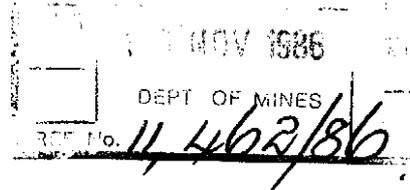


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E.L.42/71 (WEST)

ARGENT AREA

ANNUAL REPORT 1985/86

OPEN FILE

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Renison Ltd. (2)

D. A. Evans

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Senior Geologist
Renison Ltd.,
August, 1986

AMG REFERENCE POINTS ADDED

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- II. Geophysical Reports
 - A. Interpretation of the Magnetic and Electromagnetic Surveys over the Dunkley Fault Grid (E.L. 42/71).
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1.0 SUMMARY

The Argent area of E.L.42/71 is located immediately west and southwest of the Renison Mine Lease. A large section of the area is underlain by rocks of the Crimson Creek Formation, of probable Precambrian-Cambrian age. At the Renison Bell mine, these predominantly volcanoclastic rocks include the uppermost members of the mine sequence. With the existence of mineralized faults established, the Argent area is thus prospective for fracture-controlled, carbonate-replacement (Renison-style) tin mineralization.

Exploration of the Argent area by private companies has continued intermittently since 1960 and the area now covered by E.L.42/71 has been explored by Renison Ltd. since 1969. In recent years, exploration in the Argent area by Renison Ltd. has concentrated on locating deeply-buried, stanniferous sulphide mineralization.

The exploration programme conducted in 1985-86 was comprised of grid cutting, ground magnetic, VLF-EM, IP and CSAMT surveying, geological mapping, downhole EM logging and surface rock chip sampling. Interpretation reports on geophysical surveys previously completed in the Argent area were compiled by a consultant geophysicist. The total cost of the 1985-86 exploration programme was \$77,926.

Due to the depressed state of the international tin market, exploration of the Argent area was suspended in April 1986 and no additional work is budgetted for in the next year, after which the current E.L. is due for relinquishment. Definite potential exists for the discovery of stanniferous, carbonate-replacement and fault-fill mineralization at depth, in the eastern section of the E.L. area, adjacent to the Renison Mine Lease. Thus Renison Ltd. is negotiating a longer-term tenure, over parts of the E.L. area, for future deep-seeking exploration programmes to proceed.

2.0 CONCLUSIONS AND RECOMMENDATIONS

Dolomite horizons of the Renison mine sequence have been located, at depth, by broadly-spacing diamond drilling, in the following areas of the Argent section of E.L. 42/71:

- i) in the Dunkley Tramway area (in drillhole S705);
- ii) midway between the Argent Dam and Western Hills (in drillhole S835);
- iii) in the Serpentine Hill - Commonwealth Hill area, adjacent to the southwestern corner of the Renison Mine Lease (in drillhole S1182);
- iv) in the footwall of the northwestern extension of the Federal Fault, near the abandoned Owen Meredith mine workings.

Limited geological mapping was the only work undertaken in the area of drillhole S835 during the 1985-86 exploration programme. The mapping confirmed that an extensive area in this section of the E.L. is underlain by the lower Success Creek Group and consequently has no significant exploration potential for stratabound carbonate-replacement tin mineralization. Depths to the hangingwall of the No. 3 Horizon, throughout the immediate area of drillhole S835, appear to be no more than 200m. Results from the broadly-spaced ground magnetics survey on crosslines of the Argent Grid, and from the more recent coverage of the airborne magnetics survey flown for the Tasmanian Department of Mines, indicate that the area is unprospective for pyrrhotite-cassiterite mineralization.

No additional exploration of the area of drillhole S705 has been recently undertaken. Although depths to the carbonate horizons of the Renison mine sequence are somewhat greater, up to 350m to the No. 3 Horizon hangingwall in places, the area is concluded to be unprospective. The geological setting of the Western Hills area, comprising the northwestern corner of the E.L. and approximately half of the total Argent area is dominated by correlates of the lower Success Creek Group and, possibly, the Oonah Formation. The entire area, which is located in the upthrown block northwest of the Dunkley Fault, is considered to have minimal exploration potential for carbonate-replacement and fault-infill tin mineralisation.

In 1985-86, exploration of the Argent section of E.L. 42/71 was concentrated in the Serpentine Hill area, adjacent to the southwestern corner of the Renison Mine Lease, and on grid-based evaluation programmes, further northwest. Encouraging results were obtained from downhole EM logging of a previously completed diamond drillhole, in the area between Serpentine Hill and Commonwealth Hill. The hole was logged using SIROTEM equipment, with several transmitter loop lay-outs, for comparison with the results of previously completed logging. An off-hole response,

for which excellent conductivities are apparent (? pyrrhotite source), was recorded in the depth range where the hole intersected altered and locally pyrrhotite mineralized dolomite, of the No. 1 Horizon. The carbonate horizon in this hole represents the southernmost intersection of the Renison mine sequence drilled to date, located more than 3km from the Renison Bell mine complex. The downhole EM data are still being interpreted, to obtain directional control for any follow-up drilling. Line clearing and broad-spaced ground magnetics surveying were undertaken in the Tallowwood and Cheesewood Grid areas to the northwest of Serpentine Hill. Geological mapping and VLF-EM surveying programmes were partially completed over the grids and along drill-site access tracks and firebreak trails throughout this section of the E.L. An area underlain by the Crimson Creek Formation, and thus potentially by the dolomite horizons of the Renison mine sequence, has been delineated by the coverage of the Tallowwood Grid. The area is contiguous, in terms of geological setting, with the Serpentine Hill-Commonwealth Hill area and the southwestern corner of the Renison Mine Lease. A ground magnetic anomaly in the Tallowwood Grid area is indicated to have a shallow source, and may be due to a basic intrusive, within the Crimson Creek Formation, or possibly a mineralized fault. Several localized peaks in the ground magnetics data are attributed to magnetite, which occurs as elastic grains and also hosted by basic volcanoclastic detritus, within sub-outcropping tuffaceous greywacke of the Crimson Creek Formation. Samples from weathered surface exposures of fault zones, or veins, in the Serpentine Hill and Tallowwood Grid areas have returned highly anomalous lead, zinc, arsenic and tungsten values. Although the mapping coverage remains incomplete, much of the Cheesewood Grid area appears to be underlain by the lower Success Creek Group and, in the northwest, by the Precambrian Oonah Formation. A fault-bounded block, of limited areal extent, in the centre of the grid, is interpreted to be underlain by correlates of the Crimson Creek Formation.

Clearing of the infill crosslines and of additional lines to extend the Tallowwood Grid coverage to the northeast of the the Argent Grid baseline was recommended for commencement in April 1986. A programme of bedrock geochemical sampling, and of additional ground magnetics and VLF-EM surveying, to cover the Tallowwood Grid and its proposed extensions, and 3 crosslines of the Cheesewood Grid, was also recommended. However, as a result of recent developments in the international tin market, which saw a dramatic decrease in the metal price, all exploration of the Argent area was suspended. The area remains prospective, at considerable depth, for stratabound carbonate-replacement tin mineralization. Potential exists, possibly nearer to surface, for locating fault-fill and "stratafault" tin mineralization. The Serpentine Hill-Commonwealth Hill area, adjacent to the Renison Mine Lease, is a priority area for retention under any possible longer-term exploration tenure. The

Tallowood Grid area and the section of the E.L. which adjoins the western boundary of the Renison Mine Lease, extending northwards to beyond the Federal Fault, are similarly recommended for retention.

No additional exploration of the northwestern extension of the Federal Fault was undertaken in 1985-86. A major study of the disposition of the structure, particularly in relation to the transverse faults developed in the fault footwall, in the immediate area of the Renison Bell mine, is continuing. The initial results of this work are encouraging for further exploration of the structure within the Argent area. Establishing longer-term exploration tenure, to cover the northwestern extension of the Federal Fault, remains a major priority. The possibility of extending the existing Renison Mine Lease to cover this northeastern corner of the E.L., in addition to the area further south, near Serpentine Hill, is being actively pursued. Should longer-term tenure be established, re-evaluation of the area around the old Poseidon Mine and Murchison Mine workings, located between the Argent Dam and the Dunkley Tramway, is recommended.

No further exploration of the Dunkley Fault Grid area is recommended, and this section of the E.L. can be relinquished. The results of exploration completed during 1985-86 indicate that the Renison mine sequence, if represented at all in the area, is at least 150m beneath the depth range tested to date. Thus the target depth for any stratabound carbonate-replacement mineralization would be 600 - 700m, below surface. The shallower sources of the magnetic anomaly in the grid area are interpreted to be detrital magnetite, within basic lithoclastic sediments of the Crimson Creek Formation, whilst the deepest modelled source is possibly a basic intrusive complex.

3.0 INTRODUCTION

E.L.42/71 covers approximately 53 sq km immediately south and west of the Renison Mine Lease. The southeastern section of the E.L. extends over the Serpentine Hill to Black Hill area and includes the Grand Prize mine area. Evaluation of this section of the E.L. is carried out by Goldfields Exploration Pty. Ltd. and is reported on separately (Cartwright, 1986). The section of the E.L. immediately west and southwest of the Renison Mine Lease, known as the Argent area, is being explored by staff of Renison Ltd.

Much of the southern section of the Argent area is underlain by rocks of the Crimson Creek Formation, and thus potential exists for locating the dolomite horizons of the Renison mine sequence at depth. Intersections of thick dolomite horizons, in several deep diamond drillholes sited in the southernmost section of the Renison Mine Lease and in the immediately adjacent section of E.L.42/71, between Serpentine Hill and Pine Hill, confirm this potential. The general area is strongly faulted and the Late Precambrian-Early Cambrian sequences are presumably intruded, at depth, by Devonian-age granite. On the basis of these favourable geological parameters, the area is prospective for the two major styles of tin mineralization that exist at the Renison Bell mine, viz:

- a) stratabound, near-massive pyrrhotite (-pyrite) replacement of dolomite horizons;
- b) semi-massive pyrrhotite (-arsenopyrite-pyrite-chalcopyrite) fault infill.

Other types of tin mineralization which may exist in the area, but which are less attractive as exploration targets, include stanniferous skarn and greisen.

Work completed in the Argent area during the 1985-86 exploration programme, and available results, are detailed in this report.

011 4.0 EXPLORATION LICENCE TENURE

E.L.42/71 was originally granted, over an area of approximately 28.5 sq km, on August 25, 1971. Subsequently the E.L. has been enlarged, to its current area of approximately 53 sq km, over which tenure has been held unchanged since 1976.

With the new conditions applying to exploration licences in Tasmania, in force from July 1, 1982, E.L.42/71 is due for relinquishment in August, 1987.

012
5.0 LOCATION AND ACCESS

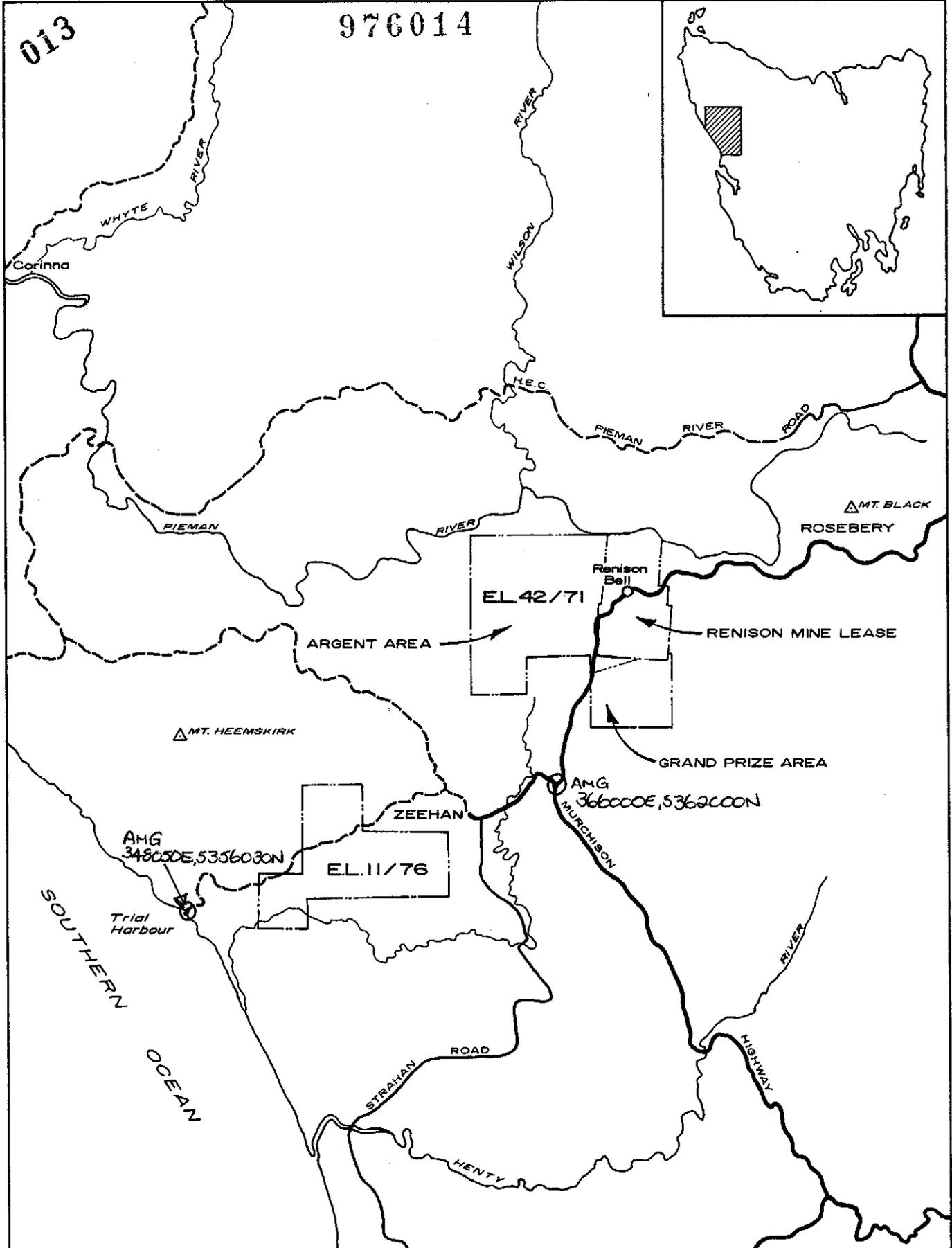
The Argent area of E.L.42/71 is located to the west and southwest of the Renison Bell townsite and mine complex in Western Tasmania (Ref.Fig.1). The eastern boundary of the E.L. adjoins the Renison Mine Lease. To the north, the Argent area is bounded by the Pieman River. The E.L. extends south close to Melba Flats, and in the west to the abandoned Dunkley Tramway.

Steep, dissected terrain, supporting thick rain-forest vegetation, occurs in an elevated area of the E.L. which extends between Serpentine Hill and Dunkley Tramway, and in the northeastern section of the E.L. towards the Pieman River. In the northwestern section, from the Dunkley Tramway towards Western Hills, the terrain is less steep and less dissected, with extensive areas covered by button-grass. Much of the southwestern section of the E.L., from northwest of Melba Flats through to the Dunkley Tramway, was burnt-out by the major bushfires of early 1981. Thick re-growth of ti-tree (*Leptospermum* Spp.) and bottlebrush (*Callistemon* Spp.) is now established in this generally low and poorly drained area, which was previously covered by extensive areas of eucalypt forest. The burnt and fallen hardwood, and dense re-growth, seriously impede off-road access in this area.

The Murchison Highway and the Emu Bay Railway cut through the southeastern section of E.L.42/71 between Serpentine Hill and Melba Flats. An all-weather, unsealed road, turning off from the Murchison Highway at Argent Dam, provides access to the northeastern section of the E.L. and beyond to logging areas along the Pieman River. The abandoned Dunkley Tramway has been up-graded to a reasonable standard track from the Pieman logging road, near the old Owen Meredith workings, for approximately 6 km to the southwest. A bulldozed four-wheel drive track, established and maintained by Renison Ltd., allows summer access between Melba Flats, via the abandoned Cuni Mine area, and the Dunkley Tramway. The Dunkley Fault Grid area, located in the far southwestern section of the E.L., can be accessed from this track or alternatively by a similar standard track which heads northwest from Melba Flats. Numerous other four-wheel drive tracks, including those established in early 1981 for bushfire control purposes, provide limited access to the area of steep terrain to the northwest of Serpentine Hill. Some of these tracks, constructed for Renison Ltd., access old drill sites. Most require clearing and some reconstruction work after each winter, especially in the areas of burnt-out vegetation.

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AMG REFERENCE POINTS ADDED

5 cm

RENISON LIMITED

2.5 0 5.0 10.0 15.0 km
SCALE 1:250 000

GEOLOGIST: D.A.E.	<p>E.L.42/71 ARGENTA AREA LOCALITY PLAN</p>
DRAUGHTSMAN: R.F.	
CHECKED:	
DATE: AUG., 1986	
REVISED:	<p>FIG.No. 1</p>

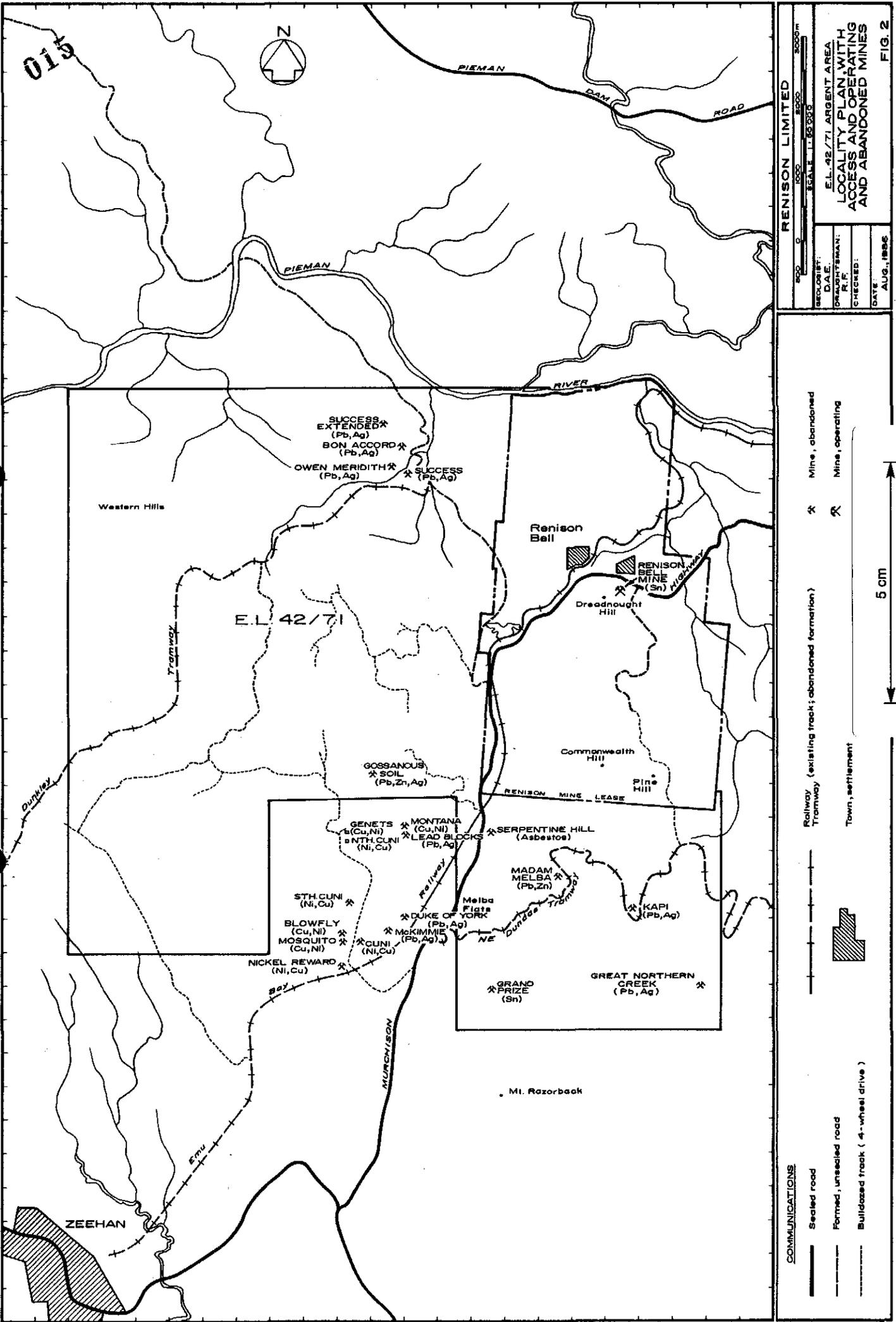
0140 PREVIOUS EXPLORATION

A history of the very earliest mineral exploration and mine development in the Zeehan district of western Tasmania, since 1876, is recorded in Blissett (1962). The Owen Meredith, Bon Accord, Success and Success Extended workings, located from 3-4 km northwest of Renison Bell townsite, were mined intermittently between 1890 and 1917, with an estimated total production of 91.5 tonnes of lead and 1008 kg of silver. In the Cuni district, 8 km northeast of Zeehan, the Lead Blocks Mine produced an estimated 1443 tonnes of lead and 3732 kg of silver, with a total production of 34.6 tonnes of lead and 93 kg of silver recorded from the nearby McKimmie Mine. The Lead Blocks Mine was worked between 1893 and 1914, and subsequently by tributors up until 1947, whilst the McKimmie Mine closed prior to 1902. The Cuni workings were originally pegged in 1893, with mining activity recorded from 1909 - 1914 and again from 1928 - 1932. Recorded production totalled approximately 7520 tonnes of ore, with grades of from 7.1 - 11.6% nickel and 4.1 - 5.5% copper. The pentlandite-pyrrhotite (-pyrite-chalcopyrite) and millerite (-chalcopyrite-pyrite) ores occurred in association with Late Cambrian, metasomatized dolerite, which has intruded the Crimson Creek Formation. Locations of these old workings are shown in Figure 2.

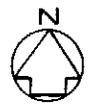
Other old workings, comprised of a shaft, a collapsed adit and several trenches, are located approximately 1 km northwest of the Lead Blocks Mine. A clearly defined track through this area is possibly the remains of a wooden tram way.

More recent work completed in the district, which has included coverage of the Argent area of E.L.42/71, is detailed below (from Kilpatrick, 1985):

- i) Tasmanian Department of Mines (1951-54) - conducted detailed geological surveys near Zeehan, Renison Bell and to the north of the Pieman River. A grid was established over the Owen Meredith and Bon Accord line of workings and self-potential and TURAM surveys were carried out.
- ii) Tasmanian Department of Mines (1958-61) - geological mapping of the Zeehan district was undertaken (Blissett, 1962).
- iii) Rio Tinto Australia Exploration (1960) - carried out limit gridding and ground magnetics and self-potential surveying to test the magnetic anomaly in the Dunkley Fault area.



015



PIEMAN RIVER DAM ROAD

SUCCESS EXTENDED* (Pb,Ag)
BON ACCORD* (Pb,Ag)
OWEN MERIDITH* (Pb,Ag)
SUCCESS* (Pb,Ag)

Western Hills

E.L. 42/71

Renison Bell

RENISON BELL MINE (Sn)
Dreadnought Hill

Commonwealth Hill

Pine Hill

GOSSANOUS SOIL* (Pb,Zn,Ag)

RENISON MINE LEASE

GENETS* (Cu,Ni)
SOUTH CUNI* (Ni,Cu)

MONTANA* (Cu,Ni)
LEAD BLOCKS* (Pb,Ag)

SERPENTINE HILL* (Asbestos)

MADAM MELBA* (Pb,Zn)

KAPI* (Pb,Ag)

STH CUNI* (Ni,Cu)

BLOWFLY* (Cu,Ni)
MOSQUITO* (Cu,Ni)

Melba FISTS* (Pb,Ag)
DUKE OF YORK* (Pb,Ag)

McKIMMIE* (Pb,Ag)
CUNI* (Ni,Cu)

NICKEL REWARD* (Ni,Cu)

GRAND PRIZE* (Sn)

GREAT NORTHERN CREEK* (Pb,Ag)

Mt. Razorback

ZEEHAN

5 CM

- 016
- iv) Electrolytic Zinc Co. (1962) - a large, but poorly recoverable grid was cut, over much of the eastern section of the Argent area. Ground magnetics, IP and geochemical surveys were completed, followed up by two diamond drillholes (MFP 124 and MFP 125). No information is on record for exploration in the western section of the grid where little, if any, work is thought to have been completed.
 - v) Comstaff Pty. Ltd. (1966-1970) - commenced exploration with a programme of stream sediment sampling. The Renison Bell West Grid was established to test the northwestern extension of the Federal Fault. Ground magnetics, IP, self-potential and soil geochemical surveys, as well as geological mapping, were undertaken. Three diamond drillholes (RB1, RB2 and RB3) were completed.
 - vi) Aberfoyle Exploration Pty. Ltd. (1965) - had an airborne magnetics survey flown over the Waratah to Zeehan area. The flight line spacing used was approximately 400m.
 - vii) Paringa Mining and Exploration Co.Ltd. (1971) - established the Wilson River Grid, just north of E.L.42/71, to test for any northwestern extension of the Federal Fault and Owen Meredith Fault system. Exploration activities comprised ground magnetics, self-potential and geochemical surveys.
 - viii) Renison Ltd. (1972 - 1985) - the Dunkley Grid (5 lines, totalling 15 km) was cut in 1972, across the Dunkley Fault, aimed at further testing of the magnetic anomaly. Ground magnetics surveying and geological mapping were completed on three of the lines. Data from the remaining lines are not recoverable.

Subsequent exploration programmes conducted by Renison Ltd. throughout the Argent area have been as follows:-

- a) Crimson Creek Grid - work was commenced in 1973, with re-pegging and extension of Comstaff's Renison Bell West Grid. Renison Ltd. completed geological mapping and ground proton-precession magnetics, IP and some MIP surveying over the grid. In 1974-75, four diamond drillholes (S369, S370, S386 and S388: total depth 1038.3m) were completed, testing the Federal Fault and Owen Meredith Fault system and the area of the Owen Meredith workings. In the 1979-80 summer, a soil geochemical survey was completed. From June 1979 to September 1983, six additional holes (S594, S650, S697, S1008, S1026 and S1134), totalling 3532.9m were drilled in the area, to test the Federal Fault at depth.

- b) Argent Grid - a baseline and 400m spaced crosslines were established in 1975 over the area of E.Z.'s Melba Flat Grid, and further west. Geological mapping, ground proton-precession magnetics and IP and soil geochemical surveying were subsequently completed. From April 1978 to March 1982, three diamond drillholes (S495, S835 and S966: total depth 1286.1m) were completed. The most recent activity in the grid area was the drilling of hole S1207, in December 1984, to a depth of 658m. The hole was aimed at testing the source of a poorly defined magnetic anomaly in an area of Crimson Creek Formation, and at locating the Renison mine sequence at depth.
- c) Dunkley Tram Grid - three crosslines, totalling 3.5 km in length, were cut in 1979. Geological mapping, ground proton-precession magnetics and IP surveying and soil geochemical sampling were undertaken. In September 1980, diamond drillhole S705 was completed to a depth of 333.4m. The hole tested the Renison mine sequence at depth.
- d) Dunkley Fault Grid - 34.6 km of baseline and crosslines (200m spacing) were cut in 1983. Geological mapping, ground proton-precession magnetics surveying and bedrock geochemical sampling were completed over the grid. In early 1984, infill gridding (15.1 line km) and additional ground magnetics surveying and bedrock geochemical sampling were undertaken. A VLF-EM survey was undertaken on most of the crosslines in the northern section of the grid. Diamond drillhole S1200 was completed in November 1984, to a total depth of 598.7m, aimed at testing the large magnetic anomaly located and defined by the grid-based exploration programmes. The drilling results were inconclusive. Subsequently, a UTEM survey was carried out to define any conductive zones associated with the magnetic anomaly.

Recent exploration in the southwestern section of the Renison Mine Lease has included coverage of the immediately adjacent E.L. area. Diamond drillhole S1182 was completed in mid-1984 to a depth of 746m. The hole intersected a talc-altered dolomite bed, correlated with the No.1 Horizon of the Renison mine sequence and hosting locally abundant pyrrhotite mineralization. The lower dolomite horizons of the mine sequence appear to have been faulted out and the hole was stopped after intersecting granite. In February 1985, Geoterrex carried out downhole EM logging of S1182, using EM37 equipment and five transmitter loop layouts.

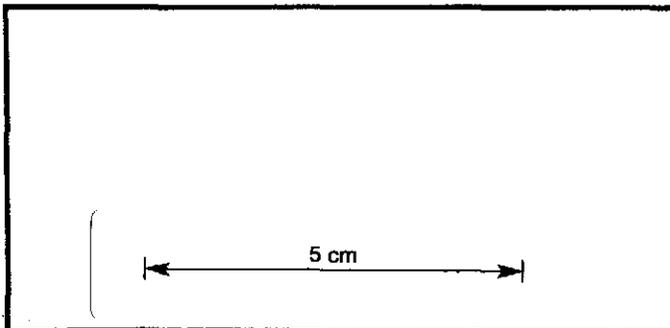
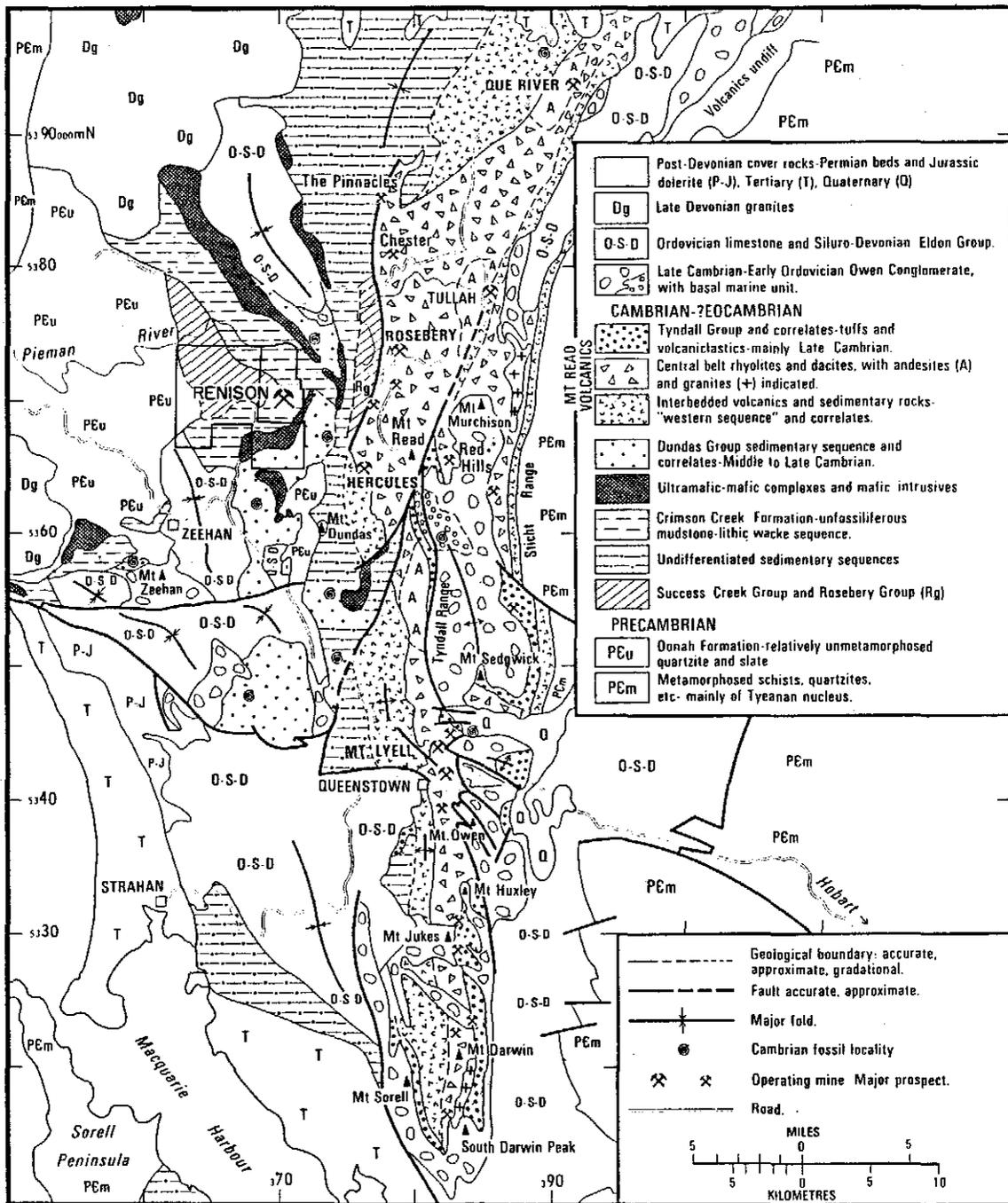
The Argent area was also included in the coverage of the regional airborne magnetics survey flown for the Tasmanian Department of Mines in 1981. Regional geological mapping of the Dundas - Mt. Lindsay - Mt. Ramsay area, compiled by the Department of Mines, was recently published (Brown, 1983) and includes coverage of the E.L.42/71 area.

7.0 GEOLOGY7.1 Regional Geology

The geological setting of the Western Tasmanian region is dominated by Early to Middle Palaeozoic sediments and volcanics, which were deposited in the Dundas Trough, and by associated Precambrian basement rocks (Ref. Fig.3, after Corbett, 1981). The trough, one of several developed in the region between nuclei of metamorphosed Precambrian rocks, trends north-northeast and is comprised of five major litho-stratigraphic divisions (Corbett and Brown, 1980):

- i) early trough sequences - consisting of the Success Creek Group, a sequence of interbedded fine siliciclastic rocks and minor dolomite, and the Crimson Creek Formation, an unfossiliferous sequence of mudstone and turbiditic, volcanoclastic lithic wacke, with minor conglomeratic and basic volcanic units. The Success Creek Group unconformably overlies the Precambrian Oonah Formation and is conformably overlain by the Crimson Creek Formation. Both of the younger sequences may yet prove to be of Precambrian age.
- ii) mafic-ultramafic complexes - several of these possible dismembered ophiolites occur in faulted contact with the Crimson Creek Formation. Locally, the contact between these mafic-ultramafic rocks and the overlying, fossiliferous Middle Cambrian sediments has been established as a low-angle unconformity.
- iii) fossiliferous Dundas Group and correlates - comprised of interbedded lithic wacke, mudstone and conglomerate, with minor basic and acid volcanics. From fossil evidence the sequence is dated from Middle to Late Cambrian.
- iv) Mt. Read Volcanics and associated rocks - occurring along the eastern margin of the Dundas Trough and comprised of acid to intermediate volcanics, with interbedded volcanoclastic sediments which appear to interfinger with the Dundas Group.
- v) Owen Conglomerate and correlates - comprised of up to 1000m of Precambrian-derived conglomerate and sandstone. Late Cambrian age marine fossils have been located in the sequence.

019



RENISON LIMITED	
5 0 10 20 30 SCALE 1:500 000	
GEOLOGIST: D.A.E.	REGIONAL GEOLOGY OF CENTRAL WESTERN TASMANIA (from Corbett, 1981)
DRAUGHTSMAN: R.F.	
CHECKED:	
DATE: AUG., 1986	
REVISED:	FIG.No. 3

020

Also represented in the Zeehan-Renison Bell area are correlates of the Ordovician-Devonian sequences of Western Tasmania, viz the Gordon Limestone and the Eldon Group, which were deposited during a widespread shallow marine transgression over the Dundas Trough.

A period of intense folding, associated with the Middle Devonian Tabberabberan orogeny, caused the cessation of deposition within and over the Dundas Trough. Two phases of deformation, correlated with this period of tectonism, dominate the structural setting of the region (Corbett, 1981). The early deformation phase resulted in broad, open folds, with north-south trends, whilst the later phase produced steep west-northwest trending faults and folds. Post-tectonic granitic intrusions are represented in the region.

Permian sediments unconformably overlie the folded Precambrian and Early Palaeozoic sequences to the northwest and southwest of Zeehan. Only scattered occurrences of the Jurassic dolerite, which is widespread further east throughout Tasmania, have been mapped in the Zeehan area (Blissett, 1962). Tertiary sediments were also mapped, and rare occurrences of basalt were recorded by Blissett, in the area, but are not represented within E.L.42/71 or the Renison Mine Lease. Pleistocene fluvio-glacial deposits occur at Renison Bell townsite and in the Renison Bell mine area. Recent alluvial deposits are restricted to the valleys of presently active streams. Marsh and swamp deposits are represented in the E.L.42/71 area around the upper reaches of Western Rivulet, traversed by the abandoned Dunkley Tramway.

7.2 Geology of the Renison Mine Lease and the Argent Section of E.L.42/71

The oldest rocks in the area are those exposed in the westernmost section of E.L.42/71, between the Pieman River and the abandoned Dunkley Tramway. These exposures are located along the eastern edge of a large block which extends north and south of the Pieman River, from a point approximately 7.5km northwest of Renison Bell townsite, and as far west as the Heemskirk Granite, and which has been mapped as Precambrian Oonah Formation (Blissett, 1962; Brown 1983). Investigation of a proposed dam site, for storage of tailings from the Renison Bell mine, was undertaken by Coffey and Partners Pty. Ltd. during 1983, in the Western Hills area. The investigation centred on the upper catchment area of Western Rivulet and Dunkley Creek.

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Descriptions of rock types in surface outcrops and in pits and trenches in the area are consistent with the Oonah Formation. Poorly bedded to massive, fine to medium-grained orthoquartzite, dark grey to black, fissile shaley siltstone and interbedded light grey siltstone and fine to medium-grained sandstone comprise the major lithological units of this area. All of the rock types are extensively folded. As described by Brown (1984), the Oonah Formation in the Dundas-Mt.Lindsay-Mt.Ramsay area consists of a lower sequence of lithic and quartz sandstone, with laminated phyllitic mudstone, and an upper sequence of interbedded mudstone and carbonate units, laminated siltstone and mudstone, graded lithic sandstone and tuff and lava units. Isoclinal folds, with well-developed axial surface cleavage, are preserved in these rocks.

The central and northeastern sections of E.L.42/71, and virtually the entire Renison Mine Lease area, are underlain by rocks of the Success Creek Group and the Crimson Creek Formation, representing the earliest sequences deposited in the Dundas Trough. A detailed study of the stratigraphy and sedimentology of these sequences, in the immediate area of the Renison Bell mine, was undertaken by Morrison (1982). A summary of the major lithological units comprising the Renison mine sequence is shown in Figure 4. Potentially, extensive areas of the Argent section of E.L.42/71 are underlain, at depth, by the dolomite horizons of the Renison mine sequence. Stratigraphic drilling has confirmed the existence of these horizons in the northeastern, central and southeastern sections of the E.L.

Rocks of the Cambrian mafic-ultramafic complex, and of the Dundas Group, are exposed in the E.L. area east and southeast of Serpentine Hill, but are not within the scope of this report. The geology of this area is described by Komysan (1985).

Correlates of the Silurian-Devonian Eldon Group outcrop in the southwestern corner of E.L.42/71.

Middle Devonian granitic rocks outcrop in the Pine Hill area, located in the southeastern corner of the Renison Mine Lease. The greisenized granite intrudes the Crimson Creek Formation and a northeastern continuation of the Serpentine Hill mafic-ultramafic complex. Granitic rocks, which intrude the Dalcoath Member of the Success Creek Group, have also been intersected at depth, in drillholes, beneath the Renison Bell mine workings, some 1000m below surface. The major lithologies represented in diamond drill core and in outcrop are feldspar-porphyritic granite, quartz/feldspar-porphyritic granite

022

PALAEOZOIC

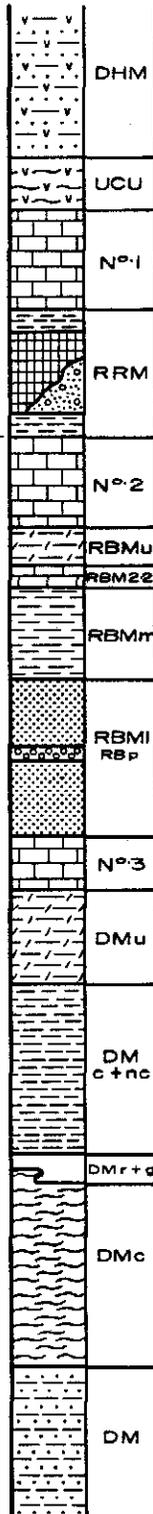
? EARLY CAMBRIAN

CRIMSON CREEK FORMATION

PRECAMBRIAN

? LATE PROTEROZOIC - EARLY CAMBRIAN

SUCCESS CREEK GROUP



DREADNOUGHT HILL MEMBER: Green and red-brown siltstone and greywacke, minor basalt, tuff.

UPPER CONTORTED UNIT (0-45m): Red siltstone, chert, lapilli tuff, locally contorted black shale, siltstone, sandstone.

N°1 DOLOMITE (8-25m): Grey stylolitic, laminated dolomite, impure margins, locally sandy.

RED ROCK MEMBER (25-35m): Interbedded red, white and grey sandstone, conglomerate, siltstone, chert, jasper and iron formation, local volcanic fragment.

N°2 DOLOMITE (5-30m): Grey stylolitic dolomite locally laminated, pelletal or with red-lined cavities.

RENISON BELL MEMBER upper (5-10m): Grey-green dolomitic siltstone.

RENISON BELL MEMBER 2:2 (1-3m): Nodular dolomite, siltstone.

RENISON BELL MEMBER middle (10-30m): Black shale, minor sandstone, siltstone, conglomerate.

RENISON BELL MEMBER lower (20-40m): Quartz sandstone, shale partings, pebble beds to 10m, local basal intraclast conglomerate.

N°3 DOLOMITE (to 15m): Grey stylolitic dolomite, locally laminated, pelletal; locally divided in two by shale.

DALCOATH MEMBER upper (10-15m): Grey-green dolomitic siltstone and shale with nodular dolomite, tuff beds.

DALCOATH MEMBER carbonaceous and non-carbonaceous unit (8-54m): Grey and black laminated siltstone, locally colour, mottled slump folded, broken. Minor sandstone, shale beds.

DALCOATH MEMBER red and green unit (to 54m): Siltstone, sandstone, shale.

DALCOATH MEMBER contorted unit (to 80m): Black to grey shale and siltstone with broken beds of sandstone.

DALCOATH MEMBER undivided (to 800m): Massive quartz sandstone, shale and siltstone in upper part.

RENISON LIMITED



GEOLOGIST:
D.A.E.
DRAUGHTSMAN:
R.F.
CHECKED:
DATE:
AUG., 1986
REVISED:

STRATIGRAPHY
OF THE
RENISON MINE SEQUENCE
(after Morrison, 1982)

FIG.No. 4

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and quartz-feldspar porphyry, each also represented by fine-grained or pegmatitic variants (Patterson, 1979; Patterson, Ohmoto and Solomon, 1981). From geochemical and petrological studies (Ward, 1981) these rocks can all be classified as granite and appear to be intermediate between I-type and S-type. The rocks intruded by the Pine Hill granite have been affected by thermal metamorphism, with a hornblende-hornfels facies developed, and by boron metasomatism. Several quartz-porphyrific, granitic minor intrusives occur throughout the mine area, trending northwest. A thin, basaltic-composition minor intrusive, possibly of Jurassic age, cuts through the mine workings and the Pine Hill area on a north-northwest trend.

The structure of the Renison Bell mine area is dominated by a northwest-striking anticline, which is an open, upright fold formed during the Tabberabberan orogeny (Patterson, Ohmoto and Solomon, 1981). The stratabound, carbonate - replacement tin orebodies are located in the gently folded mine sequence on the northeastern limb of this anticline. Numerous faults cut through the mine area. A well-developed fault set, striking northwest parallel to the major fold axis, includes the Federal Fault and the Argent Fault systems. Transverse faults, one set striking east-northeast and the other trending north-northeast, occur between these major longitudinal structures.

The northwestern continuation of the Federal Fault extends over approximately 3km through the northeastern corner of E.L.42/71. Several faults of similar orientation, including a possible continuation of the Grand Prize Fault, are interpreted in the central and southeastern sections of the Argent area. Throws on these faults in places appear to have been sufficiently large for the structures to contact rocks of the Success Creek Group, including correlates of the dolomite horizons in the Renison mine sequence, and the Crimson Creek Formation. In the southwestern corner of the E.L. a major fault contacts probable Crimson Creek Formation and rocks of the Silurian-Devonian Eldon Group. This structure also has a northwesterly trend. The Dunkley Fault, extending through the southwestern section of the Argent area, trends northeast and contacts rocks of the lower Success Creek Group (possibly Oonah Formation) and the Crimson Creek Formation. Displacement on all of these structures appears to have been dominantly normal dip-slip. Due to the paucity of the outcrop through much of the Argent area, little is known of any regional or local folding in the Late Precambrian to Early Cambrian sequences.

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7.3 Economic Geology

The only operating mine in proximity to E.L.42/71 is at Renison Bell. In the year ended June 30, 1985, Renison Ltd. produced 2892 tonnes of tin, contained in 5724 tonnes of concentrates, from the 389,969 tonnes of ore mined at an estimated grade of 1.01% tin. Published ore reserves, as at January 1985, totalled 18,560,000 tonnes (proven and probable ore) at an estimated grade of 1.1% tin. Historical production, up to the end of 1984, totalled an estimated 73,441 tonnes of tin, recovered at an average grade of 1.22% tin from 8,947,535 tonnes of ore milled.

The stanniferous sulphide mineralization at the Renison Bell mine is located in Late Precambrian - Early Cambrian rocks of the Success Creek Group and the Crimson Creek Formation, with the major ore types comprised of:

- a) stratabound replacement ore - with cassiterite in disseminated to semi-massive pyrrhotite (-pyrite), which has replaced the dolomite of the No.2 and No.3 Horizons, and to a lesser extent the No.1 Horizon, in the Renison mine sequence. Other sulphide minerals in this ore type include chalcopyrite, marcasite, sphalerite and galena, and the main gangue minerals comprise dolomite, siderite, talc and quartz. Approximately 80% of all recorded production from the mine is estimated to have been of this ore type;
- b) fault ore - comprised of disseminated to semi-massive pyrrhotite (also as veins and veinlets), with relatively common arsenopyrite, minor chalcopyrite, pyrite and cassiterite, and sparse to trace galena, sphalerite, bismuthinite, wolframite, scheelite and stannite. Gangue minerals are also relatively more common, and include quartz, tourmaline, fluorite, phlogopite and minor muscovite. This ore type occurs infilling the Federal Fault and in the major east-northeast trending transverse faults close to the Federal Fault.

Recent re-interpretation of the structural setting in the immediate mine area (Morland, 1986) has led to the definition of a third major ore type, termed "stratafault" ore. Approximately 47% of the total remaining reserves at the mine is comprised of this ore type, which occurs within zones of complex structure, in close proximity to major fault systems, usually where two faults converge. Rock units, which may include the dolomite horizons of the mine sequence, occurring between the paralleling faults are often shattered and mineralized by stanniferous sulphide veins. The dolomite units can host

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replacement mineralization.

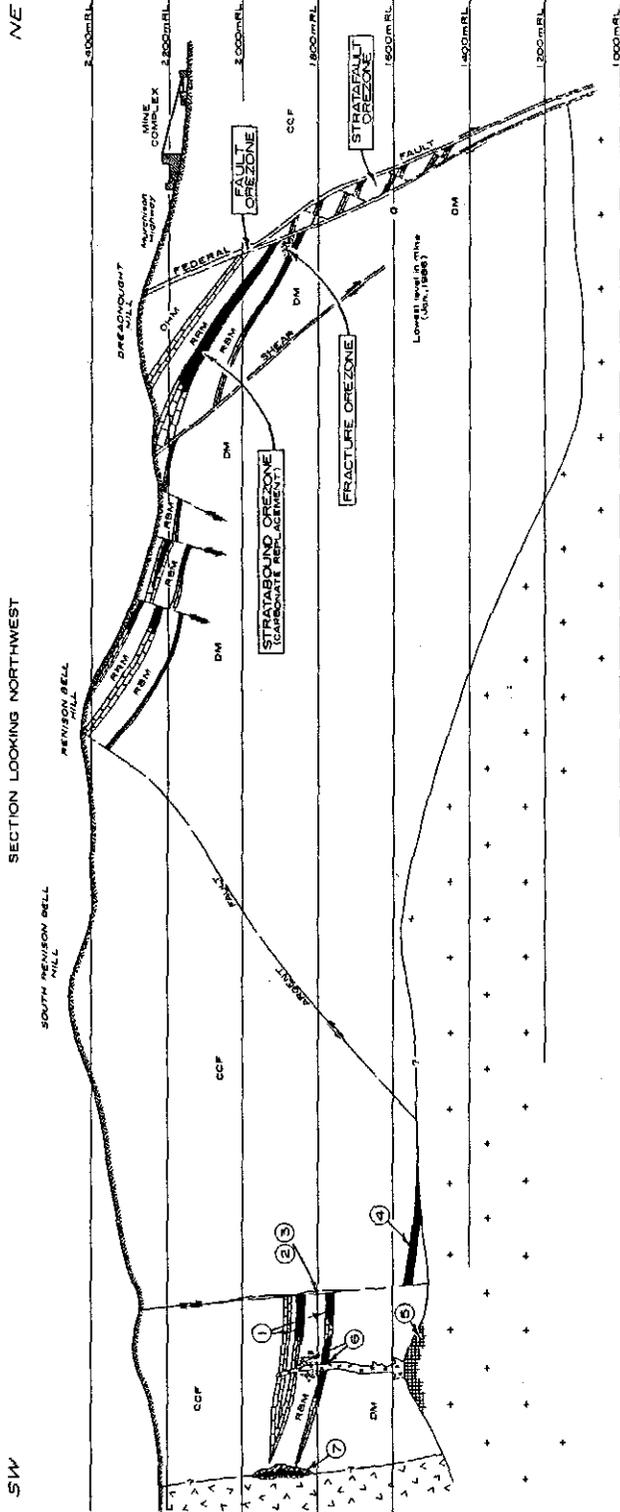
The fourth, but only a minor ore type at the Renison Bell mine is fracture ore. The mineralization is hosted by fractured, silicified and tourmalinized, fine clastic sub-units of the Renison Bell Member, within the Success Creek Group, and comprises quartz, pyrrhotite, tourmaline and cassiterite.

Other styles of tin mineralization known to exist in the Renison Bell mine area, but which are not regarded as being of economic significance in the present international market for tin, include -

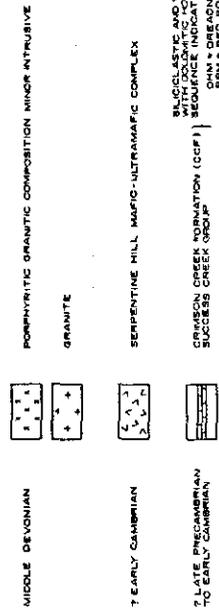
- i) disseminations and veins of cassiterite in greisen zones associated with the Pine Hill granite;
- ii) stanniferous magnetite/sulphide/calc-silicate skarns (contact metasomatic mineralization).

Minor occurrences of lead-silver mineralization are known within the Argent area and the Renison Mine Lease (Blissett, 1962). Analyses by the CSIRO of samples from the Renison Bell mine, and from several of the minor lead-silver occurrences in the district, indicate a distinctive, shared lead isotopic signature (Jones and Evans, 1985). The deposits have consistently high $^{206}\text{Pb}/^{204}\text{Pb}$ ratios, distinct from most of the Cambrian volcanogenic massive sulphides of Western Tasmania.

Figure 5 is a schematic section of the Renison Bell mine area, showing the distribution of the various ore types and a model of exploration targets. With the prevailing economics of the international tin market, and given the metallurgical problems inherent in the more complex ore types at Renison, the priority exploration target is a stratabound carbonate-replacement orebody. At a relatively shallow depth, this near-massive pyrrhotite mineralization would have a strong surface magnetic and conductivity expression. The Red Rock Member, of the Renison mine sequence, is also strongly magnetic, due to the presence of relatively common magnetite in jasper-chert units. The results of past exploration programmes conducted in the Argent area effectively preclude the existence of any near-surface stanniferous sulphide deposits, and thus the most recent exploration has been concentrated on locating deeply-buried mineralization.



STRATIGRAPHY

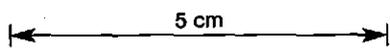


EXPLORATION TARGETS FOR SOUTH RENISON MINE LEASE AND ARGENT AREA (E.L. 42/7) (1074 Cont., 1986)

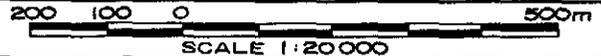
- ① STRATFOLLIE CARBONATE REPLACEMENT MINERALIZATION
- ② FAULT INFILL MINERALIZATION
- ③ STRATFOLLIE MINERALIZATION
- ④ CONTACT METASOMATISM SHARN (S. MT. LINDSAY)
- ⑤ GABBROITE MINERALIZATION IN GREISEN
- ⑥ GABBROITE MINERALIZATION IN STRATFOLLIE AND IN QUARTZ VEIN ROCKS ALTERED PORPHYRY DYKES AND IN QUARTZ VEIN STOCKWORKS AROUND DYKES (S. MT. BISCHOFF, CLEVELAND MINE)
- ⑦ HYDRATE - CHRYSE - GABBROITE & STANNITE MINERALIZATION IN TALCCARBONATE AT FALLEN COAST OF CAMBRIAN ULTRA-MAFIC COMPLEX (S. F. RASDBACK)

NOTE: SEMI-MASSIVE TO NEAR-MASSIVE SULPHIDE REPLACING DOLOMITE HORIZONS SHOWN IN BLACK.

NOTE: SECTION THROUGH RENISON MINE AFTER MORLAND, 1986.



RENISON LIMITED



SCALE 1:20000

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CHECKED:
DATE:
AUG., 1986
REVISED:

SCHEMATIC SECTION THROUGH RENISON MINE AREA

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8.0 1985-86 EXPLORATION PROGRAMME

The major aim of the 1985-86 exploration programme within the Argent area of E.L. 42/71, from recommendations made after the previous year's work (Kilpatrick, 1985), was coverage of the following :

- i) additional work in the Dunkley Fault Grid area, to complete the evaluation of the large magnetic anomaly defined by previous airborne and ground magnetics surveys. The anomaly was drilled in late 1984 to test a modelled geophysical target but the results were discouraging ;
- ii) initial coverage of the area between Serpentine Hill and the Western Hills, to the northeast of the Dunkley Fault Grid. Previous mapping of access tracks had indicated some areas were underlain by rocks of the Crimson Creek Formation. The Serpentine Hill area is also located adjacent to the southern section of the Renison Mine Lease, where drilling has established the presence of the Renison mine sequence, at considerable depth. An intersection of sulphide-mineralised, talc-altered dolomite, correlated with the upper section of the mine sequence, was drilled in the E.L. area immediately adjacent to the southern boundary of the Mine Lease, in 1984 ;
- iii) geological reconnaissance mapping in the Western Hills area, and near the Dunkley Tramway, immediately northwest of the Dunkley Fault, to verify the extent of the lower Success Creek Group or Oonah Formation, and allow future exploration effort to be concentrated on the more prospective sections of the E.L. to the east and northeast.

These objectives were to be achieved in conjunction with the continuing exploration of the southern section of the Renison Mine Lease. A programme of downhole EM logging of previously completed drillholes throughout these areas was proposed.

