorly developed but similar pattern has been recorded from several areas just east of EL 47/70 Jukes Pty., East Darwin, and Hal Jukes. This may extend westwards into the Dundas Group outcropping in E.L. 47/70.

SUMMARY OF REPORTS OF KNOWN MINERALIZATION WITHIN E.L. 47/70Harris Reward Gold Mine (after Twelvetrees 1900)

This is an abandoned mine, four miles from Lynchford, near the junction of the Newall and King Rivers. A tunnel was driven along a quartz reef for 60 feet, where it pinched out, and 20 feet of further driving failed to find any continuation. South of the tunnel another tunnel ~~was~~ crosscuts the trend of the vein near its entrance, but a further 30 feet was driven without finding more quartz ore. Eight tons of quartz were taken from the surface, yielding 15 ounces of gold. A shaft was sunk 40 feet from the reef, and a crosscut driven 10 feet which intersected a small vein. The quartz contained a little galena, but no pyrite. Because water filled the shaft, work was discontinued.

Oliphant's Asbestos Show (after Twelvetrees 1900)

About $\frac{1}{4}$ mile north-east of the King River Mine battery, asbestos has been located in oxidised rock. The rock type appears to be felsite. There appears to be no recorded production from this prospect.

King River Gold Mine (after Twelvetrees 1900)

This prospect is located along Lynch Creek. Several tunnels have been driven on a 10 feet wide reef of quartz striking approximately 045° and dipping NW.

The country rock is yellow clay, with black ironstained seams, and the clay is stated to be auriferous only where intersected by the ferruginous seams. The clay is probably weathered volcanics. There appears to be no significant recorded production.

Strahan Road Gold Mine (after Bradley, 1957)

This prospect is probably typical of many gold bearing veins of the region but it is the only one which can be traced for any distance. The vein can be followed in a south-west direction as a ridge of silicified greywacke from a Knoll at 361700yE, 815400yN to the Strahan road. Gold prospectors have driven short adits at several points, apparently without much success, and alongside the road some fairly extensive workings were made. The vein was probably formed along one of the north-east striking faults, a pattern which seems common in this area.

Queenstown Airport Gold Pits

It appears that many pits were sunk on the stock-work-like stoney quartz veins intruded in the folded Bell Shale? sequence just west of Queenstown. It is doubtful whether any gold was found.

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Eagle Creek

The Eagle Creek prospect, recorded by T.B. Moore in 1905, is located on the second north branch of Eagle Creek approximately $\frac{1}{2}$ mile above their confluence. Eagle Creek is a major creek draining into the Gordon River. The two adits and costean were sunk on pyrite/hematite mineralisation. The prospect appears to lie on a east-west fault, or near the point where this structure intersects a regional north-south fault. The prospect was reported to be of no economic importance.

SUMMARY OF DETAILED EXPLORATION WORK COMPLETED BY OTHER
MINING COMPANIES WHO HAVE HELD EXPLORATION LICENCE
WHICH HAVE COVERED WHOLLY OR PARTLY E.L. 47/70

1. Lyell-E.Z.-Explorations

Apart from a few field traverse reports, no detailed information is available on exploration activity within E.L. 47/70. An aerial magnetic survey was conducted for the whole west coast of Tasmania, but no useful information can be gained for the area of the Licence. It has been stated that an aerial E-M survey was flown but there appears to be no Mines Department record of this.

It can be assumed that outside exploration programmes have been carried out whenever inferred reserves at Mt. Lyell looked in short supply, i.e. in the early 1900's, early 1940's, late 1950's.

2. Rio Tinto Australian Exploration Pty. Ltd.

The largest single organised exploration effort was conducted by Rio Tinto Australian Exploration Pty. Ltd. between 1956 and 1960. The regional exploration programme by Rio Tinto involved an aeromagnetic survey totalling approximately 3,000 square miles in northwest Tasmania, followed by airborne electromagnetic surveys in selected areas (THIS may have been in conjunction with L.E.E.?). This work was followed by geological reconnaissance in the belt of Cambrian rocks outcropping between Mt. Lyell and Mt. Bischoff. Following the reconnaissance phase, the R.T.A.E. programme concentrated on examination of known mineral occurrences within a 15 by 20 mile rectangle in the Zeehan-Rosebery area. The field methods employed were reconnaissance mapping, ground electromagnetics and a limited use of soil geochemical surveys (R.T.A.E. did not use the stream sediment reconnaissance technique).

It is not apparent whether the R.T.A.E. Exploration Licence covered any area now included in E.L. 47/70.

3. Pickands Mather & Co. International

Possibly as the result of the participation in the Savage River Iron Ore development programme, P.M.I. took up in 1965, a 4050 square mile Exploration Licence which included the norther part of E.L. 47/70 (as far south as 810,000yN). Their reconnaissance investigation involved a three year field programme commencing July 1965, utilising stream sediment,

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geochemical and geological reconnaissance surveys, followed by detailed stream geochemical, soil geochemical and I.P. geophysical surveys. They envisaged scout drilling on target areas in the second and third years of their programme. This did not materialize except on the Airport Anomaly and the Roaring Meg grid area.

