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UNION OIL DEVELOPMENT CORPORATION

BIRCH INLET (E.L. 9/74)

ANNUAL REPORT

1974/75 FIELD SEASON

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PROJECT GEOLOGIST

AUGUST 1975

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PLANS

1. Locality Plan: Distribution of Cambrian Volcanic and Sedimentary Sequences, Tasmania 1:500,000 Plan No. 457.

2. Geology (after Australasian Minerals) - 2 sheets, 1:15,840

3. Rock Chip and Stream Sample Locations (with tabulated results) - 2 sheets, 1:15,840, Plan No. 449 and 50.

4. Soil Sample Profiles - Copper, 2 sheets, 1:15,840, Plan No. 451 & 2.

5. Soil Sample Profiles - Lead, 2 sheets, 1:15,840, Plan No. 453 & 4.

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7. Summary of Results - 1975, and Proposed Areas for Detail Study in 1976, 1:31,680, Plan No. 464.

8. Anomalous Areas (1-7) - 4 sheets, 1:15,840, Plan No. 465 - 468

9. Airborne Electromagnetic Anomaly Map - Geoex Pty. Ltd., 1:16,000.

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APPENDICES

1. Geophysical Survey on Tasmanian E.L. 9/74 - Birch Inlet, B. K. Salisbury.

2. Concise Report on the Helicopter Borne Magnetic and Electromagnetic Survey by Geoex Pty. Ltd.

3. E. L. 9/74 Birch Inlet Geophysical Interpretation, B. K. Salisbury.

1. INTRODUCTION

The Birch Inlet Exploration Licence (E.L. 9/74) is situated in southwest Tasmania, approximately 160 kilometers south of Queenstown and is 368 square kilometers in area. The area was pegged in May 1974 by R. D. McNeil with the aim of exploring the elongate belt of acid volcanics which outcrop east of the Innes Peak-Mount Lee Range, and cover an area of approximately 60 square kilometers. Access to this area is generally quite difficult and during bad weather it is totally inaccessible. Helicopter access is natrually the easiest but the high charges of this service necessitate that it be used only on selected occasions. The two other routes of access are: a 50 kilometer boat trip from Strahan to Birch Inlet, then a 20 kilometer drive by bombardier to the main camp; or a flight from Hobart to Moores Valley airstrip by light aircraft (weather permitting) then approximately 20 kilometers by bombardier to the camp.

The terrain over the volcanics varies from rugged in the north to steeply undulating in the south. Vegetation, although open in places, is generally quite thick, the rain forest areas being almost impenetrable. Elevation is between 200 and 700 meters, and the annual rainfall is thought to be about 600 centimeters. The heavy rains cause river flooding and extremely boggy conditions between April and November and therefore make it impossible to work in this area during the winter months.

Regional stream sampling has been done over this area by the Lyell-Electrolytic Zinc partnership in the late 1950's and by The Broken Hill Proprietory Co. Ltd. in the late 1960's. Australasian Minerals Inc. (1972-4) was the first company to do any detail work in this area, and this consisted of widely spaced soil sample traverses, random rock chip sampling, and mapping. Also, Australasian Minerals had a Scintrex Turair survey flown over the northern part of the volcanics in February 1973.

Prior to beginning any detail field work last summer, it was necessary to use a bulldozer to put in a five kilometer access track from the

Low Rocky Point Lighthouse track to the belt of Cambrian volcanics. Access over the southern two-thirds of the volcanic belt was made possible by the use of two bombardiers (J5 and Muskeg), while the northern part necessitated the use of a helicopter for access.

2. SUMMARY

Exploration has been confined to a volcanogenic copper-lead-zinc search over the areas of Cambrian volcanics (here known as the Lucas Volcanics) which are known to contain economic deposits at Queenstown and Rosebery. The belt of Lucas Volcanics is approximately 16 kilometers long and three kilometers wide and is flanked on either side by narrow Cambrian sedimentary units: the D'Aguilar Group (basal) to the east lies unconformably on Precambrian metasediments while the Thirkell Group (upper-most unit) to the west is unconformably overlain by Ordovician conglomerates and sandstones known as Owen Conglomerate.

Field work was carried out from mid-February to mid-April 1975 and consisted of gridding, ground geophysics, airborne E.M., stream, soil and rock chip sampling, and some reconnaissance mapping. Seven anomalous areas have been found within the Cambrian sequence which warrant further investigation in the 1975/76 field season.

3. RECOMMENDATIONS

The seven anomalous areas found during the last summer program should be tested in detail by soil and/or auger sampling, ground geophysics and mapping, with the aim of providing drill targets for the 1976/77 season.

4. WORK COMPLETED

(i) Gridding

Twelve grid lines 800 meters apart and averaging 2.6 line kilometers were cut normal to the strike of the volcanics (262½° - 082½° magnetic) over the southern half of the volcanic belt. A base-line was cut for the northern part of this grid while over the southern part the base-line points for the remaining grids were located from 1:16,000 aerial photographs. The lines were cleared by bombardier and put in by chain and compass with station spacings of 50 meters. In the rugged northern part of the volcanics, a short hand cut grid (495 meters) bearing 120-300 degrees (? normal to strike) was put in over a ridge containing anomalous rock chip samples.

(ii) Stream Sampling Refer hand written page Following this page

A total of 129 stream sediment samples were taken from drainages over the Cambrian volcanics; seventy of these came from the rugged northern part of the area where access was only possible by helicopter. The drainage area of this northern part was approximately 14 square kilometers, therefore giving a sample density of four samples per square kilometer. The fifty-nine samples from the southern half of the area were taken where grid lines crossed streams and therefore do not give a comprehensive stream coverage. However, these samples were easy to take during the soil program and did provide some useful information.

(iii) Soil Sampling

There were approximately 1,260 soil samples taken over the main grid at 25 meter intervals, and 34 samples taken at 15 meter intervals over the single short grid line in the north of the area. All samples were taken from a depth of approximately 10 centimeters, presumably in the A1 horizon.

~~29001~~	CU	PB	ZN
29001	2	<5	2
2	<2	<5	5
3	<2	<5	2
4	<2	<5	<2
5	<2	<5	2
6	<2	<5	5
7	2	18	5
8	<2	<5	2
9	2	<5	<2
10	<2	<5	2
11	2	<5	5
12	2	<5	2
13	5	8	5
14	5	8	8
15	5	10	10
16	2	<5	2
17	2	22	8
18	5	8	8
19	5	8	8
20	2	8	8
21	2	5	2
22	8	10	10
23	5	12	5
24	5	25	10
25	5	20	8
26	8	5	8
27	8	12	8
28	2	<5	5
29	2	8	5
30	2	<5	5
31	2	<5	2
32	2	<5	8
33	5	<5	5

-	CU	PB	ZN
29034	2	5	8
35	2	5	8
36	2	<5	5
29037	2	<5	5
29038	<2	<5	2
39	2	<5	5
40	<2	<5	5
41	<2	<5	2
42	<2	<5	5
43	<2	<5	2
44	2	5	5
45	<2	<5	5
46	<2	<5	2
47	2	5	2
48	<2	<5	2
49	2	<5	2
50	2	<5	2
51	5	<5	5
52	5	<5	12
53	2	<5	5
54	2	<5	5
55	2	<5	2
56	<2	<5	2
57	<2	<5	5
58	<2	<5	2
59	<2	<5	5
60	<2	<5	2
61	<2	<5	5
62	2	<5	5
63	2	<5	5
64	5	<5	5
29065	<2	<5	2

5080007

Plan N° 669

	CU	PB	ZN
29066	<2	<5	2
67	<2	<5	5
68	<2	8	5
69	<2	<5	10
70	<2	<5	90
71	<2	<5	8
72	2	5	20
73	<2	<5	5
74	2	<5	5

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	CU	PB	ZN
29075	<2	<5	5
76	<2	<5	2
77	<2	<5	5
78	<2	<5	5
79	2	5	8
80	2	5	10
1	<2	10	12
2	<2	<5	5
3	<2	<5	5
4	<2	<5	2
5	<2	<5	5
6	2	18	10
7	<2	5	2
8	5	5	15
9	<2	<5	5
90	<2	<5	2
1	2	<5	5
2	2	5	8
3	<2	<5	5
4	<2	5	10
5	<2	<5	5

Plan 450 75-1112

	CU	PB	ZN
29096	<2	<5	10
7	<2	<5	8
8	2	<5	5
9	5	55	20
29100	5	5	15
1	2	5	10
29102	<2	<5	8
3	<2	8	5
4	2	<5	8
5	<2	<5	8
6	2	<5	10
7	2	<5	8
8	<2	<5	10
9	<2	<5	8
29110	2	<5	15
1	2	<5	8
2	2	<5	5
3	<2	<5	8
4	<2	<5	5
5	2	<5	8
6	2	5	5
7	2	<5	12
8	2	10	10
9	5	8	35
29120	2	18	35
1	<2	8	10
2	<2	<5	20
3	2	<5	12
4	2	<5	10
5	5	<5	20
6	<2	<5	10
7	2	<5	10
8	<2	10	12
29129	<2	<5	5

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(iv) Rock Chip Sampling

A total of 42 rock chip samples were taken throughout the area.

(v) Geological Mapping

Several traverses were made over the Lucas Volcanics to become familiar with the geology and to check some of the features previously mapped by Australasian Minerals Inc.

(vi) Geophysics

Twenty-one line kilometers of gradient induced polarisation was carried out between 12800N and 19200N at 800 meter intervals. During April 1975 a helicopter borne E.M. survey was flown over the southern part of the volcanics by Geoex Pty. Ltd. For the details of these programs please refer to the appended reports.

5. GEOLOGY

The belt of volcanics occurring here are known as the Lucas Volcanics and are equivalent to the Mount Read Volcanics to the north and the Lewis River Volcanics to the south. Essentially the Lucas Volcanics consist of a monotonous sequence of medium to coarse grained quartz-feldspar tuffs with some rhyolite flows and occasional units of lapilli, aglomerate and fine grained sediments. The tuffs generally consist of medium grained phenocrysts of quartz and feldspar with minor amphiboles and a groundmass of finely crystalline quartz, feldspar and minor chlorite. The quartz crystals are euhedral to rounded and partially embayed, while the feldspars are euhedral to sub-hedral and are occasionally altered to saussurite and chlorite or weathered to kaolinite. Some spherical vesicules were noted, and may indicate a flow origin for the particular unit. Trace amounts of opaques (magnetite) have also been noted to occur in the tuffs.

The following description is the author's summary of the stratigraphy and structure as described by I. D. Martin (1974) of Australasian Minerals.

Precambrian (Proterozoic)

The Precambrian rocks to the east of D'Aguilar Range have been described by Martin as undifferentiated quartzites, quartz-mica schists, tourmaline-quartz schists, silicified dolomites, graphitic schists and chlorite schists.

Cambrian

D'Aguilar Group

The D'Aguilar Group has been mapped by Martin as the lower-most group of the Cambrian rocks in the area, and the contact with the Proterozoic quartzites and mica schists is a faulted and folded unconformity. He has divided the group into three units; the lower-most is a poorly sorted polymictic conglomerate with well rounded boulders of chert, quartzite, quartz mica schist and minor sandstone and limestone pebbles. Overlying, and interbedded with the coarse conglomerate, are fine grained quartz-muscovite sandstones and quartz-mica schists. The next unit consists of epiclastic volcanic rocks which contain kerotophyres that could be either lavas or intrusives. The upper-most unit is a thin conglomerate which contains a few boulders of volcanic material. Interbedded with these units and in contact with the upper-most unit of the group is a dark green to black shale. No facing evidence was obtained from these rocks.

Lucas Volcanics

The Lucas Volcanics are described by Martin as a succession of rhyolites, ignimbrites, minor ash-fall tuffs and intercalated sedimentary and pyroclastic horizons, and some intrusive quartz-feldspar porphyries, one of which is presumbed to be large (discussed below).

Many of the ignimbrites and rhyolites found by Martin contained up to two percent pyrite and traces of occasional chalcopyrite. Brown mottling in sediments and pyroclastics is assumed to be caused by sulphides.

It is presumed by the author that the ignimbrites and ash-fall tuffs were determined by microscopy, as neither were recognised as such during the field traverses.

