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Vol 1 of 2.

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UNITED STATES METALS REFINING COMPANY

EXPLORATION LICENCE
EL 2/64

JUKES – DARWIN AREA
TASMANIA

LITERATURE SURVEY

PRELIMINARY INSPECTION

AUGUST-DECEMBER 1964.

AMG REFERENCE POINTS ADDED

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TABLES

1. SUMMARY

A belt of sediments and volcanics follows a major north-south zone of faulting in Western Tasmania. Mineralisation is widespread throughout the zone and several major mines are operating including the Mt. Lyell Mining and Railway Co. Ltd. The Mt. Lyell copper mine at Queenstown produced in 1963, 14, 139 tons of copper from 2, 112, 776 tons of ore treated.

South of Mt. Lyell, the major fault structure continues in a similar stratigraphic environment and is marked by numerous small prospects.

United States Metals Refining Co. took up 84 sq. miles immediately south of Queenstown under Exploration Licence EL 2/64 to permit a literature survey to be undertaken and an inspection to be carried out. Two weeks later the B.H.P. Co. Ltd., occupied all available ground in the surrounding area.

Two inspection visits were made and attention was concentrated on four prospects: Prince Darwin, Findons, Jukes Pty. and Lake Jukes. Ground access to all prospects is limited to foot or pack tracks which are overgrown in many places.

At Prince Darwin, a hematite-magnetite lode has been mapped for 2, 000' and self-potential and magnetic surveys carried out. Sulphide mineralisation is concentrated in a section 500' long which averages about 0. 5% copper. Some evidence exists to suggest that the sulphide lode continues for the whole length studied.

At Findons Prospect, disseminated copper mineralisation is found in sheared chloritic volcanics. No self potential anomaly was recorded and mineralisation is limited.

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The Jukes Pty. area, at the north end of the Licence area is in a zone of strongly sheared volcanics near two faults. Chalcopyrite has been found in disseminated and vein form and prospected in several adits. Only shallow self potential anomalies are found and the magnetic anomaly appears to lie away from the mineralisation zone which extends about 2,000' southwards before passing under a cover of younger rocks.

The Lake Jukes Prospect, also at the north end of the area, contains a series of irregular veins of bornite with chalcopyrite in a siliceous breccia of possibly volcanic origin.

While the area is considered favourable for ore deposition on the basis of stratigraphy and tectonic disturbance, the work carried out has not indicated zones of mineralisation and alteration of sufficient intensity to warrant further expenditure.

2. TITLE

Exploration Licence EL 2/64 has been granted to United States Metals Refining Company by the Minister of Mines, the Hon. E.E. Reece (Premier of Tasmania) under section 15B of the Mining Act, 1929, Tasmania. The Licence remains in force to March 27, 1965, and can be renewed subject to continuity of work programmes satisfactory to the Director of Mines. The area covered is 84 square miles defined on the Licence as "commencing from the posted notice situate at Crotty and adjacent to the King River Bridge and bounded on the east by 14 miles grid south on the south by 6 miles grid west on the west by 14 miles grid north on the north by 6 miles grid east to the point of commencement".

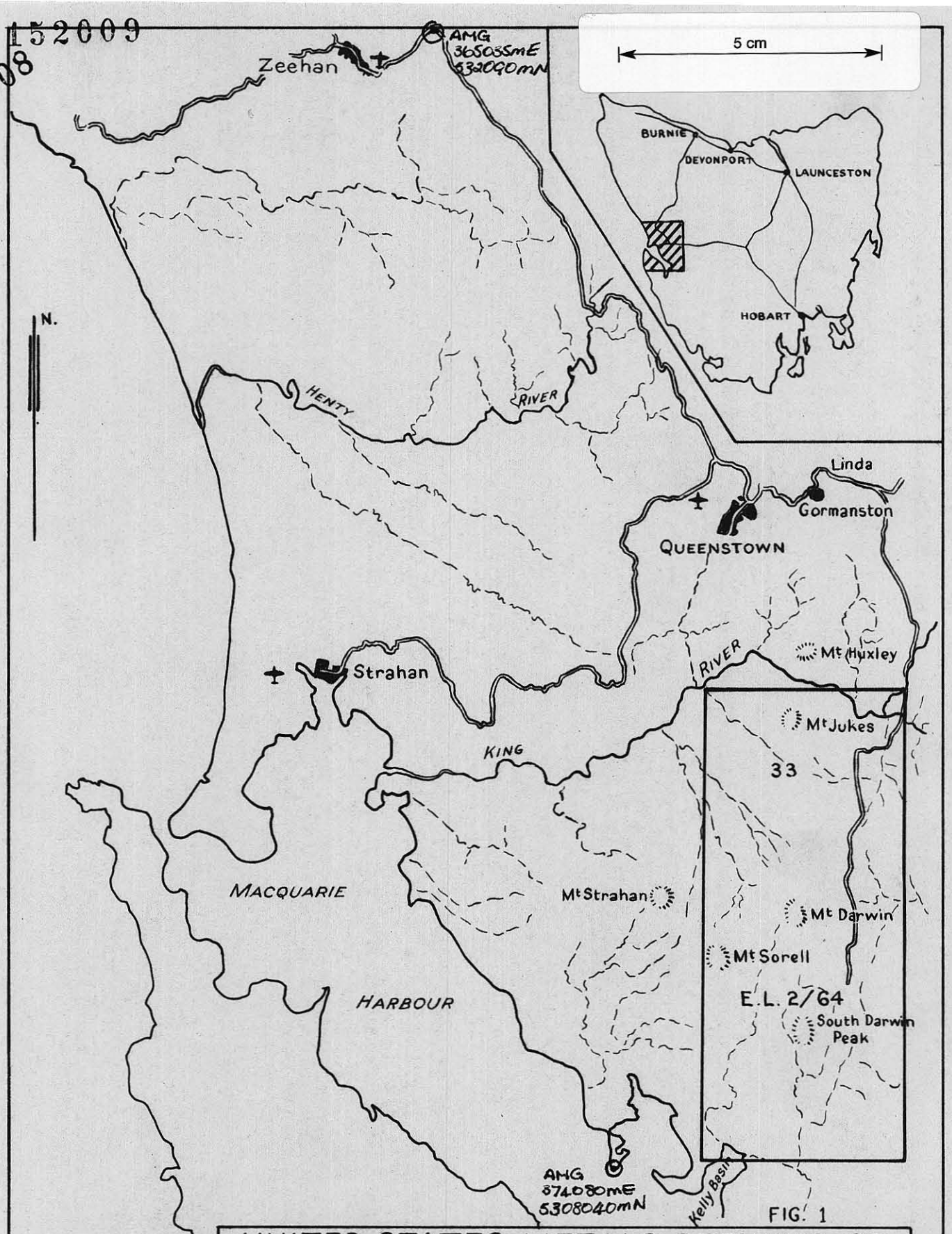

FIG. 1

UNITED STATES METALS REFINING CO.	
Exploration Licence E.L.2/64, Tasmania	
JUKES DARWIN AREA	
LOCALITY MAP	
Date: December 1964	Scale: 1 : 250,000

AMG REFERENCE POINTS ADDED

3. LOCATION

The area is on the West Coast of Tasmania between Queenstown (population 4, 600) and Macquarie Harbour. The Licence covers the southern end of the West Coast Range from Mt. Jukes in the north to South Mt. Darwin in the south. Fig. 1.

The fishing port of Strahan (population about 250) is 15 miles west of the Licence on Macquarie Harbour.

4. ACCESS

4.1 Road. Queenstown is 156 miles by the Lyell Highway from Hobart, the State Capital. Access from the North-West Coast is by the newly completed Murchison Highway via Rosebery. Fig. 1. Road surfaces are partly gravelled and partly bitumened. In winter, road surfaces degenerate badly. In the highlands, roads are closed for short periods by winter snow.

Strahan is 24 miles west of Queenstown and is reached by a narrow, very winding gravel road.

The Licence is traversed from north to south by a poor quality all-weather 4-wheel drive vehicle track. Substantial bridges have been erected or repaired by the Hydro-Electric Commission of Tasmania to facilitate a programme of stream gauging, surveying and dam site testing in the King River area at the North end of the Licence. Discussions with officers of the Commission have indicated that that organisation would offer no objection to this Company making use of these facilities provided weight restrictions are respected and any damage incurred to the surface is made good.

Logical access to the mountainous area is by helicopter. Rugged terrain, thin soil cover, dense forest and a sharp relief of up to 2,000 feet combine to make the provision of vehicular tracks to most of the small prospects a difficult proposition.

4.2 Sea. The port of Strahan is equipped to take cargo vessels up to about 2,000 d.w.t. Strong currents and a shallow, narrow entrance to the harbour restrict the size of shipping using the port. The Mt. Lyell Mining and Railway Co. Ltd., Queenstown, have bulk loading facilities for pyrite concentrate which is shipped to the mainland of Australia for acid manufacture.

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4.3 Air. Queenstown has a strip licenced to accommodate small aircraft. This strip is being extended to permit the use of commercially operated small twin engined aircraft on regular schedules.

Strahan has a twice weekly service from Hobart operated by Trans Australia Airlines with a 10 passenger Beechcraft A80 Queenair. The 200 m.p.h. aircraft is available for charter, when not otherwise in service, for £40/hour. Weather conditions will allow more usage to be made of the strip at Strahan than that at Queenstown.

5. FACILITIES

5.1. Telegraphic. Full postal, telephone and telgraphic facilities are available at Queenstown and Strahan.

5.2. Power. Queenstown and Strahan draw from the State grid of the Hydro-Electric Commission with local distribution at 240v.

5.3. Business. Hotel, motel, banking, motor service and a wide range of shopping facilities are available in Queenstown.

A limited amount of heavy earth moving equipment is available for contract work provided the machines are not employed by their owners on local timber concessions.

Strahan has several hotels, fuel supplies and minimum shopping facilities.

5.4. Medical. Medical, surgical and maternity facilities are available at the Queenstown Hospital where up to 4 Doctors comprise the medical staff. There is also a dental clinic.

Bush nursing facilities are available at Strahan.

Ambulances are available at both towns which are also serviced by aerial ambulances of the Royal Flying Doctor Service based from Hobart and Launceston.

6. CLIMATE

6.1. General. Weather conditions are controlled largely by winds from the west and south-west. The West Coast Range, although under 4000', is the first barrier to impede the moisture-laden air moving in from over the Southern Ocean.

In winter, highland conditions are characterised by heavy rain, high winds, hail, sleet and snow. The valleys are dank with rain and fogs.

Good weather conditions can usually be expected from late November to early April in a normal season.

6.2. Temperature. (See Appendix I). Zeehan, 20 miles north-west of Queenstown. The following averages have been made up for the 30 year period, 1931-1960:-

Average annual maximum	59.2° F
Average annual minimum	43.3° F
Extreme maximum	99.2° F
Extreme minimum	19.4° F

Cape Sorell: (near Strahan) (1931 - 1960)

Average annual maximum	58.6° F
Average annual minimum	49.1° F
Extreme maximum	90.0° F
Extreme minimum	30.0° F

6.3. Rainfall. (See Appendix I). Queenstown: elevation about 500' above sea level.

Annual average for 30 years, 1931 - 1960 - 99.44"

Monthly averages for same period:

January	5.72"
February	5.66"
March	6.44"
April	9.02"

May	9.82"
June	9.58"
July	10.34"
August	10.66"
September	9.18"
October	8.91"
November	7.27"
December	6.84"

Lake Margaret Power Station: Elevation about 2000'.

Annual average rainfall about 143"

Cape Sorell: Elevation about 50'.

Annual average rainfall 55.13"

Zeehan: Elevation about 500', situated 20 miles north-west of Queenstown.

Mean annual rainfall, 1931-1960 . . . 97.36" in an average of 242 wet days per year.

6.4. Snow. Winter snow falls in the highlands but only lies on the ground on the West Coast Range for short periods. Sleet and hail commonly accompany winter storms.

7. PHYSIOGRAPHY

The West Coast Range runs north-south as a rugged series of rocky peaks rising to nearly 4000' above sea level and about 2000' above the surrounding river valleys. Mountains of the Range within the Licence are, from north to south, Mt. Jukes (3833'), Mt. Darwin (3383'), Mt. Sorell (3752') and South Darwin (2250').

Deeply cut north-south river valleys flank the range. The largest river in the area is the King River which flows south along the eastern side of the range before cutting through the range in a westerly direction by means of a deep gorge just north of Mt. Jukes; it then continues its southerly course, flowing into the Macquarie Harbour west of Mt. Sorell.

To the west of the West Coast Range, a deeply dissected erosional surface, the elevated Tertiary Henty Peneplain slopes gently to the west towards the coast, dropping 200' abruptly to the sea.

Tertiary glacial action has accentuated the ruggedness of the range, and cirques, hanging valleys, etc. occur.

The drainage pattern has been largely controlled by the narrow belt of resistant "Owen" conglomerate which is anticlinally folded on a N-S axis. The soft overlying beds, in particular the "Gordon" limestones, have been eroded away from this axis which is now the axis of the West Coast Range.

The parallel valleys are cut into the softer rocks on the limbs.

Faulting has also been important in the formation of the present topography.

8. STRATIGRAPHY

8.1. General. Fig. 2., from Campana and King in "Geology of Tasmania" (1962), summarises the stratigraphy of the area.

Lower Palaeozoic sedimentation and tectonics in western Tasmania have been controlled by a rigid Precambrian massif in the central western highlands called the "Tyennan Geanticline". During the early Cambrian, eugeosynclinal conditions developed along the western margin of this massif with the deposition of greywackes, lavas and pyroclastics into the sedimentary basin. Part of this sequence of rocks now forms the Mt. Read Volcanics.

Continued subsidence of the trough led to the deposition of the argillites, greywackes, conglomerates and volcanics of the Dundas Group. This was apparently partly contemporaneous with the deposition of the essentially older Mt. Read Volcanics.

Late in the Cambrian, Jukesian movements of the Tyennan Orogeny occurred along a zone roughly parallel to the West Coast Range. Wade and Solomon (1958) suggested that the west-side-up Lyell Shear" (Great Lyell Fault) was a product of this movement. The Darwin Granite was apparently emplaced at this stage.

Potash-rich siliceous granites, rhyolites and felsites are found close to the "Lyell Shear" whilst further away the rocks are less siliceous and are soda-rich. Wade and Solomon (1958) used this as evidence of the important influence the "Lyell Shear" has played in controlling volcanic activity in the area. Bradley (1957) used the same phenomenon as a basis for his argument favouring Devonian granitisation of the volcanics. He considered granitisation to be the mode of formation of the Darwin Granite.

Rapid erosion followed the "Jukesian Movement" and apparently led to the deposition of up to 2000' of greywacke breccia-conglomerates between the Great Lyell Fault and the Tyennan Massif. Within these is the transgressive Jukes Conglomerate. The Owen Conglomerate was then deposited

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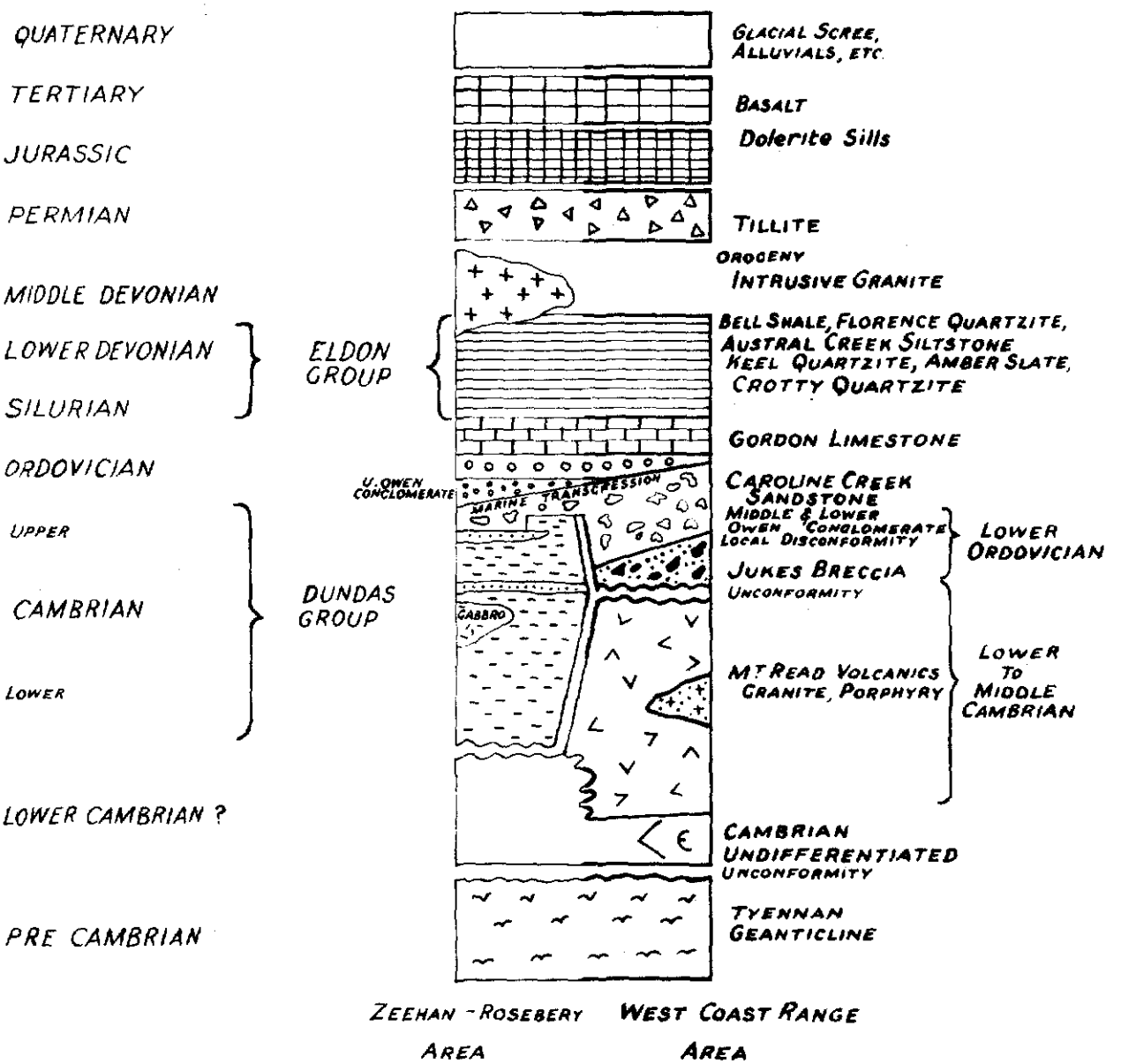

FIG. 2

UNITED STATES METALS REFINING CO.	
Exploration Licence E.L.2/64 Tasmania	
JUKES - DARWIN AREA	
STRATIGRAPHIC SEQUENCE	
Date: December 1964	Scale

From. Campana & King. P129 Geology of Tasmania 1962

transgressively and overlies both the Jukes Conglomerate and the Cambrian rocks either conformably or unconformably.