P.M.I. located two target areas within the present boundaries of E.L. 47/70:-

1. Lynch Creek Anomaly.
2. Airport Anomaly.

The Lynch Creek area is situated 2-3 miles south of Queenstown and lies generally to the east of the junction of Queen River and Lynch Creek. Detailed geological mapping and soil sampling was completed over a grid system consisting of 78,000 feet of lines. Ground magnetic readings (25 feet spacing) were completed on all lines. An In-line electromagnetic survey was completed on alternate lines. One I.P. set-up (300 foot dipole) was made on 'line 144S' to check a copper/lead soil high.

No surface evidence of mineralization was found, although old gold workings existed in the deep clays overlying the spilitic rocks. A well defined magnetic anomaly was found coincident with the crystal tuff to the west of the area which contained pyrite and pyrrhotite. It does not appear that holes were drilled on this prospect. It appears that the only drilling programme was at the Roaring Meg Creek grid area to the north-east of E.L. 47/70, several miles distant from Lynch Creek.

The Airport prospect was situated 1½-3 miles north-west of Queenstown in open flat terrain surrounding the aerodrome. A grid was established to investigate anomalous copper/lead stream sediment values, obtained during their earlier reconnaissance traverses. 77,000 feet of grid line (400 foot spacing) was cut, and drained. Geological mapping and detailed soil sampling (100 foot intervals) was completed. There were incomplete ground magnetic electromagnetic and I.P. surveys - the latter of one set-up only (300 feet dipole). One 262 foot drill hole (A-501) was drilled to check a small copper/lead soil and coinciding I.P. anomaly. It is understood that the results of their programme were most discouraging. It appears the I.P. anomaly can be attributed to graphite shales, and the geochemical anomalies to mine dump material which was used to build the airstrip.

4. United States Metals Refinery Company

In 1964, U.S.M.R. Company took up 84 square miles immediately south of Queenstown over the Jukes-Darwin field. This may have covered in part the eastern part of the present E.L. 47/70. U.S.M.R. Company considered the area favorable for ore deposition on the basis of stratigraphy and tectonic disturbance. After carrying out geological reconnaissance and prospecting over the best prospects in the Jukes-Darwin belt, U.S.M.R. Company considered that the zones of mineralization and alteration were not of sufficient intensity to warrant future exploration.

5. Broken Hill Proprietary Co. Ltd.

In 1964, shortly after the U.S.M.R. Company's application was lodged, the Broken Hill Proprietary Company took up all available land in the immediate area. Since that date they have held a considerable area in West Tasmania. They relinquished the areanow held under E.L. 47/70 in 1970, and it is believed they are concentrating exploration activities in the Mt. Darwin area. Apart from an incomplete geological map, no information is available from the Mines Department concerning their past exploration programmes. It is understood that on relinquishing their Exploration Licence in full, information will then be released. On private communication with B.H.P? they have nothing to report that may be of relevance to the area held by E.L. 47/70.

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SUMMARY OF AREAS WORTHY OF RECONNAISSANCE

1. Any outcrop areas of Dundas Group volcanics within E.L. 47/70:-
 - a) Mt. Sorell north-west towards the Harris Reward Gold Mines.
 - b) Undifferentiated sequence east of Strahan
 - c) Gordon River area and south of 790,000yN. Information from prospectors living in the district suggests that none of the previous companies have conducted an intensive ground reconnaissance programme. If this is true, the geology shown on maps of this area is probably only based on aerial photo interpretation. Therefore, it would seem that in the future, plans may be made to conduct field traverses across this portion of the E.L. 47/70 (irrespective of the geology shown on past maps and irrespective of the knowledge, poor though it may be, of known occurrences of mineralization).
 - d) Lynchford area. Check out conducted mineralization investigated by programme of Pickands Mather & Co. Internation.

2. All known occurrences of mineralization within E.L. 47/70 must be located, examined and reported by CMC geological personnel, viz:
 - a) Harris Reward Gold Mine.
 - b) King Gold Mine.
 - c) Prospects close to Mt. Sorell and west of Mt. Darwin.
 - d) Lead-silver prospects near Queenstown-Strahan road.
 - e) Any prospects reported by local residents.

3. Anomalous geological features which could indicate mineralization must be examined.

The area of hematized rock on the eastern flank of Mt. Sorell close to the Mt. Read Volcanic-Owen Conglomerate unconformity. This feature is the only specific anomaly known of to date. It was one of the factors which justified the participation of C.M.C. in the programme.