Thirkell Group

This unit unconformably overlies the Lucas Volcanics, and according to Martin, consists of a basal polymictic conglomerate (5 to 50 percent volcanic clasts) which grades into fine grained chloritic rocks (?epiclastic tuffs), thence into black shales which contain pyrite and occasional chalcopyrite and sphalerite. Overlying this is a sequence of quartz and quartz-mica sandstones similar to the overlying Ordovician sandstones. The Thirkell Group is thought to represent the final stage of Cambrian volcanism.

Porphyry (?intrusive)

This unit is described by Martin as holocrystalline and petrologically uniform and is therefore thought by him to be an intrusive porphyry similar to the one that intrudes the Dora Conglomerate near Queenstown which is equated to the Thirkell Group. However, the author feels that apart from the texture and uniformity, there is no definite evidence of intrusion, so this should only be regarded as a tenuous interpretation. Also, the fact that a magnetic trend cuts the proposed intrusive, tends to refute its existence.

Ordovician

Owen Conglomerate

This unit consists of oligomictic quartz conglomerate, and well bedded quartz mica sandstones. These units form the Thirkell Hill-Innes Peak-Mt. Lee Range, and sedimentary features have indicated a west facing.

Structure

The structures (as described by I. D. Martin) in the Precambrian rocks are complex and suggest at least three periods of folding. The faulting is dominantly meridinal and east dipping. The faulted contact between the Precambrian and the Cambrian volcanics is suggested to be a steep reverse fault with negligible horizontal movement.

From aerial photographs, minor structures and repetition of sequences, both in the same order and in reverse order, suggest that isoclinal folds are probably present in the Cambrian Volcanics; however, Martin could not substantiate this in the field.

It was suggested by Martin that magnetic data over the northern part of the volcanics defined an anticlinal structure plunging to the north and that the reversal of stratigraphic units in the acid volcanics correlates with this interpretation. However, B. K. Salisbury (U.O.D.C. Geophysicist) strongly refutes Martin's magnetic interpretation and states that there is definitely no magnetic evidence of such a fold.

The Ordovician sequence shows a faulted, north-striking and gently plunging anticline (15 degrees) with steep dips to the west and gentle easterly dips. The sequence has been cut by a number of major strike faults which do not show any evidence of horizontal displacement.

Numerous minor faults are visible from the aerial photographs, and can be seen to transect the Tertiary sediments overlying the Cambrian volcanics; horizontal displacement may exceed 100 meters in places.

6. GEOCHEMISTRY

(i) Stream (sediment)

Stream samples consisted of fine sediment material from the creek bed. Samples were prepared and analysed by AMDEL and are now stored in U.O.D.C.'s Kalgoorlie Office. The assaying technique was a percholoric acid digestion at 180°C for 30 minutes, then diluted with water and determined by A.A.S.

The values of copper, lead and zinc are uniform and therefore the determination of background values is quite simple.

Copper

< 2 - 4 ppm: background, with majority of values less than 2 ppm.

5 - 7 ppm: weakly anomalous (always 5 ppm), significant when occurring with either a lead or zinc anomaly.

> 7 ppm: anomalous (always 8 ppm)

Lead

< 5 - 8 ppm: background, with majority of values less than 5 ppm.

9 -18 ppm: weaklay anomalous, significant when occurring with either a copper or zinc anomaly.

> 18 ppm (55 ppm highest value): anomalous

Zinc

< 2 - 9 ppm: background (generally in 2-8 ppm range)

10 -35 ppm: weakly anomalous, significant when occurring with either a lead or copper anomaly.

35 ppm (single high value): anomalous

Samples with a single element anomaly are not considered significant, and no follow-up work is recommended. Significant samples are those with two, or all three elements with values in the weakly anomalous to anomalous range. Where a number of samples draining the same area are significant, it is recommended that further reconnaissance be carried out to determine the source.

(ii) Soils

Samples were taken at a depth of approximately 10 centimeters in the humic rich A1 horizon. They were then dried and sieved to minus 80 mesh and analysed by AMDEL using the perchloric acid digestion and A.A.S. determination. The samples are now stored at U.O.D.C.'s Kalgoorlie Office.

Due to the relatively constant background values (especially copper and lead), the classification of anomalous values is relatively straightforward:

Copper

< 2 - 5 ppm: background.

6 - 9 ppm: possibly significant when occurring with anomalies of lead or zinc.

10 -14 ppm: weakly anomalous.

> 14 ppm (highest value 22 ppm): anomalous.

Lead

< 5 -14 ppm: background (generally 5-10 ppm).

15 -19 ppm: possibly significant when occurring with anomalies of copper or zinc.

20 -29 ppm: weakly anomalous.

> 29 ppm (highest value 260 ppm): anomalous (generally 100-150 ppm).

Zinc

< 2 -49 ppm: background (erratic within these limits).

50 -79 ppm: possibly significant when occurring with anomalies of copper or lead.

80 -99 ppm: weakly anomalous.

> 99 ppm (highest value 400 ppm): anomalous (generally 100-150 ppm)

Areas which warrant further exploration are those defined by anomalous values of at least two elements which are in close proximity to each other. This has led to the definition of three major areas that will require more detailed exploration during the coming field season.

The Thirkell Area (Area 1) is a copper-lead zone which is coincident with the Thirkell Group of sediments occurring along the eastern flank of the Innes Peak-Thirkell Hill Range between 160N and 192N.

The Southern Area (Area 4) consists of two separate zones; one is a broad zinc-lead zone (Area 4b) between 112N and 120N, and the other (Area 4a) is a strong, narrow Cu, Pb, Zn zone to the west of Area 4b and occurs on three lines, 104N, 112N and 120N.

The Central Area (Area 5) is a wide lead-zinc zone which occurs in the centre of the volcanic belt between 152N and 176N.

(iii) Rock Chip

Each sample consisted of four to six pieces of rock from the one locality. The samples were pulverised and analysed by AMDEL, using perchloric acid digestion and A.A.S. determination. The pulps are stored at U.O.D.C.'s Kalgoorlie Office and representative hand specimens at the Hobart Office.

The following is the anomaly classification for acid pyroclastics and rhyolites sampled in this area:

Copper

< 2 -29 ppm: background (generally 2-5 ppm).

30 -99 ppm: weakly anomalous.

> 99 ppm (highest value 430 ppm): anomalous

Lead

< 5 -29 ppm: background (generally 5-10 ppm).

30 -99 ppm: weakly anomalous.

> 99 ppm (highest value 1150 ppm): anomalous.

Zinc

< 2 -99 ppm: background (generally 5-35 ppm).

100-299 ppm: weakly anomalous.

> 299 ppm (highest value 690 ppm): anomalous.

7. DISCUSSIONS AND RECOMMENDATIONS ON THE MAIN ANOMALOUS AREAS

The seven areas which warrant further exploration are here discussed as Areas 1 to 7; where possible descriptive names for the areas are in brackets.

Area 1 (Thirkell Anomalies) refers to anomalies within the Thirkell Group of fine grained sediments and pyritic shales. The anomalous zone proposed for further examination consists of copper-lead soil anomalies on all lines between 160N and 192N, I.P. anomalies on all lines between 144N and 192N (except 152N and 168N), and three significant airborne M-400 E.M. anomalies at 108N, 114N, and 157N. Also of significance within this group, is a zone of copper-zinc soil anomalies in the vicinity

of 144N, and three rock chip anomalies at approximately 122N; the most significant of these contained 130 ppm copper, 190 ppm lead, 160 ppm zinc.

In the northern part of the E.L., on the east slopes of Mount Lee, the Scintrex Turair Survey located three significant anomalies and several minor conductors within the Thirkell Group. However, because of the lack of access, it is suggested that no follow-up work be attempted on these particular E.M. anomalies.

According to I. D. Martin, the basal conglomerate unit of the Thirkell Group grades upward to a black shale containing pyrite and occasional grains of chalcopyrite and sphalerite. It is probable that this is the source for the geophysical and geochemical anomalies and therefore may tend to down-grade these anomalies. However, it is important to note that economic zinc, lead, copper deposits occur in and adjacent to black shales at Rosebery and Farrell, and therefore it is suggested that the more anomalous sections of the Thirkell Group be further examined using a Rosebery-type deposit as a target. This may best be achieved by detail mapping, ground geophysics, and soil and/or auger programs at 400 meter intervals between 144N and 180N where there are coincident I.P., soil and airborne E.M. anomalies. Also the M-400 E.M. anomaly (No. 6) near 112N should be tested at 400 meter intervals by soil and I.P. surveys.

Area 2 (D'Aguilar Anomalies) consists of three I.P. anomalies over a particular unit within the D'Aguilar Group on lines 160N, 168N, and 184N. As these anomalies occur near the ends of the lines (? close to the electrodes), it was thought they may have been due to distortion (end of line effect); however, the occurrence of an airborne E.M. anomaly coincident with the I.P. response on line 160N supports these as true I.P. anomalies. Although the D'Aguilar Group consists essentially of polymictic conglomerates and epiclastic sediments, I. D. Martin noted several interbedded dark green to black shales which may be the source of these geophysical anomalies.

Except for the east end of line 160N, no geochemical sampling has been done over these I.P. anomalies. Therefore it is suggested that this area be further tested by detail mapping and soil and/or auger sampling as well as a detail geophysical survey.

Area 3 (Hales River) consists of strong airborne E.M. anomalies on three flight lines (Geoex Anomaly No. 8), giving a strike length of at least 400 meters with the possibility of extneding further as the anomaly is open to the south. A magnetic anomaly occurring between 50 and 150 meters to the west of the E.M. response could be associated with it, therefore making this a prime target for follow-up work. From I. D. Martin's mapping, it appears as though the anomaly occurs within the D'Aguilar Group of sediments; however, the author feels this interpretation is rather open at present; the possibilities of it occurring in either the Cambrian volcanics or the Precambrian sediments cannot be dismissed. It is suggested that detail mapping, geochemical sampling (soil/auger), and ground geophysics be used to further define this anomaly.

It is proposed to put in grids at 200 meter spacing for the entire strike of the anomaly, and to extend one of the lines to intersect weaker E.M. anomalies occurring 500 meters to the east (Anomaly No. 9) and 600 meters to the west (Anomaly No. 10).

Area 4 (Southern Area - Lucas Volcanics) contains several significant anomalous soil horizons, rock chip samples, and weak stream anomalies. Geophysical coverage of this area was restricted to the airborne E.M. survey which revealed a significant isolated anomaly south of the claim boundary and two weak anomalies at approximately 108N/5W and 6W.

A strong copper, lead, zinc soil horizon (Area 4a) with a coincident weak E.M. response (108N/5W) occurs on the western side of the area, and appears to transgress the presumed strike of the volcanics and the magnetic trace data by approximately 15 degrees. It is possible this anomaly could be due to a mineralised fault or dike; however, there is no photo lineament to support this interpretation. Mappying by I. D. Martin in the vicinity of 104N/8W gives a bedding strike compatible to

that of the soil anomaly. It is proposed to test this part of the area with ground geophysics at 400 meter intervals and soil/auger lines at 200 meter intervals, as well as detail mapping and rock chip sampling.

The other part of this area of interest, is a zone of significant lead-zinc soil anomalies (Area 4b) and weak copper anomalies occurring on lines 122N and 120N between 4E and 4W. Also, there are some weakly anomalous rock chip samples (lead-zinc) and weak copper, lead zinc stream values from all streams sampled. This part of the area is not thought to be of major significance, and further work will depend on the results of the ground geophysics which is to be done over the existing 800 meter spaced grids. Further work to test any anomalies would be done on 400 meter spacings and consist of I.P. and soil and/or auger sampling.

Area 5 (Central - Lucas Volcanics) contains many strongly anomalous lead and zinc soil values on lines 160N, 168N and 176N in the vicinity of the base line. The only other anomlies to note in this area are a significant I.P. anomaly at 160N/00E, a rock chip sample at 169N/1E which is anomalous in copper, and two weakly anomalous copper soil values associated with the lead-zinc anomalies in the vicinity of 176N/4W. The I.P. and rock chip anomalies do not appear to be related to any lead-zinc anomalies. It is proposed that soil and/or auger sampling on 400 meter line spacings and 25 meter sample intervals be used to further investigate this area. Detail mapping of the strongly anomalous zones is also suggested.