The Upper Owen Conglomerate of Wade and Solomon (1958) is referred to as the Caroline Creek Sandstone by Banks et. al. in Geology of Tasmania (1962).

The deposition of the Gordon Limestone followed conformably and was itself succeeded conformably by the shales and quartzites of the Eldon Group.

Extensive tectonic, metasomatic and mineralising activity in the middle Devonian marked the Tabberabberan Orogeny.

Prolonged erosion had led to peneplanation by the Carboniferous. Sedimentation followed this quiescent period but only limited Tertiary river gravels, and Quaternary moraines are represented in the area of the Exploration Licence.

8.2. Precambrian. The western edge of the Tyennan Geanticline runs north-south just east of the Andrew River, about 2 miles east of the Licence.

The Precambrian is divided into "Older" and "Younger". The basis for the subdivision is a comparison between the degrees of metamorphism and deformation to which the rocks have been subjected. Reference in age is made to the Frenchman Orogeny.

Precambrian rocks are not represented within the area of the Licence. The nearest are to the east and belong to the "Fincham Group" of massive and schistose quartzites and phyllites belonging to the Older Precambrian.

8.3. Cambrian. Probably of Lower to Middle Cambrian age, the Mt. Read Volcanics form one of the most important units of the Cambrian.

The Mt. Read Volcanics are defined by a type sequence seen in a section at Mt. Read, near Rosebery and some 25 miles north of the Licence. They are a thick pile of volcanics with large bodies of keratophyre, quartz porphyry and quartz felspar porphyry associated with massive or schistose pyroclastic rocks. In the type area they are at least 8000' thick.

Campana and King (1962) postulated a volcanic belt -"the Mt. Read Volcanic Arc" - along the margin of the Tyennan Geanticline. They envisaged this to be related to a system of subsidence fractures, with volcanic infilling of a graben-like depression occupying much of what is now the West Coast Range.

The age of the Mt. Read Volcanics is disputed; particularly in relation to its part equivalent, the Dundas Group, which is also important economically.

The Mt. Read volcanics are generally regarded as being essentially older than the Dundas Group.

Considerable confusion exists in the literature, particularly prior to 1960. Up to this time, "Dundas Group" was used as a blanket term for nearly all Cambrian rocks in the State.

Solomon (1960) discussed the volcanics in the Queenstown - Darwin area under the name "Dundas Group"; Campana et. al. (1958) indicated these volcanics to be overlying the Dundas Group, while Campana and King (1962) indicate these volcanics to be older or partly equivalent to the Dundas Group. The confusion is therefore complete.

Regardless of terminology, the sequence of Campana and King (1962) is used in this report and the stratigraphic column referred to is shown

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in Fig. 2. Thus, the volcanic and sedimentary assemblage of the Cambrian in the area from Mt. Lyell in the north to Sth. Mt. Darwin in the south is called the Mt. Read Volcanics to conform with Campana and King, pp 129 & 144, Geology of Tasmania (1962).

Solomon (1960) described the rocks of Cambrian age in the area south from Queenstown.

8.3.1. Lavas. These are a series of rocks with variable alkali content ranging from potash-rich rhyolites and soda-rich keratophyres to alkali-poor basalts. The dominant felspars vary from Ab_{60} to Ab_{98}. The rocks have undergone albitisation.

The mode of deposition was probably as lavas, sills and plugs.
(a) Spherulitic potash rhyolites occur on Mt. Darwin, Intercolonial Spur and further north. These are closely jointed, pink, hematitic, felspar porphyries.

Outcrops of the rhyolites are confined to a narrow zone from Sth. Mt. Darwin to north of the Licence area. This roughly follows the axis of the West Coast Range.

Solomon (1960) noted that the Cambrian granite (Darwin Granite) is of similar composition to this rock and is intruded into it. See Table I.

(b) Quartz keratophyres. Quartz felspar porphyry masses are found north of Mt. Darwin. They appear to conform to local structural trend in a general way.

(c) Sodi-potassic rhyolites are found in the Queenstown area.

Table I

Rock Analyses

	1.	2.	3.	4.
SiO_2	73.44	74.96	71.9	76.92
TiO_2	0.33	0.13	n.dt	0.19
Al_2O_3	14.18	13.55	14.7	14.07
Fe_2O_3	1.46	0.79	3.6	0.43
FeO	0.55	0.71	n.dt	0.64
MnO	Tr.	0.01	n.dt	Tr.
MgO	0.43	0.48	0.6	0.25
CaO	-	0.16	0.5	0.16
Na_2O	0.16	2.33	1.9	3.24
K_2O	8.05	5.57	4.7	2.61
H_2O+	1.38	0.86	0.6	1.84
H_2O-	0.08	0.16		Nil
P_2O_5	0.10	0.05	n.dt	Tr.
CO_2	0.38	0.30	0.4	0.06
S	Tr.			
	100.54	100.06	98.9	100.41

1. Potash Rhyolite, Intercolonial Spur (Mt. Jukes).
   Analyst: Tasmania Department of Mines, 1956.
2. Pink Granite, South Darwin.
   Analyst: Tasmania Department of Mines, 1956.
3. Pink Granite, South Darwin.
   Analyst: Mt. Lyell Mining & Railway Co. Ltd., 1955.
4. White Granite, South Darwin.
   Analyst: Tasmania Department of Mines, 1956.

(From Solomon, 1960)

(d) Keratophyres. Sodic felspar porphyries are the most common of the lavas in the Queenstown area. They are best seen east of Mt. Sorell, and to the north and east of Mt. Jukes. These rocks are rich in albite and chlorite. Most of the felspar porphyries fall into this category.

(e) Augite Trachyte (?). These are albite rich with quartz and augite and are found in the Queen River valley, south of Queenstown but north-west of the Licence area.

(f) Andesites are found north of Queenstown.

(g) Basalt flows are found near Lynch Creek, west of the area.

8.3.2. Pyroclastic Rocks.

(a) Agglomerates. These are common in the Queenstown area. Solomon (1960) suggested that they are the result of autobrecciation. Coarse agglomerates are found in the potash rhyolite of Mt. Darwin and in the Lake Jukes area.

(b) Tuffs. Solomon (1960) described tuffs north of Queenstown.

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

(a) Conglomerates. Poorly sorted conglomerates are found with pebbles of "slate", "chert", quartzite and sandstone which have presumably been fed into the geosyncline from the Precambrian quartzites. The rocks are very similar to the overlying Jukes Breccia or Conglomerate and to the even younger "Owen" conglomerates.

(b) Sandstone. Greywacke sandstones are found in the area.

(c) Mudstones and Slates. These outcrop as isolated lenses over a wide area.

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

The two major types are the pink and the white granite. The pink granite is a coarse grained rock composed of pink orthoclase, quartz and altered plagioclase (Orthoclase > quartz > plagioclase). The white granite is also coarse grained, is locally pegmatitic, and is composed of cloudy plagioclase and colourless quartz. Analyses are shown in Table I.

8.4. Ordovician. The Ordovician rocks are members of the Junee Group. In the area of the Licence, the following formations are represented:

Gordon Limestone	Lower to Upper Ordovician
Caroline Creek Sandstone	Lower Ordovician
Owen Conglomerate	Lower Ordovician
Jukes Conglomerate	Lower Ordovician

8.4.1. Jukes Conglomerate. This formation is defined by a section near Lake Jukes, within the Licence area. It is up to 300' thick.

The Conglomerate consists of angular, sub-angular or sub-rounded fragments of the underlying lavas, hematite and sandstone. These fragments are up to 4' long. Quartz and quartzite fragments are rare.

8.4.2. Owen Conglomerate. This formation consists of a siliceous conglomerate and a quartz sandstone. It may exhibit a conformable or

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unconformable relationship with the underlying Jukes Conglomerate. The type section, on Mt. Owen just north of the Licence area is 1180' thick.

The formation is divided thus:

Middle Owen (Wade & Solomon)	Pale Conglomerates; Red or Purple Sandstone.
Lower Owen (Wade & Solomon)	Conglomerate, Sandstone, Siltstone.

The conglomerate is siliceous with fragments of vein quartz, quartzite, quartz schist, chert and occasionally other rock types. The cement is siliceous.

The Lower Owen contains coarser material than the overlying Middle Owen and has fragments up to 2' long. Coarse fragments are well rounded while sand size grains are inclined to be angular. Sorting is good and the framework is closed.

The Middle Owen is more clearly bedded than the Lower Owen and shows cross bedding and cut and fill structures. The conglomerate beds are lenticular.

Sections in "Geology of Tasmania" (1962) show the Owen Conglomerate to thin from about 1250' on Mt. Jukes to about 200' at South Mt. Darwin.

8.4.3. Caroline Creek Sandstone. (Upper Owen Conglomerate of Wade and Solomon, 1958). This formation rests conformably on Owen Conglomerate which it overlaps. It is a well sorted, siliceous sandstone coloured white, yellow, pink, red, chocolate, brown or green.

The thin transitional sandy and clayey beds, which overlie this formation and underlie the subsequent Gordon Limestone, could be a correlate of

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the "Florentine Valley Mudstone Formation" found elsewhere in Tasmania.

8.4.4. Gordon Limestone. The Gordon Limestone is defined by a type sequence, 5000' thick, at Wherret's Lookout. The Formation here overlies the Florentine Valley Mudstone and conformably or disconformably underlies the Eldon Group. The Limestone is generally pure but argillaceous and arenaceous beds are found near the base and near the top of the sequence.

The Gordon Limestone is found on the limbs of the broad anticline which forms the axis of the West Coast Range in the Licence area.

8.5. Silurian - Lower Devonian. For the purposes of this report, only the Eldon Group will be considered. This is a sedimentary series over 12000' thick near Queenstown. The Eldon Group overlies conformably and unconformably the older Junee Group and is composed of six formations:

Bell Shale Florence Quartzite	Lower Devonian
Austral Creek Siltstone	Upper Silurian
Keel Quartzite	Middle Silurian
Amber Slate	Lower - Middle Silurian
Crotty Quartzite	Lower Silurian

8.5.1. The Crotty Quartzite is 1600' thick at Zeehan. It has the coarsest sediments of the Group and is made up of quartzite with pebbly bands and siltstone.

8.5.2. The Amber Slate is 800' of fine grained sediments.

8.5.3. The Keel Quartzite is 200' of cemented, ripple marked, shallow water dirty sands.

8.5.4. The Austral Creek Siltstone is approximately 200' of quartzites and siltstones.

8.5.5. The Florence Quartzite is 1600' of highly fossiliferous arenaceous sediments.

8.5.6. The Bell Shale consists of bands of silicified sandstone and shale. It is 1400' thick and is placed at the top of the sequence and in the Lower Devonian.

8.6. Other. For the purposes of this report the startigraphy of more recent rock units is not of immediate interest and will be omitted.

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9. TECTONICS OF THE WEST COAST RANGE.

9.1. Structural Features.

9.1.1. General: The West Coast consists of four major folds, of which the West Coast Anticlinorium is one. The relationship of these folds is shown in the sketch map by Solomon after Carey 1953 (Fig.4).

The structural features of the West Coast Range mentioned below are illustrated in the sketch map showing the structural elements in the Queenstown Area by Wade and Solomon 1958 (Fig. 3).

9.1.2. West Coast Anticlinorium: This is the major structure in the area. It has a north-south trend with the axis passing east of Queenstown and it exhibits a marked asymmetry. The secondary drag folds are vertical or overturned with severely attenuated eastern limbs and with relatively flat undisturbed western limbs. This has been caused by the piling up of the geosynclinal sediments against the rigid Tynennan Block by forces directed eastwards.

All other structures in the area are superimposed on the West Coast Anticlinorum.

9.1.3. Great Lyell Fault (Lyell Shear). This runs north-south as shown on Fig. 3 and is characterised by a line of mineral occurrences. The movement is west side up and north. Its surface expression is sometimes marked by intermittent zones of either overturning or faulting. In other places it is not visible at the surface. This is due in part to the off-setting of the structure by north-west tear faults and partly due to the variation caused by different depths of more recent rock cover and changes in the physical properties of these overlying rocks. In depth it is still probably a fault.

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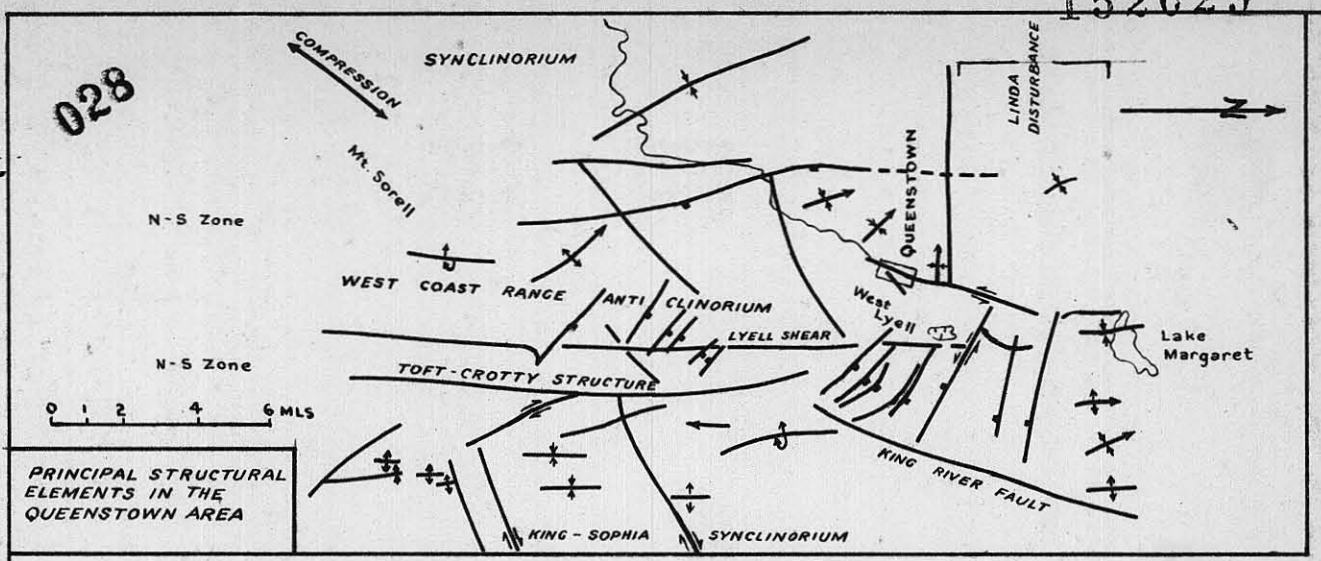

FIG. 3 *(from Wade & Solomon 1958)*

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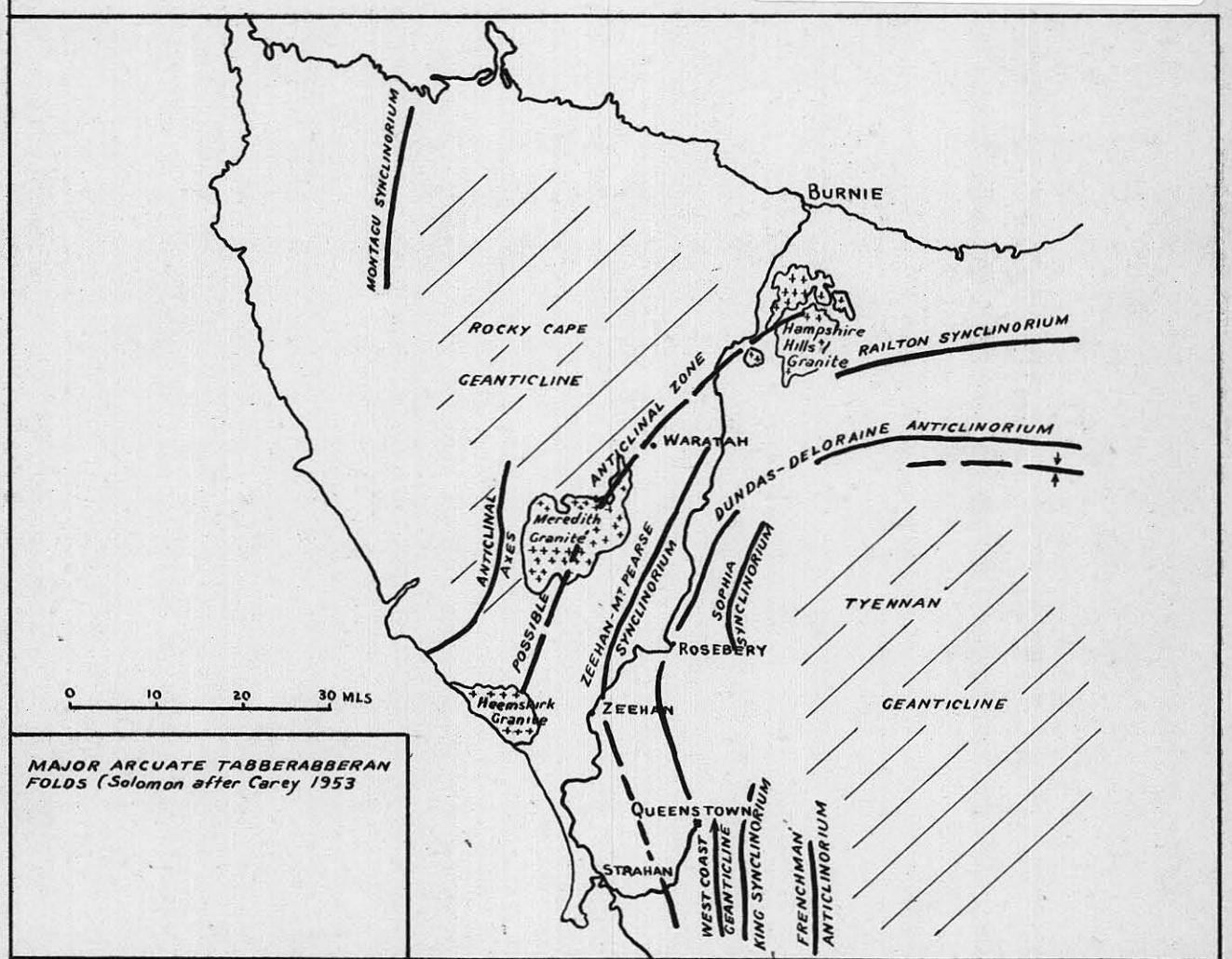

FIG. 4 *(from Geology of Tasmania 1962)*

UNITED STATES METALS REFINING CO.	
Exploration Licence EL 2/64 Tasmania	
JUKES DARWIN AREA	
STRUCTURE	
Date: December 1964	Scale

The main shear movement took place from the late Cambrian to the Tabberabberan Orogeny in the Devonian. Following the deposition and effusion of the Mt. Read Volcanics, west side up movement on the Great Lyell Fault caused the formation of the "Dundas Ridge". To the east and west of this ridge, basins were formed. Sedimentation was strongest in the eastern basin into which were deposited first the Jukes Conglomerate and then the Owen Conglomerate. At Mount Lyell there is a marked thinning of the Owen Conglomerate to the west of the Great Lyell Fault.