8.1 Work Completed

In summary, the 1985-86 exploration programme in the Argent area comprised :

- a) IP survey (Dunkley Fault Grid) - a dipole-dipole IP survey was completed in August 1985, over a line (620S Dunkley Fault Grid) approximately parallel to the section line of drillhole S1200. The survey was centred at 1900E, with 50m spaced dipoles, and carried out using a Hunttec MkIV receiver. Mitre Geophysics completed the survey and subsequent interpretation of results ;
- b) gridding (Serpentine Hill - Western Hills area) - two areas were covered by 200m spaced crosslines, surveyed on a compass bearing of 246° magnetic. The areas were tied by the old Argent Grid baseline, which was re-cleared and re-pegged. Total line clearing completed was 30.755 line km, as follows :
- i) Argent Grid baseline - 4.355 line km (from 1000N - 4355N)
 - ii) Tallowwood Grid - 5 crosslines for a total of 7.4 line km
 - iii) Cheeswood Grid - 12 crosslines for a total of 19.0 line km.

The baseline was re-pegged at 30m intervals, on a bearing of 302° magnetic. The crosslines, all cut to the west-southwest of the baseline, were pegged at 25m intervals. All lines were measured using a Topofil hipchain, with slope corrections applied where necessary. Crossline origin points were recovered relative to pre-existing survey pegs along the Argent Grid baseline, where possible, and crossing points of the grid lines on the various access tracks throughout the area were recovered on aerial photographs. A major part of the gridding contract was completed by Ashton Exploration, with some clearing also done by Renison Ltd. personnel and by Alliston Exploration ;

- c) ground magnetics surveying (Serpentine Hill - Western Hills area) - totalled 37.465 line km, as follows :
- i) Argent Grid baseline - 4.32 line km
 - ii) Tallowwood Grid crosslines - 7.4 line km
 - iii) Cheeswood Grid crosslines - 20.525 line km (including a repeat traverse over a 1525m section of one crossline, with readings taken at 25m intervals, to check data reproducibility)
 - iv) access tracks - 5.22 line km.

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All surveying was carried out by Renison Ltd. personnel, using the Company's Geometrics G816/G826A proton-precession magnetometer (except for one line of the Cheesewood Grid where, due to equipment malfunction, a Geometrics G816 instrument, borrowed from G.F.E.L. in Burnie, was used). Total magnetic field data were recorded at 12.5m intervals along crosslines, 25m intervals along access tracks and at 30m intervals along the Argent Grid baseline, with the magnetometer sensor held approximately 3m above the ground. A hired Austral PPM-3BS instrument was used as an automatic base-station, set to read at 30 second intervals, at a site in the northeastern section of the Cheesewood Grid area (4190N / 9830E local grid coordinate; approximately 19810N / 11705E on Renison Mine Grid). Field data were reduced to an arbitrary value of 62,300 gammas for the base station, using the analogue print-outs from the automatic instrument. Several lines of the Cheesewood Grid has to be repeated due to magnetic disturbances. From the check traverse completed, data reproducibility appears to be within 2 - 3 gammas overall, with a maximum discrepancy of 5 gammas obtained ;

- d) ground VLF-EM surveying (Serpentine Hill - Western Hills area) -
totalled 16.55 line km, comprised of :
- i) Argent Grid baseline - 4.32 line km
 - ii) Tallowwood Grid crosslines - 7.4 line km
 - iii) access tracks - 5.0 line km.

All surveying was undertaken by Renison Ltd. personnel, using a Geonics EM16 instrument hired from Australex in South Australia. Readings were recorded at 25m intervals along the Tallowwood Grid crosslines and the various access tracks, and at 30m intervals along the Argent Grid baseline. The tilt of in- and out-of-phase components of the transmitted horizontal EM waves were recorded. Only the signal from Northwest Cape proved of sufficient strength to be routinely recorded. Frequent attempts during the survey to read signals from stations in Japan and Hawaii were not successful ;

- e) geological mapping - mapping has been completed, at 1:2000 scale, in the following areas :

- i) over the Tallowood Grid crosslines
- ii) along the access track from the Murchison Highway, near Serpentine Hill, to drillhole S1207
- iii) along the firebreak track extending from near drillhole S835 south and southwest to the Argent Grid baseline
- iv) over the access track to drillhole S966, located north-northwest of Serpentine Hill.

Mapping of several crosslines of the Cheesewood Grid was completed prior to the decision, in early April 1986, to suspend exploration of the Argent area ;

- f) sampling - 29 rock chip samples were collected from surface outcrops, during mapping and ground geophysical traverses, for geochemical analysis. Sample preparation and analyses were completed by Renison Ltd. at the mine site laboratory. The samples were analysed by XRF and AAS methods, for Sn, acid-soluble Sn, S, As, Cu, Pb, Zn, Ag, Bi and WO_3 . In addition, 14 rock chip samples and 43 samples of drill core (from drillhole S1200) were collected for petrological study ;
- g) downhole EM logging - logging of 3 drillholes in the Argent area was completed by Solo Geophysics, using SIROTEM medium-power instrumentation. Transmitter loops were powered to 96 volts, at approximately 10 amps DC. Received data were recovered in 256 stacks, over 28 channels. A slim-line (25mm diameter) probe was used, with downhole readings taken at 5m and 10m intervals. Details of the logging programme were as follows :
 - i) drillhole S1182 (in the southeastern section of the Argent area, immediately adjacent to the Renison Mine Lease) - was initially logged in February 1985 by Geoterrex, using EM37 instrumentation. Five transmitter loops, each approximately 300m by 300m, were cleared and flagged for the initial survey, with one loop centred over the drillhole and the other four centred at approximately 600m north, south, east and west of the hole. To obtain a direct comparison with the EM 37 data the drillhole was re-logged in December 1985, and also in

031

five transmitter loops. Five logging runs, each of 640m, were thus completed. Although not cased with PVC pipe, the hole has remained open.

- ii) drillhole S1200 (Dunkley Fault Grid) - this hole was cased off after completion of drilling in late 1984. In December 1985, the hole was logged to a depth of 528m. A blockage at this depth, possibly due to the PVC casing having split and parted, prevented any further logging (total hole depth was 598.7m). The transmitter loop was 200m by 200m, laid out to partly enclose the projected horizontal trace of the angled hole, to the southwest of its collar point. The results of the initial downhole survey were discouraging, thus additional logging runs with a multiple spread of transmitter loops were not warranted.
- iii) drillhole S1207 (northwest of Serpentine Hill) - this hole had also been previously cased off, immediately after drilling in late 1984, and was logged in December 1985. A blockage at 537m prevented logging to the bottom of the hole, at 658m. The transmitter loop was approximately 250m by 250m, laid out on compass bearings, using a Topofil hipchain, with the near-vertical hole at the centre. Due to discouraging results of the initial survey run, repeat logging with multiple transmitter loops was not undertaken.
- h) CSAMT surveying - 47 readings, on 4 traverses, were completed in the Argent area by contractors Zonge Engineering and Research Organisation Inc., in March 1986. One traverse was carried out along the access track to drillhole S1182, immediately adjacent to the southern section of the Renison Mine Lease, with 18 stations recorded, at spacing of 75m, closing to 50m. Ten stations were recorded along the 300m by 300m downhole EM transmitter loop cut around drillhole S1182. In the area northwest of Serpentine Hill, 4 stations (at 200m spacings) were surveyed along the access track to drillhole S1207. The survey was completed with 15 readings, at 100m spacings, taken along crossline 1480N of the Tallowood Grid.

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- i) spectral IP surveying - was completed in March 1986 by Solo Geophysics. Test readings were carried out over exposures of the Crimson Creek Formation, along the access track to drillhole S1207 northwest of Serpentine Hill, and of the Success Creek Group, along the Dunkley Fault Grid access track, off the Dunkley Tramway. This test survey was completed as part of an extension programme of the Tasmanian Department of Mines Mt. Read Volcanics Project.

In addition, several reports relating to the Argent area were compiled, during the past year, by consultants. Dr. John Bishop, of Mitre Geophysics, compiled an interpretation report using data from previously completed geophysical surveys, and also reported on the magnetic, EM and follow-up IP surveys undertaken in the Dunkley Fault Grid area. Reports on the downhole EM logging and CSAMT surveying programmes are at present in preparation. Petrological reports, on rock chip and drill core samples from the area, were received from Central Mineralogical Services, of Adelaide (Ref. Appendix III).

8.2 Results and Discussion

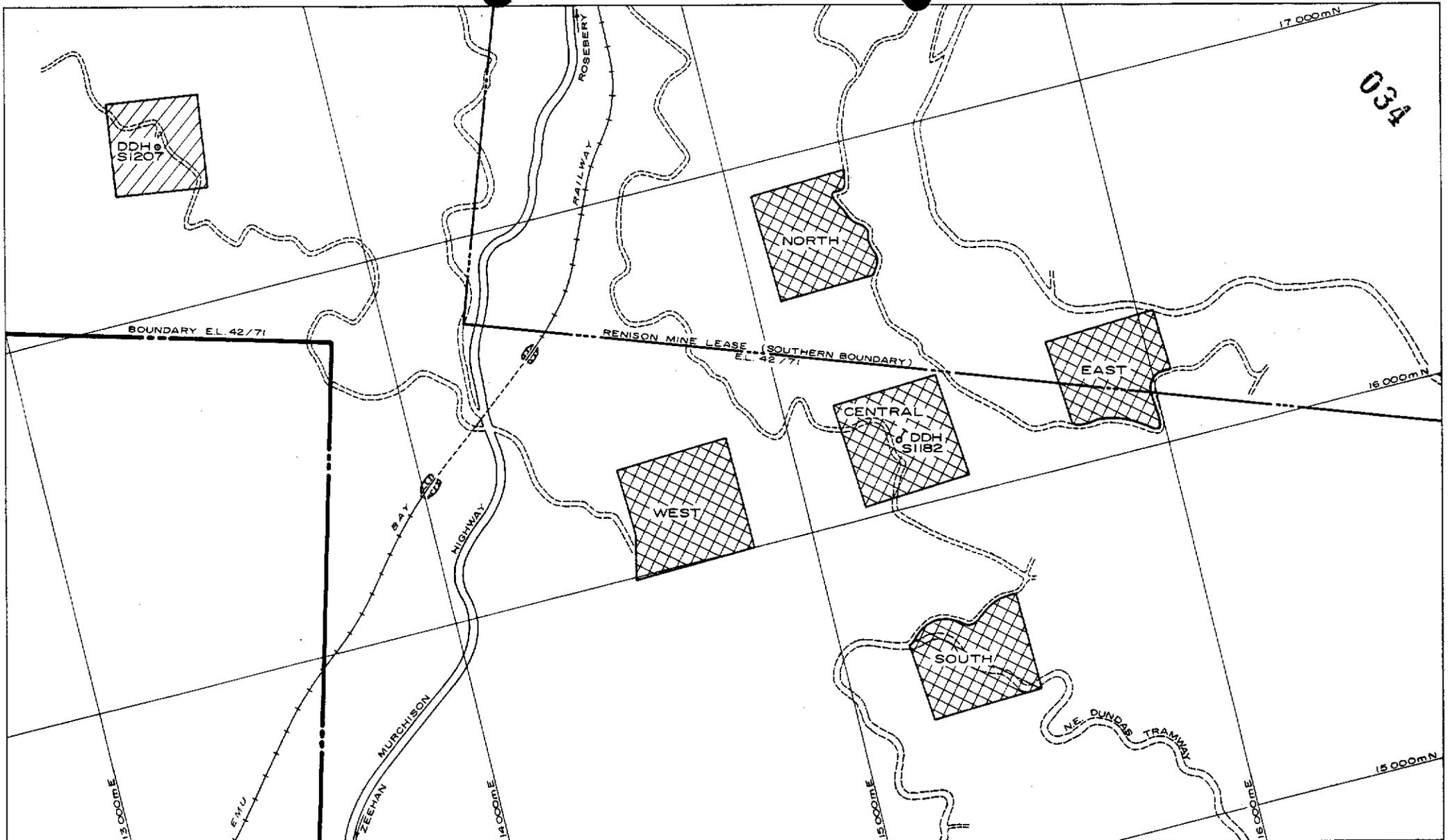
8.2.1 Dunkley Fault Grid Area

The results of the dipole-dipole IP survey, conducted in August 1985 over the section line of drillhole S1200, were discouraging, given that the objective was to determine whether the modelled shallow magnetic responses could be due to a disseminated pyrrhotite source. Observed, diffuse chargeability highs (Ref. Plan No. 1) were attributed to the minor pyrite mineralisation intersected towards the top of the hole, within the Crimson Creek Formation (Bishop, 1985a). Thus, the shallow magnetic responses were concluded to be due to magnetite, which also appears to be the most likely cause of the deeper modelled source. However, downhole EM logging of drillhole S1200 was recommended to test for any extension, and possible increase in abundance of the minor pyrrhotite intersected at approximately 280m. A local negative response, centred at 220m, is apparent within a broader, early-time positive response in the SIROTEM downhole EM data (Ref. Plan No. 2). Interpretation of these data, which included checking of the transmitter loop geometry

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and polarity, indicated the response to be due to an in-hole source, attributed to the sparse pyrrhotite visible in the drill core from approximately 219 - 222m. The sulphide occurs in high-angle, thin veins and veinlets, locally associated with quartz, and in rare traces as blebs and aggregates. Diffuse stringers and veins of carbonate, with traces of chlorite, are also represented in core. The mineralisation is hosted by green to dark green-grey, fine to very fine-grained, matrix-rich lithoclastic sediments, with minor dark grey, carbonaceous sub-units.

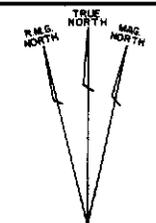
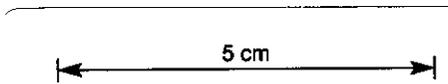
Petrological study of a suite of 43 core samples, representing the various lithological units intersected in drillhole S1200, has been completed. The results (Ref. Appendix IIIA) confirm that the hole was drilled, over its entire length, in the Crimson Creek Formation, in rock units considerably above the stratigraphic position of the Renison mine sequence. Samples from near the top of the hole, to approximately 411m, represent an upper sub-unit of the Crimson Creek Formation, characterized by relatively abundant, clastic, leucoxene-altered minerals, basic lithoclastic and augite detritus, and by conspicuous, although trace amounts of detrital chromite. The underlying rocks also contain clastic chromite, but less conspicuously. Rocks of the lower sub-unit are characterized by relatively leucocratic lithoclasts and by quite abundant magnetite, which occurs either as clastic grains or hosted by basic lithoclasts. Correlation of this lower sub-unit with the upper section of the Dreadnought Hill Member is made on the basis of the intercalated fine, carbonaceous and calcareous sediments and minor impure limestone. Alteration of the rocks comprising both sub-units is restricted to a chloritic assemblage, a product of low-grade regional metamorphism. The noted absence of actinolitic alteration, which is characteristic of the Dreadnought Hill Member in close proximity to the Renison Bell mine, and of any contact metamorphic effects, suggests that the depth to granite in the Dunkley Fault Grid area is considerable. The traces of pyrrhotite present in the core samples are concentrated within the intercalated fine carbonaceous sediments and are interpreted to be syngenetic. The completed petrological studies, in which a distinct absence of replacement sulphide mineralization was noted, appear to validate the interpretation of the IP and downhole EM surveys, attributing the magnetic anomaly in the Dunkley Fault Grid area to a detrital



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LEGEND:

-  DHEM TRANSMITTER LOOP, EM37 SYSTEM (GEO-TERREX) AND SIROTEM SYSTEM (SOLO) - CUT LINES
-  DHEM TRANSMITTER LOOP, SIROTEM SYSTEM (SOLO) - POSITION APPROXIMATE. **NOTE:** LOOP LAID OUT ON COMPASS BEARING WITH TOPOFIL HIPCHAIN.

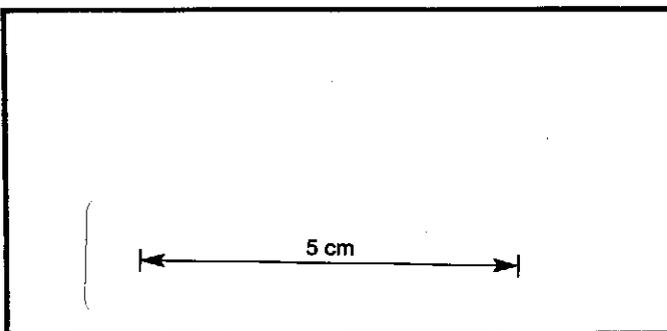
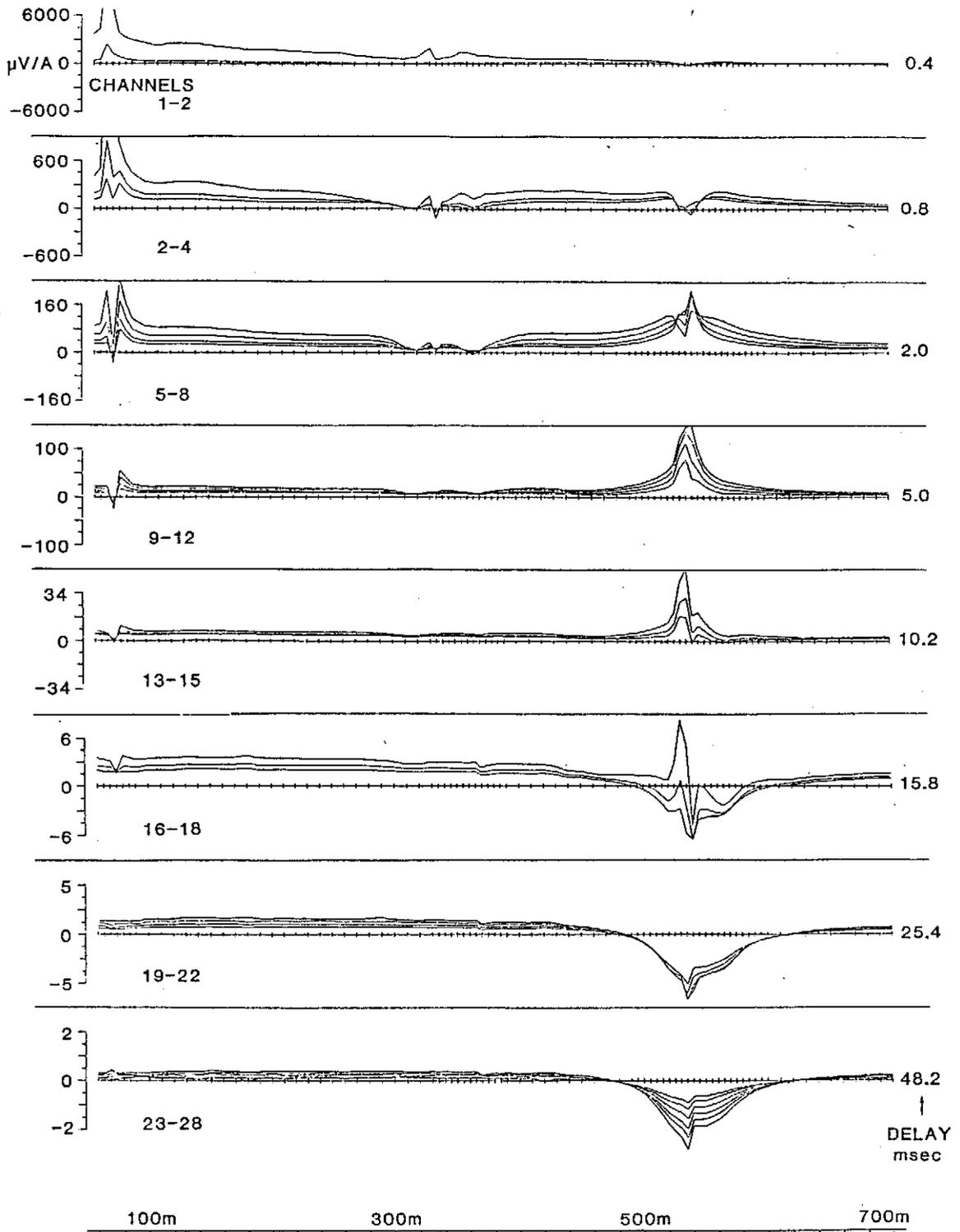


RENISON LIMITED	
 SCALE 1:10 000	
GEOLOGIST: DAE.	SERPENTINE HILL AND COMMONWEALTH HILL AREA
DRAUGHTSMAN: R. F.	DRILLHOLES S1182 AND S1207
CHECKED:	LOCATION OF
DATE: SEPT, 1986	DHEM TRANSMITTER LOOPS
REVISED:	FIG.No. 6

96-2605

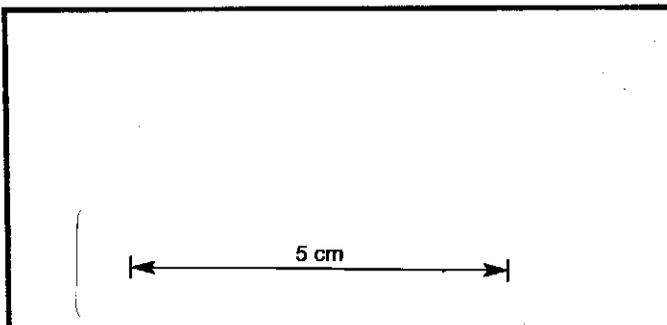
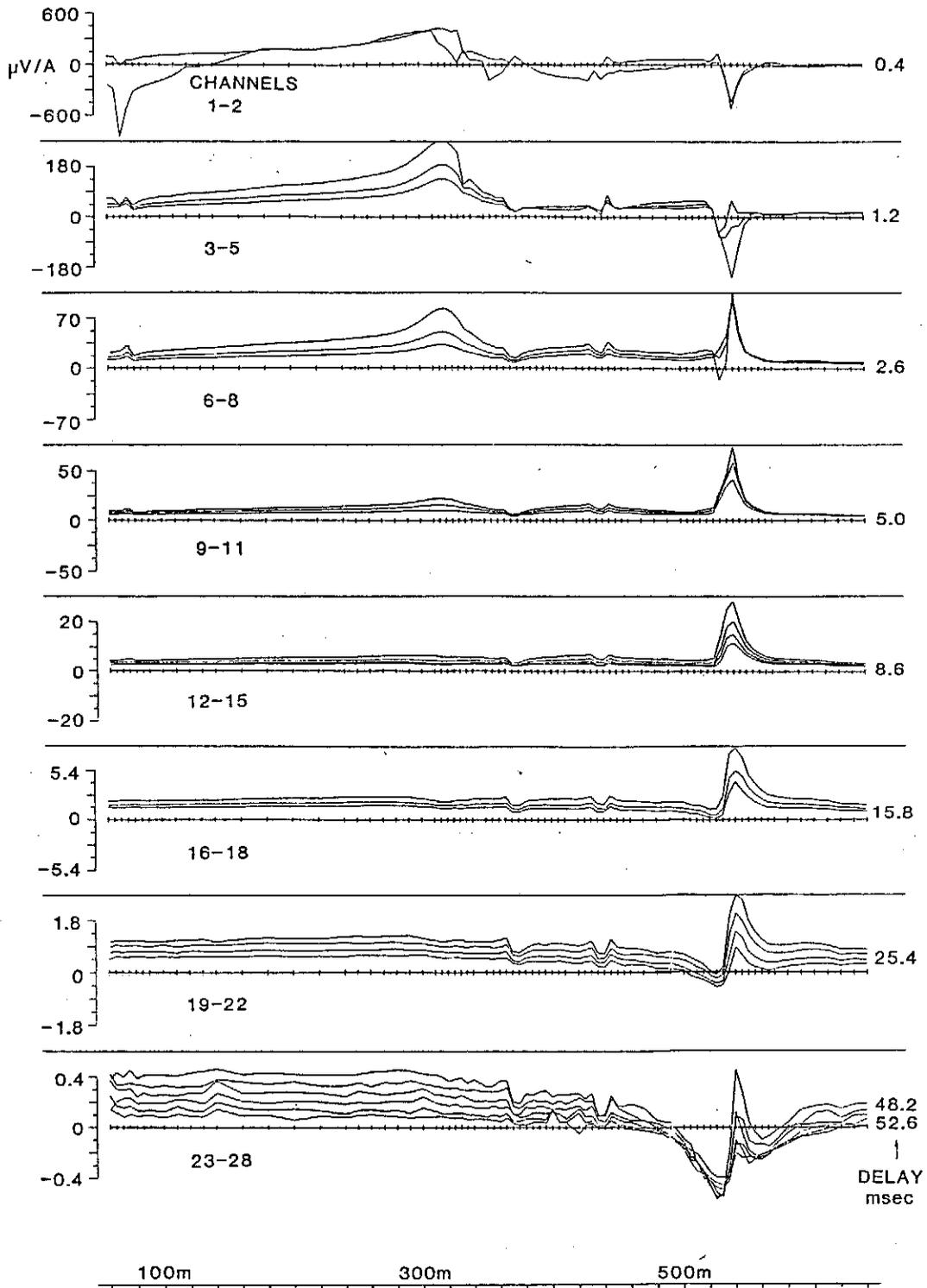
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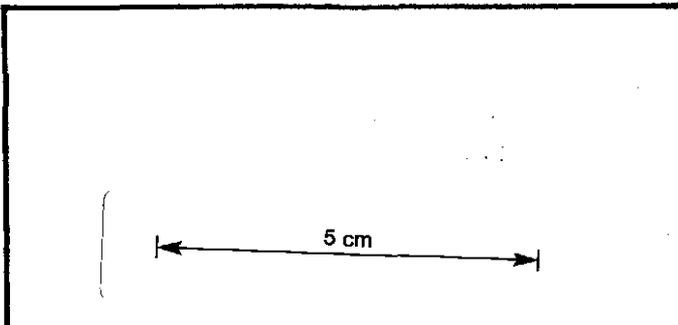
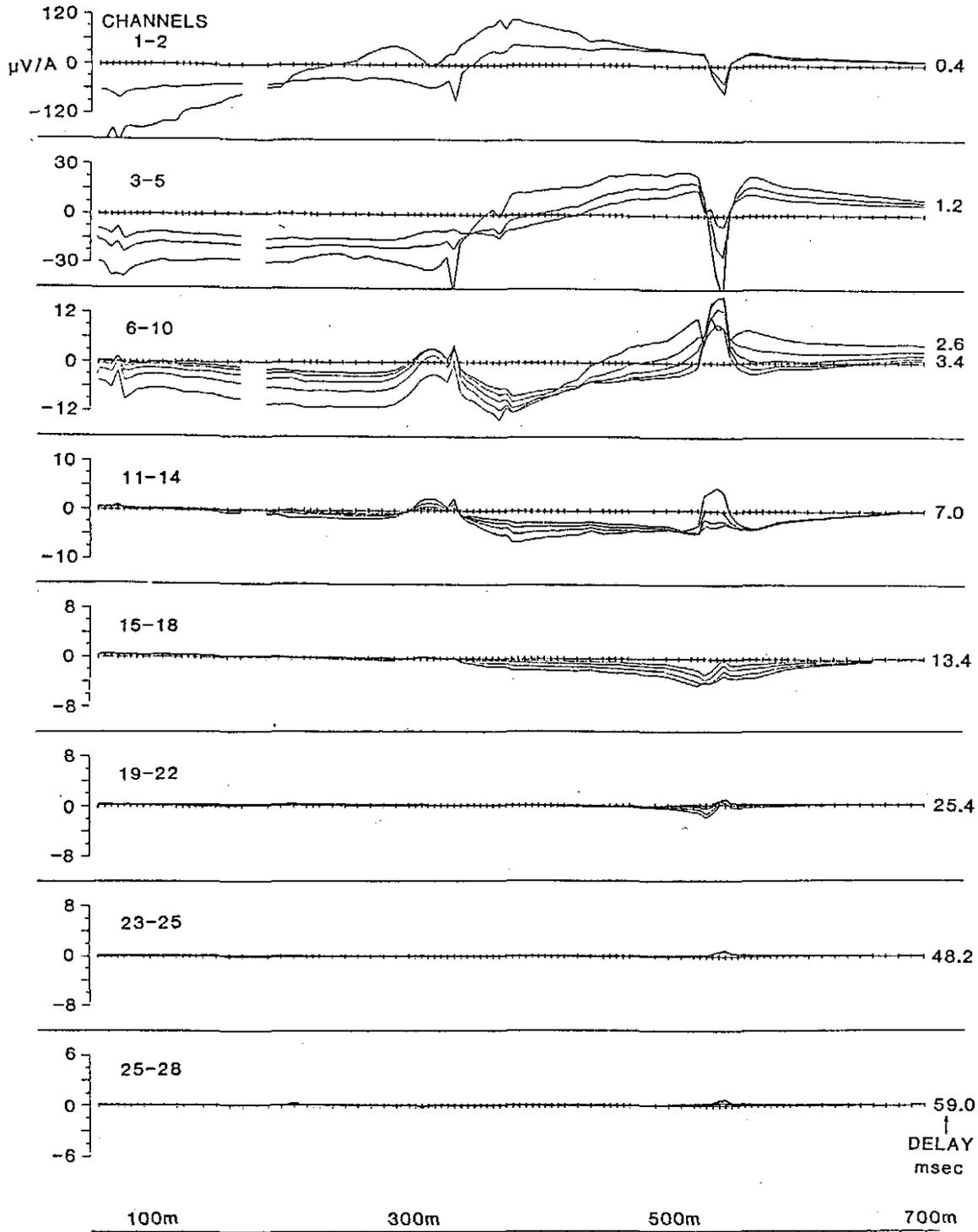
RENISON LIMITED	
<p>SCALE 1:5000</p>	
GEOLOGIST: D.A.E. DRAUGHTSMAN: R.F. CHECKED: DATE: SEPT., 1986 REVISED:	SERPENTINE HILL AND COMMONWEALTH HILL AREA DRILLHOLE S1182 SIROTEM DHEM LOGS CENTRAL LOOP
	FIG.No. 7

036

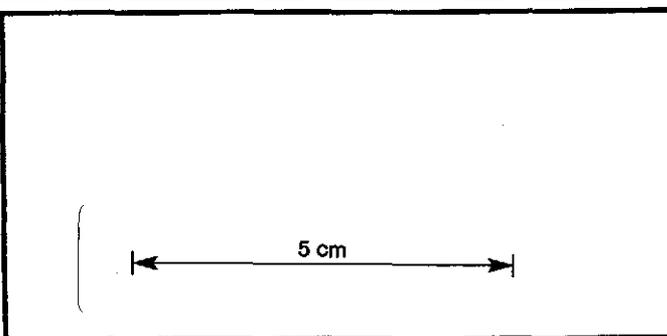
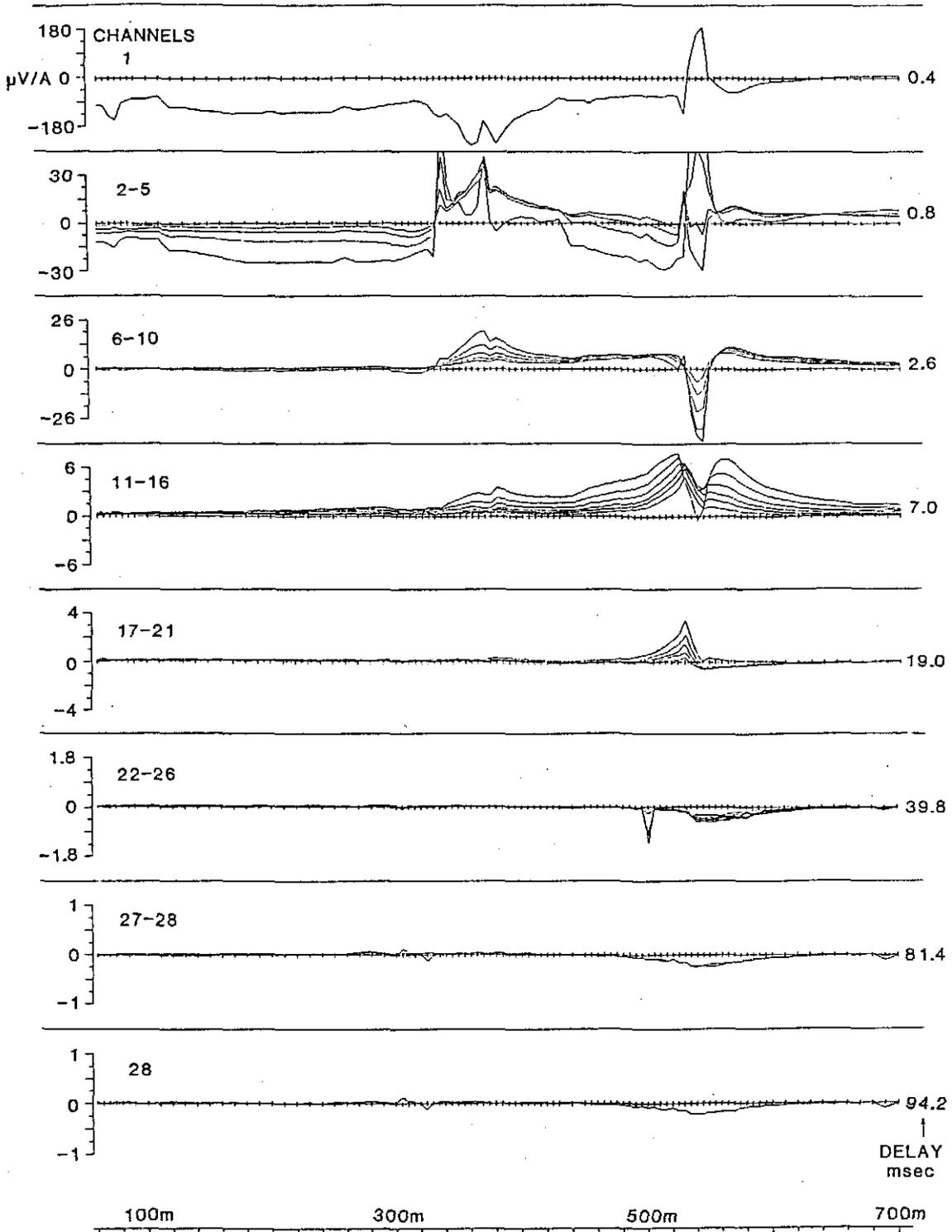


RENISON LIMITED	
<p>50 0 300m</p> <p>SCALE 1:5000</p>	
GEOLOGIST: D.A.E.	SERPENTINE HILL AND COMMONWEALTH HILL AREA DRILLHOLE 31182 SIROTEM DHEM LOGS NORTH LOOP
DRAUGHTSMAN: R.F.	
CHECKED:	
DATE: SEPT., 1986	
REVISED:	FIG.No. 8

037

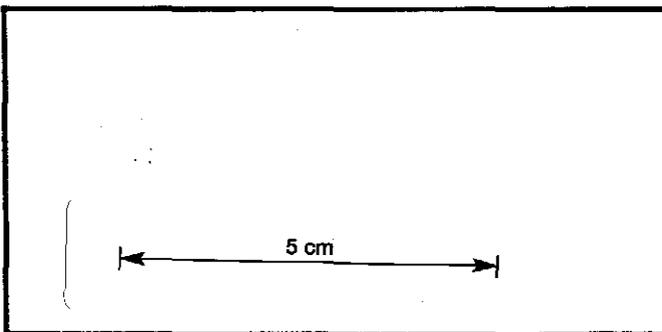
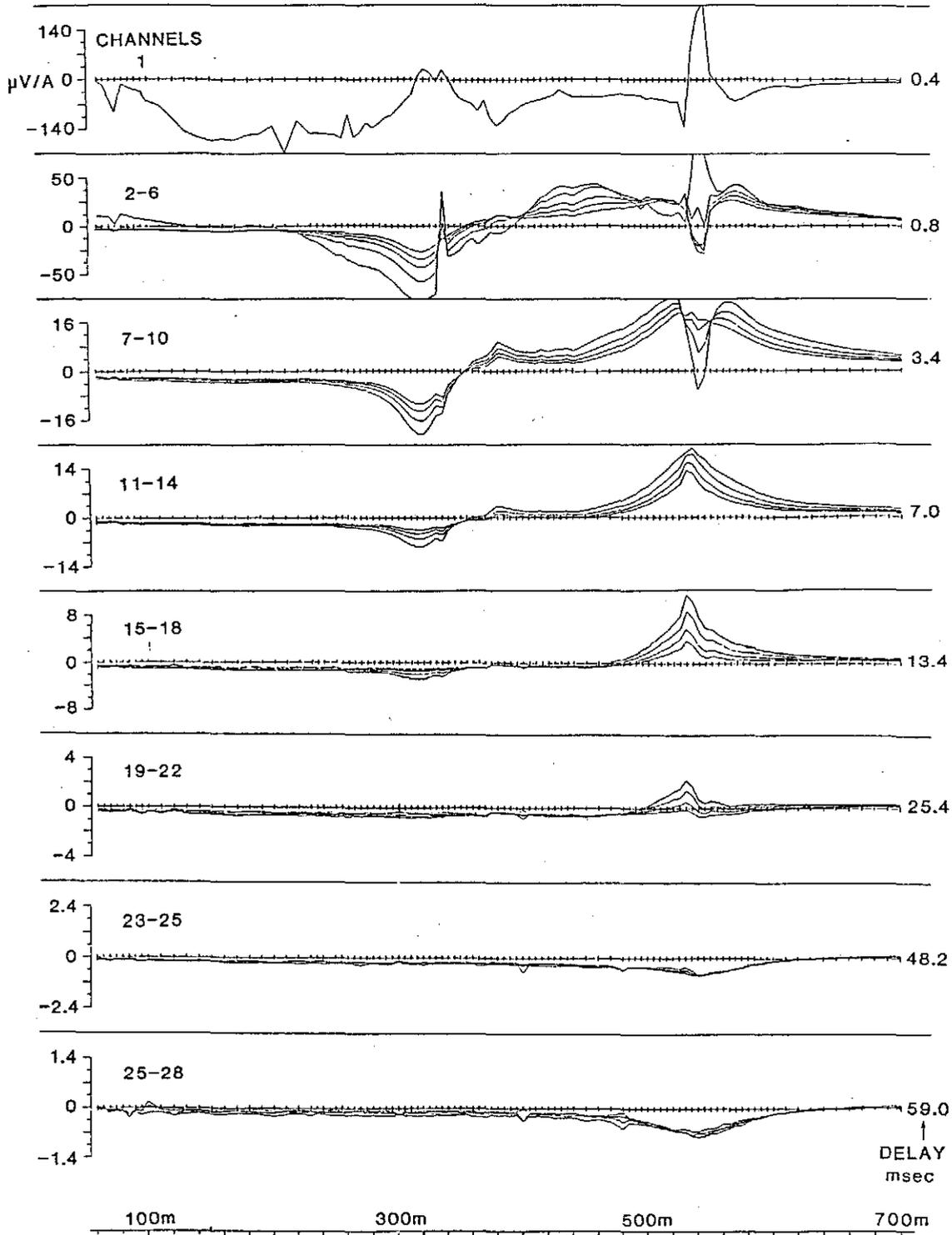


RENISON LIMITED	
<p>50 0 300m</p> <p>SCALE 1:5 000</p>	
GEOLOGIST: D.A.E. DRAUGHTSMAN: R.F. CHECKED: DATE: SEPT., 1986 REVISED:	SERPENTINE HILL AND COMMONWEALTH HILL AREA DRILLHOLE S1182 SIROTEM DHEM LOGS EAST LOOP
FIG.No. 9	



RENISON LIMITED	
 SCALE 1:5 000	
GEOLOGIST: D.A.E. DRAUGHTSMAN: R.F. CHECKED: DATE: SEPT, 1986 REVISED:	SERPENTINE HILL AND COMMONWEALTH HILL AREA DRILLHOLE S1182 SIROTEM DHEM LOGS SOUTH LOOP
FIG.No. 10	

039

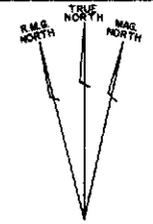
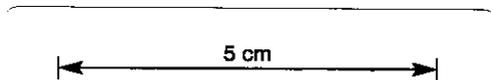
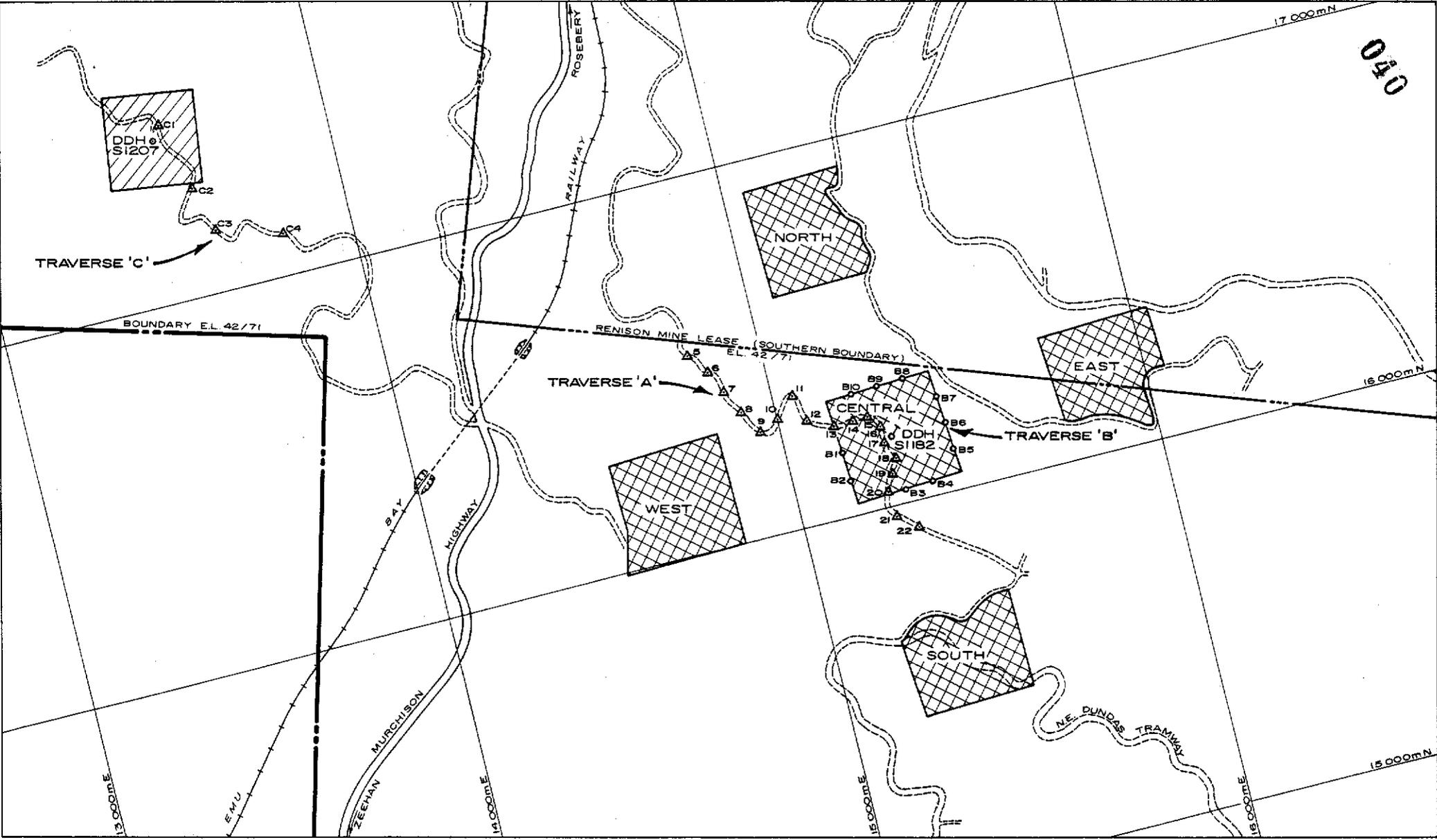


RENISON LIMITED	
<p>SCALE 1: 5 000</p>	
GEOLOGIST: D.A.E.	SERPENTINE HILL AND COMMONWEALTH HILL AREA DRILLHOLE S1182 SIROTEM DHEM LOGS WEST LOOP
DRAUGHTSMAN: R.F.	
CHECKED:	
DATE: SEPT., 1986	
REVISED:	
FIG.No. 11	

040

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RENISON LIMITED	
 SCALE 1:10000	
GEOLOGIST: D.A.E. DRAUGHTSMAN: R.F. CHECKED: DATE: SEPT., 1986 REVISED:	SERPENTINE HILL AND COMMONWEALTH HILL AREA LOCATION OF CSAMT TRAVERSES
	FIG.No. 12

041

magnetite source within basic lithoclastic sediments of the Crimson Creek Formation. The deepest modelled source of the anomaly is possibly a basic intrusive complex. The estimated depth to the top of the Renison mine sequence, if represented in the area, is at least 150m beyond the bottom of drillhole S1200. Thus the target depth for any stratabound carbonate-replacement mineralization would be 600 - 700m below surface.

8.2.2 Serpentine Hill - Commonwealth Hill Area

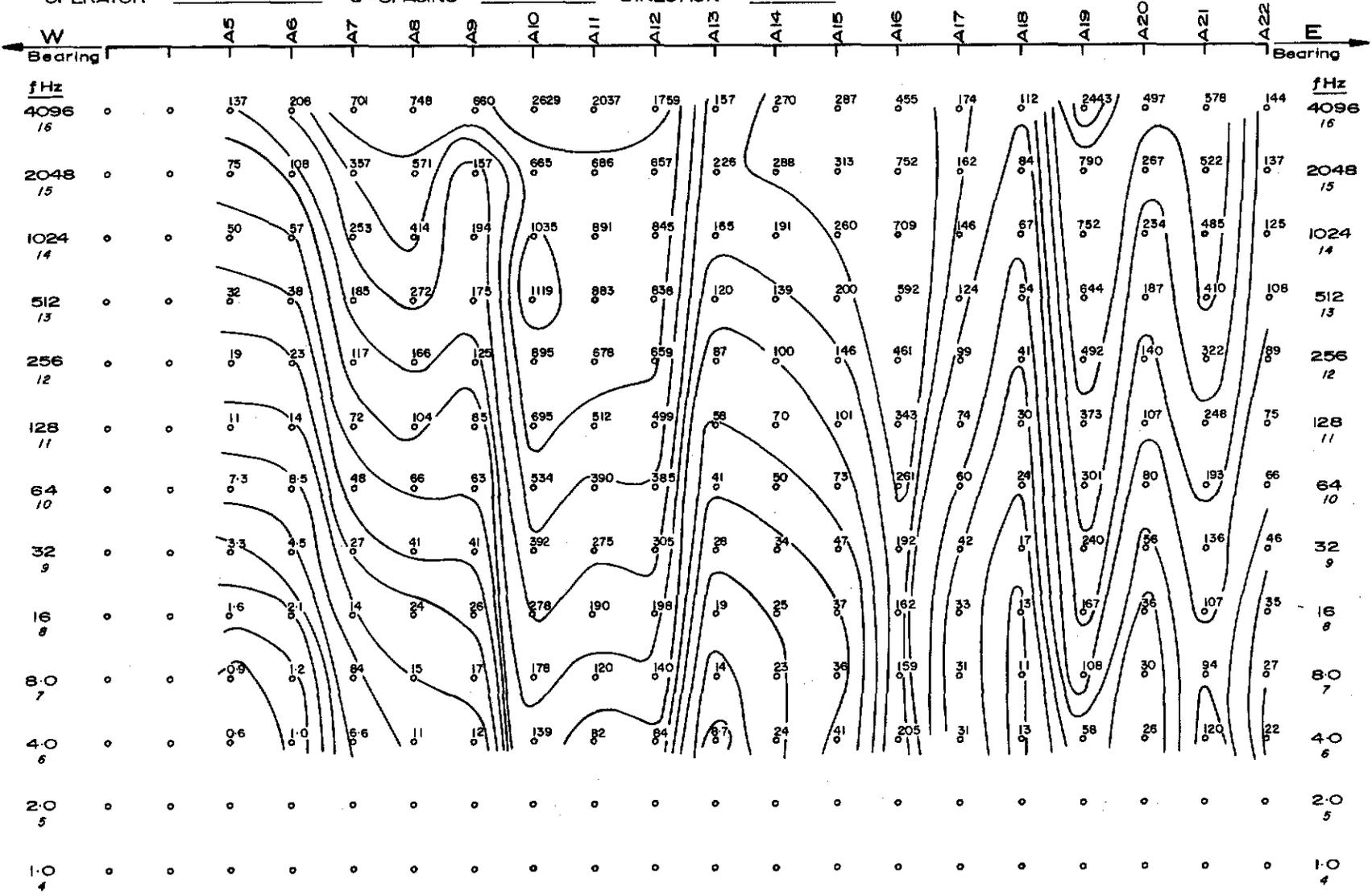
Work completed in this area, during 1985-86, was carried out mainly as an extension of the exploration programme over the southern section of the Renison Mine Lease. Apart from limited geological mapping and sampling of surface exposures, along access tracks to drill sites in the area, exploration concentrated on deep-seeking geophysical techniques.

Downhole EM logging of drillhole S1182, which is located immediately adjacent to the southern boundary of the Mine Lease, has been repeated using SIROTEM equipment, to obtain data for comparison with the results of the initial downhole logging, in which an EM 37 system was used. Locations of the 5 transmitter loops used, in both logging programmes, are shown in Figure 6. The results of the repeat logging programme (Ref. Fig. 7 - 11, from Bishop, Lewis and McNae, 1986) are particularly encouraging, although still subject to further interpretation. Two significant conductive horizons, one centred at a depth of 315m and the other at 540m, were apparent from the EM 37 data. The shallower response was interpreted to be due to skarn mineralisation within the Crimson Creek Formation, whilst the weaker response at 540m is centred on an intersection of altered and weakly pyrrhotite-mineralized dolomite, correlated with the No. 1 Horizon of the Renison mine sequence. An additional response is apparent, centred at 540m, in the SIROTEM logging data, which recorded out to much later times. The results indicate a potentially prospective conductor located approximately 75m off-hole. Additional modelling is required to obtain better directional information on this target.

CSAMT readings were completed on three traverses in the area (Ref. Figure 12 for locations). The major objective of the survey was to

042

CLIENT RENISON LOCATION EL 42/71 Tx LENGTH 1400m PLOT OF P
 JOB NUMBER 585 LINE A DISTANCE 5.5km UNITS µm
 DATE 15-3-86 ORIENTATION E-W ORIENTATION E-W AMT/AET CSAMT
 OPERATOR B.C. α-SPACING 50m DIRECTION S



RENISON LIMITED

SCALE N.T.S.

GEOLOGIST
D.A.E.
DRAUGHTSMAN
R.F.

DATE: SEPT. 1986

CHECKED:

REVISIONS:

SERPENTINE HILL AND
COMMONWEALTH HILL AREA
CSAMT TRAVERSE 'A'
RESISTIVITY
PSEUDO-SECTION

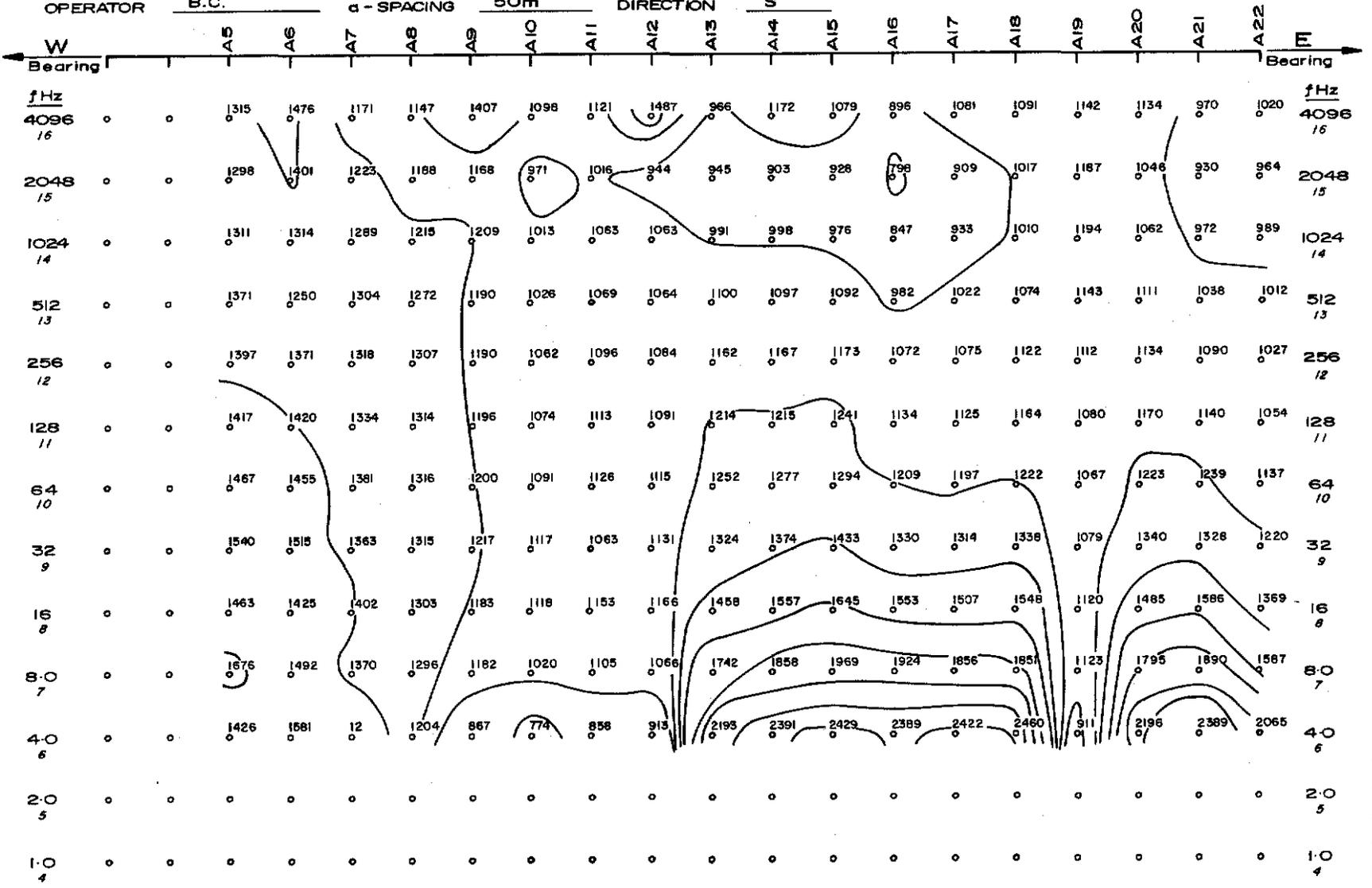
FIG. NO. 13

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98 4007

043

CLIENT	<u>RENISON</u>	LOCATION	<u>EL 42/71</u>	Tx LENGTH	<u>1400m</u>	PLOT OF	<u>$\Delta \phi$</u>
JOB NUMBER	<u>585</u>	LINE	<u>A</u>	DISTANCE	<u>5.5km</u>	UNITS	<u>mRad</u>
DATE	<u>15-3-86</u>	ORIENTATION	<u>E-W</u>	ORIENTATION	<u>E-W</u>	AMT/AET	<u>CSAMT</u>
OPERATOR	<u>B.C.</u>	α - SPACING	<u>50m</u>	DIRECTION	<u>S</u>		



RENISON LIMITED

SCALE N.T.S.