APPENDICES

Appendix (i) : REGISTERED DESCRIPTION OF E.L. 47/70

Commencing at the posted notice situate at a north west corner of the area applied for whose grid co-ordinates are 810,000 yards N, 344,000 yards E and being a point east of Strahan and 150 yards south of the 5 mile peg on the Strahan-Queenstown Road thence grid south to 803,000 yards N, grid west to 340,000 yards E again grid south to 800,000 yards N south easterly to 780,000 yards N, 360,000 yards E again grid south to 770,000 yards N grid east to 380,000 yards E grid north to 790,000 yards N, again grid west to 360,000 E again grid north to 810,000 yards N again grid west to 359,000 yards E again grid north to 817,500 yards N, northerly to 821,000 yards N, 360,000 yards E again grid west to 350,000 yards E again grid south to 810,000 yards N aforesaid and again grid west to the point of commencement.

The area embraced by this licence shall be exclusive of all municipal and public reserves and roadways, leases, water licences, easement licences, special and exploration licences, prospectors licences, miners right issued under the Mining Act, 1929, and which is in the lawful possession or occupation of any person or which is marked out prior to the date of marking out of this licence, land exempt from the provisions of the Mining Act, 1929, scenic reserves and other Crown Reservations and other land set apart or dedicated for any public purpose.

18th November, 1970.

Appendix (ii) : MAJOR REFERENCES:

- Notes: 1. In the first column, references designated * can be obtained from the C.M.C. library.
2. In the second column, references designated # have some relevance to the geology of the Exploration Licence and some may contain references to particular localities.

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1957 (b) Report on the Examination of Findons
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Appendix (iii) MINES DEPARTMENT EXPLORATION RECORDS (NOT ALREADY LISTED UNDER MAJOR REFERENCES).

P 2 - 2 - 3C Pickands M.I. Status of Airport Anomaly,
near Queenstown, Tasmania.
March 1967.

P 2 - 2 - 3E " Status of Lynch Ck. Anomaly,
near Queenstown, Tasmania,
March 1967.

Lyell - Ez Explorations

Report on Reconnaissance of
Lower Part of Gordon River
Valley
January, 1957.

Lyell - Ez Explorations

Report on Examination of Eagle
Ck Area
January, 1957.

Lyell - Ez Explorations

Report on Work at Eagle Ck.
December, 1956.

Lyell - Ez Explorations

Report on Examination of Eagle
Ck. Area
February, 1957.

Lyell - Ez Explorations

Report on Andrew Ck.
December, 1956.

Lyell - Ez Exploration

Summary Report on Track Cutting
and Prospecting by M. Penney &
party (refer Eagle Ck.)
April, 1958.

Appendix (iv) : LANDS DEPARTMENT MAPS

Franklin 1 mile Provisional Sheet No. 8013

Pillinger ½ mile Topographical Zone 7 Sheet No. 65A

Lyell "C" (Crotty) ½ mile Topographical Zone Z
Sheet No. 58C

Dyeline 1 mile Strahan Sheet No. 7913 - N

Dyeline ½ mile Lyell "A" (Queenstown).

Dyeline ½ mile Pillinger "C"

Dyeline ½ mile Henty

Dyeline ½ mile Strahan

Dyeline ½ mile Cape Sorell

Queenstown 4 mile Topographical map Sheet No. 5

028
Appendix (v) : LANDS DEPARTMENT PHOTOS.

1. KING FRANKLIN RUNS

Scale: 1" = 3200' (approx.) Height = 20,000'

RUN 2 T302-100 to T302-110

RUN 3 T305- 43 to T302- 55

RUN 4 T302- 25 to T302- 35

RUN 5 T301- 97 to T301-108

T307- 8 to T307- 13

RUN 6 T301- 79 to T301- 87

RUN 7 T301- 35 to T301- 42

RUN 8 T301- 23 to T301- 30

RUN 9 T311- 2 to T311- 8

2. MACQUARIE HARBOUR

Scale ? Height ?

RUN 1 T354-127 to T354-129

RUN 2 T354-106 to T354-110

RUN 2 T44055 to 44058

RUN 3 44083 to 44085

RUN 4 44095 to 44099

RUN 5 44100 to 44105

RUN 7 44120 to 44127

QUEENSTOWN SOUTH F209

Scale: 1" = ? Height = 3,300'

QUEENSTOWN AREA F0116

Scale: 1" = ½ mile Height = 13,000'

T556-125 to T556-132

T556-109 to T556-116

T556-100 to T556-108

818030

029

QUEENSTOWN AREA F256

Scale 1: 10,000 Height = 7,550'