Area 6 lies between lines 152N and 160N and co-orindates 4W and 10W; and contains minor soil, rock chip and stream anomalies and a significant airborne E.M. anomaly. The main E.M. anomaly, which is located at 154N/9W, shows good conductivity and is associated with a magnetic high; a weaker E.M. response approximately 250 meters to the north-north-east may be a continuation of this same (?) sulphide zone. Several weak copper and lead soil anomalies and lead-zinc rock chip anomalies occur in the vicinity of this possible E.M. trend and therefore add greater emphasis

to it. Stream samples at approximately 6W and 7W on line 152N are weakly anomalous in copper, lead and zinc, but are not related to the previously mentioned anomalies and are therefore not thought to be of any significance.

It is proposed to further test this E.M.-geochemistry zone by detail mapping and soil or auger sampling on200 meter spaced grids. If time permits, ground geophysics could be run over this area when the work is being done on the nearby Thirkell anomalies (Area 1).

Area 7 (Northern Area - Lucas Volcanics) contains many significant stream, soil and rock chip anomalies. Two magnetic units pass through the more anomalous parts of this area; one is coincident with a significant Turair anomaly south of the area of interest, while the other is coincident with a local area of strongly anomalous rock chip samples which contain minor sulphide boxworks. The anomalous soil and rock chip samples taken by Australasian Minerals Inc. are scattered through the area and do not have any definite trend whereas the anomalous copper stream samples, taken by U.O.D.C., do outline a local area and therefore will allow more definitive work to be done next season. Reasonable ground access to this area is not possible at present; however, it is proposed that an attempt be made to put in a bombardier track. Providing this is successful, the work on this area and the Turair anomaly to the south will consist of detail soil and/or auger sampling, mapping and rock chip sampling.

8. RECOMMENDATIONS FOR GEOPHYSICS by B. K. Salisbury

Induced polarization surveys may be conducted over previously located I.P. and E.M. features in the D'Aguilar and Thirkell sections as well as over a stronger E.M. Anomaly 8 at the southern end of the Exploration Licence. At maximum, four pole-dipole traverses of the Thirkell zone, four pole-dipole traverses of E.M. Anomaly 8, one pole-dipole traverse of the D'Aguilar, and a gradient spread for Lines 104, 112, and 120N are contemplated for this program.

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UNION OIL DEVELOPMENT CORPORATION

GEOPHYSICAL SURVEY ON TASMANIAN E.L. 9/74 - BIRCH INLET

FEBRUARY 1975 through APRIL 1975

Twenty-one line kilometers of gradient induced polarization data were obtained on nine lines over the Cambrian Lucas Volcanic section of the Birch Inlet block. Lines were spaced at 800 meter intervals on a grid whose baseline parallelled the strike of the volcanic belt.

Current electrode separation of 2.5 kilometers allowed survey of three lines from one spread, with two such spreads employed to overlap the width of the volcanic section. This was possible due to the high signal of 1000 ohm-meter resistivity environment. The potential dipole spacing was 50 meters.

Time domain, two second pulses, were achieved with a Scintrex transmitter and monitered with Scintrex I.P.R.-7 and I.P.R.-8 receivers, calibrated to each other on the third window of the I.P.R.-8 decay curve. Data thus presented is in the I.P.R.-8 terminology and scale millivolts/volt.

Background chargeabilities range from 5 to 20 millivolts/volt. Many of the fluctuations observable in the profiles are probably due to lithologic background variations, rather than significant sulphide accumulations. A few stronger relative chargeability highs are evident.

1. Thirkell Anomalies

#3	L-176N	15+25 W
#4	L-160N	14+75 W
#5	L-160N	13+25 W
#6	L-144N	15+25 W
#7	L-144N	14+25 W

These are stronger chargeability features, some of which (4, 5 and 7) have associated conductivity highs (resistivity lows). Anomaly #6 apparently lies at the Thirkell-Owen contact; the others are internal to the Thirkell Group.

2. Thirkell-Lucas Contact Anomalies

#1	L-192N	14+00 W
#2	L-184N	14+25 W

These chargeability highs are significantly above local background. Anomaly #2 has higher conductivity. Significant distortion of the resistivity values may be occurring this close to the current electrode, and therefore, the data of Line 192 is particularly suspect.

3. Lucas Volcanics Anomalies

#11	L-160N	0+50 W
#12	L-176N	7+75 W
#13	L-192N	6+25 E
#14	L-192N	10+25 E
#15	L-184N	9+75 E
#16	L-184N	12+25 E
#17	L-144N	10+25 W
#18	L-144N	11+75 W
#19	L-136N	10+25 W - 11+25 W
#20	L-128N	8+25 W - 9+25 W
#21	L-136N	5+75 E

With the exception of #11, these are weak anomalies, any or all of which may be lithologic in derivation. Anomalies 13 and 15; 14 and 16; and 17, 18, 19 and 20 may be related as grouped. Anomaly 11 has a strong associated resistivity high. Strong conductivity correlation is lacking for the other anomalies.

4. Lucas or D'Aguilar Anomaly 22

A strong chargeability feature is inferred from the data at the end (16+25 E) of Line 136 N, down at the bottom of a rain forest choked valley. This is in the area of Lucas Volcanics as best may be inferred from the absence of a typical D'Aguilar ridge. However, the feature resembles that seen over the D'Aguilar outcrops. Being near the current electrode, the resistivity data are suspect.

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5. D'Aguilar Anomalies

#8 L-184N 16+00 E
#9 L-168N 19+00 E
#10 L-160N 19+25 E

These are broad, higher amplitude, features near the last stations surveyed. Distortion may create the greater width, or these may be broader bodies. Resistivity data are useless here.

Apparent resistivities are high throughout the area. Values of 1000 ohm-meters are common on the Lucas Volcanics. Thirkell and Owen (?) resistivities appear generally higher. Distorted resisitivity values undoubtedly occur near the ends of the survey lines, because the array was pushed to its limit.

Blair Salisbury

021

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29001
v
29127
508024

REPORT ON THE COMBINED HELICOPTER-BORNE MAGNETIC AND ELECTROMAGNETIC SURVEY IN THE MOUNT LEE AREA OF WESTERN TASMANIA FOR UNION OIL DEVELOPMENT CORPORATION

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508025

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REPORT ON THE COMBINED HELICOPTER-BORNE MAGNETIC AND ELECTROMAGNETIC SURVEY IN THE MOUNT LEE AREA OF WESTERN TASMANIA FOR UNION OIL DEVELOPMENT CORPORATION

1. INTRODUCTION

At the request of Mr. J. McGregor Dawson of Union Oil Development Corporation, a one day helicopter-borne combined magnetic and electromagnetic survey was conducted in the Mount Lee area of Western Tasmania. The purpose of the survey was to map any anomalous magnetic or electromagnetic response which may indicate sulphide mineralisation.

Mount Lee is situated approximately 60 kilometres south of Queenstown in Western Tasmania.

2. SURVEY DETAILS

The survey was flown from Strahan, Western Tasmania, because the crew was already based there for other work.

Flight lines were spaced at 300 metre interval throughout the area, wherever possible. The lines were 5 kilometres long and flown either east or west. Subject to the discretion of the pilot over the rugged terrain, a minimum terrain clearance of 140 metres was maintained.

A total of 120 line kilometres was flown in the area. Navigation was by visual means from photomosaics, at a scale of approximately 1:16,000, supplied by Union Oil Development Corporation. The actual flight path was recovered on to the photomosaics from 16 mm. tracking film.

Instrumentation employed during this survey is described in the notes attached to this report.

3. PRESENTATION OF RESULTS

The results of the combined magnetic and electromagnetic survey are shown on the accompanying map, Dwg. Number AEM 75/06. (Dg. 9 The map has been prepared as an overlay from the photomosaic, and because the photomosaic is uncontrolled, the marked direction of north is only approximate.

The results are shown in the standard manner described by the map legend and the notes attached to this report. Wherever possible a line to line correlation of the anomalies are shown.

As requested by the client the magnetic data is shown in analogue form.

A magnetic contour map has not been prepared but such a map of this area may be of assistance in mapping and interpretation of the geological structure of the area.

Magnetic highs are shown on the anomaly map only where they coincide with the electromagnetic anomalous zones.

4. DISCUSSION OF RESULTS

Detailed geological information of the area is not available, but a rough geological sketch provided by the client was referred to in the interpretation.

It should be noted that in areas of rugged terrain, especially those of Western Tasmania, it is not usually possible to fly at a constant height above the ground. With this in mind, a series of tests were performed over known anomalies to determine the effect of altitude. These show that although the amplitude of the anomaly decreases with increase in height, the more important conductivity ratio remains substantially constant. The anomaly expected from a normal massive sulphide body is usually detectable to a height of about 750 feet and areas

where the altitude exceeds this figure should be regarded as not fully investigated.

Zone 1:

Zone 1 consists of an isolated 'D' category anomaly with an average conductivity ratio of 0.5 and is located approximately on the contact between the Owen conglomerate and the Thirkel Group of sediments. The conductivity ratio coupled with the poor shape of the anomaly suggests that the zone may be associated with a swamp, or minor conductivity variations due to surface weathering. Ground followup of the zone should be regarded as low priority.

Zone 2:

This zone consists of a 'C' category anomaly on Line 22 associated with a possible anomaly on Line 23. Although low in amplitude, the anomaly has a good conductivity ratio of 1.1 and an associated magnetic high. The location is approximately on the contact of the Thirkel Group of sediments and the Lewis River volcanics. Ground followup should be carried out to determine the nature of the source.

Zone 3:

This zone consists of an isolated possible anomaly on Line 21. Ground followup is not recommended.

Zone 4:

Zone 4 consists of possible anomalies on two adjacent lines. A rather rapid change of altitude occurs in this area and the anomalies seem likely to be related to this cause. No ground followup is recommended.

Zone 5:

A possible anomaly in an area of higher apparent conductivity makes up Zone 5. In areas of higher conductivity altitude changes are often reflected as weak anomalous responses. This is suggested to be the source of this anomaly. No ground followup is recommended.

Zone 6:

Zone 6 consists of a series of anomalies in an area of high apparent conductivity. They make up a possible conductor axis which may reflect the contact between the sediments and the volcanics. Ground followup is recommended for this zone using either ground electromagnetic methods or Induced Polarisation. This should start on Line 6 and Line 8 where there are 'D' category anomalies with conductivity ratios of 0.5.

Zone 7:

This possible conductivity zone consists of an isolated 'D' anomaly on Line 2. The anomaly is out of the area of higher conductivity and the source of the zone is possibly a swamp. Ground followup is not recommended.

Zone 8:

This zone can be recognised on three flight lines. The anomalies are of reasonable amplitude and moderate conductivity ratios, ranging from 1.0 to 0.4, with a coincident magnetic high. The zone appears to lie on the Precambrian sediments. Ground followup is recommended using either electromagnetic methods or Induced Polarisation. This zone is considered to be of high priority.

Zone 9 and Zone 10:

These two zones consist of possible anomalies and flank both sides of Zone 8. Ground followup on Zone 8 should include Zone 9 and Zone 10.

Zone 11:

Zone 11 is made up of two possible anomalies in an area of low conductivity. Altitude changes in this area could be the cause. No ground followup is recommended.

Further Recommendations:

A number of isolated possible anomalies have been shown on the map but not discussed. These are probably due to surface conductivity changes caused by weathering.

A few zones of higher conductivity have been shown on the map and may assist geological interpretation.

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5. CONCLUSIONS AND RECOMMENDATIONS

Eleven zones of anomalous electromagnetic responses have been mapped from the combined helicopter-borne magnetic and electromagnetic survey.

Zone 8 is the most important zone and should have priority in the ground followup work. Zone 6 and Zone 2, which could be located on the contact of the sediments with the volcanics should also be investigated.

The priority anomalies should first be located and confirmed using a vertical coil electromagnetic system and magnetometer traverses. Since electromagnetic anomalies can be caused by non-mineralised solution-filled shears, faults and contacts, the confirmed anomalies should be tested with Induced Polarisation traverses before drilling, in order to establish the presence of metallic sulphides.