SERPENTINE HILL AND COMMONWEALTH HILL AREA
CSAMT TRAVERSE 'A'
PHASE PSEUDO-SECTION

FIG. NO. 14

REVISIONS:

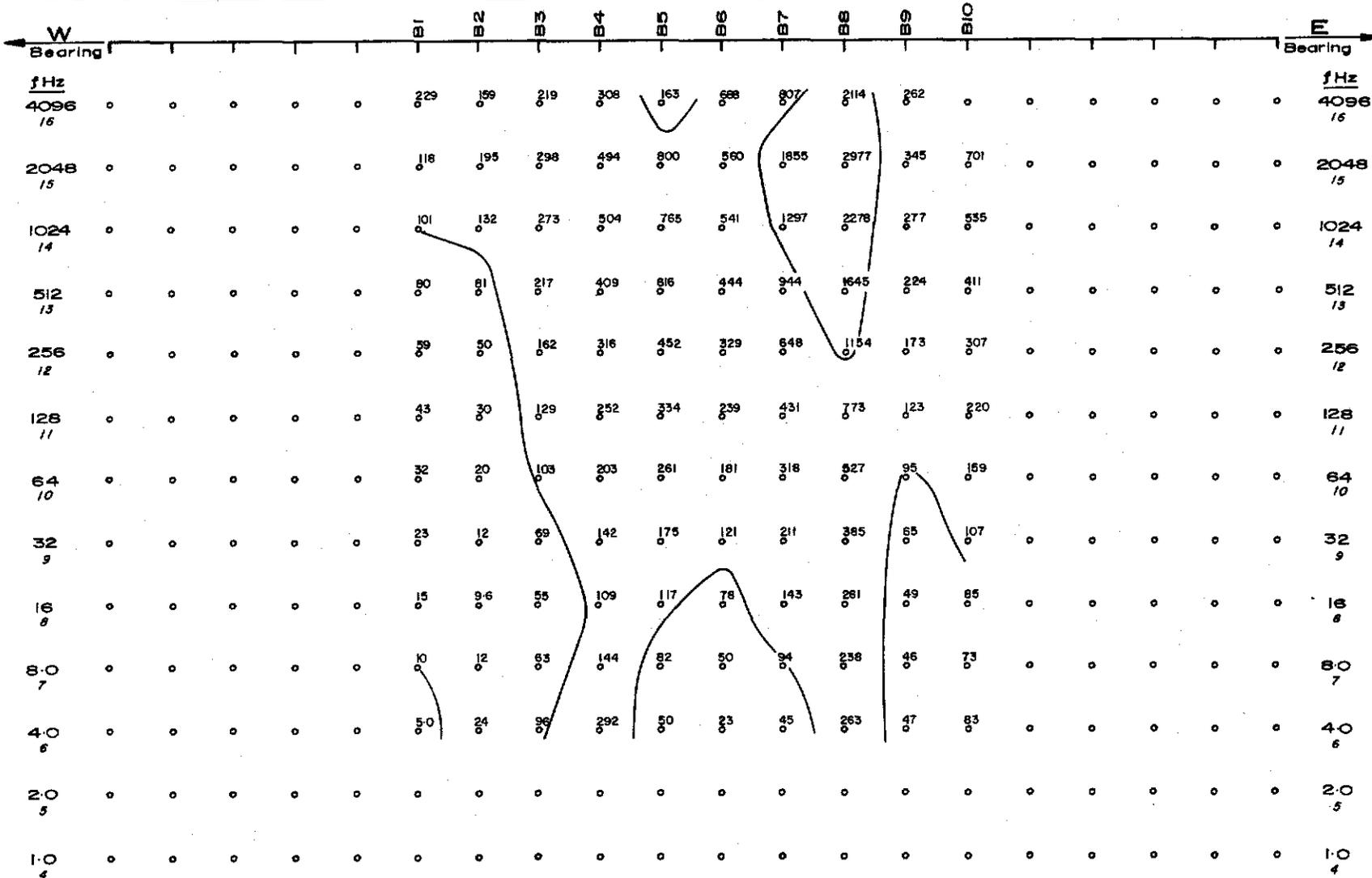
DATE:	SEPT, 1986
CHECKED:	R.F.
DRAUGHTSMAN:	DAE
GEOLOGIST:	DAE

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976044

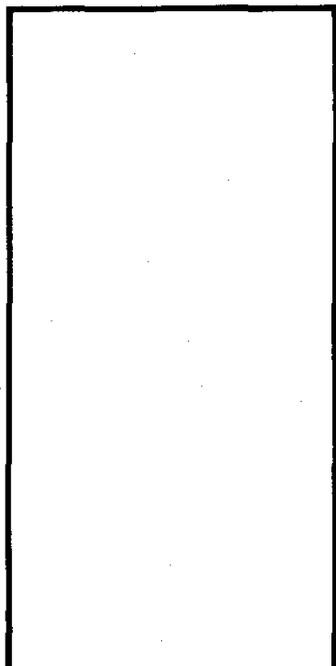
044

CLIENT RENISON LOCATION EL 42/71 Tx LENGTH 1400m PLOT OF P
 JOB NUMBER 585 LINE B DISTANCE 5.5km UNITS μm
 DATE 18-3-86 ORIENTATION E-W ORIENTATION E-W AMT/AET CSAMT
 OPERATOR B.C. α - SPACING 50m DIRECTION S



86-2605

976045



RENISON LIMITED

SCALE N.T.S.

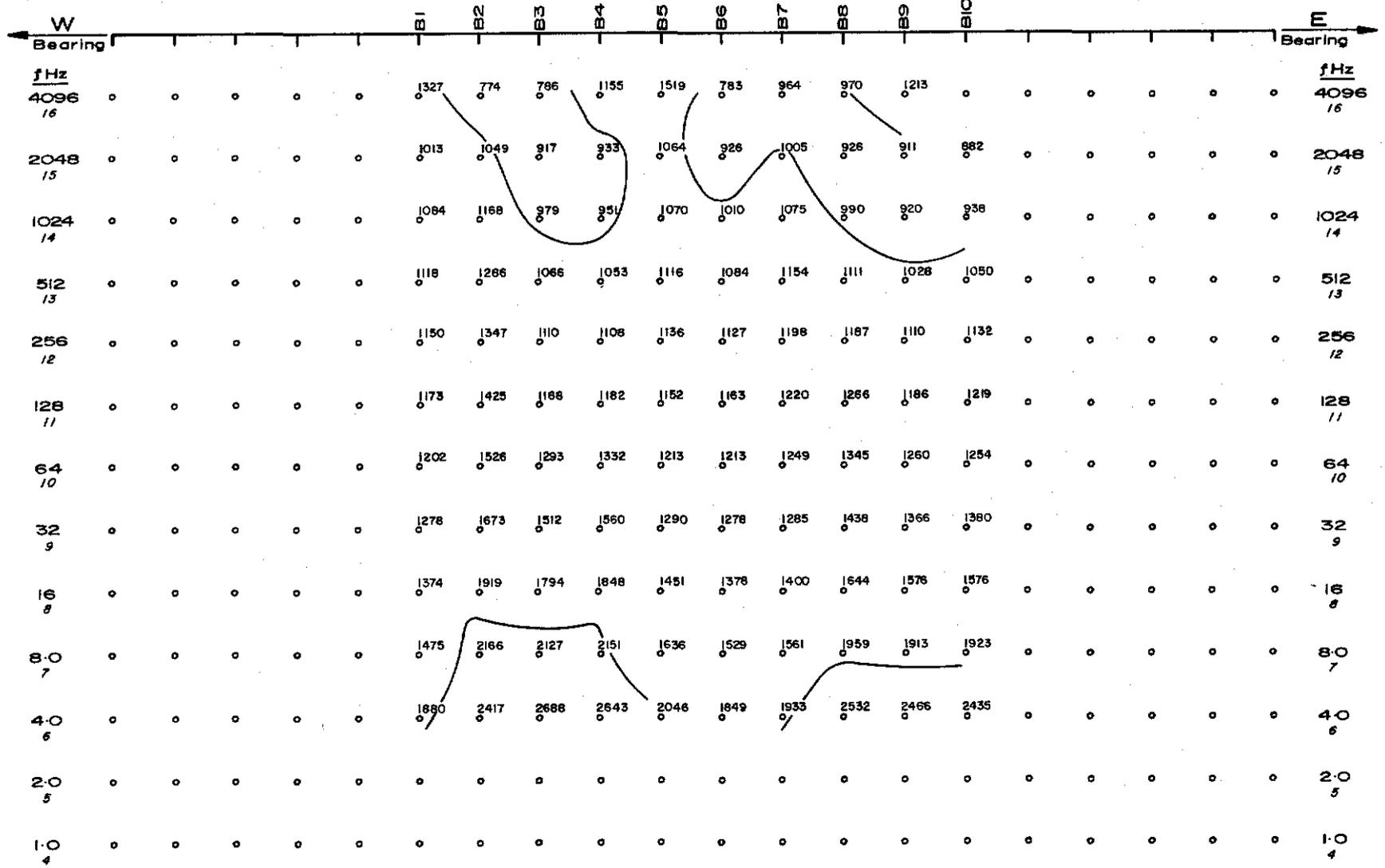
SERPENTINE HILL AND
COMMONWEALTH HILL AREA
CSAMT TRAVERSE 'B'
RESISTIVITY
PSEUDO-SECTION

GEOLOGIST: _____
 D.A.E.
 DRAUGHTSMAN: _____
 R.F.
 CHECKED: _____
 DATE: SEPT. 1986
 REVISION: _____

FIG. No. 15

045

CLIENT RENISON LOCATION EL 42/71 Tx LENGTH 1400m PLOT OF $\Delta \mu$
 JOB NUMBER 585 LINE B DISTANCE 5.5 km UNITS mRad
 DATE 18-3-86 ORIENTATION E-W ORIENTATION E-W AMT/AET CSAMT
 OPERATOR B.C. α -SPACING 50m DIRECTION S



86-2605

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RENISON LIMITED

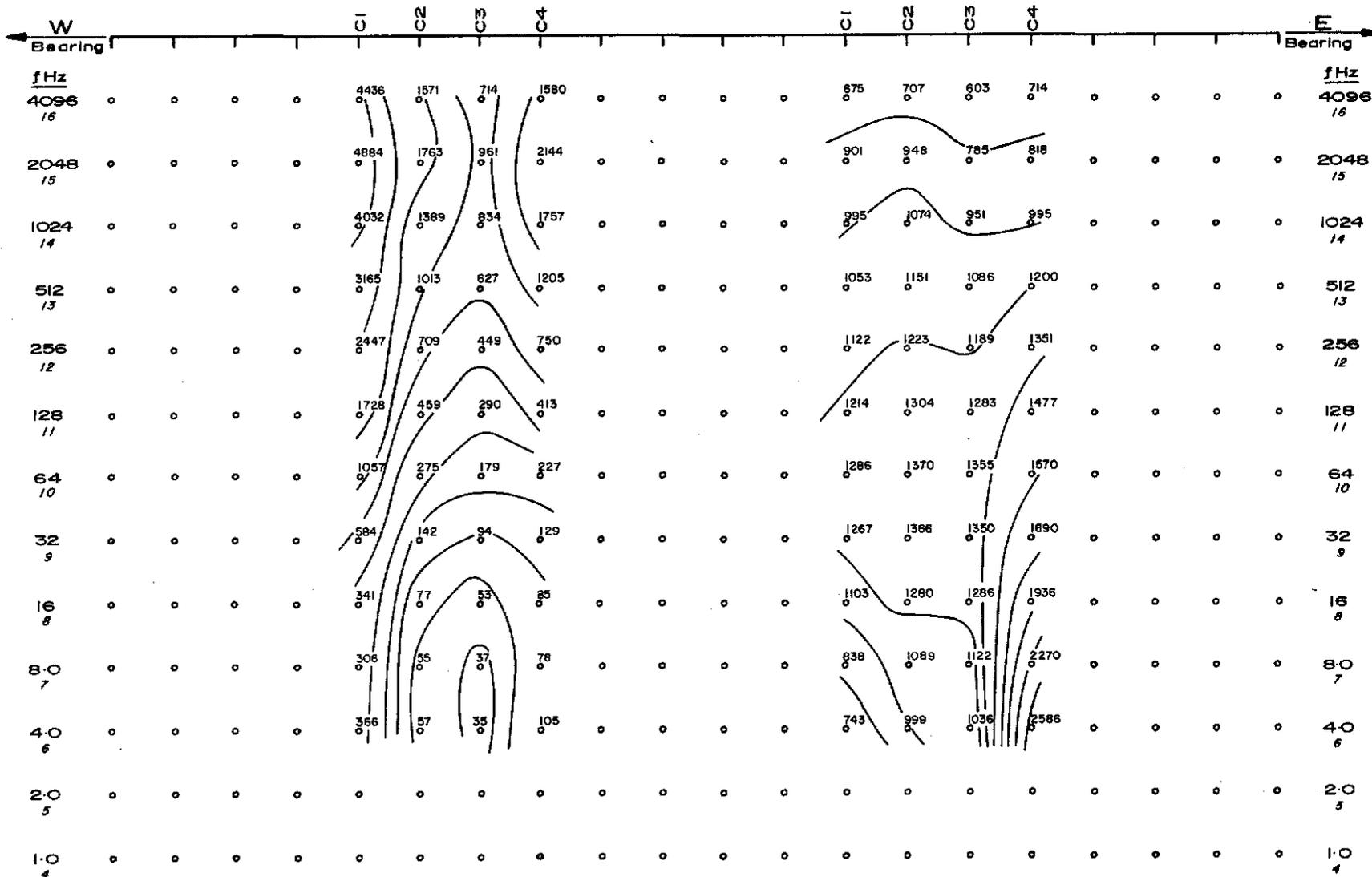
SCALE N.T.S.

GEOLOGIST: _____
 DATE: _____
 DRAUGHTSMAN: _____
 R.F. _____
 CHECKED: _____
 DATE: SEPT. 1986
 REVISED: _____
 SERPENTINE HILL AND
 COMMONWEALTH HILL AREA
 CSAMT TRAVERSE 'B'
 PHASE
 PSEUDO-SECTION

FIG. No. 16

CLIENT	<u>RENISON</u>	LOCATION	<u>EL42/71</u>	Tx LENGTH	<u>1400m</u>	PLOT OF	<u>$P + \Delta\phi$</u>
JOB NUMBER	<u>585</u>	LINE	<u>C</u>	DISTANCE	<u>5.5km</u>	UNITS	<u>$\mu m + mRad$</u>
DATE	<u>22-3-86</u>	ORIENTATION	<u>E-W</u>	ORIENTATION	<u>E-W</u>	AMT/AET	<u>CSAMT</u>
OPERATOR	<u>B.C.</u>	a - SPACING	<u>25m</u>	DIRECTION	<u>S</u>		

046



RENISON LIMITED

SCALE NTS

GEOLOGIST: _____
 DIAE: _____
 DRAUGHTSMAN: _____
 R.F. _____

DATE: SEPT. 1986
 CHECKED: _____
 REVISED: _____

SERPENTINE HILL AND
 COMMONWEALTH HILL AREA
 CSAMT TRAVERSE 'C'
 RESISTIVITY AND PHASE
 PSEUDO-SECTION

FIG. NO. 17

26-2605

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follow-up the encouraging results of the SIROTEM downhole logging in drillhole S1182. The survey coverage overlapped the southwestern section of the Renison Mine Lease. In the area of drillhole S1207, northwest of Serpentine Hill, the survey was limited to four stations. The transmitting source for each of the traverses was a fixed, grounded dipole, laid out along the Dundas Road, east of the Murchison Highway. Field data, plotted as pseudo-sections, for each of the three traverses, are shown in Figures 13 - 17. Although further interpretation of these data has to be carried out, the results appear to be discouraging.

Downhole EM logging of drillhole S1207 has been completed, using the SIROTEM system and a 250m by 250m transmitter loop (Ref. Figure 6, for drillhole and loop locations, and Plan No. 2, for the downhole logs). A weak positive response, centred at 495m, is attributed to an in-hole source, and the results thus appear to be discouraging.

No results are as yet available from the test spectral IP survey carried out along the access track to drillhole S1207. Readings were taken over weathered, but continuous exposure of the Crimson Creek Formation.

Geological mapping completed along the access tracks to drillholes S966 and S1207, northwest of Serpentine Hill, has confirmed the areal extent of the Crimson Creek Formation in this section of the E.L. Soil cover throughout the area is generally thin (commonly less than 0.5m), comprised of a very thin, surficial layer of leaf mould, with or without humic clay, underlain by distinctive yellow to yellow-brown clay. The dominant lithology mapped in the area is a fine to very fine-grained, locally coarse-grained, volcanoclastic litharenite or greywacke, with sub-ordinate hematitic siltstone and very minor carbonaceous siltstone. Scattered sub-outcrops and float of microgabbro have been mapped along the access track to drillhole S966. In outcrop, the coarse lithoclastic sediments typically exhibit spheroidal weathering, and may be quite strongly magnetic in hand specimen. Bedding dips east to northeast, from 20° to near-vertical. From thin section studies (Ref. sample no. C1076, Appendix IIIB), the dominant rock type is a mildly chlorite-altered, fine-grained tuffaceous greywacke, containing clasts of basaltic extrusives, clinopyroxene and plagioclase, and conspicuous magnetite detritus.

Several zones of botryoidal goethite and limonite, containing minor quartz and iron oxide-stained chalcedonic silica, are exposed along the access track to drillhole S1207. Rock chip samples collected from these zones assayed up to 200 ppm Sn, 3.0% Pb, 3.3% Zn, 33 g/t Ag and 180 ppm WO_3 (Ref. sample no. C1085, Appendix IV). The zones are interpreted to be weathered fracture-fill deposits, as indicated by the thin section study of sample no. C1096 (Ref. Appendix IIIB), which was collected from a 20 - 30 cm wide ferruginous zone located immediately north-northwest of drillhole S1207. This ferruginized tectonic breccia is comprised of a matrix of fine-grained quartz, with clasts of tuffaceous greywacke, the latter derived from the Crimson Creek Formation.

Depths to the top of the Renison mine sequence in the area to the northwest of Serpentine Hill are likely to be of the same order (that is 600 - 700m below surface) as those estimated for the Dunkley Fault Grid area. Anomalous ground magnetics responses, as for example in the area immediately northwest of drillhole S966, previously drilled by Electrolytic Zinc Company (in holes MFP 124 and MFP 125), are due to detrital magnetite within volcanoclastic sediments of the Crimson Creek Formation, from considerably above the stratigraphic position of the Renison mine sequence. Mineralized faults are evident in the area, which thus remains prospective, possibly at relatively shallow depths, for stanniferous sulphides occurring as fault-fill and 'stratafault' mineralisation. A recommended programme of grid-based, bedrock geochemical sampling, and *additional ground magnetics and VLF-EM surveying*, to extend the Tallowwood Grid to include coverage of this area, was due to be commenced in April 1986, aimed specifically at locating and defining the mineralized faults. However, the programme was abandoned following the decision by Renison Limited to suspend all exploration in the Argent area. Drilling and subsequent downhole EM logging have already confirmed the exploration potential of the area further east, immediately south of the Renison Mine Lease. Longer-term land tenure, to permit further exploration, will be sought.

8.2.3 Tallowwood Grid - Cheesewood Grid Area

The main objectives of the most recent, grid-based exploration, in the area between Serpentine Hill and the Western Hills, were:

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- (i) establishing the extent of interpreted Crimson Creek Formation rocks, particularly in proximity to the Dunkley Tramway;
- (ii) location of the major faults throughout the area and exploration of these structures for fault-infill, stanniferous sulphide mineralization and, at depth, for possible "stratafault" and stratabound carbonate-replacement mineralization.

Outcrops of possible Crimson Creek Formation were located, along the access track to the Dunkley Fault Grid area from the Dunkley Tramway, during previous reconnaissance geological mapping. The Cheesewood Grid was cut to enable the initial coverage of this area. Previously completed drilling, in holes S966 and S1207, had also established that much of the area further southeast, towards Serpentine Hill, is underlain by the Crimson Creek Formation. The Tallowood Grid was cut, and geological mapping and ground magnetics and VLF-EM surveying were subsequently undertaken, to link up the coverage of the Dunkley Fault Grid and Argent Grid areas. Exploration of this section of E.L. 42/71, comprising the Tallowood Grid and areas immediately east and southeast, is regarded as an extension to the coverage of the southern section of the Renison Mine Lease, with emphasis on deep-seeking geophysical techniques and deep stratigraphic drilling.

Geological mapping of the Tallowood Grid has confirmed that much of the area is underlain by the Crimson Creek Formation, although outcrops are scarce. Light yellow to yellow-brown clay soil (C Horizon), with a very thin layer of leaf mould and humic clay poorly developed to absent, covers much of the area. The distinctive soil horizon is developed on the dissected western slopes of a thickly forested ridge, which extends northwest from Serpentine Hill. From creek banks and in cuttings along access tracks throughout the area, the soil cover rarely exceeds 1m in thickness, above relatively fresh rocks of the Crimson Creek Formation. The dominant rock type is a fine to locally coarse-grained, volcanoclastic litharenite or greywacke. From thin section studies (Ref. sample no. C1089 and C1110, Appendix IIIB), these rocks have been described as fine-grained, tuffaceous greywacke and labile siltstone, comprised of altered volcanoclastic detritus, plagioclase grains and clasts of

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quartz, rare chert and micaceous pelite. Fine clastic magnetite, with ilmenite and hematite grains, are conspicuous, although only in trace to sparse amounts. The finer clastic matrix exhibits alteration to a chlorite and leucoxene assemblage. Spheroidal weathering is locally developed in outcrops. Bedding tends to be massive and poorly defined, both in thin section and outcrop. The sequence appears to dip east to northeast, throughout the grid area, from 45° to near-vertical. Scattered outcrops of altered micro-gabbro (Ref. sample no. C1091, Appendix IIIB) are located along crosslines 1000N and 1240N, and represent the mafic intrusives, and possible minor extrusives, which occur sporadically within the Crimson Creek Formation throughout the Renison Bell district.

A marked change in soil type is apparent in the north and northwest section of the Tallowood Grid area, overlying rocks correlated with the lower Success Creek Group. Outcrop is generally rare, through the relatively thick, light grey to brown-cream, sandy clay soil cover. Scattered float, comprised of gravel and pebbles of orthoquartzite, occurs at the change of slope along the margins of swampy creek drainages, which flow south through the area. Outcrops are best developed in the northwest corner of the grid area, where the terrain is steepest, with good, continuous exposure located along firebreak tracks. In outcrop, the dominant rock types are interbedded quartz-arenite and argillite sequences, the coarser elastics indurated to orthoquartzite. Minor hematitic argillite, mottled brown in outcrop, has also been mapped. A bedding-concordant, phyllitic cleavage is well represented in the finer sequences, generally dipping steeply to the south and southwest. From thin section studies (Ref. sample no. C1114, Appendix IIIB), these finer sub-units have been described as sericitic pelite, containing altered lithic detritus and partly degraded flakes of biotite. The original rock was a silty shale, in which a weak, bedding-concordant slaty cleavage has been developed.

Fact geology of the Tallowood Grid area is shown on Plan No. 3, accompanying this report, together with the locations of rock chip samples, collected from surface exposures. Chemical analyses have been completed on 11 of these samples (Ref. Appendix IV for results). Six of the samples represent surficial deposits of limonite, which are common throughout the area. The limonite is typically pisolitic, and is interpreted to be a recent deposit, possibly derived

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from weathering of the mafic intrusives within the Crimson Creek Formation. In all instances mapped to date the deposits are located within swampy drainage channels. The deposits would appear to scavenge metallic ions, including copper (with a maximum assay of 335 ppm), lead (up to 3990 ppm) and zinc (up to 10600 ppm). Similar deposits occur in the Dunkley Fault Grid area. Anomalous base metal analyses recorded in previous programmes of bedrock geochemical sampling, particularly in the northwest corner of the grid area, are attributed to these ferruginous deposits. Other ferruginous zones, possibly weathered vein or fault-infill mineralization, were located during mapping of the Tallowood Grid area, and are represented in 5 samples (sample no. C1095, C1105, C1108, C1109 and C1112). The samples are comprised of botryoidal and vughy goethite and limonite, with skeletal crystals of quartz. Sample no. C1108 comprises quartz-matrixed lithic fragment breccia, and was collected near a line of old workings, which include a shaft, between crosslines 1240N and 1480N. The workings appear to have been developed on a north-northwest trending vein or fault. Analyses of the 5 samples range from 13-145 ppm Sn, 4-580 ppm As, 58-925 ppm Cu, 10-8685 ppm Pb, 980 ppm - 1.87% Zn, 1-23 g/t Ag and up to 136 ppm WO_3 .

The occurrence of conspicuous, fine clastic magnetite has been noted in thin section studies of samples from the Crimson Creek Formation, within the Tallowood Grid area. As in the Dunkley Fault Grid area, to the west and southwest, and in the Serpentine Hill to Commonwealth Hill area, further east, depths to the top of the Renison mine sequence are likely to be considerable (possibly in the order of 500-600m). Magnetite in the Crimson Creek Formation, as clastic grains and hosted by basic lithoclasts is interpreted to be a major contributing source of the anomalous ground magnetics responses recorded in the Tallowood Grid area. Results of the recently completed ground magnetics survey have been presented as contoured data, stacked profiles and as profiles for each of the grid crosslines (Ref. Plan No. 4, 5 and 7-11 inclusive). Simple modelling of data from the anomaly centred at 9700E, on crossline 1480N, indicates a shallow source, buried to a depth of approximately 30m (average) and dipping to the west. The east to northeast dip directions mapped from outcrops throughout the grid area suggest that the anomaly source is not a sub-unit of the magnetite-bearing tuffaceous greywacke, known to occur in this section of the E.L.,

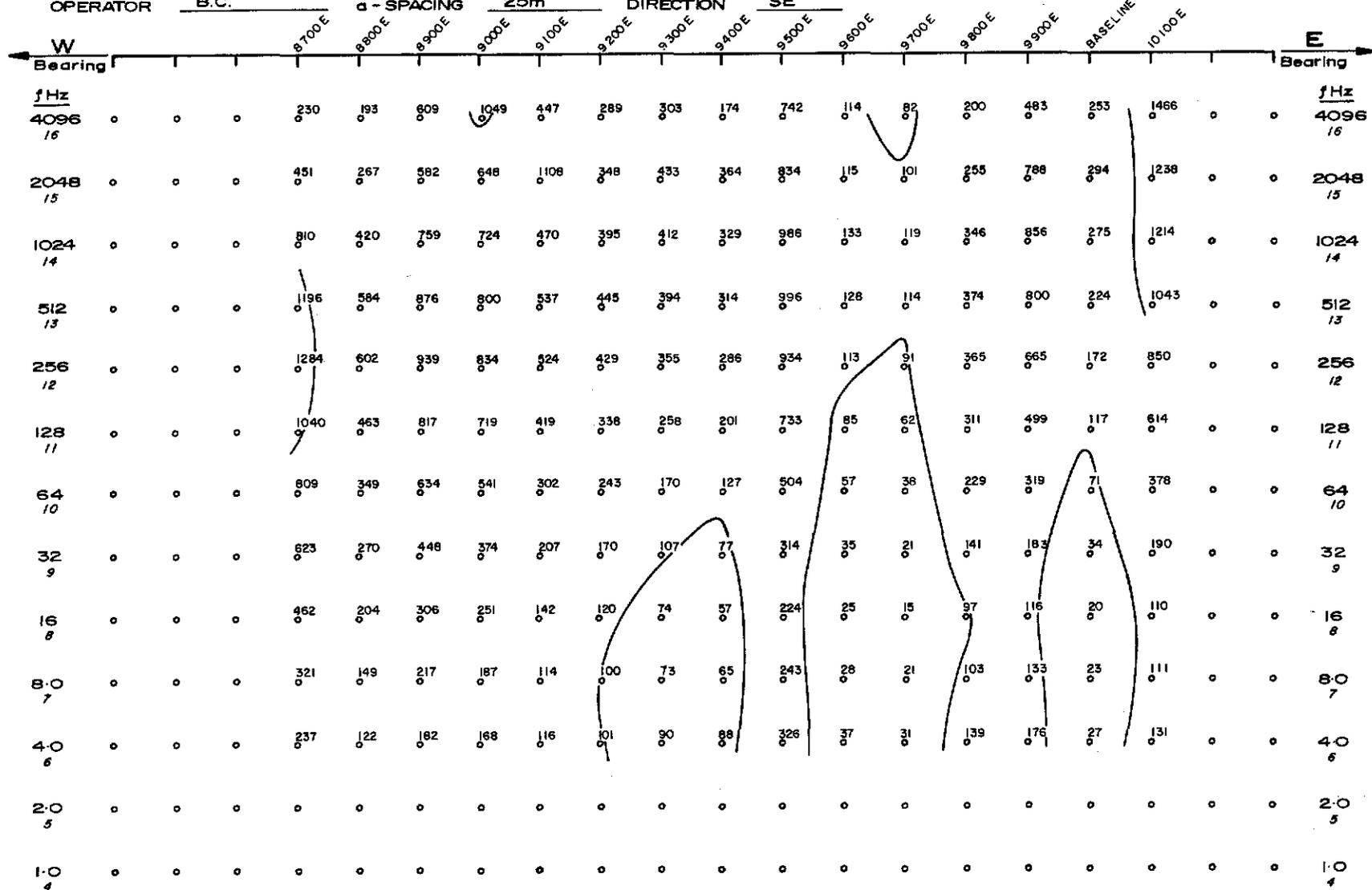
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within the Crimson Creek Formation. Possible sources of the anomaly may be a basic intrusive in the Crimson Creek Formation, or a mineralized fault. Micro-gabbro occurs in scattered outcrops approximately 200m to the south-southwest of the anomaly peak. Several conductors are apparent in the VLF-EM data (Ref. Plan No. 6) recorded on the Tallowood Grid crosslines and, in the western section of the grid area, possibly define a faulted contact between the Crimson Creek Formation and rocks correlated with the lower Success Creek Group. Data from the CSAMT traverse completed over crossline 1480N of the grid are shown in Fig. 18 and Fig. 19. The results, although awaiting final interpretation, do not appear to be encouraging. Additional gridding, comprising infill crosslines and extension of lines to the east, was proposed for commencement in April 1986. A programme of bedrock geochemical sampling, and additional ground magnetics and VLF-EM surveying, was also recommended, but all work has since been suspended.

Coverage of the Cheesewood Grid area was similarly curtailed. Only the northernmost crosslines have been mapped to date. The areal extent of possible correlates of the Crimson Creek Formation, initially mapped along the access track constructed to the Dunkley Fault Grid area from the Dunkley Tramway, now appears limited. These rocks include chloritic siltstone and tuffaceous greywacke which, although weathered in outcrop, contain relict microscopic features typical of the Dreadnought Hill Member, within the Crimson Creek Formation. Conspicuous clastic magnetite and leucoxene-altered assemblages have been reported from previously completed petrological studies (Kilpatrick, 1985). From the Cheesewood Grid coverage, these possible mine sequence rocks occur in a fault-bounded wedge, extending from crosslines 3160N to 3880N, with maximum dimensions of 600m along-strike (that is, north to northeast, locally east-southeast) and up to 600m down-dip. Extensive areas of the grid appear to be underlain by older rocks, correlated with the Success Creek Group and, possibly, to the west, by the Oonah Formation. Exposures are very scarce throughout, limited to scattered, poor sub-outcrops, generally located on the flanks of low hills. Petrological studies of samples collected from these moderately weathered exposures indicate the dominant lithologies to be variably carbonaceous, sericitic and locally lithoclastic orthoquartzite (Ref. Appendix IIIB). The original

CLIENT RENISON LOCATION E.L.42/71 Tx LENGTH 1400m PLOT OF ρ
 JOB NUMBER 585 LINE 5 DISTANCE 5.5km UNITS $\Omega \cdot m$
 DATE 22-3-86 ORIENTATION N75E ORIENTATION E-W AMT/AET CSAMT
 OPERATOR B.C. a -SPACING 25m DIRECTION SE

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86-2605

976054

RENISON LIMITED

SCALE N.T.S.

GEOLOGIST:

D.A.E.

DRAUGHTSMAN:

R.F.

CHECKED:

DATE:

SEPT, 1986

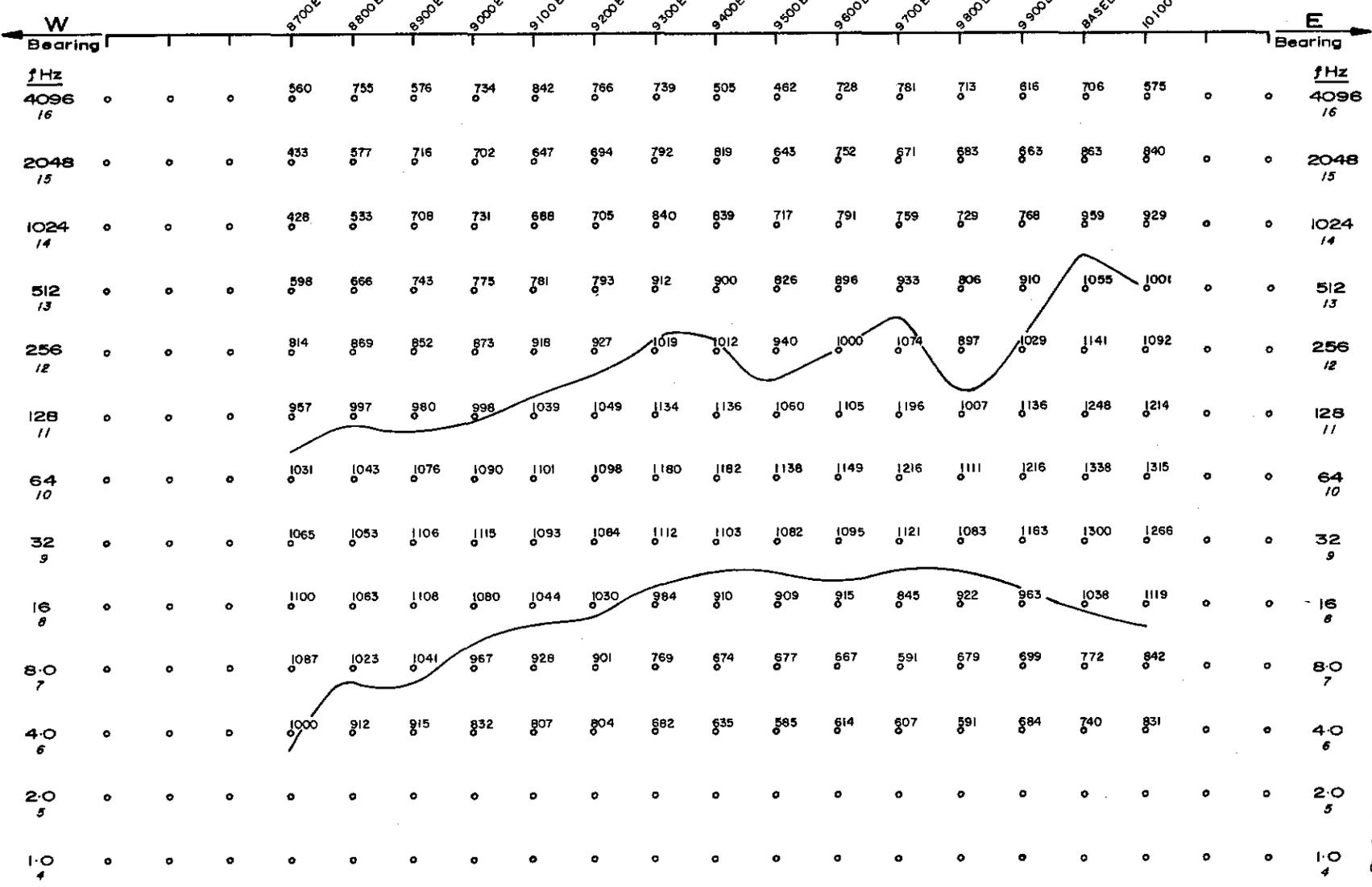
REVISED:

CSAMT TRAVERSE-TALLOWOOD GRID
 LINE 1480N
 RESISTIVITY PSEUDO-SECTION

FIG. NO. 18

054

CLIENT RENISON LOCATION E.L.42/71 Tx LENGTH 1400m PLOT OF $\Delta \phi$
 JOB NUMBER 585 LINE 5 DISTANCE 5.5km UNITS mRad
 DATE 22-3-86 ORIENTATION N75E ORIENTATION EW AMT/AET CSAMT
 OPERATOR B.C. α -SPACING 25m DIRECTION SE



RENISON LIMITED

SCALE N.T.S.

GEOLOGIST: D.A.E.
 DRAUGHTSMAN: R.F.F.
 CHECKED: []
 DATE: SEPT. 1986
 REVISED: []

CSAMT TRAVERSE-TALLOWOOD GRID
 LINE 1480N
 PHASE PSEUDO-SECTION

FIG. No. 19

976055

50 4000

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sediments were generally fine-grained and well-sorted with medium-scale bedding. Hydrothermal or contact-metamorphic alteration effects are noticeably absent. Sample no. C1083 has been described as a tuffaceous greywacke, comprised of chloritic and possible lava clasts, albitized fragments and feldspar grains, with augite and minor quartz clasts, in a leucoxene and chlorite-altered matrix, and has been correlated with the minor tuff sub-units of the lower Success Creek Group. Minor traces of detrital magnetite were noted in the thin section study of the sample, which was collected from outcrop along the Dunkley Tramway, in the westernmost section of the grid area. Given the paucity of outcrop in the area, these tuffaceous sub-units could reasonably be assigned to the Crimson Creek Formation. Conversely, similar rocks exposed along the Cheesewood Track, between the Dunkley Fault Grid and the Dunkley Tramway, which have previously been correlated with the Crimson Creek Formation, may indeed prove to be older (and, thus, have minimal exploration potential for stratabound carbonate-replacement tin mineralization). Extensive areas in the western and northwestern section of the Cheesewood Grid are covered by Quaternary swamp deposits, which have accumulated in alluviated tributaries of the Dunkley Rivulet.

The interpreted distribution of correlates of the Crimson Creek Formation, within the Cheesewood Grid area, is supported by the results of the recently completed ground magnetics survey (Ref. Plan No. 4 and No. 5). Weakly anomalous responses, some 30-50 gammas above the arbitrary value assigned to the survey base station, and up to 70-100 gammas above the low total field values recorded over areas of known lower Success Creek Group or Oonah Formation rocks, are apparent on crosslines 3160N to 3880N. These weak anomalous responses are attributed to the presence of minor detrital magnetite in the Crimson Creek Formation correlates. Sharp peaks in the ground magnetics data recorded close to the western ends of several crosslines may represent a fault, possibly the contact between the lower Success Creek Group and the Oonah Formation. Alternatively, or in addition to a fault source for these responses, the anomalies may be due to correlates of the minor spilitic flows which have been recorded in the Oonah Formation (Blissett, 1962). A sample of amygdaloidal basalt (Ref. sample no. C1101, Appendix IIIB) was collected from along the Dunkley Tramway, but is possibly not in situ.

Physical property measurements were carried out, at the University

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Physical property measurements were carried out, at the University of Sydney Petrophysical Laboratory, on 2 samples collected during a reconnaissance ground magnetics traverse along the Dunkley Tramway. Sample no. C1082, comprised of lithic fragment breccia with visible pyrrhotite and sphalerite (assays include 18.5% Zn, 26 g/t Ag and 610 ppm WO_3), is probably ore dropped from a tram wagon. Sample no. C1083, a tuffaceous greywacke correlated with the Lower Success Creek Group, has been described above in detail. Magnetic susceptibility values obtained from these samples were as follows -

<u>Sample No.</u>	<u>Magnetic Susceptibility</u> <u>(CGS units x 10⁻⁶)</u>
C1082	20
C1083	100

Chemical analysis results from these 2 samples are detailed in Appendix IV. Two other surface exposures in the Cheesewood Grid area have also been sampled for chemical analysis (Ref. sample no. C1099 and no. C1115, Appendix IV). Both samples are comprised of pisolitic goethite and ochreous limonite, were collected in areas of swampy drainage, and are thus interpreted to be recent deposits.

Traversing of a previously un-mapped firebreak trail, which extends south to the central section of the Argent Grid baseline from the access track to drillhole S835, has been undertaken. The trail follows a steep ridge, comprised mainly of fine clastic sediments of the Success Creek Group (possibly correlates of the Dalcoath Member). A wide zone of outcropping hematitic siltstone striking southeast to south-southeast through the area is correlated with the Red and Green Siltstone unit of the Dalcoath Member in the Renison Bell mine area. The unit includes interbeds, of locally cross-stratified siltstone, which in places have a karst-weathered appearance. As sampled, these fine clastics have been described as sericitic pelite, exhibiting contorted to fragmented, fine-scale bedding lamination and an absence of contact alteration effects, and are non-dolomitic (Ref. sample no. C1100).

No results are as yet available from the test spectral IP survey carried out along the access track to the Dunkley Fault Grid area,

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south of its junction with the Dunkley Tramway. Readings were taken over continuous exposure of rocks correlated with the lower Success Creek Group.

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APPENDIX I

E.L.42/71 (WEST) - ARGENT AREA

1985-86 EXPLORATION EXPENDITURE

E.L.42/71 (WEST) - ARGENT AREA1985-86 EXPLORATION EXPENDITURE

SALARIES	\$ 18,881
LEAVE LOADING	\$ 1,655
CONSUMABLES - GENERAL	\$ 763
OUTSIDE SERVICES - GEOPHYSICAL	\$ 27,047
- GEOCHEMICAL	\$ 90
- GRID CUTTING	\$ 18,749
- SITE ACCESS	\$ 3,022
- OTHER	\$ 7,719
<hr/>	
TOTAL	\$ 77,926
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APPENDIX II

E.L. 42/71 (WEST) - ARGENT AREA

GEOPHYSICAL REPORTS

SEE VOLUME 2

APPENDIX II A

INTERPRETATION OF THE MAGNETIC AND ELECTROMAGNETIC SURVEYS

OVER THE DUNKLEY FAULT GRID (E.L. 42/71) *

* Text and figures of original report only (plans not included).

SEE VOLUME 3

APPENDIX II B

INTERPRETATION OF THE GEOPHYSICAL SURVEYS OVER THE

ARGENT AREA OF E.L. 42/71 *

* Test and figures of original report only (plans not included).

APPENDIX III

E.L. 42/71 (WEST) - ARGENT AREA

PETROLOGICAL REPORTS

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APPENDIX III A

PETROLOGICAL REPORTS - DRILL CORE SAMPLES (HOLE S1200)

REPORT CMS 86/4/20

A suite of forty drill core samples from DDH 1200 and ten rock chip samples from the Argent section of E.L. 42/71 was received for petrological examination. Representative thin-sections were prepared and examined together with respective offcuts, with feldspar and carbonate stain tests performed as warranted. Attached tabulated descriptions summarise the microscopic data and include interpretative comments.

Summary

The S 1200 drill cores represent a thick sequence of labile turbiditic clastic sediments with intercalated carbonaceous pelites "grading" into calc-pelitic and impure, variably dolomitised limestone facies. Clastic sediments are essentially entirely basic-volcanomict lithoclastic types, but include varying proportions of calcareous and carbonaceous sediment as clasts or slumped intraclasts. Accessory clastic quartz may be present, but is generally insignificant. Heavy mineral assemblages are dominated by leucoxenic semi-opaques, varying proportions of magnetite, and traces of chromite.

This sequence may be subdivided into two semi-distinct units on the basis of lithoclastic and accessory components. An "upper" subunit is characterised by abundant clastic leucoxenic semi-opaques and is essentially devoid of clastic magnetite. Basic lithoclasts, where relatively fresh, include pyroxene-rich (ankaramitic/trend ultramafic) types, and augite appears as an accessory clastic component. This group also includes relatively conspicuous trace accessory detrital chromite. Sporadic basic igneous rocks are similarly relatively chromiferous. Thus "upper" sequence extends to, and includes, the 411.44-411.48 m sample.

The "lower" subunit is characterised by relatively quite abundant lithoclast-hosted and clastic magnetite, variably martitised (or hematitised) and then detectable mesoscopically as reddish Fe-stainings. Basic lithoclasts are relatively leucocratic (feldspathic) types devoid of pyroxene. Clastic chromite, although present, is relatively inconspicuous. Limestone units tend to be relatively dolomitic (i.e. dolomitised).

In detail, detrital chromite is present throughout the whole drilled sequence, as sampled. This phase exhibits incipient red translucency and may be compared with the primary chromite of the Serpentine Hill and related ultramafic complexes.

With the exception of the trace accessory detrital chromite component, the lower subunit, as defined, appears typical of the DHM section of Crimson Creek Formation. The semi-cyclic carbonaceous pelite/calc-pelitic/impure limestone intercalations are suggestive of Upper DHM, as is similarly the minor clastic chromite component. On this basis, although strictly petrological, this sequence would not be considered as proximal to the Renison Mine Sequence.

The sequence as a whole exhibits an essentially pervasive and uniform alteration assemblage of chlorite, variably complexed by calcite veining and metasomatic replacements. Accessories include quartz, and rarely talc.

Chlorite is reasonably interpreted as a low-grade regional metamorphic product. In contrast, calcite is typically vein and/or replacive in origin, tends to exhibit a high R.I. (reflecting Fe- and/or Mn-contents), and is of marginal hydrothermal character.

Actinolitic alteration assemblages, characteristic of Renison Mine-proximal zones of D.H.M./C.C.F. labile sediments, are entirely absent as are detectable contact-metamorphic effects. The drilled sequence is then considered as distal in terms of proximity to granitic intrusives.

Detectable magnetic components comprise disseminated to locally semi-massive pyrrhotite and the locally conspicuous detrital magnetite. Pyrrhotite tends to be concentrated in pelitic sediments and is interpreted as a syngenetic phase. Both magnetic components are then primary to the host rocks.

In the absence of strictly contact metamorphic or metasomatic effects, notably in the relatively reactive calcareous sediments, a basic intrusive complex appears a potential causative factor to the magnetic anomaly. It should be noted, however, that the modelled deeper source depth of 400 m closely approximates the boundary between the "upper" and relatively magnetitic "lower" subunits.

The E.L. 42/71 (Argent section) rocks are partly weathered, but are generally diagnostic. With minor exceptions, petrological characteristics are in agreement with the interpreted stratigraphy.

D. Cowan, B. Sc.

Sample No.	Classification - Composition	Fabric	Accessories	Comments
S 1200 34.9 - 35.0 (T.S. 55821)	<u>Chloritic Pelite</u> . Semi-sericitic muscovite with subordinate chlorite, minor micro-crystalline quartz. Pervasive disseminated fine silt-sized clastic muscovite flakes. Rare microlenses of massive chlorite.	Laminated on a sub-millimetric to micro-scale. Very incipiently concordantly sheared.	Minor impure chert interbeds. Conspicuous ultrafine clastic leucoxenic semi-opaques.	Includes rare discontinuous chlorite veinlets with traces of pyrite and sphalerite. Sublabile characteristic with conspicuous clastic titanopaque
42.5 - 42.57	<u>Chloritic Greywacke</u> . Chlorite-matrixed framework of chloritic-sericitic/leucoxene-stained basaltic lava clasts, subordinate chloritised mica flakes, plagioclase and minor quartz grains. Locally conspicuous clasts of chlorite.	Turbiditic siltstone/fine sandstone with a centimetric interbed of silt-matrixed shale pelite, breccia. Incipiently sheared.	Conspicuous fine partly martitised clastic magnetite, subordinate leucoxenic semi-opaques. Rare pyrite.	Labile (reworked-tuffaceous) turbiditic sandstone/siltstone intercalated with slumped-intraclastic shale breccia zones. Weakly magnetic (clastic magnetite).
48.94- 48.98	<u>Altered Microgabbro</u> . Albitised/chlorite-sericite-stained plagioclase laths with subordinate chloritised pyroxene. Chlorite mesostasis. Sporadic chloritic veinlets and microfractures.	Weakly pyroxene-porphyrific, medium-grained "basaltic". Mildly sheared.	Minor films of partly degraded sideritic carbonate. Leucoxenised opaques, traces of chromite.	Chlorite-albite-altered, mildly sheared chromiferous microgabbro. Fabric consistent with a semi-chilled minor intrusive or, alternately, a flow.
75.7 - 75.76	<u>Calc-Pelite/Impure Limestone</u> . Fine to micro-crystalline calcite with varying proportions of sericite and carbonaceous matter. Minor silt- to fine sand-sized clastic albitised plagioclase, quartz grains. Disseminated pyrite.	Laminated silty shale/argillaceous siltstone with centimetric interbeds of limestone. Weakly sheared.	Minor clots of dolomite in limestone units. Sparse calcite veinlets (stressed). Minor detrital muscovite flakes.	Carbonaceous calc-pelite units are pyrrhotitic, and impure limestone units pyritic.
98.64- 98.71	<u>Carbonaceous Greywacke</u> . Framework of silt- to sand-sized chloritic, variably carbonate-stained basalt clasts, subordinate dolomite clasts. Carbonaceous dolomitic pelitic to chloritic matrix.	Banded/mildly sheared carbonaceous pelitic fine sandstone with bands of chloritic-matrixed lithic sandstone.	Detrital muscovite flakes, traces detrital chromite. Corroded relics of augite (basalt clasts). Traces pyrite.	Carbonaceous-dolomitic pelite-matrixed fine sandstone with interunits of strongly volcanomict chloritic greywacke. Minor sheared calcite-quartz veinlets.
121.81 to 121.85	<u>Carbonaceous Siltstone</u> . Ultrafine pale chlorite with pervasive carbonaceous matter, silt-sized corroded relics of clastic lava clasts, feldspar grains. Disseminated carbonaceous pelite clasts. Boudinaged chlorite veinlets.	Mildly sheared silty clastic, with sand-sized pelite intra-clasts, boudinaged chlorite veinlets.	Conspicuous fine to ultrafine pyrrhotite. Minor clastic quartz, muscovite flakes.	Affinities with the 98.64 to 98.71 m carbonaceous fine sandstone facies. Relatively carbonaceous, non-dolomitic and pelite-intraclastic. Incipiently magnetic (pyrrhotite).
150.46 to 150.51	" <u>Tuffaceous Greywacke</u> ". Framework of chlorite-clay-stained to thoroughly chloritised basic lava clasts with corroded relics of augite, varying proportions cloudy microcrystalline carbonate. Chlorite matrix.	Massive (unbedded) turbiditic fine to medium sandstone. Mildly sheared.	Clastic pyroxene, leucoxenised opaques, traces of detrital chromite, traces of pyrrhotite.	Close affinities with the chloritic greywacke interbeds at 98.71 m. Entirely basic-volcanomict with basaltic to ankaramitic clasts.
161.74 to 161.80	" <u>Tuffaceous Greywacke</u> ". Framework of variably chloritised basic lava clasts, subordinate augite grains. Chlorite matrix with sporadic clots of calcite. Minor clasts of tuffaceous psammopelite. Sporadic calcite veinlets.	Closely analogous to 150.46 to 150.51 m. Fractured and calcite-veined in comparison.	Leucoxenised opaques, traces detrital chromite, minor carbonaceous pelite clasts. Trace pyrite, pyrrhotite.	Close affinities with 150.46 to 150.74 metres; slightly polymict in comparison. Calcite veinlets include accessory chlorite and quartz, predominate mild shearing effects.

Sample No.	Classification - Composition	Fabric	Accessories	Comments
S 1200 cont. 181.0 to 181.08	"Tuffaceous Greywacke". Framework of silt- to fine sand-sized chloritic lava clasts, albitised plagioclase with a leucoxenitic chlorite matrix. Sporadic lenses of micro-crystalline albite. Conspicuous carbonaceous matter, very fine pyrrhotite.	Submillimetric to micro-laminated, incipiently shale-parted silty clastic with lensoid albitic units, shale intraclasts.	Minor clastic quartz grains, muscovite flakes.	Turbiditic shale-parted/intraclastic labile siltstone/fine sandstone with albitised pelitic ashy partings. "Flame" structures reflect incipient shearing/boudinaging of pelitic partings.
193.75 to 193.81	Calcareous Greywacke. Framework of chloritic/carbonate-stained barite lava clasts, limestone and dolomitic limestone clasts, albitised feldspar grains, sporadic carbonaceous shale clasts. Dolomitic carbonaceous pelite matrix.	Weakly bedded, fine to medium sandstone-matrixed shale breccia.	Minor quartz grains, muscovite flakes, calcite veinlets. Conspicuous fine to ultra-fine pyrrhotite; traces	"Flaser"-bedded polymict shale breccia. Weakly magnetic due to pyrrhotite content (similarly 181.0 to 181.08 m). Pyrite is partly calcite veinlet-hosted.
255.65 to 255.70	Dolomitic Calc-Pelite. Fine to microcrystalline calcite with varying proportions of very fine sparry dolomite, semi-sericitic white mica, minor quartz, pervasive carbonaceous matter. Disseminations, lenses, spongy films of pyrrhotite.	Weakly laminated silty to fine sandy clastic with frequent carbonaceous shaly lenses. discontinuous partings.	Minor traces pyrite, chalcopryrite. Sparse displacive calcite-chlorite veinlets with clots of pyrrhotite.	"Grades" from dolomitic sandy calc-pelite into pelite-matrixed dolomitic calcarenite (impure clastic limestone). Pyrrhotite partly in contorted spongy films with minor chalcopryrite/
281.70 to 281.75	Brecciated Pelite. Strongly carbonaceous, sericitic pelite with interbands of chloritic labile carbonaceous siltstone and silty shale. Semi-pervasive chloritic fractures with interspersed vugs, veinlets of calcite, chlorite and quartz.	Banded on a millimetric to microscale. Disharmonically micro-folded to brecciated/chlorite-calcite-quartz-veined/matrixed.	Ultrafine disseminations and fracture-related clots of pyrrhotite with rare associated chalcopryrite, sphalerite.	Contorted to tectonically brecciated intercalation of carbonaceous shale and chloritised labile silty shale argillaceous siltstone. Incipiently restressed matrix, veinlets.
287.47 to 287.54	Dolomitic Calc-Pelite. Sericitic clay, pervasively stained with carbonaceous matter, pervasive fine to microcrystalline dolomite, disseminated clots of calcite. Sporadic irregular discontinuous calcite veinlets.	Weakly lenticularly laminated with carbonaceous pelitic microlenses. Incipiently sheared. Weakly stressed.	Conspicuous fine to ultrafine syngenetic pyrite. Minor chlorite in veinlets.	Close affinities with 255.65-255.70. In contrast, this rock is distinctly pyritic, rather than pyrrhotitic, and is strictly pelitic rather than psammopelitic.
298.27 to 298.32	Calcareous Greywacke. Framework of weakly dolomitic limestone clasts, subordinate basic lava clasts, albite and minor quartz grains. Calcite-stained chlorite-illite matrix with varying proportions of carbonaceous matter.	Banded/incipiently, shale-parted silty fine sandstone/sandy siltstone. Weakly displacive, mildly stressed.	Conspicuous clastic leucoxenitic semi-opaque, minor muscovite flakes. Disseminated and veinlet-hosted pyrite, pyrrhotite.	Affinities with 193.75-193.80 m; finer-grained, relatively uniform and distinctly banded in comparison and essentially devoid of pelite intraclasts.
330.75 to 330.80	Carbonaceous Pelite. Semi- to sericitic illite with pervasive ultrafine carbonaceous matter. Minor, but more or less pervasive fine cloudy dolomite rhombs. Minor silt-sized clastic quartz, muscovite flakes. Disseminated fine to ultrafine pyrite.	Lenticularly micro-laminated; weakly low-angle discordantly sheared.	Sporadic weakly displacive calcite(-quartz-pyrite) veinlets, carbonaceous micro-fractures.	Strongly carbonaceous, weakly dolomitic pelite with thin bands, lenses of semi-massive syngenetic pyrite. Veinlets are pre-tectonic; mildly stressed.
337.94 to 337.99	"Tuffaceous Greywacke". Framework of thoroughly chloritised-kaolinised basic lava clasts, subordinate limestone clasts, minor feldspar, quartz grains. Calcite-stained chlorite-kaolin/minor quartz matrix. Sporadic calcite veinlets.	Slump-brecciated, medium-grained turbiditic sandstone with intraclasts of silty calcareous carbonaceous greywacke.	Leucoxenitic semi-opaque, traces detrital chlorite, muscovite. Minor pyrite, pyritised pyrrhotite.	Slump breccia composite of basic-volcanomict turbidite and carbonaceous calc-turbidite components. Irregularly veined, fractured and mildly restressed.