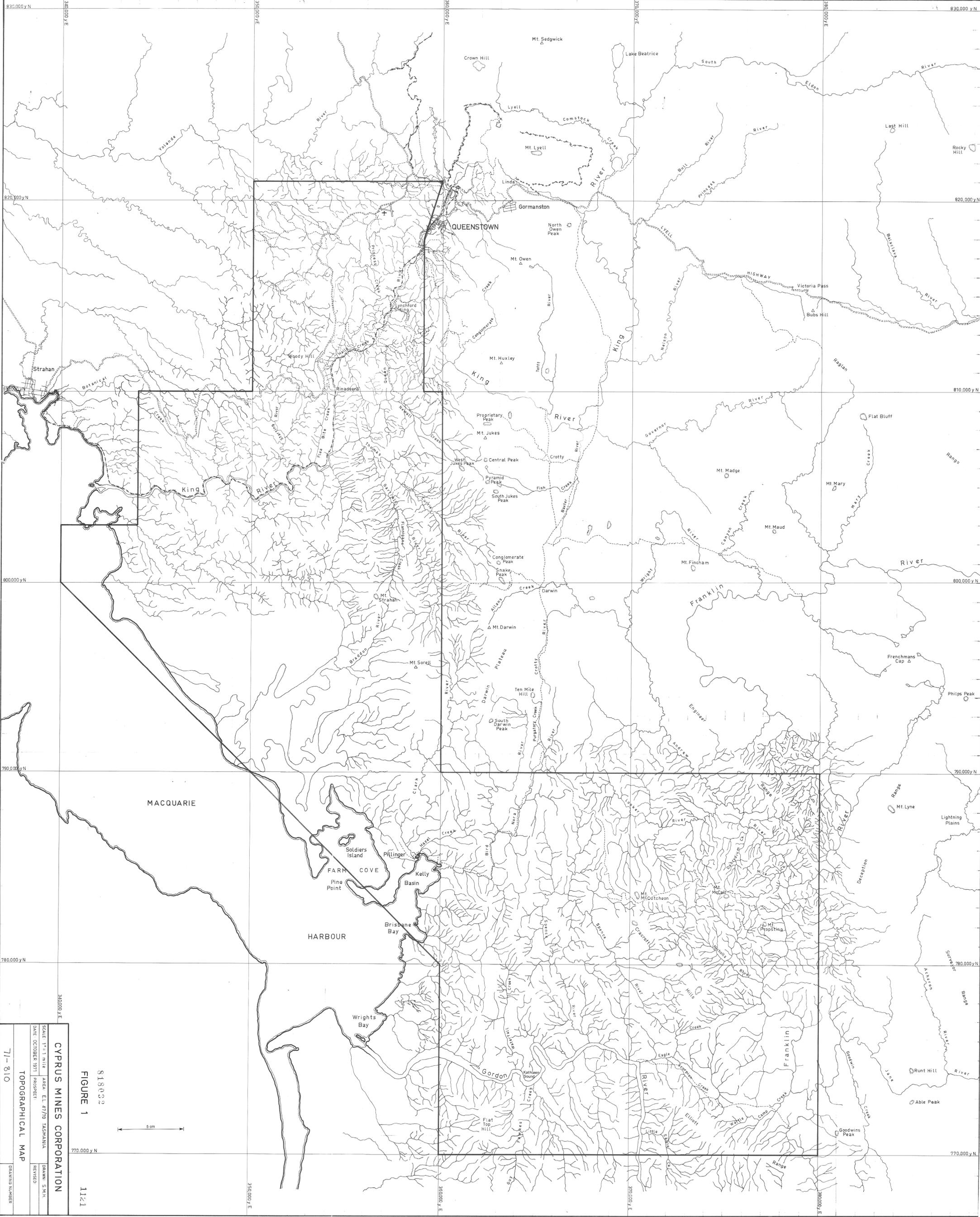
T568-100 to T568-110

T568-110 to T568-134

T568-136 to T568-150

Appendix (vi) INDEX OF C.M.C. MAPS ACCOMPANYING THIS REPORT

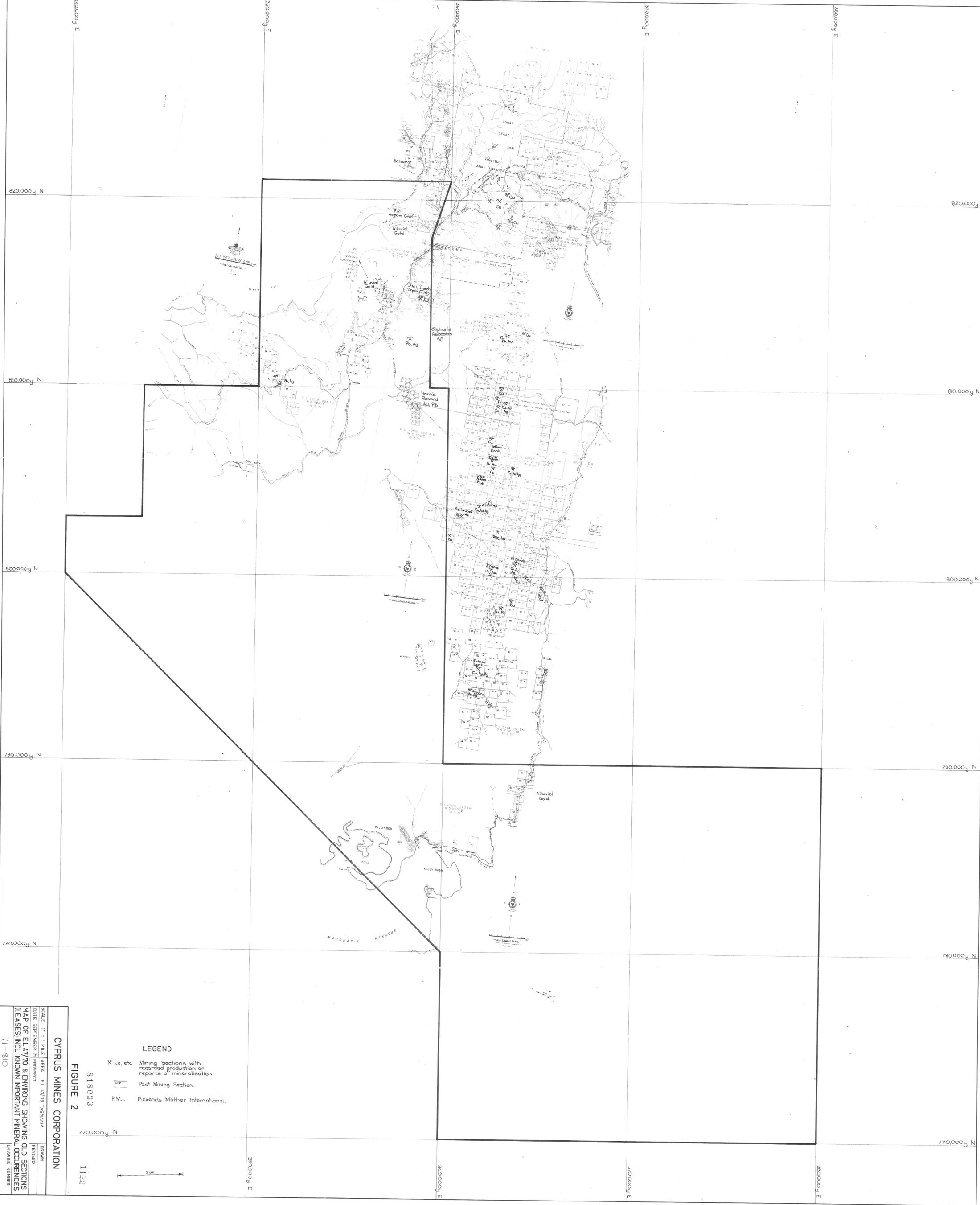
- 030
- Fig. 1: Topographical map of E.L. 47/70
- 2: Map of E.L. 47/70 and environs showing old sections (leases) including known important mineral occurrences.
- 3: Geological map of West Coast after Solomon (1964)
- 4: B.H.P. Co. Ltd. Geological map from old E.L. 13/65 - 1969
- 5: Geology map of Queenstown area after Bradley (1954)
- 6: Alteration map of Queenstown area after Bradley (1954)



830,000 y N
 820,000 y N
 810,000 y N
 800,000 y N
 790,000 y N
 780,000 y N
 770,000 y N
 340,000 y E
 350,000 y E
 360,000 y E
 370,000 y E
 380,000 y E
 390,000 y E

818032
 FIGURE 1
 1121
 5m
 770,000 y N

CYPRUS MINES CORPORATION
 SCALE: 1" = 1 mile
 AREA: EL. 4770 TASMANIA
 DATE: OCTOBER 1971
 TOPOGRAPHICAL MAP
 DRAWING NUMBER
 71-810



SCALE 1" = 1 MILE (AREA - EL. 47/70 TASMANIA)
 DATE (SEPTEMBER 71) PROJECT
 MAP OF EL.47/70 & EMWONS SHOWING OLD SECTIONS
 (LEASES) INCL. KNOWN IMPORTANT MINERAL OCCURRENCES
 DRAWING NUMBER 71-810

CYPRUS MINES CORPORATION
FIGURE 2
 818033
 1122
 5 cm

- LEGEND**
- X Cu, etc Mining Sections with recorded production or reports of mineralization.
 - P.M.I. Pickands Mather International.