The analogue magnetic data shows a considerable amount of detail and the preparation of an airborne magnetic contour map should be carried out. This will assist the geological mapping and interpretation of the ground geophysics.

As the results of ground exploration become available it may be possible to re-evaluate zones to be possible sources of sulphide mineralisation.

GEOEX PTY. LTD.

C.G. WEBSTER
Geophysicist

12th June, 1975.

for J.E. HAIGH
Geophysicist

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UNION OIL DEVELOPMENT CORPORATION

E.L. 9/74 - BIRCH INLET GEOPHYSICAL INTERPRETATION

More recent geophysical surveys of the Cambrian Lucas Volcanic belt covered by E.L. 9/74 include the following:

filed at 75-1112 in vertical

February, 1973 - A Scintrex conducted Turair survey for Australasian Minerals

March, 1975 - A U.O.D.C. conducted I.P. survey for U.O.D.C.

April, 1975 - A Geoex conducted M-400 E.M. survey for U.O.D.C.

Magnetic observations made concomitantly with the electromagnetic surveys

The Turair survey covered the northern third of the area with lines spread at 500 foot intervals. The central portions of the belt have been surveyed with gradient I.P. methods along lines spaced at 800 meter intervals. The lower third of the area was surveyed using the McPhar-400 electromagnetic system on 300 meter line spacing. No coverage of the belt exists for an area just east of Innes Peak, but this is a relatively small portion of the length of the volcanic belt. Substantial overlap exists for the I.P. survey and the airborne electromagnetic survey flown by Geoex.

Reports of all three surveys exist on file. This report is intended as a means of tying the three data sets together and is therefore only supplemental. Important anomalies of all three surveys are grouped as to their apparent geologic associations, and all anomalies are shown on one Geophysical Anomaly Synthesis Map. Magnetic highs shown on the electromagnetic profile data are traced on this map. A description of some of the magnetic features is herein provided.

Conductive or Chargeable Sources

Responses reflecting anomalous conductivity or chargeability were obtained on these geophysical surveys. Such anomalies generally lack the stronger characteristics which might be anticipated from major sulphide accumulations in an environment lacking overburden masking. However, orebody anomalies are rarely first order features, and the following anomalies might warrant further study.

Pre-Cambrian and D'Aguilar Anomalies

Each of the geophysical surveys discovered some of its highest amplitude anomalies east of last mapped Cambrian Lucas Volcanics. Some of these anomalies appear related to Cambrian D'Aguilar Group rocks, the others to the Pre-Cambrian sequence.

More interesting D'Aguilar anomalies are:

Turair Conductor E, Anomalies 20 and 30
Turair Conductor K, Anomaly 40
I.P. Anomalies 8, 9 and 10
M-400 Conductor 4

Stronger Pre-Cambrian anomalies are:

Turair Conductor C, Anomaly 22
Turair Conductor M, Anomaly 39
M-400 Conductor 8, with a magnetic coincidence (possibly in D'Aguilar Group or Lucas Volcanics)

Lucas Volcanic Anomalies

Relatively few anomalies were detected in the Lucas Volcanics, and most of these have very poor amplitude characteristics. The following are the better of the Lucas Volcanic anomalies:

Turair Conductor J, Anomaly 5
Turair Conductor L, Anomaly 43
Turair Anomaly 47
I.P. Anomaly 11
I.P. Anomaly 22 (D'Aguilar related ?)
M-400 Conductor 2 on Line 22

Thirkell Anomalies

Numerous anomalies were discovered along the trend of the Thirkell Group rocks. Some of these anomalies are quite close to the Thirkell-Lucas contact, while others are higher in the Thirkell section.

Thirkell-Lucas contact anomalies are:

Turair Conductor H, Anomaly 50
Turair Conductor G, Anomalies 29 and 36
I.P. Anomalies 1 and 2
M-400 Conductor 5, Anomalies on Lines 8 and 6

Internal Thirkell anomalies are:

I.P. Anomaly 3
I.P. Anomalies 5 and 7
I.P. Anomalies 4 and 6 (on Thirkell-Owen contact)

Owen Anomalies

Owen coverage is minimal and no interesting Owen anomalies have been defined.

Magnetic Sources

Profile by profile examination of magnetic traces obtained on the electromagnetic surveys reveals that most of the source magnetic bodies are thin (< 200 meters); shallowly buried, if at all; and linear, persisting as identifiable features on several adjoining flight lines. To some degree, amplitude appears relatable to width, perhaps suggesting fairly consistent magnetite (specularite?) concentrations.

A higher amplitude, long anomaly observed in the southwestern portion of the Lucas Volcanic lends itself to more detailed study. This feature begins as a steeply dipping, thinner unit at the lower end of the survey block, apparently thickening and beginning to dip quite shallowly to the west by the vicinity of I.P. grid Line 128N. Westerly dip is maintained to the northern limit of these data; however, the body may thin in this direction. Assuming this

magnetic body has approximately its estimated 400-meter thickness (at its maximum), its magnetic susceptibility would be in the 1000 x 10^{-6} cgs. realm, equivalent to some half percent magnetite concentration.

Although there may be correlation of some magnetic features with rocks mapped as "rhyolite flows, abundant chloritized biotite", most source lithologies are unknown. Anomalies are noted in both the Pre-Cambrian and Cambrian Lucas Volcanic environments. Only three cases of reasonable magnetic high association with conductors are noted. These are Anomaly 8 of the Geoex survey and Anomalies 23 and 47 of the Turair survey.

No magnetic anomalies are noted over D'Aguilar group outcrops where the writer has seen hematite fracture fillings which he thought were weathered specularite. This may be important in considering possible sources for I.P. anomalies associated with D'Aguilar group rocks.

There are no indications of "blind" magnetic bodies in the survey area. All features have shallowly derived gradients.

Blair K. Salisbury

June 25, 1975

10 0 10 20 30 40KILOMETERS

SMITHTON

DEVONPORT

LAUNCESTON

BLACK BLUFF

E.L.10/74

QUAMBY

ROSEBERRY

QUEENSTOWN

BIRCH'S INLET

E.L.9/74

HOBART

41°00'

42°00'

43°00'

145°00'

146°00'

147°00'

LEGEND

18	Basic-intermediate volcanic and associated rocks
19	Mid-upper Cambrian fossiliferous greywacke turbidites, Unfossiliferous greywacke turbidites and orthoquartzite
34	Mid-upper Cambrian acid-intermediate volcanics with fossiliferous upper Cambrian shallow water deposits
u	Undifferentiated Cambrian volcanics and sediments

5 cm

UNION OIL DEVELOPMENT CORPORATION

75-1112

DISTRIBUTION OF CAMBRIAN VOLCANIC AND SEDIMENTARY SEQUENCES TASMANIA

Scale: 1: 500,000

Plan No 457

75-1112

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75-1112

GORDON RIVER

Sprent River

LEGEND

QUATERNARY		Alluvial fans, mud flows, outwash
		Detritus, coarse to fine talus, glacial debris
		Alluvium, river bed and fluvioglacial sands and silts
ORDOVICIAN		Undifferentiated oligomictic quartz conglomerate, Conglomeratic quartz–mica sandstone, pyritic sandstone, limestone. Rare shale and siltstone horizons.
		Coarse conglomerate.
CAMBRIAN	THIRKELL GROUP	Volcanic rich polymictic conglomerate, epiclastic sandstones, siltstones calcareous siltstones and carbonaceous shales, pyritic in part. Chlorite schists and phyllitic schists.
		micaceous sandstone
		chloritic and phyllitic schists, carbonaceous shale
		Volcanic conglomerate
	LUCAS VOLCANICS	Undifferentiated acidic volcanics, dominantly ignimbrites and ash fall pyroclastics. Rhyolite domes and flows. Intrusive (?) trachy-andesites. Clastic and chemical sediments.
		Chert
		Epiclastic tuff, sandstone and shale
		rhyolite flows and domes, no ferro magnesian minerals
		Rhyolite flows, abundant chloritized biotite
		Ignimbritic rocks, some coarse agglomerate and fragmental rhyolite
		Ash fall tuffs with occasional ignimbrite and rhyolite flows. Lapilli tuff
		Trachy–andesite and coarse grained intrusive (?) rhyolites.
CAMBRIAN	D'AGUILAR GROUP	Poorly sorted polymictic conglomerate; cross bedded green and grey shale, epiclastic sandstone and siltstone. Occasional lenses of massive and sheared keratophyre. Generally strongly sheared.
		Keratophyre
		Conglomerate
PRE CAMBRIAN		Undifferentiated quartzite, quartz-mica schist, tourmaline-quartz schist, silicified dolomite, graphitic schist and chlorite schist.

- Unconformity
- Fault (observed or inferred)
- Photo lineament (mostly joints)
- Approximate geological boundary
- Intra formational boundary
- Strike and dip of stratum
- Prevailing strike and dip of stratum
- Vertical stratum
- Strike and dip of foliation
- Prevailing strike and dip of foliation
- Vertical foliation
- Watercourse

NOTE: Unconformity between Quaternary and older formations not shown.

TN MN

UNION OIL DEVELOPMENT CORP.

TASMANIA E. L. 9/74

(formerly E.L. 2/72)

GEOLOGY

after Australasian Minerals

Nov. 1974 Sheet 1

5 cm

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Scale 1 : 15 840

0 500 1000 1500 Metres

0 1000 3000 5000 Feet

75-1112

2

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75-1112

LEGEND

QUATERNARY		Alluvial fans, mud flows, outwash
		Detritus, coarse to fine talus, glacial debris
		Alluvium, river bed and fluvioglacial sands and silts
ORDOVICIAN		Undifferentiated oligomictic quartz conglomerate. Conglomeratic quartz—mica sandstone, pyritic sandstone, limestone. Rare shale and siltstone horizons.
		Coarse conglomerate.
CAMBRIAN	THIRKELL GROUP	Volcanic rich polymictic conglomerate, epiclastic sandstones, siltstones calcareous siltstones and carbonaceous shales, pyritic in part. Chlorite schists and phyllitic schists.
		micaceous sandstone
		chloritic and phyllitic schists, carbonaceous shale
		Volcanic conglomerate
	LUCAS VOLCANICS	Undifferentiated acidic volcanics, dominantly ignimbrites and ash fall pyroclastics. Rhyolite domes and flows. Intrusive (?) trachy-andesites. Clastic and chemical sediments.
		Chert
		Epiclastic tuff, sandstone and shale
		rhyolite flows and domes, no ferro magnesian minerals
		Rhyolite flows, abundant chloritized biotite
		Ignimbritic rocks, some coarse agglomerate and fragmental rhyolite
		Ash fall tuffs with occasional ignimbrite and rhyolite flows. Lapilli tuff
		Trachy—andesite and coarse grained intrusive (?) rhyolites.
CAMBRIAN	D'AGUILAR GROUP	Poorly sorted polymictic conglomerate; cross bedded green and grey shale; epiclastic sandstone and siltstone. Occasional lenses of massive and sheared keratophyre. Generally strongly sheared.
		Keratophyre
		Conglomerate
PRE CAMBRIAN		Undifferentiated quartzite, quartz-mica schist, tourmaline-quartz schist, silicified dolomite, graphitic schist and chlorite schist

- Unconformity
- Fault (observed or inferred)
- Photo lineament (mostly joints)
- Approximate geological boundary
- Intra formational boundary
- Strike and dip of stratum
- Prevailing strike and dip of stratum
- Vertical stratum
- Strike and dip of foliation
- Prevailing strike and dip of foliation
- Vertical foliation
- Watercourse

NOTE: Unconformity between Quaternary and older formations not shown.

TN MN

UNION OIL DEVELOPMENT CORP.