The other lines of north-south faulting, i.e. the Toft Crotty structure, (see Fig. 3) were also active during the Lower Paleozoic and Tabberabberan Orogeny.

9.1.4. North-West Faults. These are sometimes seen in conjunction with asymmetrical north-east facing folds, in which the steep North limb has been faulted out. Some down-throw to the north and they vary in strike from west-north-west to north-north-west. These faults were apparently formed contemporaneously with the Great Lyell Fault i.e. they sometimes displace the Great Lyell Fault and vice versa. The faults tend to be more noticeable within the massive competent Owen Conglomerate than in the softer volcanics and sediments where pressure tends to be relieved by the development of a north-west schistosity.

The intersection of these north-west trending faults with the Great Lyell Fault is an important ore control, and the following prospects, East Darwin, Findons, Hal Jukes, Jukes Pty., and Prince Darwin are all situated near the intersection of one of these faults with the Great Lyell Fault.

9.1.5. Linda Disturbance: The most extensive development of the north-west trending faults is in the Mount Lyell area. Here the faults trend west-north-west, and throw to the south. They produce a crude west-north-west rift valley structure.

The rich ore bodies of the Mount Lyell area are found close to the intersection of the Linda Disturbance and the Great Lyell Fault.

9.1.6. North-East Faults: These are tensional faults with a small vertical movement and a throw to the north. Wade and Solomon regard these of being little importance as regards ore occurrence; Bradley (1956) holds the opposite view. The Bean and Thow prospect on Mount Jukes is located near one of these faults.

9.1.7. Mineralised Rift Valley Theory: Campana (et al 1958) put forward the theory that mineralisation in the West Coast Range was controlled by the deep seated eastern and western faults of a north-south rift valley. The rift valley has been infilled with Jukes and Owen Conglomerates, which overlie the Mt. Read Volcanics. Along the western edge of this proposed rift valley are the following mines and prospects from south to north:-

Prince Darwin, Jukes area, Mount Lyell, Mount Tyndall, Rosebery - Hercules, Chester, Pinnacles and Mount Bischoff. Lake Dora is found on the eastern edge of the rift valley.

9.2. Tectonic Forces: The tectonic features of the West Coast Range are a result of the Tabberabberan Orogeny and minor movements during the Lower Paleozoic leading up to that orogeny.

The three major factors which have influenced the formation of these features are:-

1. Forces acting from the S.W.
2. The presence of a rigid massif to the east.
3. The increasing thickness of geosynclinal sediments westwards from the margin of the massif.

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9.3. Summary: 1. At Mt. Lyell, the tectonic control of mineralisation is the intersection of the major north-south Great Lyell Fault with the west-north-west faulting of the Linda Disturbance.

2. A poorly developed but similar pattern has been recorded from several areas within the Licence; Jukes Pty., East Darwin, and Hal Jukes.

10. ECONOMIC GEOLOGY - PREVIOUS EXPLORATION.

10.1. General. The copper boom on the Mt. Lyell Field in the 1890's stimulated financial speculation and prospecting in the surrounding areas. Prospectors found signs of copper on Mt. Jukes in 1897 and in the Darwin Area the following year. Small companies prospected these areas under hard conditions. The prospects which were developed in any way during this period are discussed in Section 11 of this Report. When the North Lyell Company closed its smelter at Crotty in 1903, most activity in the area ceased.

Various Government Geologists visited the area and published reports from 1900 to 1914.

The next attempt to prospect the area was made by the Mt. Lyell Mining and Railway Co. Ltd., who employed G.A. Douglas from April to August 1940 to re-examine the old prospects. Douglas did nothing new. He re-opened old access tracks and diligently sampled workings and exposures but inevitably concluded, as did the original prospectors, that because of the difficulty of access, no further work was justified.

In the early 1950's, changes in geological thought at Mt. Lyell focussed attention on the Jukes-Darwin Area again. Tracks were cut out and regional mapping undertaken. As a result of this, recommendations were made in 1955 for a geophysical survey at East Darwin.

In 1956, the Mt. Lyell Mining & Railway Co. Ltd., combined with the Electrolytic Zinc Co. of A/sia Ltd., to form Lyell-E.Z. Explorations (LEE). LEE took under Licence a large area from Queenstown to the south-west corner of Tasmania. During the period from 1956 to 1960, parts of the Jukes-Darwin area were re-examined in brief field trips. In 1957, LEE covered the area with an aeromagnetometer survey but the terrain was too rugged to permit aeroelectromagnetic instruments

to be flown. The geophysical survey of the East Darwin area recommended in 1955 was carried out in 1959 and ground magnetic and Turam electromagnetic methods were used (see 10.3).

Under great difficulties, LEE bored one drill hole into the Lake Jukes Prospect. Results have not been made available.

10.2. Geology. One of the first published geological assessments of the area was by Tasmanian Government Geologist W.H. Twelvetrees who visited the area in 1900. Twelvetrees recognised the possibility that the pyritic schist at East Darwin was a similar occurrence to that at Mt. Lyell and noted a mineralised schistose belt from Jukes Pty. to near Lake Jukes. The presence of granites and acid volcanics are recorded and also the important linear nature of these volcanics from South Darwin to north of Rosebery.

Twelvetrees postulated a common origin for [illegible] copper ores in this part of the West Coast Range and divided them into the following categories: Chalcopyrite in volcanics and schists Bornite in [illegible] - as at Lake Jukes; Chalcocite - also at Lake Jukes; Malachite and [illegible]rite as oxidation products and native copper associated with the hematite magnetite masses.

In 1903, G.A. Waller inspected Findons Prospect. He described schistose felsites with impregnations of copper and iron pyrites.

The most comprehensive report on this area in the pre-LEE era is by C. Loftus-Hills, published in 1914. Loftus-Hills recognized a suite of acid rocks containing granites, volcanics and volcanic breccias with a common origin. Loftus-Hills recognised that the Darwin Granite differed from the typical Devonian Granite and described the various rock units.

In discussing the distribution of ore deposits, Loftus-Hills made the following comments:

1) The copper-silver-gold deposits of importance are confined to the zones of more marked schistosity, e.g., East Darwin, Jukes Pty. and Findons.

2) Deposits with magnetite and hematite occur in the hard dense felsite and are found throughout the area.

3) The hematite-bornite association is restricted to Lake Jukes.

He noted that chlorite is commonly present with the lode outcrops but that sericite is found only in the quartz-schist at East Darwin.

The property descriptions by Loftus-Hills are included in Section 11.

The major contribution to modern exploration was made by geologists of the Mt. Lyell Mining & Railway Co. Ltd., who produced the regional map of the area accompanying this report (Fig. 6). (Darwin Sheet Only). This map is an original work and is subject to revision in the light of recent changes in stratigraphic nomenclature and more recent detailed investigations. It is, however, the most recent map available. It should be treated as a reconnaissance map only and care should be taken in attempting to use this map in conjunction with the text of this report. Some additions have been made to it.

Significant features illustrated by the map are:

1) The north-south zone of potash-rhyolites which is assumed to be more or less coincident with the Great Lyell Fault. It will be noted that the known prospects follow this zone.

2) A number of "cross" faults are mapped at the north end in the Mt. Jukes area and near East Darwin. It is suggested that the absence of these from the mapping at the southern end is due to considerably less detailed work by Wade & Solomon in that area. Several faults near Prince Darwin have been added.

035 Wade and Solomon (1958) pointed out that the surface expression of the Great Lyell Fault varied greatly and may be locally absent due to changes in physical properties in the overlying rocks. This has been discussed in section 9.1.3.

Confusion in nomenclature and correlation is found in abundance in the literature.

10.3. Geophysics. Geophysical exploration in this area has been remarkably sparse in the past with only two limited ground surveys being undertaken, one of which was a follow-up of an airborne anomaly.

LEE covered the whole of their Exploration Licence with an airborne magnetometer survey. Within the area of our Lease, the magnetic map shows a large anomaly of from 200 to 1,000 gammas extending from South Darwin to the King River with two breaks. (See Fig. 7 .) Comparison with the map (Fig.6) shows that the shape, size and position of the anomaly coincide approximately with the outline of the potash-rhyolite. It seems reasonable to suppose that part of the explanation for the anomaly may be found in the presence of iron-rich veins within the rhyolites which form the core of Intercolonial Spur, Mt. Darwin and the South Darwin Plateau. Breaks in the anomaly occur where the younger conglomerates unconformably overlie these rocks. On this basis there is some indication that the rhyolite band continues under the conglomerate or breccia in the Lake Jukes Area. This area must be considered of interest.

It will be noted that magnetic highs occur in the Prince Darwin and Tasman Darwin areas at the south end of the lease and at the south-west corner of the main anomaly.

At the northern end of the Lease, a small circular anomaly near the Jukes Pty Prospect was followed up by LEE with a very limited ground magnetic

survey. The results of this work are shown in conjunction with the Self Potential work carried out by this Company in December 1964. (Figs.14 & 15). Several small narrow magnetic anomalies were recorded which appear to bear little relation to the known mineralisation.

At the request of the Mt. Lyell Mining & Railway Co. Ltd., the Bureau of Mineral Resources conducted a ground magnetic and electromagnetic survey over the East Darwin workings (See Fig.16). The area of the survey was limited and three anomalies were recorded by the Turam method. These did not coincide with the magnetic anomalies which were considered to be of little importance. The largest E.M. anomaly was 700' long and 100' wide. It corresponds well with Pearce's and Dillon's No. 1 Workings. The results offer little encouragement for further work in these areas.

11. REPORTS ON MINERAL OCCURRENCES.

This section is based entirely on a literature survey from the references quoted. Reference should be made to a later section of this Report for results of current investigations.

11.1. Prince Darwin.

Location: South-west side of the South Darwin Plateau.

References and Lease Nos.:

Twelvetrees 1901	:	2662-93M
Loftus Hills 1914	:	3867-M
Douglas 1940	:	3867-M
Wade 1957 (a)	:	3867-M

General Geology: The country rock is resilicified Jukes Breccia (Wade). Ore zone consists of siliceous-cherty material plus the following: 20% hematite, a little magnetite, some disseminated pyrite and chalcopyrite, and some quartz-veins. The ore zone is 120'-200' wide, approximately 700' long, strikes 160° and dips 90°. It is well jointed. Adjacent to the north adit the strike of the country rock is 90°, dip 50° S. Jointing is flat. Loftus Hills (1914) states "that this is a contact metamorphic deposit 1000' from the granite".

Workings:

Main Adit: The main adit extends 135' approximately south-east into the lode. Assays of samples taken by Douglas are averaged below. The adit walls are now heavily encrusted with limonite and chalcanthite and the walls are hard to sample.

Northern Adit: This was driven 50' in barren Jukes Breccia. Wade (1957) (a) considered that the hematite formation is faulted off.

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Assays:

Average for 90' is 0.608% Cu (Douglas)
Average for 130' is 0.7% Cu, 2 oz. /ton Ag.,
0.033 oz./ton Au (Cundy 1904).

Ore Reserve: 4×10^6 tons containing less than 20% Fe_2O_3, 10% $Fe S_2$ and 1% Cu (Wade 1957 (a)).

Conclusions: Wade recommended thorough sampling before drilling.

11.2. Tasman Darwin.

Location: South-west side of South Darwin Plateau.

References and Lease Nos.:

Twelvetrees 1901	:	3365-93M
Loftus Hills 1914	:	5560-M

General Geology: The country rock is felsite, containing disseminated pyrite and stained with copper salts. A large number of magnetite or hematite bodies occur, some of which contain sulphides, and are associated with quartz "patches".

Workings: A tunnel was driven 50' South-west in felsite but failed to intersect an ore body which on the surface is 30' wide and 5 chains long.

Assays: Surface sampling revealed 0.5% - 1% Cu. (Loftus Hills, 1914).

11.3. Tasman Darwin Extended.

Location: Next to Tasman Darwin.

References and Lease Nos.:

Twelvetrees 1902	:	2598-93M

039 General Geology: Hematite veins outcrop in the west and central part of this section. These veins contain copper and iron pyrites. Native copper occurs in the country rock.

11.4. Findon's Trenches.

Location: North-west spur of Snake Peak.

References and Lease Nos.:

Twelvetrees 1901, Brumby's section, Melbourne Darwin	:	2746-7-93M
Waller 1903, Findon's Trenches	:	265-M
Loftus Hills 1914	:	3107-M
Douglas 1940	:	3107-M
Wade 1957 (b)	:	3107-M

General Geology: The country rock is a featureless, fine grained, pink, felspathic sediment, striking 330° and dipping 60° W. The mineralised zone is 20' to 30' wide, but is poorly exposed. The copper is leached at the surface to a depth of several feet. The mineralisation consists of copper and iron pyrites.

Workings:

No. 1 Trench: This is 8' long and 3'-4' deep. A surface bulk sample assayed 2.9% Cu (Waller). Chalcopyrite, covellite and pyrite are present in sparsely disseminated form.

No. 2 Trench: Disseminated pyrite, chalcopyrite and covellite are found in a chlorite rock (Waller).

Shaft: Bulk sample from tip (Waller) 3.0% Cu.
Bulk sample (20 lb) from tip (Findon) 5.0% Cu.

No. 3 Trench: 45' N.W. of No. 2 Trench. This is 12' long and 3-4' deep. There is no mineralisation visible except for a trace of disseminated pyrite over 1.5' assaying 3.2% Cu. in the pit at the west end. The rest of the trench is leached.

No. 4 Trench: 350 feet N.W. of the other workings. This trench is 19' long in chlorite rock which has been leached of copper. 2' assayed 2.5% Cu. at west end.

Adit: This was driven to intersect the 2' of mineralisation seen on the west end of No. 4 trench. Accurate measurement, however, indicates that the adit had not yet reached the vein (Wade). This adit is 126' long and was driven at 228° with a 12' drive to S.E. Little copper mineralisation was intersected.

Assays: (Wade 1957 (b))

Adit:		Main Trench:	
Sample No. 1	0.07% Cu.	Sample No. 1	0.07% Cu.
No. 2	0.12% Cu.	No. 2	0.54% Cu.
No. 3	0.03% Cu.	No. 3	0.05% Cu.
No. 4	0.03% Cu.		

Conclusions and Comments: Low grade mineralisation occurs over a width of up to 12' and a length of 420'.

Loftus Hills' assay values of 3.0% Cu. and 5% Cu. appear to be picked ore. Cundy (1903) sampled along and across the lode. He reported the following:

Cu.	Ag. oz/ton	Au.
2.05%	0.10	tr.

In 1940 Douglas sampled the lode and confirmed Cundy's values. Sampling by Wade (1957 (b)) averaged 0.14% Cu. He suggested that this difference could be the result of surface leaching over the last 54 years and considered that less superficial sampling should be undertaken.

11.5. East Darwin.

References and Lease Nos.:

Loftus Hills 1914, Pearce's Workings, Dillon's Workings, Souter's Workings, Mount Darwin Pty. Ltd. : 4615-M, 4654-M, 4655-M.

General Geology: The eastern part of the area is dark green chloritic schist, the central part is grey schist and the western part is hard, dense, red felsite. The central grey schist strikes from north to south and is the host rock for unaltered pyrite and chalcopyrite.

If the copper occurrences of the four tunnels are continuous, there is a belt of mineralisation extending over 2600'.

11.5.1. Dillon's Workings.

Locality: East side of Snake Peak.

References and Lease Nos.:

Twelvetrees; 1901; South Mount Lyell; 2158-9-93M
Loftus Hills; 1914; Dillon's Nos. 1 & 2 Tunnels ; 4615-M
Douglas; 1940 ; 4615-M

General Geology: The country rock is grey schist which strikes at 340°. Disseminated chalcopyrite occurs in the area.

Workings:

No. 1 Tunnel. This passed through grey schist with pyrite and chalcopyrite.

No. 2 Tunnel. This was driven west for 120' in grey schist. From 90' - 92' chalcopyrite is present.

Assays:

No. 1 Tunnel (Douglas 1940)

Footage From to	Cu. %
90' - 95'	0.10
95' -100'	0.09
100' -105'	0.30
105' -110'	0.08
110' -115'	0.27
115' -120'	0.05
120' -125'	0.08
125' -130'	0.31
130' -135'	0.45
135' -140'	0.30
170' -175'	0.07
175' -180'	1.71
180' -185'	0.35
185' -190'	0.10

No. 2 Tunnel (Loftus Hills 1914)

Footage From to	Cu. %
90'-92'	9.0

11.5.2. Pearce's Workings.

Location: East Darwin.