Sample No.	Classification - Composition	Fabric	Accessories	Comments
S 1200 cont. 351.0 to 351.05	Carbonaceous Siltstone. Kaolin-illite with semi-pervasive ultrafine carbonaceous matter, pervasive corroded relics of silt-sized clast feldspar, minor cloudy dolomite, clastic muscovite. Pervasive fine pyrrhotite. Minor calcite-chlorite veinlets.	Weakly laminated silty clastic with sporadic non-carbonaceous interbeds. Weakly stressed veinlets.	Detrital leucoxenic semi-opaques. Disseminated partly pyritised pyrrhotite in veinlets. Traces clastic quartz.	Carbonaceous, weakly dolomitic silty labile siltstone. Generally argillaceous, with minor interbeds of massive siltstone. Weak magnetism reflects pyrrhotite content.
388.0 to 388.06	Breccia. Silt- to medium sand-sized chloritic basic lava clasts, subordinate feldspar, quartz grains, felsic intermediate acid lava clasts; intraclasts of carbonaceous pelite and silty greywacke. Leucoxenic chloritic-kaolinitic matrix.	Slump-brecciated/pelite-intraclastic, weakly pelite-parted silty fine to medium sandstone.	Clastic muscovite flakes, leucoxenic semi-opaques. Minor chlorite-quartz-calcite veinlets. Sparse pyrrhotite, traces pyrite.	Slump breccia composite of "tuffaceous turbidite, carbonaceous pelite components. Relatively polymict, with basic and felsic volcanic-derived components. Rare clastic chromite.
392.05 to 392.1	Brecciated Altered Basalt. Chlorite-stained/albitised plagioclase laths and microlaths with a chlorite mesostasis, pervasive films of carbonaceous matter. Pervasive chlorite veins/veinlets with interspersed vugs and films.	Brecciated/chlorite-matrixed and mildly resheared basaltic. Locally semi-mylonitic. Films of quartz.	Conspicuous leucoxenised opaques, traces of pyrite, rare chromite. Minor stressed calcite-quartz veinlets.	Thoroughly altered, fractured to brecciated/chlorite-veined, matrixed basaltic lava or semi-chilled minor intrusive. Bulk colouration reflects secondary carbonaceous matter.
393.2 to 393.23	Pyritic Pelite. Semi- to sericitic white mica with varying proportions of carbonaceous matter and microcrystalline cloudy dolomitic carbonate. Disseminated pyrite. Sporadic quartz-calcite-chlorite veinlets.	Alternation of laminated, strongly carbonaceous and similarly banded non-carbonaceous pelite. Incipiently sheared.	Minor lenses of strongly pyritic impure (argillaceous) chert.	Pyrite is fine to ultrafine syngenetic framboidal in part. Veinlets are weakly displacive, include spongy clots of carbonaceous matter and are incipiently stressed.
411.44 to 411.48	Tuffaceous Greywacke/Labile Siltstone. Extensively chloritised labile siltstone with interbeds of leucoxenic chlorite-matrixed silty fine sandstone with an albite/chloritised basic-intermediate lava clast/minor quartz framework.	Massive to laminated/weakly graded, locally slumped siltstone. Massive to siltstone-intraclastic sandstone.	Clastic leucoxenic semi-opaques. Traces of pyrrhotite. Minor pyrrhotitic quartz-chlorite-calcite veinlets.	Siltstone is strictly a very fine-grained labile turbiditic facies. Locally scoured and appearing as minor intraclasts within the intercalated sandstone.
421.95 to 421.99	"Tuffaceous Greywacke". Framework of chloritic basic and felsic intermediate lava clasts, albitised/chlorite-stained plagioclase and minor quartz grains, minor limestone clasts. Chlorite matrix/cement.	Incipiently banded turbiditic silty fine sandstone. Relatively angular framework.	Conspicuous detrital martitic (hematitic) magnetite, leucoxenic semi-opaques, rare chromite. Rare pyrrhotite.	Extensively chloritised basic-intermediate volcanomict greywacke. Relatively distinctive Crimson Creek characteristics. Incipient magnetism reflects clastic opaques.
446.23 to 446.29	"Tuffaceous Greywacke". Framework of chloritic basic-intermediate lava clasts, subordinate albite and minor quartz grains. Conspicuous hematitic clastic opaques. Leucoxenic chlorite matrix/cement.	Banded-turbiditic fine sandstone with units of low-angle transcurrent bedded siltstone.	Minor calcite-chlorite-quartz veinlets.	Close affinities with 421.95-421.99. Generally finer-grained, with siltstone interunits. Relatively abundant martitised clastic magnetite.
465.35 to 465.4	"Tuffaceous Greywacke". Framework of chloritised basic, minor chloritic intermediate lava clasts, minor limestone clasts, chloritic albite grains. Chlorite matrix. Conspicuous martitised/oxidised clastic opaques.	Weakly bedded silty fine to medium turbiditic sandstone.	Displacive calcite-chlorite-quartz veinlets with traces of pyrite. Leucoxenic TiO ₂ stainings.	Relatively chloritised, weakly calcareous labile turbidite with abundant degraded clastic opaques. Affinities with 421.95-421.99 m and 446.23-446.29 m.

Sample No.	Classification - Composition	Fabric	Accessories	Comments
S 1200 cont. 465.6 to 465.64	<u>Altered, Veined Greywacke.</u> Thoroughly chloritised/sericitised silty sandstone with chlorite pseudomorphed carbonate clots and rhombs. Discordant vein of quartz, vermiform chlorite, intergranular calcite, disseminated pyrite.	Weakly banded turbiditic silty fine sandy host rock. High-angle discordant, weakly stressed vein.	Conspicuous leucoxenic and limonitic degraded opaques (host rock); traces poikilitic cloudy rutile (vein).	Host rock exhibits marked and pervasive chlorite-sericite alteration, minor chlorite-quartz veinlets, conspicuous leucoxenised/oxidised clastic opaques.
466.04 to 466.09	<u>Altered, Veined Labile Siltstone.</u> Semi-pervasively Fe-oxide pigmented chlorite-sericite rock with more or less pervasive boudinaged sericite-chlorite veinlets. Disseminated pyrite; minor pyritic calcite-quartz-chlorite veinlets.	Sericitic shale-parted silty clastic. Closely veined to brecciated/sericite-chlorite-matrixed. Mildly resheared.	Conspicuous oxidised/leucoxenised clastic opaques.	General features consistent with a fault breccia paragenesis. Alteratic veining/mild restressing features essentially identical with those at 465.6-465.64 m.
467.67 to 467.72	<u>Breccia.</u> Sparry calcite with included to near-massive aggregates of chlorite, disseminated to semi-massive pyrite. Intraclasts of chloritised/variably pyritised "tuffaceous greywacke". Sporadic secondary calcite veinlets.	Calcite-chlorite-pyrite matrixed breccia with semi-orientated millimetric-scale clasts. Mildly restressed.	Pervasive leucoxenic staining in clasts. Traces of pyritised pyrrhotite in matrix. Traces secondary limonite.	Calcite-chlorite-pyrite-matrixed tectonic breccia. Vein/matrix assemblage analogous to 465.6 m, 466.04 m zones, but quartz-deficient. Similarly restressed.
471.0 to 471.03	<u>"Tuffaceous Greywacke"</u> . Framework of variably chloritised/weakly carbonated basaltic lava clasts, subordinate albite, minor quartz grains, conspicuous partly martitised magnetite. Leucoxenic chlorite matrix. Minor chloritic calcite veinlets.	Weakly bedded, poorly sorted (silty fine to medium) turbiditic sandstone. Weakly stressed veinlets.	Traces of basalt clast hosted and detrital chromite. Minor quartz-calcite veinlets. Traces of chalcopyrite.	Extensively chloritised/weakly carbonated basic-volcanomict greywacke. Quartz-calcite- and subsequently calcite-chlorite-veined; weakly stressed.
481.90 to 481.97	<u>Tuffaceous Greywacke.</u> Framework of variably chloritised and carbonate-stained basaltic lava clasts, subordinate albite, minor quartz grains, conspicuous magnetite. Leucoxenic chlorite matrix. Minor calcite veinlets.	Very similar to 471.0-471.03 m. Weakly banded in comparison. Weakly stressed veinlets.	Minor felsitic intermediate-acid lava clasts. Rare detrital chromite. Minor traces of pyrite, chalcopyrite.	Close affinities with 471.0-471.03 m relatively banded and polymict in comparison. Similarly altered, but with relatively fresh clastic magnetite.
500.4 to 500.46	<u>Altered Greywacke.</u> Fine to microcrystalline cloudy carbonate (calcite) and chlorite with corroded relics of basic lava clasts. Minor albite, quartz veins. Interbands of strongly carbonaceous limestone.	Massive, medium-grained, turbiditic sandstone. Microcrystalline carbonaceous pelite-parted limestone. Weakly sheared.	Leucoxenic semi-opaques, disseminated pyrrhotite, traces of pyrite. Rare chromite.	Thoroughly calcite-chlorite-altered, medium-grained, relatively basalt-lithoclastic turbidite with interbeds of Fe-calcite-altered impure (carbonaceous, argillaceous) limestone.
509.25 to 509.31	<u>Altered Greywacke.</u> Framework of silt- to medium sand-sized basic lava clasts, extensively replaced by cloudy calcite, subordinate feldspar grains. Leucoxenic, calcite-stained chloritic matrix. Sporadic calcite veinlets.	Incipiently banded, silty fine to medium, "turbiditic". Weakly stressed veinlets.	Leucoxenic semi-opaques. Minor felsite, carbonaceous limestone clasts. Traces chromite, pyrrhotite, pyrite.	Extensively carbonated (calcitised) basic volcanomict turbidite, essentially similar to 481.90 m, 500.4 m. Reflects two generations of calcite veinlets.
511.0 to 511.08	<u>Impure Limestone/Calc-Pelite.</u> Fine to microcrystalline calcite with interspersed carbonaceous shaly partings and interbeds, subordinate to minor corroded relics of labile silty clastic debris. Frequent calcite veinlets.	Contorted sub- to millimetric-scale bedding laminations. Generally conformable veinlets. Mildly stressed.	Disseminated pyrite. Conspicuous leucoxenic opaques in silty units. Minor vugs of albite in veinlets.	Primarily a banded limestone/carbonaceous pelite/labile silty impure limestone intercalation. Reflects Fe-calcite veining/metasomatism.

stressed.

Sample No.	Classification - Composition	Fabric	Accessories	Comments
S 1200 cont. 513.20 to 513.25	<u>Dolomitic Impure Limestone.</u> Fine sparry dolomitic carbonate with intergranular calcite, pervasive carbonaceous matter, minor sericite and microcrystalline quartz. Sporadic talc-calcite veinlets with minor quartz.	Weakly laminated host rock. Displacive, mildly sheared veinlets.	Thinly disseminated "syngenetic" pyrite. Ultrafine leucoxenic semi-opaques.	Affinities with 511.0 m. In comparison this rock represents a relatively massive impure limestone with diagenetic partial dolomitisation the major alteration feature.
517.54 to 517.57	<u>Altered Microgabbro.</u> Albitised/chlorite-stained plagioclase laths with subordinate chloritised pyroxene and a pervasive calcite-chlorite-altered mesostasis. Conspicuous leucoxenised opaques. Sporadic chloritic calcite veinlets.	Even-grained, "doleritic" (subophitic), with mildly sheared displacive veinlets.	Traces of pyrrhotite.	Pervasively albite-chlorite-calcite-altered, medium-grained basic with "doleritic" minor intrusive characteristics.
518.53 to 518.58	<u>Dolomitic Impure Limestone.</u> Fine sparry dolomitic carbonate with minor relics of microcrystalline calcite, thinly disseminated silt-sized quartz grains, minor sericite; pervasive carbonaceous matter. Minor dolomitic calcite veinlets.	Banded/incipiently carbonaceous shale-parted on sub-to millimetric scale. Mildly sheared.	Thinly disseminated pyrite. Minor films of microcrystalline quartz in carbonate veinlets.	Close affinities with 513.20-513.25. In comparison, this rock represents a relatively massive (extensively dolomitised) impure limestone devoid of labile silty components.
522.03 to 522.07	<u>Altered Microgabbro.</u> Albitised/chlorite-calcite-stained plagioclase laths with subordinate chloritised pyroxene and a conspicuous chlorite-calcite-altered mesostasis. Conspicuous leucoxenised opaques. Sporadic chlorite-calcite veinlets.	Closely analogous to 517.54-517.57 m. Mildly sheared veinlets.	Minor traces ultrafine-grained pyrrhotite and ?chalcopyrite.	Close affinities with, and conceivably a repetition of, the 517.54-517.57 m. altered microgabbro. Similarly discontinuously veined and mildly sheared.
528.55 to 528.6	<u>Calcareous Greywacke.</u> Framework of dolomitic limestone clasts, subordinate chloritic/carbonate-stained albite and minor quartz grains. Dolomitic chlorite matrix. Interbedded of carbonaceous dolomitic calc-pelite.	Massive to locally brecciated/calcite-healed turbiditic silty fine to medium sandstone.	Carbonaceous pelite clasts (sandstone), silt-sized quartz, muscovite (pelite). Leucoxenic semi-opaques. Traces of pyrite.	Greywacke is weakly banded and vaguely slump-brecciated with detail obscured by secondary brecciation, veining. Affinities with e.g. 298.27 to 298.32 m
537.85 to 537.9	<u>Breccia.</u> Clasts of kaolinitic "tuffaceous greywacke", carbonaceous shale/silty shale/sublabile argillaceous carbonaceous siltstone. Fine- to medium-grained vein-type quartz cement with interspersed vugs, veinlets of calcite.	Random to orientated, submillimetric-to centimetric-scale angular clasts. Incipiently stressed matrix.	Rare to conspicuous - syngenetic pyrite (pelite clasts), rare chalcopyrite (greywacke clasts), traces chlorite	Quartz-calcite-matrixed/incipiently restressed tectonic breccia. Affinities with e.g. 467.67-467.72 m (matrix).
551.31 to 551.39	<u>Labile Pelite/Calc-Siltstone.</u> Chloritic and sericite with semi-pervasive hematitic Fe-pigmentation. Interunits of silty clastic limestone grading into impure limestone and calcareous siltstone.	Bedded silty clastic with minor shaly partings. Semi-pervasive displacive chloritic calcite veinlets.	Conspicuous semi-martitised silt-sized clastic magnetite, subordinate leucoxenic semi-opaques.	Displacive calcite, veined to semi-brecciated calcite-healed sub- to labile pelite, clastic limestone/calcareous siltstone intercalation.
561.26 to 561.3	<u>Chloritic Pelite.</u> Sericite and closely intergrown chlorite with varying proportions of fine silt-sized, semi-martitised magnetite, leucoxenic semi-opaques, vague corroded relics of feldspar.	Banded on centimetric to submillimetric scale; alternating slightly and relatively silty shale.	Discontinuous chlorite veinlets with poikilitic calcite, disseminated chalcopyrite.	Intercalation of massive green chloritic pelite and red-brown, Fe-pigmented chloritic silty pelite. Main variation is the proportion of very fine clastic opaques.

075

CENTRAL MINERALOGICAL SERVICES

Sample No.	Classification - Composition	Fabric	Accessories	Comments
S 1200 cont. 575.43 to 575.48	<u>Labile Psammopelite Breccia</u> . Chloritic/weakly calcareous "tuffaceous" silty fine sandstone/sandy siltstone with intraclasts and interbeds of chloritic labile siltstone and silty shale. Pervasive leucoxenic, minor hematitic stainings.	Slump-brecciated, millimetric-scale interlamination of turbiditic fine sandstone, siltstone, silty shale	Minor weakly displacive calcite veinlets. Minor traces disseminated and veinlet-hosted pyrite, chalcopyrite.	Labile ("tuffaceous", turbiditic) psammopelite, slump-brecciated/intraclastic and extensively chloritised.
596.13 to 596.19	<u>Tuffaceous Greywacke/Carbonaceous Pelite</u> . Pervasively chlorite-/weakly carbonate-stained, fine-grained labile greywacke in contact with a strongly carbonaceous chloritic weakly dolomitic labile silty pelite.	Sub- to millimetric-scale banded silty sandstone; lenticularly microlaminated pelite. Fractured contact.	Displacive disseminated pyrrhotitic chloritic quartz-calcite veinlets. Pervasive leucoxenic opaques, pyrrhotite	Affinities with 575.4 m; unslumped and distinctly carbonaceous in comparison, similarly altered. Displacive quartz-calcite-healed fractures are mildly restressed.
598.07 to 598.11 (T.S. 55863)	<u>Calcareous Greywacke</u> . Framework of chloritised/carbonate-stained basic lava clasts, subordinate dolomitic limestone clasts, minor feldspar, quartz grains. Leucoxenic chlorite matrix. Minor chloritic calcite veinlets.	Variably slumped turbiditic silty fine to medium sandstone with turbiditic siltstone units, intraclasts	Traces of detrital and altered lava clast-hosted chromite, magnetite. Carbonaceous pelite clasts; traces of pyrite.	"Tuffaceous" turbiditic sandstone/siltstone intercalation with accessory limestone and carbonaceous pelite clasts. Semi-brecciated (slumped), extensively chloritised.

976076

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APPENDIX III B

PETROLOGICAL REPORTS - ROCK CHIP SAMPLES

FIELD DESCRIPTIONS OF ROCK CHIP SAMPLES FOR PETROLOGICAL STUDY,
ARGENT AREA OF E.L. 42/71

Sample No.	Location	Stratigraphy	Summary Macroscopic Description
C1076	E.L. 42/71 (18906N/ 13146E, on Access Track to S966	CCF	Spheroidal weathered, dark blue-grey to brown, altered argillaceous matrix-rich, medium to coarse-grained ?volcaniclastic litharenite (volcanic wacke), with magnetite.
C1083	Along Dunkley Tram way at approx. 20200N/ 10460E	? Lower Success Creek Group or Oonah Fm.	Green, fine-grained, spotted to weakly foliated meta-argillite or very fine-grained meta-litharenite.
C1089	E.L. 42/71-Tallowwood Grid Area (17052N/ 13438E), South of Line 1000 N.	CCF	As for C1076, but dark blue, fine-grained (non-magnetic).
C1091	E.L. 42/71-Tallowwood Grid Area (17143N/ 12718E), North of Line 1000 N	?CCF	Altered, medium to coarse-grained gabbro.
C1096	On access road to drill hole S1207, at 17521N/13517E).	Fault (CCF/CCF)	Ferruginized, lithic fragment breccia with goethite and ochreous limonite. Fault zone is 20-30cm thick.
C1100	E.L. 42/71 - S835 Area (20220N/12620E).	DM (?red & green siltstone unit)	Green, moderately soft (slightly waxy), altered dolomitic siltstone.
C1101	E.L. 42/71 - Dunkley Tram way	?Oonah Fm.	Blue, blue-grey, altered, fine-grained, amygdaloidal basalt.
C1102	E.L. 42/71-Cheesewood Grid Area (approx. 19715N/11695E).	Lower Success Creek or Oonah Fm.	White, light-grey, saccharoidal orthoquartzite with colour-mottled alteration zones (?mineralogy).
C1103	E.L. 42/71-Cheesewood Grid Area (Line 4360 N)	? Oonah Fm.	Weathered, oxidized, micaceous orthoquartzite or quartz-mica schist.
C1104	Cheesewood Grid, Line 4360 N, at 19969N/ 10950E.	? Lower Success Creek Group	Light grey, brown-grey, locally pink, fine-grained micaceous orthoquartzite (?trace pyrite).
C1107	Tallowwood Grid, Line 1480N, at 17540N/ 12441E.	? Crimson Creek Fm.	Black, carbonaceous siltstone-shale. Weak phyllitic texture developed in places.

078

FIELD DESCRIPTIONS OF ROCK CHIP SAMPLES FOR PETROLOGICAL STUDY,ARGENT AREA OF E.L. 42/71 (Continued)

Sample No.	Location	Stratigraphy	Summary Macroscopic Description
C1110	Tallowwood Grid, Line 1480N, at 17499N/ 12838E.	Crimson Creek Fm.	Spheroidal weathered in outcrop; grey, grey-green, very fine-grained, argillaceous (? volcanoclastic) litharenite. Fine-scale bedding is irregularly developed.
C1113	Cheesewood Grid, Line 3160N, at 18950N/ 11030E.	? Lower Success Creek Group	Dark grey, black, weathered to brown, matrix-altered, fine to medium-grained micaceous "proto-quartzite".
C1114	Tallowwood Grid, Line 1960N, at 17965N/ 11537E.	? Lower Success Creek Group	Dark grey, brown, very fine-grained micaceous meta-litharenite?

079

CENTRAL MINERALOGICAL SERVICES

Date 19th February, 1986

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

Job No. CMS 86/2/13 Date Received: 18.2.1986 (Letter)

Reference Letter dated 7.2.1986 - D.A. Evans

Sample No. C 1076

Nature of Sample: Hand Specimen

DESCRIPTION SECTION No. 55435

a. Hand Specimen:

Dark grey, fine-grained sandstone.

b. Microscopic:

This sample represents a mildly altered tuffaceous greywacke with affinities to E 1026.

This rock is weakly bedded on a centimetric scale, and is poorly sorted in the silt to medium sand range. The framework consists largely of basaltic lava clasts, supplemented by clinopyroxene and partly albitised plagioclase grains. Accessories include conspicuous partly martitised clastic magnetite, chlorite pellets and rare quartz grains. The matrix is chloritic and weakly/pervasively leucoxene-stained. Rare ultrafine pyrite grains are present and appear syngenetic in origin.

The mild alteration may be categorised as chloritic and corresponds with the "base", sub- to regional low-grade metamorphic alteration of Crimson Creek Formation labile turbidites. This may be contrasted with the marginal contact-related micaceous assemblage in E 1020.

D. Cowan, B. Sc.

IDENTIFICATION
C 1076
Tuffaceous Greywacke

976080

080
CENTRAL MINERALOGICAL SERVICES

Date 19th February, 1986

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

Job No. CMS 86/2/13 Date Received: 18.2.1986 (Letter)

Reference Letter dated 7.2.1986 - D.A. Evans

Sample No. C 1089

Nature of Sample: Hand Specimen

DESCRIPTION SECTION No. 55436

a. Hand Specimen:

Dark grey, fine-grained sandstone.

b. Microscopic:

This is a mildly altered tuffaceous greywacke, essentially similar to E 1020 and C 1076.

The rock is poorly sorted in the silt to fine sand range and is essentially massive (unbanded), with bedding defined by a weakly dimensionally orientated framework. Clastic components comprise argillically clouded lava clasts and albitic plagioclase grains with subordinate to accessory proportions of quartz, sporadic chert and sericitic pelite clasts, conspicuous fine opaques (ilmenite, hematite, minor magnetite, minor muscovite flakes and sporadic chlorite pellets. The matrix is leucoxene-pigmented, chloritic.

This sediment is relatively polymict in comparison with E 1020 and particularly C 1076, with accessory sediment clasts, mica flakes, and partly felsic intermediate- and volcanic-derived quartz grains. Clinopyroxene is present in traces as corroded (partly chloritised) relics, but is conspicuous in comparison with C 1076.

Alteration is closely analogous to that noted in C 1076, with no tangible contact effects.

D. Cowan, B. Sc.

IDENTIFICATION
C 1089
Tuffaceous Greywacke

976081

081

CENTRAL MINERALOGICAL SERVICES

Date 19th February, 1986

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

Job No. CMS 86/2/13 Date Received: 18.2.1986 (Letter)Reference Letter dated 7.2.1986 - D.A. EvansSample No. C 1091Nature of Sample: Hand SpecimenDESCRIPTION SECTION No. 55437

a. Hand Specimen:

Green-grey, altered "dolerite".

b. Microscopic:

This rock may be classified as an altered microgabbro.

Major mineralogy comprises pervasively sericite-saussurite-altered plagioclase laths, essentially fresh augite and disseminated chlorite-pseudomorphed olivine. Accessories comprise chloritised diallagic orthopyroxene, extensively leucoxised opaques, traces of pyrrhotite, a sparse chloritic mesostasis, and rare flakes of Ti-biotite.

Texturally, this rock is medium-grained (hence micro-). The coarse mesoscopic appearance reflects the ferromag constituents, with the rock primarily porphyritic in olivine, and to a certain degree the sub- to ophitic clinopyroxene.

Pyrrhotite is concentrated in the secondary chlorite aggregates, which locally include a little talc. Alteration is of deuteric character, although no doubt enhanced by low-grade metamorphic effects.

This rock may represent a minor to medium-scale intrusive or, alternately, the core zone of a thick flow, dependent on field relationships. General features are consistent with the Cambrian "dolerites", although the presence of (altered) olivine is a little unusual.

D. Cowan, B. Sc.

IDENTIFICATION

C 1091

Altered Microgabbro

976082

082

CENTRAL MINERALOGICAL SERVICES

Date 20th February, 1986

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

Job No. CMS 86/2/13 Date Received: 18.2.1986 (Letter)Reference Letter dated 7.2.1986 - D.A. EvansSample No. C 1100Nature of Sample: Hand SpecimenDESCRIPTION SECTION No. 55441

a. Hand Specimen:

Grey, carbonaceous, silty pelite.

b. Microscopic:

This sample represents a deformed but essentially unaltered sericitic pelite.

Major mineralogy comprises semi- to sericitic white mica with subordinate to minor closely intergrown microcrystalline quartz and varying proportions (< 1 - 10 %) of fine silt-sized detrital quartz. Accessories comprise thinly disseminated detrital muscovite flakes, chloritised biotite flakes, carbonaceous matter, and detrital leucoxenic semi-opaques.

This rock exhibits contorted to segmented sub- to fine millimetric-scale bedding laminations and grades into a sericitic shale-matrixed breccia. Deformation appears to reflect intraformational slumping, but detail is obscured by mild shearing and associated secondary brecciation effects. The sediment is well-lithified, but devoid of tangible contact alteration effects. The rock is non-dolomitic and represents a primarily planar-bedded alternation of (quartzose-micaceous) silty and relatively massive shale.

D. Cowan, B. Sc.

IDENTIFICATION

C 1100

Sericitic Pelite

976083

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

Job No. CMS 86/2/13 Date Received: 18.2.1986 (Letter)

Reference Letter dated 7.2.1986 - D.A. Evans

Sample No. C 1101

Nature of Sample: Hand Specimen

DESCRIPTION SECTION No. 55438

a. Hand Specimen:
Green-grey amygdaloidal ?basalt.

b. Microscopic:
This sample represents an amygdaloidal altered basalt and may be correlated with the minor Onah Formation basic volcanics in terms of petrological characteristics.

The millimetric-scale, flow-orientated amygdales are chloritic, with subordinate partly recrystallized chalcedonic quartz and minor calcite. These are enclosed in a typical "basaltic"-textured lava comprising albitised semi- to felted plagioclase microlaths with a chloritic (primarily ?glassy) mesostasis. Minor pyroxene laths are represented by leucoxenic chlorite-stained cloudy carbonate clots. Accessory leucoxenised fine-grained opaques are conspicuous throughout.

This rock exhibits minor flow-brecciation features. Amygdales include accessory traces of fine-to ultrafine-grained pyrite, concentrated as spongy films and clots in the relatively siliceous and calcitic types. Incipient stress effects are evident, with occasional chloritic microfractures.

D. Cowan, B. Sc.

IDENTIFICATION
C 1101
Amygdaloidal Basalt

084

CENTRAL MINERALOGICAL SERVICES

Date 20th February, 1986

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

Job No. CMS 86/2/13 Date Received: 18.2.1986 (Letter)

Reference Letter dated 7.2.1986 - D.A. Evans

Sample No. C 1102

Nature of Sample: Hand Specimen

DESCRIPTION SECTION No. 55439

IDENTIFICATION

C 1102

Carbonaceous, Sericitic
Orthoquartzite

a. Hand Specimen:

Grey/locally mottled white, fine-grained quartzitic sandstone.

b. Microscopic:

The rock may be classified as a carbonaceous sericitic orthoquartzite.

The rock is weakly banded on a millimetric to centimetric scale and is well-sorted in the fine sand range. The framework consists of subangular to rounded quartz with accessory sericitic pelite and impure (sericitic) chert clasts, thinly disseminated muscovite flakes, detrital tourmaline grains and rare zircons. Cement comprises overgrowth quartz and intergranular clots and films of sericite.

The mottled colouration reflects the distribution of carbonaceous matter, concentrated in the sericite matrix/cement and, to a lesser degree, the sericitic pelite clasts. Carbonaceous matter is bleached within the irregular whitish zones. Marginal to these areas the rock reflects partial ferruginisation of the clay fraction. Ferruginised zones grade into and include patchy relics of the original, strongly carbonaceous sandstone (the mesoscopically dark grey-black bands, zones).

Bleaching and ferruginisation appear related to a network of microfractures locally healed with microcrystalline/semi-fibrous secondary quartz. There are no tangible, strictly hydrothermal or contact-alteration effects. Limonite stainings appear entirely exotic (i.e. introduced) in the absence of detectable oxidised sulphide or degraded carbonate.

D. Cowan, B. Sc.

976085

085

CENTRAL MINERALOGICAL SERVICES

Date 20th February, 1986

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

Job No. CMS 86/2/13 Date Received: 18.2.1986 (Letter)

Reference Letter dated 7.2.1986 - D.A. Evans

Sample No. C 1103

Nature of Sample: Hand Specimen

DESCRIPTION SECTION No. 55440

a. Hand Specimen:

Buff-grey, ferruginous, fine quartzitic sandstone.

b. Microscopic:

This may be classified as a ferruginised micaceous protoquartzite. The rock is lithologically similar to C 1102, but carries a higher proportion of lithic clasts and is relatively poorly sorted.

The framework is weakly banded on a millimetric scale and is poorly sorted in the silt to medium sand range. The major clastic component is angular to subangular quartz with a minor proportion of well-rounded grains. The subordinate lithoclastic component comprises sericitic pelite, quartzose-silty pelite, impure chert, and minor ferruginised, weakly dolomitic chert clasts. Accessories include muscovite flakes and a minor heavy mineral assemblage of tourmaline, oxidised/leucoxenised opaques, and rare zircons.

The cement consists of Fe-stained to ferruginised very fine to sericitic mica, supplemented by minor overgrowth quartz, and is weakly carbonaceous.

Sporadic quartz veinlets carry spongy clots of limonite representing degraded and ferruginised mica. The rock as a whole appears to reflect weak micaceous alteration ("biotitisation"), but finer detail is obscured by the pervasive secondary ferruginisation effects.

D. Cowan, B. Sc.

IDENTIFICATION
C 1103
Ferruginised, Micaceous Protoquartzite

976086

Sample No.	Classification - Composition	Fabric	Accessories	CENTRAL MINERALOGICAL SERVICES Comments
C 1083 (T.S. 55864)	<u>Tuffaceous Greywacke</u> . Framework of chloritic/poorly determinate lava clasts, subordinate albitised shard fragments and feldspar grains, weakly chloritic augite and minor quartz grains. <i>Leucoxenic chlorite matrix</i> .	Incipiently banded silty, fine sandy "turbiditic". Very incipiently sheared.	Minor clasts of carbonaceous pelite. Minor traces detrital magnetite. Rare ultrafine pyrite.	Turbiditic, weakly carbonaceous pelite. Intraclastic silty fine sandstone with distinct weakly reworked tuffaceous characteristics, consistent with the minor lower Success Creek tuffs. 0386
C 1096	<u>Ferruginised Breccia</u> . Clasts of extensively weathered/ferruginised, variably Mg-oxide-impregnated "tuffaceous greywacke", carbonaceous pelite, minor quartz grains. Matrix of fine-grained quartz.	Random to semi-orientated, submillimetric- to centimetric-scale angular clasts; weakly crustiform matrix.	Sporadic irregular vugs, veinlets of degraded/ferruginised carbonate.	Vein-type, quartz-cemented tectonic breccia. Clasts are dominantly Crimson Creek Formation turbiditic types with subordinate poorly diagnostic pelite. Cement is essentially unaltered.
C 1104	<u>Sericitic Orthoquartzite</u> . Framework of silt- to fine sand-sized, sub- to rounded quartz grains, relatively minor sericitic clay pellets, minor muscovite flakes. Overgrowth quartz/intergranular microcrystalline quartz.	Well-sorted, incipiently bedded silty fine sandstone. Incipiently stressed. Sericite cement.	Carbonaceous pelite clasts, detrital leucoxenic semi-opaques. Minor quartz veinlets. Irregular limonitic stainings.	Fine-grained impure (sericitic, weakly carbonaceous) orthoquartzite. Typical lower Success Creek Group characteristics. Unaltered apart from quartz veinlets.
C 1107	<u>Carbonaceous Psammopelite</u> . Loose framework of subangular to rounded quartz grains, sericitic/variably carbonaceous shale, minor quartzose silty shale and impure chert clasts. Carbonaceous quartzose-micaceous silty shale.	Weakly bedded fine sandy silty shale with an incipient low-angle discordant slaty cleavage.	Conspicuous fine to ultrafine syngenetic pyrite. Minor detrital leucoxenic semi-opaques.	Carbonaceous-pyritic, quartzose-micaceous psammopelite. Entirely devoid of labile constituents. Typical Success Creek Group characteristics.
C 1110	<u>Altered Labile Siltstone</u> . Framework of pervasively chloritic/sideritic carbonate-stained silt-sized lithic clasts, minor albite and quartz grains. Carbonate-stained leucoxenic chlorite matrix.	Submillimetric to microlaminated/chloritic argillaceous siltstone-parted silty clastic.	Traces fine silt-sized clastic magnetite. Traces very fine to ultrafine pyrrhotite.	Pervasively chlorite-carbonate-altered labile siltstone. Distal well sorted "tuffaceous" turbiditic facies. Crimson Creek Formation characteristics.
C 1113	<u>Carbonaceous Protoquartzite</u> . Framework of subangular to subround quartz grains, subordinate variably carbonaceous sericitic pelite clasts. Overgrowth quartz/intergranular carbonaceous sericite cement.	Essentially unbedded ("massive"), moderately sorted (fine to medium) sandstone.	Detrital muscovite flakes, leucoxenic semi-opaques, rare tourmaline, zircon. Minor limonite stainings.	Affinities with C 1104, coarser-grained, relatively lithoclastic and carbonaceous in comparison. General features consistent with lower Success Creek Group.
C 1114 (T.S. 55870)	<u>Sericitic Pelite</u> . Semi- to sericitic white mica with pervasively disseminated silt-sized quartz grains, subordinate partly degraded biotite flakes, minor sericitised/poorly determinate lithic clasts.	Weakly banded silty shale with a weak concordant slaty cleavage.	Oxidised/leucoxenised clastic opaques. Minor fine-grained metamorphic biotite.	Quartzose-micaceous silty pelite with conspicuous relict detrital biotite flakes (semi-characteristic of lower Success Creek Group).
				976087

APPENDIX IV

E.L. 42/71 (WEST) - ARGENT AREA

ROCK CHIP SAMPLES (WITH ANALYSIS RESULTS)

EXPLORATION SAMPLE REGISTER - ROCK CHIP SAMPLES FOR GEOCHEMICAL ANALYSIS (ARGENT AREA, E.L. 42/71)

SAMPLE NO.	SAMPLE LOCATION			LITHOLOGICAL DESCRIPTION		CHEMICAL ANALYSIS (in ppm, unless shown)									
	GRID	N	E	STRATIGRAPHY	LITHOLOGY	Sn	S	As	Cu	Pb	Zn	Ag	W _{o3}	Bi	Sol.Sn.
C1075	R.M.G.	16643	13735	?Fault/Vein	Limonite/goethite with limonite ochre.	230	0.2%	750	480	14000	16100	100	70	<5	N/A
C1077	R.M.G.	18561	13521	?Fault/Vein	Limonite/goethite with quartz and ? manganese oxides.	<10	0.2%	40	120	60	125	<1	20	<5	<100
C1078	R.M.G.	20446	12961	No. 2 Horizon	Light brown-orange to white, colloform chalcedonic silica, with crystalline quartz and remnant karst-weathered textures.	<10	0.2%	20	10	<10	10	<1	10	10	<100
C1079	R.M.G.	20398	12950	? No. 2 Horizon	Quartz with goethite/limonite (float).	<10	0.2%	60	60	60	120	<1	<10	<10	<100
C1080	R.M.G.	19785	12660	?Fault/Vein	Black limonite/goethite/manganese oxides.	20	1.8%	20	60	2660	7800	8	<10	<10	<100
C1081	R.M.G.	17825	10830	? Qrf	Pisolitic limonite/goethite (from surficial deposit, in swampy drainage low).	<10	<0.1%	<10	30	30	170	<1	<10	<10	<100
C1082	R.M.G.	20200	10460	?Fault/Vein	Quartz-veined lithic-fragment breccia, with visible sphalerite and trace pyrrhotite. Sample probably of ore dropped from tram wagon.	200	4.7%	50	500	210	18.5%	26	610	<10	200
C1083	R.M.G.	20200	10460	Lower Success Creek Group (or Oonah Fm.)	Green, fine-grained, chlorite-altered tuffaceous greywacke. Minor traces of detrital magnetite.	<10	0.05%	<10	130	<10	320	<1	<10	<10	<100
C1084	R.M.G.	17103	12864	? Qrf	Massive to pisolitic limonite/goethite with ? manganese oxides. Tallowood Grid - Line 1000 N.	50	<0.1%	270	30	1030	10600	2	20	<10	<100
C1085	R.M.G.	16661	13999	?Fault/Vein	Locally massive goethite/limonite.	200	<0.1%	320	145	3.0%	3.3%	33	180	<10	100

NOTES - R.M.G. = Renison Mine Grd

N/A = Not Assayed

088

976089

EXPLORATION SAMPLE REGISTER - ROCK CHIP SAMPLES FOR GEOCHEMICAL ANALYSIS (ARGENT AREA, E.L. 42/71)

SAMPLE NO.	SAMPLE LOCATION			LITHOLOGICAL DESCRIPTION		CHEMICAL ANALYSIS (in ppm, unless shown)									
	GRID	N	E	STRATIGRAPHY	LITHOLOGY	Sn	S	As	Cu	Pb	Zn	Ag	W _{o3}	Bi	Sol.Sn.
C1086	R.M.G.	16806	13817	?Fault/Vein	Goethite/limonite, with manganese oxides (from outcrop of sheared Crimson Creek Fm.).	40	<0.1%	20	80	1460	2310	1	<10	<10	<100
C1087	R.M.G.	17305	12843	? Qrf	Pisolitic limonite/goethite. Tallowood Grid - Line 1240N.	30	<0.1%	30	105	160	770	<1	<10	<10	<100
C1088	R.M.G.	17660	12000	? Qrf	Pisolitic limonite/goethite. Tallowood Grid - Area Between Lines 1480N and 1720 N.	50	<0.1%	<10	15	60	3000	<1	<10	<10	<100
C1090	R.M.G.	17095	12890	? Qrf	Massive to pisolitic, black to dark brown limonite/goethite, with orange-brown limonite ochre. Tallowood Grid Line 1000 N.	17	<0.1%	134	335	3990	5040	5	60	<10	<100
C1092	R.M.G.	16999	14032	?Fault/Vein	Massive limonite/goethite, with botryoidal goethite in vughs (boxworks); minor quartz and iron-stained chalcedonic silica.	63	<0.1%	153	125	4410	16200	9	107	<10	<100
C1093	R.M.G.	17357	13613	Fault	Lithic fragment-filled breccia with vughy limonite/goethite: 15-20cm thick zone.	26	0.2%	62	35	490	1750	3	29	<10	<100
C1094	R.M.G.	17129	13683	?Fault/Vein	Vughy limonite/goethite, with ? manganese oxides.	28	<0.1%	117	90	2100	8800	8	78	<10	<100
C1095	R.M.G.	17488	13160	?Fault/Vein	Quartz, limonite/goethite (massive to vughy - float sample). Tallowood Grid - Line 1480 N.	145	<0.1%	207	275	1620	18700	12	136	10	<100
C1096	R.M.G.	17521	13517	Fault	Quartz-matrixed, lithic fragment tectonic breccia (with clasts of tuffaceous greywacke, derived from the Crimson Creek Fm.).	23	0.2%	192	330	1810	3340	8	25	<10	<100
C1097	R.M.G.	17726	13326	Fault/Vein	Quartz/goethite, with vughy quartz, minor crystalline quartz, from 20cm thick fault zone.	4	0.1%	21	100	60	90	1	<5	<10	<100

976090

082

EXPLORATION SAMPLE REGISTER - ROCK CHIP SAMPLES FOR GEOCHEMICAL ANALYSIS (ARGENT AREA, E.L. 42/71)

090

SAMPLE NO.	SAMPLE LOCATION			LITHOLOGICAL DESCRIPTION		CHEMICAL ANALYSIS (in ppm, unless shown)									
	GRID	N	E	STRATIGRAPHY	LITHOLOGY	Sn	S	As	Cu	Pb	Zn	Ag	W ₃	Bi	Sol.Sn.
C1098	R.M.G.	17716	13391	?Fault/Vein	Goethite, minor quartz, infilling irregular fine fracture (<10cm thick).	<3	0.1%	22	260	<10	110	<1	<5	<10	<100
C1099	R.M.G.	20325	11582	?Fault/Vein	Limonite/goethite. Argent Grid Baseline - 4810N.	9	0.1%	<5	90	730	490	1	55	10	<100
C1105	R.M.G.	17544	11978	?Fault/Vein	Vughy limonite/goethite, with quartz fragments. Tallowwood Grid - Line 1480N.	18	0.86%	4	925	10	1220	1	<5	<10	<100
C1106	R.M.G.	17528	12462	Qrf	Pisolitic limonite/goethite Tallowwood Grid - Line 1480N.	15	0.79%	28	75	340	305	<1	73	<10	<100
C1108	R.M.G.	17446	12647	Fault/Vein	Vughy quartz-matrixed, lithic fragment breccia (float/sub-outcrop). Tallowwood Grid - Line 1480N.	72	<0.1%	67	108	690	1915	3	8	<10	<100
C1109	R.M.G.	17510	12735	Fault/Vein	Black, botryoidal limonite/goethite with sparse limonitic ochre and scattered clear quartz crystals. Tallowwood Grid - Line 1480N.	13	<0.1%	23	205	8685	980	23	18	<10	<100
C1111	R.M.G.	17500	12911	Qrf	Pisolitic limonite/goethite. Tallowwood Grid - Line 1480N.	147	0.97%	<5	83	120	395	1	80	<10	<100
C1112	R.M.G.	17310	12713	?Fault/Vein	Locally botryoidal and vughy limonite/goethite, with minor skeletal quartz. Tallowwood Grid - Line 1240N.	14	<0.1%	580	58	220	2970	2	60	<10	<100
C1115	R.M.G.	20766	11267	Qrf	Pisolitic limonite/goethite, with limonitic ochre. Cheesewood Grid - Line 5320N.	30	0.2%	20	10	40	50	<1	20	<10	<100

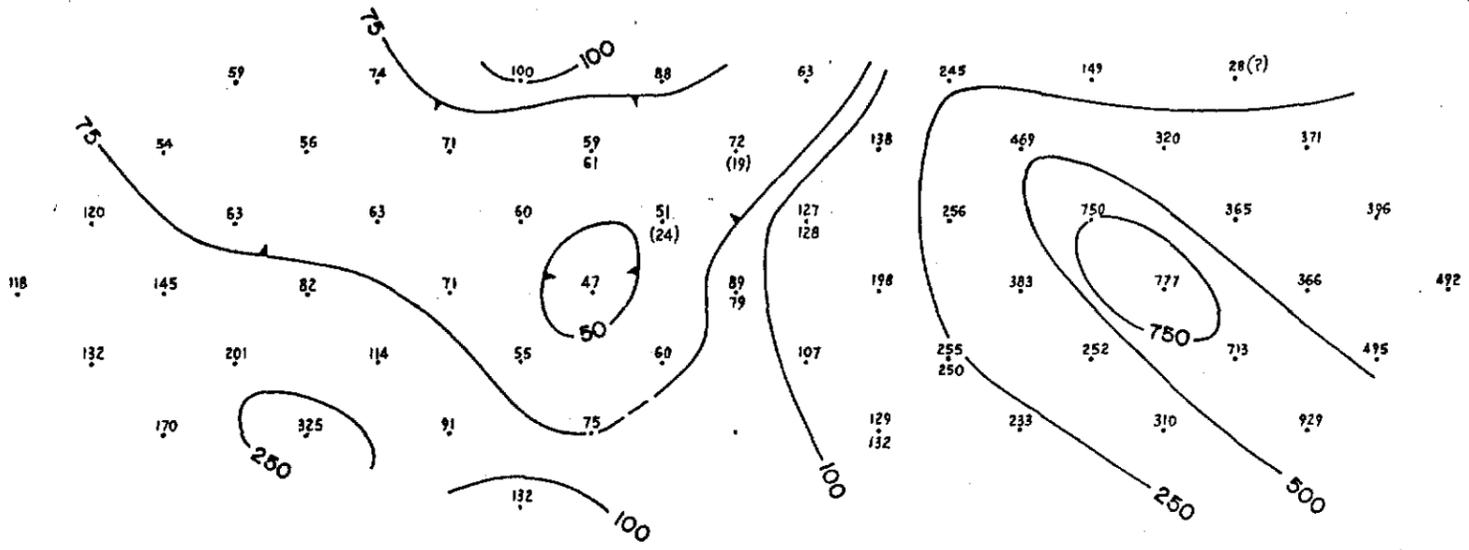
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091

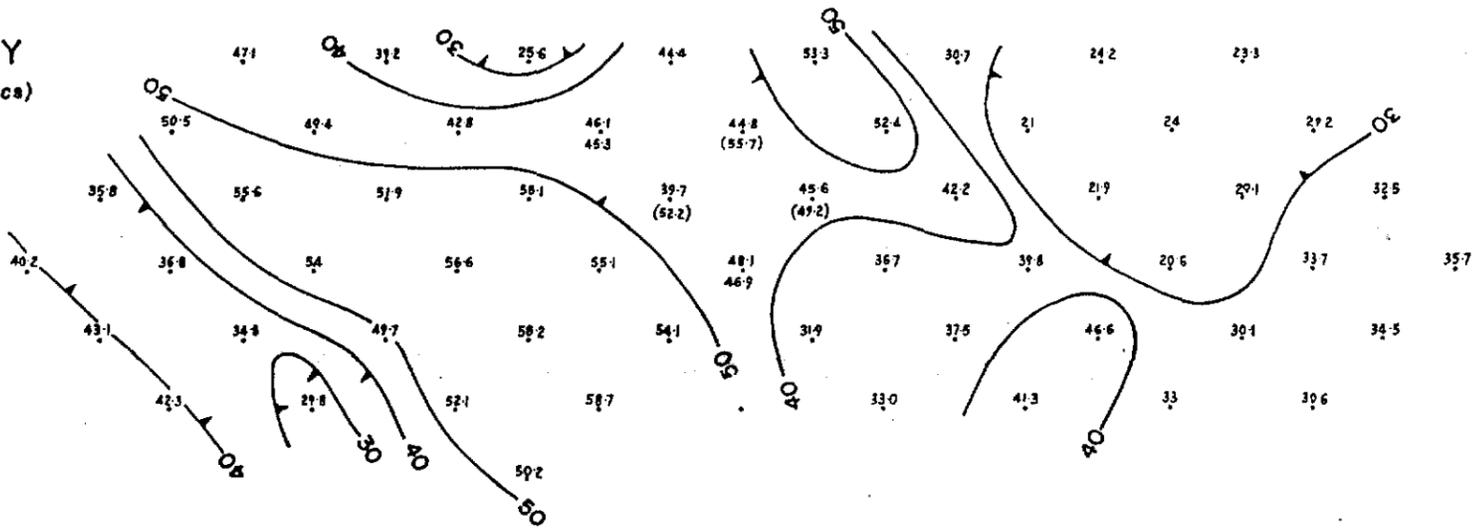
1650 E 1700 E 1750 E 1800 E 1850 E 1900 E 1950 E 2000 E 2050 E 2100 E 2150 E position

(arbitrary)
Transmitting
dipole nos.