TASMANIA E. L. 9/74

(formerly E.L. 2/72)

GEOLOGY

after Australasian Minerals

Nov. 1974

Sheet 2

5 cm

508038

Scale 1 : 15 840

0 500 1000 1500 Metres

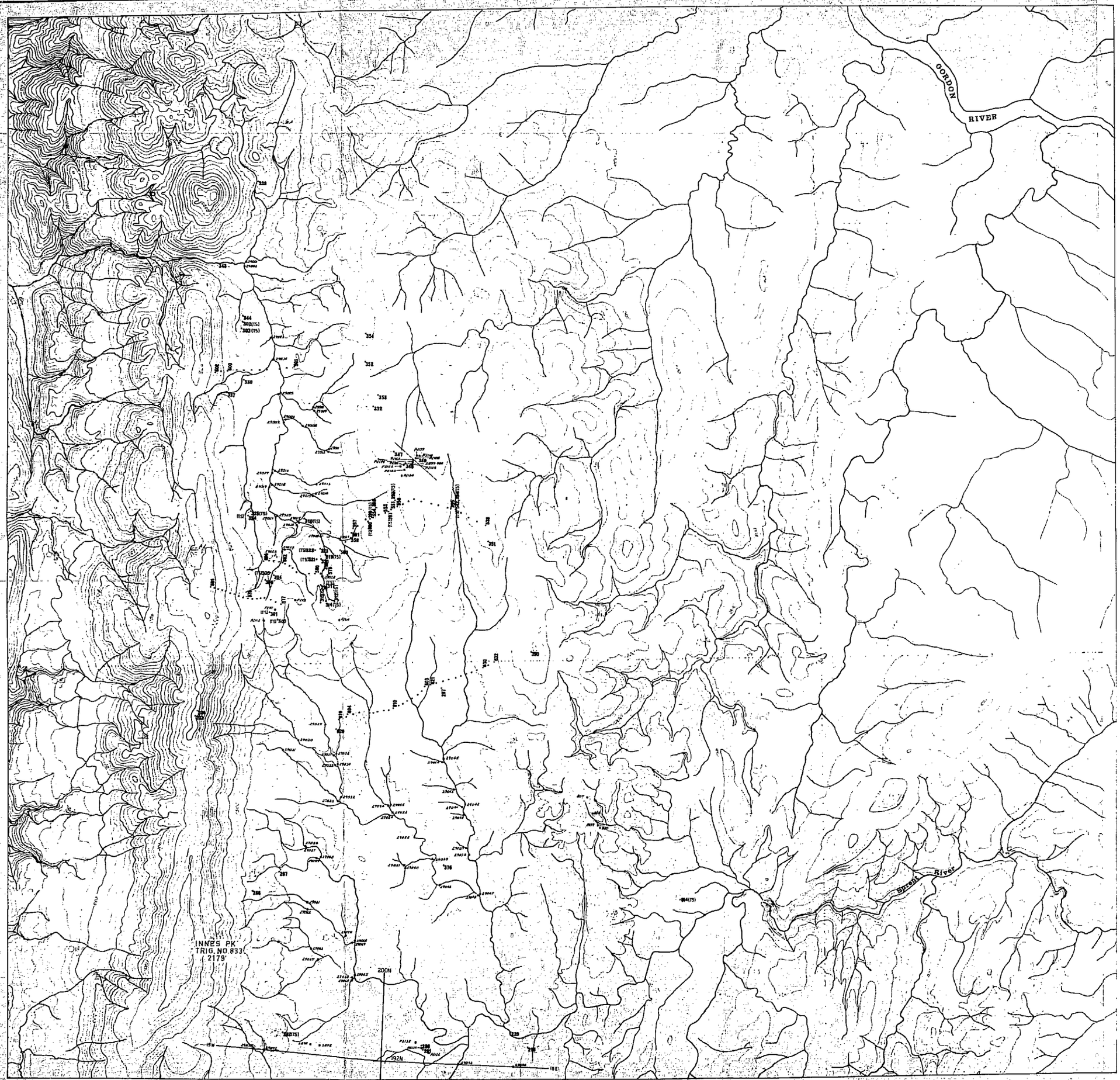
0 1000 3000 5000 Feet

75-1112

2

003

75-1112



STREAM SAMPLE RESULTS

Sample No	Cu	Pb	Zn
29001	2	<5	2
2	<2	<5	5
3	<2	<5	2
4	<2	<5	<2
5	<2	<5	2
6	<2	<5	5
7	2	18	5
8	<2	<5	2
9	2	<5	<2
10	<2	<5	2
11	2	<5	5
12	2	<5	2
13	5	8	5
14	5	8	8
15	5	10	10
16	2	<5	2
17	2	22	8
18	5	8	8
19	5	8	8
20	2	8	8
21	2	5	2
22	8	10	10
23	5	12	5
24	5	25	10
25	5	20	8
26	8	5	8
27	8	12	8
28	2	<5	5
29	2	8	5
30	2	<5	5
31	2	<5	2
32	2	<5	8
33	2	<5	5
34	2	5	8
35	2	5	8
36	2	<5	5
29037	2	<5	5

Sample No	Cu	Pb	Zn
29038	<2	<5	2
39	2	<5	5
40	<2	<5	<2
41	<2	<5	2
42	<2	<5	5
43	<2	<5	2
44	2	5	5
45	<2	<5	5
46	<2	<5	2
47	2	5	2
48	<2	<5	2
49	2	<5	2
50	2	<5	2
51	5	<5	5
52	2	<5	12
53	2	<5	5
54	2	<5	5
55	2	<5	2
56	<2	<5	2
57	<2	<5	5
58	<2	<5	2
59	<2	<5	5
60	<2	<5	2
61	<2	<5	5
62	2	<5	5
63	2	<5	5
64	1	<5	5
65	<2	<5	2
66	<2	<5	2
67	<2	<5	5
68	<2	8	5
69	<2	<5	10
70	<2	<5	90
71	<2	<5	8
72	2	5	20
73	<2	<5	5
74	2	<5	5

ROCK CHIP SAMPLE RESULTS

Sample No	Cu	Pb	Zn
S894	40	12	15
S895	95	18	18
S899	170	150	420
S900	50	18	10
P2101	100	180	170
2	8	5	18
3	10	22	70
4	8	10	120
5	110	20	260
6	10	8	220
7	12	10	100
8	38	20	270
9	18	12	50
10	15	10	65
11	2	8	10
12	2	25	5
13	5	8	95
P2114	18	8	8
P2134	5	<5	8
5	5	8	90
P2136	5	10	100

* 318 (TS) Australasian Minerals sample location (Thin Section)

TN MN

UNION OIL DEVELOPMENT CORP.

TASMANIA E.L. 9/74

(formerly E.L. 2/72)

GEOCHEMICAL SAMPLING

July '75

Sheet 1

ROCK CHIP & STREAM SAMPLE LOCATIONS

PLAN NO 449

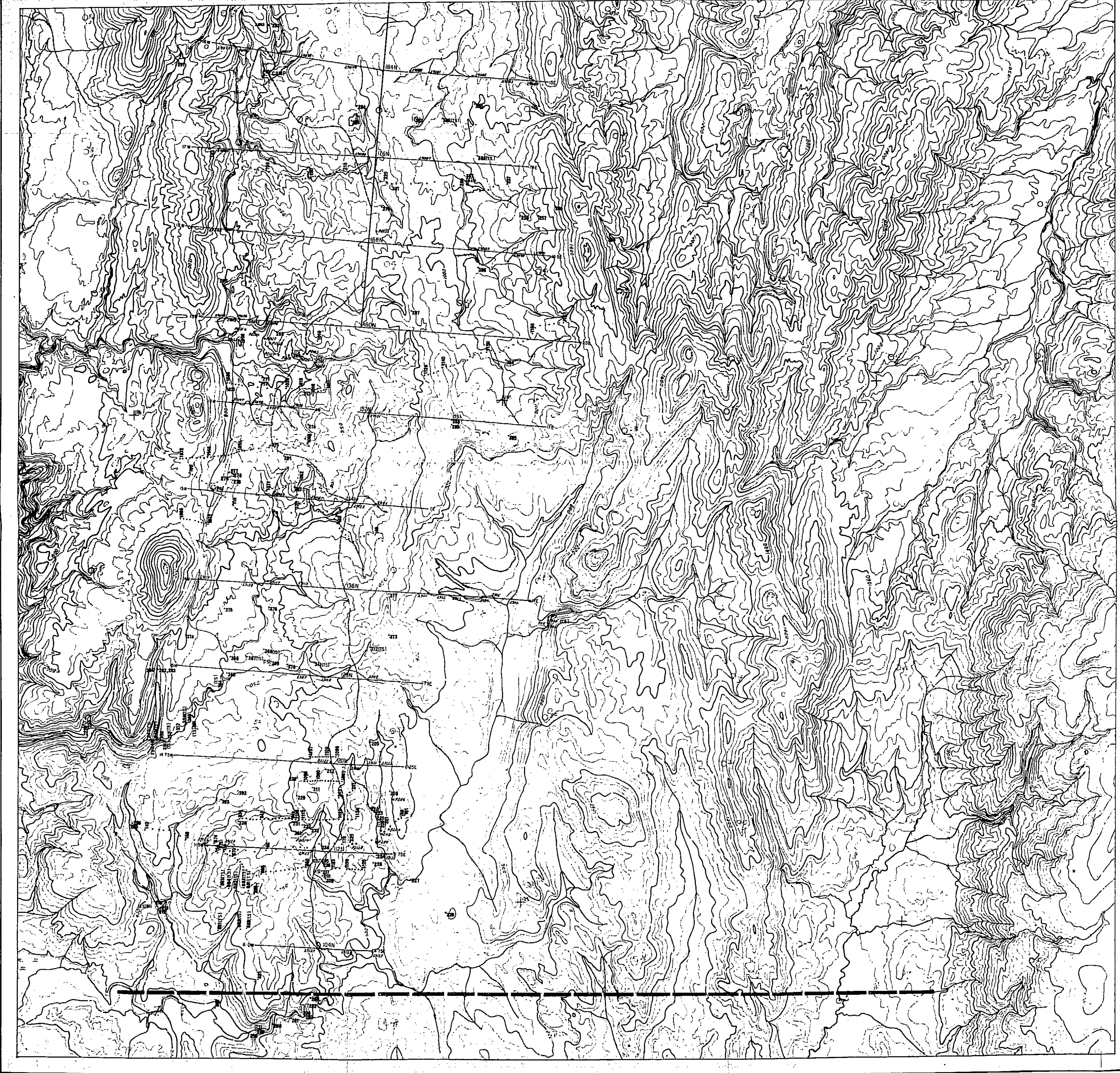
Scale 1 : 15 840

0 500 1000 1500 Metres

0 1000 3000 5000 Feet

3

75-1112



STREAM SAMPLE RESULTS

Sample No	Cu	Pb	Zn
29075	<2	<5	5
6	<2	<5	2
7	<2	<5	5
8	<2	<5	5
9	2	5	8
80	2	5	10
1	<2	10	12
2	<2	<5	5
3	<2	<5	5
4	<2	<5	2
5	<2	<5	5
6	2	18	10
7	<2	5	2
8	5	5	15
9	<2	<5	5
90	<2	<5	2
1	2	<5	5
2	2	5	8
3	<2	<5	5
4	<2	5	10
5	<2	<5	5
6	<2	<5	10
7	<2	<5	8
8	2	<5	5
9	5	55	20
100	5	5	15
1	2	5	10
29102	<2	<5	8

Sample No	Cu	Pb	Zn
29103	<2	8	5
4	2	<5	8
5	<2	<5	8
6	2	<5	10
7	2	<5	8
8	<2	<5	10
9	<2	<5	8
10	2	<5	15
1	2	<5	8
2	2	<5	5
3	<2	<5	8
4	<2	<5	5
5	2	<5	8
6	2	5	5
7	2	<5	12
8	2	10	10
9	5	8	35
20	2	18	35
1	<2	8	10
2	<2	<5	20
3	2	<5	12
4	2	<5	10
5	5	<5	20
6	<2	<5	10
7	2	<5	10
8	<2	10	12
29129	<2	<5	5

ROCK CHIP SAMPLE RESULTS

Sample No	Cu	Pb	Zn
S 893	50	5	22
P 2115	12	8	12
6	5	8	80
7	2	<5	10
8	20	12	12
9	5	18	60
20	2	<5	2
1	2	<5	5
2	5	8	50
3	2	5	5
4	5	8	55
5	2	8	5
6	5	8	5
7	2	10	35
8	5	48	E90
9	2	10	12
30	2	5	5
1	<2	10	8
2	<2	10	8
P 2133	430	20	10

• 372 (TS) [illegible] Minerals sample location (Thin Section)

UNION OIL DEVELOPMENT CORP.