References and Lease Nos.:

Twelvetrees	1901, Mount Darwin Pty. Ltd.	: 3066-M, 3067-93M
Loftus Hills	1914	: 4654-M
Douglas	1940	: 4654-M

General Geology: Ore has been found at intervals over 1000' within the schist.

Workings: A tunnel - see Fig. 16 - was driven into grey schist. Drives north and south followed a weakly mineralized zone.

Assays: (Douglas 1940)

Main Adit.

Footage From to	Cu. %
410 - 415	0.05
415 - 420	0.25
420 - 425	0.16
425 - 430	0.09
430 - 435	0.11
435 - 440	0.20
440 - 445	0.15
445 - 450	0.14
450 - 455	0.35
455 - 460	0.07
460 - 465	0.07
465 - 470	0.10

North Drive.

Footage From to	Cu. %
0 - 10	0.55
10 - 20	0.70
20 - 30	0.14
30 - 40	0.09
40 - 50	0.11
50 - 60	0.55
60 - 70	0.35

11.5.3. Souter's Tunnel.

Location: East Darwin, 90' below Dillon's No. 2 Tunnel.

References and Lease Nos.:

Loftus Hills 1914	:	4615-M
Douglas 1940	:	4615-M

Workings: See Fig. 16. Only weak mineralisation was cut.

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Assays: (Douglas 1940)

Location of samples	Footage From to	Cu%	Fe%	Ag. ozs. per ton.	Au. ozs. per ton.
Main Adit	135-140	0.03	8.8	0.023	0.002
	140-145	0.02	6.0	0.043	0.002
	145-150	0.03	7.9	0.033	0.002
	150-155	0.01	7.0	0.028	0.002
	155-160	0.06	9.3	0.066	0.004
East Cross-cut	0-5	0.04	3.1	0.136	0.009
	5-10	0.04	5.9	0.085	0.005
	10-15	0.04	5.8	0.056	0.003
	15-20	0.06	6.4	0.014	tr.
	20-25	0.37	7.8	0.132	0.008
	25-30	0.09	7.1	0.043	0.003
	30-35	0.27	7.5	0.038	0.002
	35-40	0.17	6.2	0.071	0.004
	40-45	0.10	6.2	0.038	0.002
	45-50	0.10	6.5	0.042	0.002
	50-55	0.07	6.1	0.038	0.002
	55-60	0.02	7.2	0.038	0.002
	60-65	0.04	15.1	0.052	0.003
	65-70	0.06			
	70-75	0.04			
	75-80	0.02			
	80-85	0.03			
	85-90	0.10			
	90-95	0.03			
	95-100	0.02			
	100-105	0.02			
	105-110	0.04			
	110-115	0.03			

Location	Footage From to	Cu. %
North West Drive.	0-5	0.04
	5-10	0.06
	10-15	0.05
	15-20	0.15
	20-25	1.17
	25-30	0.07
	15' bottom	0.98
North Contact Drive	0-5	0.05
	5-10	0.12
	10-15	0.05
	15-20	0.05
	20-25	0.08
	25-30	0.04
	30-35	0.05
	35-40	0.06
	40-45	0.05
	45-50	0.05
	50-55	0.05
	55-60	0.06
	60-65	0.05
	65-70	0.06
	70-75	0.07
	75-80	0.03
	80-85	0.03

11.5.4. Mount Darwin Pty. Ltd.

Location: East Darwin

References and Lease Nos.:

Loftus Hills 1914 : 4655-M

Douglas 1940 : 4655-M

General Geology: Veins and masses of chalcopyrite outcrop in a stream at bottom of a deep gully. Efforts to prove the north and south extension of the stream outcrop were not successful.

Workings: An adit was driven on a bearing of 240° from below the outcrop. The adit ended in green felsite with chalcopyrite.

Douglas examined the adit and found nothing of value.

Assays:

Location	Footage From to	Cu. %	Length of Sample
Main Adit	190-195	Tr.	5'
	195-200	Tr.	5'
South Drive	0'	2.42	8"
	10'	2.72	12"
	20'	0.65	12"
	30'	0.06	6"

Conclusion: Mineralisation intersected here is probably a northward extension of mineralisation in 4654-M and 4615-M.

11.6. Adit.

Location: North-east slopes of Mount Darwin.

References and Lease Nos.:

Twelvetrees 1901: Mount Lyell Extended: 2549-93M
Loftus Hills 1914 : 3109-M

General Geology: The country rock is chloritic schist containing disseminated pyrite and chalcopyrite with specular iron in veins and on cleavage planes.

11.7. Trench Mount Darwin.

Location: Snake Spur - below Findon's.

References and Lease Nos.:

Loftus Hills 1914	:	2101-93M
Douglas 1940	:	2101-93M

General Geology: The country rock consists of the following: Conglomerate, cherty slate, chlorite schist and felsite. The strike of the felsite is 40° W. The country rock contains disseminated chalcopyrite, specularite and pyrite.

Workings: There is a 200' long trench striking at 60°.

Assays: (Measured from south-west end).

Footage	Cu. %
0	0.06
10	0.03
20	0.05
30	0.03
40	0.03
50	0.42
60	0.21
70	0.06
80	0.04
90	0.04
100	0.25
110	0.08
120	3.11
130	0.08
140	0.08
150	0.08
160	0.03
170	0.02

11.8 Hal Jukes (Hydes)

Location: On Inter-Colonial Spur, situated on the north-western slopes of Mount Darwin.

References and Lease Nos.:

Loftus Hills 1914 : 5925-M

Douglas 1940 : 5925-M

General Geology: North of the adit there is a band of dark green chloritic schist, striking North-South and dipping vertically. The schist carries some pyrite and chalcopyrite. This is described as an oxidised capping and extends several hundred feet north and south of the adits.

Workings:

Upper Adit: This adit was driven for 50' on a bearing of 60° through dark green schistose felsite carrying some chalcopyrite and pyrite.

Lower Adit: At a lower level, a second adit was driven N.E. from a creek in hard green felsite and dark chlorite schist. No worthwhile mineralisation was encountered.

Assays: (Douglas) Low values only.

11.9. Lake Jukes Proprietary.

Location: Situated on steep western face of Mount Jukes.

References and Lease Nos.:

Loftus Hills 1914 : 4414-93M

General: Serrated crags of massive hematite have been interpreted as being oxidised portions of pyritic bodies.

Workings: A tunnel was driven for 234' in a N.E. direction. Hematite was intersected and the tunnel ended in banded porphyroids.

11.10. Lake Jukes.

Location: The prospect is situated in the upper Lake Jukes cirque on a hogback ridge just south of the lake.

References and Lease Nos.:

Twelvetrees 1901 ;

Loftus Hills 1914 ; 4811-M and 4812-M.

General Geology: The country rock is granophyre, with quartz schist outcropping to the east. There are blue hematite and bornite fissure fillings on the summit of the ridge.

Workings:

No. 1 Adit: This adit was started on the eastern side of the hogback ridge and was driven for 400' on a bearing of 260°. A 2' fissure lode of quartz and delessite dipping N.W. at 45° was disclosed. Stoping was started, but the lode petered out in all directions.

No. 2 Adit: This is to the south and 30' below No. 1 adit. The adit was driven 200' on a bearing of 270° in hard green felsite but only intersected one small patch of chalcopyrite.

No. 3 Adit: This adit is 100' above No. 1 adit and was driven for 20' in a westerly direction. Two feet of bornite was discovered but faded out in all directions.

No. 4 Adit: The No. 4 adit followed a narrow bornite vein for 50'.

Western Adit: The adit was started in conglomerate and was driven 30' on a bearing of 145°. It was completed in hard felsite. No mineralisation was encountered.

Trench: A trench is situated a few hundred feet north of the adit on the western side of the ridge. The general characteristics found on the ridge were repeated i.e. "irregularity and inconsistency". (Loftus Hills 1914).

11.11. Bean and Thow.

Location: This is situated to the east of the Lake Jukes prospect and lower down the hill.

References and Lease Nos.:

Loftus Hills 1914 : 1594-M

Geology: In this area there is a band of sulphide bearing green chloritic schist striking N.W. - S.E. which runs persistently to Yellow Knob, half a mile south.

Workings: There are two trenches 20' long and 6' deep with scattered chalcopyrite. Surface leaching has occurred.

11.12. North Mount Jukes.

Location: This is in the Jukes Pty. area on the northern slopes of Mt. Jukes and is just to the north of the King Jukes Prospect. (11.13).

Reference and Lease Nos.:

Twelvetrees 1901 : 2699-93M
Loftus Hills 1914 : 2699-93M

General Geology: The country rock is hard felsite.

Workings: One adit was driven, but no ore was intersected. Loftus Hills reported a little mineralisation on tip.

11.13. King Jukes.

Location: This is in Jukes Pty. area on the northern slopes of Mt. Jukes. A track passes through the centre of section from west to east.

References and Lease Nos.:

Twelvetrees 1901 : 1737-M and 1861-93M
Loftus Hills 1914 : 5936-M

General Geology: The country rock is chlorite schist and felsite.

Workings: An adit was driven in chlorite schist and felsite with patchy mineralisation.

A second adit was driven 87' on a bearing of 135° in grey felsite. No mineralisation was encountered.

11.14. Juke Pty. Area.

Location: Situated on the saddle between Proprietary Peak and East Jukes Peak.

References and Lease Nos.:

Twelvetrees 1901, Mount Jukes Pty; 1711-93-M, 1712-93M
Loftus Hills 1914 ; 6012-M
Rodda 1958

General Geology: Mineralisation occurs in rocks of the "Dundas Group" where a N.W. - S.E. cross fault intersects a N.E. - S.W. fault. This has been compared with the Linda Disturbance at Mt. Lyell. Sheared felsite occurs near the fault. Hematite outcrops in the N.W. part of the area. There is a well-defined brown ridge striking a little E. of N.

Magnetic Survey: Four magnetic traverses were undertaken by L.E.E. (1958) as a follow up of airborne magnetometer work which outlined a magnetic anomaly. This was supposedly tied in with a large magnetite outcrop. There seemed to be little magnetite on mine dumps , however, associated with either pyrite or copper minerals.

Workings:

No. 1 Adit: This was driven at 270° for 190'. From 18' to 36' (measurements from portal) dark green chloritic schist was intersected carrying chalcopyrite blebs. The remainder

of the adit from 36' to 190' was in schist carrying disseminated pyrite. A winze was sunk for 52' on the abovementioned chalcopyrite zone. Assays of samples from the base of winze are quoted as "15% Cu, 12 dwts/ton Au." (Twelvetrees). At the base of the winze, a hanging-wall drive was put in for 50'. At 26' from the winze a cross-cut was put into the foot wall. The ore body here was 24' wide and assayed 4.10% Cu., 0.53 oz./ton Ag, 0.27 oz./ton Au. (Souter quoted by Loftus Hills).

No. 2 Adit: This adit is 310' below No. 1 Adit. The first 407' of the adit was driven on a bearing 188° in hard green felsite showing a few sporadic splashes of sulphides. The next 108' on a bearing of 237° was also in hard green felsite with occasional sulphide makes. At 515', 4 ft. of vein filling, containing good ore, was intersected. This was followed by a drive of 79' on a bearing of 60°. The ore soon petered out and was replaced by hard red felsite. The main adit continued for a further 117' on a bearing of 230° in mottled green and red felsite and ended in felsite carrying pyrite, hematite and magnetite.

The ore body intersected in No. 1 adit was not intersected in No. 2 Adit.

No. 3 Adit: This was in progress (1914) and at that time had been driven 80' in green chloritic schist carrying disseminated pyrite and chalcopyrite. The ore body had not been exposed.

11.15. Jukes Comstock.

Location: This prospect is situated below the workings of the Mount Jukes Pty. Company.

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References and Lease Nos.:

Twelvetrees 1901 : 1713-93M

Loftus Hills 1914 : 6012-M

General Geology: The country rock is felsite which contains a limonite stained belt.

Workings: There are two adits, the upper one was driven for 18' and assayed 3.5% Cu. and 3.5 dwts/ton Au, the lower tunnel intersected barren felsite.

12. PRELIMINARY INSPECTION EL2/64

12.1. General

Two inspections were made of the major prospects in the area.

From October 25 to October 30, 1964, 3 geologists with a helicopter based at Strahan made a reconnaissance of the area and conducted a magnetometer survey at the Prince Darwin Prospect.

From November 28 to December 12, 1964, under appalling weather conditions, a party of seven, including three geologists, camped in the area. This party cut traverses, ran an S.P. survey over the Prince Darwin Prospect and carried out mapping and thorough sampling of the adit and outcrop. At Findons Prospect an S.P. survey was run and samples taken from the workings. At the Jukes Pty. Prospect, mapping, sampling and self-potential traversing were again undertaken. A visit was made to the Lake Jukes Prospect and several samples taken.

Several disused and overgrown tracks were re-opened to afford access to the prospects.

12.2. Prince Darwin Prospect. (Figs. 8, 9, 10).

The Prince Darwin Prospect lies on the steep western slope of the South Darwin Plateau. Without helicopter transportation, access is difficult and strenuous and is gained by a rough track rising 1200 ft., from Ten Mile Hill, a point on the long disused Kelly Basin to Gormanston railway.

Two adits have been driven into the steep hillside, one to the south-west, the other to the north-east. The surrounding area is heavily overgrown in the valleys.

The Tasman-Darwin workings, south of this area, were not located.

055

12.2.1. Geology. (See Fig. 8). The centre and eastern edge of the South Darwin Plateau is composed of a mass of granite striking north-south which is pre-Ordovician - possibly Cambrian - in age.

The granite is generally coarse grained and is made up of two laminae of somewhat different composition (Table I) and mineralogy. The pink granite on the eastern side is characterised by pink orthoclase with quartz and altered plagioclose. The white granite is composed of quartz and altered plagioclose.

There is no visible contact metamorphic effect along the section of the western margin mapped. Jointing is common on both a north-south trend and on a NW-SE trend. Hematite veining is widespread and appears identical to that seen in the rhyolites to the west. Small pits and trenches have been started and abandoned in the search for copper associated with these veins.

West of the granite a band of acid volcanics strikes north-south. Volcanic breccias appear to be interbedded with these rhyolites. The composition of the rhyolite from a point near Mt. Jukes, north of this area, is shown in Table I.

Folding, shown by Wade and Solomon, was not observed though local structures suggest that this folding may occur. General trends indicate a north-south strike with westerly dips of from 30° to 45°. Of particular significance is the fault pattern suggested by photo-interpretation and confirmed in part by mapping. The importance of this is indicated in Section 9.

The lode zone can be traced for about 2,000' and can be divided into two sections on the basis of intensity of mineralisation.

The northern and, at the surface, most strongly mineralised section is about 500' long and is situated between two westerly trending faults. The zone is about 150 feet to 180 feet wide and strikes at 340°. The lode is sub-parallel to the hillside contours, but is exposed to a depth of about 250 ft. in a deeply incised stream valley at the north end.

Along strike the lode is conspicuous as a deep brown, iron stained belt. Hematite and magnetite veins and veinlets occur throughout this zone with minor disseminations of pyrite.

Bleaching and weak shearing are found in the poorly mineralised section of the host volcanic breccia within the lode zone.

Outcrop samples across the width of the lode indicate negligible amounts of copper and gold remain, but a low silver content is persistent.

Surface Sample assays:

Near adit: average samples 3374 and 3375
- Copper: trace
- Gold: trace
- Silver: 0.50 dwt./ton

500 N: average samples 3376, 3377
- Copper: trace
- Gold: trace
- Silver: 0.58 dwt./ton

400 N: average samples 3351, 3352, 3353.
- Copper: 0.0059%
- Gold: Nil
- Silver: 2.6 dwt./ton

00 N: Sample 3382.
- Copper: trace
- Gold: Nil
- Silver: 0.29 dwt./ton

057

500 S: Sample 3383.
Copper: Nil
Gold: Nil
Silver: 0.29 dwt./ton

Where the erosion at the north end gives a limited section through the lode there is evidence of leaching and poorly developed gossan. It is apparent that mineralisation, both of the hematite-magnetite type and of the pyrite-chalcopyrite type is very much better developed at this point than at any other point exposed. This may be a result of the proximity of the lode to the junction of the faults shown on the map, or may indicate strengthening of the lode below the surface.

The adit is collared in a small cliff-face near the bottom of this exposure. It runs diagonally across the lode towards the eastern wall, but does not reach that wall. A cross-cut extends 17 feet to the south-west.

Mineralisation in the adit is in the form of veins and blebs of pyrite and chalcopyrite within the dense, hard, hematite-magnetite lode material.

Adit sample assays are shown on Fig. 5. These average:

From 0' to 125.5', 0.46% Copper, 0.08 dwt/ton. Gold, 2.39 dwt./ton Silver
From 40' to 125.5', 0.67% Copper, 0.13 dwt./ton Gold, 3.34 dwt./ton Silver.

This confirms the sampling of Douglas (1940). See Section 11.1.

At adit level, the lode has narrowed to about 100'. This is partly a result of the oblique intersection of the lode with the fault on the west side but may also be caused by either a steep west dip, not apparent elsewhere, or by a narrowing of the lode at this point.

The estimate of Wade (1957 a) that this outcrop contains approximately 4,000,000 tons of hematitic material seems reasonable. It seems unlikely, however, that the grade of this mass would exceed 0.5% Copper.