RESISTIVITY
ohm - m

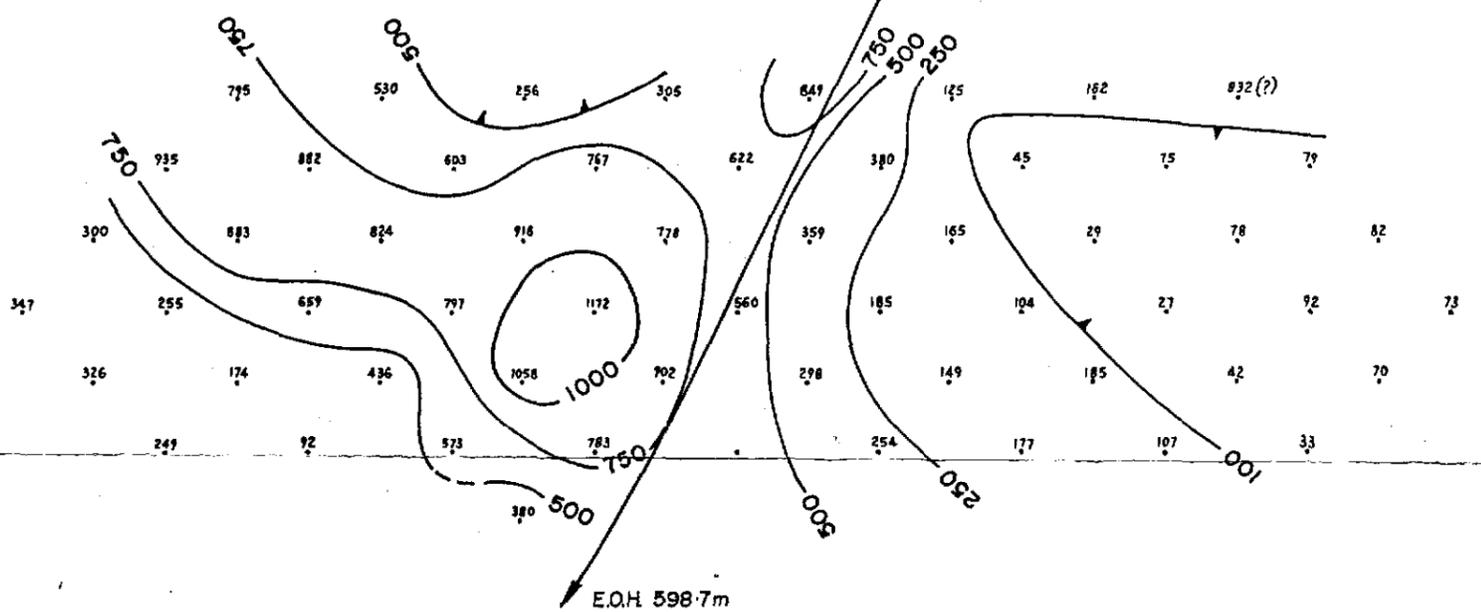


CHARGEABILITY
(50 msec - 1550 msec)



DDH S1200

METAL
FACTOR



976092

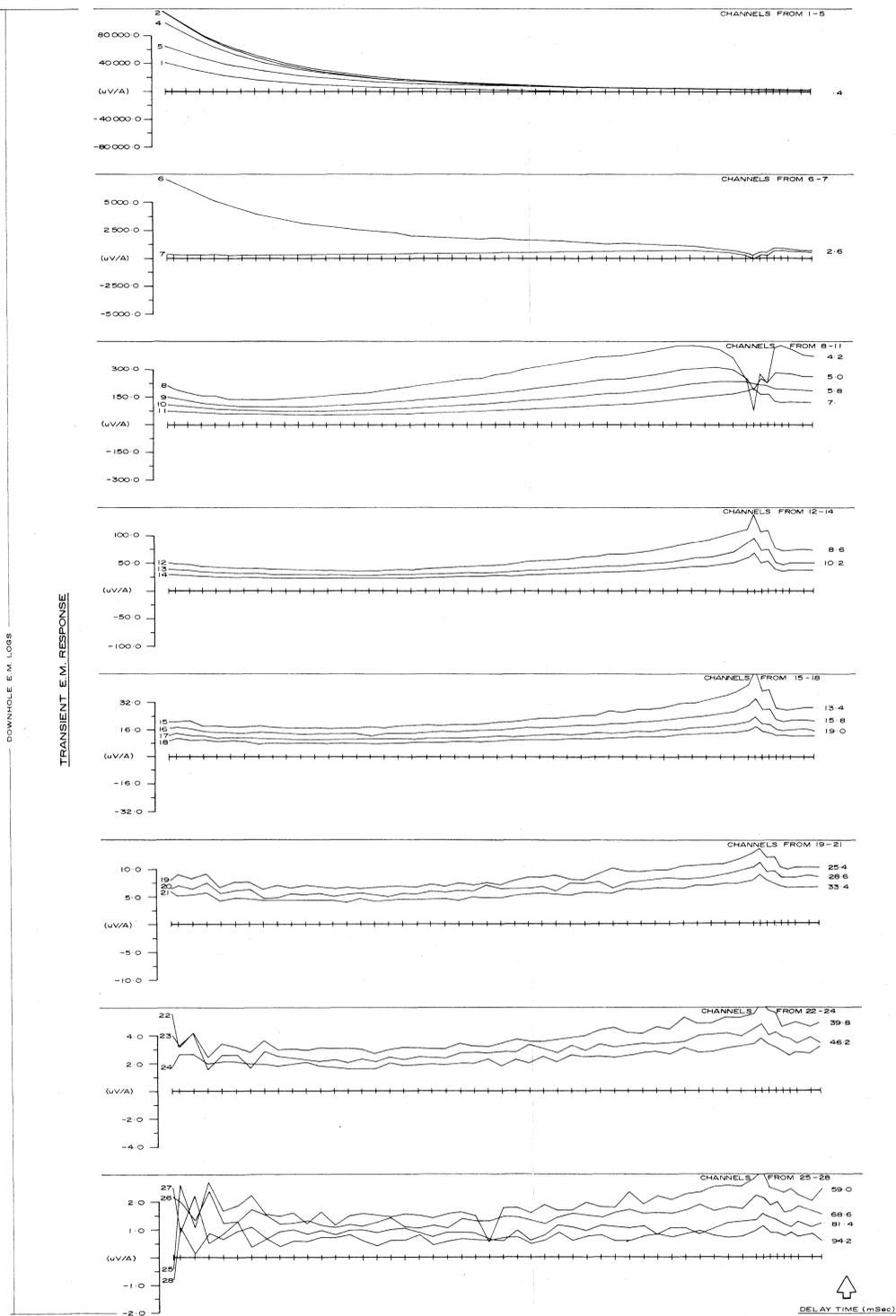
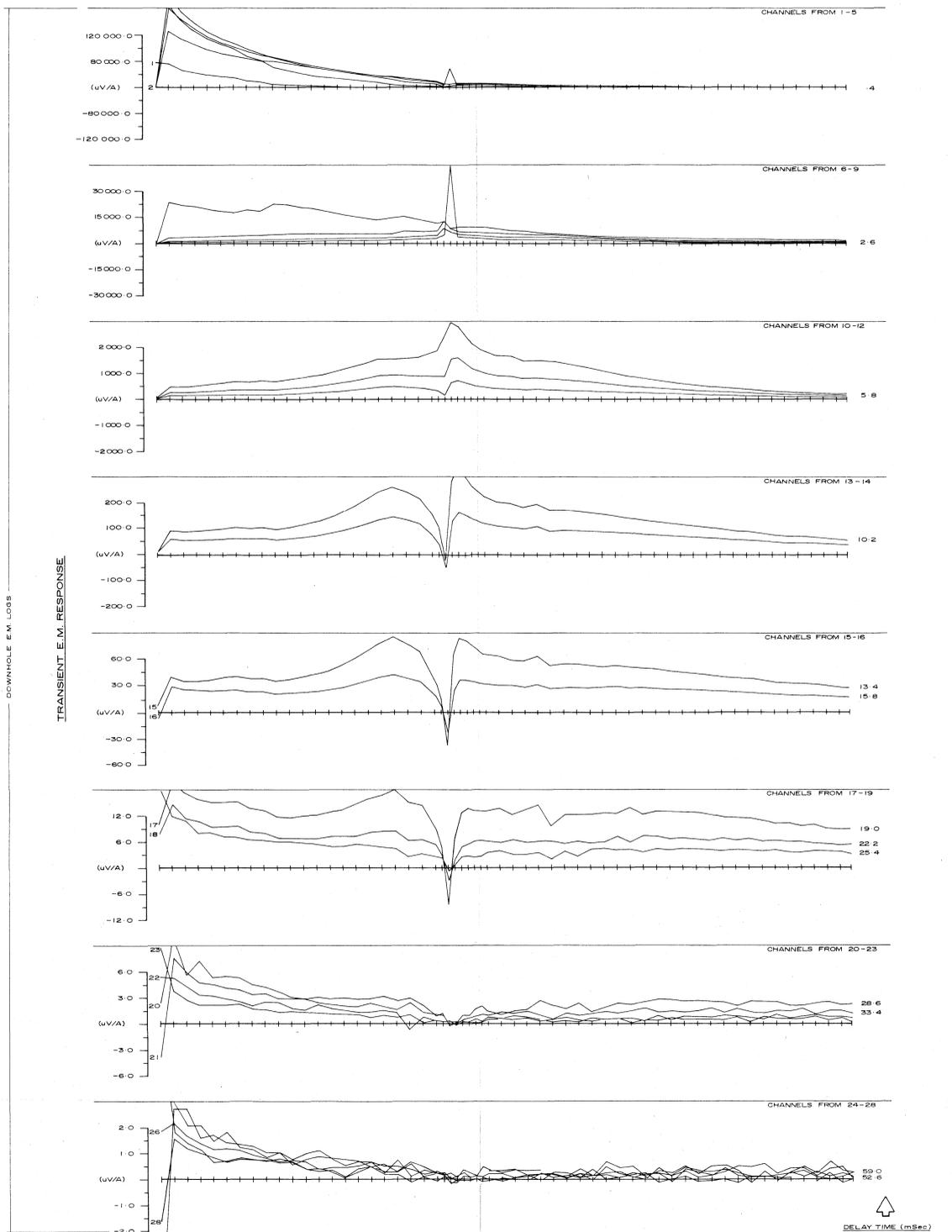
86-2605

Survey by : Mitre Geophysics
 Date : August, 1985
 Receiver : Hunter MkIV, 8 sec period:
 50 msec delay, 150 msec window

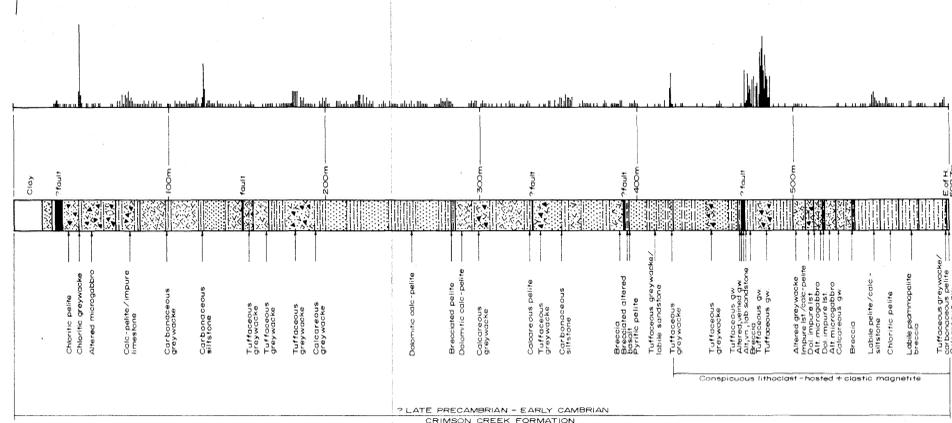
5 cm

Ref: RN/MG85/08

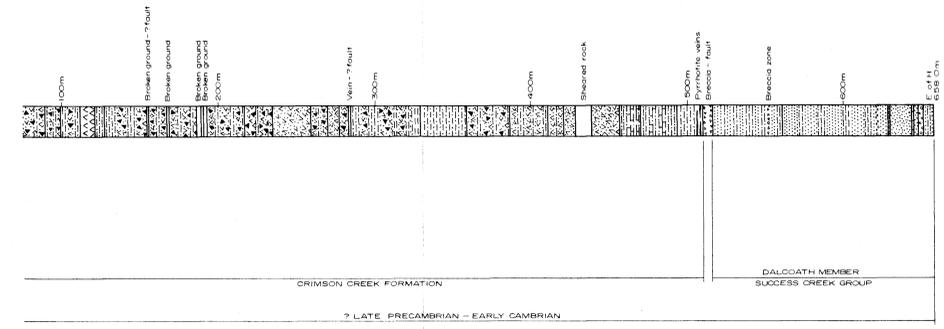
RENISON LIMITED	
Dunkley Fault Grid	DRAWN BY : J.B.
DIPOLE-DIPOLE IP	DRAFTSMAN: T.G.D.S
Line 620S	DATE : Aug 85
	REVISIONS :
	FILE NO.
SCALE 1:2500	PLAN N° 1



MAGNETIC SUSCEPTIBILITY (cgs units, uncorrected)



GEOLOGICAL LOG



LEGEND

DOWNHOLE E.M. LOGS
 Logging was completed by SOLO GEOPHYSICS, using SIROTEM medium power (96V, at 10 amps DC) instrumentation. A slim-line (25mm diameter) probe was used, with readings taken at 5 or 10m intervals, as shown on logs.
 Other details of survey -
 i) S1200: Date of survey - 19/12/85
 Loop size - 200m x 200m (from 500S/1800E to 200S/2000E then to 100S/2000E and 100S/1800E and back to origin - D.F.G. co-ords.)
 ii) S1207: Date of survey - 20/12/85
 Loop size - approx. 250m x 250m (laid out using compass and Topofil heichain)

MAGNETIC SUSCEPTIBILITY

INSTRUMENT: Elliot Magnetic Susceptibility Meter (Model S/N, PP-2A 128)
 READINGS TAKEN AT: 1m intervals (down to 0.2 - 0.5m intervals in anomalous zones)
 NOTE: Magnetic property measurements conducted by CSIRO (July, 1985) suggest that readings from core should be corrected by a factor of 1/2, to allow for volume of sample.

GEOLOGY

LITHOLOGY (field description)
 Gabbro, microgabbro
 Claystone, mudstone
 Siltstone
 Calcareous siltstone
 Sandstone
 Greywacke
 Tuff
 Granite to pebble conglomerate

NOTE: Lithological descriptions, from thin section studies (Central Mineralogical Services), are shown at sample depths, below geological log.

86-2605 976093

RENISON LIMITED

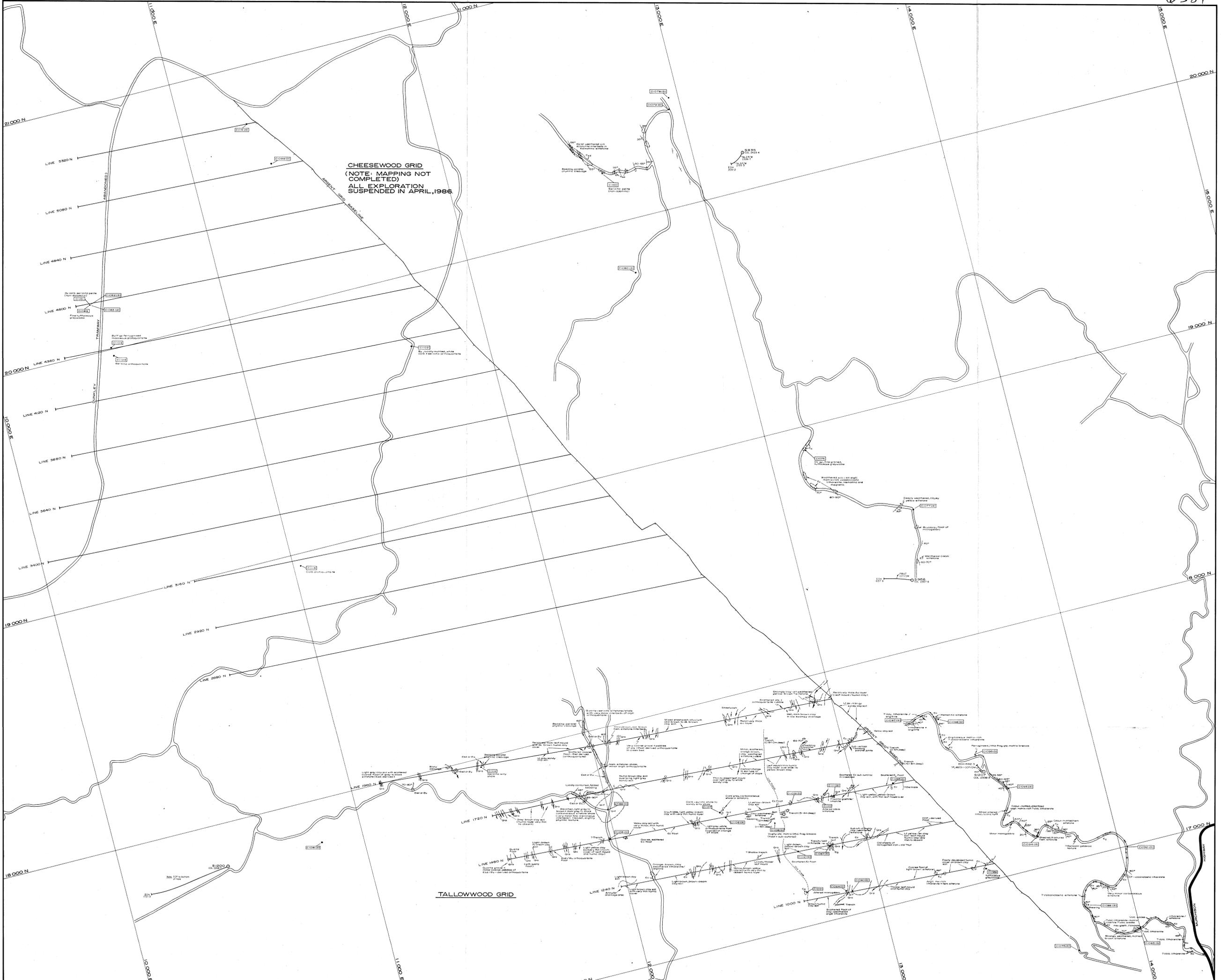
SCALE 1:2000

DUNKLEY FAULT GRID AND SERPENTINE HILL AREA

DRILLHOLES S1200 AND S1207 SIROTEM DHEM LOGS

DATE: **SEPT, 1986**
 REVISION: **6386**

PLAN No. 2



LEGEND

ACCESS

- MURCHISON HIGHWAY (SEALED)
- VEHICULAR TRACK (UNSEALED, GENERALLY 4-WHEEL DRIVE STANDARD)
- OLD MINE ACCESS PACK-TRACK
- ARGENT GRID BASELINE (NOTE: ORIGINAL BASELINE ACCURATELY SURVEYED; LINE RE-CLEARED AND RE-DESIGNED IN NOV. 1985; NORTHERN SECTION THROUGH BURNT-OUT AREA, RE-CUT)
- CROSSLINE, TALLOWWOOD GRID AND CHEESEWOOD GRID (NOTE: LINES IN NOV. 1985 - FEB. 1986; LINES WERE MARKED OUT USING TOPOGRAPHIC, HELICOPTER AND COMPASS; ON 24° MAGNETIC BEARINGS; LOCATION OF LINES APPROX. ONLY)

SAMPLE TYPES

ROCK CHIP SAMPLE FOR PETROLOGICAL STUDY (WITH SUMMARY PETROLOGICAL DESCRIPTION)

ROCK CHIP SAMPLE FOR GEOCHEMICAL ANALYSIS (RESULTS SHOWN IN APPENDIX II OF REPORT)

GEOLOGY

Q10 Alluvium - silt, sand, minor gravel - stream channel and swamp deposits

Q11 Placidic (massive) siltstone, with limonite oxide - surficial deposits, possibly derived from weathering of mafic intrusives

CRIMSON CREEK FORMATION

SUCCESS CREEK GROUP

Ec Fine to locally coarse-grained, buff to grey, micaceous siltstone (interbedded argillaceous matrix with, volcanoclastic litharenite), with conspicuous detrital magnetite; minor hematitic siltstone, turf and gabbro

Ec/Ps Indurated quartz and limonite sandstone (porphyroclastic) with interbedded, sericitic siltstone-shale; minor mottled brown, hematitic siltstone-shale

Outcrop - sub-outcrop

Strike of bedding (with measured dip)

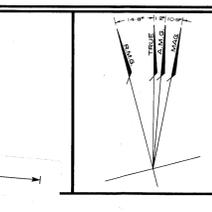
Strike of bedding - concordant, locally phyllitic cleavage (with measured dip)

Strike of joint (with measured dip)

Fault (with measured dip)

Diamond drill hole (with plan trace, hole no., collar and E of N.R.L.s and summary of geology intersected)

Stream, creek drainage channel



RENISON LIMITED

SCALE 1:5,000

100 200 300 400 500m

SEOLOGIST: D.A.E.

DRAUGHTSMAN: R.F.P.

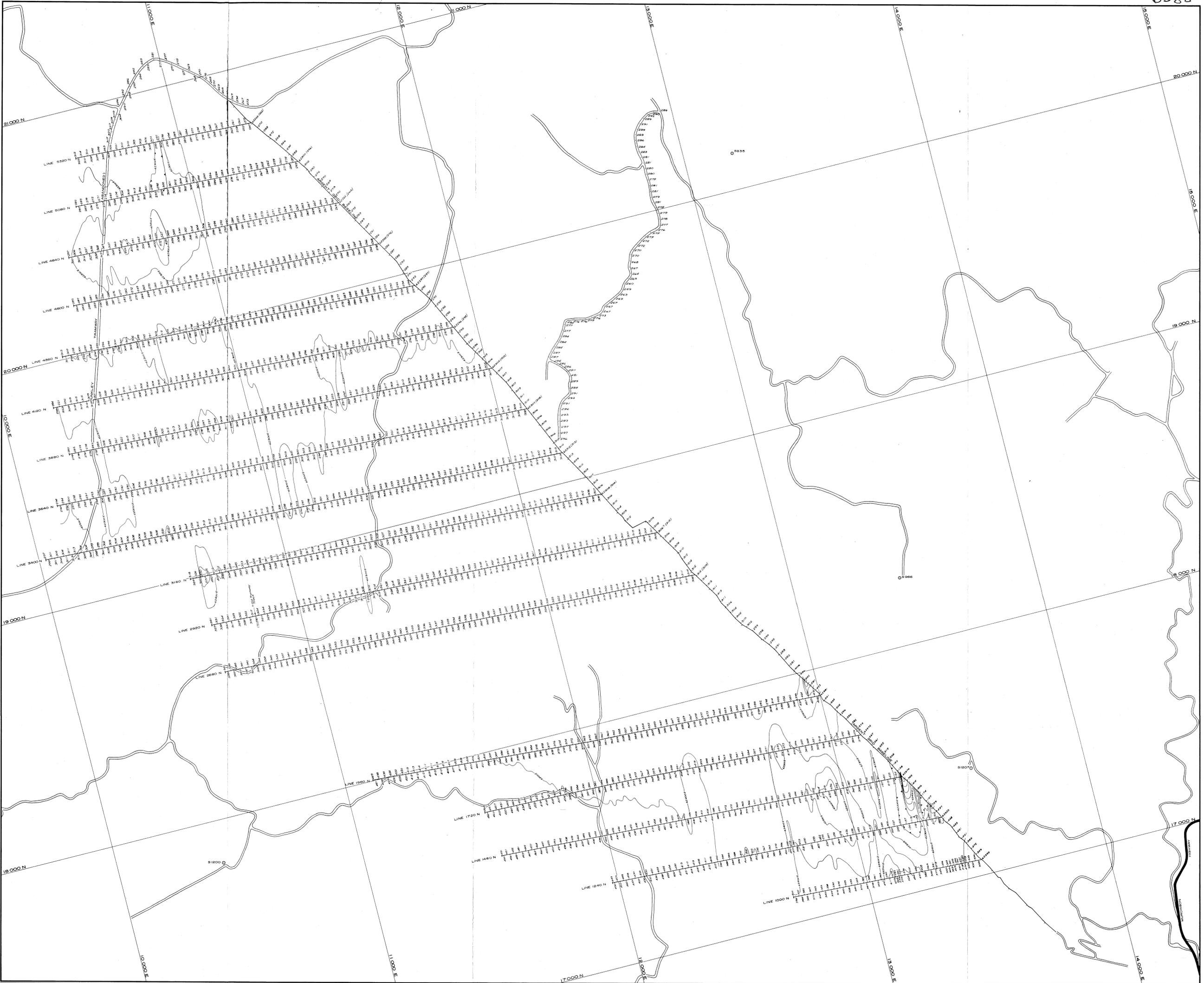
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DATE: SEPT., 1986

REVISED: []

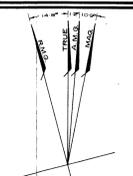
E.L. 42/71 (ARGENT SECTION) TALLOWWOOD AND CHEESEWOOD GRIDS FACT GEOLOGY (AND SAMPLE LOCATIONS)

6387 PLAN N° 3

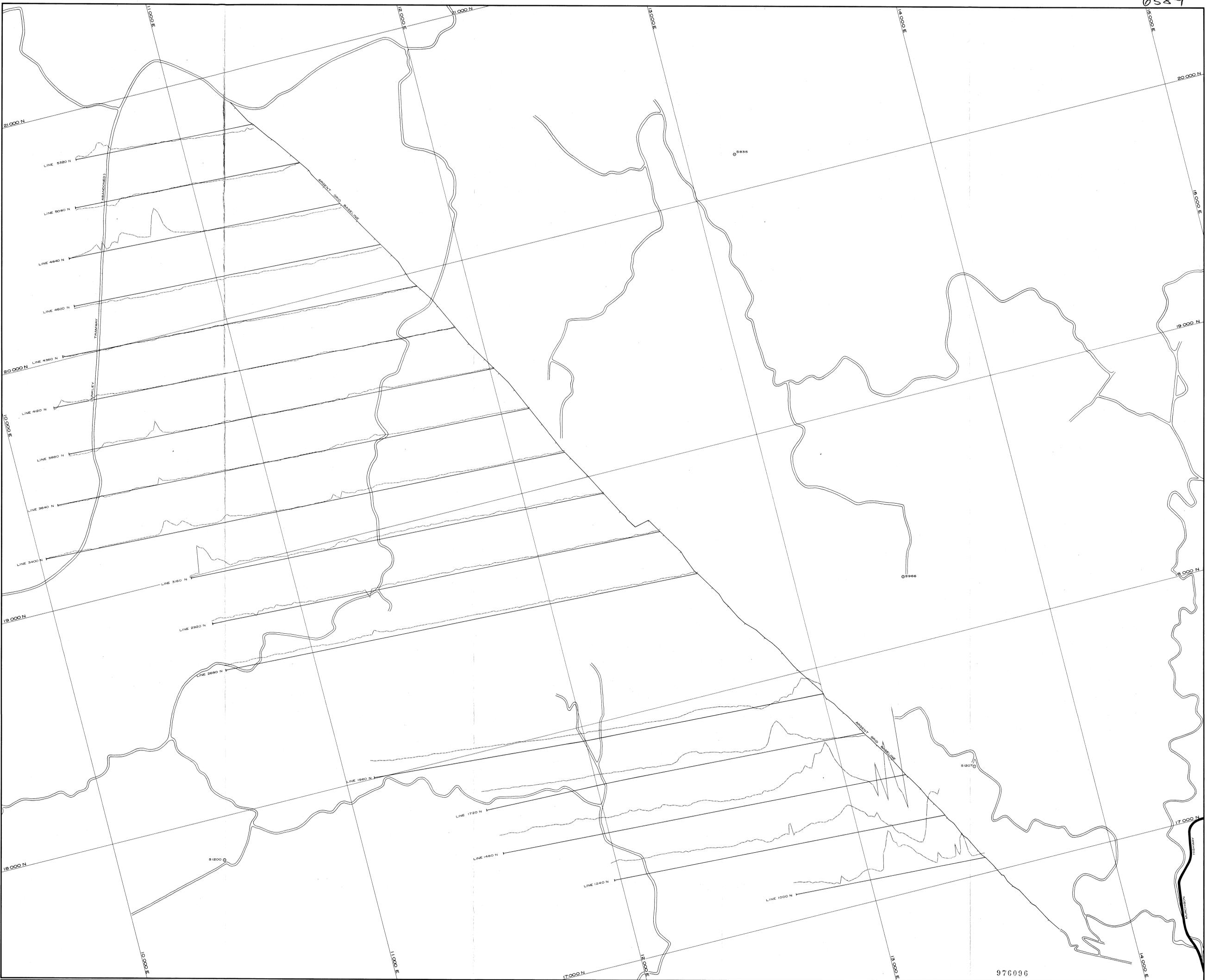


LEGEND:
GROUND MAGNETICS:
 * TOTAL MAGNETIC FIELD VALUE (3 READING AVERAGE). READINGS TAKEN ROUTINELY AT 12.5m SPACINGS; CLOSER SPACINGS IN ANOMALOUS AREAS.
 o REPEAT VALUE AT 25m SPACINGS (3 READING AVERAGE), TAKEN AT DIFFERENT TIME FROM ORIGINAL SURVEY.
 NOTE: MAGNETOMETER SENSOR ORIENTED TO NORTH AND HELD APPROX. 3m ABOVE GROUND.
 ALL READINGS REDUCED TO VALUE OF BASE STATION (62 300 ±). BASE STATION FOR SURVEY IS AT 19 810N / 11 705E (R.M.G.)
INSTRUMENTATION:
 ROVING MAGNETOMETER - GEOMETRICS 0986/9826A (N° 6265)
 BASE STATION MAGNETOMETER - AUSTRAL PPM-305 (N° 535),
 READING AT 30 SEC. INTERVALS.

5 cm



RENISON LIMITED	
100 200 300 400 500m SCALE 1:5 000	
GEOLOGIST: S.C.E. DRAUGHTSMAN: R.F. CHECKED: DATE: SEPT, 1986 REVISED:	E.L. 42 / 71 (ARGENT SECTION) TALLOWOOD AND CHEESEWOOD GRIDS TOTAL FIELD GROUND MAGNETICS (CONTOURS)
6388	PLAN N° 4



LEGEND:

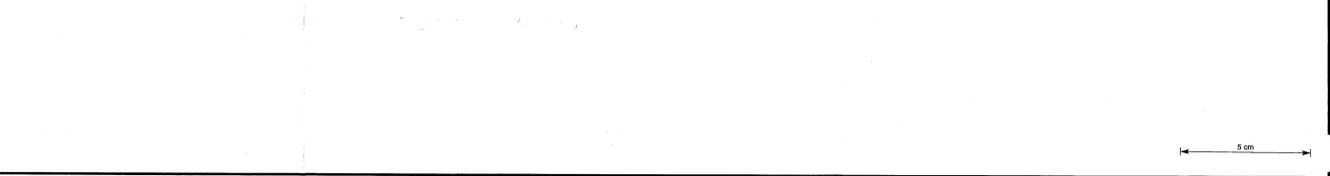
GROUND MAGNETICS:

- TOTAL MAGNETIC FIELD VALUE (3 READING AVERAGE)
- READING TAKEN ROUTINELY AT 12.5m SPACINGS; CLOSER SPACINGS IN ANOMALOUS AREAS
- REPEAT VALUE AT 25m SPACINGS (3 READING AVERAGE), TAKEN AT DIFFERENT TIME FROM ORIGINAL SURVEY

NOTE: MAGNETOMETER SENSOR ORIENTED TO NORTH AND HELD APPROX. 5m ABOVE GROUND

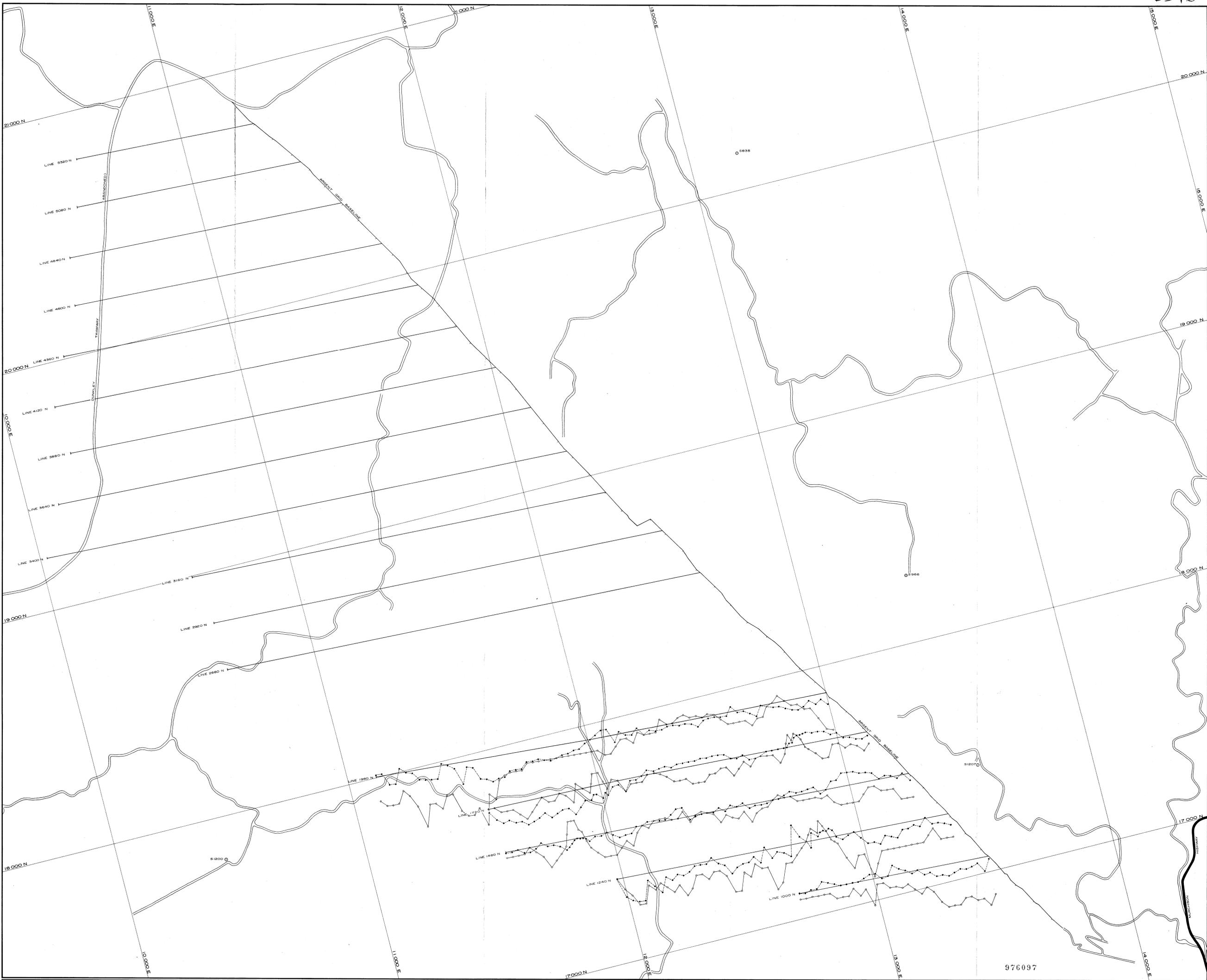
INSTRUMENTATION:

ROVING MAGNETOMETER - GEOMETRICS 586/5826 A (N°8265)
 BASE STATION MAGNETOMETER - AUSTRAL PPM-385 (N° 535),
 READINGS AT 30 SEC INTERVALS



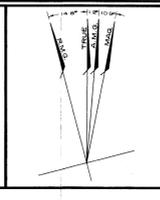
976096

RENISON LIMITED	
100 200 300 400 500m SCALE 1:5000	
GEOLOGIST: D.A.E.	E.L. 42/71 (ARGENT SECTION) TALLOWOOD AND CHEESEWOOD GRIDS TOTAL FIELD GROUND MAGNETICS (STACKED PROFILES)
DRAUGHTSMAN: R.F.	
CHECKED:	
DATE: SEPT, 1986	
REVISED:	6389
PLAN N° 5	



LEGEND:

VLF-EM:
 TRANSMITTER STN. 1 (NWC-AUSTRALIA)
 ○--- QUADRATURE } TILT ANGLE (%)
 ○--- IN-PHASE }
 TRANSMITTER STN. 2 (NDJ-JAPAN)
 ●--- QUADRATURE } TILT ANGLE (%)
 ●--- IN-PHASE }
 INSTRUMENTATION:
 GEONICS EM-16 (N-45) EM-60



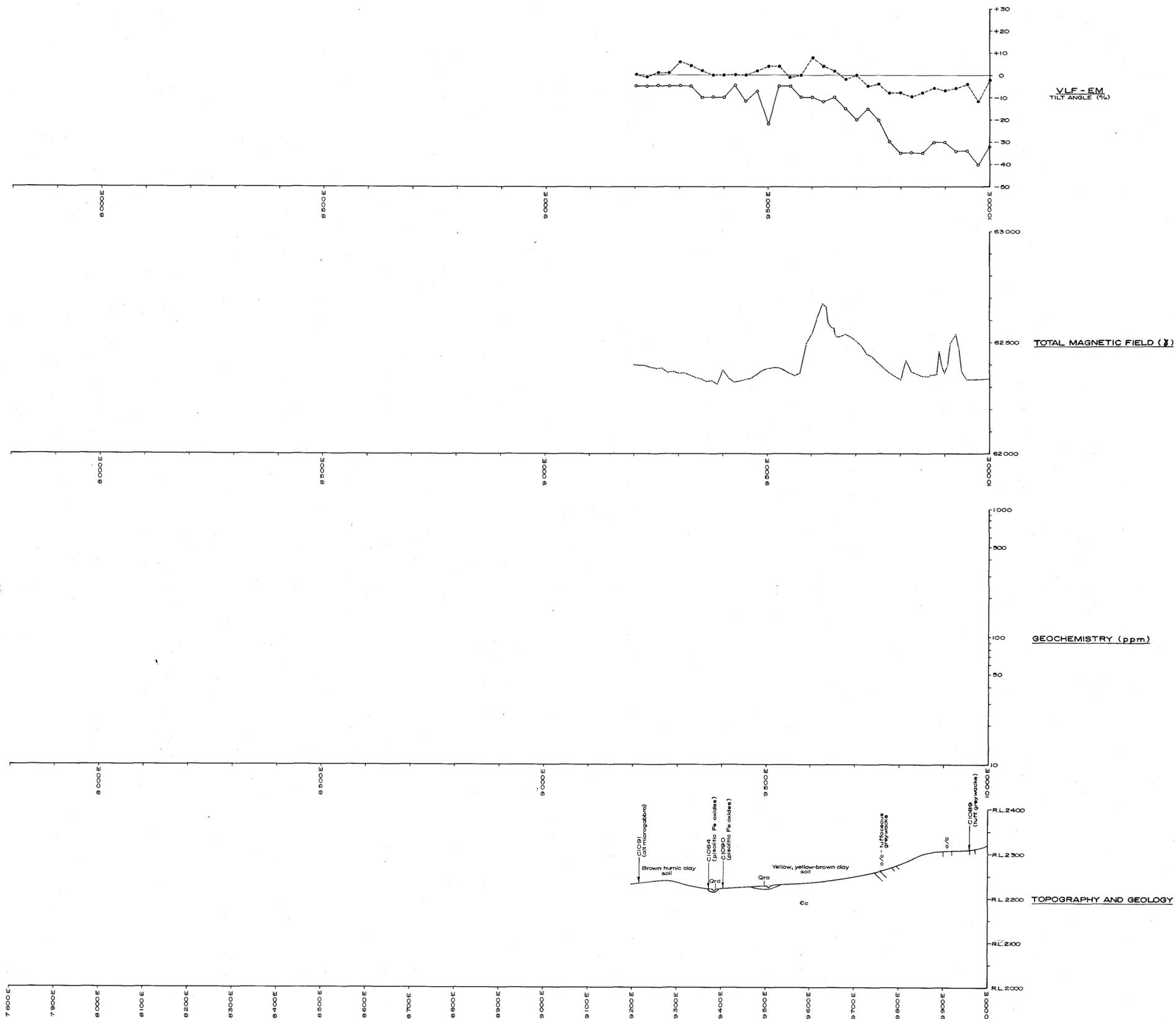
RENISON LIMITED

100 50 0 100 200 300 400 500m
 SCALE 1:5000

GEOLOGIST: DAE
 DRAUGHTSMAN: R.F.
 CHECKED:
 DATE: SEPT, 1986
 REVISED:

**E.L. 42/71 (ARGENT SECTION)
 TALLOWOOD
 AND
 CHEESEWOOD GRIDS
 VLF-EM
 (STACKED PROFILES)**

6390 PLAN N°6



976098

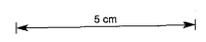
LEGEND:

TOPOGRAPHY:
 REDUCED LEVELS BASED ON 1:5000 ZEEHAN TOPOGRAPHIC SHEET SERIES. PARTS OF SHEETS B1/4 (NW); B2/3 (NE); B3/2 (SW); B4/1 (SE).

NOTE:
 RENISON MINE R.L. DATUM = SEA LEVEL + 2000m.

GEOCHEMISTRY:

- Sn (ppm)
- As (ppm)
- Cu (ppm)
- Pb (ppm)
- Zn (ppm)
- WO₃ (ppm)
- Bi (ppm)



GROUND MAGNETICS:

- TOTAL MAGNETIC FIELD VALUE (3 READING AVERAGE). READINGS TAKEN ROUTINELY AT 12.5m SPACINGS; CLOSER SPACINGS IN ANOMALOUS AREAS.
- REPEAT VALUE, AT 25m SPACINGS (3 READING AVERAGE), TAKEN AT DIFFERENT TIME FROM ORIGINAL SURVEY.

NOTE: MAGNETOMETER SENSOR ORIENTED TO NORTH AND HELD APPROX. 3m ABOVE GROUND.
 ALL READINGS REDUCED TO VALUE OF BASE STATION (62 300 γ).
 BASE STATION FOR SURVEY IS AT 19 810N / 11 705E (R.M.G.).

INSTRUMENTATION:
 ROVING MAGNETOMETER - GEOMETRICS 9816/9826A (N° 6265)
 BASE STATION MAGNETOMETER - AUSTRAL PPM-36S (N° 535),
 READING AT 30 SEC. INTERVALS.

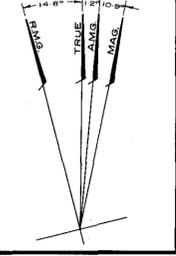
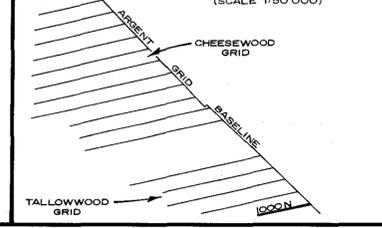
VLF-EM:

- TRANSMITTER STN. 1 (NWC-AUSTRALIA)
- QUADRATURE } TILT ANGLE (%)
- IN-PHASE } TILT ANGLE (%)

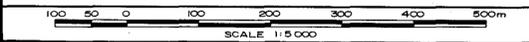
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- QUADRATURE } TILT ANGLE (%)
- IN-PHASE } TILT ANGLE (%)

INSTRUMENTATION:
 GEONICS EM-16 (N° AES EM-60)

GRID LOCATION KEY
 (SCALE 1:50 000)



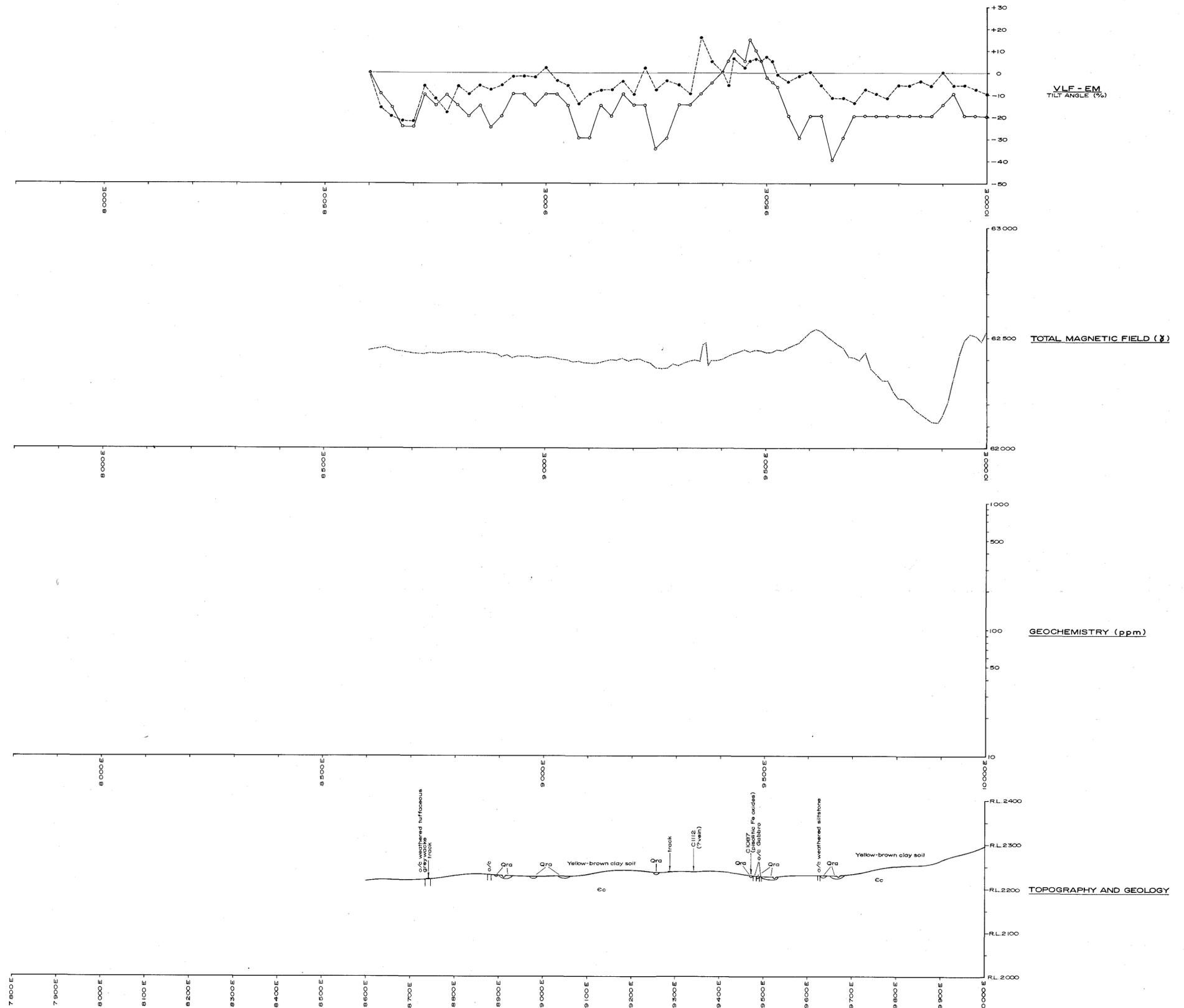
RENISON LIMITED



GEOLOGIST:
 D.A.E.
 DRAUGHTSMAN:
 R.F.
 CHECKED:
 DATE:
 APRIL, 1996
 REVISED:

**E.L. 42/71 (ARGENT SECTION)
 TALLOWWOOD GRID
 LINE 1000 N
 GEOPHYSICAL AND GEOCHEMICAL
 PROFILES**

6391 PLAN N° 7



976099

LEGEND:

TOPOGRAPHY:
 REDUCED LEVELS BASED ON 1:5000 ZEEHAN TOPOGRAPHIC SHEET SERIES. PARTS OF SHEETS B1/4 (NW); B2/3 (NE); B3/2 (SW); B4/1 (SE).

NOTE:
 RENISON MINE R.L. DATUM = SEA LEVEL + 2000m.

GEOCHEMISTRY:

- Sn (ppm)
- As (ppm)
- Cu (ppm)
- Pb (ppm)
- Zn (ppm)
- WO₃ (ppm)
- Bi (ppm)



GROUND MAGNETICS:

- TOTAL MAGNETIC FIELD VALUE (3 READING AVERAGE). READINGS TAKEN ROUTINELY AT 12.5m SPACINGS; CLOSER SPACINGS IN ANOMALOUS AREAS.
- REPEAT VALUE, AT 25m SPACINGS (3 READING AVERAGE), TAKEN AT DIFFERENT TIME FROM ORIGINAL SURVEY.
- NOTE:** MAGNETOMETER SENSOR ORIENTED TO NORTH AND HELD APPROX. 3m ABOVE GROUND.
- ALL READINGS REDUCED TO VALUE OF BASE STATION (62 300 γ).
- BASE STATION FOR SURVEY IS AT 19 810N / 11 705E (R.M.G.).

INSTRUMENTATION:

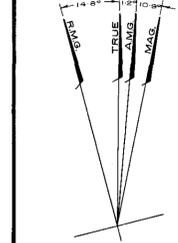
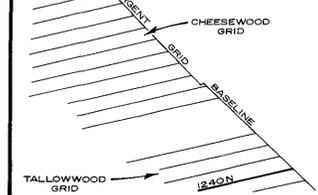
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 BASE STATION MAGNETOMETER - AUSTRAL PPM-38S (N° 535),
 READINGS AT 30 SEC. INTERVALS.

VLF-EM:

- TRANSMITTER STN. 1 (NWC-AUSTRALIA)**
- QUADRATURE } TILT ANGLE (%)
- IN-PHASE }
- TRANSMITTER STN. 2 (NDJ-JAPAN)**
- QUADRATURE } TILT ANGLE (%)
- IN-PHASE }
- INSTRUMENTATION:**
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GRID LOCATION KEY

(SCALE 1:50 000)



RENISON LIMITED

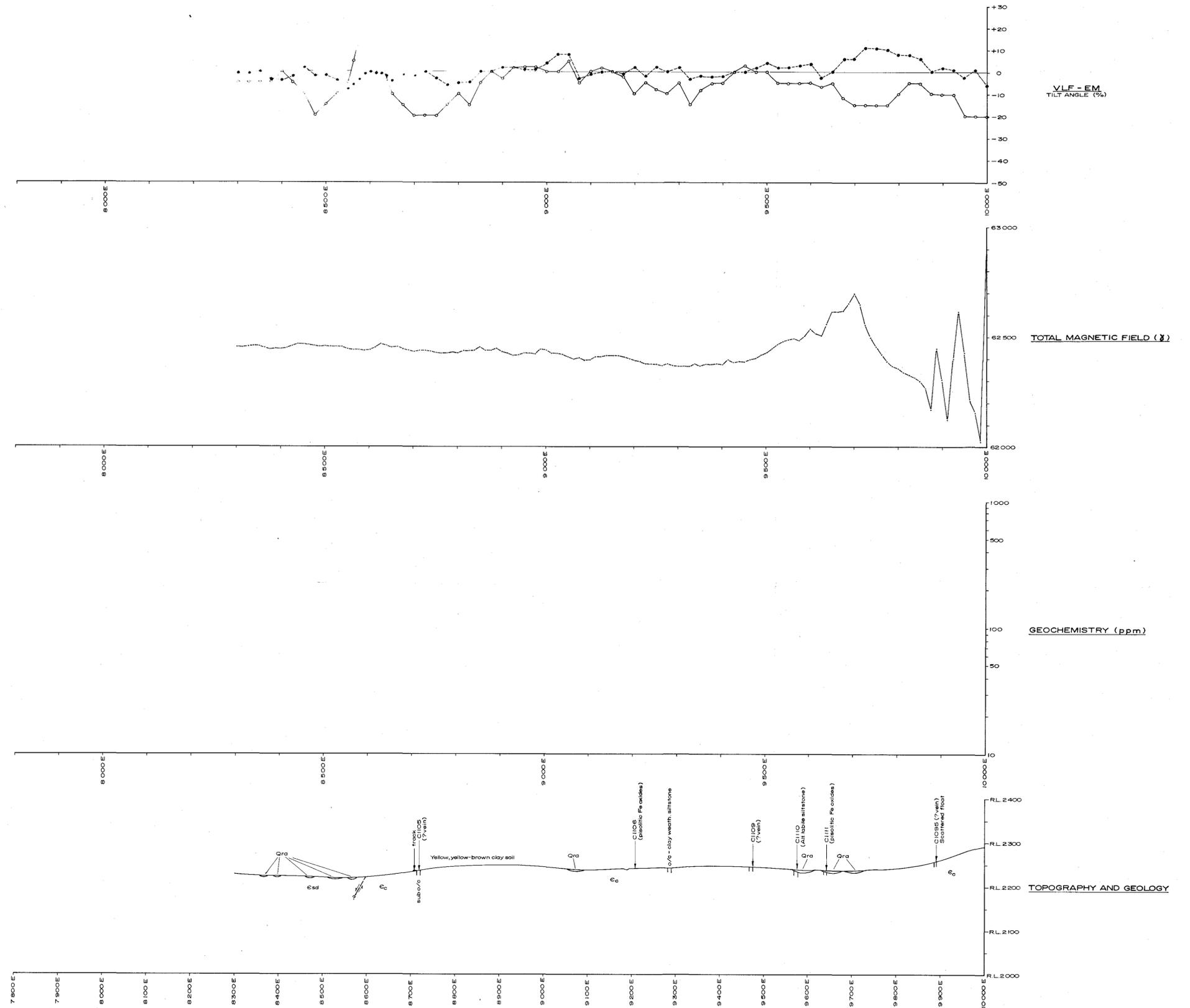


GEOLOGIST:
 D.A.E.
 DRAUGHTSMAN:
 R.F.
 CHECKED:
 DATE:
 APRIL, 1986
 REVISED:

**E.L.42/71 (ARGENT SECTION)
 TALLOWWOOD GRID
 LINE 1240 N
 GEOPHYSICAL AND GEOCHEMICAL
 PROFILES**

6392 PLAN N° 8

86-2605



976100

LEGEND:

TOPOGRAPHY:
 REDUCED LEVELS BASED ON 1:5000 ZEEHAN TOPOGRAPHIC SHEET SERIES PARTS OF SHEETS B1/4 (NW); B2/3 (NE); B3/2 (SW); B4/1 (SE).

NOTE:
 RENISON MINE R.L. DATUM = SEA LEVEL + 2000m.

GEOCHEMISTRY:

- Sn (ppm)
- As (ppm)
- Cu (ppm)
- Pb (ppm)
- Zn (ppm)
- WO₃ (ppm)
- Bi (ppm)



GROUND MAGNETICS:

- TOTAL MAGNETIC FIELD VALUE (3 READING AVERAGE). READINGS TAKEN ROUTINELY AT 12.5m SPACINGS; CLOSER SPACINGS IN ANOMALOUS AREAS.
- REPEAT VALUE, AT 25m SPACINGS (3 READING AVERAGE), TAKEN AT DIFFERENT TIME FROM ORIGINAL SURVEY.

NOTE: MAGNETOMETER SENSOR ORIENTED TO NORTH AND HELD APPROX. 3m ABOVE GROUND.
 ALL READINGS REDUCED TO VALUE OF BASE STATION (62 300 γ).
 BASE STATION FOR SURVEY IS AT 19 810N / 11 705 E (R.M.G.).

INSTRUMENTATION:

ROVING MAGNETOMETER - GEOMETRICS G816/G826A (N° 6265)
 BASE STATION MAGNETOMETER - AUSTRAL PPM-3BS (N° 535),
 READING AT 30 SEC. INTERVALS.

VLF-EM:

TRANSMITTER STN. 1 (NWC-AUSTRALIA)

- QUADRATURE } TILT ANGLE (%)
- IN-PHASE }

TRANSMITTER STN. 2 (NDJ-JAPAN)

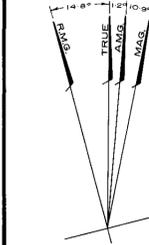
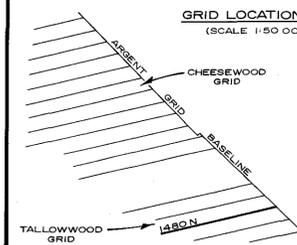
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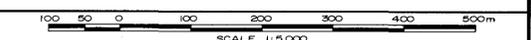
GEONICS EM-16 (N° AES EM-60)

GRID LOCATION KEY

(SCALE 1:50 000)



RENISON LIMITED

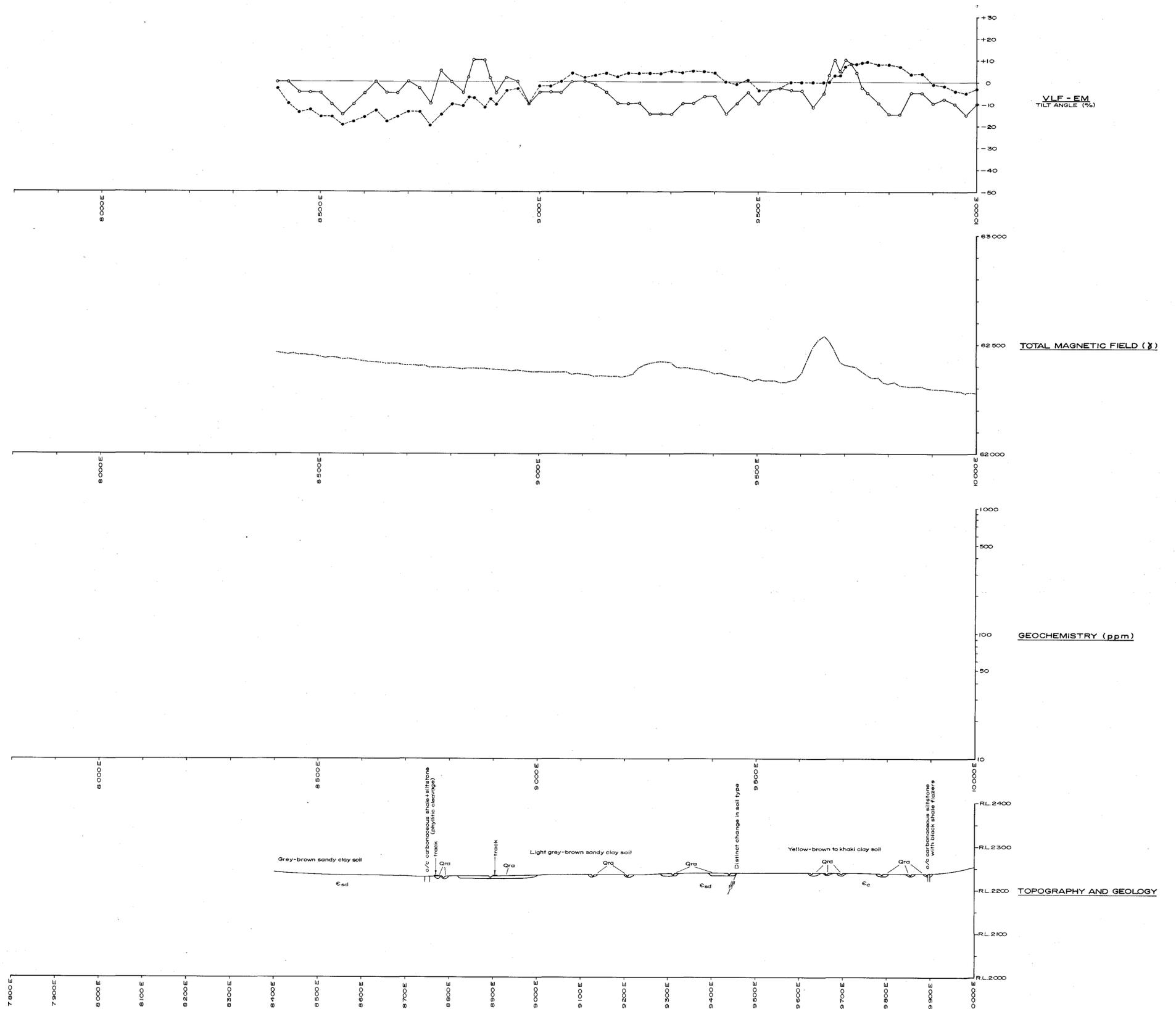


GEOLOGIST:
 D.A.E.
 DRAUGHTSMAN:
 R.F.
 CHECKED:
 DATE:
 APRIL, 1988
 REVISED:

E.L. 42/71 (ARGENT SECTION)
 TALLOWWOOD GRID
 LINE 1480 N
 GEOPHYSICAL AND GEOCHEMICAL
 PROFILES

6393

PLAN N° 9



976101

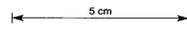
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NOTE:
 RENISON MINE R.L. DATUM = SEA LEVEL + 2000m.

GEOCHEMISTRY:

- Sn (ppm)
- As (ppm)
- Cu (ppm)
- Pb (ppm)
- Zn (ppm)
- WO₃ (ppm)
- Bi (ppm)



GROUND MAGNETICS:

- TOTAL MAGNETIC FIELD VALUE (3 READING AVERAGE). READINGS TAKEN ROUTINELY AT 12.5m SPACINGS; CLOSER SPACINGS IN ANOMALOUS AREAS.
- REPEAT VALUE, AT 25m SPACINGS (3 READING AVERAGE), TAKEN AT DIFFERENT TIME FROM ORIGINAL SURVEY.
- NOTE:** MAGNETOMETER SENSOR ORIENTED TO NORTH AND HELD APPROX. 3m ABOVE GROUND.
- ALL READINGS REDUCED TO VALUE OF BASE STATION (62 300 γ). BASE STATION FOR SURVEY IS AT 19 810N / 11 705E (R.M.G.).