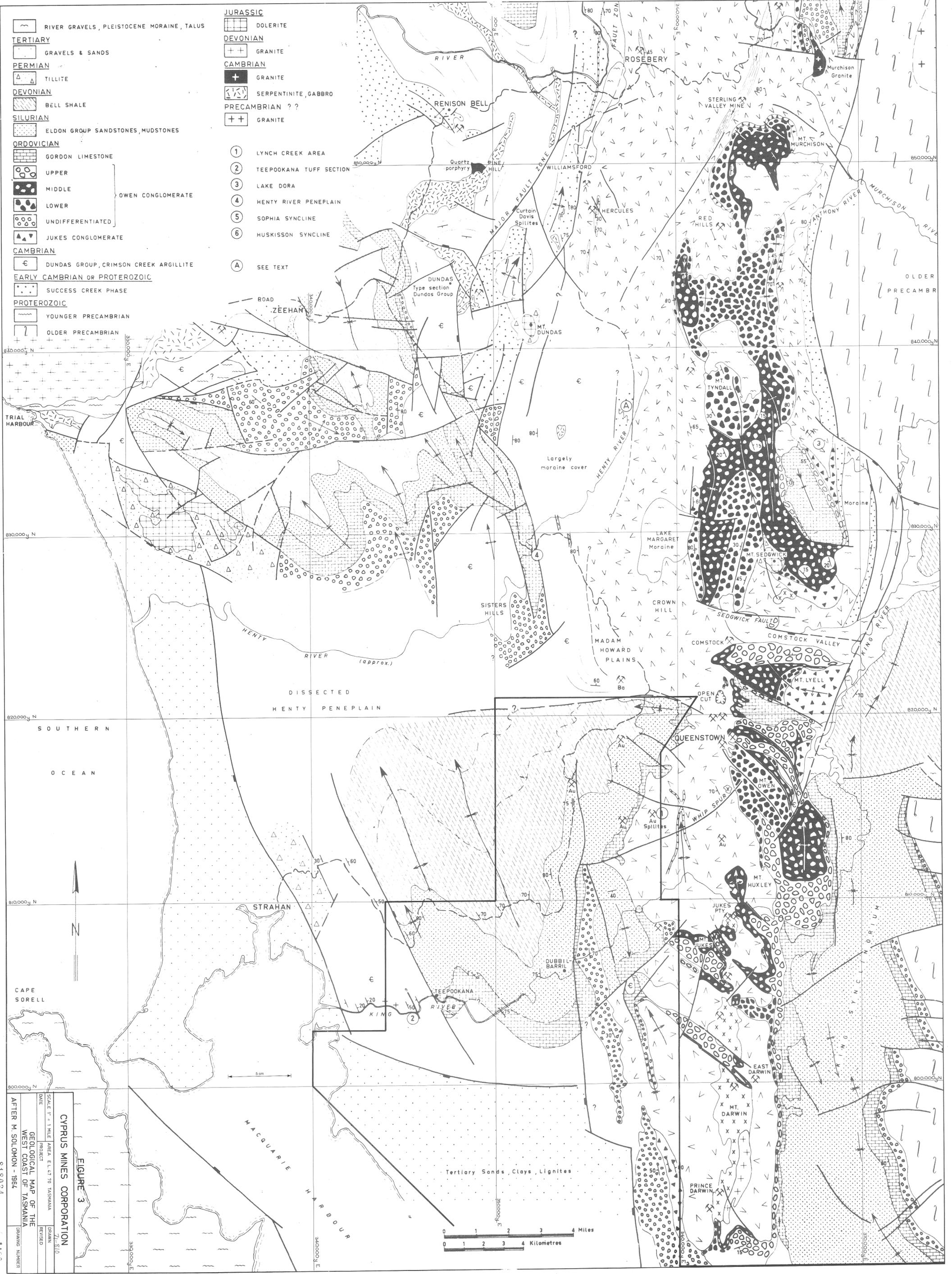
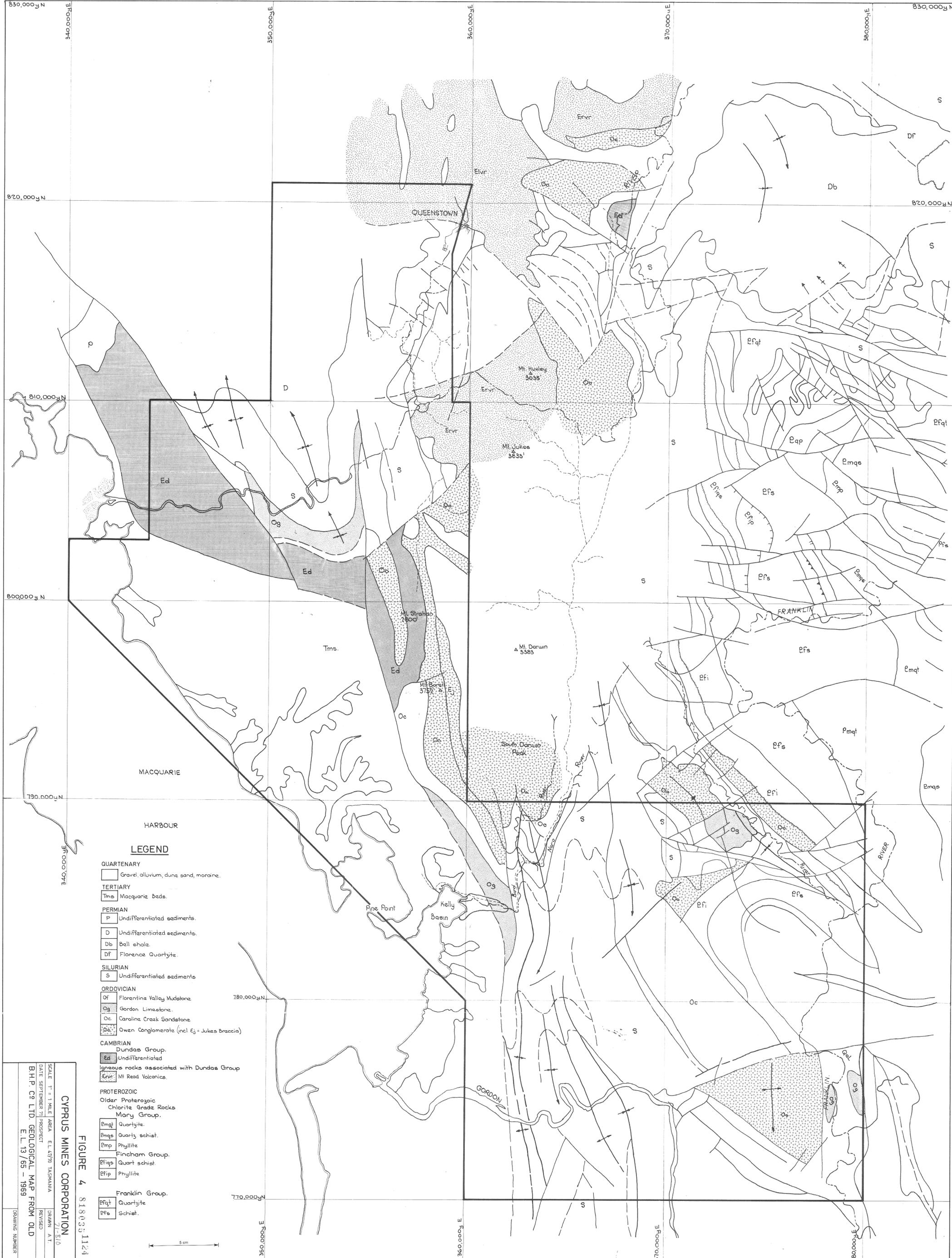


