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MT. PELION WOLFRAMITE PROJECT

GEOLOGICAL BACKGROUND AND SUMMARY OF PREVIOUS WORK.

BY
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0031. LOCATION & ACCESS

The *MOUNT PELION* wolframite deposit is situated on the south-eastern side of the upper Forth River Valley, in rugged, mountainous, isolated terrain in County Lincoln in north-central Tasmania. To the west and north of the minesite, on the opposite side of the Forth River, is located the Cradle Mountain - Lake St. Clair National Park, having the river as one of its boundaries. Note this as mining activities are virtually prohibited in national parks and any northern extensions of the deposit are effectively lost. The Forth River flows north, discharging into the Bass Strait near *Devonport* (Figure 2). Vegetation* is of the thick rainforest type with bracken, tree ferns and extremely well developed tall eucalypts (which supports a timber industry viz. J.T. GUNN LUMBER CO.). Here the rainfall averages 127cm (50") per year. The southern part of the area about the minesite, has limited exposures of outcrop due to the thick talus cover, but they are better along the steeply rising creek (Reid Creek) which drains the area. Currently only bushwalkers and small groups of motor cyclists visit the minesite via Patons Road, south from *Lemonthyme Power Station* (Figure 3).

At present the mine can be reached from *Launceston* or *Devonport* via *Mole Creek* or *Sheffield*, respectively, by sealed road as far as the *Lemonthyme Power Station*, which is 26.6km from the minesite via a rough gravel road of quite variable quality. The first 13.6km of this gravel road is, however, navigable by two-wheel drive vehicles as it is maintained by the local lumber company (J.T. Gunn). For the remaining 13km to the minesite a four-wheel drive vehicle is necessary. There are several patches of bad deterioration, near to the minesite, which become quite hazardous in winter. The local timber company maintains the first section of the gravel road and will continue to do so for some years to come, but they are not interested in participating in the cost of upgrading the last 13km of the road. It must be upgraded before further work can be done in the area as access is currently inadequate. This work is now in progress under the direction of KIBUKA personnel, having been funded by SEREM as a part of their agreement obligations.

* See Appendix 1 for more detailed description of the vegetation, particularly timber-types. The minesite is at 366m (1,200') a.s.l. according to Reid (1919), but the adit portal is shown at 238.4m on Plate 3.

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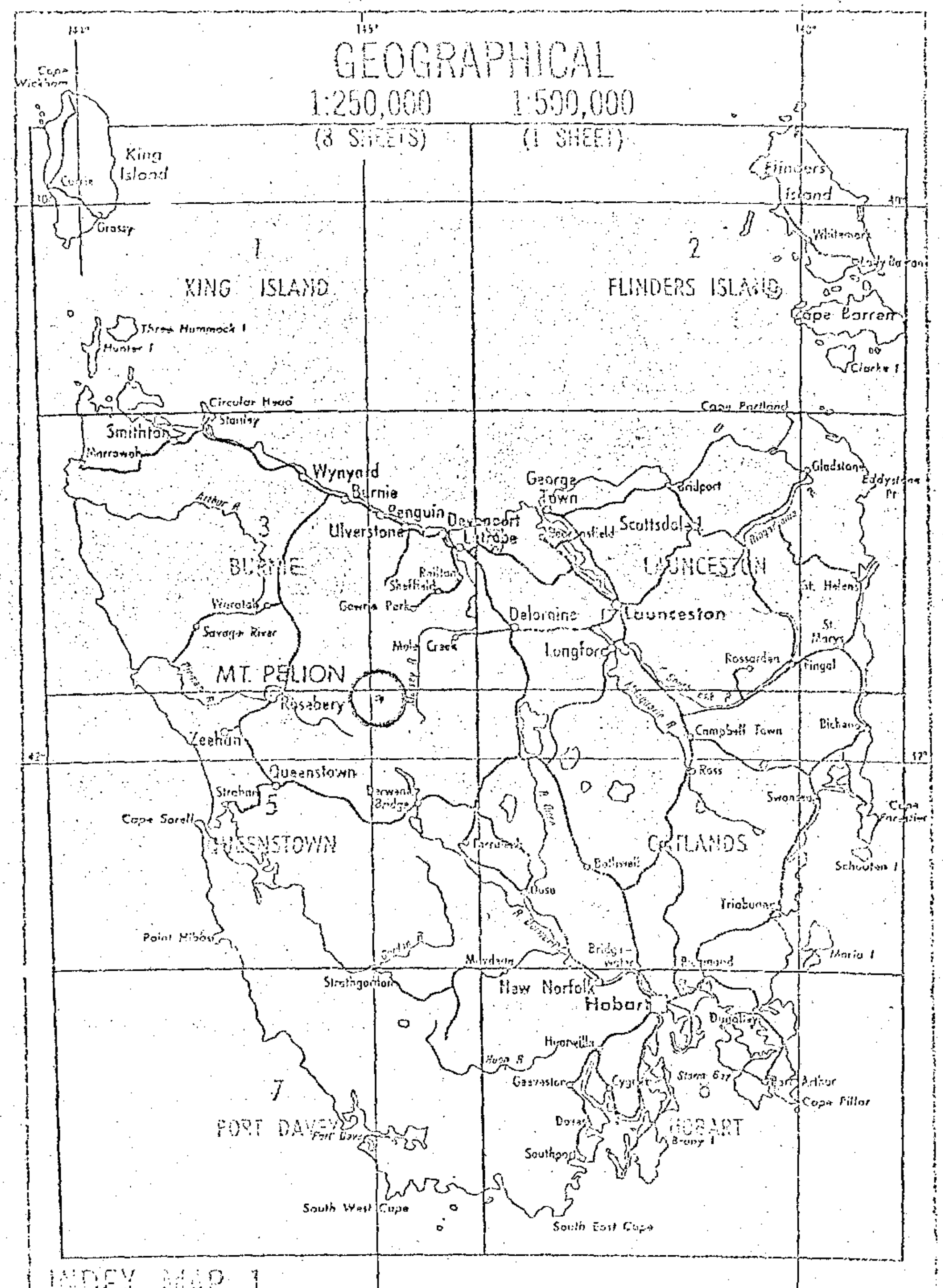

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FIGURE 1

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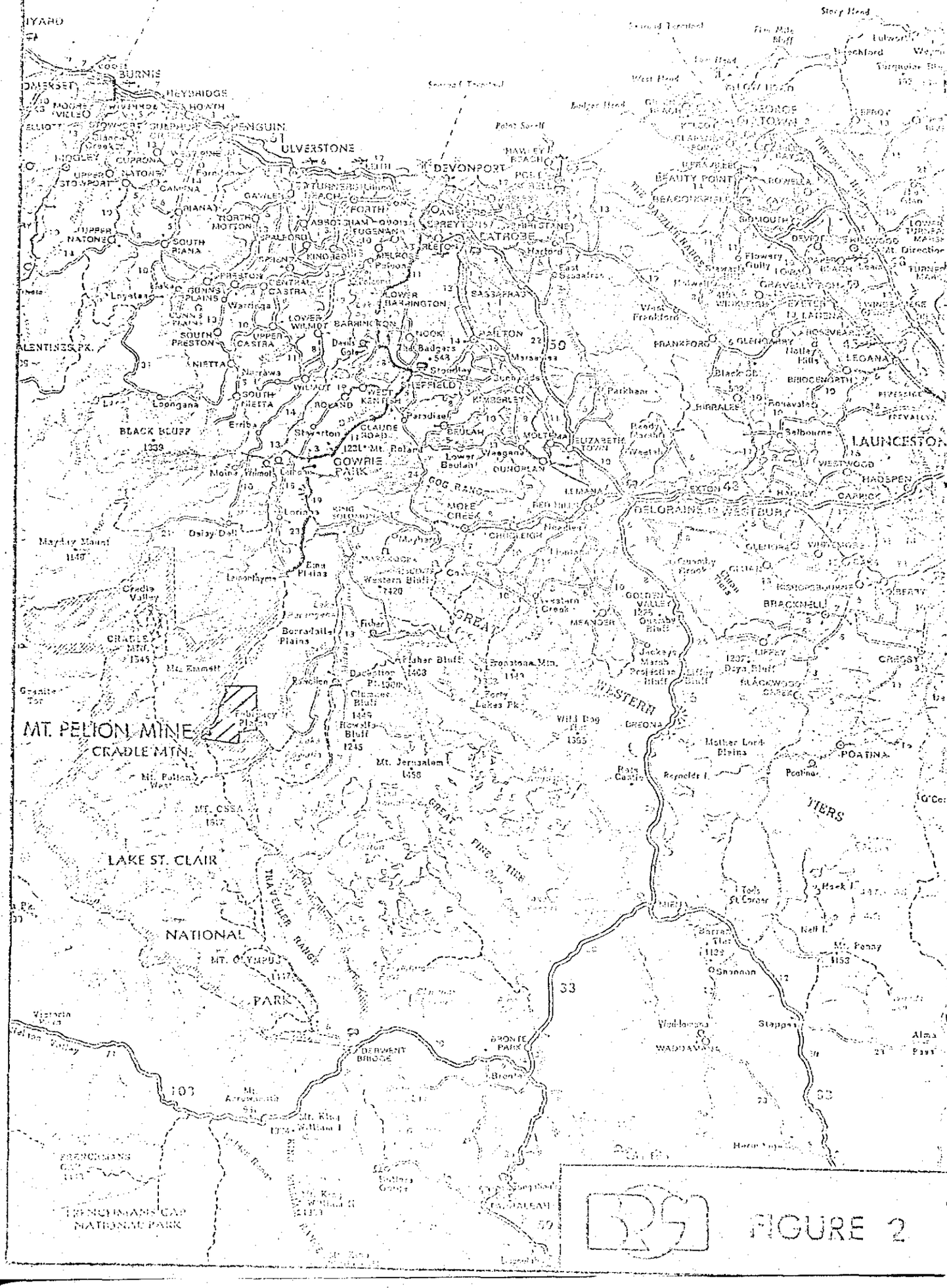

FIGURE 2

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The distances from the *MT. PELION MINE* to significant towns in the area are shown below (refer to Figure 2): Minesite to Launceston 150km (93 miles)

Devonport	99km (62 miles)
Burnie	151km (94 miles)
Sheffield	66km (41 miles)
Mole Creek	63km (39 miles)
Gowrie Park	62km (33 miles).

It takes about 2 hours to get from *Launceston* to *Lemonthyme Power Station* and 1 hour from *Devonport*. The section from *Lemonthyme Power Station* to the minesite will take from 1 hour (summer) to 2 hours (winter).

Launceston and *Devonport* airports provide daily flights to *Melbourne* and *Hobart*, and *Wynyard* provides daily flights to *Melbourne* via *King Island*. *Burnie* and particularly *Devonport* are marine ports, as well as providing extensive contractor services and repair shops. Explosive supplies would come from I.C.I. Australia Ltd. at *Burnie*. Food supplies could come from *Sheffield* or *Mole Creek*. *Mole Creek* is also the nearest railhead. *Gowrie Park* is a near deserted former construction centre for the Tasmanian Hydro Electric Commission and it could be used for temporary or permanent housing for the mine workforce and a base for the project.

Recent photography (17.04.1975) at 1:40,000 scale is available from the Tasmanian Lands Department (see coverage on Figure 3) - CONICAL ROCKS/ SOPHIA Run 3, Photos 000, 001; Run 4, Photos 024, 025; Run 5, Photos 000, 001; Run 6, Photos 022, 023.

2. EXPLORATION TITLES AND AGREEMENTS

SCAMANDER MINING CORPORATION N.L. and LOUISA MINING CORPORATION N.L. by virtue of an Agreement between them dated June 30, 1976, hold three Tasmanian Mining Leases covering 80ha (210acres), which are valid for 21 years, over the *MT. PELION* lodes: No. 60M/69 (granted 01.04.1969); 60M/71, and 59M/71 (granted 01.10.1971). These leases were the subject of an Option Agreement between these companies and KIBUKA MINES PTY. LTD. (acting on behalf of TRIAKO MINES N.L. and BUKA MINERALS N.L.) dated June 2, 1977. The option which was to be exercised on July 2, 1977, according to this Agreement, was extended to February 15, 1978. (See Figure 4).

FIGURE 3

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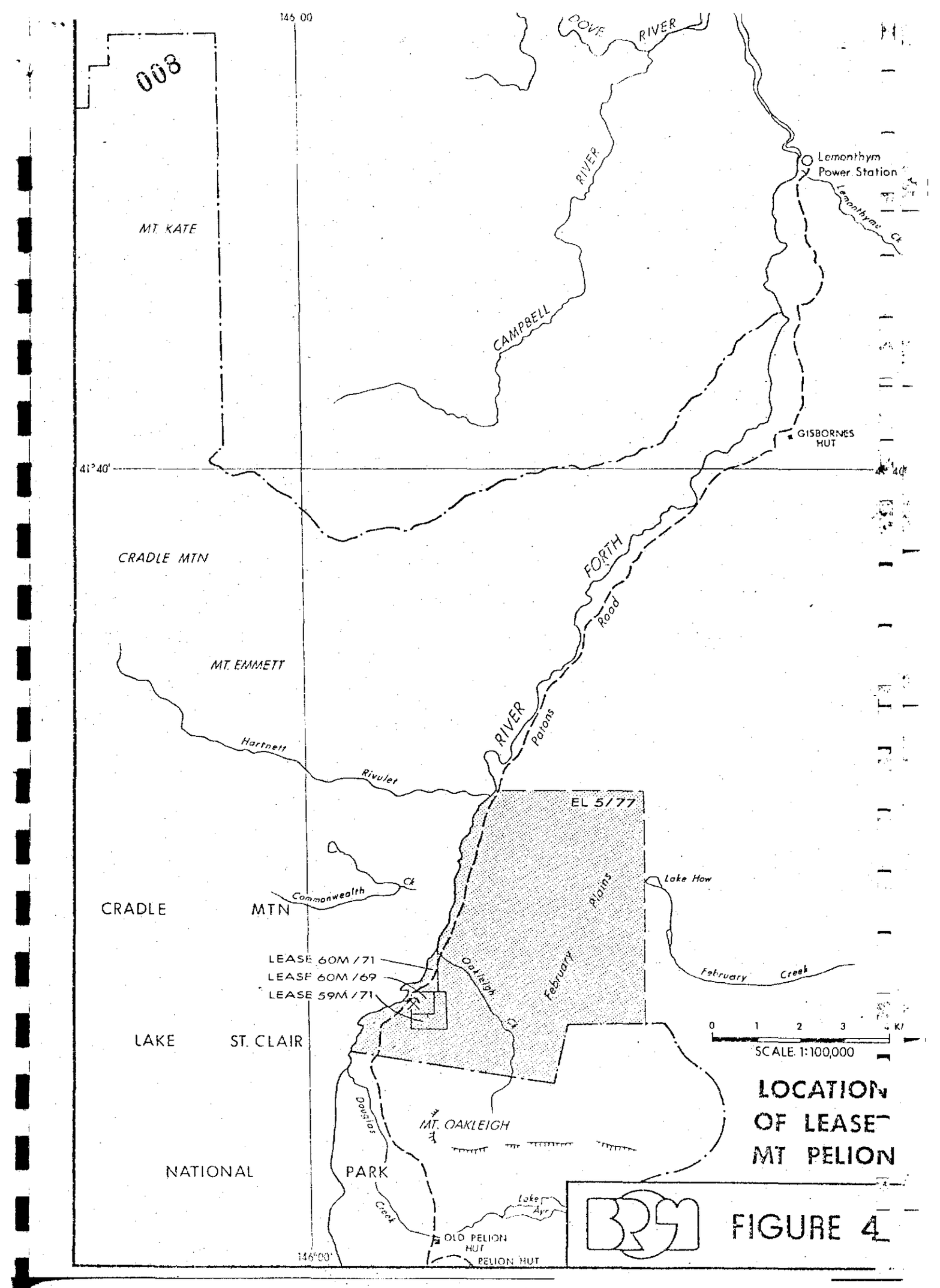
008
146 00
MT. KATE
CAMPBELL RIVER
Lemonthym Power Station
Lemonthyme Ck
GISBORNES HUT
41°40'
CRADLE MTN
FORTH Road
MT. EMMETT
Hartnett Rivulet
PATONS RIVER
EL 577
Lake How
Commonwealth Ck
CRADLE MTN
LEASE 60M/71
LEASE 60M/69
LEASE 59M/71
Oakleigh Ck
February plains
February Creek
LAKE ST. CLAIR
0 1 2 3 KI
SCALE 1:100,000
Douglas Creek
MT. OAKLEIGH
NATIONAL PARK
Lake Ayr
OLD PELION HUT
PELION HUT
146°00'
LOCATION OF LEASE MT PELION
FIGURE 4

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These leases were then offered to SEREM (AUSTRALIA) PTY. LTD. as part of an option package, which also included the Tasmanian Exploration Licence 5/77 "River Forth" (it expires on November 4, 1977, and is held by KIBUKA in trust for TRIAKO-BUKA). An area of common exploration interest was also defined as all that area extending in any direction for a radius of 20km from the 240m (780ft) Adit Level portal of the old *MT. PELION* workings. This latter Option Agreement between SEREM-TRIAKO-BUKA was signed on July 26, 1977, and provides for geological examination of the area and a reassessment of the feasibility of establishing a wolfram mining project there. By providing A$35,000 towards the upgrading of the access road to the minesite, SEREM has until January 30th, 1978 to exercise its option to acquire a one-third share in the area (with the remainder to be held 33.3% TRIAKO, 33.3% BUKA). Upon exercise, SEREM will earn its interest by providing the first A$330,000 towards *"mine development, machinery, equipment, access and other costs directly related to bringing the property into production"*. Any excess expenditure required will be contributed by each party in proportion to its interest in the joint venture (i.e. one-third each).