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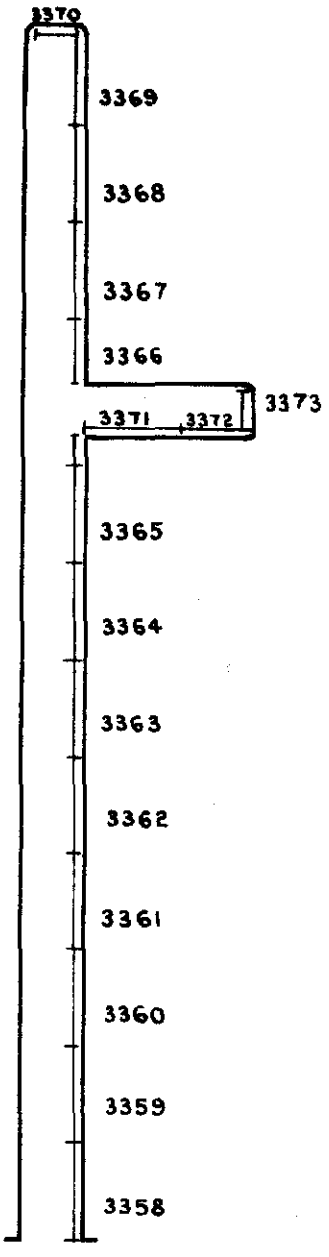
152059

Sample Number	Width (feet)	Cu %	Au (dwt)	Ag (dwt)
3358	10·0	0·10	Nil	1·0
3359	10·0	0·11	Nil	0·79
3360	10·0	0·18	Nil	0·79
3361	10·0	0·21	Nil	0·79
3362	10·0	0·93	0·79	3·21
3363	10·0	1·56	0·21	3·21
3364	10·0	0·60	tr.	3·21
3365	10·0	0·62	Nil	3·42
3366	10·0	0·42	tr.	2·79
3367	10·0	0·25	0·21	4·42
3368	10·0	0·73	tr.	4·21
3369	10·0	0·52	Nil	4·00
3370	4·0	tr.	Nil	2·00
3371	10·0	0·39	Nil	1·58
3372	7·5	0·10	Nil	0·58
3373	4·0	tr.	Nil	Nil



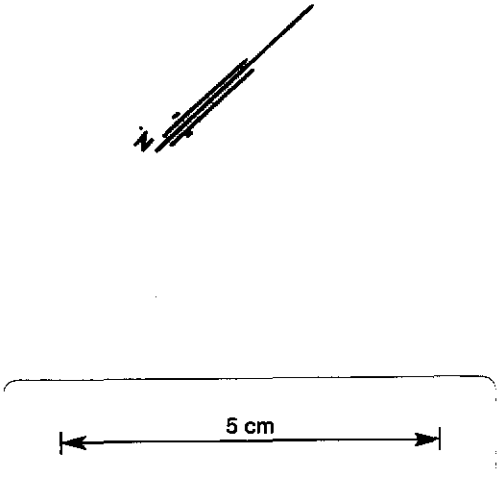


FIG. 5.

UNITED STATES METALS REFINING CO.	
Exploration Licence E.L.2/64 Tasmania	
JUKES-DARWIN AREA	
PRINCE DARWIN PROSPECT PRINCE DARWIN ADIT ASSAY PLAN	
Date: December 1964	Scale: 1 inch = 20 feet

South of the fault at approximately 100 N, the lode zone is poorer and appears to split into two branches. Zones of hematitic material continue intermittently for over 5,000' and at the Tasman-Darwin, not located during this examination, pyrite, chalcopyrite and native copper have been reported (Section 11.2 and 11.3).

Semi quantitative spectrographic analyses for minor elements are shown in Table II. The high barium content is not unexpected in an area where minor barium lodes have been reported. No other elements occur in economic quantities.

12.2.2. Geophysics.

Six magnetic traverses were run in the Prince Darwin area and two in the Tasman Darwin area. (Figs. 9 and 9a).

In the Prince Darwin area, contours of the magnetic traverse profiles show excellent agreement with the geological mapping of the lode. (Fig. 8). The extreme scale of the anomalies has been caused by surface magnetite which could mask any deep seated effect which may be present. The anomalies illustrate the linear nature of the lode zone. This is emphasised by the lack of relief on the traverse profiles on either side of the lode.

The pattern is again demonstrated by the self-potential contour map (Fig. 10). The maximum anomaly of over -350 millivolts occurs close to the adit mouth where sulphides visible in the outcrop reach a maximum in the creek-cut section. The shape of this anomaly is consistent with an increase in depth of burial of the sulphides to the south. This is certainly due, in part, to the rapid change in the topographic relief south of traverse 500N and may also be influenced by a widespread southerly plunge of folds shown in this area by the map of Wade and Solomon.

Conditions under which the self-potential was run were very bad and

considerable surface water was flowing across the hillside. This may have resulted in poorer anomalies than might be expected.

South of the 100N fault, the anomaly is shallow and somewhat broader than the magnetic anomalies but there is good general agreement.

A widening of contour spacing is evident on the downhill side of the lode. This may be a topographic effect.

12.2.3. Summary.

1. A hematite rich zone appears to occupy a particular horizon in acid volcanics and breccias in a tectonic environment considered favourable for ore deposition.

2. The zone of greatest mineralisation is 500' long and 150' - 180' wide and it is exposed to a depth of approximately 250' in a steep valley. At this depth, pyrite and chalcopyrite are present. Assay information indicates only traces of copper at the surface but about 0.5% in the adit at 250'. Gold values are low and silver values of 0.3 dwt/ton to about 3.0 dwt/ton occur throughout the zone.

3. Approximately 1500' of a hematite rich zone has been followed south of the above zone. Surface examination gives no indication of sulphide mineralisation.

4. Magnetic and self-potential contour maps are in close agreement with the geology. The possibility of a buried or south-plunging lode at the north end is indicated. The southern zone is weaker but is persistent and self-potential results suggest sulphides may be present below the surface.

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12.3. Findons Prospect. (Figs. 11, 12).

The trenches, pits and adit in the Findons Area are on the northern slopes of Mt. Darwin, near Snake Peak. Access is by foot or pack track from the abandoned Darwin townsite on the disused railway. The track rises steeply 1,500' through the East Darwin workings to the bare plateau on which the prospect is situated.

12.3.1. Geology. (See Fig. 11).

The altered volcanics in the area are weakly schisted but are generally featureless. A zone of disseminated pyrite and chalcopyrite some 20' wide can be seen in the trenches and appears to strike at about 330°. It is poorly exposed along strike.

Chloritic alteration is wide spread in the poorly developed schists.

A north-westerly trending fault with hematite and magnetite veinlets and chloritised volcanics approximately parellels the lode - see map - and a major fault is located some ½ mile north on the north-east face of Snake Spur.

Snake Spur is a ridge of resistant Owen Conglomerate unconformably overlying the Cambrian volcanics in a syncline which is faulted on its north-east limb.

Trenches and pits were sampled. Sample 3380 was sent to A. M. D. L. for semiquantitative spectrographic analysis and the result is shown in Table II. Assays for copper, gold and silver were:

Sample No.	Location	Type of Sample	Copper	Gold	Silver
3378	Trench "A"	Grab sample	1.17%	Trace	4.29dwt/ton
3379	Trench "C"	21' channel	Trace	Nil	Trace
3380	Trench "B"	20' channel	0.48%	Nil	1.29 dwt/ton
3381	Trench "E"	15' channel	0.13%	Nil	0.79dwt/ton

12.3.2. Geophysics. (See Fig. 12).

Self-potential measurements were run over the lode zone in four traverses totalling 3,900 feet. Traverses were 200 feet apart and extended approximately 500' on either side of the lode zone.

Contouring of profiles gave no indications of any electrical disturbance in the mineralised area. Weather conditions were bad and water was lying or running over most of the area. However, in view of the results at Prince Darwin under similar conditions, it is surprising that the disseminated sulphides in this prospect gave no indications.

The contour map reflects the strike of the fault or contact shown on the map.

It must be assumed that either the subsurface conditions were not such as to allow the oxidation of the sulphides to proceed, or that the sulphide occurrence is extremely limited.

12.3.3. Summary.

1. Localised chloritic schists are found in acid volcanics with disseminated pyrite and chalcopyrite.

2. No self-potential anomaly was recorded in the area because of (a) the unsuitability of the method, or (b) the restricted nature of the sulphides.

12.4. Jukes Pty. Prospect. (Figs. 13, 14 & 15).

This prospect includes workings discussed in Section 11 as King Jukes, Jukes Proprietary, and Jukes Comstock. The area lies on the northern slopes of Mt. Jukes and Proprietary Peak. The lower section drops precipitously to the King River which cuts through the West Coast Range in a gorge between Mts. Jukes and Huxley.

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Three adits have been driven into the mineralised zone and a number of trenches cut.

Access is by good foot track from Crotty.

12.4.1. Geology. (See Fig. 13).

Mapping showed a fault running more or less along the creek and marking the eastern edge of the mineralised zone. The fault strikes approximately N.E. - S.W. and intersects another fault striking west of north about 800' north-east of the No. 3 Adit.

A prominent ironstained zone parallels the fault on the west side for over 2,000'. The southern extension of this is now covered by Ordovician Owen Conglomerate which unconformably overlies the Cambrian rocks. The zone varies in width from 200' to 400'.

The rocks in the area are felspathic porphyries with interbedded conglomerates or volcanic breccia. Along the fault there is a zone up to 200' wide which is strongly sheared and altered and is now a chloritic schist. The iron staining covers an area much larger than the schist. Mineralisation within this sheared zone appears to have been disseminated pyrite and chalcopyrite with some hematite and magnetite. The association of the hematite to the chalcopyrite is not clear.

Samples were taken and assayed for copper, gold and silver. Gold assays were the highest encountered throughout the area. Sample assays were:

3384	No. 1 Adit	Channel 18'-30'	0.83% Copper	1dwt/ton gold	2.79 dwt/ton silver.
3385	No. 2 Adit	Grab from dump	10.5% Copper	3.5 " " "	16.87 dwt/ton silver
3386	No. 2 Adit	" " "	12.6% Copper	26.0 " " "	36.0 dwt/ton silver

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Sample 3385 was unoxidised pyrite and chalcopyrite disseminated in schist and in veinlets. No. 3386 was oxidised lode material stacked beside the adit mouth and was schist, heavily stained with malachite, and minor amounts of azurite and chalcopyrite. It seems very likely that this material contained a different copper mineral to that in No. 3385 but there was no indication of what that mineral was.

No. 3385 was semi-quantitatively spectrographically assayed by AMDL and the results are tabulated in Table II.

12.4.2. Geophysics. (See Figs. 14 and 15).

A magnetometer survey was carried out by Rodda for L.E.E. Comparison of the contours of the magnetic profiles with the self-potential contours suggest that some minor changes in contouring may be justified and these have been made to the magnetic plan presented.

The schisted zone has caused no significant variation in magnetic intensity and the anomalies are centered on areas of high iron staining.

Self-potential contouring produced a weak basinal anomaly about 200' long over the workings and a curved elongated anomaly 600' long which cannot be correlated with any mapped feature.

12.4.3. Summary.

1. A belt of chloritic schist up to 200' wide follows a fault zone. Iron staining is prominent over a wider zone and can be traced over 2,000' before passing under rocks stratigraphically higher in the sequence.

2. Assay information indicates that high-grade copper ore, probably from minor ore shoots, has been extracted and that the gold content in this is higher than in the other areas sampled.

3. The geophysical methods used - magnetometer and self-potential - do not appear to have been very appropriate to the deposit under the conditions prevailing. A small self-potential anomaly lies over the workings.

12.5. Lake Jukes Prospect.

The Lake Jukes Prospect is located on a hogback ridge in the cirque on the eastern face of Mt. Jukes. Lake Jukes is a glacial tarn which lies between the old mine and a high cliff face. The lake is only 2,800' above sea-level but weather conditions are extreme. Several inches of ice may cover the lake in winter. Light hail and sleet fell during the present inspection.

Irregular veins and veinlets of hematite and bornite are scattered through the bare ridge. The veins are usually only several inches wide. The largest mined was 2' wide. All the veins investigated by mining did not persist in length or depth. Disseminations of chalcopyrite occur adjacent to the rich bornite veins.

The hematite-bornite lode material consists of dense blue-black hematite which is spotted and veined with bornite. When exposed, partial oxidation of the bornite occurs and malachite is formed.

Five adits have been driven into the ridge which is composed of a hard silicified breccia. This is mapped by Wade and Solomon as the Jukes Conglomerate but could be part of the Cambrian volcanics. Four of these adits enter the outcrop from the east and one from the west. Reports indicate that they did not achieve their objective to cut better mineralisation than was seen at the surface. Results of the drill hole sunk by LEE are not known.

Two samples were taken from the dumps by the adit and were assayed by the Department of Mines Laboratories, Launceston, Tasmania. Results were as follows:

Sample 3387, selected bornite, 22.2% Copper, Trace Gold, 20 dwt/ton silver.

Sample 3388, disseminated chalcopyrite, 4.26% Copper, 0.12 dwt/ton gold, 9.79 dwt./ton Silver.

Semiquantitative spectrographic analyses were carried out by the Australian Mineral Development Laboratories, Adelaide, South Australia, on these samples and the results are tabulated in Table II.

Sheared volcanics and schists (mapped as conglomerates) outcrop some 1,500' east of the old mine. These contain sporadic disseminations of chalcopyrite. The prospect referred to in Section 11.11 as the Bean & Thow occurs here but little work has been done.

The area is one of interest for the following reasons:

1) The airborne magnetic results would indicate that the rhyolites may unconformably underlie the conglomerates at the old mine. It would be expected that these would form a more suitable host rock for mineralisation.

2) Copper mineralisation is found both as rich bornite veins and as disseminated chalcopyrite. Records show that gold was worked in a quartz-delessite vein for a short period.

3) Cross structures near the mine and schisting nearby to the east indicate a tectonic environment in the Cambrian volcanics of a type favourable for ore deposition.

13. General

13.1. Silver Content of Samples. Fig. 17 shows the silver content of samples taken in the area plotted against the copper content on a logarithmic scale. The graph shows that all samples containing copper contain silver in a roughly proportional amount. Some samples however contain silver but no copper. It would appear therefore that the copper may have been more actively leached than the silver with which it is apparently associated.

Surface outcrop samples of lode material at the Prince Darwin contain essentially no copper but up to 4 dwt/ton silver. It might therefore be supposed that this outcrop, very often containing no visible sulphide at all, originally contained copper which has now been leached.

If this assumption can be carried even further, it would indicate that the original copper content was not less than 0.5% Cu. to 1.0% Cu. Leaching of the silver would increase this value. No estimate can be made of the extent to which the silver has been leached.

If the mineralogical connection envisaged above does not exist then no such assumptions concerning the copper content are valid.

13.2. Minor Elements. Semiquantitative spectrographic analyses were carried out on six samples from different parts of the area. The results are shown in Table II.

Economic metallic elements, with the exception of copper, gold and silver, occur in only minor quantities.

Comparison with minor element assemblages of the "Porphyry Copper" type deposits of North and South America show that similar contents of

TABLE II

Semi-Quantitative Spectrographic Analyses (parts per million)

Location	Prince Darwin		Findons	Jukes Pty.	Lake Jukes	Lake Jukes
Sample No.	3355	3357	3380	3385	3387	3388
Cu	1000	**10,000	3,000	*10,000	**10,000	**10,000
Pb	40	20	6	30	1,200	800
Zn	80	200	80	500	250	300
Ni	50	15	15	25	3	7
Co	20	8	5	15	12	30
Cd	* 3	* 3				
Ag	2	8	1.5	80	200	20
Bi	2	5	3	100	50	20
Au	* 3	* 3	* 3	* .3	10	* 3
Sn	10	15	4	15	15	12
Cr	10	6	1	* 1	* 1	1
W	12	8	25	250	60	40
V	150	15	12	5	3	10
Mo	25	15	* 1	15	25	20
Be	* 1	* 1	3	* 1	2	* 1
Ga	6	5	20	10	8	10
Ge	2	2	2	* 1	* 1	2
In	* 1	3				
Pb	* 1	* 1				
Ag	* 100	* 100				
Sb	* 50	* 50				
Mn	100	200	1,000	500	200	500
Os	* 3	* 3				
Pt	* 100	* 100				
Ir	* 1	* 1				
Rh	* 1	* 1				
Ru	* 3	* 3				
B	200	500	8	3	5	4
P	400	800				
Ba	800	150	300	100	400	150
Sr	10	* 1	2	5	5	* 1
Zr	150	100	50	30	30	50
Rb			120	100	* 40	150

* indicates less than
** indicates more than

tin, rubidium and, to some extent barium are found in both areas. Strontium content however is very much lower in the Jukes - Darwin area.

13.3. Notes on the Mt. Lyell Mining and Railway Co. Ltd.

Discovery of payable copper followed the removal of a limonite hematite capping in the course of exploration for gold. Little data is now available to indicate the nature of this iron "blow", or its size.

Lode occurrences at Mt. Lyell fall into three main mineralogical categories:

1) Massive chalcopyrite lodes with a little pyrite.
2) Disseminated sulphides in sheared and schisted sediments and volcanics. These contain approximately 15% pyrite and 0.5% to 2.0% Cu.
3) Massive bornite lodes with chalcopyrite containing up to 35% Cu but averaging about 6% Cu. These occur in massive quartzite which shows little alteration along lode contacts.

The mine area follows closely the contact between sheared Cambrian volcanics and sediments and steeply overturned Ordovician conglomerates. This contact is interpreted as the surface expression of the Great Lyell Fault. The fault is displaced by the west-north-west trending faults of the Linda Disturbance.

In the sheared zone of Cambrian rocks, quartz sericite schists occur closest to the overfold. These schists have a distribution pattern similar to that of the disseminated pyrite. Quartz-chlorite schists are found further west of the contact but an interleaving of the two types occurs. It has been suggested that the mineralogical differences are the result of different compositional types within the original beds. Both major schist types are hosts to ore mineralisation but sericite schists are better developed near ore bodies.

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The origin of the schists is probably tectonic but their association with the mineralisation is not clear.

Localisation of ore bodies within the fault pattern suggests that tectonics have played a major role in ore genesis control.

Stratigraphic control would appear to be determined by the more chemically inactive and impervious nature of the conglomerates overlying the Cambrian sediments and volcanics which were more favourable for replacement. The presence of the richest lodes in unschisted environments suggests that the schists may have provided a fortuitous host for disseminated mineralisation.

14. CONCLUSIONS

1) Sufficient outcrop is available over most of the area to permit careful visual examination by prospectors. The potential in any of this area lies entirely in the possible development of economic lodes below the surface in favourable areas.

2) A belt of potash-rich acid volcanics extends through the area of the Licence and is locally schisted with accompanying chloritic alteration.

3) Schisting is more widespread than has been previously indicated and is found in a more or less continuous belt along the eastern side of the West Coast Range . Scattered occurrences of copper mineralisation have been recorded in this belt.