TASMANIA E. L. 9/74

(formerly E.L. 2/72)

GEOCHEMICAL SAMPLING

July '75

Sheet 2

ROCK CHIP & STREAM SAMPLE LOCATIONS

PLAN NO 450

Scale 1 : 15 840

0 500 1000 1500 Metres

0 1000 3000 5000 Feet

3

75-1112

75-1112



TN MN

UNION OIL DEVELOPMENT CORP.

TASMANIA E. L. 9/74

(formerly E.L. 2/72)

GEOCHEMICAL SAMPLING

5 cm

July '75

SOIL SAMPLE PROFILES

Sheet 1

COPPER

VERTICAL SCALE 1" = 20 ppm

PLAN NO 451

508040

Scale 1 : 15 840

0 500 1000 1500 Metres

0 1000 3000 5000 Feet

4

75-1112

006



TN MN

UNION OIL DEVELOPMENT CORP.

TASMANIA E. L. 9/74

(formerly E.L. 2/72)

GEOCHEMICAL SAMPLING

5 cm

July '75

SOIL SAMPLE PROFILES

Sheet 2

COPPER

5080 11

VERTICAL SCALE 1" = 20ppm

PLAN NO 452

Scale 1 : 15 840

0 500 1000 1500 Metres

0 1000 3000 5000 Feet

75-1112

4

75-1112



UNION OIL DEVELOPMENT CORP.

TASMANIA E.L. 9/74

(formerly E.L. 2/72)

GEOCHEMICAL SAMPLING

5 cm

July '75

SOIL SAMPLE PROFILES

Sheet 1

LEAD

508042

VERTICAL SCALE 1" = 20 ppm

PLAN NO 453

Scale 1 : 15 840

0 500 1000 1500 Metres

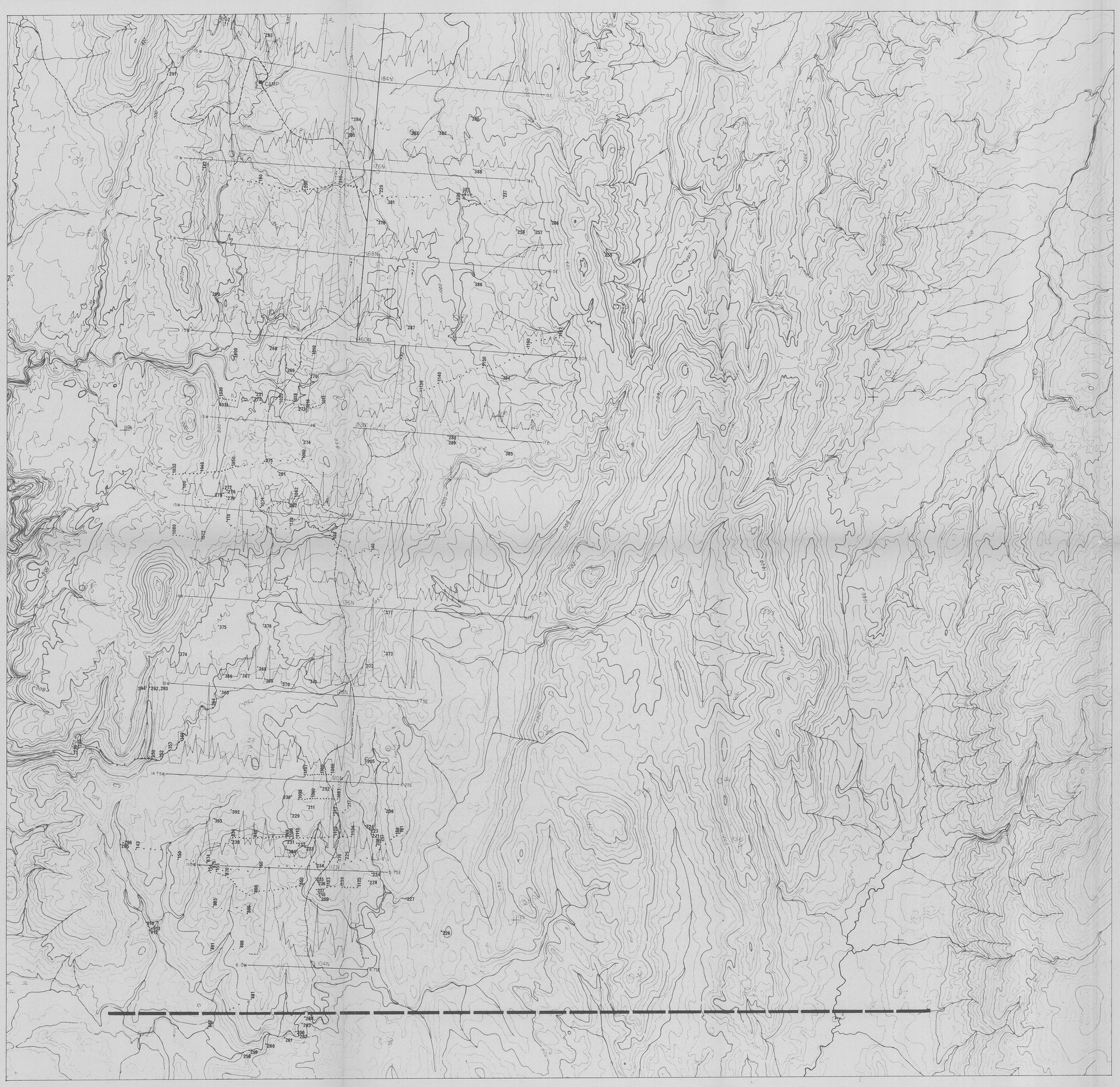
0 1000 3000 5000 Feet

75-1112

5

003

75-1112



TN MN

UNION OIL DEVELOPMENT CORP.

TASMANIA E.L. 9/74

(formerly E.L. 2/72)

GEOCHEMICAL SAMPLING

5 cm

508043

July '75

SOIL SAMPLE PROFILES

Sheet 2

LEAD

VERTICAL SCALE 1" = 20ppm

PLAN NO 454

Scale 1:15 840

0 500 1000 1500 Metres

0 1000 3000 5000 Feet

75-1112

5

003

75-1112

GORDON RIVER

Stuart River

INNES PK
TRIG. NO. 833
2179'

200N
192N
15W
15E

TN MN

UNION OIL DEVELOPMENT CORP.

TASMANIA E. L. 9/74

(formerly E.L. 2/72)

GEOCHEMICAL SAMPLING

5 cm

July'75

SOIL SAMPLE PROFILES

Sheet 1

ZINC

508044

VERTICAL SCALE 1" = 80 ppm

PLAN NO 455

Scale 1 : 15 840

0 500 1000 1500 Metres

0 1000 3000 5000 Feet

6

75-1112

75-1112



TN · MN

UNION OIL DEVELOPMENT CORP.

TASMANIA E. L. 9/74

(formerly E.L. 2/72)

GEOCHEMICAL SAMPLING

5 cm

July '75

SOIL SAMPLE PROFILES

ZINC

Sheet 2

509045

VERTICAL SCALE 1" = 80 ppm

PLAN NO 456

Scale 1 : 15 840

0 500 1000 1500 Metres

0 1000 3000 5000 Feet

6

75-1112

011

75-1112

LEGEND

Oc	Owen Conglomerate	ORDOVICIAN
Et	Thirkell Group	CAMBRIAN
Ev	Lucas Volcanics	CAMBRIAN
Ed	D'Aguilar Group	CAMBRIAN
Pe	Precambrian	

Fault

Geological boundary

Cu----- Geochemical soil anomaly showing anomaly element

SCINTREX E.M anomalies
- ▲ Stronger
- △ Weaker

UODC I.P anomalies
- ● Stronger
- ○ Weaker

GEOEX E.M anomalies
- ⊣⊢ Stronger
- ⊢ Weaker

Magnetic body trace

Oc

Oc

AREA 7

Anomalous Cu, Pb, Zn, rock chip samples

Anomalous Cu, Pb, Zn in stream sediments

Oc Et

Pe

Ed

1800

1 Pb 192N Zn Pb 13 14

2 15 16 8

Cu Pb 3 12 176N Ev

Cu

Pb

9

Ed

4 5 Zn 11 160N Zn Zn 10

Cu AREA 6 AREA 5 Pb Pb

Et

Cu Zn 6 17 144N

Zn 18

19 Pb Zn Zn Zn Pb Zn 21 22

20 128N Pb Pb

Cu Pb Pb

Zn Cu Pb Zn Zn Pb Zn

Cu 112N Zn

Zn Zn

Cu, Pb, Zn

AREA 1 THIRKELL ANOMALIES

AREA 2 D'AGUILAR ANOMALIES

AREA 4 SOUTHERN AREA

AREA 3 HALES RIVER AREA

UNION OIL DEVELOPMENT CORPORATION

TASMANIA EL 9/74

SUMMARY OF RESULTS-1975 AND PROPOSED AREAS FOR DETAILED STUDY IN 1976

Scale 1:31,680 Date: 23-7-75

Plan No 464

508046

0 500 1000 1500 metres

0 1000 3000 5000 feet

5 cm

75-1112.

7

75-1112



LEGEND

Australasian Minerals Soil Samples

- Cu ○ 10 - 30 ppm; ● 30 - 100 ppm
- Pb △ 30 - 100 ppm; ▲ > 100 ppm
- Zn □ 100 - 300 ppm; ■ > 300 ppm

UODC Soil Samples

- Cu ---- 10 - 15 ppm; —— > 15 ppm
- Pb ---- 20 - 30 ppm; —— > 30 ppm
- Zn ---- 80 - 100 ppm; —— > 100 ppm

TN MN

UNION OIL DEVELOPMENT CORP.

TASMANIA E. L. 9/74

(formerly E.L. 2/72)

Plan No 468

508047

5 cm

July '75

Sheet 1

SOIL SAMPLE ANOMALIES

Scale 1 : 15 840

0 500 1000 1500 Metres

0 1000 3000 5000 Feet

8

75-1112

013

75-1112

GORDON RIVER

INNES PK.
TRIG. NO. 833
2179'

210N

192N

LEGEND

STREAMS

Cu — Cu — Anomalous - 8ppm
(Cu) — Weakly Anomalous - 5ppm

Pb — Pb — Anomalous - 19-55ppm
(Pb) — Weakly Anomalous - 9-18ppm

Zn — Zn — Anomalous - 90ppm
(Zn) — Weakly Anomalous - 10-35ppm

ROCK CHIPS

Cu ● ≥100ppm ○ 30 - 99ppm

Pb ▲ ≥100ppm △ 30 - 99ppm

Zn ■ ≥300ppm □ 100-299ppm

GEOPHYSICS

Scintrex E.M. Anomalies
Stronger
Weaker

U.D.D.C. I.P. Anomalies
Stronger
Weaker

—— —— Magnetic body trace

TN MN

UNION OIL DEVELOPMENT CORP.