3. PREVIOUS GEOLOGICAL WORK

Although copper had been found in the area in 1892, the discovery of wolfram deposits in the Upper Forth Valley did not take place until 1916 (by P. Hartnett during the construction of the Pelion Road). Most development was undertaken shortly afterwards by the *MT. PELION MINING COMPANY* and other independent operators, on deposits located on the eastern side below Mt. Oakleigh. The original holdings were Lease Nos. 7492 (contains workings), 7777, 7493, each of 32 ha (80ac); and No. 7855 of 8 ha (20ac). The main *MT. PELION* lode was discovered by F. Duncan of the Company and other wolfram and cassiterite veins were discovered in the locality by Hartnett in the 1916-1919 period, particularly the *LONE PINE PROSPECT*. Reid (1919) and Hitchcock (1920) give a most complete picture of the early development of this area (see also Appendices 1 to 4). At this time the adit had been driven 36m (117ft) into the main vein (*TUNNEL LODE*), and numerous trenches had been excavated in the area. A short crosscut was made on the *CLIFF LODES* and trenching had taken place on the *WATERFALL LODE* also on nearby Reid Creek. (See Figures 6 and 7).

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Hitchcock (1920) revealed that the surface trenching had proceeded on a 230° magnetic bearing for some 152m (500ft), or 140m (458ft) horizontally; to a vertical height of about 65m (212ft). Before he left it had advanced a further 12m (40ft) southwards. The vein width in the trenches varied from 30cm to 41cm (12"-16").

In 1944 the W. BLOOMFIELD R. KNIGHT J. MARTIN SYNDICATE applied for a 12ha (30ac) lease covering the *MT. PELION LODE* and worked the deposit by shallow open cutting and a little underhand stoping until 1948. Thomson (1956) examined the area for the ZINC CORPORATION LTD. (later C.R.A.) and claimed that the 36cm (14") wide lode had been exposed at the surface for 140m (460ft) by exploratory trenching, subsequently visited by another Government geologist (Elliston, 1951). The adit had been extended to 40m (130ft) into the hillside on the main vein and it had been exposed at the surface with a 15m (50ft) long shallow trench. By then, according to Macleod, Jack and Threader (1961), the continuity of the 30cm wide (12") lode had been established over a strike length of 152m (500ft) and to a depth of 91m (300ft).

Very little was written on the area until the exploration work of the BROKEN HILL PROPRIETARY CO. LTD. (B.H.P.), INTERNATIONAL MINING CORPORATION N.L., SCAMANDER MINING CORPORATION N.L., and finally LOUISA MINING CORPORATION N.L. This latter company acquired the leases, currently offered to SEREM, from SCAMANDER.

A geological consulting firm, E.A. WEBB and ASSOCIATES PTY. LTD. were engaged by INTERNATIONAL MINING CORPORATION N.L. and carried out a stream sediments survey for Cu, Zn, Mo in the Forth and Mersey River Valleys during the 1969-1971 period. All creeks draining into the Forth River were sampled at 122m (400ft) intervals for Cu, Zn, Mo and Pb. In addition, base of slope samples were collected along the track south of the *MT. PELION* wolframite mine (including gossan float which probably came from the *BIG BLOW* lode).

Work by I.M.C. located granite float higher up the valley slopes, but no definite outcrops were found. Owen (1971) felt that they could be of interest as nearly all the stream sediment assays had higher metal values than usual. He also points to the possible presence of mineralised granite to the south of the mine site in the *BIG BLOW* lode area where higher geochemical values were obtained. Geophysical work, performed previously by B.H.P., also suggested that granite may occur at shallow depth in this area, below the Precambrian sediments.

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A considerable amount of correspondence between a geological consulting firm, HALL RELPH & ASSOCIATES PTY. LTD. and SCAMANDER (discussed in detail in Lawrence, 1977 [B.R.G.M. Report 77/SYD/11, June, 1977]), refers to their work on behalf of SCAMANDER over the period 1970-1973 after they acquired the ground from a small prospector, N. McCOY. Even a preliminary feasibility study was prepared for them by L.R. MURPHY, consulting mining engineer, in July, 1971. LOUISA apparently contributed little in the way of new exploration.

When SCAMANDER took over in 1970 (see Hall & Relph, 1970), the 1.8m x 1.2m (6ft x 4ft) adit had been driven to 41m (136ft) along the main quartz vein and the surface trench had been excavated to an average depth of 1.5m (5ft) and extended over a length of 137m (450ft). Bulldozing done under the supervision of Hall & Relph, south of the old surface trench, proved the vein over a strike length of 274m (900ft).

G.I. Fisher, licenced surveyor of Launceston, prepared for SCAMANDER 1" to 20ft topographic and planimetric map of the mine site (dated 30.08.1971), showing the extent of surface trenching and the distance that the adit had been driven on the main lode. Plates 1 and 2, at a scale of 1:200, were derived from the original survey plans. The reduced level (R.L.) of the adit portal floor is 238.4m, with the R.L. at the start of the trench being 244.7m, and rising to an R.L. of 307.1m at the end of the trench. Towards the end it reached 4.5m (15ft) in depth in places.

SCAMANDER extended the 240m (780ft) Level Adit, which bears 173° magnetic, to the present length of 154m (505ft), but enlarged it to 2.1m x 2.1m (7ft x 7ft) by the close of driving operations 02.09.71. Hall and Relph, 1970, recommended that a 1.8m x 1.2m (6ft x 4ft) winze be sunk in the vein at the 38m (124ft) mark. It was sunk in late 1970 at 76° east to a depth of 11.4m (37.5ft) partly in the clear. A short exploratory cross-cut was driven westwards at about the 80m (263ft) mark for about 2.5m (8ft).

The vein width in the trench and adit was 30cm (12") but varied from 20cm (8") to 38cm (15"). The vein was 56cm (22") in the face at the end of the drive and 33cm (13") at the portal (Ralph, 1973). Recent work by B.R.G.M. established that the average width of the vein, over its exposed length in the adit, was 35.3m. The width of the vein in the face was measured at 35cm (top), 40cm (middle) and 26cm (base).

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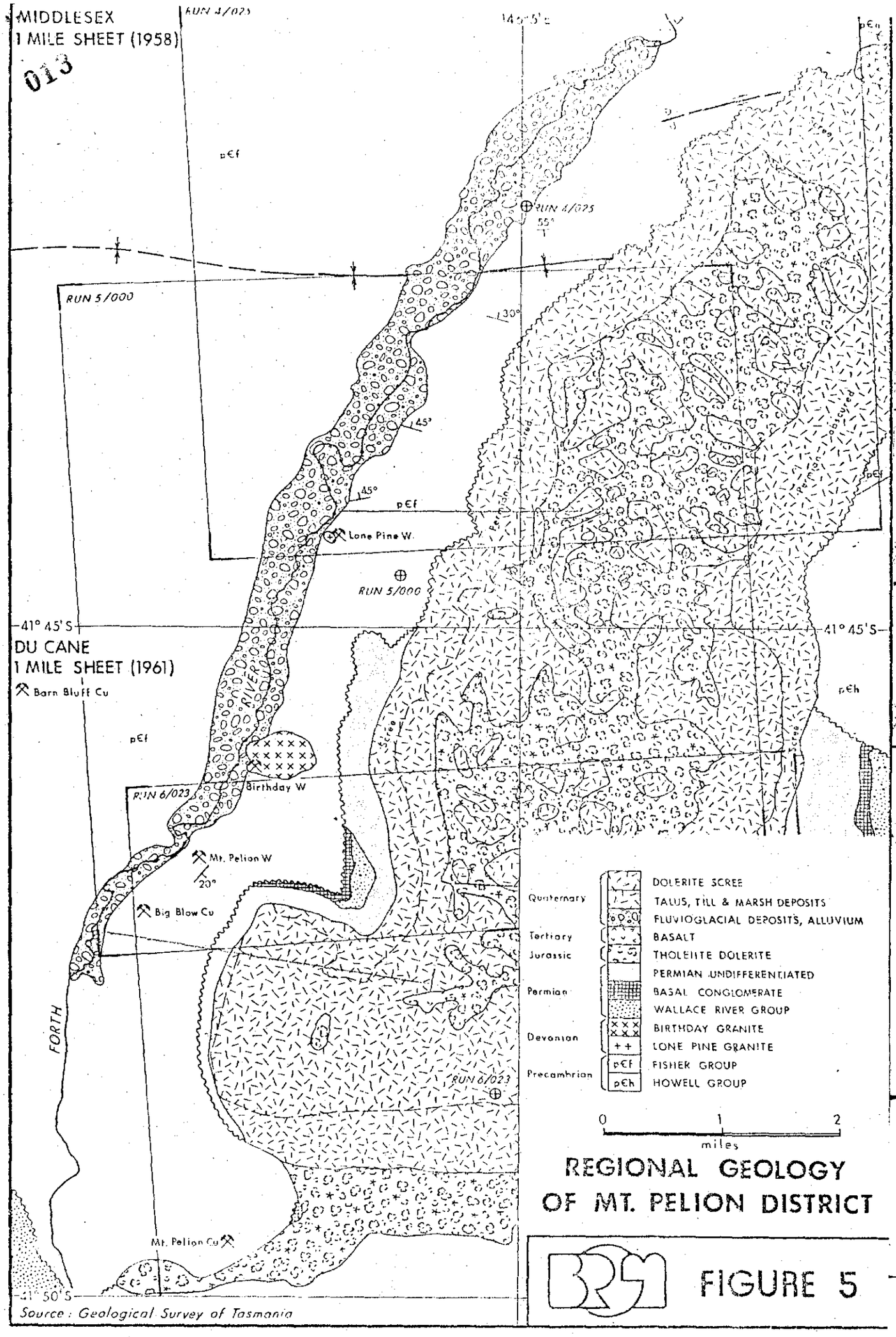
4. REGIONAL GEOLOGY

The *MT. PELION* mine lies within a thick sequence of later Precambrian (Proterozoic) metasediments, which form the Tyennan Nucleus, and are the oldest rocks in Tasmania. This complexly deformed basement belt occupies the western half of the State, where it is flanked further westwards by the well mineralised Cambrian rocks of the Queenstown-Zeehan-Rosebery area. Further eastwards the Precambrian is unconformably overlain by about 600m of flat lying Permian sediments (including coal) and Triassic shales and sandstones, which are the host rocks for the huge outpourings and sill-like intrusions of Jurassic tholeiitic dolerite. Tertiary basalt caps the Permian and Precambrian rocks about 11km north-east of the mine site. Devonian muscovite-biotite granites (adamellite) intrude these rocks and two small stocks outcrop near the minesite (Lone Pine and Birthday Granites). The age of the most important period of granite emplacements in Tasmania is about Late Devonian-Early Carboniferous (375-335 m.y. BP Williams et al, 1975). However, Williams et al, 1975 also note that radio isotopic ages for the three small granitic and granodioritic plutons (Dove Granite) on the southern edge of the Fossey Mountain Trough indicate an emplacement before the Middle Ordovician and probably during the Late Cambrian. Therefore the granites near the mine site may be older than originally thought. Superficial Pleistocene deposits of glacial and periglacial origin occur widely on and around the Central Plateau and in the valleys of the Forth and Mersey Rivers and their tributaries. Recent scree and talus deposits obscure much of the geology around the Central Plateau and the lower slopes of the Fossey Mountains. (See Figure 5).



REGIONAL GEOLOGY OF MT. PELION DISTRICT

FIGURE 5

Source : Geological Survey of Tasmania

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5 cm

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4.1 PRECAMBRIAN STRATIGRAPHY

The Tyennan Nucleus consists of rocks grouped into a quartzite-phyllite assemblage; and a schist-quartzite assemblage, which includes mica and garnet schists associated with quartzite, amphibolite and eclogite (Williams et al, 1975). Most of the rocks have been derived from orthoquartzite or siltstone and the metamorphism grade is greenschist facies.

There were two periods of metamorphism and two widespread phases of deformation, but the time relationships between the two differ from area to area. However, much of the tectonic activity is attributed to the late Proterozoic Frenchman Orogeny (Spry, 1958). This block was generally emergent from late Proterozoic time until the beginning of Permian sedimentation. Tabberabberan (Devonian) orogenic movements had little effect on these Tyennan Nucleus rocks with them behaving comparatively rigidly. It was subsequently uplifted during the Tertiary epeirogeny (Jennings, 1963).

The dominant schistosity and the main compositional banding on a regional basin is east-west. If otherwise (and it is rare), the strikes relate to closure around plunging folds oriented along east-west axes. In the southern and western portions of the Middlesex One Mile Sheet near *MT. PELION* the structural trends swing more to the southwest (Jennings, 1963).

In the Forth Valley the rock types include quartzite, mica schist and quartz mica schist with a general strike slightly east of north and dips of between 15 and 30° to the south-east (Macleod, 1961). Ralph (1973) quotes that the host rocks "*vary in strike from 082° to 109° magnetic and in dip from 15° to 27° in a northerly direction*". The metasediments are abundantly veined by white quartz and locally sheared along planes trending north-north-west. These shear planes served as structural controls in the localization of copper and wolfram mineralisation in the Forth Valley.

Spry (1958) described and sub-divided the Precambrian metasediments in the Mersey and Forth Valleys and Jennings (1963) refined them

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JENNINGS (1963)	ROCK TYPES	SPRY (1958)
	CAMBRIAN SYSTEM	
	Unconformity	
Dove Group	Quartz-mica and garnet-mica schists. Little or no quartzite.	Dove Schist 1500m (5000ft)
Fisher Group	Thinly bedded, massive and laminated quartzite with inter-bedded quartz-mica schists.	Fisher Group 1500m (5000ft) Maggs Quartzite 600m (2000ft)
Howell Group	Interbedded quartzite, quartz-mica and garnet-mica schists.	Howell Group 1500m (5000ft) Arm Schist 600m (2000ft)

The type locality for the HOWELL GROUP is along the western wall of the Mersey Valley at Websters Marsh. It includes mica (muscovite) schist, garnet-mica schist, albite-mica schist, mica quartzite and pure quartzite (mostly a quartz-sericite schist facies). The schist and quartzite form units up to 60m (200ft) thick and occur in roughly equal proportion. The Fisher Group, believed to overlie the Howell Group, consists of interbedded formations of slate and quartzite with the latter dominant.

In the section of the Forth Valley near the minesite the Precambrian rocks include a rapidly alternating interbedded sequence of quartzite and mica schist, whereas in the Mersey Valley near Howells Plain, and below Cathedral Mountain, massive quartzite is dominant with occasional very narrow intercalations of schist.

In both valleys the rocks have features in common with both the Howell and Fisher Groups and cannot be confidently correlated with either group (Macleod et al, 1961).

No evidence of an unconformity between the Howell and Fisher Groups has been detected and Jennings (1963) suggests that the Howell Group may be a facies variation of the Fisher Group, which passes downwards gradationally from a dominantly quartzitic facies into an alternating assemblage of quartzite and meta-pelite.

The Howell Group rocks have been strongly deformed: they show structural ribbing, boudinage, rod and mullion structure as well as small and large scale shear folds. The overall structure within the Group is difficult to assess. Because of the complicated structure, the

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thickness of the Howell Group is unknown, but it is estimated to exceed 1000m (3000ft) by Jennings, 1963.

The FISHER GROUP rocks conformably overlie the Howell Group and are dominantly siliceous. They consist of thinly bedded quartzite with micaceous schistose partings between beds and interbedded bands of quartz-muscovite schist (mostly a quartzite facies). A characteristic feature of the Group is the occurrence of finely laminated black and white quartzite and of fine black partings along bedding planes. Usually the quartzite is white but pink quartzite is not uncommon. Much of the quartzite is dense, white or glassy and completely recrystallized but in some of the less deformed zones individual grains may be distinguished clearly in hand specimens. The rocks are shattered by closely spaced jointing and veins of milky quartz up to 1.5m (5ft) wide are fairly common. The most common rocks encountered are thinly bedded to flaggy or blocky, but some massive bands have been noted, usually severely crushed and brecciated. The relatively thin bedding combined with the close jointing produces abundant scree slopes.

The thickness cannot be assessed from field exposures but a minimum estimate is 1000m (3000ft), Jennings (1963). Faults occur in all sections and the folding on all observable scales is severe.