4) Tectonic features in the area include west trending faults not previously mapped. These faults displace the north-south zone and must, by analogy with known occurrences in the Mt. Lyell area, represent favourable sites for possible lode formation.

5) Prince Darwin.

Sulphide mineralisation is associated with a zone of hematite and magnetite some 500' long and 150' wide. It is exposed to a depth of 250'. A copper content of about 0.5% Cu is indicated with about 2.5 dwt/ton of Ag and traces of gold. Leaching has removed essentially all the copper from the iron-rich outcrop and has been effective to an unknown depth. There is no indication of secondary enrichment.

The lode continues at least 1500' further south with a similar but more weakly mineralised outcrop. There is no surface sulphide mineralisation but silver has been assayed from the outcrop suggesting

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that copper sulphides have been leached out. Native copper has been reported in this zone. A weak self-potential anomaly confirms a strong magnetic anomaly outlining the lode and suggests sub-surface sulphides.

A well developed system of west trending fault and joints offset strong north-south structures and this tectonic environment may be favourable for ore deposition.

The suggestion made in the Preliminary Report of July 1, 1964, that the lode may be situated in the Jukes Conglomerate and thus be stratigraphically above the most favourable zone for ore deposition is now considered unfounded and Wade's identification of this horizon incorrect.

The lode seen in outcrop is not economic and there is little evidence to indicate that there will be greater concentrations of copper either along strike or in depth.

6) The mineralisation at the northern end of the area of the Licence is chalcopyrite with gold. Gold values in the three samples taken ranged from 1 dwt to 26 dwt/ton. This suggests higher values for gold than in the Prince Darwin area.

Extensive prospecting with adits and trenches has failed to locate economic quantities of ore. Mineralisation occurs in a favourable environment of chloritic schists associated with fault zones and passes under younger rocks to the south.

7) The bornite lodes at Lake Jukes outcrop on a hard bare ridge exposed by Pleistocene glaciation. The exposure has been poorly prospected in depth and the possibility of extensions along strike has not been explored below the surface. A belt of schists lies some 1500' east of the old mine and faulting cuts the area.

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8) Results from the Findons area give no encouragement for further work.

9) The East Darwin area has been covered by a ground electromagnetic survey by the Bureau of Mineral Resources. This survey has indicated an anomalous zone too small to be of economic interest.

Not found

We should not condemn on Geophysical data especially EM

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15. RECOMMENDATIONS

1) The Prince Darwin area contains a zone of hematite and magnetite at least 2,000' long and 100' to 200' wide. Little evidence is available at the surface to indicate the presence of sulphide mineralisation but inspection of the adit, assay data and a self potential anomaly suggests that this could be the surface expression of a copper lode.

Assuming 20,000 tons of ore per vertical foot to a depth of 1,000 feet over the whole length of the lode, the lode only becomes of economic interest at current prices if a grade of about 1.5% Cu or better is maintained throughout. It is considered unlikely that an economic grade would be found here and no further work is recommended.

2) At the north end of the lease a zone about 2 miles long and 1 mile wide stretching from south of the Lake Jukes Prospect to the northern boundary of the area of the Licence has been subjected to faulting and schists have been formed in volcanics in part of the area.

Two small copper prospects occur with rich mineralisation in uneconomic quantities. Disseminated mineralisation also occurs in uneconomic quantities in the schists. Part of the area is unconformably overlain by younger rocks.

Prospecting of these occurrences has been thorough, and no further work is recommended.

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APPENDIX I. Weather.

Temperature Averages; 1931-1960.

Month	Mean Maximum (°F) Cape Sorell (Strahan)	Mean Maximum (°F) Zeehan	Mean Minimum (°F) Cape Sorell (Strahan)	Mean Minimum (°F) Zeehan
Jan.	64.3	67.2	53.1	47.9
Feb.	64.6	67.1	53.6	48.5
Mar.	63.5	65.1	53.0	47.2
April	59.6	59.6	50.1	44.2
May	56.5	55.6	48.5	42.1
June	53.8	51.9	45.5	38.4
July	53.0	51.1	45.1	38.0
Aug.	51.7	52.7	45.2	38.6
Sept.	55.4	55.9	46.3	40.4
Oct.	57.3	58.3	47.6	42.5
Nov.	59.6	61.4	49.3	44.6
Dec.	62.4	65.2	51.7	47.2
Year	58.6	59.2	49.1	43.3

Extreme Temperatures; 1899-1960.

Month	Extreme Maximum (°F) Cape Sorell (Strahan)	Extreme Maximum (°F) Zeehan	Extreme Minimum (°F) Cape Sorell (Strahan)	Extreme Minimum (°F) Zeehan
Jan.	90.0	99.0	41.0	31.0
Feb.	88.0	99.2	42.0	30.7
Mar.	84.4	92.5	32.0	28.0
April	79.0	82.0	38.5	25.0
May	73.0	74.6	34.0	23.0
June	69.0	67.3	33.0	19.4
July	67.0	66.2	30.0	20.1
Aug.	65.1	69.3	33.0	22.6
Sept.	68.5	80.0	34.0	23.0
Oct.	76.0	85.9	36.5	26.6
Nov.	86.0	94.0	38.0	30.0
Dec.	85.0	98.0	41.0	31.2
Year	90.0	99.2	30.0	19.4

076

APPENDIX I. Weather (Cont.)

Rainfall Averages: 1931-1960.

Month	Queenstown	West Lyell	Lake Margaret	Cape Sorell (Strahan)
Jan.	5.72"	6.13"	8.83"	2.67"
Feb.	5.66"	6.00"	8.53"	3.17"
March	6.44"	7.46"	9.67"	3.40"
April	9.02"	10.45"	12.58"	4.68"
May	9.82"	12.11"	13.96"	5.43"
June	9.58"	10.85"	13.53"	5.61"
July	10.34"	11.90"	13.76"	6.63"
Aug.	10.66"	11.81"	14.91"	6.42"
Sept.	9.18"	11.85"	12.85"	5.09"
Oct.	8.91"	10.32"	12.93"	4.63"
Nov.	7.27"	9.78"	11.82"	3.93"
Dec.	6.84"	8.30"	9.86"	3.47"
Year	99.44"	116.96"	143.23"	55.13"

077

152078

APPENDIX II. Assays.

DEPARTMENT OF MINES

Laboratory,
LAUNCESTON

22nd December, 1964

CERTIFICATE OF ANALYSIS

To United States Metals Refining Co.,
69 Macquarie Street, Sydney, N.S.W.

The samples received from the above (per Mr. J.F. Gilfillan) on the 16th December, 1964, and stated to be from Jukes-Darwin Area, Western Tasmania, have been examined, with the following results:-

Sample No.	Constituents	Per Cent	Per Ton Ozs.	Dwts.	Grs.
3358	Gold	Nil			
	Silver		0	1	0
	Copper	0.10			
3359	Gold	Nil			
	Silver		0	0	19
	Copper	0.11			
3360	Gold	Nil			
	Silver		0	0	19
	Copper	0.18			
3361	Gold	Nil			
	Silver		0	0	19
	Copper	0.21			
3362	Gold		0	0	19
	Silver		0	3	5
	Copper	0.93			
3363	Gold		0	0	5
	Silver		0	3	5
	Copper	1.56			
3364	Gold	Trace			
	Silver		0	3	5
	Copper	0.60			

W. St. C. Manson
Chief Chemist and Metallurgist

078

152079

APPENDIX II. Assays (Cont.)

DEPARTMENT OF MINES

Laboratory,
LAUNCESTON

22nd December, 1964

CERTIFICATE OF ANALYSIS

To United States Metals Refining Co.,
69 Macquarie Street, Sydney, N.S.W.

The samples received from the above (per Mr. J.F. Gilfillan) on the 16th December, 1964, and stated to be from Jukes-Darwin Area, Western Tasmania have been examined, with the following results:-

Sample No.	Constituents	Per Cent	Per Ton Ozs.	Dwts.	Grs.
3365	Gold	Nil			
	Silver		0	3	10
	Copper	0.62			
3366	Gold	Trace			
	Silver		0	2	19
	Copper	0.42			
3367	Gold		0	0	5
	Silver		0	4	10
	Copper	0.25			
3368	Gold	Trace			
	Silver		0	4	5
	Copper	0.73			
3369	Gold	Nil			
	Silver		0	4	0
	Copper	0.52			
3370	Gold	Nil			
	Silver		0	2	0
	Copper	Trace			
3371	Gold	Nil			
	Silver		0	1	14
	Copper	0.39			

W. St. C. Manson
Chief Chemist and Metallurgist

152080

APPENDIX II. Assays (Cont.)

DEPARTMENT OF MINES

Laboratory,
LAUNCESTON

22nd December, 1964

CERTIFICATE OF ANALYSIS

To United States Metals Refining Co.,
69 Macquarie Street, Sydney, N.S.W.

The samples received from the above (per Mr. J.F. Gilfillan) on the 16th December, 1964, and stated to be from Jukes-Darwin Area, Western Tasmania, have been examined, with the following results:-

Sample No.	Constituents	Per Cent	Per Ton Ozs.	Dwts.	Grs.
3372	Gold	Nil			
	Silver		0	0	14
	Copper	0.10			
3373	Gold	Nil			
	Silver	Nil			
	Copper	Trace			
3374	Gold	Trace			
	Silver		0	1	0
	Copper	Trace			
3375	Gold	Trace			
	Silver	Nil			
	Copper	Trace			
3376	Gold	Trace			
	Silver		0	0	14
	Copper	Trace			
3377	Gold	Nil			
	Silver		0	0	14
	Copper	Trace			
3378	Gold	Trace			
	Silver		0	4	7
	Copper	1.17			

W. St. C. Manson
Chief Chemist and Metallurgist

080

152081

APPENDIX II. Assays (Cont.)

DEPARTMENT OF MINES

Laboratory,
LAUNCESTON

22nd December, 1964

CERTIFICATE OF ANALYSIS

To United States Metals Refining Co.,
69 Macquarie Street, Sydney, N.S.W.

The samples received from the above (per Mr. J.F. Gilfillan) on the 16th December, 1964, and stated to be from Jukes-Darwin Area, Western Tasmania, have been examined, with the following results:-

Sample No.	Constituents	Per Cent	Per Ton Ozs.	Dwts.	Grs.
3379	Gold	Nil			
	Silver	Trace			
	Copper	Trace			
3380	Gold	Nil			
	Silver		0	1	7
	Copper	0.48			
3381	Gold	Nil			
	Silver		0	0	19
	Copper	0.13			
3382	Gold	Nil			
	Silver		0	0	7
	Copper	Trace			
3383	Gold	Nil			
	Silver		0	0	7
	Copper	Nil			
3384	Gold		0	1	0
	Silver		0	2	19
	Copper	0.83			
3385	Gold		0	3	12
	Silver		0	16	21
	Copper	10.5			

W. St. C. Manson
Chief Chemist and Metallurgist

081

152082

APPENDIX II. Assays (Cont.)

DEPARTMENT OF MINES

Laboratory,
LAUNCESTON

22nd December, 1964

CERTIFICATE OF ANALYSIS

To United States Metals Refining Co.,
69 Macquarie Street, Sydney, N.S.W.

The samples received from the above (per Mr. J.F. Gilfillan) on the 16th December, 1964, and stated to be from Jukes-Darwin Area, Western Tasmania, have been examined, with the following results:-

Sample No.	Constituents	Per Cent	Per Ton Ozs.	Dwts.	Grs.
3386	Gold		1	6	0
	Silver		1	16	0
	Copper	12.6			
3387	Gold	Trace			
	Silver		1	0	0
	Copper	22.2			
3388	Gold		0	0	3
	Silver		0	9	19
	Copper	4.26			

Fees: £31:-:-

W. St. C. Manson
Chief Chemist and Metallurgist

082

APPENDIX II. Assays (Cont.)

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

Conyngham Street, Parkside, South Australia
Telephone 79-1662. Telegrams 'Amdel' Adelaide.

17th November, 1964

Please quote this reference in your reply:

AN 3/149/0
Part Report

Mr. John F. Gilfillan,
United States Metals Refining Co.,
5th Floor,
I.C.I. House, 69 Macquarie Street,
SYDNEY. N.S.W.

REPORT AN986/65

YOUR REFERENCE: Letter dated 10/11/64

IDENTIFICATION: Sample Nos. 3351 - 3357 (inc).

DATE RECEIVED: 11/11/64

ANALYSIS
per cent

Sample Mark	Copper Cu
3351	0.0087
3352	0.0055
3353	0.0034
3354	0.0019
3355	0.16
3356	1.19
3357	2.93

Analysis by: D. McPharlin

Officer in Charge, Analytical Section: T.R. Frost

Thomas R. Frost
for L. Wallace Coffer
Director

083

APPENDIX II. Assays (Cont.)

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

Conyngham Street, Parkside, South Australia
Telephone 79-1662. Telegrams 'Amdel' Adelaide.

17th November, 1964

Please quote this reference in your reply:

AN 3/149/0
Part Report

Mr. John F. Gilfillan,
United States Metals Refining Co.,
5th Floor,
I.C.I. House, 69 Macquarie Street,
SYDNEY. N.S.W.

REPORT AN986/65

YOUR REFERENCE: Letter dated 10/11/64

IDENTIFICATION: Sample Nos. 3351 - 3357 (inc).

DATE RECEIVED: 11/11/64

ANALYSIS
ozs. per long ton

Sample Mark	Gold Au	Silver Ag
3351	Nil	0.20
3352	Nil	0.15
3353	Nil	0.05
3354	0.070	0.20
3355	0.540	0.15
3356	0.015	0.55
3357	0.025	0.45

Analysis by: T. Francis

Officer in Charge, Analytical Section: T.R. Frost

Thomas R. Frost
for
L. Wallace Coffer
Director

NOTE: Sample 3355 checked at 0.035 oz. Gold per long ton.

APPENDIX II. Assays (Cont.)

AN986/65

SEMI-QUANTITATIVE ANALYSIS
BY EMISSION SPECTROSCOPY
parts per million

Sample Mark		3355	3357
Copper	Cu	1000	** 10000
Lead	Pb	40	20
Zinc	Zn	80	200
Nickel	Ni	50	15
Cobalt	Co	20	8
Cadmium	Cd	* 3	* 3
Silver	Ag	2	8
Bismuth	Bi	2	5
Gold	Au	* 3	* 3
Tin	Sn	10	15
Chromium	Cr	10	6
Tungsten	W	12	8
Vanadium	V	150	15
Molybdenum	Mo	25	15
Beryllium	Be	* 1	* 1
Gallium	Ga	6	5
Germanium	Ge	2	2
Indium	In	* 1	3
Palladium	Pd	* 1	* 1
Arsenic	As	* 100	* 100
Antimony	Sb	* 50	* 50
Manganese	Mn	100	200
Osmium	Os	* 3	* 3
Platinum	Pt	* 100	* 100
Iridium	Ir	* 1	* 1
Rhodium	Rh	* 1	* 1
Ruthenium	Ru	* 3	* 3
Boron	B	200	500
Phosphorus	P	400	800
Barium	Ba	800	150
Strontium	Sr	10	* 1
Zirconium	Zr	150	100

* indicates less than

** indicates more than

Appendix II. Assays (Cont.)

AN1373/65

SEMI QUANTITATIVE ANALYSIS
BY EMISSION SPECTROSCOPY
parts per million

		3380	3385	3387	3388
Copper	Cu	3000	**10000	**10000	**10000
Lead	Pb	6	30	1200	800
Zinc	Zn	80	500	250	300
Cobalt	Co	5	15	12	30
Nickel	Ni	15	25	3	7
Tin	Sn	4	15	15	12
Bismuth	Bi	3	100	50	20
Silver	Ag	1.5	80	200	20
Gold	Au	* 3	* 3	10	* 3
Chromium	Cr	1	* 1	* 1	1
Vanadium	V	12	5	3	10
Tungsten	W	25	250	60	40
Molybdenum	Mo	* 1	15	25	20
Beryllium	Be	3	* 1	2	* 1
Gallium	Ga	20	10	8	10
Germanium	Ge	2	* 1	* 1	2
Manganese	Mn	1000	500	200	500
Zirconium	Zr	50	30	30	50
Barium	Ba	300	100	400	150
Strontium	Sr	2	5	5	* 1
Boron	B	8	3	5	4
Rubidium	Rb	120	100	* 40	150

Note:

* indicates less than

** indicates greater than

APPENDIX III

REFERENCES:

Banks, M.: 1962. In "Geology of Tasmania". Jour. Geol. Soc. Aus. V9. pt. 2.

Bradley, J.: 1954. The Geology of the West Coast Range of Tasmania, Pt. I: Stratigraphy and Metasomatism Pap. Proc. Roy. Soc. Tas. V88, pp. 193-243.

1956. The Geology of the West Coast Range of Tasmania, Pt. II: Structure and Ore Deposits. Pap. Proc. Roy. Soc. Tas. V90, pp. 65-129.

1957. The Geology of the West Coast Range of Tasmania, Pt. III: Porphyroid Metasomatism. Pap. Proc. Roy. Soc. Tas. V. 91, pp. 163-190.

Campana B. Dickenson S. B., King D. and Matheson R. S.: 1958. The Mineralised Rift Valleys of Tasmania. Aus. Inst. Min. & Met. Stillwell Anniversary Volume (and discussion).

Carey, S. W.: 1953. "Geological Structure of Tasmania in Relation to Mineralisation" in "Geology of Australian Ore Deposits" Vol. 1, 5th Emp. Mining & Metallurgical Congress.

Douglas, G. A.: 1940. Unpublished Report for the Mt. Lyell Mining & Railway Co. Ltd. on the Mineral Occurrences at Mts. Huxley, Jukes and Darwin Areas.

Hall G. & Solomon M.: 1962. "Metallic Mineral Deposits" in "Geology of Tasmania". Jour. Geol. Soc. Aus. V9. pt. 2

Rodda P: 1958. Report on Examination of Jukes Proprietary Area - Magnetic Anomaly 3N/6. Unpub. Report of Lyell - E. Z. Explorations.

Scott, Barry: 1958. Mineralisation on the West Coast Range. Unpub. Report for Lyell - E. Z. Explorations.