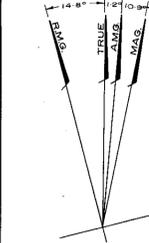
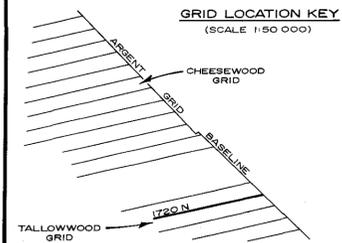
INSTRUMENTATION:

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 BASE STATION MAGNETOMETER - AUSTRAL PPM-38S (N° 535),
 READING AT 30 SEC. INTERVALS.

VLF-EM:

- TRANSMITTER STN 1 (NWC-AUSTRALIA)
- QUADRATURE } TILT ANGLE (%)
- IN-PHASE } TILT ANGLE (%)
- TRANSMITTER STN 2 (NDJ-JAPAN)
- QUADRATURE } TILT ANGLE (%)
- IN-PHASE } TILT ANGLE (%)
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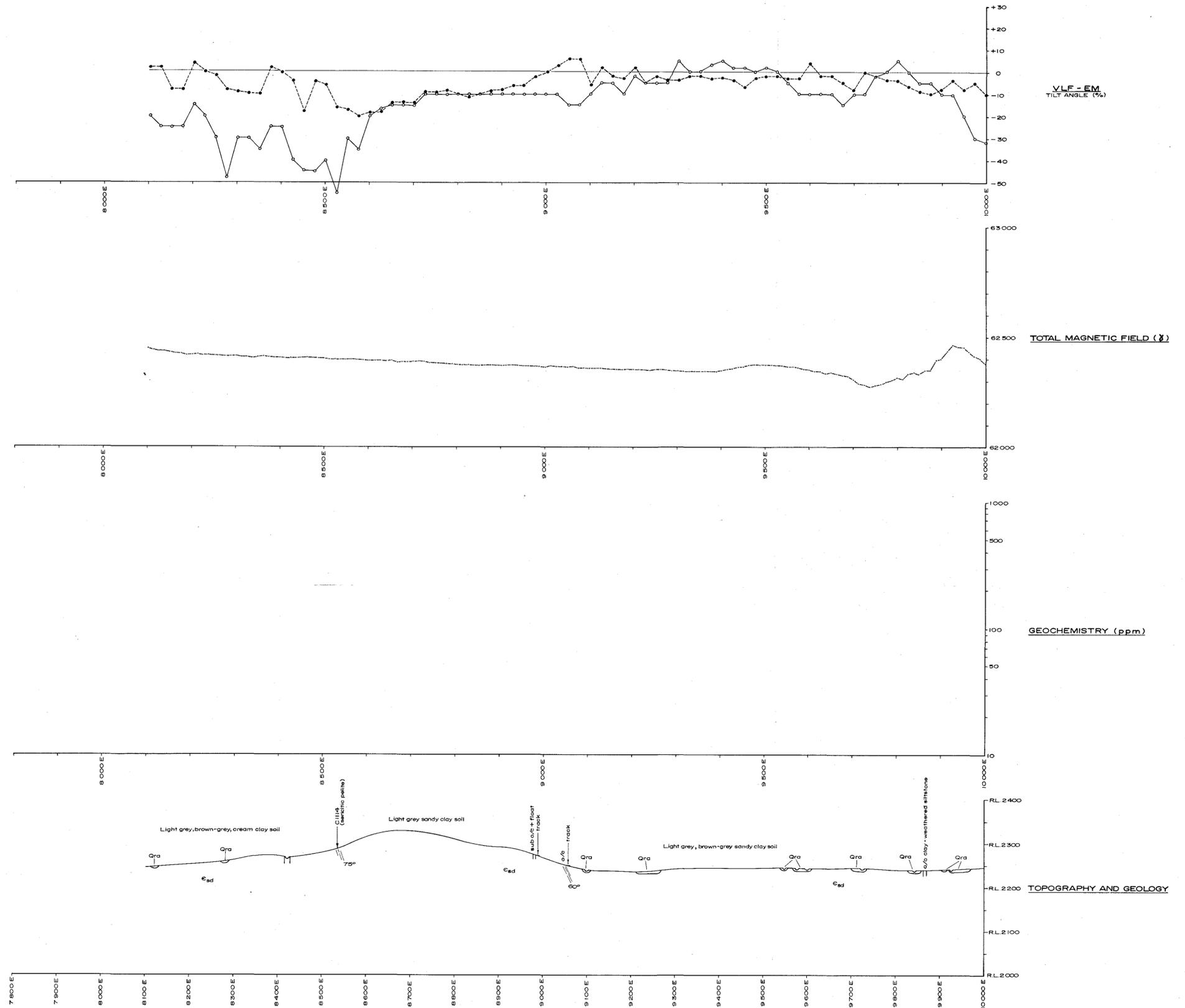
GRID LOCATION KEY
 (SCALE 1:50 000)



RENISON LIMITED

100 50 0 100 200 300 400 500m SCALE 1:5 000		
GEOLOGIST: D.A.E.	E.L.42/71 (ARGENT SECTION) TALLOWWOOD GRID LINE 1720 N GEOPHYSICAL AND GEOCHEMICAL PROFILES	
DRAUGHTSMAN: R.F.		
CHECKED:		
DATE: APRIL, 1986		
REVISED:	6394	PLAN N° 10

86-2605



976102

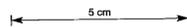
LEGEND:

TOPOGRAPHY:
 REDUCED LEVELS BASED ON 1:5000 ZEEHAN TOPOGRAPHIC SHEET SERIES: PARTS OF SHEETS B1/4 (NW); B2/3 (NE); B3/2 (SW); B4/1 (SE).

NOTE:
 RENISON MINE R.L. DATUM = SEA LEVEL + 2000m.

GEOCHEMISTRY:

- Sn (ppm)
- As (ppm)
- Cu (ppm)
- Pb (ppm)
- Zn (ppm)
- WO₃ (ppm)
- Bi (ppm)



GROUND MAGNETICS:

- TOTAL MAGNETIC FIELD VALUE (3 READING AVERAGE). READINGS TAKEN ROUTINELY AT 12.5m SPACINGS; CLOSER SPACINGS IN ANOMALOUS AREAS.
- REPEAT VALUE, AT 25m SPACINGS (3 READING AVERAGE), TAKEN AT DIFFERENT TIME FROM ORIGINAL SURVEY.

NOTE: MAGNETOMETER SENSOR ORIENTED TO NORTH AND HELD APPROX. 3m ABOVE GROUND.
 ALL READINGS REDUCED TO VALUE OF BASE STATION (62300 γ).
 BASE STATION FOR SURVEY IS AT 19810N / 11705E (R.M.G.).

INSTRUMENTATION:

PROVING MAGNETOMETER - GEOMETRICS G816/G826A (N°6265)
 BASE STATION MAGNETOMETER - AUSTRAL PPM-38S (N°535),
 READINGS AT 30 SEC INTERVALS

VLF-EM:

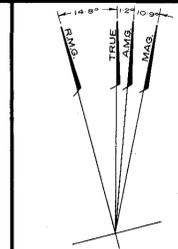
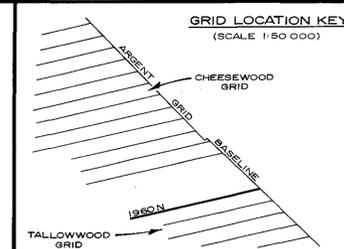
- TRANSMITTER STN. 1 (NWC-AUSTRALIA)
- QUADRATURE } TILT ANGLE (%)
- IN-PHASE }

— TRANSMITTER STN. 2 (NDJ-JAPAN)

- QUADRATURE } TILT ANGLE (%)
- IN-PHASE }

INSTRUMENTATION:

GEONICS EM-16 (N°AES EM-60)



RENISON LIMITED

100 200 0 100 200 300 400 500m
 SCALE 1:5 000

GEOLOGIST:
 D.A.E.
 DRAUGHTSMAN:
 R.F.
 CHECKED:
 DATE:
 APRIL, 1986
 REVISED:

**E.L.42/71 (ARGENT SECTION)
 TALLOWWOOD GRID
 LINE 1960 N
 GEOPHYSICAL AND GEOCHEMICAL
 PROFILES**

6395 PLAN N° 11

86-2605

092



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MINERAL EXPLORATION AND ENGINEERING CONSULTANTS

DUGGS LANE ELLIOTT TASMANIA 7325 PHONE 004-363143

INTERPRETATION OF THE MAGNETIC AND ELECTROMAGNETIC
SURVEYS OVER THE DUNKLEY FAULT GRID (E.L. 42/71)

for

Renison Ltd

by

Dr J.R. Bishop

OPEN FILE

FILED

RN/MG85/08
August, 1985.

098



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094



976105

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- Figure 11. UTEM Interpretation (1:5,000 scale).
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SUMMARY

The Dunkley Fault aeromagnetic anomaly is a prominent circular feature in the south-western part of E.L. 42/71. It has been suggested that the source for the anomaly is hornfelsing around a granitic cupola and hence the area is a possible site for tin mineralisation. A local high within the feature has been a target of Renison's recent exploration since it may be due to pyrrhotite. A ground magnetic survey over the Dunkley Fault grid has defined the local high, however drilling has failed to find its source.

Responses were obtained from a (later) UTEM survey over the grid, but these were not indicative of massive sulphides. Disseminated pyrrhotite, intersected by the drill-hole at around 280m, could be the source of at least one of the anomalies, however the responses over the magnetic high can be readily correlated with several faults intersected by the drill-hole.

It is recommended that a down-hole EM survey be carried out to test for massive pyrrhotite in the vicinity of the drill-hole. It is also suggested that an IP survey be carried out over the magnetic high to see if disseminated pyrrhotite is the cause of the shallower magnetic anomalies.

If either of the IP or EM is successful, then the near-surface (down to ~500m) is still prospective and it is recommended that further drilling be carried out to determine the source of the (local) magnetic high. If neither are successful, then it is suggested that DDH S1200 be extended to find the source of the large circular feature and to determine whether the area is prospective at depth.



INTRODUCTION

The Dunkley Fault Grid lies within the 'Argent' section of E.L. 42/71, about 7kms south west of Renison Bell. Exploration of the lease, which is considered to be highly prospective for tin mineralisation, is being carried out by Renison Ltd.

The grid overlies a pronounced aeromagnetic anomaly and has been covered by magnetic, VLF and UTEM surveys. This report interprets the results from these surveys.

EXPLORATION TARGET AND GEOLOGICAL SETTING

The prime target is a deposit similar to the Renison ore bodies; ie, a massive pyrrhotite-cassiterite replacement of carbonate horizons with associated mineralised 'feeder' faults. At Renison, the mineralisation is both highly conductive and magnetic.

A secondary target is tin-bearing skarns. Analysis of skarns in the vicinity of Renison show a variable sulphide (and magnetite) content (Stephenson, 1982), but any potentially economic skarn may also be expected to be highly magnetic and conductive (but possibly not as conductive as replacement mineralisation).

The gridded area has been interpreted as being composed of Lower to Middle Cambrian Crimson Creek Formation sedimentary rocks. The dip has been interpreted as varying between steeply east and steeply south (however there is little outcrop). The Dunkley Fault runs north-east along the northern edge of the grid and separates the Crimson Creek Formation in the south from the Lower Cambrian Success Creek Group to the north. Down-thrown Siluro-Devonian sediments lie to the west of the (recently named) Boodecker Fault on the western side of the grid.

At Renison, the Mine Sequence carbonate horizons occur between the Crimson Creek Formation and the Success Creek Group. Thus areas of Crimson Creek are considered prospective for possible underlying host rocks, while areas of Success Creek are generally considered unprospective.

The aeromagnetic anomaly referred to above is a circular feature with a local more intense response near the centre (see Figure 1). Although this previously has been interpreted as being caused by a basic intrusive, it may also be interpreted as reflecting hornfelsing around a granitic cupola with the more intense anomaly being caused by a concentration of pyrrhotite, either as carbonate replacement or skarn mineralisation.

EXPLORATION HISTORY

The area was first investigated in 1960 by Rio Tinto who carried



out magnetic and self potential surveys. The former located the aeromagnetic anomaly (defined by their mid 1950's regional survey of the north west), but no responses were obtained by the latter (Mattocks, 1960). Mattocks suggested that the anomaly was probably due to a basic intrusive and Rio Tinto carried out no further work.

Renison relocated the aeromagnetic anomaly in 1972 with three broadly spaced lines (the Dunkley grid), but no further work was done until 1983 when the area was covered with the Dunkley Fault grid. This grid covers a strike length of 2.5kms with lines spaced 200m apart (plus some intermediate lines).

In November 1984, DDH S1200 was drilled to test the magnetic anomaly. Only minor amounts of weakly magnetically susceptible material was intersected and it is assumed that the hole did not find the cause of the anomaly. The hole passed through unaltered Crimson Creek Formation for all of its 598.7m length.

All previous exploration, together with recommended further work, has been summarised in Table 1.

INTERPRETATION

AEROMAGNETICS

Figure 1 shows a contour plan of the Dunkley Fault area from the the 1981 Mines Dept's aeromagnetic survey of the west coast. The broad line spacing and the filtering (by the contractor) means that responses from shallower sources have been suppressed. Figure 2 shows a profile across the anomaly (amplitude ~ 350 nt) with a model of possible sources providing an approximate fit to the observed data.

This modelling was carried out to gain some idea of the possible depth and distribution of sources: no testing of specific geological models was attempted and thus the results shown in Figure 2 are largely schematic. Three bodies have been used to model the anomaly: body 1 may represent the hornfelsing around a granitic cupola, while body 3 hopefully represents mineralisation at a depth below the surface of the order of 170m. The sharp cut off of bodies 1 and 2 on the western side, is roughly in agreement with the position of the Eoodecker fault.

GROUND MAGNETICS

The Dunkley Fault grid has been covered with total field (proton precession) magnetics at a station spacing of 25m. The results are shown in Figure 3. They confirm the circular nature of the aeromagnetic anomaly, with a local intensification in the north-east corner. It is shown later that this local anomaly can largely be explained by two sources: a large deep body and a smaller, shallower body (other, smaller and shallower, sources



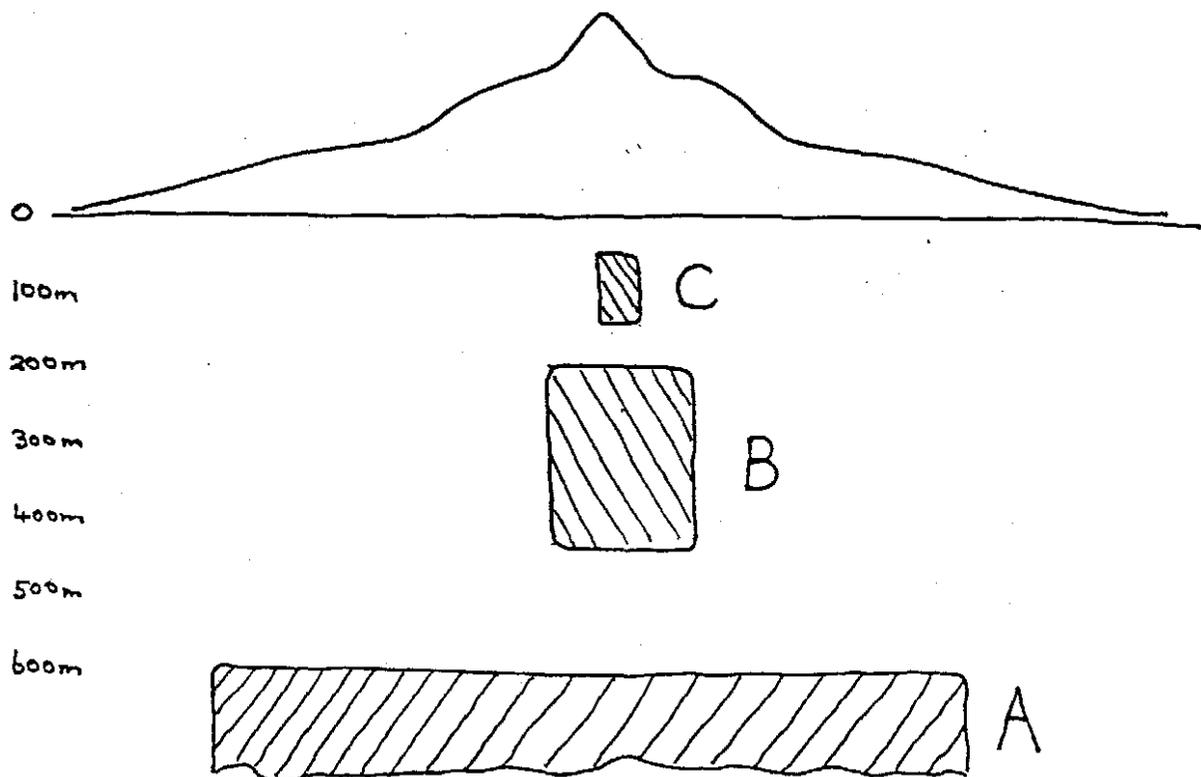
cause several local perturbations in the data).

Thus there are three magnetic anomalies of interest. These have been sketched below and are:

(1) The large circular feature which is prominent in the aeromagnetic plan. This has the deepest source (500m - 600m) and is referred to as body (or anomaly) 'A' in the rest of this report. Its source has been hypothesised to be hornfelsing around a granite cupola, but it could also be due to a basic intrusive, a (smaller) body of ultrabasic, or to a large volume of disseminated magnetite or, less likely, to pyrrhotite.

(2) The next body, located around 180m below the surface, accounts for the bulk of the 'local' anomaly. It is referred to as model (or anomaly) 'B'. Possible sources are the basic or ultrabasic intrusives or the disseminated bodies described above. However the fact that DDH S1200 did not intersect the cause of the anomaly, suggests that the source is a smaller, finite body. The preferred source is massive pyrrhotite or a halo of disseminated pyrrhotite around massive pyrrhotite.

(3) The shallowest body (labelled 'C') accounts for most of the rest of the local anomaly. The UTEM results suggest that massive pyrrhotite is not the source. A disseminated body of pyrrhotite is a possibility.



The anomaly of particular interest is B and when not explicitly stated, it is this anomaly which is being referred to.



It is also possible that the local anomaly (B+C) is due to several sources. The initial modelling, using the (geologically) interpreted steep easterly dip, assumed this (see Figure 4) and DDH S1200 was drilled largely on this interpretation. Figure 5 shows the unprospective model of an intrusive or a large volume of disseminated magnetite or pyrrhotite.

DDH S1200 failed to intersect sufficient magnetic material to explain the anomaly (a histogram of the measured susceptibilities is shown in Figure 12). Following the drilling of S1200, Figure 6 was produced to show that a series of westerly dipping bodies could account for the anomaly. Figure 7 shows that an approximation to the anomaly can also be obtained by using an idealised distribution of the measured susceptibilities, but with values increased by 3 to 4 times (ie, about 1.5 to 2 times the corrected values). Re-measurement of susceptibilities of some samples sent for magnetic property testing suggests that the correct values may be significantly higher than are indicated in Figure 12 (see Table 2)*. These susceptibilities are, with one exception, interpreted as being due to minor amounts of magnetite in the sediments. The exception is near 280m where disseminated pyrrhotite has been logged.

Following the UTEM survey, the magnetics were re-interpreted to be integrated with the results of that survey and Kilpatrick's interpretation of the structure (Kilpatrick, 1985). The steps involved in this more detailed interpretation are given in the Appendix. This interpretation resulted in the definition of the two sources B & C. (see Figure 8 and, on a different projection, Figure 12). The profile in Figure 8, which was taken from a smoothed contour plan, clearly shows that there are two distinct sources: one deep and a second much shallower.

Body 'B' is intersected by the projection of DDH S1200 (see Figure 8). The disseminated pyrrhotite intersected by the hole occurs within this interval of intersection and although the susceptibilities measured here were much less than the 0.0092 (cgs)† used for the model and are too low to account for the anomaly, it is suggested that higher concentrations of pyrrhotite away from (and mostly below) the hole may occur. Thus body 'B' is interpreted as being either a number of replacement bodies or a stockwork deposit. (Its depth of 185m is in agreement with the interpretation of the aeromagnetic anomaly; see Figure 2.) The shallower body (C) is coincident with a UTEM response and may be fault-bound mineralisation.

* The magnetic property measurements confirmed the re-measured susceptibility values and indicated that although remanence was significant for sections of the core, the total magnetisation was too low to account for the observed anomaly (Table 3).

† Even though disseminated pyrrhotite is suggested as a likely source, high susceptibilities have been used to put a lower limit on the size of the sources.



VLF

A VLF survey was carried out over the northern half of the grid in early 1984. The main aim of the survey was to define any faults or fractures in the area. The transmitters at both Japan (JPN) and North West Cape (NWC) were used as sources. Dip angle and field strength were recorded. A modified 'Fraser filter' (Fraser, 1969) was passed over the data and contour plans produced of the filtered data (Figures 9 and 10).

A number of responses were recorded, however these often did not correlate well from line to line and in many cases there is little confidence in the contour directions. The (DFG) north to north-north-west trending zones on the western side of the grid and the north-easterly trending zones in the centre and eastern sections are exceptions*. The westernmost responses (seen on lines 200S, 300S & 1600S) are probably due to the Boodecker Fault. Other responses within the grid may be caused by graphitic shales (Kilpatrick, 1984).

Of particular interest is the ring structure observed in the JPN data (Figure 10) which, when superimposed, surrounds the magnetic high (centred near 600S/1800E).

UTEM

To help determine whether pyrrhotite is the source of the magnetic anomaly, it was decided to carry out a fixed-loop time domain EM survey. A UTEM survey was carried out in February 1985 over the north eastern quadrant of the grid (ie, over the main magnetic high). The surveyed area measured about 1km x 1km, with the southern portion extending out to 1.65km. One loop (approximately 1000m x 1150m), laid out to the west, was used for the survey. The vertical component was measured with a station spacing of 25m (one whole line and parts of others were read at a 50m spacing). The purpose of the survey was to see if there were any conductors which could be directly correlated with the magnetics. Any such coincidence would support a pyrrhotite-bearing source for the magnetics.

The survey recorded a number of responses; these have been shown as bars in Figure 11, with the channels[‡] on which the responses can be observed, indicated. Five responses occur over the main magnetic anomaly: two each on lines 600S and 500S and one on 300S. The zones so defined parallel the magnetic strike.

* To try and increase the usefulness of the data, the JPN dip angle data was hand-smoothed, digitised and the modified Fraser values recalculated, however there was little improvement and this data has not been included.

‡ In the UTEM system, the channels are numbered from no. 10 ('early time' at 0.025msecs) to no. 1 ('late time' at 12.8msecs).



None of these responses is indicative of a body of massive pyrrhotite and they are readily correlated with faults intersected by the underlying DDH S1200. Fermeable zones associated with faults are certainly capable of producing responses of the type observed here; however, the faults were recorded over very narrow intervals (most less than 1m) and no significant zones of crushed or weathered rock were noted. It is therefore suggested that one or more of the responses could be caused by disseminated bodies of pyrrhotite. Such bodies could also account for the magnetic response (especially if, as expected, the pyrrhotite is strongly remanent in a direction sub-parallel to the inducing field). On Figure 12, the UTEM anomaly at 600S/1900E has been correlated with the minor disseminations of pyrrhotite logged in DDH S1200 at 280m and the fault lying immediately beneath (at 282.8m).

The anomalies are best developed on line 500S, but on both lines the two sources are sufficiently close together to cause interference between the responses, thus making a quantitative interpretation difficult. Such an interpretation was attempted for the response at 500S/1885E. A depth of at least 55m is indicated. Dip could not be determined, but is likely to be steep and possibly to the east. Assuming the source is a finite thin, tabular body (a strike length of 400m was assumed but no estimate of depth extent was obtained), then the (relatively poor) conductance of 5S is calculated. Examination of the adjacent anomaly at 500S/1965E suggests a shallower depth, but greater than 35m and a smaller conductance; other parameters were not obtainable. The amplitudes on Line 600S were smaller and no attempt was made to interpret these results. An increased depth to the north (90m for the anomaly at 300S/1950E) is in agreement with the northerly plunge interpreted for the magnetic anomaly.

Several other potentially interesting UTEM anomalies were recorded (eg, at 1100S/2275E), but these were not associated with magnetic responses. The largest and most persistent anomalies (ie, those with the longest decays) were obtained at 100S/1975E and 300S/2140E. The former coincides with an outcrop of graphitic shale and this is interpreted to continue through to 300S/2140E and possibly down to 700S/2550E.

CONCLUSIONS AND RECOMMENDATIONS

No good UTEM responses have been observed associated with the the Dunkley Fault magnetic anomaly. Those anomalies which were recorded in the vicinity of the magnetic high, do not have the slow decay expected of a massive pyrrhotite deposit and have been correlated with faults logged in DDH S1200.

Nevertheless, the source of the magnetic anomaly has not been found and it is still possible that a prospective target (ie, a body of pyrrhotite) does exist which has given rise to the UTEM and magnetic responses. Particularly so, when one of the above mentioned faults had some minor amounts of pyrrhotite associated



with it. To test for such a possibility, it is recommended that DDH S1200 be surveyed with down-hole EM. The radius of influence of such a survey should be of the order of 100m plus and this would cover all of the volume of ground which might contain the source of the magnetic anomaly. It is also recommended that an IP survey be carried out over line 600S to test whether disseminated pyrrhotite might be the source of the shallow magnetic anomaly (ie, body 'C'). If either of the IP or EM is successful, I suggest that further drilling should be carried out to find the source of the bulk of the anomaly (ie, body 'E').

Even if neither of the IP or EM is successful, it is still quite possible that the main magnetic anomaly ('A') is due to hornfelsing around a rise in the granite and thus there is still the potential for economic mineralisation at depth. Particularly so since Kilpatrick (1985) suggests that the Mine Sequence may occur within 150m below the end of DDH S1200. To test this possibility, it is recommended that DDH S1200 be extended to reach the source of the main magnetic anomaly. Very approximate modelling, described in the Appendix, suggests a depth between 500m and 600m.

These recommendations are summarised in Table 1.

J.R. Bishop
August, 1985.



REFERENCES

Fraser, D.C., 1969. Contouring of VLF-EM data. *Geophysics*, vol 34, p. 958-967.

Kilpatrick, D. J., 1984. E.L. 42/71, West Argent area. Annual report 1983-84 for Renison Ltd.

Kilpatrick, D. J., 1985. E.L. 42/71, West Argent area. Annual report 1984-85 for Renison Ltd.

Mattocks, N.G., 1960. Investigations Cuni Area. RTAE report no. 14/1960.

Stephenson, P.R., 1982. Geological report and exploration programme on the southern portion of the Renison mining lease. Unpublished company report.



TABLE 1

Completed and Proposed Geophysical Surveys over the
Dunkley Fault Grid.

(to the end of July, 1985.)

OPERATOR: DATE	SURVEY	COMMENTS
COMPLETED SURVEYS		
Rio Tinto: 1956-57	Aeromagnetics	Dunkley Fault magnetic anomaly first defined.
" " : 1960	Self potential	No responses.
" " : "	Ground magnetics	Anomaly defined, but interpreted as being due to a basic intrusive. No further work done.
Aberfoyle: 1965	Aeromagnetics	Anomaly well-defined.
Renison: 1972	Ground magnetics	Anomaly located, but not followed up.
Geox: 1981	Mines Dept aeromagnetic survey	-
Renison: 1983-84	Ground magnetics	Anomaly thoroughly covered: a broad circular feature with a local high defined. Results modelled assuming an easterly dip.
" : 1984	VLF	Low-level responses used for structural interpretation.
" : 1984	DDH S1200	Hole drilled to 599m in Crimson Creek Formation. Minor amounts of magnetite intersected, but not sufficient to explain the anomaly.
" : 1985	UTEM	No anomalies interpreted as being caused by massive pyrrhotite. Responses over local magnetic high can be correlated with faults, but may be due to disseminated pyrrhotite (which was logged at 280m, associated with a fault).
" : "	Magnetic property measurements by CSIRO	Logged susceptibilities are probably too low. Remanence is significant and sub-parallel to induced mag. (ie, acts to increase response), but both factors are insufficient to explain anomaly. Anomaly re-modelled from smoothed contours using minimum number of bodies (2) to explain bulk of response. DDH S1200 passes through deeper source which is interpreted as being due to disseminated (possibly massive) pyrrhotite.



Table 1
(continued)

	SURVEY	COMMENTS
PROPOSED SURVEYS		
(1)	One dipole-dipole IP traverse over magnetic high.	To test whether shallow mag. source is dissem. pyrrhotite.
(2)	Down-hole EM down DDH S1200.	To test for massive pyrrhotite at depths below penetration of surface UTEM survey.

Regardless of the outcome of the IP, if the down-hole EM is successful, then a target will have been defined for a second drill-hole.

If the down-hole EM is unsuccessful, but the IP is successful, then disseminated pyrrhotite is the interpreted source of the shallower source (C) and is also the likely source for the deeper body (B). Massive pyrrhotite may occur between say 200m and 500m, but out of range of the down-hole EM and further drilling to intersect the source of the deeper body (B) is recommended.

If both the IP and down-hole EM are unsuccessful, then it is unlikely that disseminated pyrrhotite is the source for the shallow (C) or the deep (B) magnetic body; ie, the near-surface is unprospective. It is therefore recommended that DDH S1200 be continued to intersect the source of the broad circular magnetic anomaly (A) to determine whether it is an intrusive or horn-felsing around a granitic cupola. If the latter, then the area should still be regarded as prospective at depth.



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TABLE 2

Susceptibility Measurements of Five Core Samples
from DDH S1200

SAMPLE NO.	DEPTH (M)	SUSCEPTIBILITY OF ORIGINAL CORE MEASUREMENT (CGS UNITS, UNCORRECTED) [*] (x 0.001)	SUSCEPTIBILITY OF SAMPLE AS RE-MEASURED BY 'ELLIOT' SUSC. METER (CGS UNITS x 0.001)	CORRECTED VALUE [†] (CGS UNITS x 0.00)
1.	116.8	0.2	0.3-0.4	0.6
2.	280.2	0.2	0.5-0.7	1.1
3.	421.	0.0	1.0	1.7
4.	472.	0.7	0.8-0.9	1.5
5.	447.3	0.0	0.0-0.1	~0.2

* To nearest half-metre

† Using the nomogram in the instruction manual. The correction is approximately x2.



TABLE 3

Magnetic Property Measurements

SAMPLE	DEPTH (M)	k^* (CGS UNITS x 0.001)	J	Q	ROCK-TYPE
1.	116.8	0.590	4850	13	black siltstone
2.	280.2	0.930	8505	15	" "
3.	421.0	2.870	1910	1.1	silty sandstone
4.	472.0	1.610	1500	1.5	sandstone/mudstone
5.	447.3	0.090	80	1.4	" "

k = susceptibility

J = NRM intensity in microgauss (10 microgauss = 1 gamma)

Q = Koenigsberger ratio = J/kH ($H=0.63$ Oe).

Measurements by: D.A. Clark, CSIRO Mineral Physics.

date: July, 1985.

* The susceptibilities quoted in Table 2 should be compared with these more accurately determined values.



APPENDIX

Contour Matching and interpretation of the Dunkley Fault Grid
Magnetic Anomaly.

The first interpretation used a number of separate bodies to explain the magnetic anomaly. Following the failure of DDH S1200, it was felt that modelling the minimum number of bodies (with no constraint on the dip) might be more successful. This was done by matching the model responses to hand-smoothed contours taken from the ground data.

These contours have been produced as an overlay (Figure A1) and suggest a large body truncated at the southern end and plunging to the north. Profiles across these contours show that the anomaly is due to two bodies; a small shallow source and a larger, deeper one (Figure A2). To model the deeper source, its contribution was interpolated on the profiles (Figure A2) and a contour plan produced. A good fit to this data was obtained from a vertical prism of 600m strike length, buried at a depth of 185m (Figure A3)*.

A similar procedure was carried out on the 'shallow component' of the profiles. A shallower prism was produced which gave a reasonable fit to the data (results not shown). These two bodies were then combined and adjusted using an interactive program to produce a reasonable fit to the central profile over the smoothed contour map (Figure 8).

Attempts were made to fit these two bodies (and other sources) so as to avoid the drill hole. No plausible solutions were found. Thus the final fit includes the drill hole. A small section of the hole (at 280m) within the body contained pyrrhotite and I suggest that larger and more concentrated volumes may occur (mostly) below the hole.

The deep-seated magnetic anomaly was approximately modelled by taking a traverse across 1000S -well away from the main response discussed above. A single prism shaped body gives a depth of around 500m (Figure A4). Although this model does not approach the shape of the hypothesised 'skin' of hornfelsing around the granitic cupola, it should provide an adequate approximation. Greater error is likely from the 'noise' caused by the numerous shallower sources. Any hole targeted to reach this source, should be planned to go to at least 600m below the surface.

* The modelling program did not allow for plunging bodies.

The discrepancies may be due as much to errors in the smoothing process as to other (small) sources.



ADDENDUM

Dipole-Dipole IP Survey over Line 620S.

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A dipole-dipole IP survey was conducted along the drill-hole access line (~620S) in August, 1985. The aim of the survey was to find out whether the interpreted shallow magnetic source beneath 600S/~1870E was due to disseminated pyrrhotite. The survey was centred at 1900E and used 50m dipoles read down to $n=6$.

The results were disappointing. Although anomalous readings were obtained (twice background), the amplitudes were not as high as would be expected over a concentration of pyrrhotite sufficient to produce the magnetic anomaly. Also, there was no well-defined shape to the 'anomaly' (as might be expected from a fault-bound zone of pyrrhotite).

The chargeability pseudosection shows a diffuse high, to 58msecs total chargeability*, on the western side, with shallow 50+ values beneath 1900E/1950E (see Figure A5). Minor amounts of pyrite as veins, stringers, disseminations along bedding planes, etc were logged in the core (Kilpatrick, 1985) and this is probably sufficient to account for the magnitude of the response. Given this interpretation, magnetite must be the source for the magnetic anomaly and this may also have contributed to the response ‡.

A strong change in resistivities was recorded across the section. The low values in the west are unlikely to be due solely to the disseminated mineralisation interpreted to be the cause of the IP response and a fault separating two rock types in the vicinity of 1900E is indicated (ie, in agreement with the VLF/UTEM response).

Although it is also likely that magnetite is the source for the deeper source (body 'B'), it is still recommended that a down-hole EM survey be carried out down DDH S1200.

* as measured by the Huntec mark four receiver between 50msecs and 1550mecs.

‡ The chargeability of magnetite has apparently been little studied. Telford et al (1976) give values of about one fifth the response from an equivalent concentration of sulphides.

Telford, W.M., Geldart, L.P., Sheriff, R.E. & Keys, D.A., 1976.
Applied Geophysics. Cambridge University press.

INTERPRETATION OF THE MAGNETIC AND ELECTROMAGNETIC
SURVEYS OVER THE DUNKLEY FAULT GRID (E.L. 42/71)

for

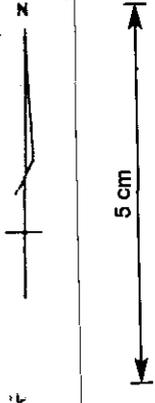
Renison Ltd.

by

Mitre Geophysics Pty. Ltd.

976123

112



RENISON BELL

Argool Dam

Renison Mine Lease

DUNKLEY FAULT GRID

E.L.42/71

ZEEHAN

Mines Dept. 1981
 Aeromagnetic Survey
 Contour interval 50m

Ref: RN/MG85/08

RENISON LIMITED

Dunkley Fault

AEROMAGNETIC ANOMALY

DRAWN BY : J.B.
 DRAFTSMAN: T.G.D.S.
 DATE : Aug.88
 REVISIONS :

FILE NO.

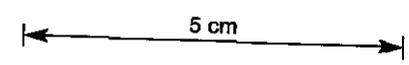
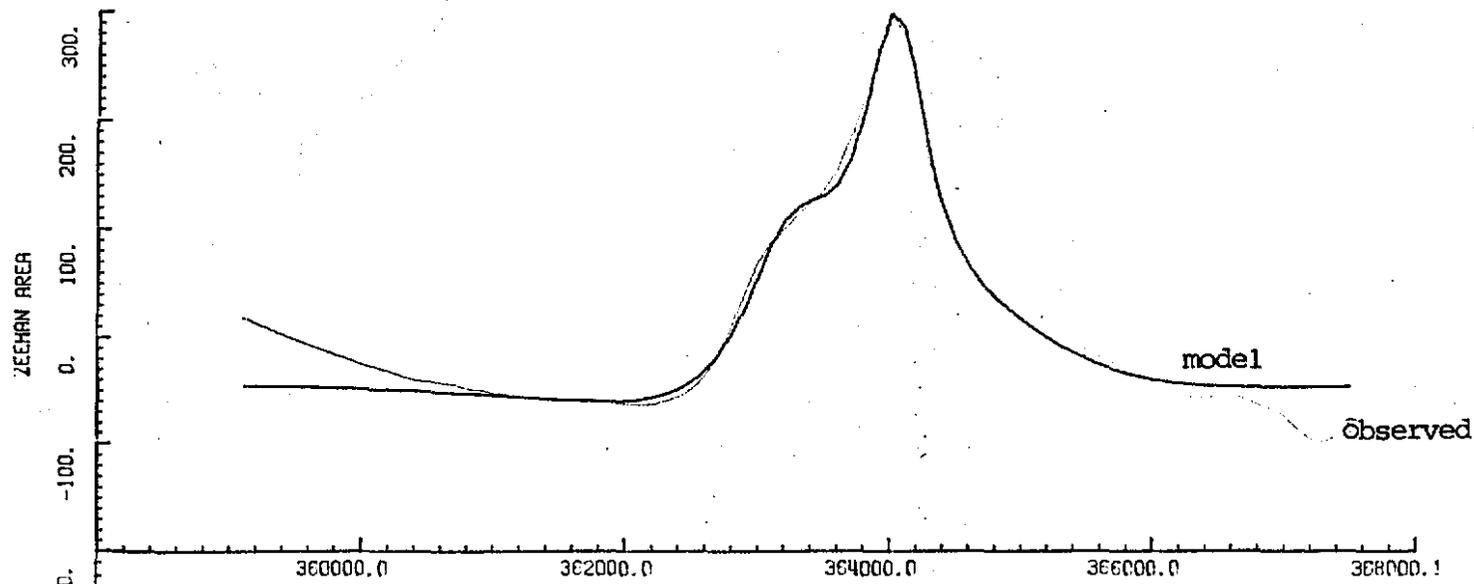
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FIG. 1

26-2608 v.s

113



mean height of sensor: 135m

TASMANIAN MINES DEPT
AEROMAGNETIC SURVEY

Incl: -72°
 Intensity: 62,500 nt
 Profile orientation: 78° (mag.)

Susceptibilities (cgs units):
 1: 0.003
 2: 0.002
 3: 0.004

MITRE GEOPHYSICS PTY. LTD.

DUNKLEY
 magnetic modelling

PROJECT: FIG. NO.-

DATE: 22-APR-83

976124

86-2605 V.2

Fig. 2

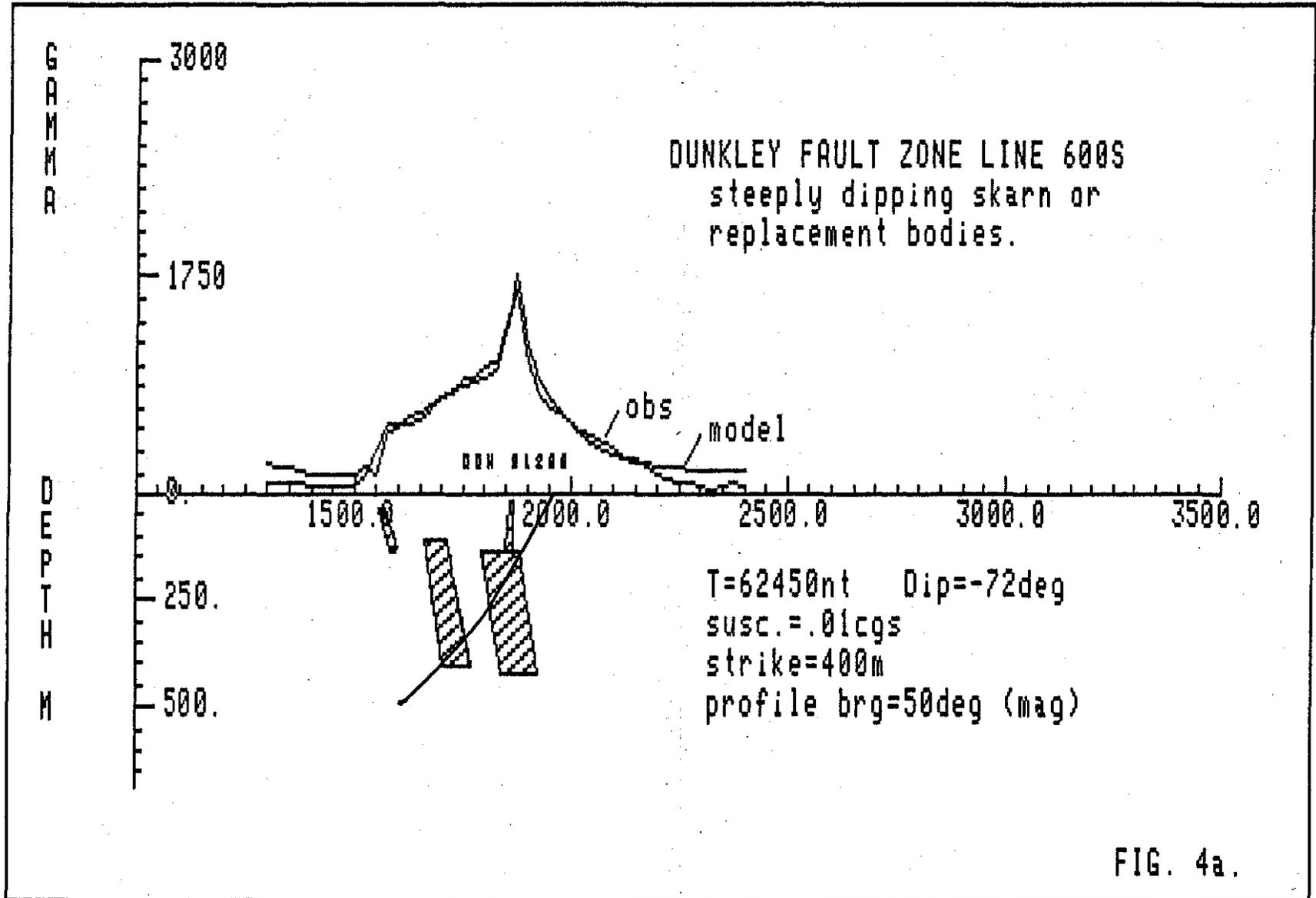
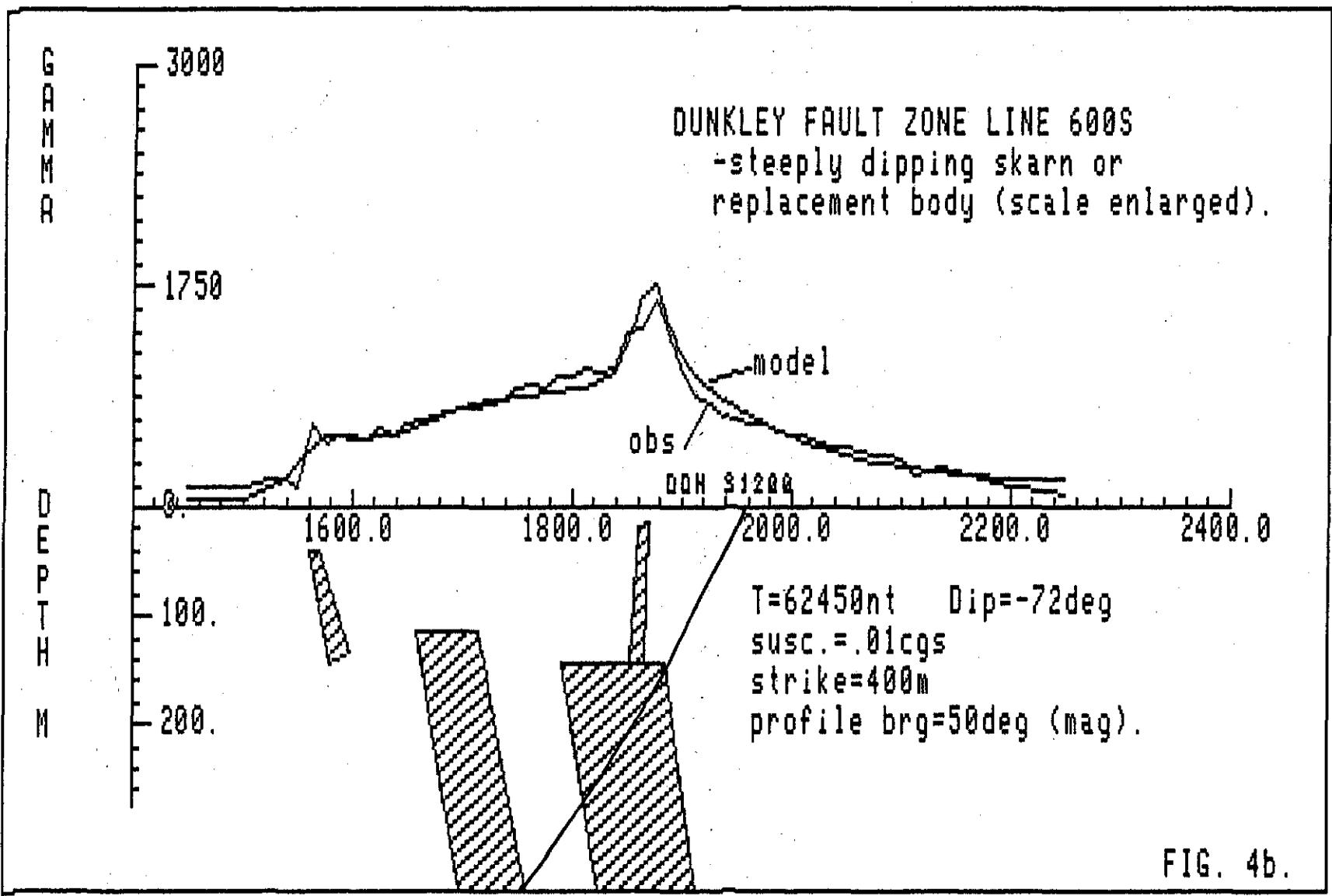


FIG. 4a.

86-2605 V.2

115



86-2605 Y.2

976126

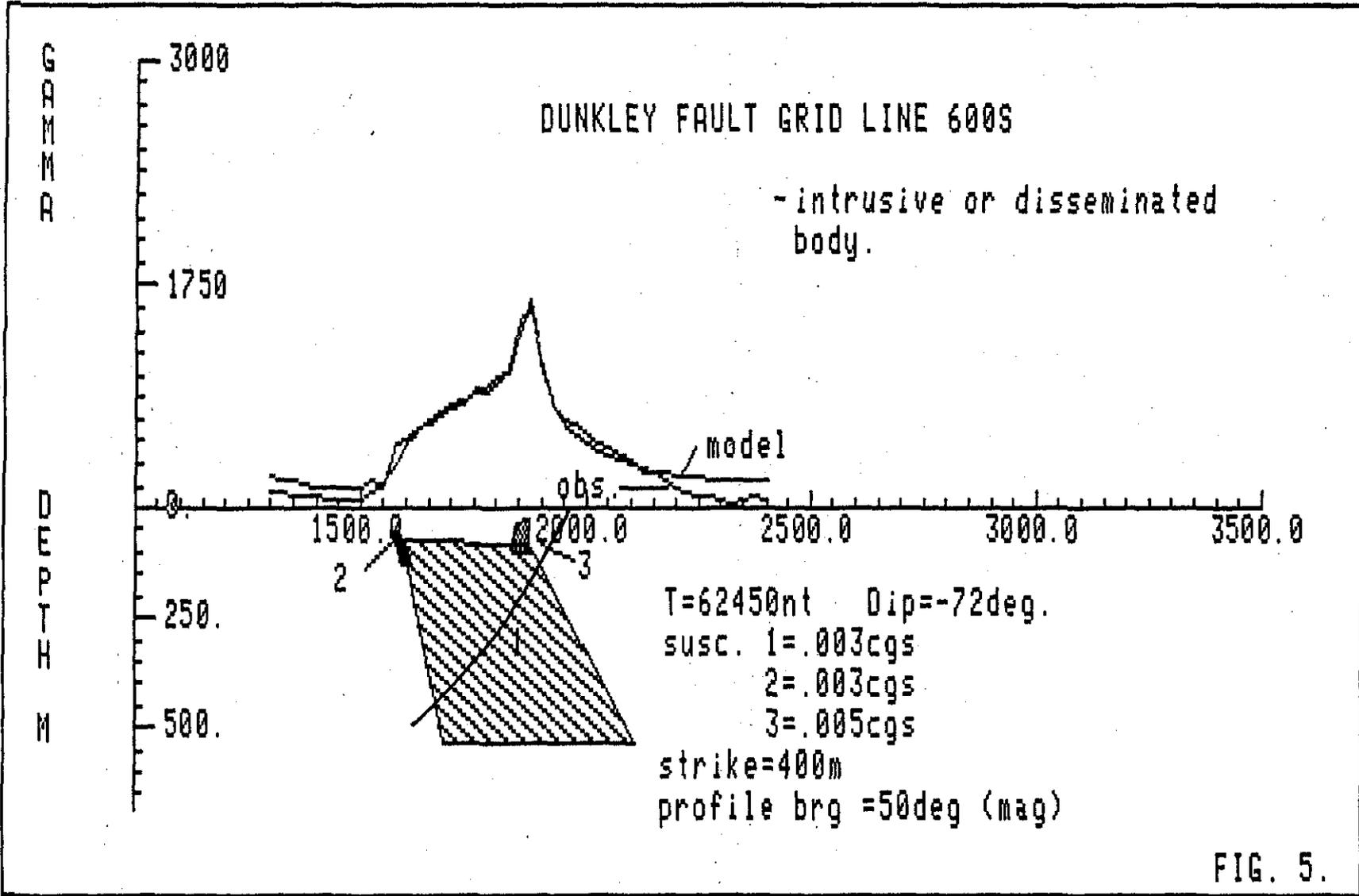


FIG. 5.

86-2605 V.2

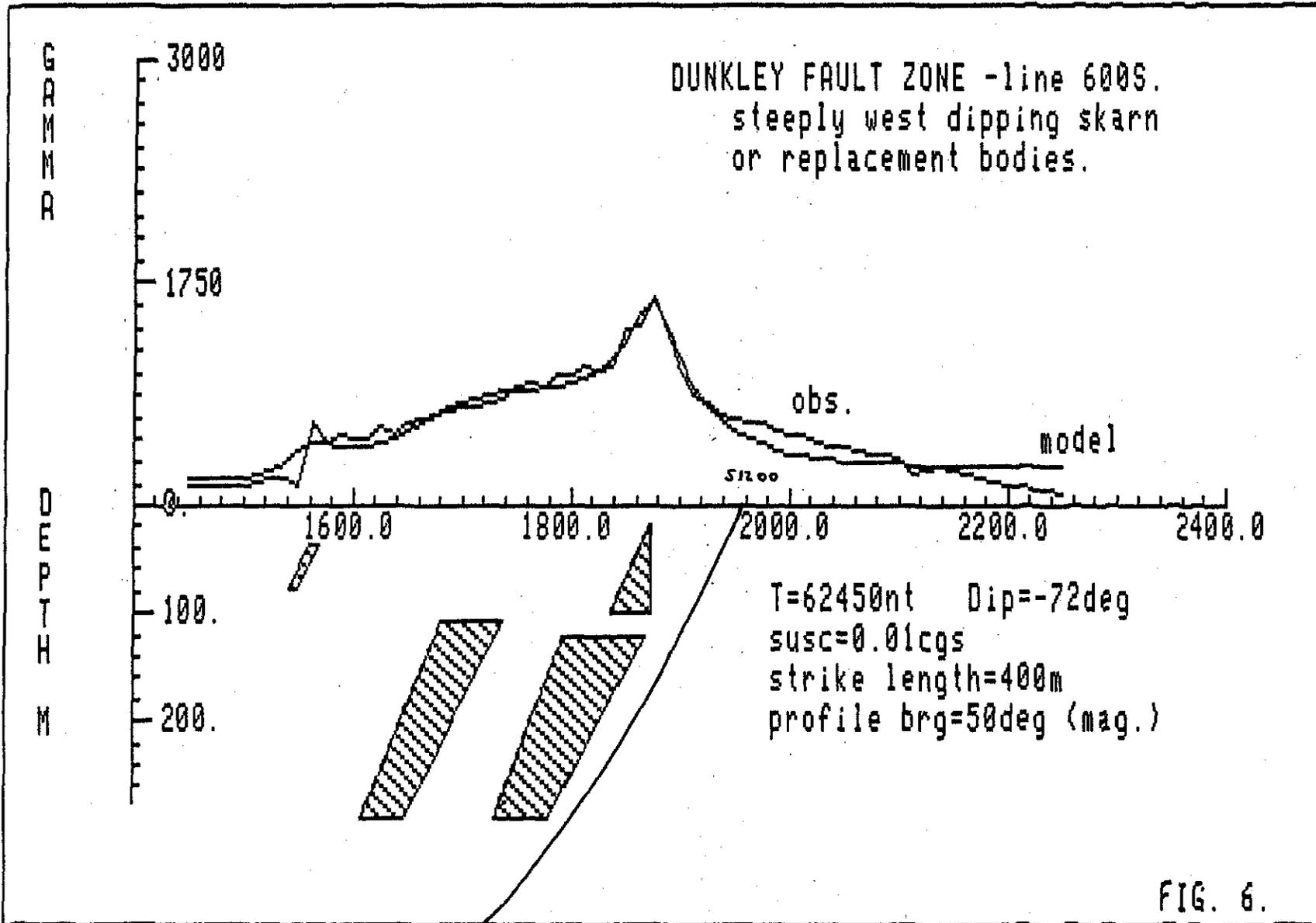


FIG. 6.