The DOVE GROUP is defined here as that group of rocks, dominantly laminated quartz-sericite schist and garnetiferous quartz-sericite schist, which outcrop along the Forth Valley between the southern boundary of the granite at the Dove River and the boundary of the Fisher Group half a mile south of the Dove sawmill (Jennings, 1963). In the type area the northern boundary of the schist is intruded by granite, elsewhere it is overlapped by Cambrian rocks or Tertiary basalt. It is therefore recognized that the upper part of the group may be missing in the type area as the group has not so far been recognized elsewhere. It is not recognized anywhere near the mine site, further to the south.

Typical lithologies are glossy, grey, finely laminated, quartz-sericite schists. They are frequently garnetiferous and such varieties weather to an olive green or brown colour. The weathered surfaces of such rocks are studded with minute limonite-filled holes from which the garnets have been shed.

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In the three groups the quartzite and schist from any one group are lithologically similar to the rocks in the other groups. Generally speaking the schist is finely laminated and the quartzite thinly bedded, though exceptions do occur. No coarse grained sediments of any kind have been observed.

4.2 PALAEOZOIC STRATIGRAPHY

Much further to the north of the minesite (north of the Lorinna-Liena area), 3660m of Lower Palaeozoic sediments (greywacke turbidites and cherts) and volcanics were deposited in the Fossey Mountain Trough, but none outcrop near *MT. PELION*. A succession of mostly marine Permian sediments, approximately 600m (2000ft) thick, is exposed in the deep valleys to the west of the minesite (Figure 4). These were laid down upon the strongly folded and deeply eroded basement of Precambrian metasediments and sedimentation continued without serious break through into the Triassic as in other parts of Tasmania. Apart from some block faulting in the Mersey Valley, the Permian sediments have been little disturbed and have a gentle regional dip to the south which averages less than one degree.

As elsewhere in Tasmania, the boundary between the Permian and Triassic is difficult to define in this region. At the top of the Permian succession there is a thick sequence of lacustrine sediments with coal seams in massive sandstone and conglomerate with frequent shale intercalations. This sandstone is rather similar to that found in the overlying lower part of the Triassic and, in the absence of fossil evidence, the boundary is provisionally fixed at the upper limit of the coal seams for which spore dating indicates an upper Permian age (Macleod et al, 1961). North of the Pelion Range the Permian coal measures include numerous thick units of carbonaceous shale interbedded with the massive sandstone, and the upper limit of this shale is regarded as the boundary between the two systems.

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The following subdivisions of the Permian have been made by Macleod et al, (1961):

	Thickness (m)
Top	
Cygnet Coal Measures	90-105 (300-350ft)
Ferntree Group	170-200 (550-650ft)
Woodbridge Group	30-75 (90-250ft)
Mersey Group	20-30 (60-100ft)
Wallace River Group	120-200 (400-650ft)
Basal Conglomerate	3-15 (10-50ft)
Base	
Total: maximum	625m (2050ft)

The BASAL CONGLOMERATE consists of unsorted and subangular pebbles and boulders of Precambrian quartzite and schist in a finer matrix. The maximum observed thickness is 30m (100ft). The largest boulders are up to 1.2m (4ft) diameter but the majority are less than 60cm (24"). From the exposures available the conglomerate provides no evidence of glacial origin (Macleod, 1961) despite Reid's (1919) claim.

The WALLACE RIVER GROUP is best exposed in the headwaters of the Wallace and Forth Rivers and in the Mersey Valley north of Cathedral Mountain. It consists of grey to dark grey and black marine mudstones with occasional grey sandstones, conglomerate, lenticles and fissile black shales totalling 180m (600ft) in thickness in the Forth Valley. Thin, bedded fine-grained mudstone, dominates the lithology, which has the same monotonous aspect as the mudstone of the Ferntree Group. Erratics of Precambrian quartzite and schist are common throughout the entire sequence and sometimes appear as impersistent lenses of conglomerate. Such conglomerate is particularly abundant in the sections exposed in the Forth Valley on the flanks of Mts. Pelion West and Thetis. The mudstones like those of the Ferntree Group are strongly and closely jointed with two persistent vertical systems.

Uplift followed the deposition of the marine sediments of the Wallace River Group and the sediments of the succeeding MERSEY GROUP were deposited under estuarine and lacustrine conditions. These terrestrial sediments range in thickness between 20-30m (60-100ft) and are mainly represented by micaceous and arkosic quartz sandstone with thinner units of carbonaceous shale. The sandstone is usually flaggy due to the presence of numerous fine laminae of micaceous mudstone and siltstone. The more massive

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sandstone units are frequently cross-bedded. On weathering the sandstone is sparkling and white to reddish yellow in colour. In many localities it weathers to prominent cliffs and waterfalls. In the Forth and Wallace Valleys thin and impersistent coal seams have been noted. The strikingly laminated appearance of the sandstone renders this group the most readily recognizable of the Permian sediments.

The fossiliferous marine mudstone, which conformably overlies the terrestrial sediments of the Mersey Group, is classified as the WOODBRIDGE GROUP on the basis of similar faunal assemblage and stratigraphical position to the corresponding sediments in the Great Western Tiers, and in other localities in Tasmania. The group ranges between 30 to 67m (100 to 220ft) in thickness in the general area to the east and south of the minesite, but few good exposures are available.

The FERNTREE GROUP is the most widely distributed unit southwards from the minesite in the eastern half of the Du Cane One Mile Sheet. The maximum thickness is of the order of 200m (650ft). The lithology consists mainly of pebbly mudstones and siltstones with occasional conglomerates and poorly sorted sandstones. The last-named are more common towards the base of the sequence.

The CYGNET COAL MEASURES at the top of the Permian succession have been recognized in many localities in Tasmania. In this area they include abundant massive arkosic sandstone in addition to carbonaceous shale. The thickness is believed to be between 90 and 105m (300-350ft) but some uncertainty exists as the coal measures are succeeded, apparently conformably, by a further 180m (600ft) of massive sandstone and interbedded shale which are similar lithologically but devoid of coal. The boundary between the Permian and Triassic is provisionally placed in the massive sandstone above the upper-most coal horizon. Examination of spores from the coal measures on the northern flank of the Pelion Range has indicated an Upper Permian age.

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4.3 IGNEOUS ROCKS

Devonian Birthday Granite (after Macleod et al, 1961).

The small granitic intrusion (adamellite) in the Forth Valley (some 3km north of the minesite) is of mid-Devonian age. It is the source of the wolfram, tin and copper mineralisation in this district. The granite is discordantly intrusive into the Precambrian quartzite and quartz-mica schist of the Fisher Group. The granite contains biotite and muscovite (with the latter predominating in some exposures), pinkish white feldspar and coarse quartz. Tourmaline, molybdenite and arsenopyrite have been noted. Near the contact the granite commonly develops large phenocrysts of feldspar and abundant biotite.

Devonian Lone Pine Granite (after Jennings, 1963).

This tiny intrusion was discussed by Reid (1919) under his section dealing with muscovite-biotite granites. He noted that aplitic and pegmatic phases occur and that greisenization of the granitic wall rock is common. He stated that in general the granite is a light to dark grey rock consisting of quartz, orthoclase and muscovite.

Since that time the prospects in and around this granite have been neglected and the exposures which were available are now obscured. The only worthwhile outcrops of the granite occur along cuttings in the Forth track over a length of about 20m. In the vicinity of the granite, boulders of pegmatitic granite and greisen may be found on the surface.

The porphyroid 'dykes' noted by Reid (1919) are considered to be hornfelsed sediments by Jennings (1963). The pegmatitic granite consists of crystals of mulky quartz up to 5cm long intergrown with crystals of kaolinized feldspar. The greisen consists of a fine intergrowth of quartz and white mica together with large crystals of milky quartz. The specimens of greisen appear to have come from a narrow vein (Jennings, 1963).

This granite is associated with several small quartz veins which in the past were prospected for tin and wolfram (*LONE PINE* prospect).

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Jurassic Dolerite (after Macleod et al, 1961).

The base of the great dolerite (tholeiite-type) sill shows a general uniformity in level over a wide area along the western escarpment of the Central Plateau. The base is usually masked by heavy scree but sufficient expsoures are available to indicate that the level lies between 1100 and 1150m (3600 and 3800ft) above sea level. In the Pelion Range the base is slightly higher. On Mts. Thetis, Ossa, Doris and Pelion East the dolerite base is seen at levels between 1300 and 1350m (4200 and 4400ft) a.s.l. In the Du Cane Range, further south, the base level is at 1150m (3800ft) with the exception of the area around Long Lake and on the southern side of the Guardians where the contact between the dolerite and sediments is steeply-dipping and seen to descend as low as 800m (2600ft). It seems likely that this zone may represent the throat of a plug-like intrusive centre. If this is so, the transition of intrusive form from steeply dipping plug to horizontal sheet must be very abrupt as the dolerite base at nearby Mt. Gould and Walled Mountain appears to be almost horizontal as in other parts of the Du Cane Range.

There is a striking difference in level between the base of the dolerite at Mt. Pelion East and along the southern escarpment of the February Plains between Mts. Oakleigh and Pillinger. At Mt. Pelion East the base of the dolerite is seen at 1350m (4400ft) above sea level where it is intrusive into Triassic sandstone about 180m (600ft) above the Permo-Triassic boundary. Some 5km north, at Mt. Oakleigh, the level of the dolerite base varies between 150m and 1000m (3100-3300ft). Here it intrudes mudstones of the Wallace River Group, which is low in the Permian succession and only 60m (200ft) above the angular unconformity with the Precambrian Fisher Group metasediments. Further east, along the escarpment below Mt. Pillinger, the base of the dolerite is as low as 800m (2600ft), where it intrudes mudstones of the Ferntree Group, which are near the top of the Permian successions. However, on the opposite side of the Mersey Valley (at Dean Bluff), the dolerite of the main plateau intrudes Triassic sandstone of much higher stratigraphic level.

These pronounced differences of both absolute and stratigraphic levels of intrusion would seem to suggest that the dolerite of the Mt. Oakleigh-February Plains Plateau has originated from a separate intrusive centre to that of the Pelion Range and the Central Plateau.

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Tertiary Basalt (after Macleod et al, 1961)

Tertiary basalt forms the summit capping of Maggs Mountain and extends to the Borradaile Plains and Emu Plains. The distribution of the basalt has been determined by the pre-basalt drainage system as described by Spry (1958), and it has been subdivided into four flows:

Glomeroporphyritic basalt	15m (50ft)	- top
Porphyritic olivine basalt	75m (250ft)	
Semi-ophitic basalt	6m (20ft)	
Porphyritic olivine basalt	18m (60ft)	- bottom

4.4 QUATERNARY DEPOSITS

As a result of glaciation and prolonged sub-aerial erosion on an area of high relief, large areas are covered with superficial deposits. Where possible a distinction has been made between scree (open accumulations of rock fragments shed by ice wedging and frost action from overlying cliffs with little or no matrix) and talus deposits (extensive deposits of rock fragments, weathered rock and soil occurring usually downslope of the scree fields). Both dolerite scree and talus deposits are well represented just to the east of the mine site. Marsh deposits and alluvium are well developed in the February Plains area and glacial varves occur at several points in the Forth Valley

The valley floors of the upper Arm, Forth and Mersey Rivers carry heavy accumulations of glacial drift consisting of poorly sorted boulder clay containing angular and sub-rounded fragments almost exclusively of dolerite in a matrix of weathered rock flour. Most of the finer material was the result of the disintegration of a dominantly dolerite terrain. It may be inferred from the large number of sub-rounded cobbles and boulders that much of the material has been subjected to fluvial action and was probably deposited from meltwater streams under and in front of the glaciers. Despite the prevalance of waterworn pebbles in the drift it is clear that the glaciers at times carried heavy loads of ground moraine. Ice abraded sub-glacial pavements and roches moutonnées in the Mersey and Forth Valleys present abundant evidence of sub-glacial erosion.

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5. MINERALISATION

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Only one wolframite-quartz vein has been exposed by mining. It trends 173° and dips 75° east.* The vein splits into two portions and rejoins in places. However, no cross faults were observed to displace it in either the trench or adit. Hall and Relph in their Progress Report dated 12.06.1970, claim that *"observations on the mode of occurrence of the wolframite and cassiterite in the vein coupled with the assay data suggest that the enriched portions pitch south at 70°-80°"*. It is their report which caused the winze to be sunk at 76°E near the 40m (130ft) mark, where apparently richer ore was extracted.

The actual wallrock is a bedded quartzite, which dips 25° north and trends 095°. It is unaltered along the vein fissure, which averages 35.3cm.wide.

The economic minerals are wolframite and cassiterite. Reid (1919) recorded molybdenite, arsenopyrite, chalcopyrite, and pyrite in minor quantities. He also recorded that the most common gangue minerals were fluorspar, tourmaline, topaz and gilbertite (mica). ROBERTSON RESEARCH (AUSTRALIA) PTY. LTD. performed testwork in April, 1977, on *MT. PELION* ore to determine a mineral processing flowsheet. They found bismithinite among the sulphides present. Wolframite was liberated at minus 2mm sizing (8# B.S.S.). Sulphides represented 5-10% of the 'heavies'. The vein quartz is sometimes clear, but mostly milky white, occurring in vugs and as massive quartz. Crystalline cassiterite occurs in these vugs and as splashes scattered throughout the vein quartz. Wolframite is fairly evenly scattered, throughout the vein material as splashes, blades and blebs. It also has occurred in rich plugs as suggested by the presence of mined out portions (by underhand stoping). The sulphides seem to predominate in the footwall (see Plate 3 also).

In general, the ore vein at the *MT. PELION* mine resembles those at *STOREY'S CREEK* and *ROSSARDEN*, except that it has less cassiterite and fluorite and lacks muscovite and pyrite selvedges along the vein (Ralph, 1973). The *CLIFF LODES* lie about 100 to 125m (350-400ft) east of the main lode with which they are parallel in strike and identical in dip. This lode system consists of a number of veins from 3-10cm (1-4") wide with others between 20-30cm (8-12"). The veins can be seen to occupy sharply defined fissures in the valley of Reid Creek. Arsenopyrite is the principal sulphide mineral, with appreciable amounts of wolframite and cassiterite, which are relatively more abundant in the narrower veins (McLeod et al, 1961). (See Figure 6).

* Reid (1919) gave a strike of 175° and a dip of 67° E for the lode.
Elliston (1951) gave a dip of 76°E (actually to 092°).
Thomson (1950) gave a dip of 74°E., and Hitchcock (1920) quoted 65°-70°E.

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About 600m (30ch) east of the *BARN BLUFF* copper workings, Commonwealth Creek intersects a dyke of granite porphyry. The rock consists of muscovite and kaolinised feldspar, and contains considerable specularite. Leading from this dyke are numbers of sharply-defined white opaque quartz reefs 0.6-1.2m (2-4ft) wide, striking a little west of north. These consists of several parallel fissures connected by smaller intersecting fissures, all of which are barren of economic minerals, but contain tourmaline and specularite. The dip of the strata here is almost vertical, the tendency being towards the south (Reid, 1919). These veins are of no economic importance, but they are useful in providing a connecting link between the tungsten veins of Forth Valley and the copper orebodies of *BARN BLUFF*. (See Figure 7).

HALL & RELPH in their reports of 14.01.1970 (*"Report on the MT. PELION Wolfram Mine"*) and 12.06.1970 (*"A Progress Report on the MT. PELION Wolfram Mine"*) indicate that the vein has a strike length southwards of the portal of 274m (900ft). They state *"A continuation of the quartz vein has been observed immediately north of the Forth River (in the National Park). This indicates a total vein length of at least 183m (600ft) and a southerly continuation from the last trench exposure is likely. This would give a possible length of some 457m (around 1500ft) in the lease area"*.

A. Fleming, in his memo to I. Shulman of BUKA-TRIAKO (dated 7.06.1977), restates that *"The quartz vein has been located on the western bank of the Forth River approximately 500 metres north of the mouth of the adit so it is reasonable to assume it has a strike length of at least 700m and possible vertical dimensions of a similar magnitude"*.

Further on he discusses the potential of the area for the presence of additional veins *".....there are other quartz veins adjacent and parallel to the main vein. One of these is 20cm wide and carries wolframite"*. (A probable reference to the *CLIFF LODES* of Reid Creek).

The feasibility study of L. Murphy (dated July, 1971) addressed to SCAMANDER, also refers to other veins: *"several other narrow veins have been located on the surface about 400ft to the east of the main vein"* (A probable reference to the *CLIFF LODES* of Reid Creek, again).

The presence of an old shaft 144m (470ft) in a northerly direction from the adit portal and about 11m (36ft) to the west of the projected trace

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of the main vein through the adit portal could suggest the presence of another vein and it should be investigated. Or, it could signal a small displacement in the strike of the vein, which has been fairly consistent at 173° magnetic.

The pattern of mineralisation in this whole region demonstrates clearly that the Dolcoath, Birthday and Lone Pine Granites are specifically related to the tin-tungsten mineralisation (Jennings, 1963). It is particularly noticeable that no tin or tungsten deposits have been reported in association with the Dove Granite, where they occur either in quartz veins, in quartz or mica schist (most economically important originally); where they occur either in quartz-veins or in quartz-tourmaline veins in greisenised granite.