1960. Lower Palaeozoic Unconformities in South Western Tasmania. Pap. Roy. Soc. Tas. 94, pp. 103-110.

Solomon M. 1958 (?) Palaeozoic Sedimentation, Tectonics & Mineralisation in the Mt. Lyell Area (Tasmania) with expecial reference to the Origin and Economic Significance of the Lyell Schists. Unpub. M. Sc. Thesis for the Uni. of Tasmania.

1960. The Dundas Group in the Queenstown Area. Pap. Proc. Roy. Soc. Tas. V94 pp. 33-50.

Twelvetrees, W. H.: 1901. Report on the Mineral Districts of the Mts. Huxley, Jukes and Darwin. Report. Sec. Mines. 1900-1901, Tas. Parl. Pap. No. 4.

Wade, M. L.: 1957(a) Report on the Examination of the Prince Darwin Workings.
Unpub. Report of Lyell - E. Z. Explorations.
1957 (b) Report on the Examination of Findons Area, 3107-M.
Unpub. Report Lyell - E. Z. Explorations.

Wade, M. L. & Solomon M: 1958. Geology of the Mt. Lyell Mines, Tasmania. Econ. Geol. V. 53, No. 4, pp. 367 - 416.

6558

Farm Cove

Kelly Basin

Flown & Compiled by Adastra Hunting Geophysics Pty Ltd. Mascot N.S.W. 1957
For Lyell E.Z Explorations

0 30 60 CHNS

5 cm

FIG. 7

UNITED STATES METALS REFINING CO.	
Exploration Licence E.L. 2/64, TASMANIA	
JUKES - DARWIN AREA	
152089 AERO MAGNETIC SURVEY TOTAL MAGNETIC INTENSITY MAP 67-487	
Date: December 1964	Scale: 1 inch = 30 chains (Approx)


4400 W
4000 W
3500 W
3000 W
2500 W
2000 W
1500 W
1000 W
500 W
00
500 E
1000 E
1500 N
1000 N
500 N
00
500 S.
1000 S.
1500 S.
1750 S.
6559
T.N.
M.N.
LEGEND
Fault
Boundary
Dip & Strike
Breccia
Rhyolite
Porphyry
Granite
Sedimentary Rocks
Joint
Schistosity
Hematite with a little pyrite
Strong Hematite Veining
Fig. 8
UNITED STATES METALS REFINING CO.
Exploration Licence E.L. 2/64 TASMANIA
JUKES-DARWIN AREA
152090
PRINCE DARWIN PROSPECT
GEOLOGICAL PLAN & TOPOGRAPHY
67-487
Date: December 1964
Scale: 1 inch = 100 feet

6561

4500 W | 4000 W | 3500 W | 3000 W | 2500 W | 2000 W | 1500 W | 1000 W | 500 W | 00 | 500 E | 1000 E

1500 N

1000 N

500 N

00

500 S

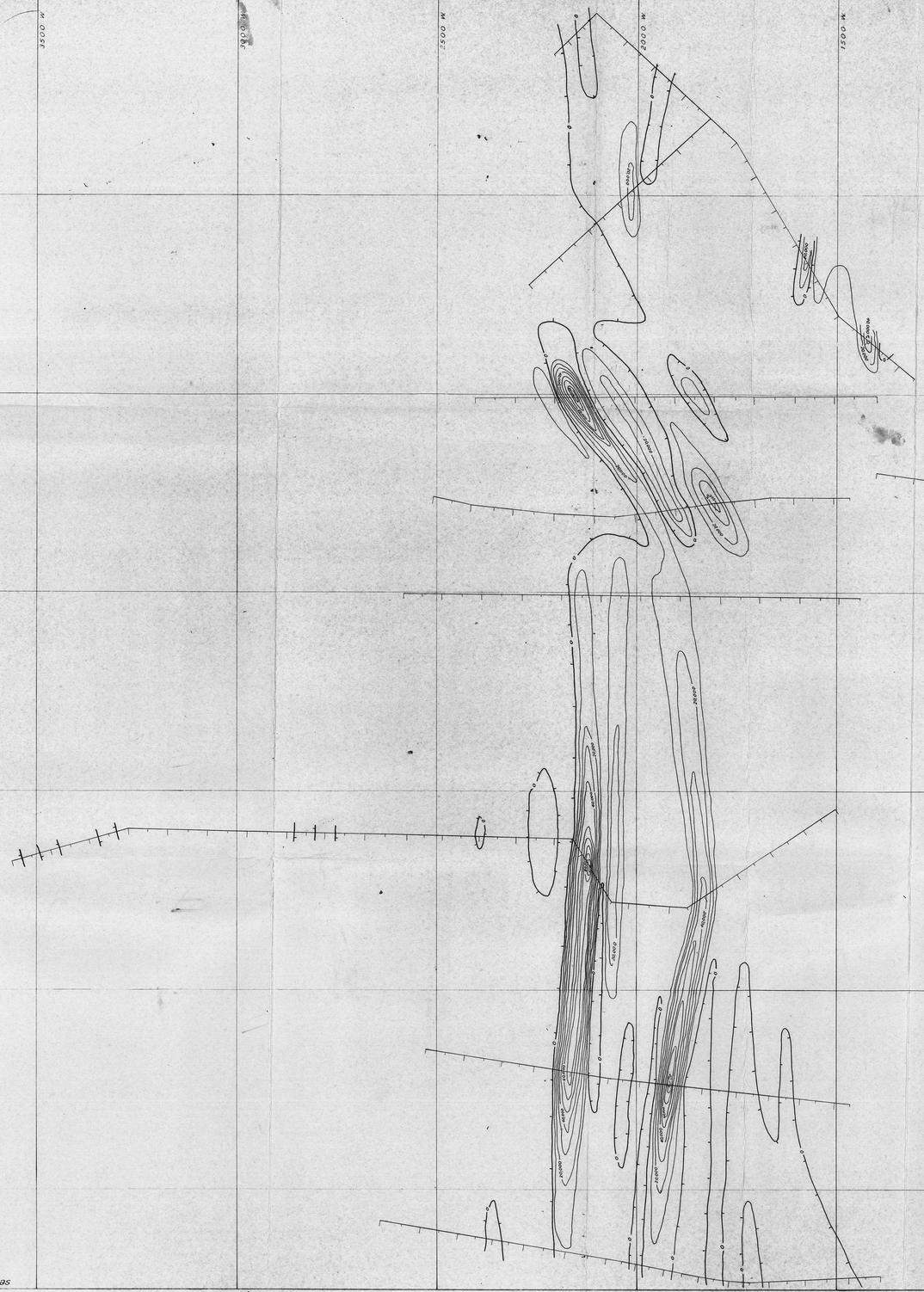
1000 S

1500 S

1750 S

T.N.

M.N.



6561

LEGEND

- Fault
- Boundary
- Dip & Strike
- Breccia
- Rhyolite
- Porphyry
- Granite
- Sedimentary Rocks
- Joint
- Schistosity
- Magnetic Contours 0 gamma

Contour Interval 10,000 gammas

5 cm

0 100 200 FT.

Fig 9

UNITED STATES METALS REFINING CO.

Exploration Licence E.L. 2/64 TASMANIA

JUKES-DARWIN AREA

152091

PRINCE DARWIN PROSPECT

MAGNETIC CONTOURS

67-487

Date: December 1964 | Scale: 1 inch = 100 feet

4400 W | 4000 W | 3500 W | 3000 W | 2500 W | 2000 W | 1500 W | 1000 W | 500 W | 0 | 500 E | 1000 E

1750 S

2000 S

2500 S

3000 S

3500 S

4000 S

4500 S

5000 S

T.N. M.N.

LEGEND

- Fault
- Boundary
- Dip & Strike
- Breccia
- Rhyolite
- Porphyry
- Granite
- Sedimentary Rock
- Joint
- Schistosity
- Magnetic Contour 0 gamma

Contour Interval 10,000 gammas

6562

0 100 200 FT.

5 cm

Fig. 9a

UNITED STATES METALS REFINING CO

Exploration Licence E.L. 2/64, Tasmania

JUKES - DARWIN AREA

152092

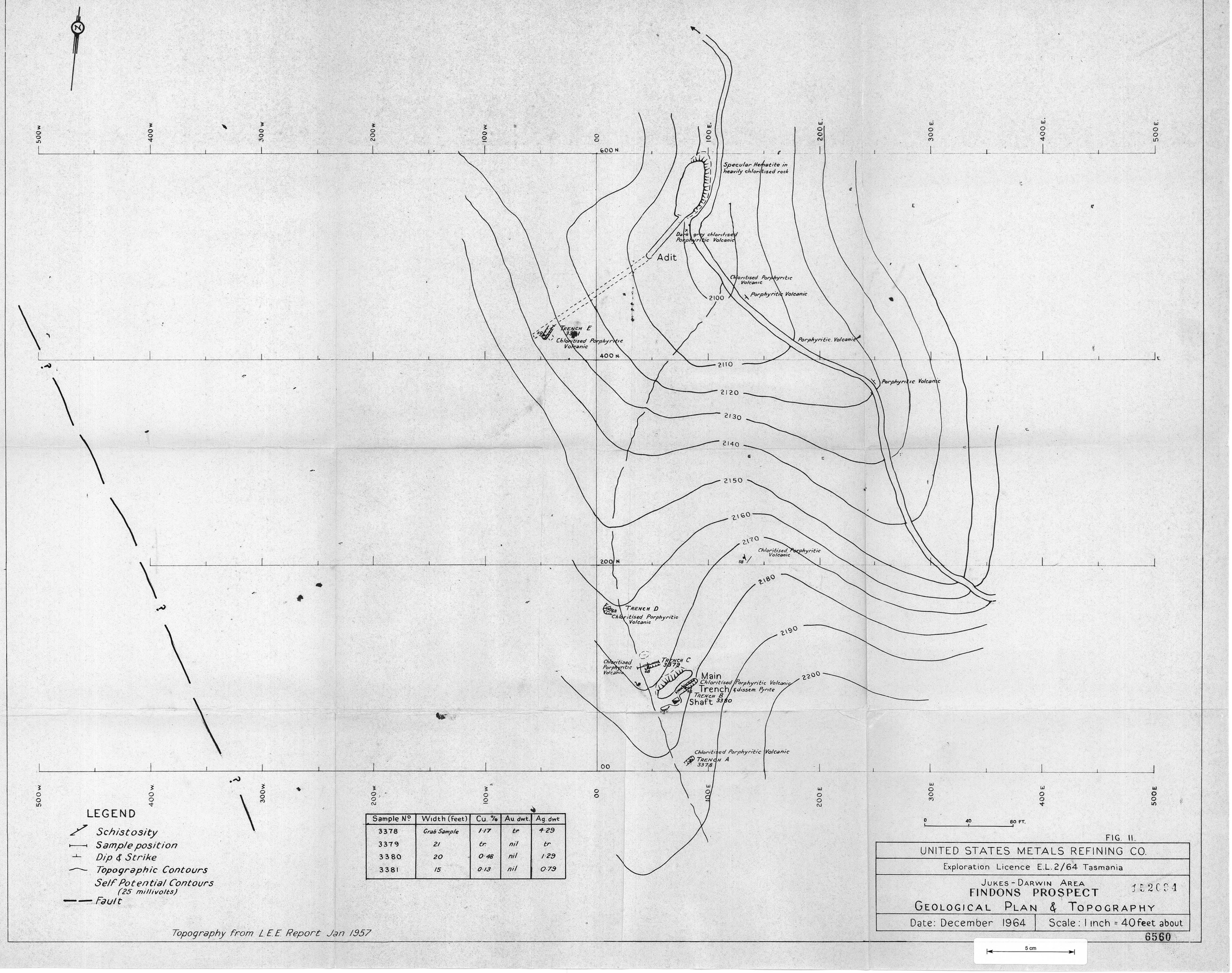
PRINCE DARWIN PROSPECT

(Tasman Darwin Area)

MAGNETIC CONTOURS 67-487

Date: December 1964 | Scale: 1 inch = 100 feet


6563
4400 W
4000 W
3500 W
3000 W
2500 W
2000 W
1500 W
1000 W
500 W
00
500 E
1000 E
1500 N
1000 N
500 N
00
500 S
1000 S
1500 S
1750 S
T.N.
M.N.
LEGEND
Fault
Boundary
Dip & Strike
Breccia
Rhyolite
Porphyry
Granite
Sedimentary Rocks
Joint
Schistosity
Self Potential Contour 0 Milivolts
Contour Interval 25 milivolts
6563
0
100
200 FT.
5 cm
FIG 10
UNITED STATES METALS REFINING CO.
Exploration Licence E.L. 2/64 TASMANIA
JUKES - DARWIN AREA
152093
PRINCE DARWIN PROSPECT
SELF POTENTIAL CONTOURS
67-487
Date: December 1964
Scale : 1 inch = 100 feet



LEGEND

- Schistosity
- Sample position
- Dip & Strike
- Topographic Contours
- Self Potential Contours (25 millivolts)
- Fault

Sample No	Width (feet)	Cu. %	Au. dwt.	Ag. dwt
3378	Grab Sample	1·17	tr	4·29
3379	21	tr.	nil	tr
3380	20	0·48	nil	1·29
3381	15	0·13	nil	0·79

Topography from L.E.E. Report Jan 1957

FIG. II.

UNITED STATES METALS REFINING CO.

Exploration Licence E.L.2/64 Tasmania

JUKES-DARWIN AREA

FINDONS PROSPECT

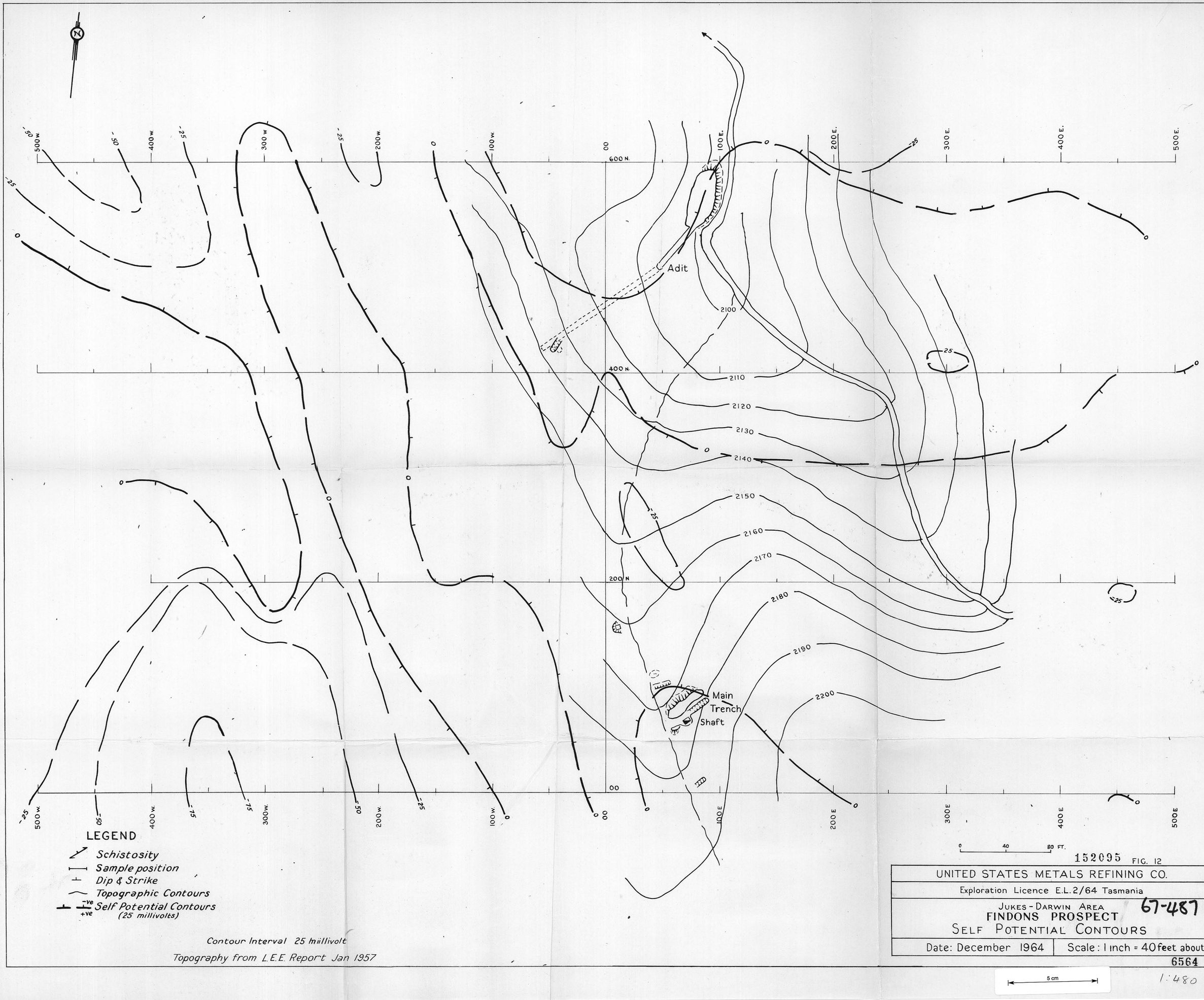
152084

GEOLOGICAL PLAN & TOPOGRAPHY

Date: December 1964 | Scale: 1 inch = 40 feet about

6560

5 cm



LEGEND

- Schistosity
- Sample position
- Dip & Strike
- Topographic Contours
- -ve / +ve Self Potential Contours (25 millivolts)

Contour Interval 25 millivolt

Topography from L.E.E. Report Jan 1957

152095 FIG. 12

UNITED STATES METALS REFINING CO.	
Exploration Licence E.L.2/64 Tasmania	
JUKES - DARWIN AREA 67-487 FINDONS PROSPECT SELF POTENTIAL CONTOURS	
Date: December 1964	Scale: 1 inch = 40 feet about