86-2605 V.2

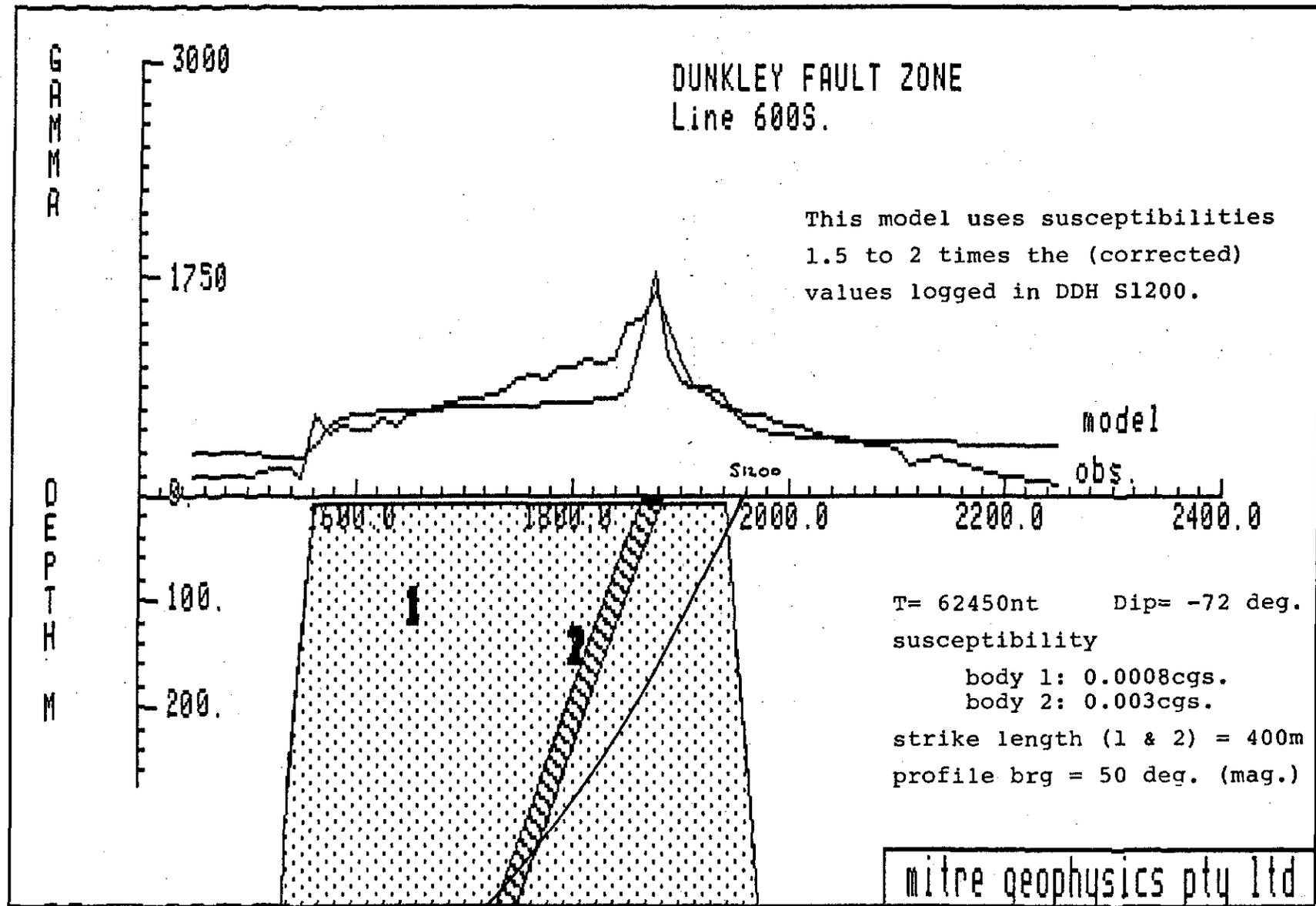
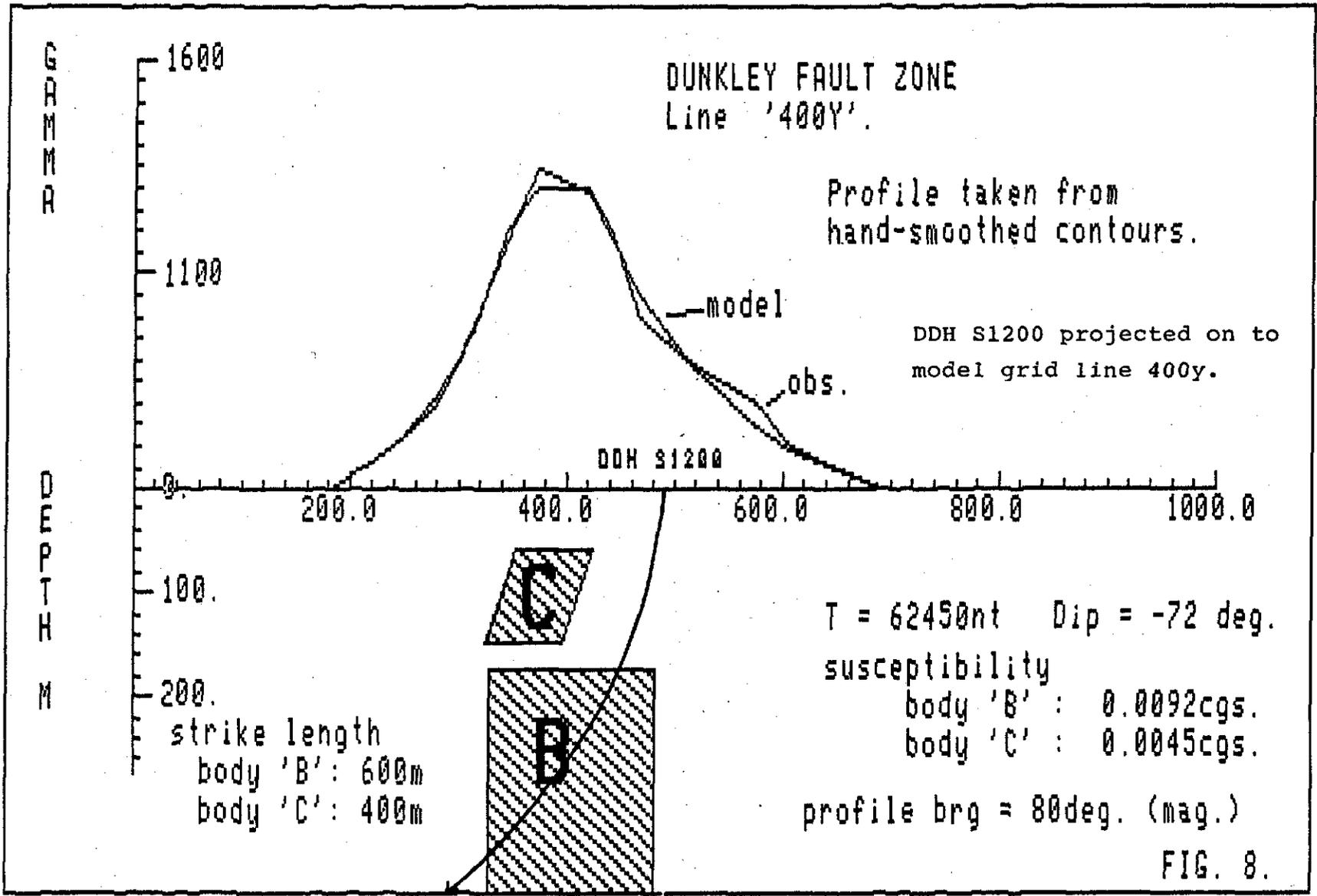


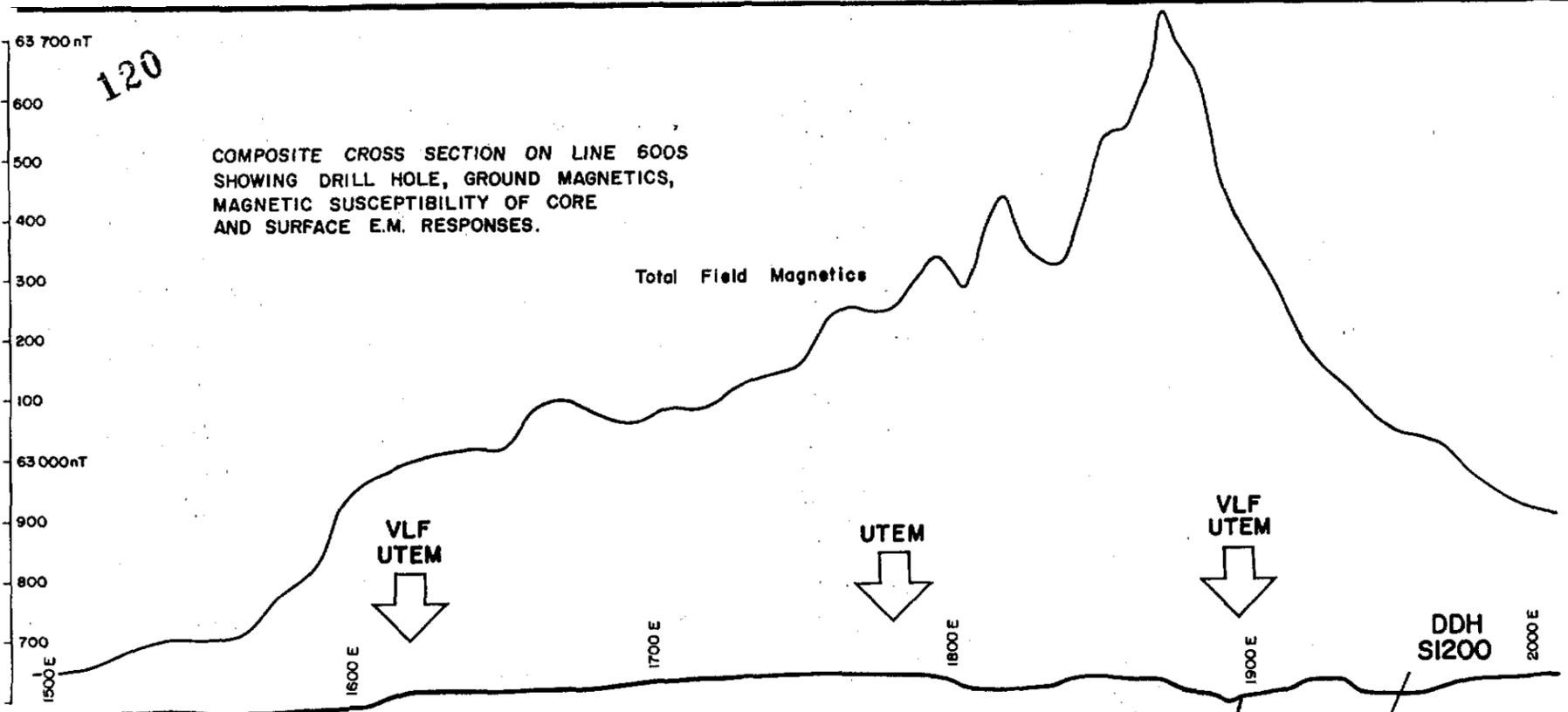
FIG. 7.

970129

86-2605 V.2



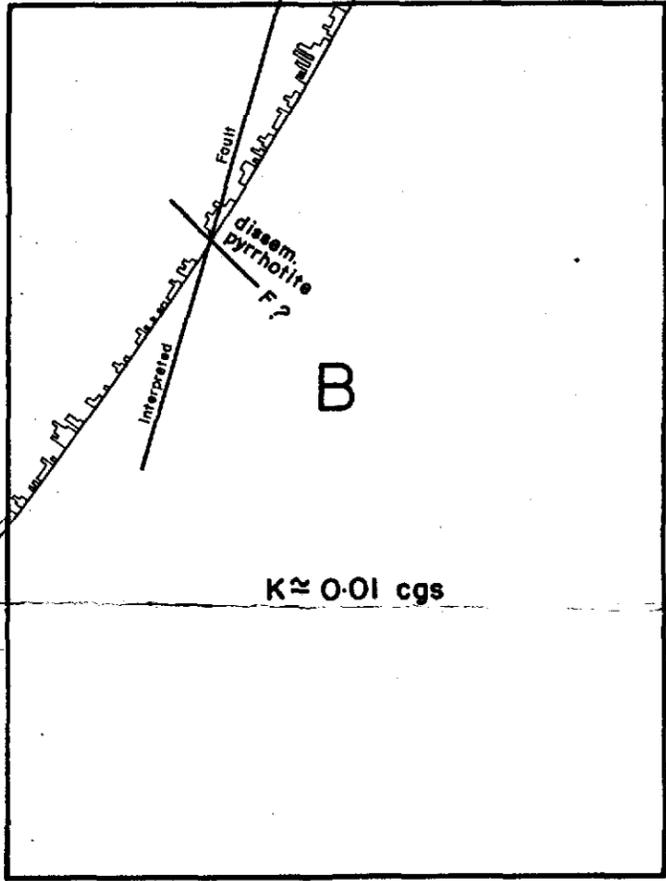
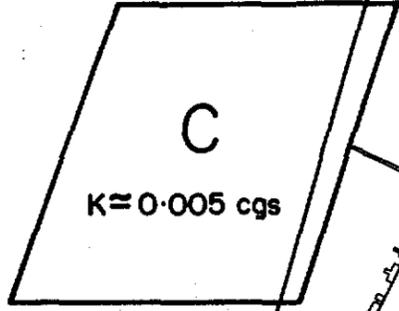
86-2605 V.2



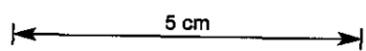
COMPOSITE CROSS SECTION ON LINE 600S
SHOWING DRILL HOLE, GROUND MAGNETICS,
MAGNETIC SUSCEPTIBILITY OF CORE
AND SURFACE E.M. RESPONSES.

Total Field Magnetics

Bodies 'B' and 'C' are
models whose responses closely
match a profile taken from
smoothed contours of the
ground magnetics data.



Magnetic Susceptibility
10mm x 1 x 10⁻³ cgs



N.B.
Susceptibility values should be
X~2 to correct for sample size.

86-2605 K2

Ref: DN/MGR5/DR

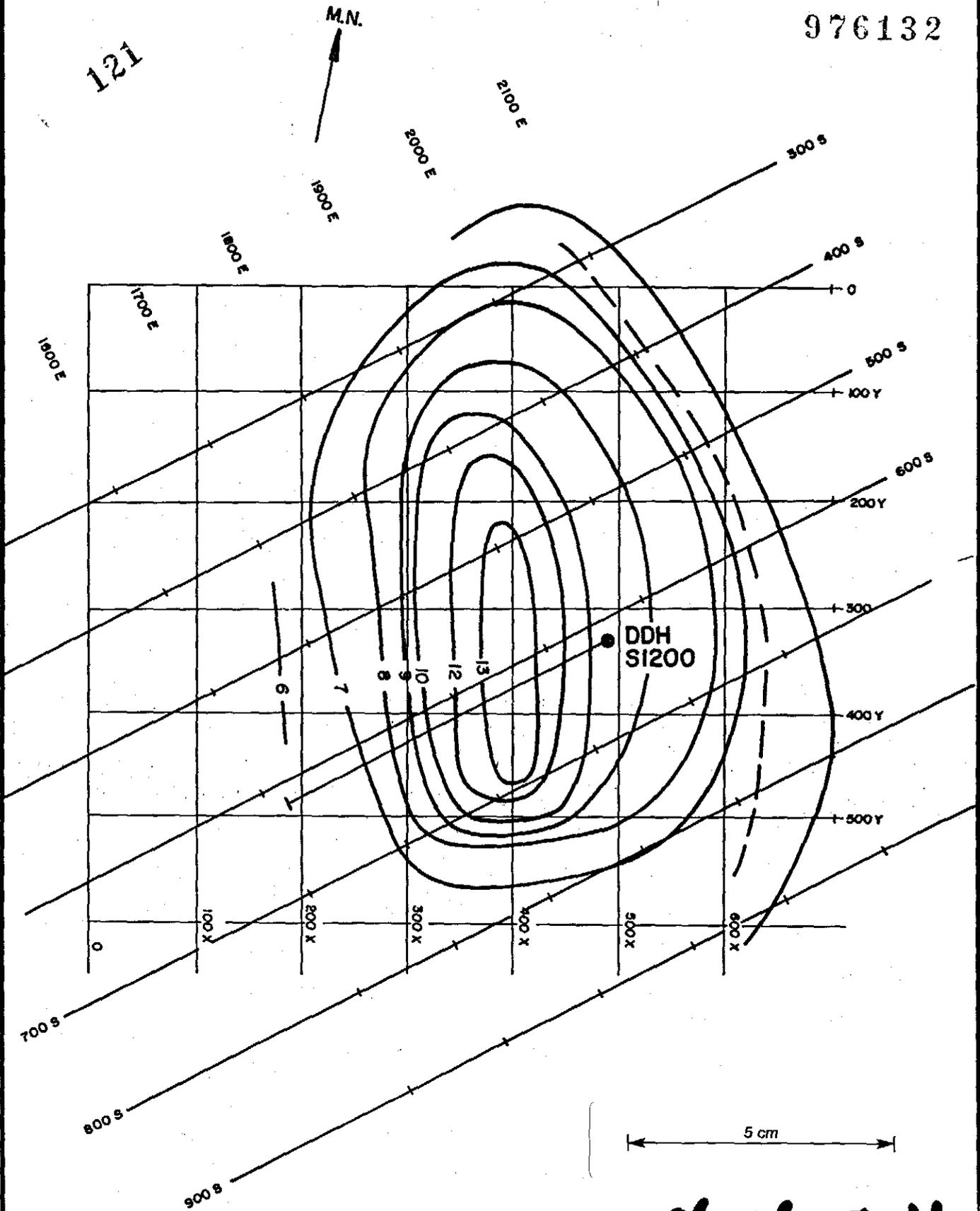
RENISON LIMITED	
Dunkley Fault Grid	DRAWN BY: J.B.
INTERPRETED CROSS-SECTION Line 600S	DRAFTSMAN: T.G.D.S.
	DATE: Aug 85
	REVISIONS:
SCALE: 1:2000	FILE NO.
20 0 20 40	Fig. 12

976131

121

976132

M.N.



Note: contours are from hand-smoothing of the ground magnetic data.

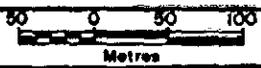
Contour Interval: 100nt

X-Y axes used for modelling, are orthogonal to the smoothed contours.

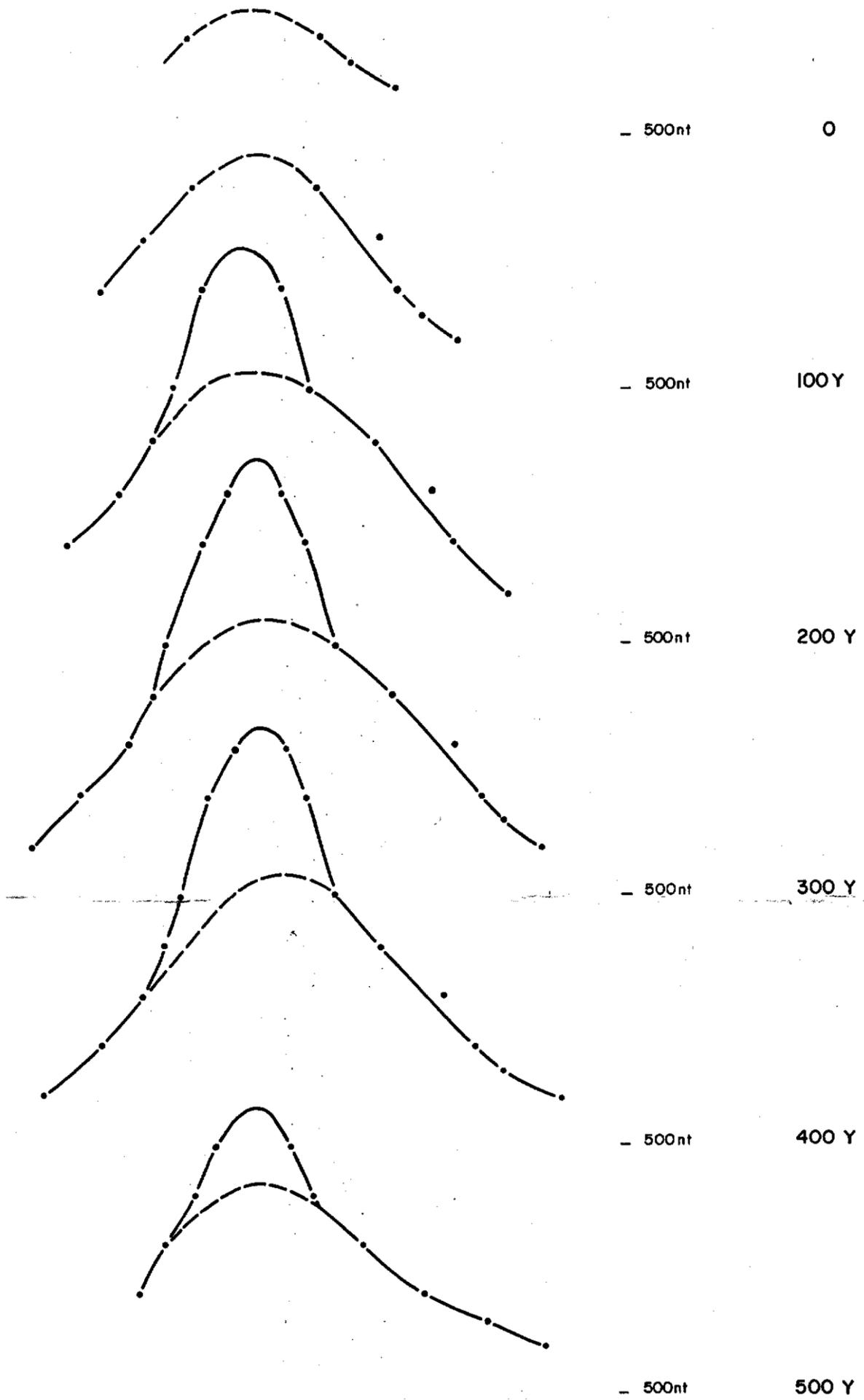
86-2605 V.2

GOLD FIELDS EXPLORATION PTY. LIMITED	
DUNKLEY FAULT GRID	DRAWN BY : J.B.
SMOOTHED CONTOURS	DRAFTSMAN: T.G.D.S.
	DATE : July 85
	REVISIONS :
	FILE NO.
SCALE 1:5000	FIG. A1

Ref: RN/MG85/08



122



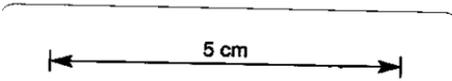
100nt
0

0 100 200 300 400 500 600 700

500nt 600 Y

Note : These profiles have been taken from the smoothed contours shown in figure A1.

----- interpolated deep source



86-2605 V.3

GOLD FIELDS EXPLORATION PTY. LIMITED	
DUNKLEY FAULT GRID	DRAWN BY : J.B.
Profiles from the Smoothed Contours	DRAFTSMAN: T.G.D.S.
	DATE : July 88
	REVISIONS :
	FILE NO.
SCALE 1:5000	FIG. A2

976133

123

Model Parameters

175m x 600m x 255m
 wide long deep
 depth to top : 185m
 altitude : 160° mag
 susceptibility : .0092 (cgs)

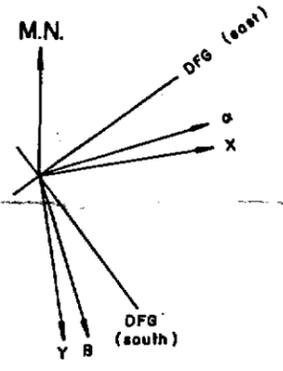
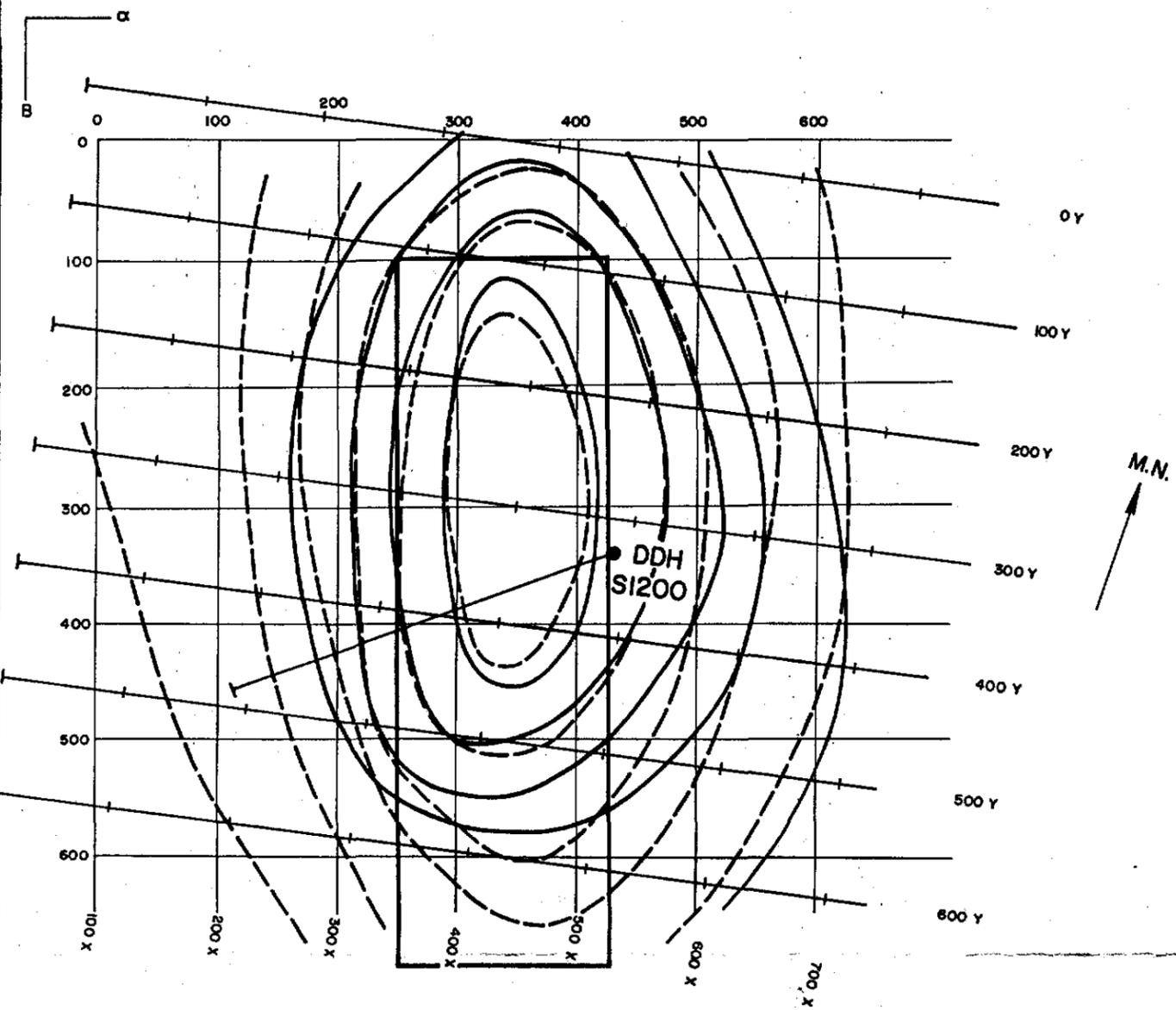
N.B. Modelling was done in α -B axes which are rotated 7° from the X-Y axes used to produce the profile.

Co-ordinates

$\alpha 1 = 258$ $\alpha 2 = 433$
 $B 1 = 50$ $B 2 = 650$
 $Z 1 = 185$ $Z 2 = 440$
 $K = .0092$ (cgs)
 $T = 62450$ Inc. = -72°
 Dip = 90° $\angle \alpha$ to profile = 0°
 \angle M.Nth to prism strike (X) = 161°

Note: The interpolated contours were taken from the 'deep source' section of the profiles shown in Figure A2.

— contours of 'deep section' of profiles in Figure A2.
 - - - contours due to modelled source

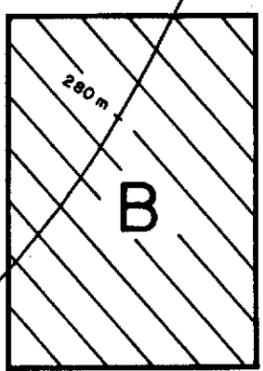


Relationship between Dunkley Fault Grid and modelling axes.

DDH S1200

0 100X 200X 300X 400X 500X 600X 400 B

DDH S1200 projected onto model grid line 400B.

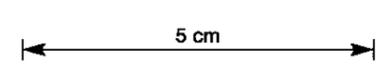


SECTION THROUGH 400B

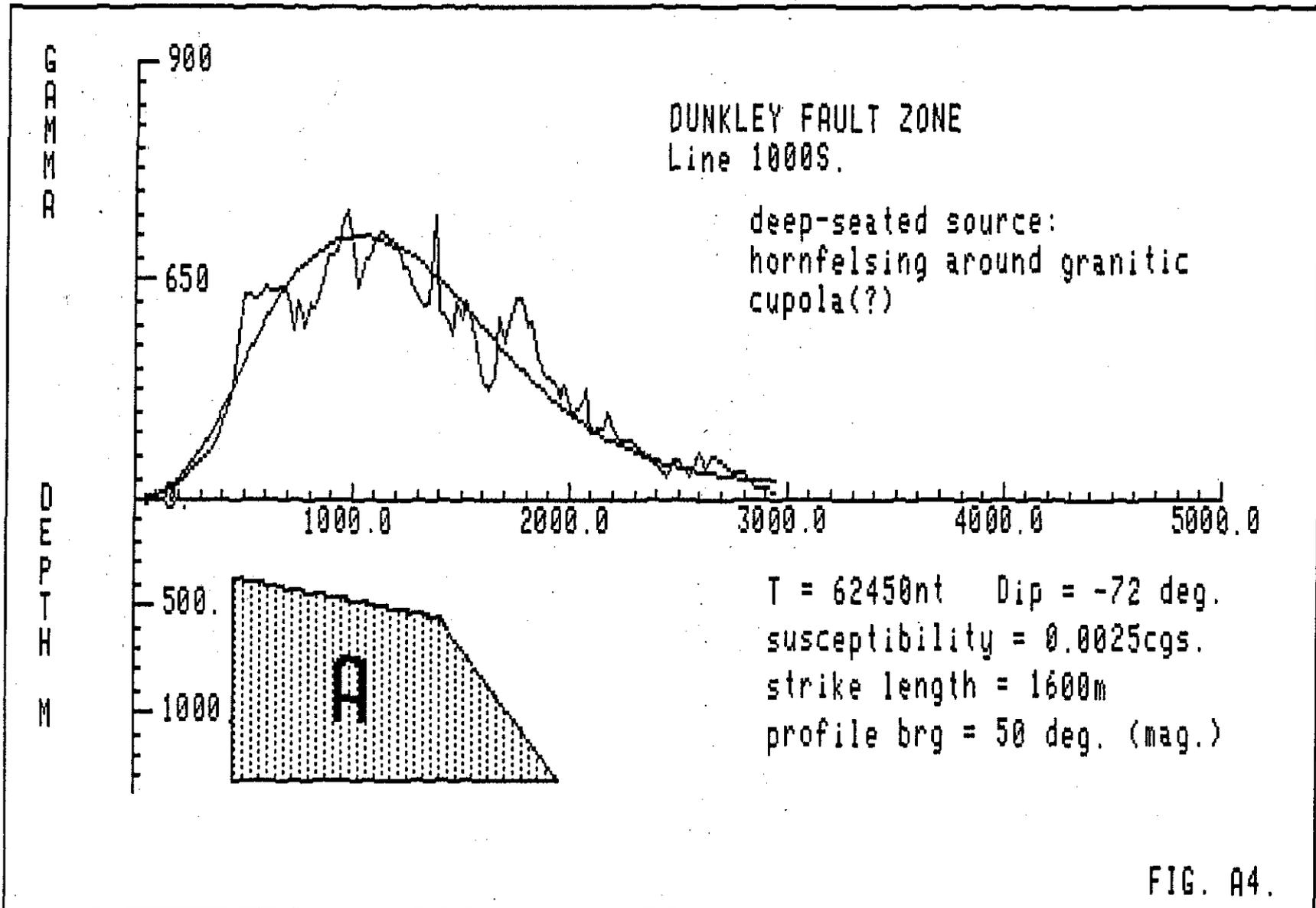
86-2605 V2

Ref: RN/MG85/08

970104



GOLD FIELDS EXPLORATION PTY. LIMITED	
Dunkley Fault Grid	DRAWN BY : J.B.
Modelled and interpolated contours for the deep source (body 'B')	DRAFTSMAN: T.G.D.S.
	DATE : July 86
	REVISIONS :
	FILE NO.
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	FIG. A3



86-2605 v.2

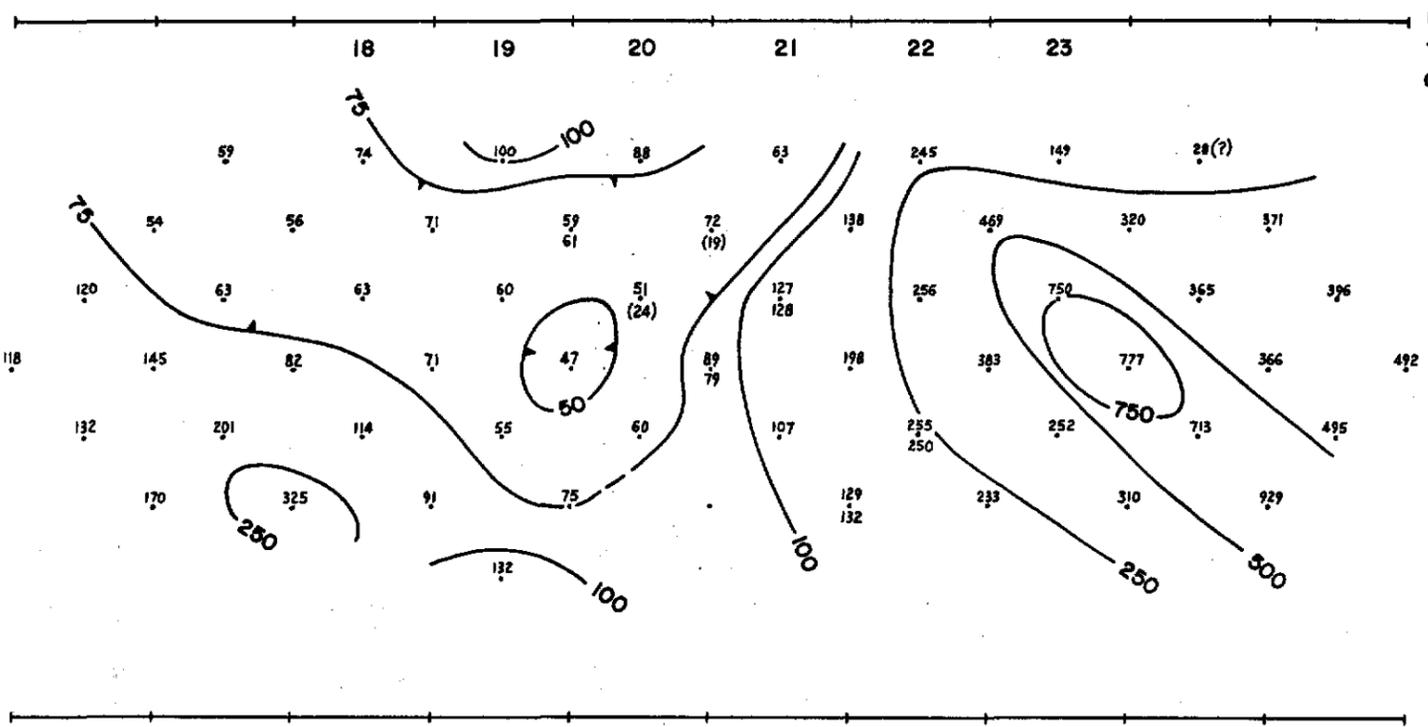
0 125

1650 E 1700 E 1750 E 1800 E 1850 E 1900 E 1950 E 2000 E 2050 E 2100 E 2150 E position

(arbitrary)
Transmitting
dipole nos.

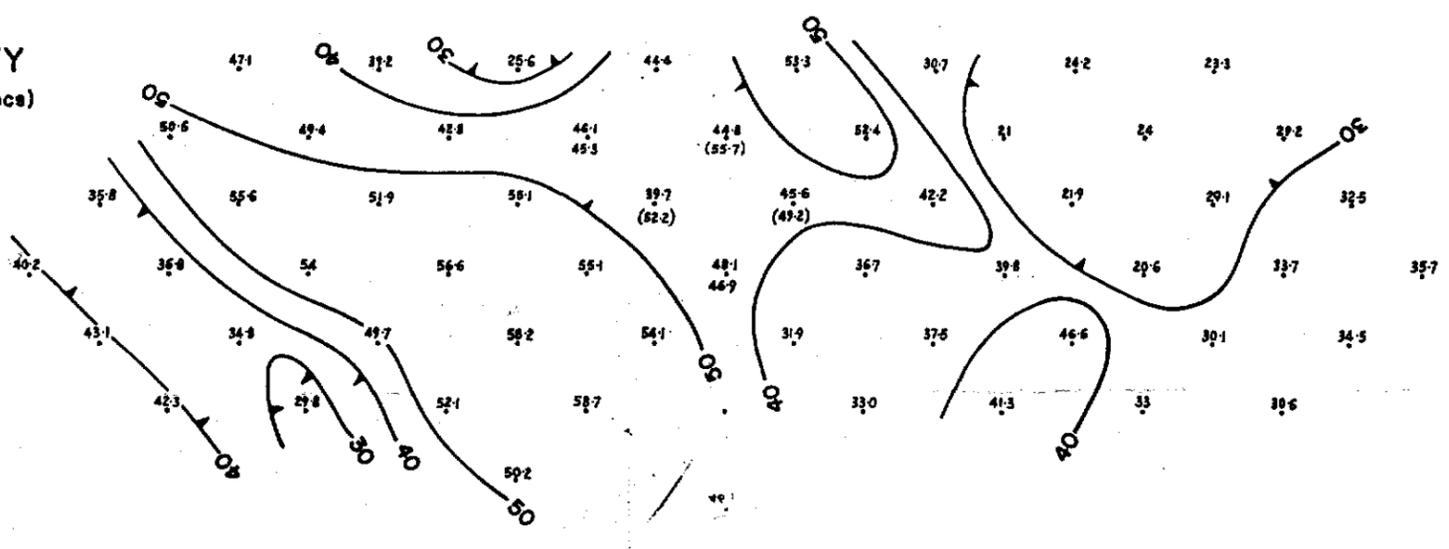
RESISTIVITY

ohm - m



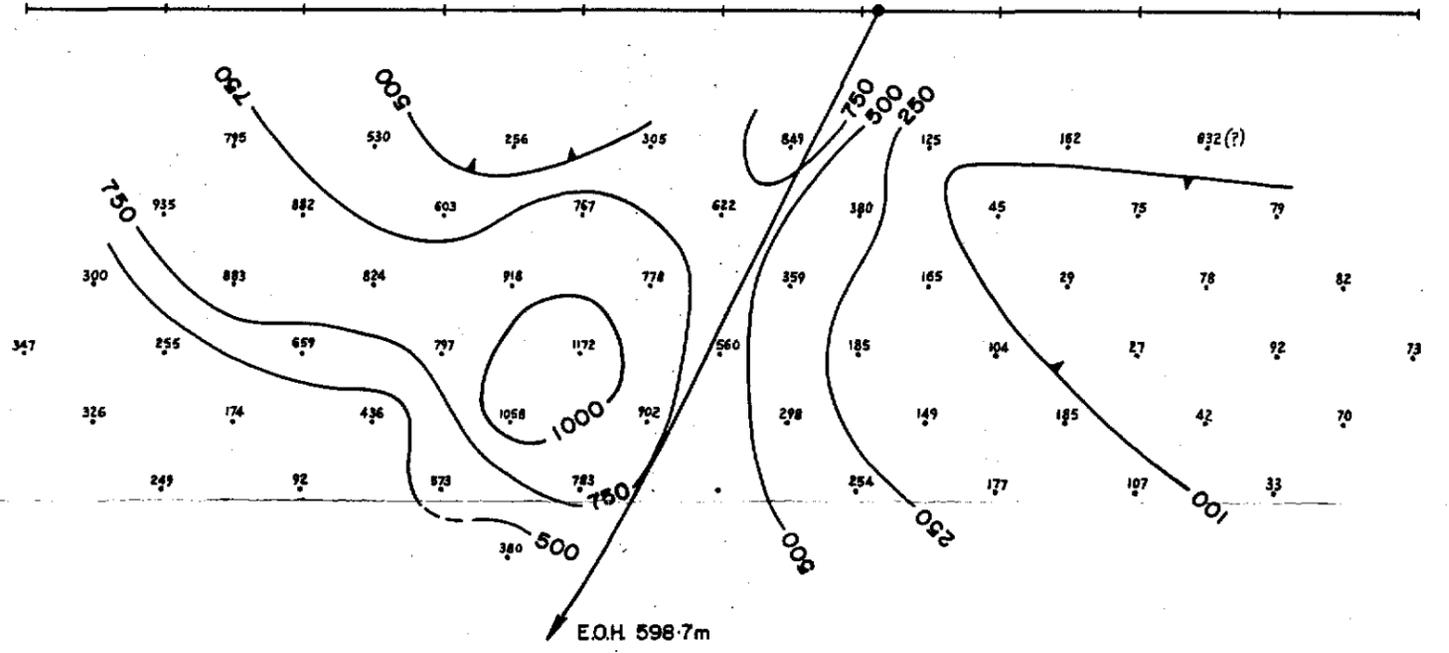
CHARGEABILITY

(50 msec - 1550 msec)



DDH S1200

METAL FACTOR



E.O.H 598.7m

5 cm

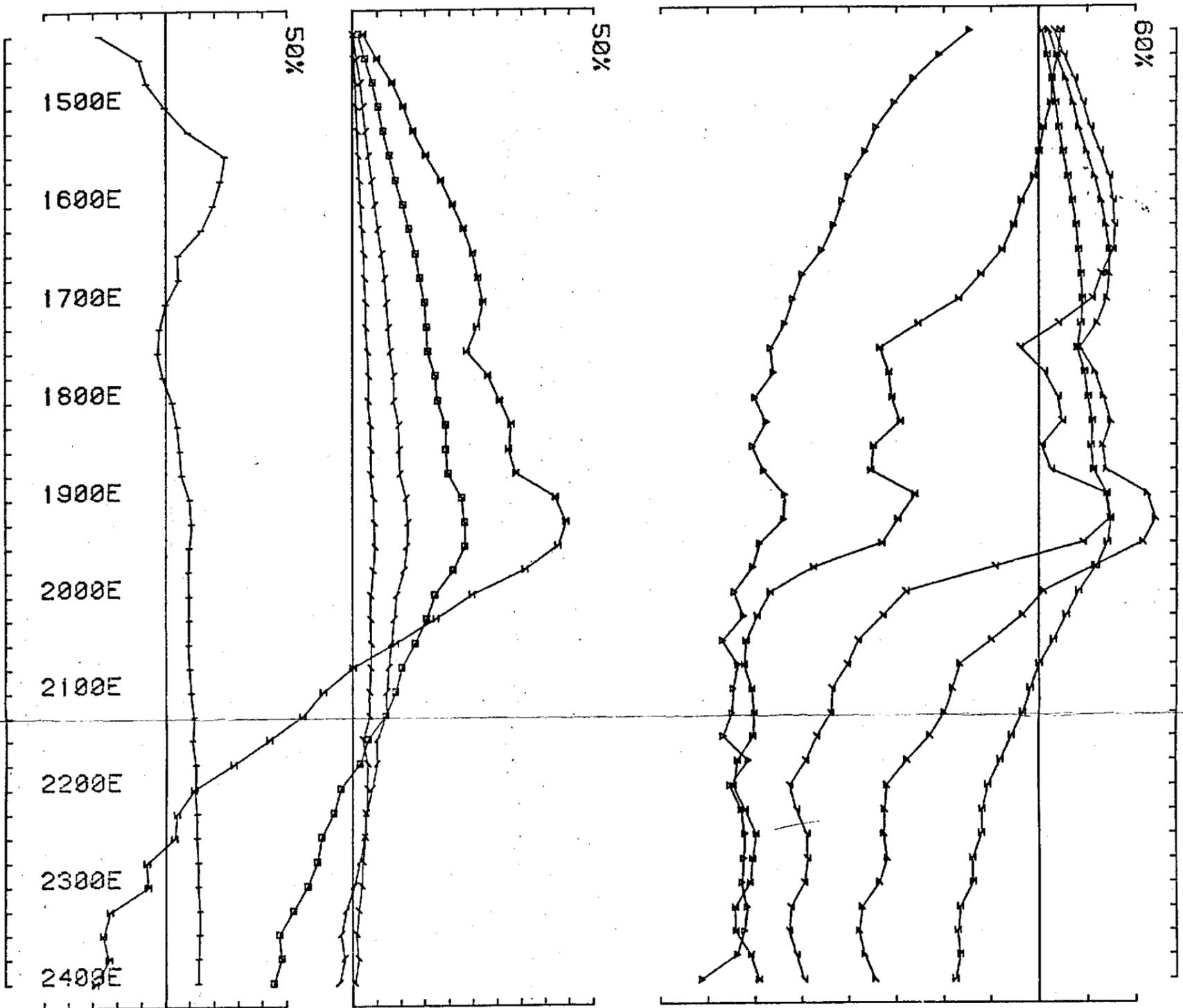
Survey by : Mitre Geophysics
 Date : August, 1985
 Receiver : Hunter MkIV, 8 sec period.
 50 msec delay, 150 msec window

976136

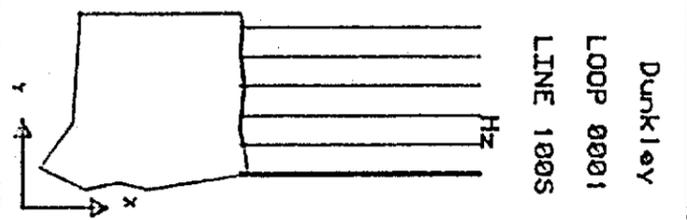
RENISON LIMITED	
Dunkley Fault Grid	DRAWN BY : J.B.
DIPOLE-DIPOLE IP	DRAFTSMAN: T.G.D.S.
Line 620S	DATE : Aug 85
	REVISIONS :
	FILE NO.
SCALE 1:2500	Fig. A5

86-2605 V.2

Ref: RN/MG85/08

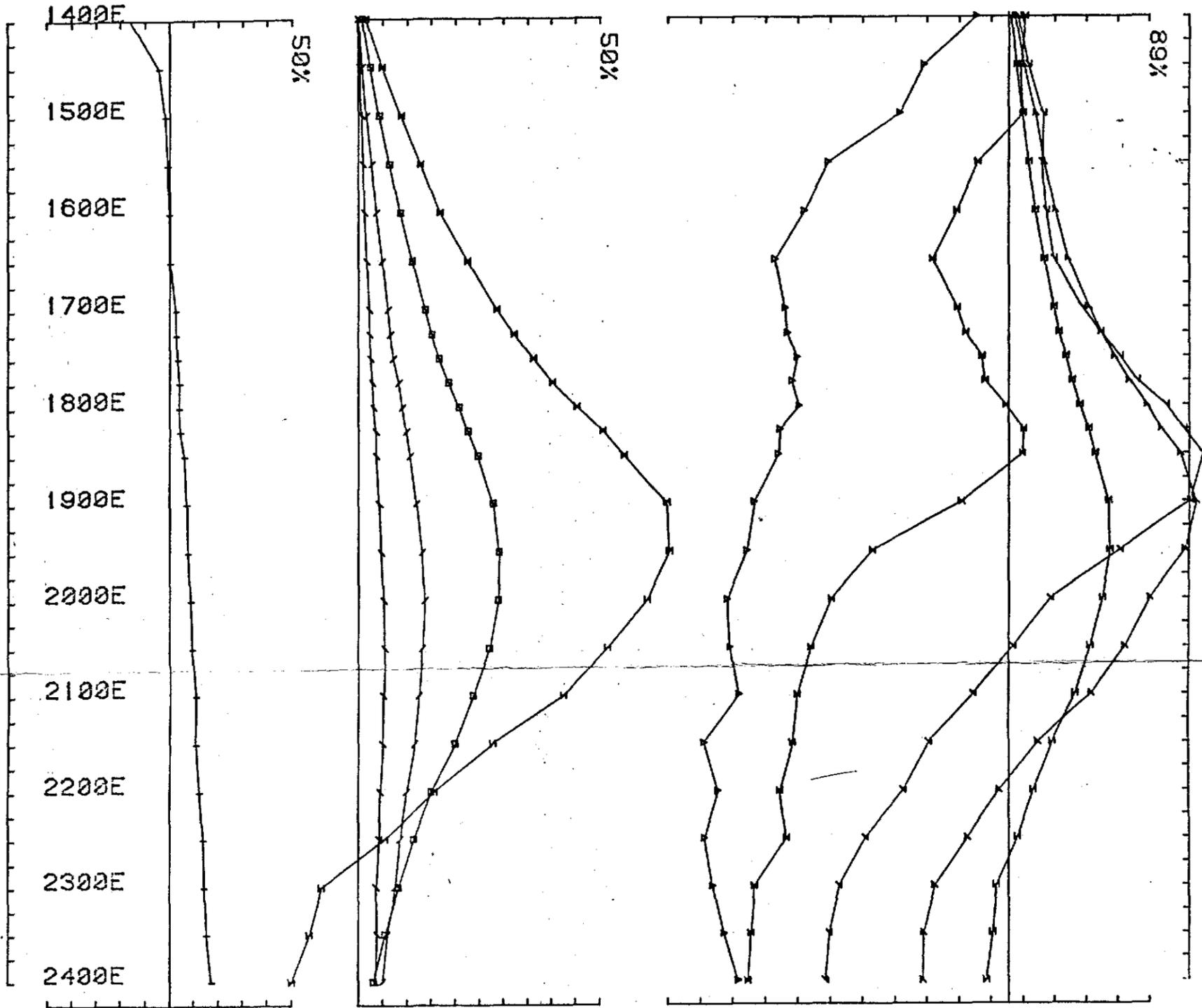


LAMONTAGNE GEOPHYSICS UTEM SURVEY Job 8503
 conducted by PMM DA Survey for Renison
 component: Hz base freq(hz) 26.230
 SECONDARY FIELD CONTINUOUS Ch 1 NORMALIZATION

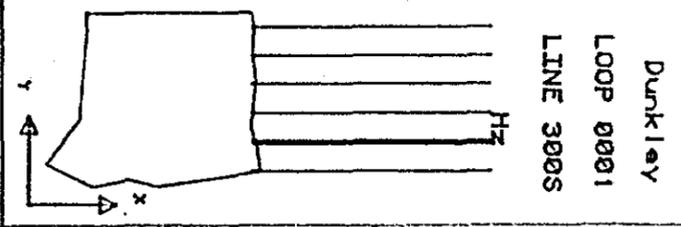


86-2605 V.2

127

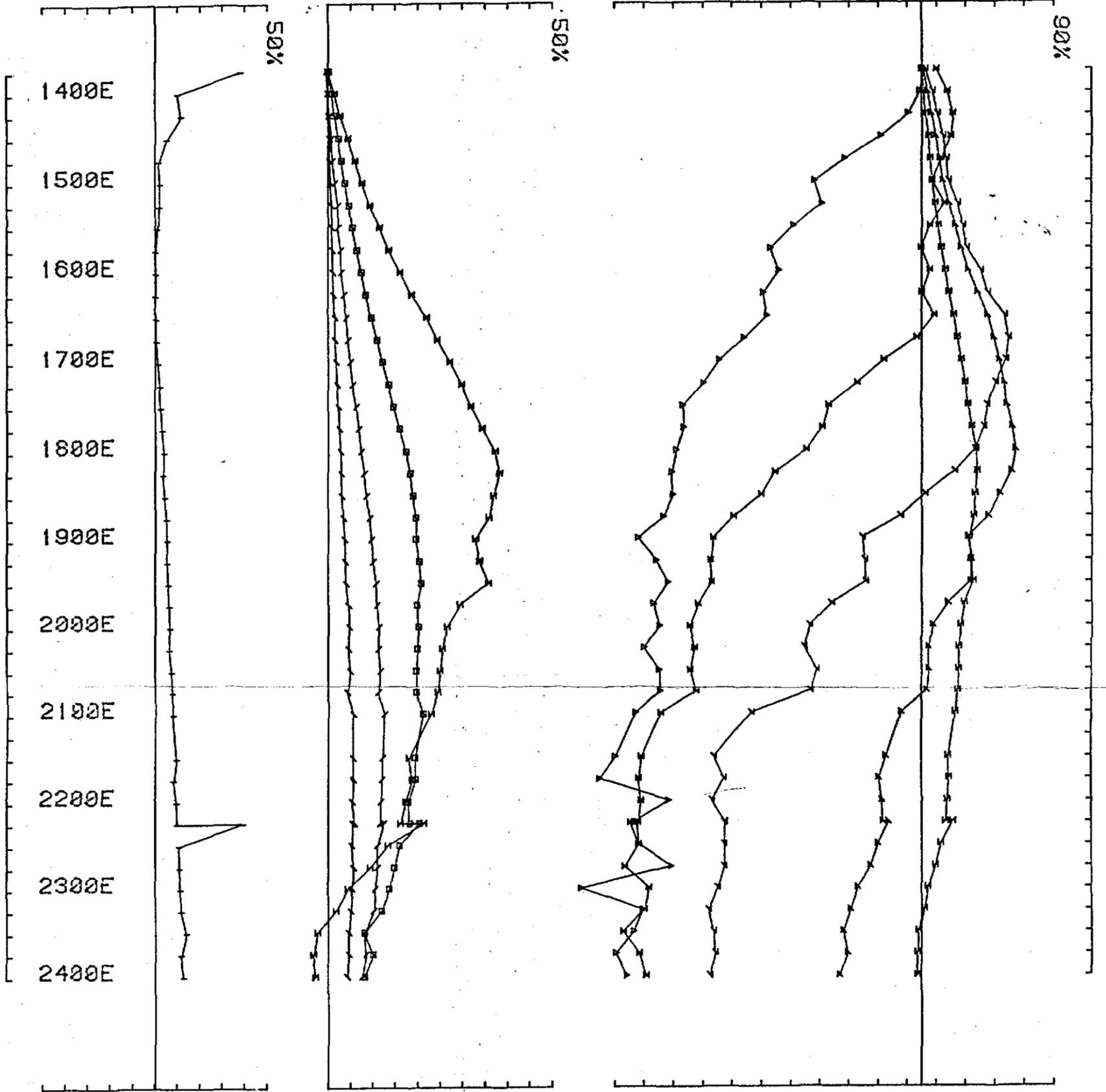


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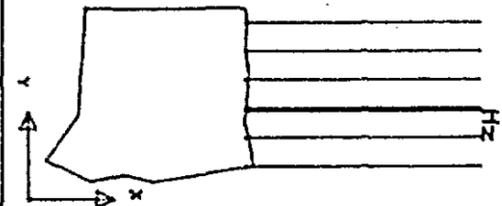