Further to the north (in the vicinity of the Dove River and Lormina) alluvial and then vein gold deposits were exploited in the early 1880's (especially *FIVE MILE RISE* goldfield). The structure of the gold orebodies here suggests that they are controlled by structures formed during the emplacement of the Dove Granite. There is also a suggestion that these orebodies at depth pass into hematite lodes carrying small quantities of sulphides and gold. Such lodes were encountered in the lower workings of the *UNION* mine. Hematite lodes of this kind seem to be restricted to the vicinity of the Dove Granite and related to it so that it must be conceded that there is as much evidence to indicate a relationship of the gold and silver-lead to the Dove Granite as there is to the Dolcoath Granite (Jennings, 1963). Elliston (1953) discussed the zonal distribution of orebodies around the Dolcoath Granite, taking into account the mineral deposits at Moina and Round Hill in addition to those on the Middlesex One Mile Sheet. His account indicates a reasonable zonation of mineralisation around the Dolcoath Granite, with tin-tungsten-molybdenite in and near the granite surrounded by successive "haloes" of gold, silver-lead and copper deposits further out. This account does not mention the Dove Granite.

According to Reid (1919) almost all the lodes of this district belong to the contact metamorphic type, consisting of:

* quartz veins containing wolframite, cassiterite, molybdenite, with arsenopyrite, pyrite, and chalcopyrite, and associated with fluorspar, tourmaline, calcite, gilbertite, and topaz;

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* chalcopyrite and galena orebodies contained in fractures and dykes coursing generally diagonally across the trend of the encasing strata;
* silver-lead deposits in porphyroid igneous rocks.

A most important factor affecting ore formation was the nature of the host rocks, both as to physical character and chemical composition. The massive Precambrian quartzites, and quartz-schists were much more easily fractured than the softer, finer-grained, micaceous schists. Consequently they provide more suitable loci for the deposition of ores. These fractures are very irregular but remarkably continuous, and they occur generally near the borders of the intruding granite stock. Farther away, the fracturing is less intense, and the deposits are found as metasomatic replacements of the hornblendic and micaceous schists, narrow basic dyke rocks, which strike diagonally across the strata in conformity with the gentral trend of the later fissures connected with the granite irruption. The hydrothermal solutions found their way through the fissures occupied by the basic dyke rocks, completely transformed them, and replaced the soluble portion with metallic minerals. They then attacked the crystalline schists intruded by the dyke and deposited therein the remainder of their metallic content. The bands of quartzite in the actinolite lodes represent the insoluble quartz schists and quartzites occurring intercalated with the crystalline schists. Thus the chloritic formation represents the dyke rock and the actinolite the altered crystalline schists.

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6. ORE GRADE AND RESERVES

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Throughout this report the ore will be assumed to have a specific gravity of 2.65 or 13.53 ft^3/ton.

Reid (1919) had taken some samples which assayed 4.66% WO_3 and 0.3% Sn (actually from sampling by C. Ryan), but Macleod et al (1961) commenting on the ore grade, stressed that "*the limited and unreliable production figures that are available suggest that the grade of the ore is much lower: between 1.0 and 1.5% WO_3*". Hitchcock (1920) reports values obtained by A. Brown of 5% WO_3 over a vein width of 30cm (12") for the whole length of the adit at that time (some 36m or 117ft). Samples were taken on the roof and floor at 6m (20ft) intervals but the method used was not described.

Thomson (1950) claimed that 9000 tons of ore were available from the 36cm (14") wide vein at an average grade of 1.5% WO_3. It had been exposed at the surface for 140m (460ft) by then. He had estimated the grade of 1.5% WO_3 from production figures, but Elliston (1951) claimed that his calculation was based upon incomplete data.

Elliston (1951) in fact gives the only real indication of production from the mine and this is reproduced in Table 1. He confirms my own view that production records give a better indication of ore grade than simple sampling methods in this type of high grade, erratically distributed vein mineralisation. He states that there were 68 tons removed from the drive extracted prior to 1919, and possibly not included in the production statistics 1944-1948; 27.5 tons from the underhand stope; and at least 200 tons from the surface workings. At the time of his visit, the vein had been opened by an adit some 40m (130ft) long and by 152m (500ft) of trenching on the surface up the hillside, which reached a height of some 91m (300ft) above the drive. About 12m (40ft) of underhand stoping had taken place in the drive [37 m^2 (400ft^2) of vein material he claimed]. He further states that if the material from the drive is included, "*the grade is about 1.1% WO_3 whereas if this material had been previously treated the grade worked out on 227½ tons (say 250 for margin) is 1.3% WO_3. Because of the very inefficient method used for refining the ore, which was broken by hand, sluiced and jugged in a primitive home made jig, the recovery was probably as low as 50%. Thomson's estimated grade of 1.5% WO_3 is then almost certainly an underestimate and a more probable grade would be 1.7-1.8% WO_3*". His impression on inspection was about 1-2% WO_3, so he took 1.7% as the grade. The reserves were estimated by him at 5,540 tons, of which some 5,000 tons would be mineable after allowing for stope pillars, etc.

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TABLE 1.

PRODUCTION HISTORY OF MT. PELION

Quarter Ending	Concentrates Produced (tons)	WO_3 Content (tons)	Value (A$)	Sn Content (tons)	Value (A$)	Au Content (tons)	Value (A$)
June 1944	0.164	0.113	62	0.051	15	–	–
Sept.1944	0.739	0.435	234	–	–	–	–
Dec. 1944	1.211	0.772	419	–	–	–	–
Mar. 1945	0.635	0.410	235	0.097	29	–	–
Sept.1947	–	–	–	0.081	35	–	–
Dec. 1947	0.437	0.240	167	0.021	9	–	–
Mar. 1948	0.819	0.531	405	0.059	30	–	–
June 1948	0.337	0.237	187	some	–	–	–
Sept.1948	0.644	0.451	347	some	–	–	–
Dec. 1948	0.159	0.106	67	–	–	13.25	114
TOTALS	5.145	3.295 t	A$2123	approx. 0.550t	approx. A$250	13.25oz	A$114

Source: Elliston (1951). Around 250t of ore had been mined.

F. Ralph in a SCAMANDER letter to Forster, dated 26.11.1971, stated that in the winze "*the values visually estimated at 3% (WO_3). Drive samples calculated over 7 foot width of adit are:*

At 200' 5 ton sample assaying	*1.03% WO_3*
At 220' 150 lbs sample assaying	*0.56% WO_3*
Grid sample 220' to 270'	**0.62% WO_3 (actually 0.80% WO_3)*
270' to 300'	*0.59% WO_3*
300' to 360'	*0.64% WO_3*
Average 220'-360' (140')	0.63% WO_3 (actually 0.69% WO_3)

* Note: an original letter from M. Rubenach to SCAMANDER dated 04.08.1971 quotes 0.80% WO_3 (not 0.62% WO_3 as reproduced before), giving an average of 0.69% WO_3 not 0.63% WO_3 as quoted by Ralph. Also the dump as at 16.08.1971 had 1321 tons from driving to the 46/Ft mark, plus the winzing (332ft and 37.5ft respectively).

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No sampling from 360' to 500', however, the vein from 360' to 500' continued to widen and values are comparable with the remainder of the adit. In the last 10' of driving in addition to the WO_3 values holding, a good patch of tin was mined.

As the driving continued, the quartz lode widened out, i.e. the first 100ft, approximately 13" vein, the vein width of the last 100ft averaging 20"; the vein in the face approx. 22" wide.

The material from the driving has been deposited on a dump which now consists of approximately 1600 tons of ore which from assays available should have an average grade of [0.69% WO_3] (not as quoted: 0.63% WO_3)".

Murphy's feasibility study in July, 1971 also gives an interesting summary of the assay results achieved to date. It is reproduced below:

"Hall-Relph's report of June, 1970 gave the assays for 20 samples from the surface trench, done by the Tasmanian Mines Department at Launceston, with an arithmetic average of 1.74% WO_3 (and 0.217% Sn) over an average vein width of 13 ins. [for 400' horizontal strike length].

I calculated more correct weighted averages weighted on both weight of sample and area of sample and obtained the result, 1.765% WO_3 over 13 ins.

A check assay was made by AMDEL of 5 of the 20 samples assayed by the Mines Department and it was found that the Department's results were too high and the Department agreed with this finding. AMDEL's results for the 5 checked samples were 75.5% of the Department's.

Reducing my above weighted average of 1.765% by this ratio we obtain a value of 1.56% WO_3 for the exposed surface of the vein.

Dr. Varne's report of 11/12/70 suggests that the "average grade of the vein may be of the order of 1.30% WO_3".

The Mines Department bulked equal weights of the 20 samples for research and the composite assay was 1.53% WO_3 (& 0.15% Sn).

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A 5 ton sample was taken from a round fired in the adit at the 200ft. point and the Mines Department assay for this sample which included vein and wallrock over a total drive face width of 7ft was 1.03% WO_3 (0.04% Sn). The vein was said to be 15ins. wide and "high grade" at this point. Calculations show that to obtain 1.03% overall the vein must have assayed 5.08% WO_3 over the 15 ins. This appears very high and there could be a slight doubt about the sampling procedure. On the other hand, Hall-Relph's section shows that a high value at this point ties in reasonably well, allowing for some pitch, with the high values 15, 16 and 17 in the surface trench.

Geologist M. Rubenach [SCAMANDER] obtained an assay for the vein at 233ft in the adit of 1.73% WO_3 by point counting and over 40ft from 190-230ft a value of 1.5% WO_3.

At a point where the very high result was obtained for the Mines Department test Rubenach had a 2.6% value for the vein.

Grab samples from 2 drive rounds just prior to 238½ft [150lb sample at 220' mark] resulted in 0.56% which would give a vein assay of 2.50% WO_3.

It will be seen that there is a wide variation in the results and unfortunately the vein has not yet been systematically sampled along the full length of the adit.

After study of the above and considering geologists' comments that the deposit is very similar to that at STOREY's CREEK and my own study of literature on STOREY's CREEK etc., I have settled on a value for the vein of 1.6% WO3 with a width of 13 ins."

Quirk (1977) in his feasibility study, summarized the assaying of previous workers and took a grade of 1.7% WO_3 for the vein only.

Using the point counting technique (1m-intervals) B.R.G.M. geologists resampled the whole adit from a point 7.7m from the portal, to the face. There were 147 measurements but 7 samples were ignored as the full vein width could not be counted (in 6 cases the values were the aggregate for 2 veins). The average vein width was 35.3cm and ore grade (for 140 samples) was 3.90% wolframite or 2.96% WO_3* (see Table 2). This calculates at 1.04% WO_3 over a 1m mining width. These values seem a little high and will be rechecked. See B.R.G.M. Report 77/SYD/13, August, 1977).

* S.G. of quartz taken as 2.65; wolframite 7.25. Wolframite is 76% WO_3.

TABLE 2.
SUMMARY OF RESULTS.

Vein width (30 samples, 5m interval)	33.42cm
Vein width (140 samples, 1m interval) - ignored 7 samples, as vein in wall.	35.31cm
Vein width (134 samples, 1m interval) - as above, but also ignored 6 others as they were aggregate of 2 veins.	35.33cm
Average Ore Grade (30 samples, 5m interval) 4.46% wolframite	3.39% WO_3
Average Ore Grade (140 samples, 1m interval) 3.90% wolframite	2.96% WO_3

Source: B.R.G.M. Report 77/SYD/13

Refer to Plate 3 also.

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Hitchcock (1920) draws attention to the presence of other lode systems in the vicinity of the main *MT. PELION (TUNNEL) LODE*. He describes the *CLIFF LODE* system occurring at 230m (750ft) south-east of the adit portal, some 305m (1000ft) up Reid Creek from where it crosses the access track to the mine (see Figure 6). There are five veins exposed in the short cross-cut above the waterfall on Reid Creek, spread over a width of about 4.3m (14ft). Sampling (see Table 3) was done by Mr. Tuson and Hitchcock (1920) reports the values averaging 6.94% Sn and 0.053% WO_3 over an aggregate vein width of 43cm (17"). This gives a bulk grade of 0.69% Sn for the veins over 4.3m (14ft) width. These veins are obviously tin-rich, which is not the case elsewhere. Another vein 20cm (8") wide was located lower down the hillside. Thomson (1950) located a 38cm (15") wide vein between these two, also having some evidence of mineralisation.

TABLE 3.

CLIFF LODES (ABOVE WATERFALL) ASSAY DATA.

Vein	Width	%Sn	% WO_3
No. 1	10-13cm (4"-5")	2.33	0.074
2	8cm (3")	3.90	0.089
3	10-23cm (4"-9")	13.25	0.042
4	5cm (2")	4.68	0.014
5	5cm (2")	4.04	0.031

The *WATERFALL LODE* occurs at the 24m (80ft) high waterfall on Reid Creek some 200m (650ft) from its crossing of the access track to the mine. Hitchcock (1920) records a 20-23cm (8"-9") vein assaying 2.6% WO_3 and 0.6% Sn, but containing an unusually high amount of arsenopyrite (see Figure 6).

A number of 3-5cm (1"-2") wide quartz-tourmaline lodes containing wolframite and cassiterite are exposed in a long costean going westwards from the waterfall to the main lode: they do not appear to be of economic interest but reveal the widespread nature of the Sn-W mineralisation (Thomson, 1950).

Hitchcock (1920) discusses the value of the eluvial/talus material as a detrital Sn-W deposit. Some sluicing was done and he quotes a grade of 0.5% Sn.

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APPENDIX 1.

VEGETATION

Much of this information comes from Reid (1919). Most of the area is covered with dense forests and thick undergrowth; with the remainder (especially in the plateau country) covered with a matted growth of native grasses, reeds and shrubs. The high rainfall is a significant factor. The distribution of vegetation is governed by the climate, the altitude, and the nature of the soil.

The forests consist chiefly of thirteen kinds of trees namely: White gum (*Eucalyptus viminalis*); Stringy-bark gum (*Eucalyptus obliqua*); Peppermint-topped stringy-bark (*Eucalyptus regnans*); Myrtle (*Fagus cunninghami*); Celery-top pine (*Phyllocladus rhomboidalis*); King William pine (*Arthrotaxis cupressoides*); Cypress pine (*Arthrotaxis selaginoides*); Leatherwood (*Eucryphia billardieri*); Sassafras (*Artherosperina nioschatum*); Horizontal (*Anodopetalum biglandulosum*); Musk (*Olearia argophylla*); and Dogwood or Peartree (*Pomaderris apetala*).

Trees are rarely seen above an elevation of 1200m, and large areas in the less protected parts below that elevation are untimbered. In the Upper Forth Valley, at altitudes not less than 900m, is found *Fagus*, the only deciduous tree known in Tasmania. On the northern slopes of the Pelion Range it grows in dense impenetrable thickets, and on the west bank of Lake Ellen it is particularly abundant. Lining the creek flowing from Lake Ellen, the upper reaches of Forth River, and its various tributary streams, are found Cypress and King William pines. They are found also near the upper edges of Forth Valley, at the southern extremity of February Plains, on the slopes of Mts. Oakleigh and Barn Bluff, and also in the northern portion of the region in the valley of the Dove River. Seldom are these trees found below an altitude of 900m. They vary in size from 30cm to 122cm in diameter, and being solid and free from flaws, they are highly prized for timber.

The sandy and gravelly flood plain of the Forth River is occupied by a dense growth of myrtle, sassafras, leatherwood, and celery-top pine trees. Looking down the Forth Valley from the edge of the plateau as a vantage point, the borders of the flood plain are sharply marked by the change

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in the vegetation from myrtle to eucalyptus. Of the trees comprising the mixed forest, celery-top pine is the most valuable. Some of these trees are 1m in diameter near the butt, and the barrels are clear of limbs for some 30m.

The most common and the most important trees in the district are the several varieties of eucalyptus, some of which attain enormous size. They occur on the fertile basaltic soils in company with pear tree and musk. In some portions of the valley isolated trees are found 60m tall, with 45m high trees not uncommon.

Horizontal and bauera undergrowth are found on the rocky hillsides, and giant tree ferns (*Dicksonia antarctica*) 10m tall, are very abundant in the valleys.

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APPENDIX 2.

BRIEF GEOLOGICAL NOTES ON OTHER RELEVANT PROSPECTS IN THE AREA.

1. LONE PINE PROSPECT. [W] - Figure 7.
See Middlesex One Mile Sheet Explanatory Report, Jennings, 1963.

A lease (No. 8151-M, of 34.2ha (80ac)) in the vicinity of the Devonian-aged Lone Pine Granite was taken up by the *HANCOCK, HARTNETT and ATKINS SYNDICATE* in 1918. At the time of Reid's (1919) visit the lease was being prospected for tin and wolfram by means of two shallow open cuts.

Although Reid (1919) regarded the prospect as "*very promising*" no production has been recorded from the lease and little or no work appears to have been done since his visit. The lease was abandoned in 1924 and no worthwhile information can be gained from the exposures available at present (Jennings, 1963).