FIGURE 3
CYPRUS MINES CORPORATION
 SCALE 1" = 1 MILE
 AREA, E.L. 47 70 TASMANIA
 PROJECT
 GEOLOGICAL MAP OF THE WEST COAST OF TASMANIA
 AFTER M. SOLOMON - 1964
 DRAWN BY
 REVISION
 DRAWING NUMBER



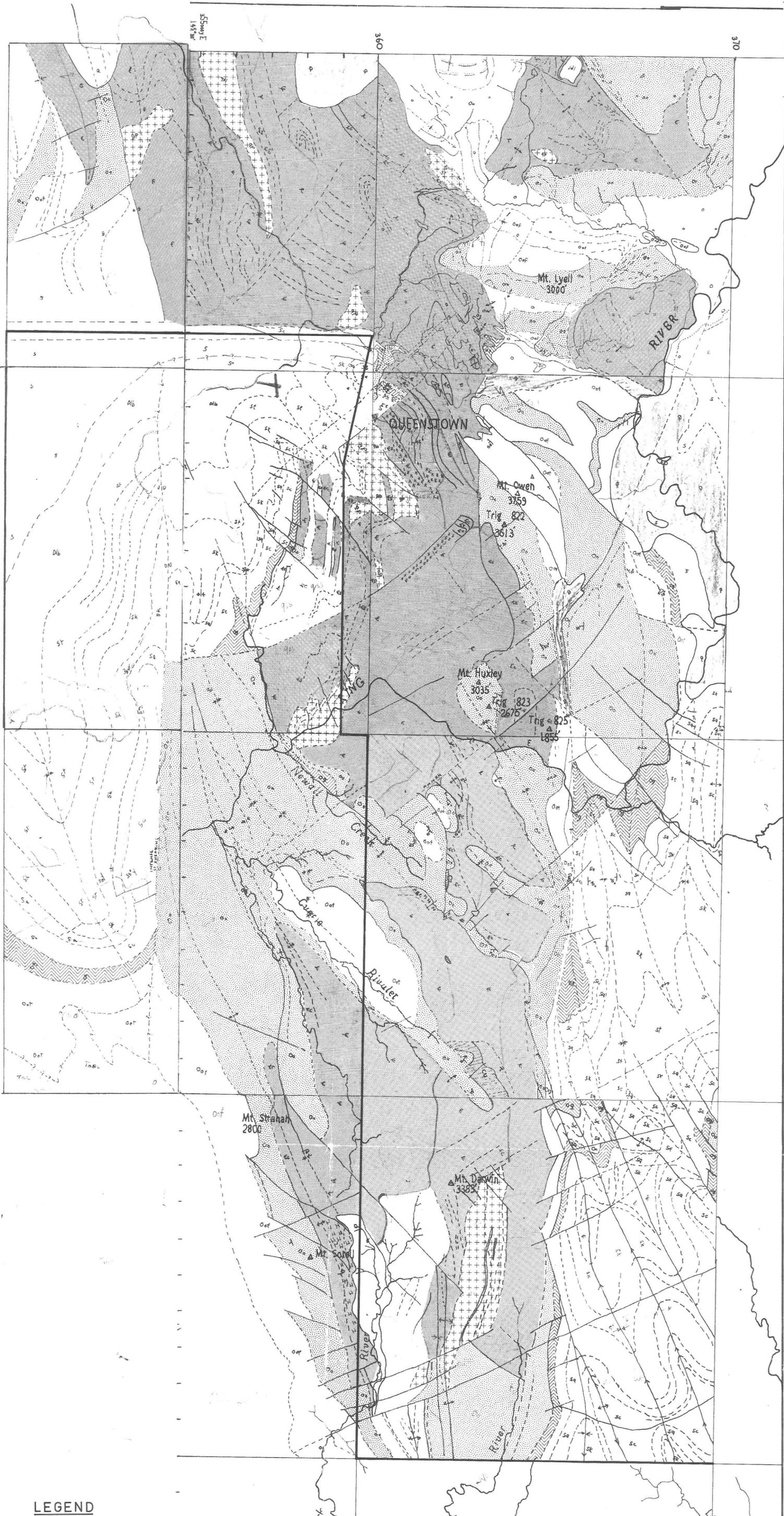
LEGEND

- QUARTERNARY**
 Gravel, alluvium, dune sand, moraine.
- TERTIARY**
 Tms. Macquarie Beds.
- PERMIAN**
 P Undifferentiated sediments.
 D Undifferentiated sediments.
 Db Ball shale.
 Df Florence Quartzite.
- SILURIAN**
 S Undifferentiated sediments.
- ORDOVICIAN**
 Of Florentine Valley Mudstone.
 Og Gordon Limestone.
 Oc Caroline Creek Sandstone.
 Oc Owen Conglomerate (incl. E₃ & Jukes Braconia).
- CAMBRIAN**
 Dundas Group.
 Ed Undifferentiated.
 Igneous rocks associated with Dundas Group.
 Ervr Mt Read Volcanics.
- PROTEROZOIC**
 Older Proterozoic
 Chlorite Grade Rocks
 Mary Group.
 Emqt Quartzite.
 Emqs Quartz schist.
 Pmp Phyllite.
 Fincham Group.
 Pfigs Quartz schist.
 Pfp Phyllite.
 Franklin Group.
 Pfqz Quartzite.
 Pfs Schist.

FIGURE 4 818033:1124

CYPRUS MINES CORPORATION
 SCALE 1" = 1 MILE AREA E.L. 47/70 TASMANIA
 DATE SEPTEMBER 71 PROSPECT DRAWN A.T.
 B.H.P. CO. LTD. GEOLOGICAL MAP FROM OLD REVISION
 E.L. 13/85 - 1969
 DRAWING NUMBER

5 cm



LEGEND

QUATERNARY

Q - Alluvium tillite

TERTIARY

Tmac - Macquarie Beds

PERMIAN

Pt - Tillite

SILURO-DEVONIAN

Eldon Group

Sh - Keel Quartzite