TASMANIA E. L. 9/74
(formerly E.L. 2/72)
Plan No 466

July'75 Sheet 1

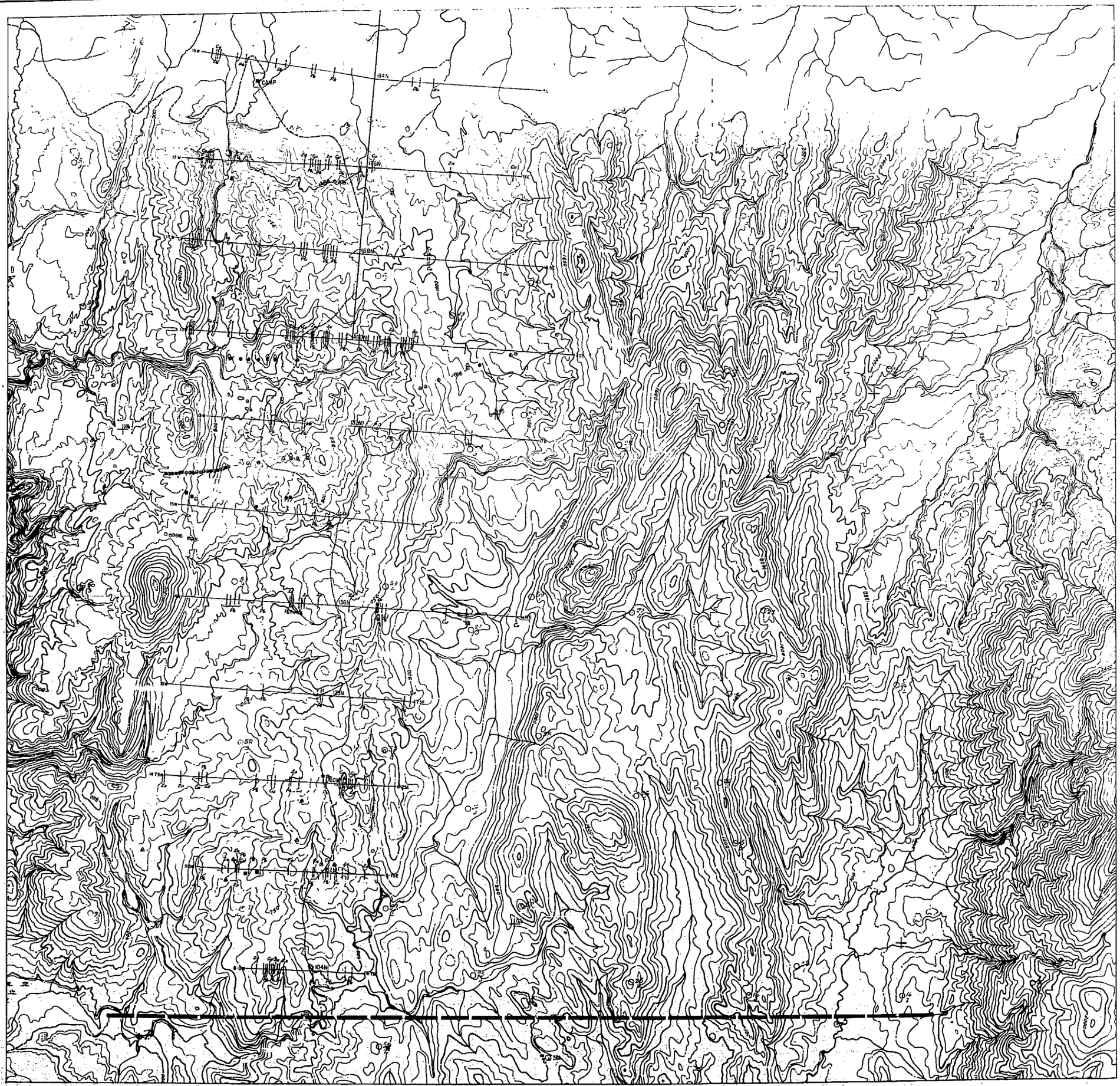
ROCK CHIP, STREAM & GEOPHYSICAL ANOMALIES

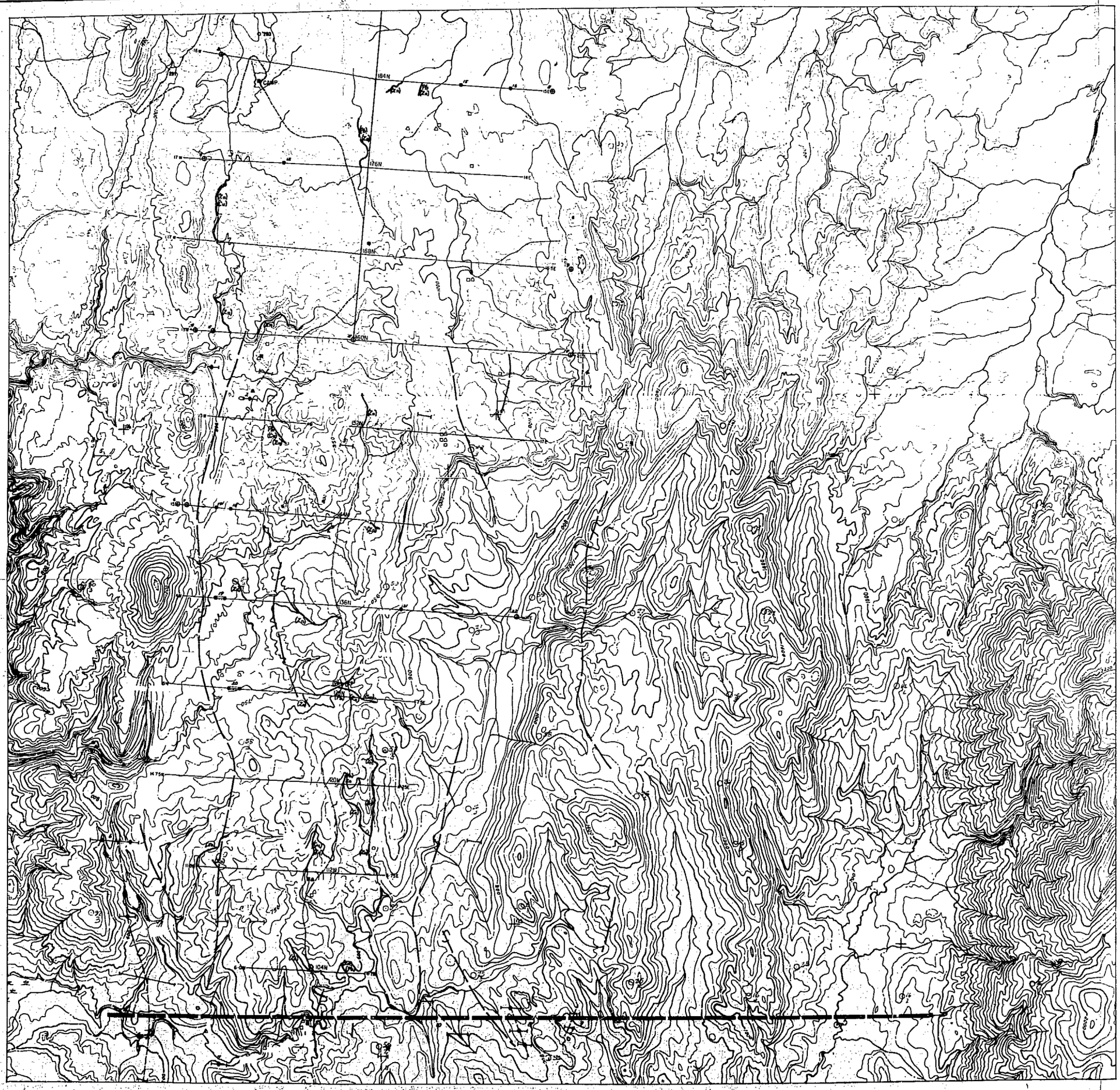
Scale 1 : 15 840
0 500 1000 1500 Metres
0 1000 3000 5000 Feet

8

75-1112

75-1112


CAMP
184N
168N
152N
136N
120N
104N
88N
72N
56N
40N
24N
8N
8S
24S
40S
56S
72S
88S
104S
120S
136S
152S
168S
184S
200S
216S
232S
248S
264S
280S
296S
312S
328S
344S
360S
376S
392S
408S
424S
440S
456S
472S
488S
504S
520S
536S
552S
568S
584S
600S
616S
632S


CAMP
184N
176N
168N
160N
152N
144N
136N
128N
120N
112N
104N
15E
16E
17E
18E
19E
20E
21E
22E
23E
24E
25E
26E
27E
28E
29E
30E
31E
32E
33E
34E
35E
36E
37E
38E
39E
40E
41E
42E
43E
44E
45E
46E
47E
48E
49E
50E
51E
52E
53E
54E

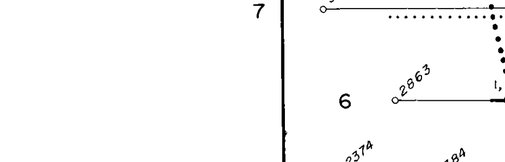
N

SURVEY BOUNDARY

REFERENCE

A
B
C
D
E

SYMBOLS SHOW LENGTH, SHAPE AND PEAK OF ANOMALY



CONDUCTIVE ZONE

SURFACE NOISE

DEFINITE, PROBABLE AND POSSIBLE CONDUCTOR AXIS

SURVEY SPECIFICATIONS —

HELICOPTER	Bell Jetranger 206B VH-BLR
E M SYSTEM	Geoex H400 dual frequency sequential transmission 340 Hz and 1070 Hz
MAGNETOMETER	Geometrics G803 proton precession (reading accuracy ± 1 gamma)
DIURNAL RECORDER	Geometrics G 806 proton precession magnetometer with Rustrack recorder and crystal clock
ALTIMETER	Bonzer radar
ANCILLIARY EQUIPMENT	Geoex intervalometer Century 444 analogue light beam recorder Geoex film digital recorder Vinten 16 mm ground tracking camera
READING INTERVAL	1 023 seconds
NOMINAL AIRCRAFT SPEED	90 knots (Mean reading spacing 47 metres)
NOMINAL AIRCRAFT SURVEY ALTITUDE	140 metres (E M bird 50 metres, Mag bird 120 metres)

5 cm

508049

75-1112

9

GEOEX PTY. LTD.

UNION OIL DEVELOPMENT CORPORATION

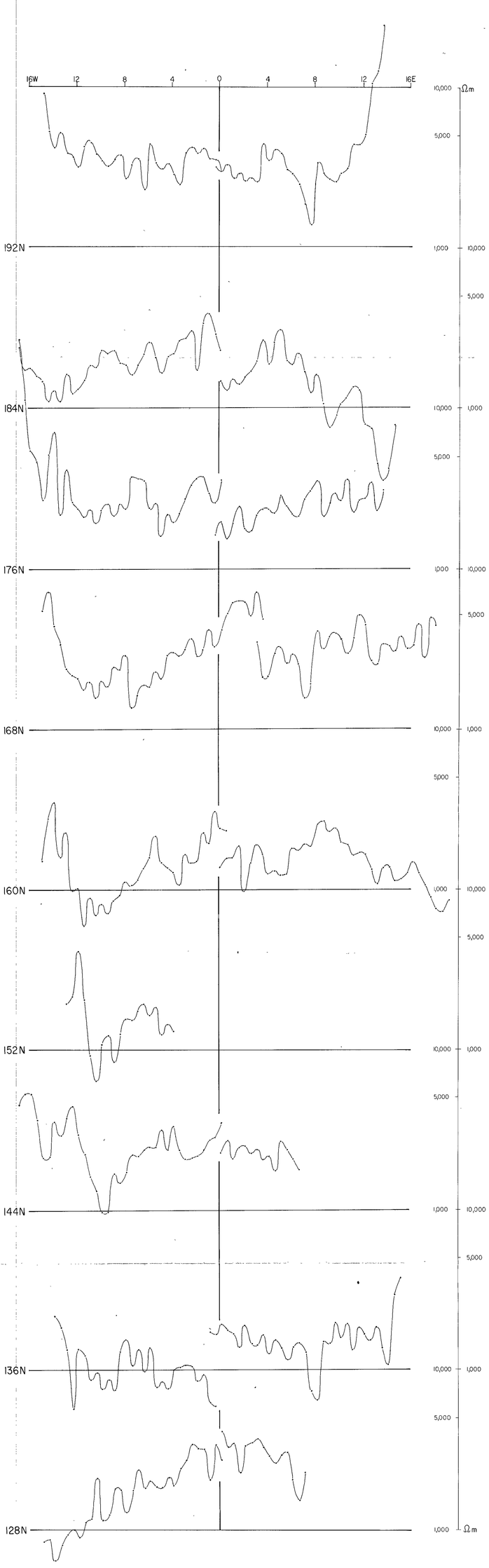
MOUNT LEE AREA

AIRBORNE ELECTROMAGNETIC ANOMALY MAP

SCALE 1 · 16000

Metres 400 0 400 800 1200 Metres

SURVEYED: APRIL 1975	APPROVED: C G WEBSTER
DRAWN BY N.B.	PROJECT N°: AEM 75/06



Union Oil Development Corporation

BIRCH'S INLET (E.L.9/74)