According to Reid (1919) the lode consists of a quartz vein 8-13cm (3-5") wide, which apparently split toward the southeast, where it was exposed as two veins 10cm (4") and 20cm (8") wide, respectively. The ore was high grade containing wolframite, cassiterite, as well as pyrite, and considerable arsenopyrite. The former occurred on or near the walls, whilst the sulphides (pyrite and arsenopyrite) were concentrated in the centre of the vein. The gangue was quartz with small amounts of fluorite, tourmaline and topaz. The lode had a general northeast trend (048° magnetic) and dipped 75° to the south-west. Both granite and quartz schists outcrop on the lease but the relationship of the lodes to the rock types is not known, although the schists strike just north of west (Jennings, 1963).

2. THE BIRTHDAY MINE.(or DOUGLAS' PROSPECT) [W-Sn-Cu] - Figure 7.
See Du Cane One Mile Sheet Explanatory Report, Macleod et al, 1961.

This mine, worked by *W. DOUGLAS*, is situated about 1.2km north of the *MT. PELION* wolfram mine on the exposed area of the Devonian Birthday Granite. Mineralised quartz veins occur in fissures in the muscovite-biotite granite and the minerals include wolframite, molybdenite, cassiterite, and less commonly, pyrite, chalcopyrite, covellite, and arsenopyrite. Several lodes have been exposed in trenches on this lease (No. 7534-M) and have been discussed in detail by Reid (1919).

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Gangue minerals are tourmaline, fluorspar, gilberfite and topaz, with white opaque quartz predominating (although smokey quartz crystals are common). The vein walls are greisenised.

The No. 1 lode system occurs on the hillside about 160m (8 ch) east of the western boundary of the lease. It consists of quartz veinlets from 3 to 8cm (1-3") wide. They have been exposed in two cuttings. Three veins show in the small trench, which is 3.7m (12ft) long, 1.5m (5ft) wide, and 11.8m (6ft) deep. They strike at 138° magnetic, and they dip at 77° north-easterly. The second trench is very close to the first, and reveals similar mineralisation. Greisen extends 15cm (6") on both sides of the walls. These veins have been traced 60m (3 ch) up the hillside in a south-westerly direction.

The No. 2 lode is a 15cm (6") quartz vein containing considerable wolframite, but also molybdenite, chalcopyrite, and arsenopyrite. It has been exposed in a trench 18m (60ft) long, and 3.7m (12ft) deep, about 60m (3 ch) north-easterly of the workings on No. 1 lode. This lode has a proven extent of 100m (5 ch) over a strike of 145° magnetic. The dip is 72° to the north-east. Some 18m (60ft) south-eastward from the end of the main trench occurs another cutting in the vein. Here it is 2.3cm (9") wide, with a similar amount of greisen beyond the walls.

The No. 3 lode strikes 150° magnetic and dips north-easterly at 70°. It lies only 6m (20ft) north-east of No. 2 lode. The width at this point is about 18cm (7"). It has been explored by a long, narrow trench, showing the usual constituent minerals with wolfram predominating. Here the greisen contains an unusual amount of chalcopyrite.

The *HANCOCK, HARTNETT and ATKINS SYNDICATE* also took up leases next to the workings, No. 8230-M north of the *DOUGLAS* property, lying wholly over the Birthday Granite. Numerous tourmaline greisen veins occur but no wolframite had been noted during Reid's (1919) visit. He also makes reference to a constant hinderance to effective exploration - the blanket talus and scree cover, except close to the Forth River.

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3. McCOY's PROSPECT [W].

See Middlesex One Mile Sheet Explanatory Report, Jennings, 1963.

This occurrence consists of irregular veins of quartz carrying very small amounts of wolframite traversing quartzite of the Precambrian-aged Fisher Group. It is situated close to the south bank of Borradaile Creek about 1.5km northwest of the hut on Borradaile Plain. The Precambrian Fisher Group rocks here strike about northeast and dip at high angles to the southeast and northwest.

Blake (1937) examined the occurrence and reported minor traces of wolfram mineralisation over a length of about 15m. However, he concluded that the lode had little continuity in length and width and that the prospect was not of economic importance. Jennings (1963) confirmed this view.

4. MISCELLANEOUS PROSPECTS [W-Sn]. - Figure 7.

See Du Cane One Mile Sheet Explanatory Report, Macleod et al, 1961.

* *HARTNETT PROSPECT (see also Reid, 1919)*

This prospect lies over 1.5km south-west of the *LONE PINE PROSPECT* on the west bank of the Forth River in a small creek on the eastern slope of Mt. Hartnett. It consisted of lease No. 8303-M of 32.4 ha (80ac) and was worked during Reid's (1919) visit by the *HANCOCK HARTNETT and ATKINS SYNDICATE*. Quartz schists have been fractured in both a north-west and south-east direction and these fissures filled with cassiterite-quartz (white).

* *BROOK PROSPECT (see also Reid, 1919)*

This prospect lies high up on the western flank near the zig-zag track up Mt. Oakleigh. It is a large pyritic orebody contained in quartz schist, which was discovered by H. Andrews in 1892. It conforms in strike and dip to the general trend of wolfram-bearing lodes in the district and is partly oxidised. It outcrops strongly over 80m (4ch) in a southerly direction. The main ore minerals are pyrite, pyrrhotite and arsenopyrite, but the ore is traversed by quartz veins containing wolframite. Reid (1919) felt that "*this prospect is worthy of attention*".

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5. THE BIG BLOW LODE [Zn-Pb-Ag-Sn]. - Figure 7.
See Du Cane One Mile Sheet Explanatory Report, Macleod et al, 1961.

This lode is exposed in open cuts at a point about 1km south of the *MT. PELION* adit. The lode is up to 3m (10 ft) wide with a north-south trend cutting across the enclosing metasediments, which here have a northwest trend. The main minerals present are sphalerite, pyrite, hematite and galena, with subordinate amounts of chalcopyrite, cassiterite, ferromanganese and arsenopyrite. Accessory mineral constituents are actinolite, epidote, calcite and fluorite with minor amounts of feldspar and quartz. Assays of a number of samples revealed a small, but fairly consistent, silver content of between 5g to 18g/tonne (3dwt to 12dwt/ton) while the content of the lode ranges between a trace and 1.20% Sn. A zinc content as high as 5.43% Zn was recorded.

6. MT. PELION COPPER MINE [Cu]. - Figure 7.
See Du Cane One Mile Sheet Explanatory Report, Macleod et al, 1961.

Copper deposits occur in Precambrian rocks on the Pelion Plains between Mt. Oakleigh and the old Pelion Hut. The lodes were discovered by *H. ANDREWS* in 1892 and various spasmodic attempts were made to develop* and explore the deposits prior to their acquisition by the MT. PELION CO. N.L. This company undertook extensive developmental work and proved the presence of several parallel sulphide lodes trending between N.10°W. and N.10°E. with westerly dips of 45° and 60°. Most of the known lodes have been examined by open cuts, investigated by trenching, surface-cutting, tunnels and shafts but, in all cases, the concentrations of economic minerals proved to be too low to be of commercial value. Galena, sphalerite, chalcopyrite, pyrite, magnetite and arsenopyrite were the principal minerals in the lodes (see also Reid [1919]). The main leases were Nos. 7311-M, 7429-M and 7269-M.

Burns (1959) re-examined the old workings on the south bank of Douglas Creek, east-northeast of the old Pelion Hut. Here the country rocks are laminated quartzite and phyllite tightly folded on east-west axes. Intersecting the Precambrian structures is a system of shears and brecciated faults with a general southerly trend, and these shears provide the structural control for the mineralisation. The main drive, 67m (220 ft) long, was driven on a brecciated normal fault which forms the eastern wall. The lode is 20-30cm (8"-12") wide and contains pyrite, chalcopyrite, sphalerite and galena.

* J. FIELD and R. FURMAGE initially, and then a few years later, F. G. SMITH.

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7. BARN BLUFF COPPER MINE [Cu] - Figure 7.

See Du Cane One Mile Sheet Explanatory Report, Macleod et al, 1961.

These copper mines are situated 7km from Barn Bluff on a spur between Cook Creek and Commonwealth Creek, at an altitude of nearly 900m. The lodes were discovered in 1898 by H. Andrews on behalf of J. Field, but the main development work was undertaken by the Barn Bluff Options Development Mining Company between January, 1901 and April, 1903 (lease Nos. 5621-M and 5302-M). C. Smith and T. Cook located the large orebodies outcropping on the north bank of Commonwealth Creek in 1899. During this period, the main tunnel was driven 136m (448ft), Nos. 2 and 3 tunnels 8m (25ft) and 9m (30ft), respectively. The orebody was exposed at surface in 18 open cuts over a length of 183m (600ft) and a width of 137m (450ft). No further development work has been carried out since.

The Precambrian metasediments in this area consist of folded, intercalated quartzite and mica schist with a general east-west strike. The sediments are traversed by a large chloritized dyke 76m (250ft) wide, with a northwest trend passing through Ward Pinnacle. On the western side, the dyke appears as a chlorite schist; whilst on the eastern side, near the mine workings, it is a dense, dark green rock, partly chloritized and impregnated with chlorite and a little chalcopyrite. On the south-western side of the chlorite dyke, large masses of white, opaque quartz containing pyrite, outcrop at several points over a distance of 600m (30ch). On the northern side of Commonwealth Creek and on the eastern side of the chlorite belt, are the actinolite ore bodies.

Mineralisation occurs in both the chloritized basic rock and the actinolite-bearing zones of the quartzite. The ore in the chlorite zones consists of massive pyrite, arsenopyrite, specularite and pyrrhotite with subordinate chalcopyrite, silver and gold mineralisation. The gangue is epidote, talc, quartz and calcite. The values are too low to be of economic grade. The dyke dips easterly and the mineralisation is concentrated there.

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The actinolite orebodies consist of alternating bands of actinolite and quartzite, heavily impregnated with pyrrhotite, pyrite, specularite, arsenopyrite and, in a lesser degree, with chalcopyrite, galena and sphalerite. Cassiterite has been detected and gold and silver are constant, though erratic, components. The gangue is actinolite, epidote, quartz, talc, calcite, magnetite and chlorite (with some tourmaline in the ore). Assay of the ore from various locations gave the following results (Macleod et al, 1961):

Locality	Cu (%)	Sn (%)	Au (g/tonne)	Ag (g/tonne)
No. 1 Tunnel	0.16	...	Tr.	36.73
Crosscut, No. 1 Tunnel	0.40	...	Tr.	24.49
Open Cut, North Bank	0.10	...	Tr.	24.49
Open Cut, No. 7	2.32	0.22	1.53	70.41
Open Cut, No. 8	1.65	0.27	Tr.	110.20

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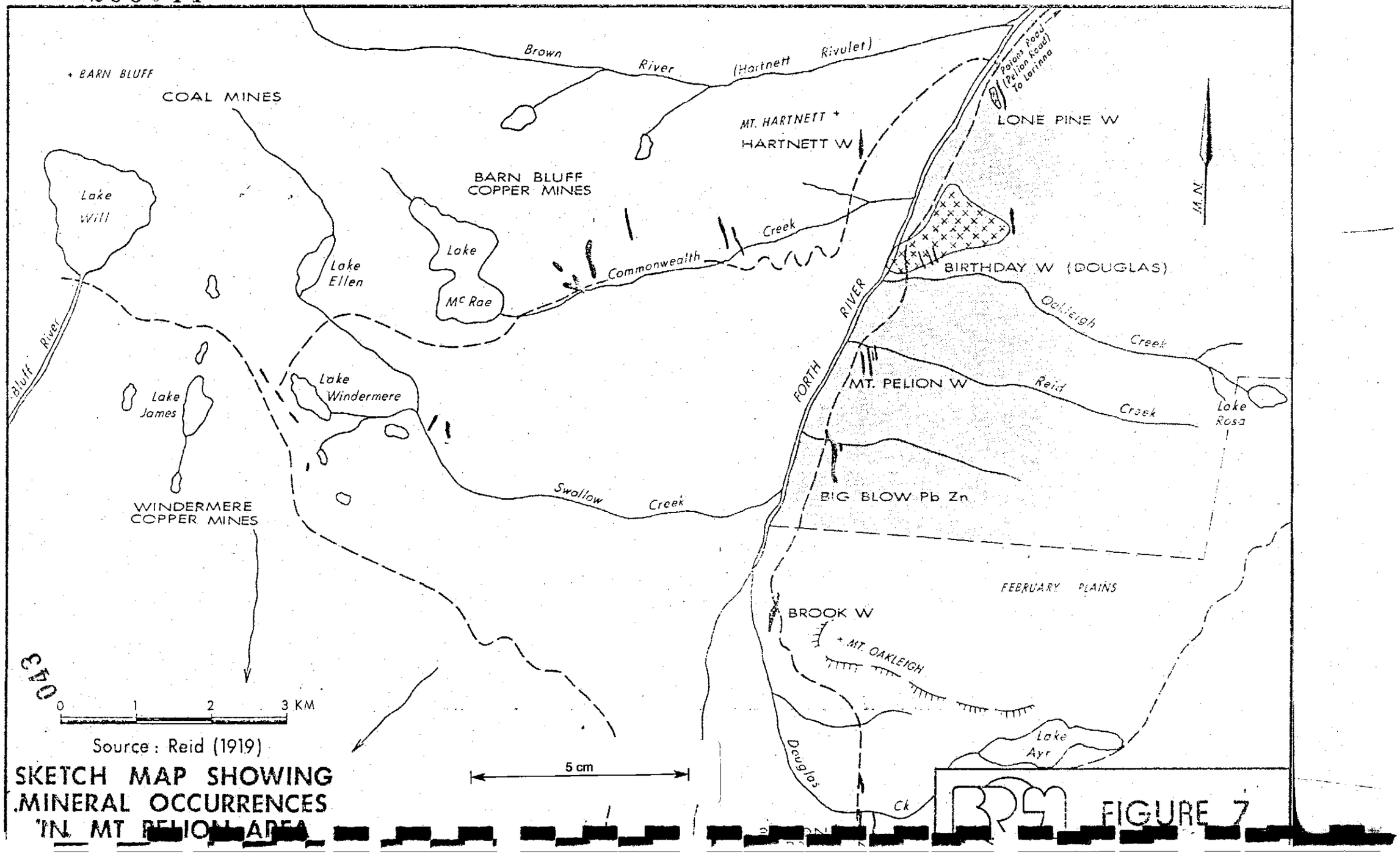

Source : Reid (1919)

SKETCH MAP SHOWING MINERAL OCCURRENCES IN MT PELION AREA

FIGURE 7

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APPENDIX 3.

MINERALOGY OF THE MT. PELION DISTRICT ORE DEPOSITS.

The principal useful elements which have been found here (see Reid, 1919) are tungsten, tin, copper, lead, zinc, silver, and gold. Below is a list of the most important minerals occurring in the district:

METALLIC MINERALS

Arsenopyrite
Cassiterite
Chalcopyrite
Galena
Gold
Haematite
Molybdenite
Pyrite
Pyrrhotite
Sphalerite
Wolframite

ROCK-FORMING MINERALS

Actinolite
Biotite
Calcite
Chabazite (zeolite)
Chlorite
Dolomite
Epidote
Fluorspar
Gilbertite (secondary mica)
Hornblende
Magnetite
Muscovite
Quartz
Topaz
Tourmaline

1. *WOLFRAMITE - Tungsten of iron and manganese* ($FeMnWO$).

It contains theoretically 76.3 to 76.6% tungstic oxide (WO_3), and 23.4% iron and manganese oxides. *Hubnerite* is the Mn-end member and *Ferberite* is the Fe one. Wolframite crystallises in prismatic tabular forms of the monoclinic system, being typically bladed also. It occurs massive, in chisel-shaped and spear-head forms, and in divergent groups of plates or needles. It is chocolate brown to greyish-black in colour and possesses a single direction of very perfect cleavage. It has a submetallic lustre on cleavage faces, dull on others. H = 5-5.5 and SG is 7.1-7.9. The streak is chocolate brown. The chief sources of wolfram in this district are the *MT. PELION, BIRTHDAY (or DOUGLAS), LONE PINE, HARTNETT and BROOK* prospects.

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2. *CASSITERITE - Oxide of tin* (SnO_2).

It contains 78.38% Sn. After wolfram this is the most important mineral of economic value in the district. It is a hard (H=6 to 7), heavy (S.G. = 6.8 to 7.1) mineral usually of black or brown colour, and occurs here in well developed crystallised form tetragonal prisms terminated by pyramids. It has a whitish streak and an adamantine lustre. In this locality it occupies the central parts of the lodes showing that it was formed later than the vein material. It is of considerable importance as a constituent of the orebodies on the *MT. PELION* and *HARTNETT* prospects.

3. *ARSENOPYRITE - Sulpharsenide of iron* ($FeAsS$).

It contains 46% arsenic. Hardness is 5.5 to 6; specific gravity 5.9 to 6.2. It is silver white in colour, even steel grey, with a grey-black streak and metallic lustre. It occurs in greatest abundance at *MT. PELION* mine, especially in the *CLIFF LODES*, at *BIRTHDAY (or DOUGLAS)* prospect and *LONE PINE*. It is one of the latest minerals deposited from solution.