6564

5 cm

1:480

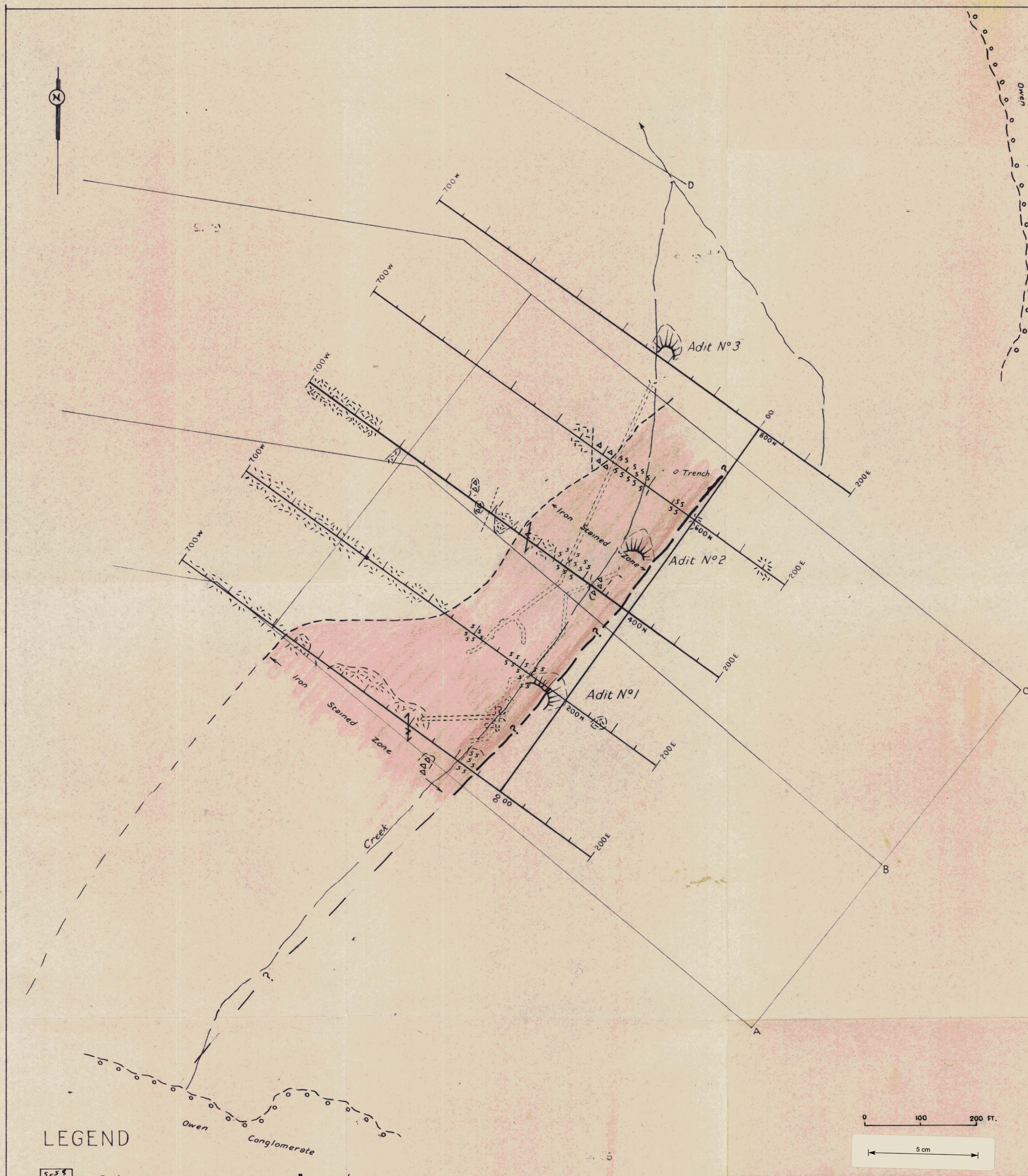


FIG. 13

UNITED STATES METALS REFINING CO.

Exploration Licence E.L. 2/64, TASMANIA

JUKES - DARWIN AREA

152096

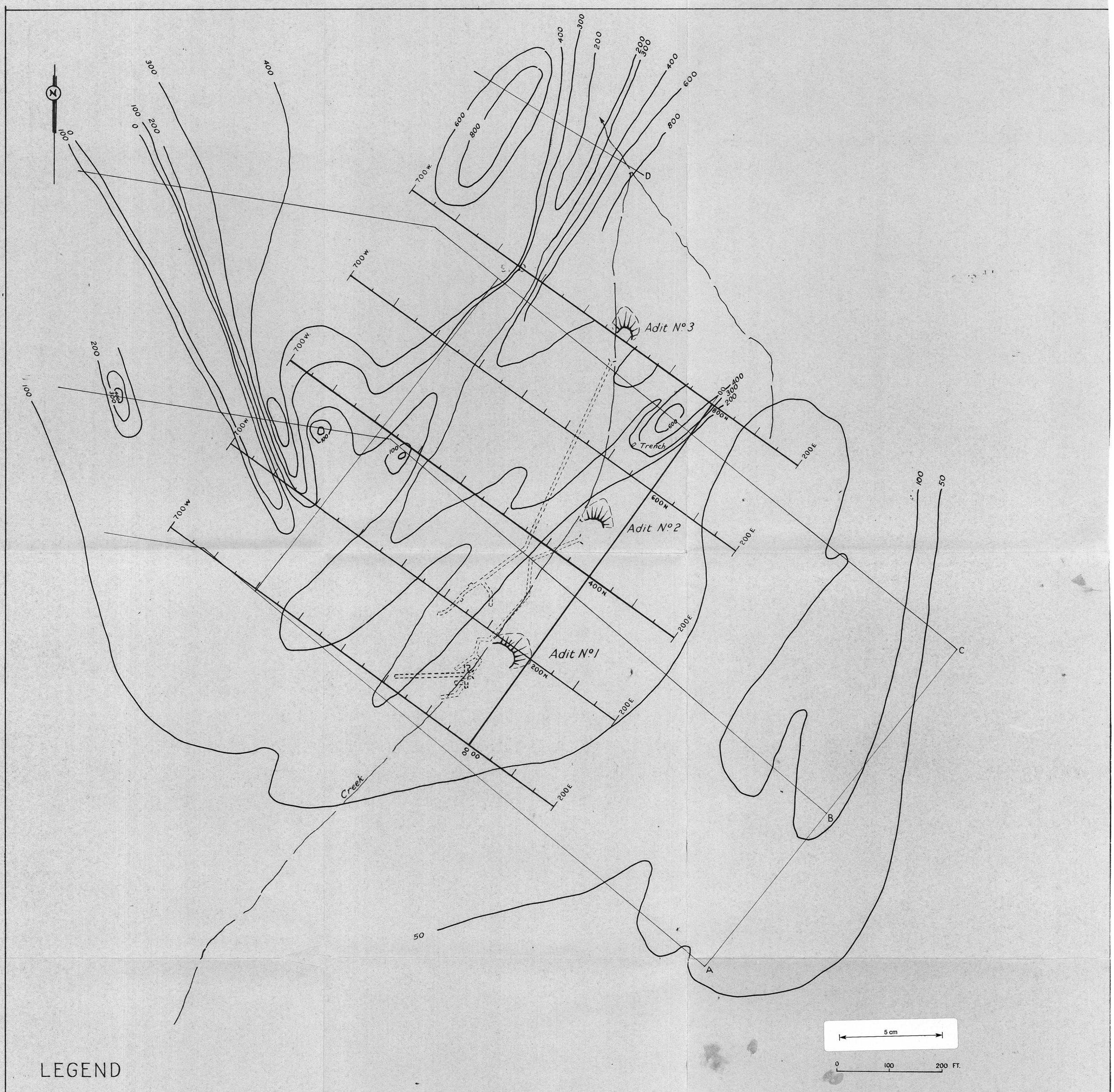
JUKES PROPRIETARY AREA

GEOLOGICAL PLAN & TOPOGRAPHY

67-487

Date: December 1964	Scale: 1 inch = 100 feet

6565



LEGEND

- Schist
- Porphyry
- Owen Conglomerate
- Magnetic Traverse Line
- S.P. Traverse Line
- Magnetic Contour
- Underground Workings

From L.E.E. Report 1958

FIG. 14

UNITED STATES METALS REFINING CO.

Exploration Licence E.L. 2/64, TASMANIA

JUKES - DARWIN AREA

152097

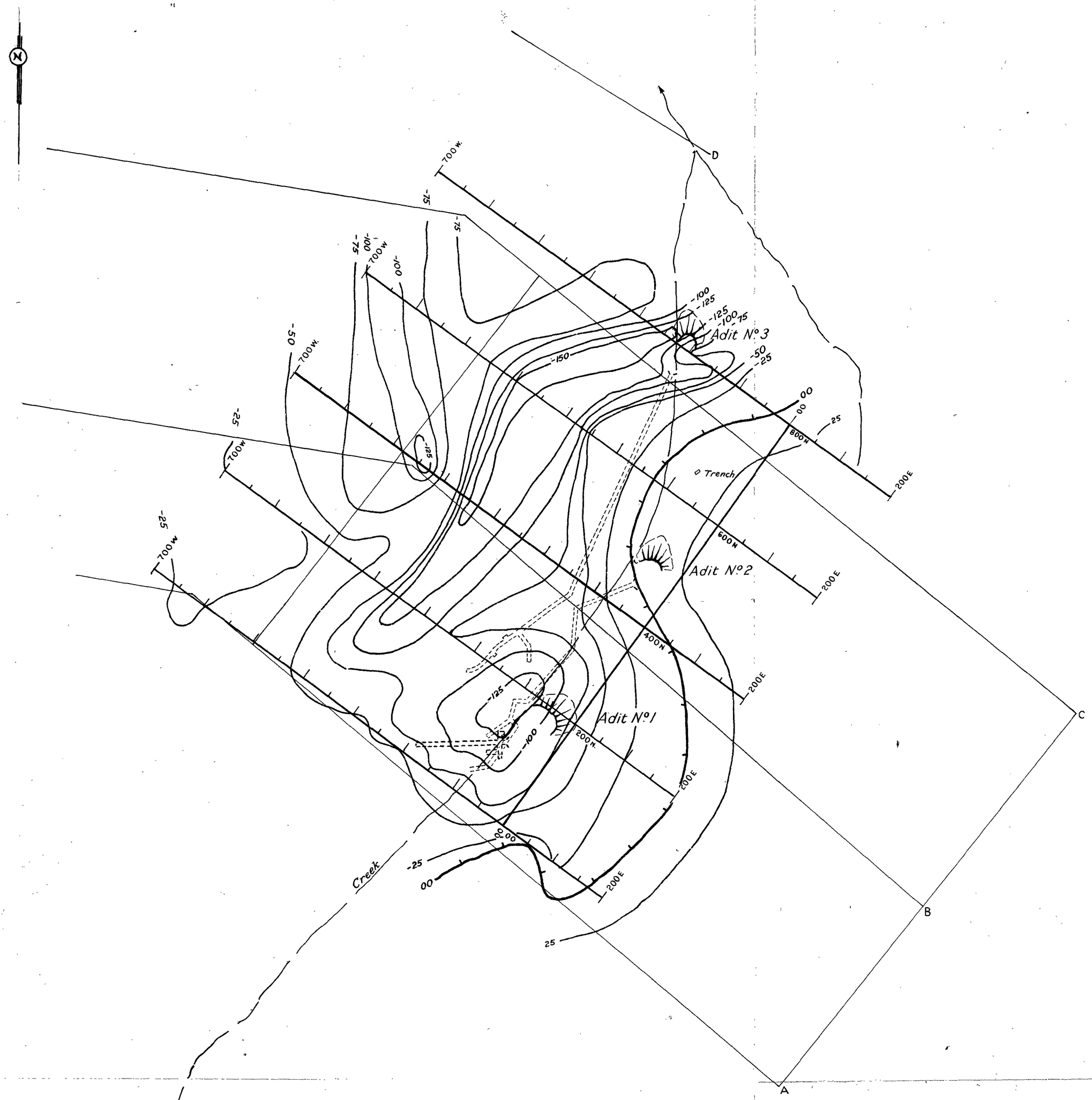
JUKES PROPRIETARY AREA

MAGNETIC CONTOURS

67-487

Date: December 1964 | Scale: 1 inch = 100 feet

6566



LEGEND

- Schist
- Porphyry
- Owen Conglomerate
- Magnetic Traverse Line
- S.P. Traverse Line
- S.P. Contour (-ve / +ve)
- Underground Workings

Contour Interval 25 millivolt
From L.E.E. Report 1958

5 cm

0 100 200 FT.

FIG. 15

UNITED STATES METALS REFINING CO.

Exploration Licence E.L. 2/64, TASMANIA

JUKES - DARWIN AREA

152098

JUKES PROPRIETARY AREA

SELF POTENTIAL CONTOURS

67-487

Date: December 1964 | Scale: 1 inch = 100 feet

6567

Magnetic North
11° E
True North

ED 8
ED 7
ED 6

DILLON'S No 1

BASE LINE
(True Bearing 345°12')

Not mineralized

ANOMALY No.2
3' of chalcopyrite
5' of pyrite
10' of gassan

PEARCES
SEC 4654

SOUTERS
SEC 4615 M

ANOMALY No 1
pyrite

TRENCH
6' of pyrite

ANOMALY No.3
Soft sheared sandstone
No pyrite

SHEARED
DUNDAS
SEDIMENTS

Pebbly silicified quartzite

Silicified quartzite

Crushed many quartz veins

Dundas pebble bed

Red silicified sandstone

OWEN CONGLOMERATE

100 200 400 600 800 1000 1200 1400 200 N

100 150 200 250 300 350 400 450 500 550 600 650 700 1000 1200 1400 1600 1800 2000 2200 S

F

5 cm

0 100 200 FT.

LEGEND

- ADIT
- SHAFT
- COSTEAN
- TRACK
- CONTACT
- CREEK
- ELECTROMAGNETIC INDICATIONS (-4° contour)
- MAGNETIC ANOMALY 300 γ contour

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics.
To Accompany Records 1959, No 36

GEOLOGY BY M.L. WADE Mt LYELL M & R. Co. Ltd.

FIG. 16

UNITED STATES METALS REFINING CO.

Exploration Licence E.L. 2/64, TASMANIA

JUKES DARWIN AREA

152099

EAST DARWIN MINES

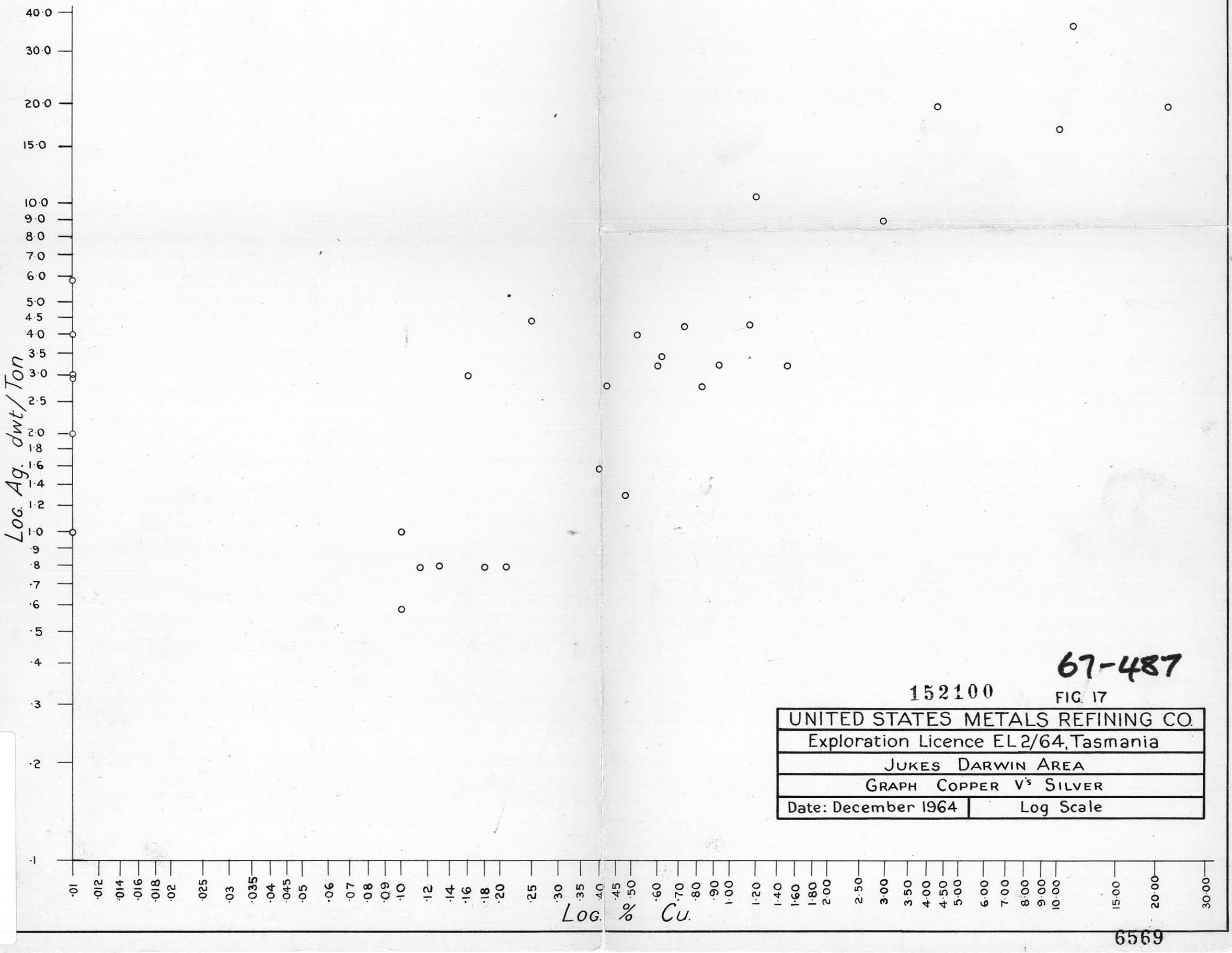
GEOPHYSICAL & GEOLOGICAL MAP

67-487

Date: December 1964

Scale: 1 inch = 100 feet

6568



67-487

152100 FIG. 17

UNITED STATES METALS REFINING CO.	
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JUKES DARWIN AREA	
GRAPH COPPER V's SILVER	
Date: December 1964	Log Scale

6569