TASMANIA

APPARENT RESISTIVITY PROFILES

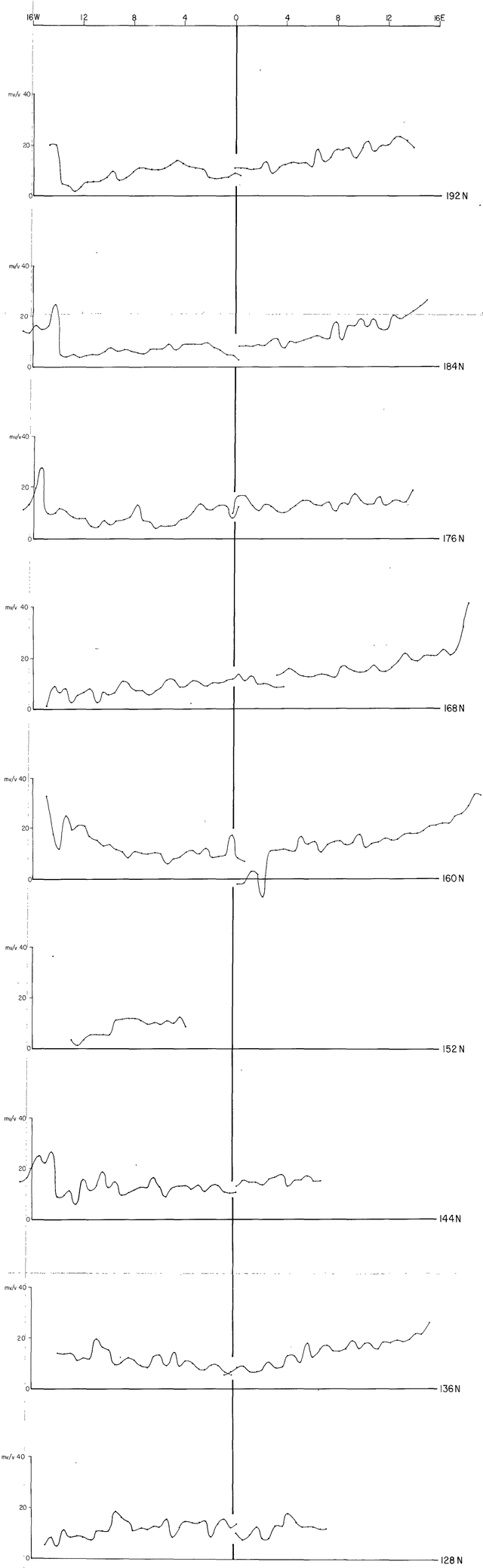
4 3 2 1 0 400 800 1200 metres

5 cm

508050

75-1112

018 10



Union Oil Development Corporation

BIRCH'S INLET (EL.9/74)

TASMANIA

CHARGEABILITY PROFILES

4 3 2 1 0 400 800 1200 metres

5 cm

508051



LEGEND

QUATERNARY

- Alluvial fans, mud flows, outwash
- Detritus, coarse to fine talus, glacial debris
- Alluvium, river bed and fluvioglacial sands and silts

ORDOVICIAN

- Undifferentiated oligomictic quartz conglomerate, Conglomeratic quartz—mica sandstone, pyritic sandstone, limestone. Rare shale and siltstone horizons.
- Coarse conglomerate.

CAMBRIAN

THIRKELL GROUP

- Volcanic rich polymictic conglomerate, epiclastic sandstones, siltstones calcareous siltstones and carbonaceous shales, pyritic in part. Chlorite schists and phyllitic schists.
- micaceous sandstone
- chloritic and phyllitic schists, carbonaceous shale
- Volcanic conglomerate

LUCAS VOLCANICS

- Undifferentiated acidic volcanics, dominantly ignimbrites and ash fall pyroclastics. Rhyolite domes and flows. Intrusive (?) trachy-andesites. Clastic and chemical sediments.
- Chert
- Epiclastic tuff, sandstone and shale
- rhyolite flows and domes, no ferro magnesian minerals
- Rhyolite flows, abundant chloritized biotite
- Ignimbritic rocks, some coarse agglomerate and fragmental rhyolite
- Ash fall tuffs with occasional ignimbrite and rhyolite flows. Lapilli tuff
- Trachy—andesite and coarse grained intrusive (?) rhyolites.

CAMBRIAN

D'AGUILAR GROUP

- Poorly sorted polymictic conglomerate; cross bedded green and grey shale, epiclastic sandstone and siltstone. Occasional lenses of massive and sheared keratophyre. Generally strongly sheared.
- Keratophyre
- Conglomerate

PRE CAMBRIAN

- Undifferentiated quartzite, quartz-mica schist, tourmaline-quartz schist, silicified dolomite, graphitic schist and chlorite schist.

- Unconformity
- Fault (observed or inferred)
- Photo lineament (mostly joints)
- Approximate geological boundary
- Intra formational boundary
- Strike and dip of stratum
- Prevailing strike and dip of stratum
- Vertical stratum
- Strike and dip of foliation
- Prevailing strike and dip of foliation
- Vertical foliation
- Watercourse

NOTE: Unconformity between Quaternary and older formations not shown.

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UNION OIL DEVELOPMENT CORP.

TASMANIA E. L. 9/74

(formerly E.L. 2/72)

GEOLOGY

after Australasian Minerals

Nov. 1974

Sheet 1

5 cm

Scale 1 : 15 840

0 500 1000 1500 Metres

0 1000 3000 5000 Feet

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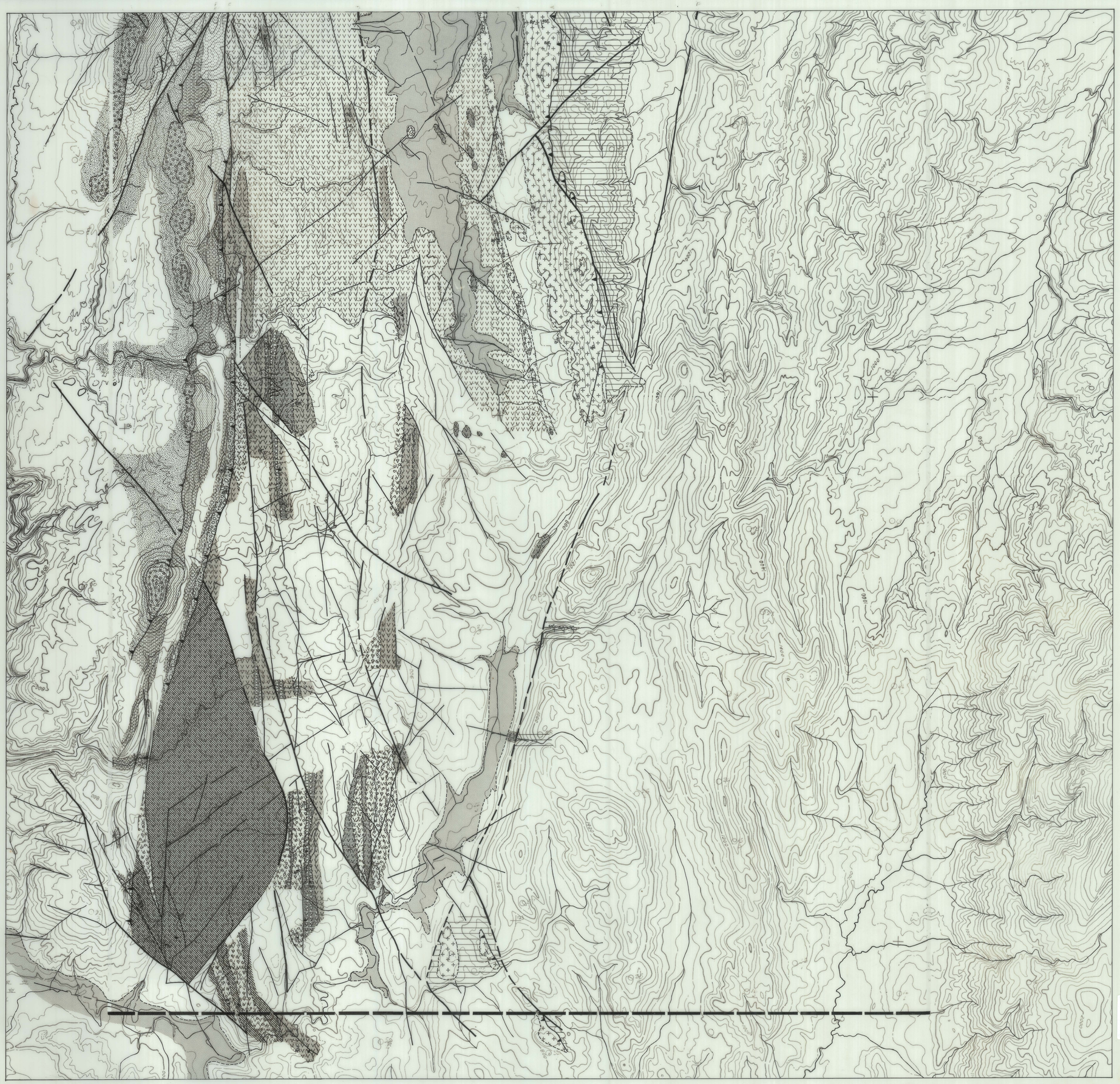
Birch Inlet (E.L. 9/74) Annual Report 1974/75 Field Season
Union Oil Development Corporation*
McGregor-Dawson, J.L.
EL9/1974



LEGEND

QUATERNARY		Alluvial fans, mud flows, outwash
		Detritus, coarse to fine talus, glacial debris
		Alluvium, river bed and fluvioglacial sands and silts
ORDOVICIAN		Undifferentiated oligomictic quartz conglomerate. Conglomeratic quartz—mica sandstone, pyritic sandstone, limestone. Rare shale and siltstone horizons.
		Coarse conglomerate.
CAMBRIAN	THIRKELL GROUP	Volcanic rich polymictic conglomerate, epiclastic sandstones, siltstones calcareous siltstones and carbonaceous shales, pyritic in part. Chlorite schists and phyllitic schists.
		micaceous sandstone
		chloritic and phyllitic schists, carbonaceous shale
		Volcanic conglomerate
	LUCAS VOLCANICS	Undifferentiated acidic volcanics, dominantly ignimbrites and ash fall pyroclastics. Rhyolite domes and flows. Intrusive (?) trachy-andesites. Clastic and chemical sediments.
		Chert
		Epiclastic tuff, sandstone and shale
		rhyolite flows and domes, no ferro magnesian minerals
		Rhyolite flows, abundant chloritized biotite
		Ignimbritic rocks, some coarse agglomerate and fragmental rhyolite
		Ash fall tuffs with occasional ignimbrite and rhyolite flows. Lapilli tuff
		Trachy—andesite and coarse grained intrusive (?) rhyolites.
CAMBRIAN	D'AGUILAR GROUP	Poorly sorted polymictic conglomerate; cross bedded green and grey shale, epiclastic sandstone and siltstone. Occasional lenses of massive and sheared keratophyre. Generally strongly sheared.
		Keratophyre
		Conglomerate
PRE CAMBRIAN		Undifferentiated quartzite, quartz-mica schist, tourmaline-quartz schist, silicified dolomite, graphitic schist and chlorite schist.

- Unconformity
- Fault (observed or inferred)
- Photo lineament (mostly joints)
- Approximate geological boundary
- Intra formational boundary
- Strike and dip of stratum
- Prevailing strike and dip of stratum
- Vertical stratum
- Strike and dip of foliation
- Prevailing strike and dip of foliation
- Vertical foliation
- Watercourse

NOTE: Unconformity between Quaternary and older formations not shown.

TN MN

UNION OIL DEVELOPMENT CORP.

TASMANIA E. L. 9/74

(formerly E.L. 2/72)

GEOLOGY

after Australasian Minerals

Nov. 1974

Sheet 2

5 cm

Scale 1 : 15 840

0 500 1000 1500 Metres

0 1000 3000 5000 Feet

75_1112

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Union Oil Development Corporation
McGonigal-Dawson J.L.
ELS/1974