4. *MOLYBDENITE - Disulphide of molybdenum* (MoS_2).

It contains 59.95% Mo of molybdenum. It is a soft lead-grey material with a metallic lustre and greasy feel. It commonly occurs in flakes or scales having a highly developed basal cleavage. Hardness is 1 to 1.5 and specific gravity 4.7 to 4.8. The greatest develpmetn of molybdenite is in the lodes of the *BIRTHDAY (or DOUGLAS)* prospect; it occurs plentifully also at the *MT. PELION* mine, and in much lesser quantities in several other lodes.

5. *PYRRHOTITE - Sulphide of iron* (FeS).

Specific gravity is 4.6. Colour is bronze-yellow to copper-red; lustre is metallic. It is magnetic. Hardness is 3.5 to 4.5. It is a common constituent of the copper lodes.

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6. *TOURMALINE - A complex borosilicate of aluminium and alkali metals or iron and magnesium (Fe, Mg).*

Colour is usually green to black. It forms at the contact between the schists and granite and commonly occurs also in greisen veins. It is highly developed in all the wolfram lodes. S.G. is 3-3.2 and H is 7-7.5.

7. *FLUORSPAR - Calcium fluoride* (CaF_2).

Specific gravity is 3.8. Hardness is 4. It is colourless, yellow, blue, green, purple, and violet. It occurs abundantly and frequently is found in perfectly developed cubes in the wolfram lodes.

8. *ACTINOLITE - A calc silicate* $(Ca[Mg,Fe]_3)\ (SiO_4)_3$.

It is a common component of the *BARN BLUFF, MT. PELION,* and *WINDERMERE* copper deposits. It is a light to dark-green mineral of secondary origin, and derived from schistose rocks in the localities named.

9. *EPIDOTE - A calcium-aluminium-iron silicate.*

It is abundantly developed in association with chlorite at *MT. PELION* and *BARN BLUFF* prospects.

10. *TALC - Hydrous magnesium silicate* $(H_2Mg_3[SiO_3]_4)$.

It is an alteration product of actinolite and epidote. It is not abundantly developed.

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APPENDIX 4.
TYPICAL TUNGSTEN CONCENTRATE SPECIFICATIONS.

ELEMENT %	WOLFRAMITE	SCHEELITE
WO_3	65.00 min.	70.00 (65 min.)
Sn	0.50 max.	0.20 max.
As	0.20 max.	0.20 max.
Mo	0.05 max.	High up to 5.00, low up to 3.00
S	1.00 max.	1.00
CaO	0.50 max.	18%
Fe	Up to 18% in ferberite	--
Mn	Up to 18% in huebnerite	--
P	0.05 max.	0.05 max.

Source: Field Geologists' Handbook AUS. I.M.M. Melbourne.

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TYPICAL ANALYSIS MT. PELION WOLFRAMITE CONCENTRATE.

ELEMENT	MT. PELION	ROSSARDEN
WO_3	66.6%	73.6%
Bi	0.105%	Trace
As	0.022%	0.01%
Sn	0.010%	1.10%
Hg	0.010%	--
S	0.050%	0.25%
P	--	0.01%
Cu	--	0.02%
CaO	--	0.25%
WnO	--	8.5%
SiO_2	--	0.3%

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SEREM - TRIAKO - BUKA

AGREEMENT

MOUNT PELION TASMANIA

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This DEED OF AGREEMENT is made the 26th day of July Nineteen Hundred and Seventy Seven.

BETWEEN:

SEREM (AUSTRALIA) PTY. LTD. (hereinafter referred to as "Serem") a Company duly incorporated in the State of New South Wales and having its registered office at 55 Clarence Street Sydney in the said State of the first part

AND

TRIAKO MINES N.L. (hereinafter referred to as "Triako") and BUKA MINERALS N.L. (hereinafter referred to as "Buka") each being a Company duly incorporated in the State of New South Wales and each having its registered address at 119 York Street Sydney in the said State of the second part.

WHEREAS:

A. Triako and Buka are the beneficial owners in equal shares of Tasmanian Exploration Licence 5/77 approximately described and delineated by yellow colour on the plan annexed as Schedule I hereto;

B. Triako and Buka have an Option to purchase Tasmanian Mining Leases 60M/69, 59M/71 and 60M/71 pursuant to an Agreement dated 2 June 1977 a copy of which is annexed as Schedule III hereto;

C. The parties hereto now wish that Serem be granted an Option to enter into a Joint Venture with Triako and Buka over the Property as hereinafter defined on the terms and conditions hereinafter set forth.

NOW THIS DEED WITNESSES:

1. DEFINITIONS

1.1 "The Property" shall mean the mining mineral and prospecting rights

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titles tenements licences easements or authorities within the Area, as hereinafter defined, of whatsoever nature or interest to which any party is now or may hereafter become legally or beneficially entitled either in whole or in part including all the land the surface thereof and all minerals in or under the land and any rights thereto the subject of minerals and prospecting rights, mining tenements, titles, easements and authorities and includes all assets, improvements, plant, buildings, equipment or otherwise acquired or held by any party hereto for the purposes of any Joint Venture constituted hereby and also incudes any ores, concentrates of minerals and mineral products produced or derived from the Area.

1.2 "The Area" shall mean all that land covered by

i) the Tasmanian Mining tenements referred to in Recitals A and B hereof, being Exploration Licence 5/77 and Mining Leases 60M/69, 59M/71 and 60M/71; plus

ii) all that area extending in any direction for a radius of twenty (20) kilometres from the 780 foot adit level portal of the old Mount Pelion Mine

which area is approximately described and delineated by red colour in the plan annexed as Schedule II hereto.

1.3 "The Effective Date" shall mean 31 January, 1978.

1.4 "The Option" shall mean the Option granted to Serem by Triako and Buka pursuant to Clause 3.1 hereof.

1.5 "The Option Period" shall mean the period from the date of execution hereof until the Effective Date.

1.6 "Interest" shall mean and refer in respect of each party to this Agreement that portion of the sole, exclusive and undivided benefit and ownership now held or hereafter acquired by the parties to this Agreement in all rights titles and interests in and to the Property to which and in proportion to which each party shall be entitled from time to time as

tenants in common.

1.7 "The Operating Committee" shall mean that committee created and constituted pursuant to Clause 5.1 hereof.

1.8 "The Mining Operator" shall mean and refer to Triako/Buka and/or its duly appointed agents, employees and contractors appointed pursuant to Clause 6.1 hereof.

1.9 "The Exploration Operator" shall mean and refer to Serem and/or its duly appointed agents employees and contractors appointed pursuant to Clause 7.1 hereof.

2. THE LICENCE

Upon execution of this Agreement and subject to the terms hereof and upon the observance of the conditions and covenants on the part of Serem to be performed Triako and Buka hereby grant to Serem the right to go upon the Area during the period of the Option granted and the further rights to:

i) explore, prospect and develop any part thereof;

ii) extract and remove therefrom all ores and minerals necessary for the purposes of assay and metallurgical and pilot plant testing; and

iii) erect, construct, maintain, use and operate thereon and therein building structures, machinery, plant and equipment and during the Option Period to remove the same placed there by Serem

AND all programmes of work carried on by Serem during the Option Period shall be at their own option and discretion and cost.

3. THE OPTION

3.1 Triako and Buka hereby grant to Serem the sole and exclusive Option to acquire from Triako and Buka a Thirty three and one-third percent (33 1/3%) Interest in the Property and to constitute with Triako and Buka a Joint Venture to place the Property into production upon the terms and conditions hereinafter contained. The period of the Option shall be until 31 January, 1978.

3.2 Serem may terminate the Option hereby granted at any time during the Option Period by simple notice in writing to Triako PROVIDED that Serem shall:

i) forfeit all previous expenditures incurred upon and in relation to the Property during the Option Period including the moneys expended by Serem pursuant to Sub-clauses 3.3, 3.4 and 3.5 hereof; and

ii) forthwith provide Triako with copies of all data and reports including interpretations and hypotheses generated by Serem during the Option Period and which would tend to assist Triako and Buka in appreciating the potential of the Property.

3.3 Serem agrees to reimburse Triako and/or Buka, as the case may be, one-third of any payments made or firmly committed to be made by Triako and/or Buka during the Option Period pursuant to the Agreement annexed hereto as Schedule III.

3.4 Forthwith upon the execution hereof Serem shall pay to Triako the sum of Thirty five thousand dollars ($35,000-00) for the purpose of financing road works to be undertaken by Triako and Buka on the first nine miles, approximately, of the existing road from the old Mount Pelion Wolfram Mine to the Lemonthyme Power Station and the payment of the said sum shall not be accounted a credit against the moneys otherwise payable by Serem pursuant to Sub-clause 4.3 hereof.

3.5 During the Option Period Serem shall finance the drilling of such diamond drill holes upon the Property at such sites as are determined amongst the parties PROVIDED that in the event a Joint Venture shall be created between the parties pursuant to Sub-clause 4.2 hereof and the said Joint Venture proceeds to commercial production from a mine or mines upon the Property Triako and Buka shall not be entitled to receive any part of that said production nor any receipts from the sale of any such production until Triako and Buka shall have first repaid to Serem two-thirds of all costs expended by Serem pursuant to this Sub-clause along with interest at the rate of Twelve per cent (12%) per annum until repayment.

4. CREATION OF THE JOINT VENTURE

4.1 Serem may exercise the Option hereby granted at any time before the Effective Date by simple notice in writing to Triako accompanied by the first instalment payable pursuant to subclause 4.3 hereof.

4.2 Upon exercise by Serem of the Option as aforesaid there shall thereupon be constituted a Joint Venture, to be known as the Mount Pelion Joint Venture, between the parties hereto having as its sole objects the exploration and exploitation of the mineral resources of the Property on the terms and conditions of this Agreement.

4.3 The said exercise by Serem of the Option hereby granted shall oblige Serem to pay to Triako, as Trustee for the Joint Venture, in consideration of its Interest hereby granted the sum of Three hundred and thirty thousand dollars ($330,000-00) payable in the following three instalments, each of One hundred and ten thousand dollars ($110,000-00), that is to say:

i) on the Effective Date;

ii) on a date one Calendar month after the Effective Date; and

iii) on a date two Calendar months after the Effective Date

PROVIDED that the date of each such instalment shall be subject to any delays in proceeding with the development programme AND PROVIDED FURTHER that the said moneys shall be applied by Triako for the purposes of mine development, machinery, equipment, access and other costs directly related to bringing the Property into production.

4.4 Upon the provision of the final instalment by Serem pursuant to Sub-clause 4.3(iii) hereof, Triako and Buka shall be deemed to hold the Property and all its rights titles and interests in respect thereof upon trust for themselves and Serem jointly which shall own the same as tenants in common in the following proportions:

Triako 33 1/3%

Buka 33 1/3%

Serem 33 1/3%

4.5 Any funds required for the purposes of the Joint Venture in excess of the Three hundred and thirty thousand dollars ($330,000-00) provided by Serem pursuant to Sub-clause 4.3 hereof shall be contributed by each of the parties hereto in proportion to its Interest as loans to the Joint Venture ~~AND in the event this involves borrowing from an arm's length third party that said third party shall have priority over all other creditors of the Joint Venture.~~

4.6 In the event that either party shall be unable or unwilling to contribute its share of loans pursuant to Sub-clause 4.5 hereof then upon failure of such party to make the contribution that is proportionate to its interest, in the case of contributions required up to One hundred thousand dollars ($100,000-00) within 30 calendar days of written notice to contribute

given by the Manager; in the case of contributions required up to One million dollars ($1,000,000-00) within 90 calendar days of said notice; and of contributions required in excess of One million dollars ($1,000,000-00) within 6 calendar months of said notice, then the other party may contribute the amount of the deficiency and the interest of the defaulting party in the operations shall abate at the rate of One (1) per centum for each Eleven thousand dollars ($11,000-00) contributed by the party not in default to make good the deficiency of the party in default PROVIDED ALWAYS that once either party shall have notified the other party in writing that it declines to make further contributions or has failed to make the contributions required by notice of the Manager within the stipulated time then the declining party shall thereafter be debarred from increasing its interest above its reduced interest.

5. OPERATING COMMITTEE

5.1 Forthwith upon the creation of the Joint Venture pursuant to subclause 4.2 hereof an Operating Committee shall be established so as to comprise three members (one member from each of Triako, Buka and Serem) and the said Operating Committee shall be empowered to make all decisions in respect of the carrying out of mining and further exploration operations of the Joint Venture and in respect of all other undertakings, activities and operations for the purposes of the Joint Venture.

5.2 A meeting of the Operating Committee shall be convened monthly (unless the parties hereto mutually agree otherwise) to consider, vary, approve and in all matters deal with programmes of work and budgets submitted at prescribed periods by the Mining Operator and the Exploration Operator as the case may be.

5.3 All decisions of the Operating Committee upon all matters shall be by simple majority vote and shall be binding upon each member of the Joint Venture PROVIDED that after the initial scale (approximately 26,000 tonnes per annum) mining operations reach full production level the representative of Serem for the time being on the Operating Committee shall have a right of veto over any planned expansion of mining operations on the Property.

5.4 The Operating Committee shall be responsible for the application of the Joint Venture's funds, including the Three hundred and thirty thousand dollars ($330,000-00) paid by Serem to ~~Amdex Mining Limited~~ TRIAKO pursuant to subclause 4.3 hereof, at the submission of the Mining Operator and/or the Exploration Operator as the case may be and shall be authorised to call for further funds from the Joint Venture parties.

6. MINING OPERATOR

6.1 Triako and Buka jointly shall be Mining Operator for the Joint Venture and shall, subject to the authority of the Operating Committee as aforesaid, have full control over all aspects of mining operations which shall be carried out by Triako and Buka and/or their duly appointed agents, servants and contractors according to programmes and budgets approved by the Operating Committee.

6.2 The Mining Operator shall submit programmes and budgets to the Operating Committee for approval in advance at such periodic intervals as the Operating Committee may from time to time prescribe.

6.3 The Mining Operator may budget and charge as Joint Venture mining expenses all direct costs attributable to, and all costs properly incurred for the purposes of, the Joint Venture mining operations but may not charge any apportionment of its own overheads PROVIDED that all overheads of direct labour (such as sickness, holiday and long service leave, workers compensation insurance and all other usual labour on-costs) and all costs

of maintenance and acquisition of the Property, including any payments to Triako's and Buka's original Vendors shall be deemed to be a Joint Venture expense.

6.4 The Mining Operator shall cause to be kept adequate and separate accounts in relation to all Joint Venture mining operations for and on behalf of each Joint Venture party showing the true financial position of all moneys received and disbursed on account of each Joint Venture party and shall cause the same to be audited and shall cause to be prepared by such auditors and reported upon by them balance sheets and supporting statements of operating results relating to the particular Property of each of the Joint Venture Parties as at each financial year end and for the inverven-ing periods then ended.

6.5 The Mining Operator shall be responsible for maintaining all the Property in good standing and shall pay all rentals and taxes applicable thereto and shall comply with all work conditions which may be imposed as requisite by any governmental authority of appropriate jurisdiction and shall in all respects comply with the laws of the State of Tasmania relative to the operations being conducted PROVIDED that all direct costs of such Property maintenance shall be a cost of the Joint Venture which the Mining Operator may budget and recoup from the Joint Venture.

6.6 The Mining Operator shall submit full reports of operating results to the Operating Committee at such periodic intervals as the Operating Committee may from time to time prescribe.

7. EXPLORATION OPERATOR

7.1 In the event the Operating Committee shall consider further exploration of the Property warranted, Serem shall be the Exploration Operator and shall through its servants agents and/or contractors carry out all exploration operations according to programmes and budgets approved by the Operating Committee.

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7.2 The Exploration Operator shall submit to the Operating Committee all programmes and budgets for approval in advance at such periodic intervals as the Operating Committee may from time to time prescribe.

7.3 The Exploration Operator may budget and charge as Joint Venture exploration expenses all direct costs attributable to, and all costs properly incurred for the purposes of, the Joint Venture exploration operations but may not charge any apportionment of its own overheads PROVIDED that all overheads of direct labour (such as sickness, holiday and long service leave, workers compensation insurance and all other usual labour on-costs) shall be deemed to be a Joint Venture expense.

7.4 The Exploration Manager shall keep adequate and separate accounts in relation to all Joint Venture exploration operations for and on behalf of each Joint Venture party showing the true financial position of all moneys received and disbursed on account of each Joint Venture party and shall cause the same to be audited and shall cause to be prepared by such auditors and reported upon by them balance sheets and supporting statements relating to the Property of each of the Joint Venture parties as at each financial year end and for the intervening periods then ended.

7.5 During the period of any exploration operations, the Exploration Operator shall submit to the Operating Committee full and complete reports of progress of the work done on the Property including all relevant maps plans logs assay results and all engineering drilling geological and other data obtained during the period and the Exploration Operator shall safely keep all core or part core where core has been split and samples all of which shall be available for inspection by the Operating Committee and the Exploration Operator shall provide such further and other information as the Operating Committee may from time to time request.