Sf - Florence Quartzite

Sa - Amber Slate

Sc - Crofty Quartzite

S - Undifferentiated

ORDOVICIAN

Junce Group

Og - Gordon Limestone

Oo - Owen Conglomerate

Oe - Engineer Quartzite

Oot - Tubicdar Sandstone Member

CAMBRIAN

Dundas Group

Ec - Conglomerate & Breccia

Es - Slates

E - Undifferentiated

METAMORPHIC ROCKS

qp - Quartz Porphyry massive

— Fault

— Fault - position approximate.

— Boundary

— Boundary - position approximate

--- Trend of outcrop

Strike & dip

Anticlinal axis

Synclinal axis

Vertical dip

- Road
- Track
- Railway
- Moraine
- Open Cut

5 cm

1125

818036 FIGURE 5

CYPRUS MINES CORPORATION		
SCALE: 1" = 1 mile	AREA: E.L. 47/70 TASMANIA	DRAWN: 71-816
DATE: SEPT. 1971	PROSPECT:	REVISED:
GEOLOGY MAP OF WEST COAST, COMPILED FROM MAPS DRAWN BY J. BRADLEY AS RESEARCH WORK FOR THE UNIVERSITY OF TASMANIA 1954-1957		
		DRAWING NUMBER



LEGEND

- "Metamorphic" Alteration (after Bradley)
-  Quartz Porphyry Massive
 -  Area of Quartz Porphyritised Rock
 -  Area of Felspathic Rock
 -  Area of Chloritised Rock
 -  Quartz Sericite Rock
 -  Area of Kaolinised Rock
 -  Area of Hematised Rock

818037 FIGURE 6. 1126

CYPRUS MINES CORPORATION		
SCALE 1" = 1 MILE	AREA E.L. 47 70 TASMANIA	DRAWN R.E.M.
DATE OCTOBER 1971	PROSPECT	REVISED
METAMORPHIC ? ALTERATION MAP OF QUEENSTOWN AREA AFTER BRADLEY (1954)		
		DRAWING NUMBER