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8. ACCESS

Duly authorised representatives of any party hereto shall at their own risk and expense and at all reasonable times during the term hereof for the purpose of inspection have full and free access to the Property and the mining and exploration operations thereon and to all records of the Property and to all Joint Venture accounts and shall also have the right to audit such records and books of account maintained by the Mining Operator and/or the Exploration Operator with respect to the Property PROVIDED that any such access or audit shall not unreasonably interfere with the normal business requirements of the Mining Operator or the Exploration Operator as the case may be.

9. APPROVALS

This Agreement is subject to and conditional upon the consents IF REQUIRED of the Australian and State Government instrumentalities of appropriate jurisidction and the parties hereto agree to use their best endeavours to obtain such consents as soon as possible after the execution hereof.

10. ASSIGNMENTS

10.1 Any party may during the term hereof with the consent of any other party assign, transfer, declare itself or themselves Trustee or otherwise dispose of its Interest or any part thereof to a Related Company (as defined in Section 6(5) of the Companies Act, N.S.W., 1961) PROVIDED that such Related Company shall enter into a Deed of Agreement with the non-assigning party or parties pursuant to Clause 10.5 hereof.

10.2 In the event that any party hereto shall desire to sell assign or otherwise dispose of all or any part of its Interest hereunder (in this Clause 10 referred to as "the Interest Under Sale") to a person or corporation other than a Related Company, the proposed assignor shall first give the other parties notice in writing of such desire setting forth the name of any proposed assignee and the terms and conditions under which the assignor is prepared to assign the Interest Under Sale; upon receipt of such notice

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the other parties shall have the right or option exerciseable by notice in writing in that behalf to the proposed assignor within thirty (30) days of receipt of such notice, of acquiring equal shares of the Interest Under Sale at the price and upon the terms and conditions set forth in the said notice.

10.3 In the event that one only of the non-assigning parties shall accept the offer or exercise the option referred to in sub-clause 10.2 hereof then the said accepting party must acquire the whole of the Interest Under Sale.

10.4 In the event the non-assigning parties shall both decline the offer or fail to exercise the option referred to in sub-clause 10.2 hereof then the proposed assignor may within sixty (60) days offer the Interest Under Sale to such proposed assignee at the same price and upon and subject to the same terms and conditions as are set forth in the said notice referred to in sub-clause 10.2 hereof.

10.5 Any assignment by any party in accordance with this Clause 10 shall be conditional upon the proposed assignee entering into a Deed with those parties then parties to this Deed embodying mutatis mutandis the terms and conditions of this Deed of Agreement.

11. SALES

Triako and Buka shall, as Mining Operator, act as the agent for sale of the Joint Venture and shall use its best efforts to market any minerals ores and/or concentrates produced from the Property on the best terms known as available in order to obtain for the Joint Venture for whom the Mining Operator acts as sales agent the highest possible return PROVIDED that Triako and Buka shall make no profit out of the Joint Venture from this agency and may not charge any agency fee or commission on Joint Venture sales AND PROVIDED FURTHER that nothing herein contained shall prevent either party from exercising its rights pursuant to Clause 16 hereof.

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12. GOVERNING LAW

This Agreement and all amendments hereto shall be deemed to be a New South Wales Contract governed by the laws for the State of New South Wales. All questions with respect to validity, interpretation and performance of this Agreement and all such amendments shall be determined according to the laws of New South Wales in force from time to time and shall be litigated in a Court of competent jurisdiction in the State of New South Wales.

13. FORCE MAJEURE

If either party shall be prevented or delayed from performing any of the obligations on its part to be performed hereunder by reason of any act of nature, strike, flood, interruption or delay of transportation, war, insurrection or mob violence, requirement or regulation of Government or any other matter which cannot be overcome by means normally employed in performance, then and in such event and so often as the same shall occur any such failure to perform shall not be deemed a breach of this Agreement but performance of any of the aforesaid obligations shall be suspended during such period of disability as may occur from time to time PROVIDED ALWAYS that nothing herein contained shall have the effect of postponing the Effective Date.

14. PUBLICATION

No news releases and no statements to the public shall be given by any party hereto with respect to the operations being conducted upon the Property without the prior approval of the other party but this Clause shall not apply to information required to be supplied under the provisions of any Securities Act or by any Stock Exchange where applicable.

15. NOTICES

All notices and/or payments required to be made or paid hereunder shall be deemed to have been given (or paid, as the case may be):

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i) in the case of posting, after properly addressed envelopes containing the same are lodged as registered mail with a post office;

ii) in the case of telegrams or telexes, one hour after transmission; and

iii) in the case of delivery by hand, at the actual time of such delivery

PROVIDED that such notices shall be addressed in the following manner:

In the case of Serem to:

Mr. G. Eijkelboom,
Managing Director,
SEREM (Australia) Pty. Ltd.,
55 Clarence Street,
Sydney. N.S.W. 2000

Telex AA 23047

In the case of Triako to:

Mr I. Shulman,
Chairman,
Triako Mines N.L.,
119 York Street,
Sydney. N.S.W. 2000

Telex AA 22316

In the case of Buka to:

Mr I. Shulman,
Chairman,
Buka Minerals N.L.,
119 York Street,
Sydney. N.S.W. 2000

Telex AA 22316

16. OWNERSHIP OF PRODUCT

Each party shall subject to the adequate provision for the satisfaction of debts own and have the right to take in kind and separately dispose of its share of all ores and concentrates produced pursuant to the terms of this Agreement.

17. PARTNERSHIP

Nothing in this Agreement shall be deemed to create a partnership between the

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parties or authorise either party to act as agent for any other party or in any way to bind or commit the other party to any obligation otherwise than as expressly herein set out.

18. TIME

Time shall be of the essence of this Agreement.

19. FURTHER ASSURANCES

The parties hereto and each of them covenant and agree that each of them shall and will upon the reasonable request of the other party make do execute or cause to be made done or executed all such further and other lawful deeds devices and assurances whatsoever for the better or more perfect and absolute performance of the terms and conditions of this Agreement.

IN WITNESS WHEREOF the parties hereto have executed these presents the day and year first hereinbefore written.

The COMMON SEAL of SEREM (AUSTRALIA) PTY LTD was hereunto affixed by authority of the Board of Directors and in the presence of:)

SEREM (AUSTRALIA) PTY. LTD. Common Seal

Director

Secretary

The COMMON SEAL of TRIAKO MINES N.L. was hereunto affixed by authority of the Board of Directors and in the presence of:)

TRIAKO MINES N.L. Common Seal

Director

Secretary

The COMMON SEAL of BUKA MINERALS N.L. was hereunto affixed by authority of the Board of Directors and in the presence of:)

BUKA MINERALS N.L. Common Seal

Director

Secretary

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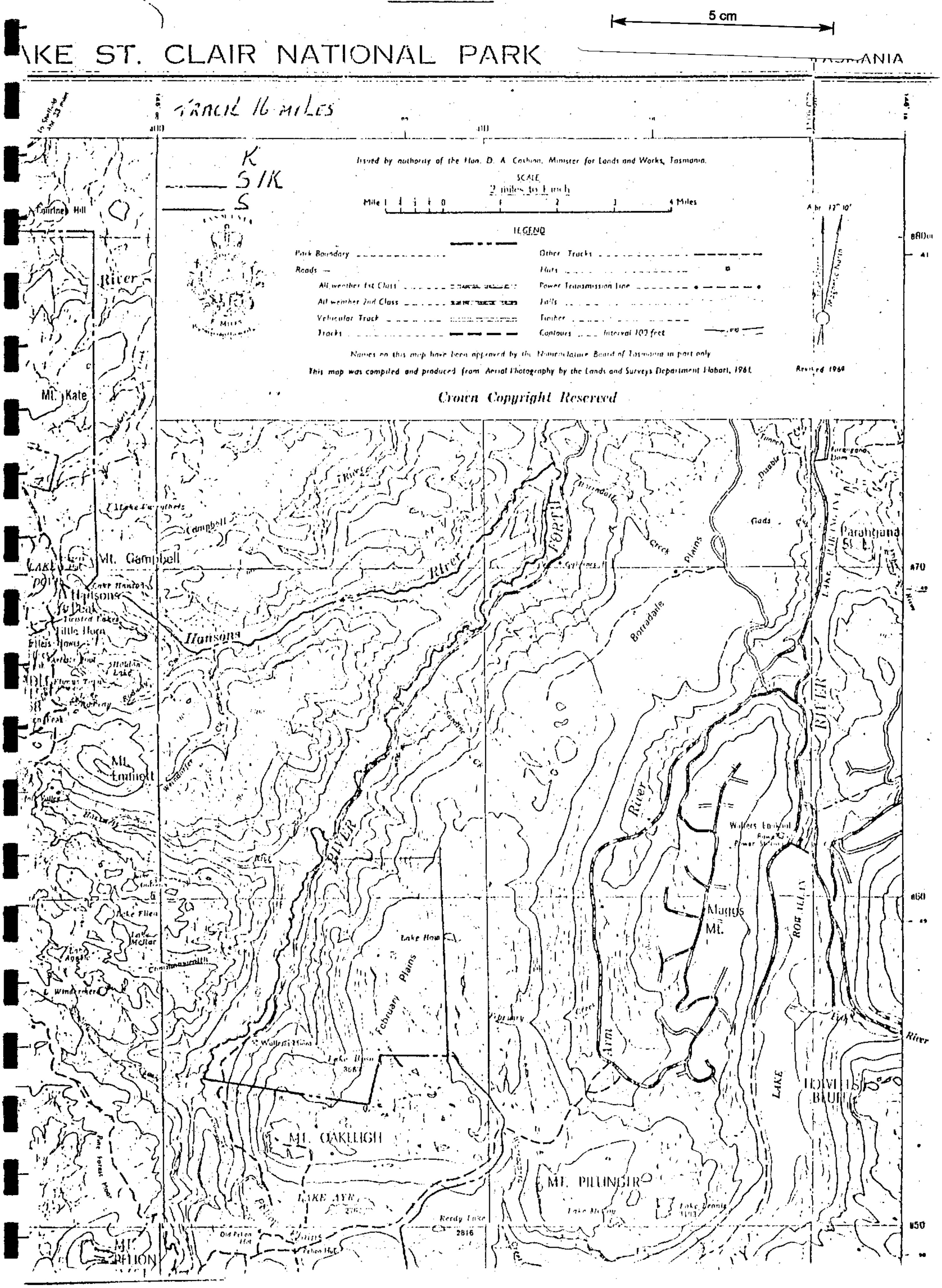
PLAN OF TASMANIAN EXPLORATION
LICENCE 5/77

HEREINBEFORE REFERRED TO AS
SCHEDULE I



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DECLARATION OF TRUST

This is to certify that KIBUKA MINES PTY LIMITED ("Kibuka") a company duly incorporated in the State of New South Wales and having its registered office at 6th Floor, 119 York Street, Sydney, in the said State, did apply on this date for the grant to it of an Exploration Licence of 3000 hectares at the confluence of Hartnett Rivulet and River Forth, Tasmania, as Trustee for and on behalf of TRIAKO MINES N.L. ("Triako") and BUKA MINERALS N.L. ("Buka") in equal shares.

KIBUKA HEREBY COVENANTS AND AGREES that at any time hereafter, if called upon so to do by the said TRIAKO and/or BUKA, it will execute all such documents and do all such things as shall be necessary to enable the right title and interest in any Exploration Licence granted to be transferred into the name of TRIAKO and/or BUKA or their nominee.

KIBUKA HEREBY ACKNOWLEDGES that the consideration provided under the said application was supplied and shall continue to be supplied by TRIAKO and BUKA and HEREBY FURTHER DECLARES that TRIAKO and BUKA shall be at liberty for their own benefit or for the benefit of any other receive all payments and benefits received out of or in connection with the said Exploration Licence.

AND KIBUKA HEREBY IRREVOCABLY APPOINTS TRIAKO and BUKA its Joint Attorneys for it and on its behalf to act in respect of the said Exploration Licence as it shall see fit and in particular KIBUKA and in KIBUKA'S name but for their own benefit or for the benefit of any nominee of TRIAKO and/or BUKA to assign or otherwise dispose of any rights accruing to KIBUKA in respect of the said Exploration Licence.

IN WITNESS WHEREOF KIBUKA has hereto affixed its seal on this 2 day of March, 1977.

The COMMON SEAL of KIBUKA MINES PTY LIMITED was hereunto affixed by authority of the Board of Directors in the presence of:

KIBUKA MINES PTY. LIMITED Common Seal

Director

Secretary

PLAN OF "THE AREA"

295068

HEREINBEFORE REFERRED TO AS

SCHEDULE II

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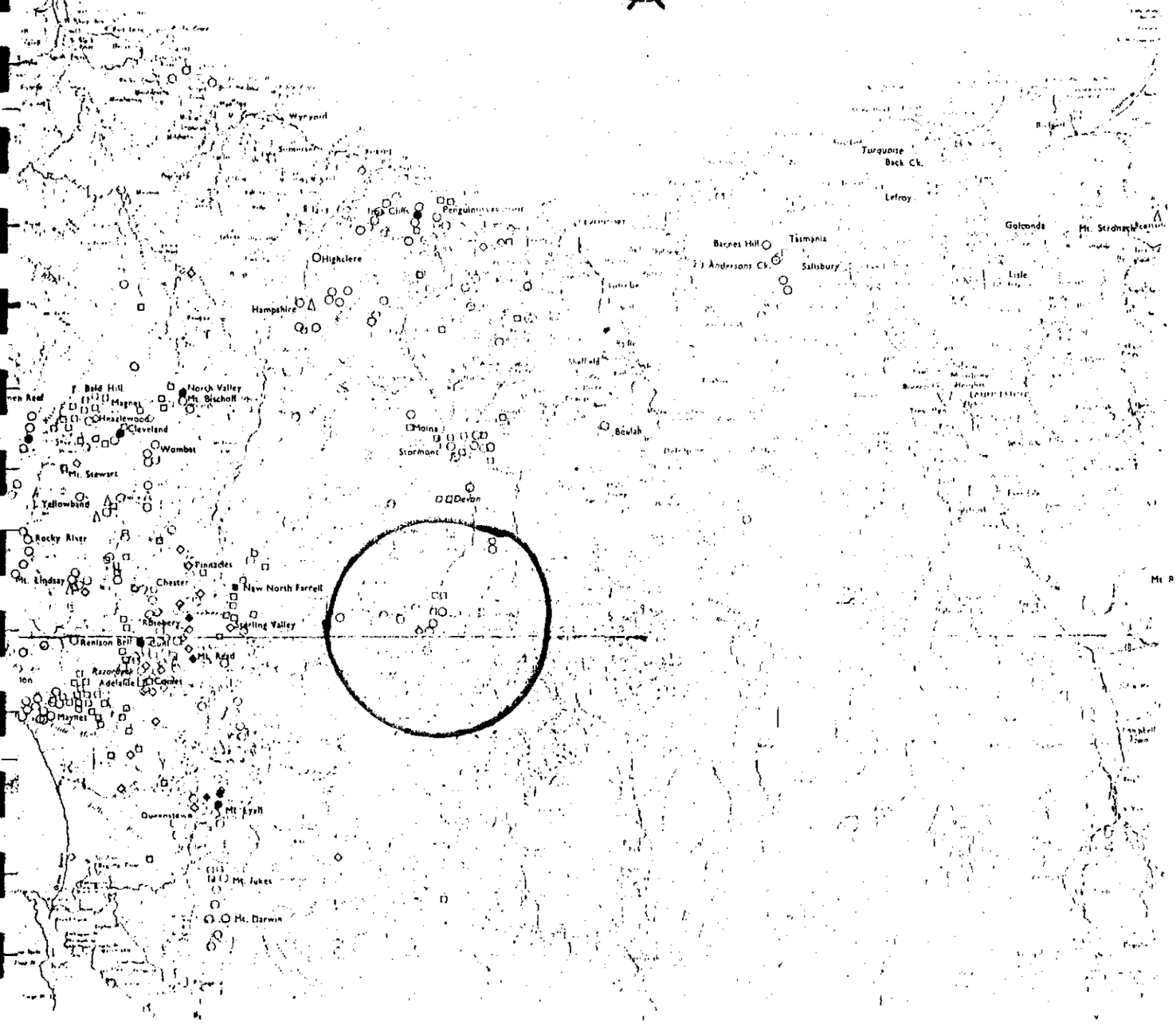
TASMANIA

SCALE 1:1,000,000

MINERAL RESOURCES MAP 'A'

LODE AND ALLUVIAL DEPOSITS

5 cm



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THIS DEED OF AGREEMENT is made the second day of June Nineteen Hundred and Seventy Seven

KIBUKA - SCAMANDER - LOUISA
AGREEMENT OF 2 June 77

HEREINBEFORE REFERRED TO AS
SCHEDULE III

BETWEEN :

KIBUKA MINES PTY. LIMITED (hereinafter referred to as "Kibuka") a Company duly incorporated in the State of New South Wales and having its registered address at 6th Floor 119 York Street Sydney in the said State, of the first part;

AND :

SCAMANDER MINING CORPORATION N.L. (hereinafter referred to as "Scamander") a Company duly incorporated in Tasmania and having its New South Wales registered office at 8th Floor 6 O'Connell Street Sydney in the said State, of the second part;

AND :

LOUISA MINING CORPORATION N.L. (hereinafter referred to as "Louisa") a Company duly incorporated in Tasmania and having its registered office at 152 Brisbane Street Launceston Tasmania, of the third part.

WHEREAS :

A. Louisa is the registered holder of Tasmanian Mining Leases Numbers 60M/69, 59M/71 and 60M/71 ("the Mining Leases") over which Scamander has lodged a Caveat pursuant to Section 116 of the Tasmanian Mining Act, 1929;

B. Pursuant to an Agreement dated 30 June 1976 between Scamander and Louisa, Scamander is entitled to receive one-half of the net proceeds realised by Louisa in any sale of the Mining Leases; and

C. Louisa now wishes to sell the Mining Leases and Kibuka wishes to take an option to purchase subject to the terms and conditions hereinafter appearing.

NOW THIS DEED WITNESSES :

1. DEFINITIONS

1.1 "the Property" shall mean the mining mineral and prospecting rights titles tenements licences easements or authorities within Tasmanian Mining Leases Numbers 60M/69, 59M/71 and 60M/71 including all the land the surface thereof and all minerals in or under the land and any rights thereto the subject of mineral and prospecting rights, mining tenements, titles, easements and authorities and includes all assets, improvements, plant, buildings, equipment or otherwise and includes all ores, concentrates of minerals and mineral products produced or derived from the aforesaid Mining Leases and in particular the old Mt. Pelion Mine dump.

1.2 "the Effective Date" shall be a date two calendar months after the date of execution hereof or the date one week after the date on which Scamander's Caveat is removed pursuant to Clause 4.1 hereof, whichever shall be the later.

1.3 "the Option" shall mean the Option granted by Louisa to Kibuka pursuant to Clause 2.1 hereof.

1.4 "the Option Period" shall mean the period beginning on the date of execution hereof and ending on the Effective Date.

1.5 "the Purchase Period" shall mean the period beginning on the Effective Date and ending on the fifth anniversary of the Effective Date.

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2. THE OPTION

2.1 Louisa hereby grants to Kibuka the right to purchase the Property for the sum of One hundred thousand dollars ($100,000.00) payable in instalments as described in Clause 3 hereof.

2.2 Kibuka may exercise this Option by notice in writing to Louisa at any time before the Effective Date.

2.3 During the Option Period, Kibuka shall have the following rights:

(i) to explore, prospect, develop, manage and control the property and any part thereof or other rights appurtenant thereto;

(ii) to extract and remove from the Property all ores and minerals necessary for the purposes of assay and metallurgical and pilot plant testing; and

(iii) to erect, construct, maintain, use and operate thereon and therein building structures, machinery, plant and equipment and during the said Option Period to remove same placed there by Kibuka.

3. TERMS OF SALE

3.1 In the event Kibuka shall determine to exercise its option hereunder the instalments of purchase moneys payable pursuant to this Clause shall be payable as to fifty per centum (50%) to Scamander and as to the remainder to Louisa PROVIDED that Louisa shall be entitled to a total One thousand dollars ($1,000.00) of first instalment moneys otherwise payable to Scamander as reimbursement of moneys expended by Louisa on the Property on behalf of Scamander.

3.2 Upon notice to Louisa by Kibuka of its intention to exercise the Option, Kibuka is bound to pay the sum of Thirty thousand dollars ($30,000.00) payable as to the first Ten thousand dollars ($10,000.00) on a date ten calendar months after the Effective Date and as to the Twenty Thousand dollars ($20,000.00) remainder before the second

3.3 Thereafter and subject to Clause 3.4 hereof Kibuka is bound to pay an instalment of Twenty three thousand three hundred and thirty three dollars ($23,333.00) on each of the next three successive anniversaries of the Effective Date.

3.4 After payment by Kibuka of the first Thirty thousand dollars ($30,000.00) pursuant to Clause 3.2 hereof Kibuka may by simple notice in writing to Louisa discontinue the purchase of the Property at which time Kibuka's obligation to pay annual instalments of Twenty three thousand three hundred and thirty three dollars shall cease PROVIDED that Kibuka shall forfeit all previous payments made hereunder and shall retire with no residual interest in the Property AND PROVIDED FURTHER that Kibuka shall not be required to pay any further sums and particularly any apportionment of any annual instalment after the aforesaid notice of discontinuance.

3.5 During the Purchase Period and for so long as timely instalment payments are made, Kibuka shall have the following rights :

(i) all those rights referred to in Clause 2.3 hereof, and

(ii) the additional rights to mine, extract and remove from the Property in any way considered appropriate by Kibuka all ores and minerals for the purpose of any sale contracted by Kibuka and to retain the whole proceeds of any such sale.

4. THE MINING TITLES

4.1 Immediately upon the execution hereof Scamander shall cause to be removed its Caveat against Louisa's title to the Mining Leases referred to in Recital A hereto.

4.2 Immediately upon the removal of Scamander's Caveat pursuant to Clause 4.1 hereof Louisa shall cause to be registered with the Tasmanian Department of Mines and at the reasonable expense of Kibuka a new Caveat against its title to each of the Mining Leases nominating Kibuka as the Caveator and notifying Kibuka's

4.3 Immediately upon receipt of Kibuka's notice of intention to exercise the Option Louisa shall execute all appropriate and desirable transfers assignments and other documents for the vesting in Kibuka of full ownership and possession of the Property and shall lodge the said transfers assignments and other documents with the Elizabeth Street, Hobart branch of the Commercial Banking Corporation of Sydney to be held in escrow until Kibuka shall have paid the full purchase price therefore.

5. LOUISA WARRANTIES

5.1 Louisa warrants that the Property and every part thereof is valid and subsisting and in good standing as at the date hereof.

5.2 Louisa warrants that it is the sole true and registered holder of the Property and that apart from the residual Caveated interest of Scamander under the Agreement referred to in Recital B hereto the Property and each part of it is free from any lien mortgage charge or other encumbrance of any nature whatsoever AND IN PARTICULAR Louisa warrants that the Property and each part thereof is not affected by any contract or agreement with any party otherwise than as disclosed in Recital B hereto.

5.3 Louisa warrants that unless and until Kibuka shall serve notice of discontinuance pursuant to Clause 3.4 hereof it shall not pledge mortgage charge or otherwise encumber the Property.

6. NEW EXPLORATION LICENCE

The Parties hereto further acknowledge that Kibuka will have the additional right independently of any obligation hereunder to apply in its own name and for its own benefit for an Exploration Licence or Licences over such additional areas in the vicinity of the Property as Kibuka may deem desirable and Louisa undertakes to aid Kibuka in such application or applications and any such aid will be paid for by Kibuka at reasonable rates.

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7. FURTHER ASSURANCES

The parties hereto and each of them warrant that they shall on the reasonable request of Kibuka make do or execute all such further and other lawful acts deeds devices and assurances whatsoever for the better or more perfect and absolute performance of the terms and conditions of this Deed of Agreement.

8. NOTICES

8.1 All notices and/or payments required to be made or paid hereunder shall be deemed to have been given (or paid as the case may be):

8.1.1 in the case of posting, twenty-four hours after properly addressed envelopes containing the same are lodged as registered mail with a post office;

8.1.2 in the case of telegrams or telexes, one hour after transmission; and

8.1.3 in the case of delivery by hand, at the actual time of such delivery.

8.2 Notices and/or payments shall be addressed to the parties at the addresses first hereinbefore set out and thereafter at such addresses as may from time to time be given in writing by the parties on ten (10) days' notice thereof.

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IN WITNESS WHEREOF this Deed of Agreement has been duly executed by the parties the day and year first before written :

The COMMON SEAL of KIBUKA MINES PTY. LIMITED was hereunto affixed by authority of the Board of Directors and in the presence of :

Secretary

KIBUKA MINES PTY. LTD. Common Seal

Director

The COMMON SEAL of SCAMANDER MINING CORPORATION N.L. was hereunto affixed by authority of the Board of Directors and in the presence of :

Secretary

SCAMANDER MINING CORPORATION N.L. Common Seal

Director

The COMMON SEAL of LOUISA MINING CORPORATION N.L. was hereunto affixed by authority of the Board of Directors and in the presence of :

Secretary

LOUISA MINING CORPORATION Common Seal

Director

~~The COMMON SEAL of ZETLAND PTY.LTD. was hereunto affixed by authority of the Board of Directors and in the presence of :~~

~~Secretary~~

~~Director~~

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DECLARATION OF TRUST

This is to certify that KIBUKA MINES PTY LIMITED ("Kibuka") a company duly incorporated in the State of New South Wales and having its registered office at 6th Floor, 119 York Street, Sydney, in the said State, contracted on 2 June 1977 with SCAMANDER MINING CORPORATION N.L. and LOUISA MINING CORPORATION N.L. which contract is attached as a Schedule hereto as Trustee for and on behalf of TRIAKO MINES N.L. ("Triako") and BUKA MINERALS N.L.("Buka") in equal shares.

KIBUKA HEREBY COVENANTS AND AGREES that at any time hereafter, if called upon so to do by the said TRIAKO and/or BUKA, it will execute all such documents and do all such things as shall be necessary to enable the right title and interest in the contract to be transferred into the name of TRIAKO and/or BUKA or their nominee.

KIBUKA HEREBY ACKNOWLEDGES that the consideration provided under the said contract was supplied and shall continue to be supplied by TRIAKO and BUKA and HEREBY FURTHER DECLARES that TRIAKO and BUKA shall be at liberty for their own benefit or for the benefit of any other receive all payments and benefits received out of or in connection with the said contract.

AND KIBUKA HEREBY IRREVOCABLY APPOINTS TRIAKO and BUKA its Joint Attorneys for it and on its behalf to act in respect of the said contract as it shall see fit and in particular for KIBUKA and in KIBUKA'S name but for their own benefit or for the benefit of any nominee of TRIAKO and/or BUKA to assign or otherwise dispose of any rights accruing to KIBUKA in respect of the said contract.

IN WITNESS WHEREOF KIBUKA has hereto affixed its seal on this 2nd. day of June, 1977.

The COMMON SEAL of KIBUKA MINES PTY LIMITED was hereunto affixed by authority of the Board of Directors in the presence of:

KIBUKA MINES PTY LIMITED
Director
Seal

295077 6689

SEREM - BUKA - TRIAKO JOINT VENTURE

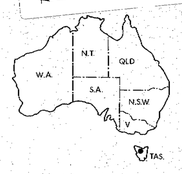
TOPOGRAPHICAL MAP

MT PELION WOLFRAMITE PROJECT

SHEET 2

0 2 4 6 8 10 12 14 16 metres
SCALE 1:200

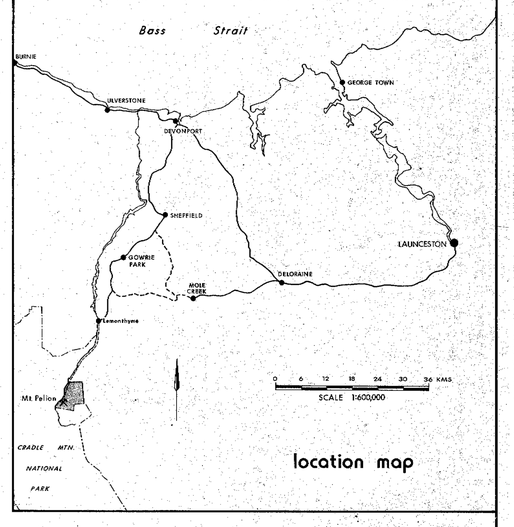
5 cm



PREPARED BY B.R.G.M. AUSTRALIA

Report No :
Date : 77-1229 R

Plate 1



location map

NOTE : Contours taken from the original survey in feet. (5 ft intervals are now approximately 1·5 metres). Contour values shown are metric conversions.

MAGNETIC NORTH

2103 2118 2133 2148 2164 2179 2194 2210 2225 2240 2257 2280 2301 2316 2332 2347 2362 2377

current lease corner peg 60M/69

EDGE OF TIMBER

CLIFF

EDGE OF TIMBER

239·3

road gravel

HUT

PLATFORM

TOOL SHED

COMPRESSOR SHED

ADIT

survey peg 5 RL 238·35m

RL 244·69m

RL 254·26m

RL 263·80m

RL 271·82m

RL 289·78m

RL 290·41m

RL 296·93m

RL 302·84m

RL 305·98m

RL 307·11m

Trench averages 1·5m depth

Trench reaches 4·5m depth in places

OLD SURFACE TRENCH

EXPLORATION ADIT

240m (780')

UG1

UG2

UG3

UG4

END OF DRIVE 02/09/1971

MP 1

MP 2

6689

SEREM — BUKA — TRIAKO JOINT VENTURE

295078 6690

TOPOGRAPHICAL MAP

MT PELION WOLFRAMITE PROJECT

SHEET 1

0 2 4 6 8 10 12 14 16 metres

SCALE 1:200

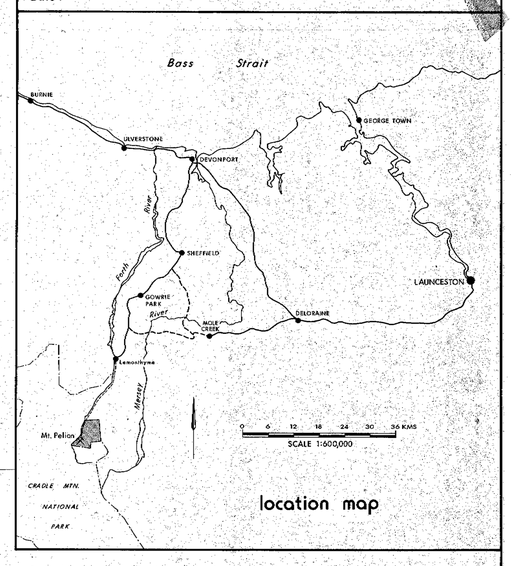
5 cm

PREPARED BY B.R.G.M. AUSTRALIA

Report No : 77-1230 R

Date :

Plate 2



location map

NOTE : Contours taken from the original survey in feet (5 ft intervals are now approximately 1·5 metres). Contour values shown are metric conversions.

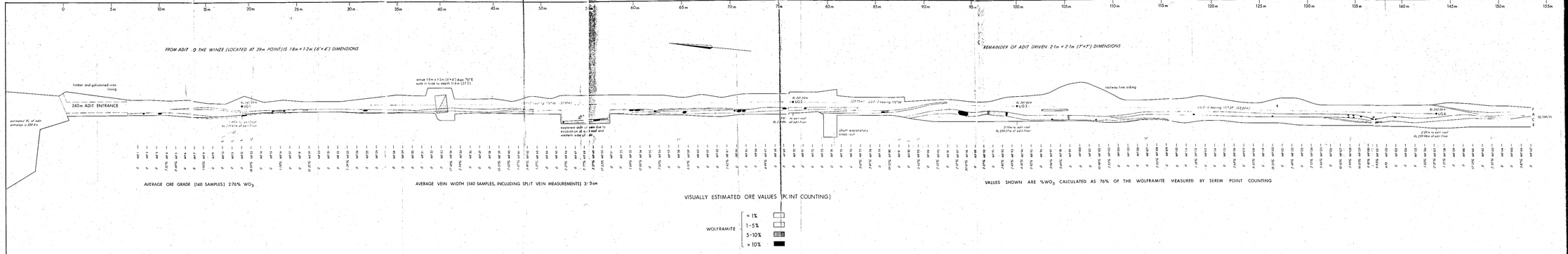
00 50 E 100 E 150 E

500 N 450 N 400 N 350 N 300 N 250 N

207·3 205·7 205·7 207·3 208·8 210·3 211·8 213·4 214·9 216·4 218·0 219·4 221·0 222·5 224·0 225·5 227·0 228·6 230·1 231·6 233·2 234·7 236·2 237·7

survey peg 15 RL 208·17m
survey peg 14 RL 207·56m
survey peg 13 RL 218·90m
survey peg 12 RL 219·97m
survey peg 16 RL 210·09m
survey peg 11 RL 221·65m
survey peg 10 RL 223·65m
survey peg 17 RL 215·06m
SHALLOW SHAFT
MP4
survey peg 18 RL 213·51m
survey peg 9 RL 209·09m
survey peg 8 RL 209·70m
survey peg 7 RL 231·19m
survey peg 6 RL 223·66m
survey peg 4 RL 226·20m
survey peg 5 RL 238·35m
MP3
old lease corner peg
current lease corner peg 60M/69
EDGE OF TIMBER
road
gravel
CLIFF EDGE OF TIMBER
HUT
Lemonthyme Power Station 26 km.
PLATFORM
TOOL SHED
COMPRESSOR SHED
ADIT
TRENCH
Forth River
Reid Creek

6690

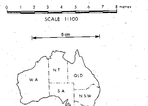


SEREM - BUKA - TRIAKO JOINT VENTURE

295079

UNDERGROUND MAP 240m (780') ADIT

MT PELION WOLFRAMITE PROJECT



PREPARED BY B.R.G.M. AUSTRALIA

Report No: 77/SYD/13
Date: AUGUST 1977

Plate 3