86-2605 V.2

976138



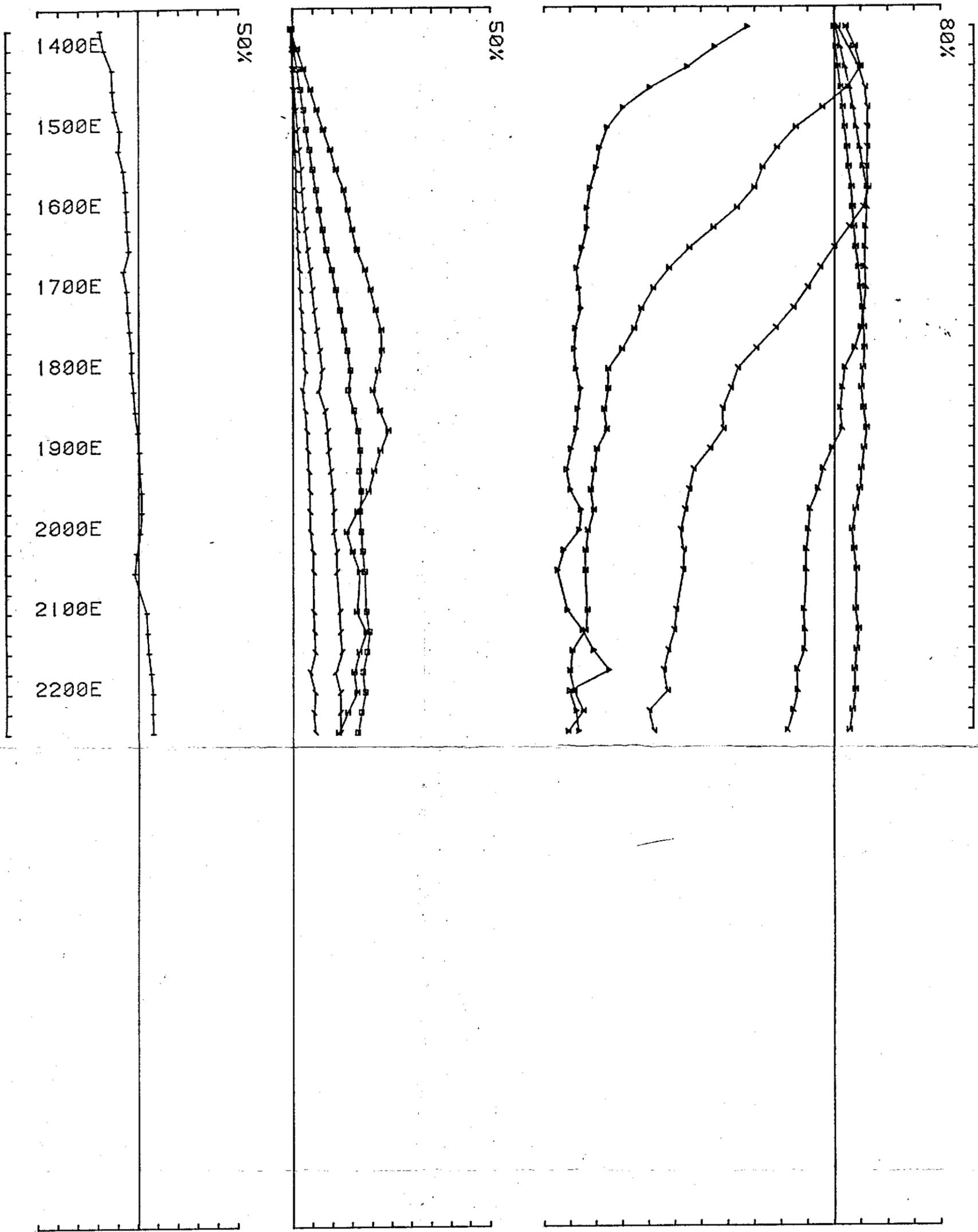
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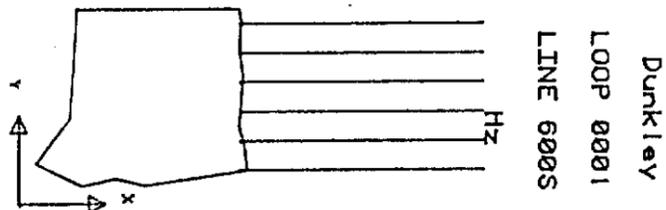
Dunkley
 LOOP 0001
 LINE 500S

86-2605 V.2

129



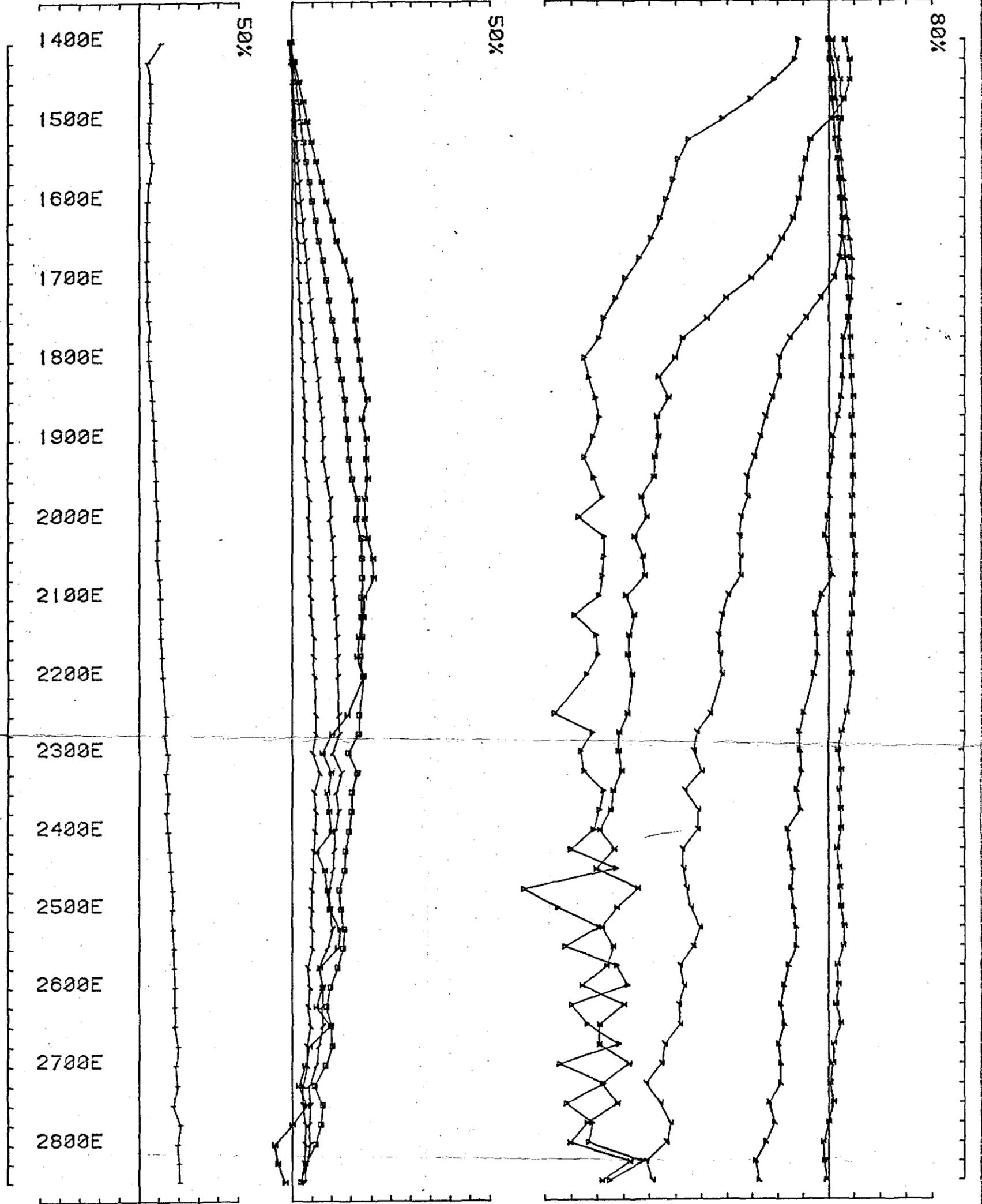
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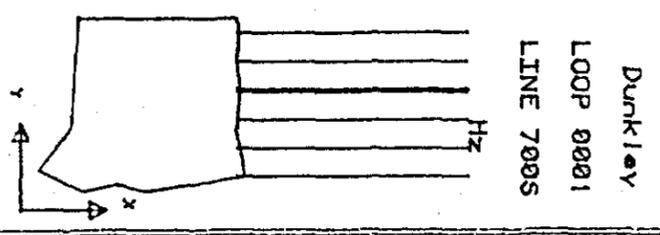
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976140

130



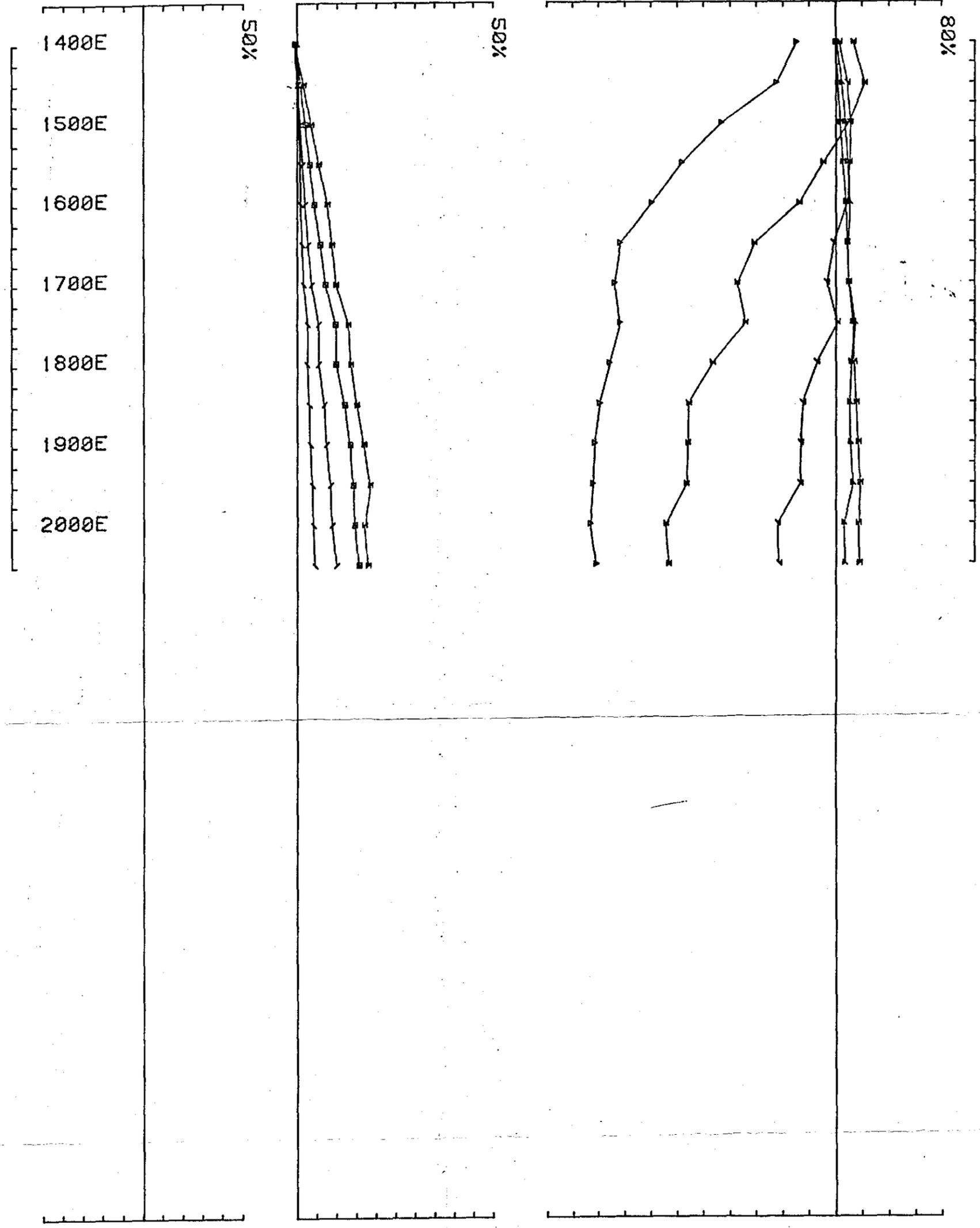
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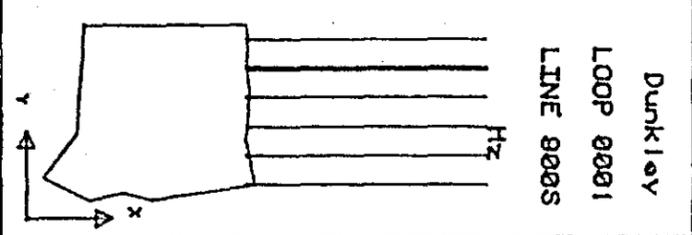
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976141

131

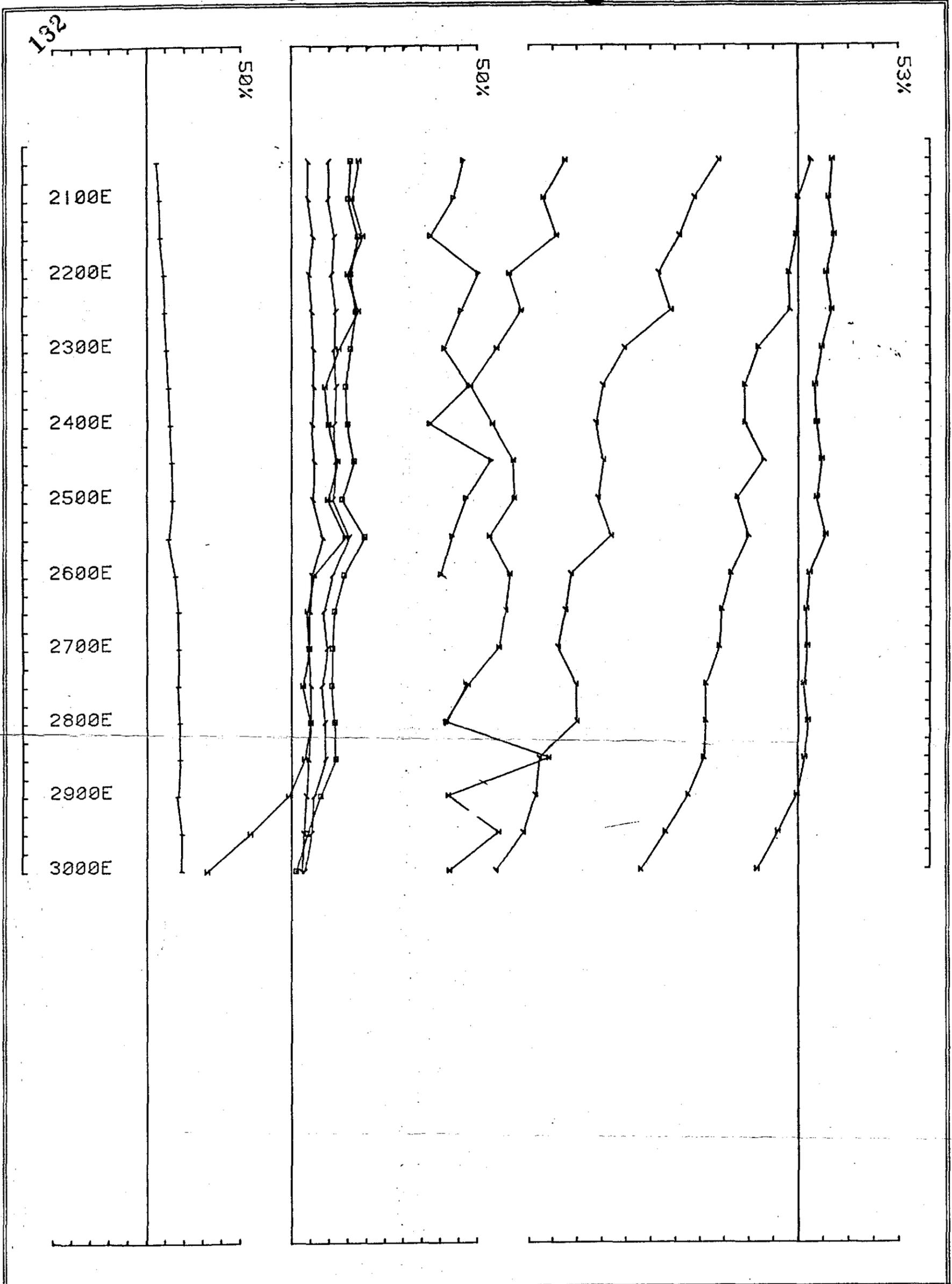


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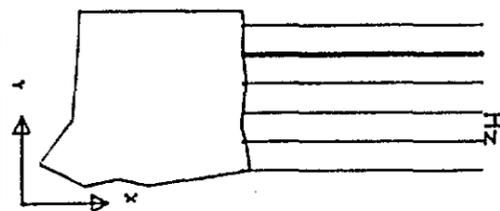


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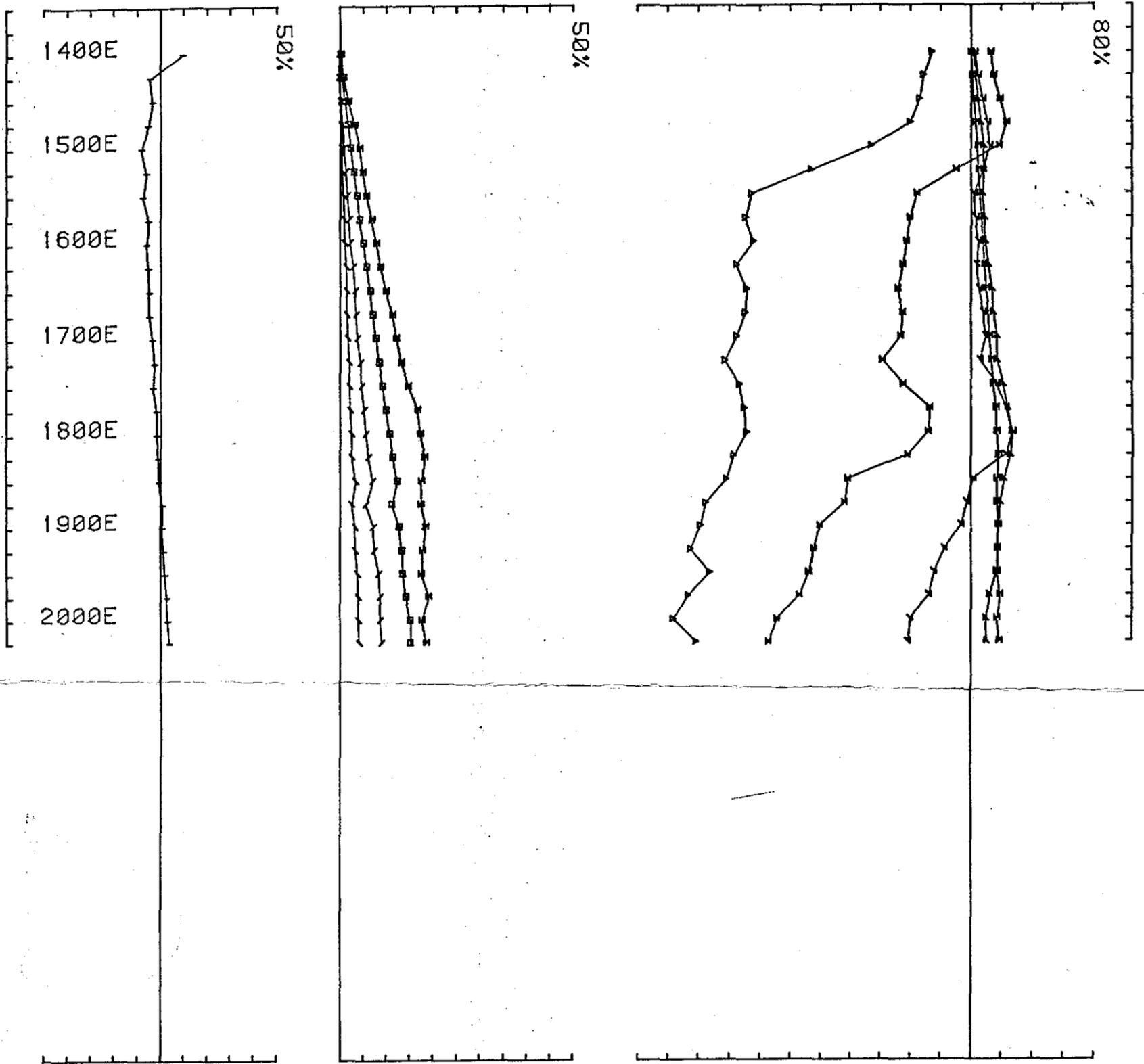


Dunkley
 LOOP 0001
 LINE 9005

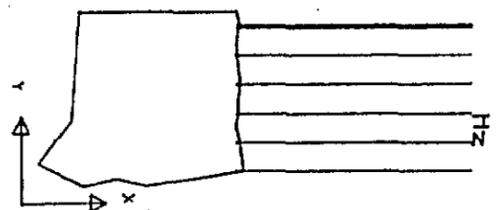
86-2605 V.2

976143

133



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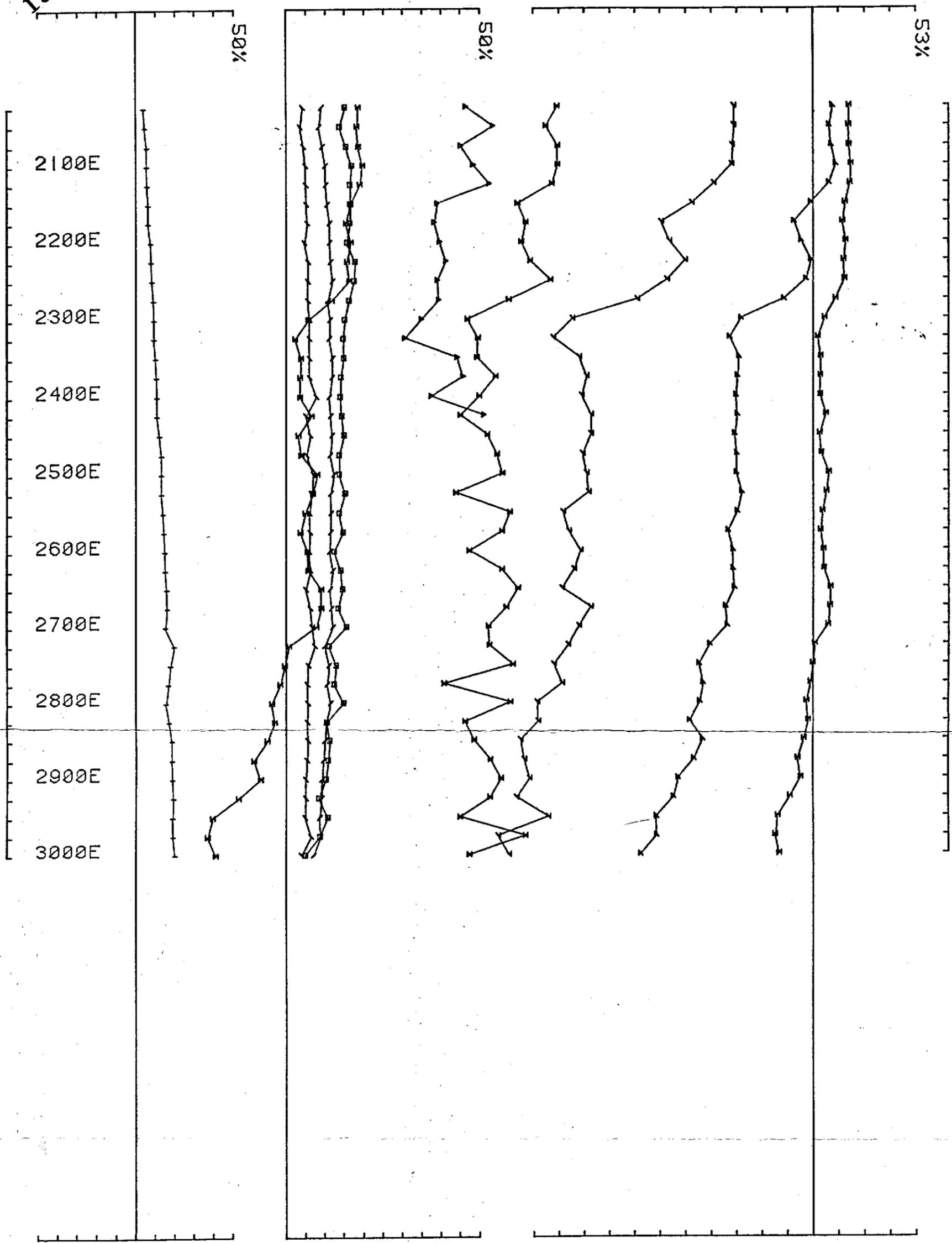


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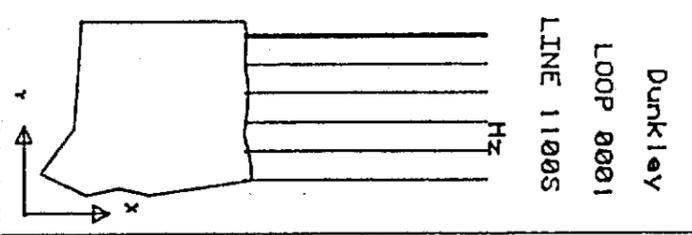
86-2605 V.2

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134



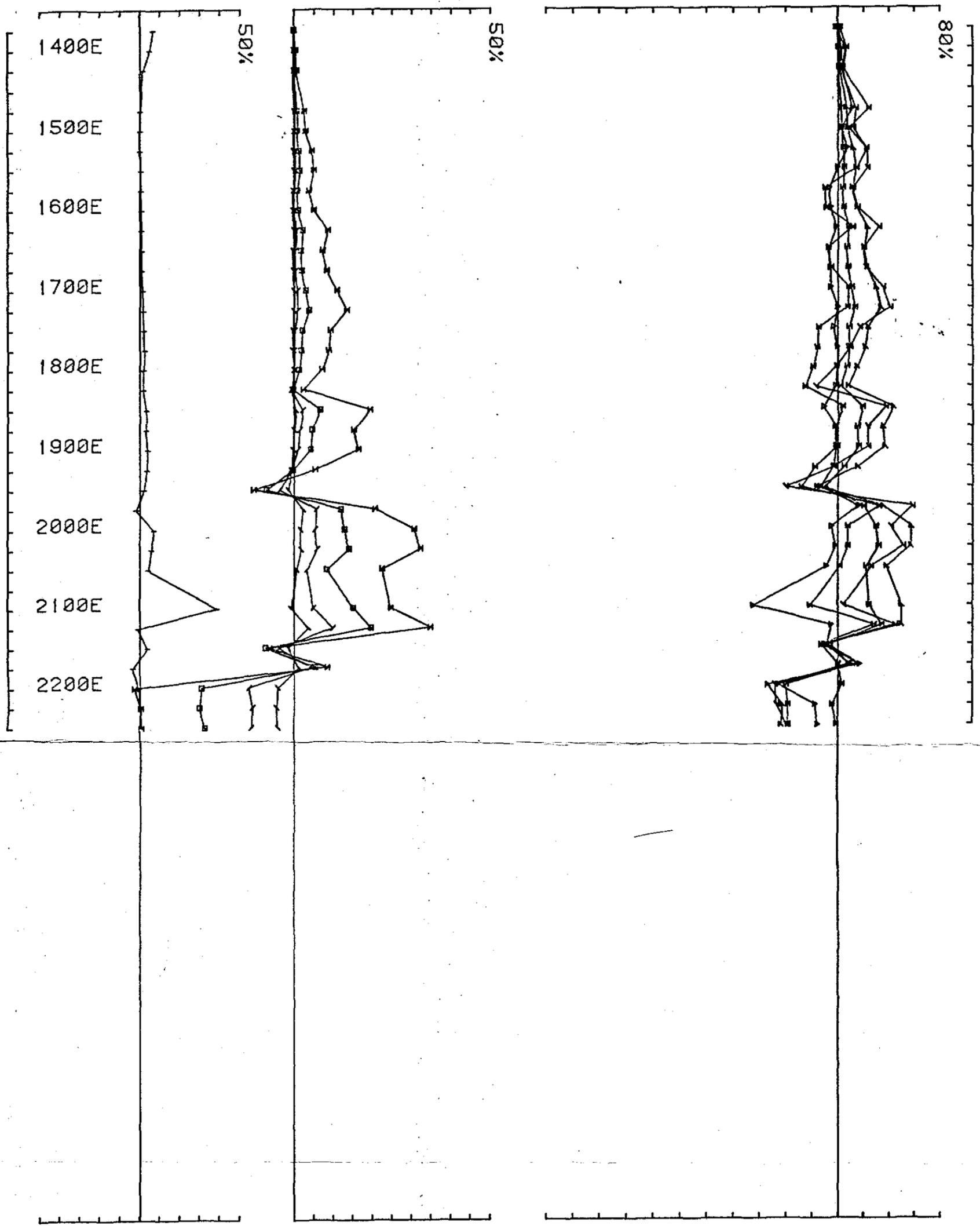
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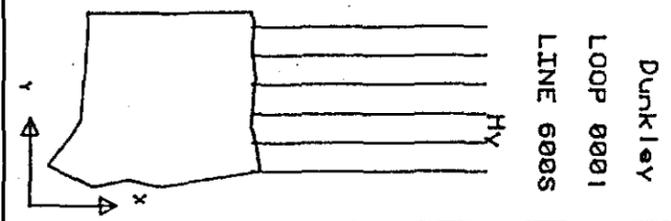
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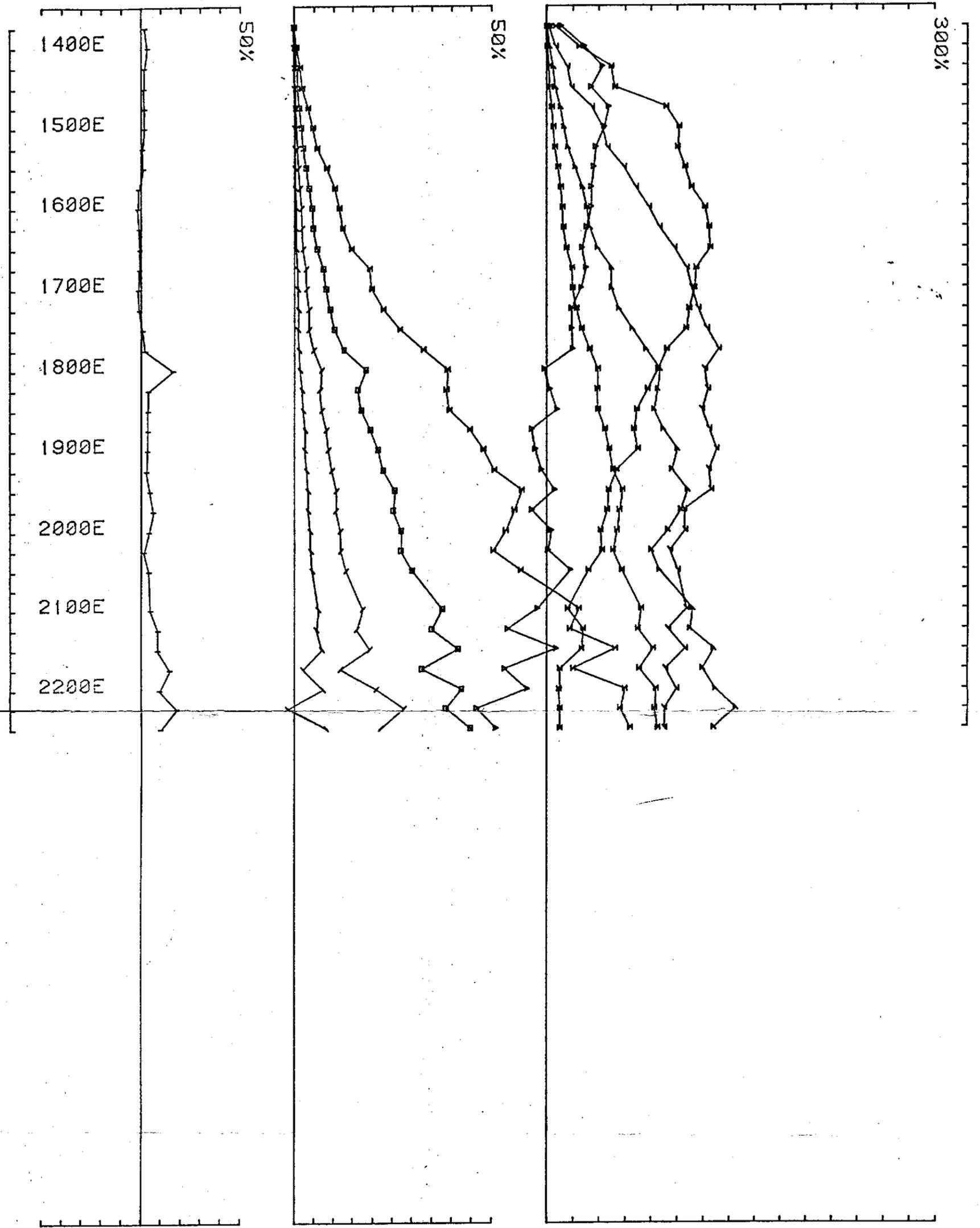
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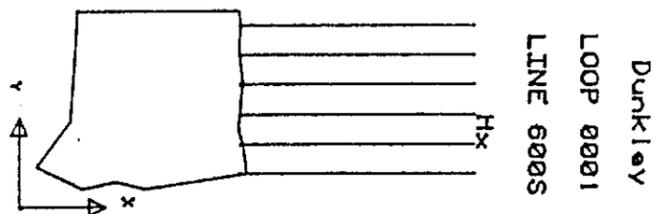
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LAMONTAGNE GEOPHYSICS UTEM SURVEY Job 8503
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 component Hx base freq(hz) 26.230
 SECONDARY FIELD CONTINUOUS Ch 1 NORMALIZATION



Dunkley
 LOOP 0001
 LINE 0005

86-2605 V.2

976147



Contour Intervals (2)
(for actual value add 62000 ft)

375
400
425
450
500
550
600
650
700
800
900
1000
1200
1400

Two base stations used for this survey, labeled ① and ②. Base station tracks set at 6250 and 6150 ft.



976148
5cm

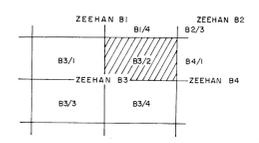
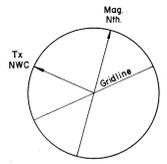
RENISON LIMITED
ZEEHAN B3/2
TOTAL FIELD GROUND MAGNETICS

GEOLOGIST	DJK	SCALE	1:500 METRES
DRAUGHTSMAN			
DATE	AUG '84		
REVISIONS			

6396 FIG 3



NOTES:
 survey date : Jan-Feb, 1984
 receiver : Phoenix VLF-2
 stn spacing : 25m
 Data filtered by a modified Fraser Filter
 $F_3 = (2/3\theta_1 + 4/3\theta_2) - (1/3\theta_4 + 2/3\theta_5)$
 where θ_i etc. are the observed dip angles
 and F is the filtered value



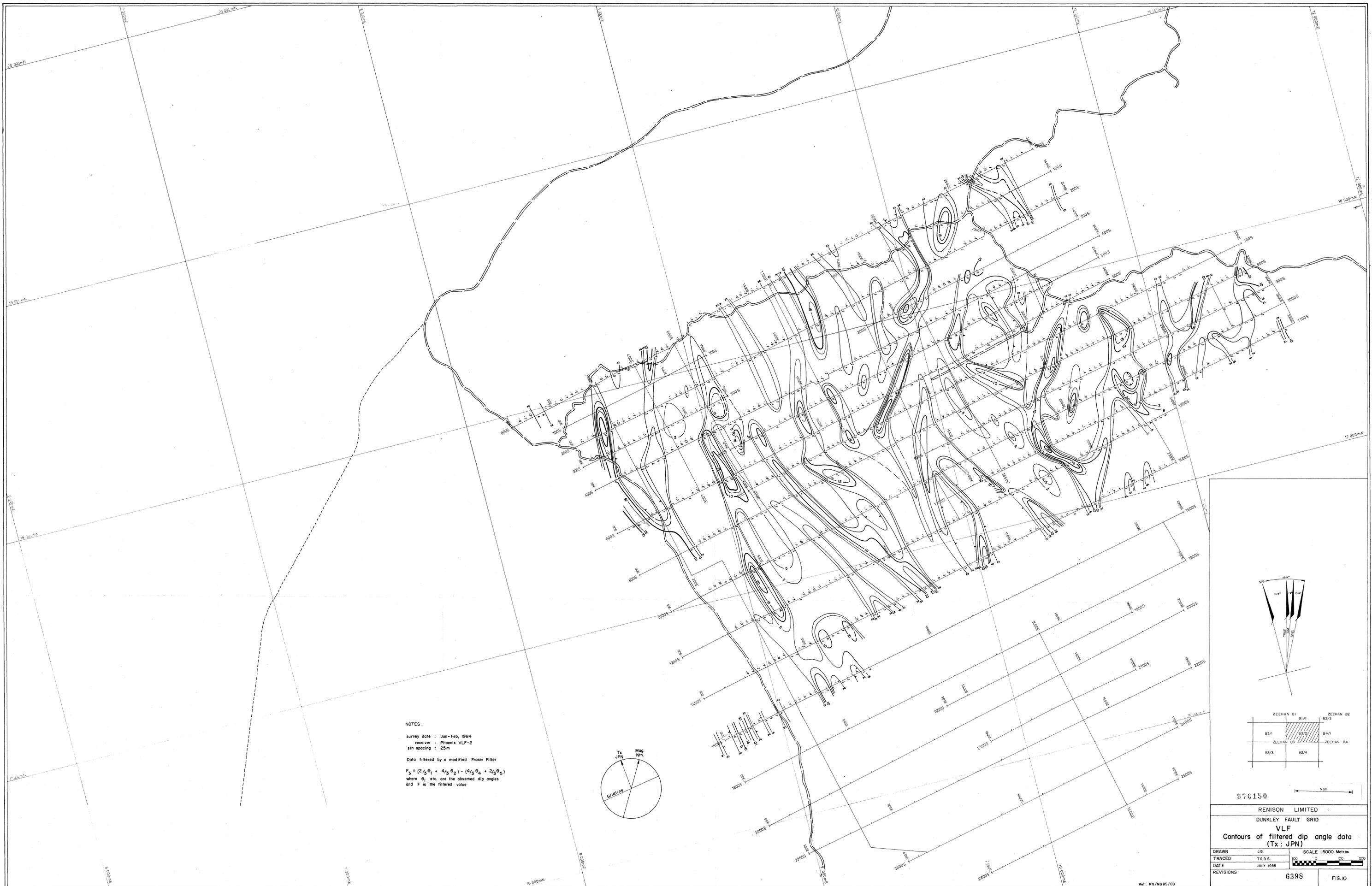
976149

RENISON LIMITED
 DUNKLEY FAULT GRID
 VLF
 Contours of filtered dip angle data
 (Tx: NWC)

DRAWN	J.B.	SCALE 1:5000 Metres
TRACED	T.G.D.S.	100 0 100 200
DATE	JULY 1985	
REVISIONS		

6397

FIG. 9

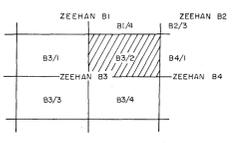
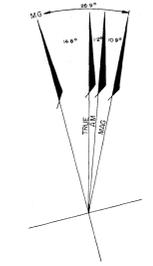
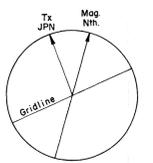


NOTES:

survey date : Jan-Feb, 1984
 receiver : Phoenix VLF-2
 stn spacing : 25m

Data filtered by a modified Fraser Filter

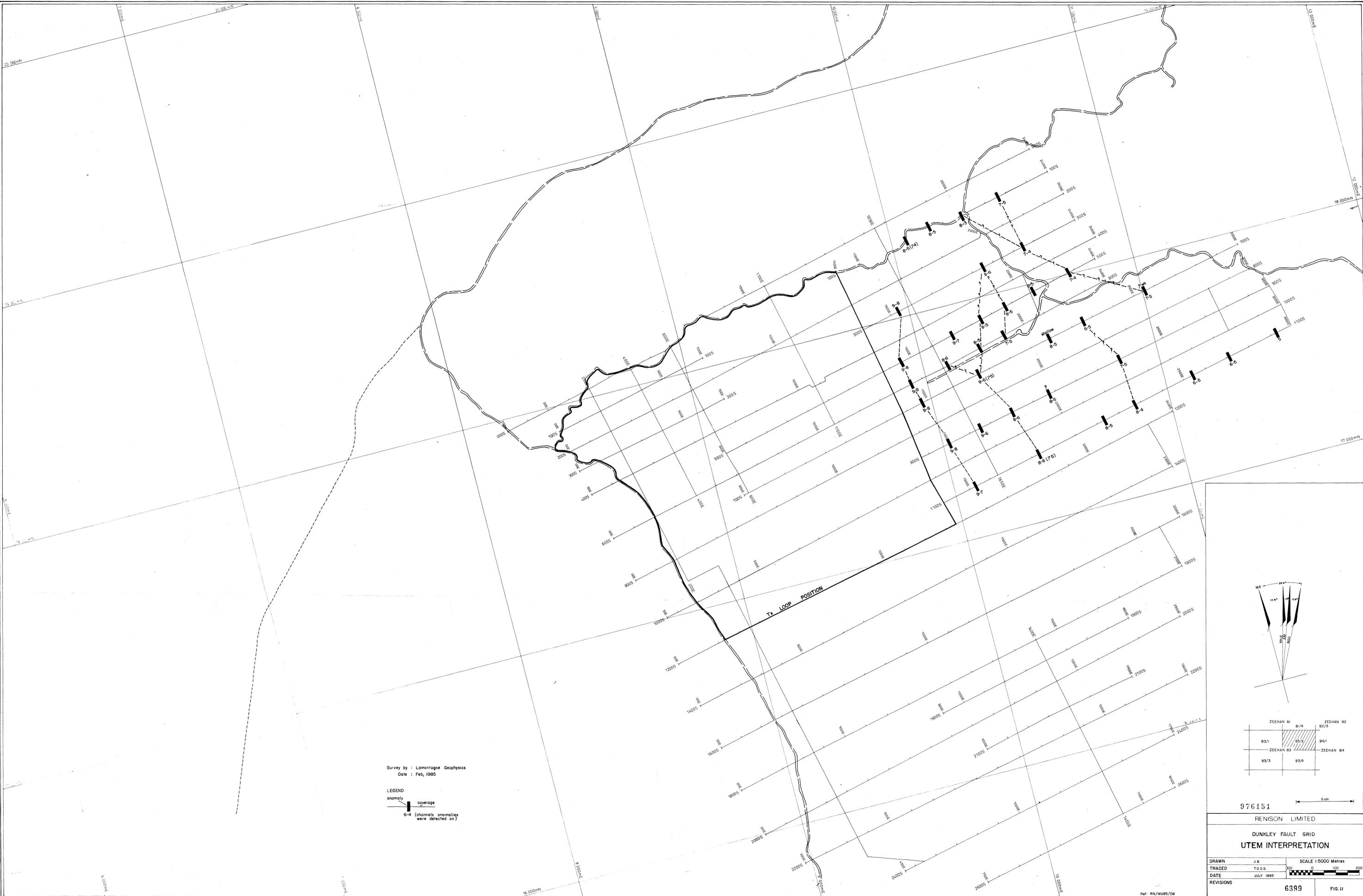
$$F_s = (2/3 \theta_1 + 4/3 \theta_2) - (4/3 \theta_3 + 2/3 \theta_4)$$
 where θ_1 etc. are the observed dip angles
 and F is the filtered value



976150

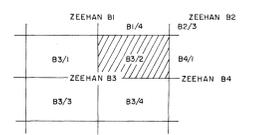
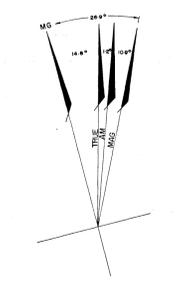
REVISIONS		SCALE 1:5000 Metres	
DRAWN	J.B.	DATE	JULY 1985
TRACED	T.G.D.S.	FIG. NO.	FIG. 10
REVISIONS		SCALE 1:5000 Metres	
REVISIONS		SCALE 1:5000 Metres	

RENISON LIMITED
 DUNKLEY FAULT GRID
 VLF
 Contours of filtered dip angle data
 (Tx : JPN)



Survey by : Lamontagne Geophysics
Date : Feb, 1985

LEGEND
 anomaly coverage
 6-4 (channels anomalies were detected on)



976151

REXISON LIMITED

DUNKLEY FAULT GRID
 UTEM INTERPRETATION

DRAWN	J.B.	SCALE	1:5000 Metres
TRACED	T.G.S.	DATE	JULY 1985
REVISIONS			

6399

FIG. II

6399

86-2605 V.2

137



MITRE GEOPHYSICS PTY LTD

MINERAL EXPLORATION AND ENGINEERING CONSULTANTS

DUGGS LANE ELLIOTT TASMANIA 7325 PHONE 004-36343

INTERPRETATION OF THE GEOPHYSICAL SURVEYS OVER THE ARGENT AREA OF E.L. 42/71.

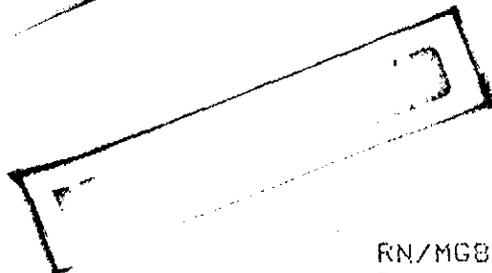
for

Renison Ltd

by

Dr J.R. Bishop

OPEN FILE



RN/MG85/03
Dec., 1985.



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SUMMARY

The Argent area of E.L. 42/71 has been covered by semi-regional aeromagnetic surveys (400m and 500m line spacings) and the prospective areas (ie those mapped as Crimson Creek Formation) have (mostly) been covered by ground magnetics and IP.

There are a number of anomalies arising from the IP surveys, but these have been interpreted as being due to graphitic shales or pyritic horizons. None has an associated magnetic response and thus none is thought to be due to (tin-bearing) pyrrhotite.

Six magnetic anomalies have been recognised as being inadequately defined and unexplained (seven including the recently defined Tallwood anomaly). Further ground surveys have been recommended for each response (details given in Table 2).

A trial survey of the seismic reflection technique has been recommended to see if it can map the stratigraphy and structure of the Argent area. Further tests of CSAMT are also suggested to see if the method can detect conductors buried to at least 800m.



INTRODUCTION

Geophysical surveys have been conducted in the Renison Bell area during several intervals over the last fifty five years. The data from all of these surveys has been compiled by Bishop (1983) and that compilation has been used as a data base for this report which evaluates and interprets the results from those surveys within the Argent area of E.L. 42/71; ie, that part of the licence which lies to the west of the Renison Mine lease (see Figure 1).

EXPLORATION TARGETS AND GEOLOGIC SETTING

The geologic setting of the Renison mine and the expected geophysical responses of the different types of tin targets (carbonate replacement, skarn, greisen and fault or contact infilling) in the surrounding area are described in Bishop (1983). But it is relevant to note here that the regions considered prospective for a cassiterite-bearing, massive pyrrhotite replacement deposit (the prime target) are those areas mapped as Crimson Creek Formation since the Renison Mine Sequence occurs below this, often at considerable depth. Skarn deposits occur within carbonate units in the Crimson Creek Formation, usually several hundreds of metres (stratigraphically) above the mine sequence. Fault infilling is not restricted to any one rock type, but has been defined in sub-economic quantities along the ultramafic contact in the southern section of the mine lease.

It is likely that any economic mineralisation within the Argent area will have similar physical properties to the Renison ore; ie, it should be highly magnetic and conductive. There are however several sources of geologic 'noise' in the area. For example, detrital magnetite within the sediments gives rise to magnetic anomalies, while graphitic shales and other pyritic horizons, in both Crimson Creek and Success Creek sediments, will produce chargeability responses and some resistivity lows.

A significant section of the Argent area has been mapped as Crimson Creek Formation (see Figure 1) and is thus considered to be prospective. It is also possible that some areas of poor outcrop, mapped as Success Creek, are actually Crimson Creek.

EXPLORATION HISTORY

Gold and alluvial tin were discovered near Renison Bell in 1890. However it was not until the 1930's that the sulphide ore was treated. And it was not until the 1960's, following an extensive drilling program, that the size of the Renison tin deposit was appreciated. Current reserves are 18,700,000 tonnes, at 1.1% tin*

* based on a 0.5% Sn cut-off grade and a grade-thickness product of 2.5



and this value is regularly upgraded.

The first geophysical surveys were carried out by the Imperial Geophysical Experimental Survey (IGES) in 1928. They used equipotential, electromagnetic (EM), self potential (SP) and magnetic methods in the region of the Old Mill, Cable and Lucks workings (north of the Dalcoath open cut). Large responses were obtained for each of the methods and, comparing the results with the bore holes in the region, magnetics was considered to be the most successful (Edge and Laby, 1931).

The next surveys were in the early 1950's, when the BMR carried out SP and magnetic surveys in the Immediate Mine* area. Although it had been appreciated by the IGES that the lodes were "large flat-lying bodies of massive pyrrhotite" as well as steeply dipping "feeders", the BMR's drilling recommendations were apparently all for the latter. Thus Renison concluded that "geophysics is unable to distinguish between steeply dipping bodies and faulted flat bodies" (McGhie et al, 1960) and geophysics was then little used in the exploration of the immediate mine area.

Geophysical exploration of the mine lease began in the late 1960's and early 1970's when several grids were cut and surveyed with (vertical field) magnetometers. Some areas were also covered by IP and SP surveys. These programs resulted in the discovery of several skarn deposits and fault or contact mineralisation, mostly in the southern part of the mine lease (none of which has yet proved economic).

Later in the 1970's, grids were cut on areas mapped as Crimson Creek Formation to the west of the mine lease; ie, within the so-called Argent area. These were surveyed by (total field) magnetometers and many of them were also covered by IP. More recently, an extensive grid has been surveyed in the south west corner of E.L. 42/71 (the Dunkley Fault Zone grid). This has been surveyed with EM techniques as well as magnetics. Two more grids, the Cheesewood and Tallowood grids, are planned for the 1985/86 field season (see Figure 1).

There have been several airborne EM/magnetic surveys over the mine. Except for one (the Tursair survey), these were flown as test surveys (by the contractors or other exploration companies) or as part of surveys of adjacent licences. The Tursair survey did not cover the area south of the mine lease and thus there has been no detailed and comprehensive EM/magnetic coverage of the exploration and mine leases. (Apart from Tursair, surveys have been flown with Input, M400 and Dighem. All recorded a large number of strong anomalies.)

* The Immediate Mine area surrounds the many old surface workings and the present mine. It includes all of the known reserves.

† All geophysical surveys up to June, 1983 are referenced in Bishop (1983).



INTERPRETATION

AEROMAGNETICS

A number of surveys cover the Argent area. The most detailed is the 1965 survey for Aberfoyle which used a quarter mile (400m) line spacing (Zarzavatjian, 1965). The most recent is the 1981 survey flown for the Tasmanian Mines Department, which had a nominal line spacing of 500m. However the data from this survey was filtered before contouring and some of the potential detail has been lost*. (The Addendum attached to this report shows that the 1981 survey is quite inadequate for our purposes. The other surveys are similarly deficient.)

Zarzavatjian (1965) defined three anomalies in the Argent area: the large circular feature near the Dunkley Fault (anomaly no. 38); a small anomaly about 3kms to the north (no. 68); and a third about 1500m south west of the Argent dam (no. 37). Zarzavatjian considered that no. 38 was due to an ultra-basic, but he made no comment about the possible sources for the others.

These anomalies were again defined by the Mines Department survey (no. 68 as an inflexion only), but three other responses can also be recognised. Thus there are six anomalous areas of possible interest. These have been labelled in Figure 2 and are listed below together with Zarzavatjian's numbering where applicable:-

- 1) Dunkley Fault (no. 38).
- 2) Tramway (no. 68).
- 3) Western Hills.
- 4) Argent Grid (no. 37).
- 5) Crimson Creek.
- 6) Argent Dam.

These anomalies are discussed individually below.

DUNKLEY FAULT ANOMALY.

This is actually a number of anomalies which reflect some shallow sources above a deep seated magnetic body. Bishop (1985) has hypothesised that the deep source may be hornfelsing around a granitic cupola, with the dominant shallow response (Bishop's anomaly 'B') due to a body of pyrrhotite. None of the other

* Gold Fields has a magnetic tape containing the unfiltered data from this survey, but it contains several 'glices'. Contour maps of this data show some more detail, but further processing is required to extract the most information from it.



shallow responses were discussed by Bishop.

The source of anomaly 'B' has probably been intersected by DDH S1200; ie, a large volume of weakly magnetic sediments is probably the cause of the response. There are however two other anomalies defined by the aeromagnetic surveys which may be of interest (especially so, if it can be shown that the deep anomaly does reflect a rise in the granite basement).

A east trending 'ridge' on the aeromagnetic contour map (labelled Dunkley Fault -East in Figure 2) was ill-defined by the follow up ground survey (see Figure 3). The more detailed presentation (Figure 4b) shows several very shallow responses and the magnetic pattern is similar to other areas on the grid, except that this one is associated with anomalous base-metal geochemistry (Kilpatrick's (1985) area 'C').

A recent follow-up visit to the area (in the vicinity of 700S/2350E) by Evans (Renison's exploration geologist) and Bishop located ironstone nodules in low-lying regions. These possibly explain the anomalous geochemistry. A low topographic ridge was noted near the highest (re-)readings and this may mirror the magnetic ridge. The ironstone sample taken was not magnetic (see Table 1) and thus the cause of the magnetic anomaly has not been ascertained. Although near-surface, unprospective iron oxides derived from a basic tuff or intrusive are a possible source, it is recommended that a number of north-south lines be surveyed to further investigate this anomaly.

Kilpatrick (1985) has suggested a drill-hole in the north-west corner of the Dunkley Fault grid. This recommendation is based on anomalous tin and base-metal geochemistry. The absence of any magnetic response is attributed to the depth of the target, which is fault- and strata-bound mineralisation; either in the Mine Sequence or in Gordon Limestone interpreted to lie beneath the Siluro-Devonian sediments to the west of the fault. If necessary, an EM survey could be carried out to better locate the fault and possibly to detect any mineralisation.

The discrete high to the south west of the main shallow response on the aeromagnetic map (labelled Dunkley Fault -South West in Figures 2 & 3) is most probably the (slightly displaced) elongate ground survey anomaly with maximum value at 600S/110E. This has no associated geochemical anomalism and is therefore probably of little interest. Other, similar highs occur in the area, but outside of the E.L. boundary.

TRAMWAY ANOMALY.

This anomaly appears as a discrete high on the 1965 aeromagnetic survey for Aberfoyle and as a north-trending ridge on the Mines Department's survey (Figure 2). A north-south ground survey carried out by Renison in the early 1970's along the Dunkley Tramway traverses this anomaly and the results show that the



aeromagnetic surveys responded to a series of shallow sources (Figure 5). In this region, the Tramway passes over ground interpreted to be Success Creek and the area has not been gridded (and therefore not mapped in any detail).

A recent follow-up visit by Evans and Bishop located possible hornfelsing at one location and Evans identified at least one sample from the Tramway as a possible Crimson Creek sediment (see Table 1). It is recommended that the proposed Cheesewood grid be extended to the west of the tramway to properly define the magnetically anomalous areas.

WESTERN HILLS ANOMALY.

This anomaly is defined as a ridge on Figure 2 and it may be the northern end of a ridge extending from the Tramway anomaly. It lies immediately to the west of the Dunkley Tram grid which was cut-in to investigate an area of outcropping Renison Mine Sequence (which was found to be un-mineralised).

The rocks underlying the anomaly are interpreted to be Success Creek and thus the area is apparently of little interest, however given the paucity of lithological and structural knowledge in the vicinity of the anomaly, the area should be further investigated. (A ground magnetic survey should be the first technique used so that the aeromagnetic response can be properly located and defined.)

ARGENT GRID ANOMALY.

The ground magnetic survey over the Argent grid showed this broad aeromagnetic anomaly to be a series of narrow, elongate responses (Figure 3). The EZ holes MFF 124 & 125 indicated that these were caused by magnetite within the Crimson Creek sediments. The Renison hole S966 probably also tested the magnetic horizons, but the core has apparently not been logged for magnetic susceptibility. (This hole and the nearby S1207 both intersected mineralised faults at the base of the Crimson Creek Formation. In both cases the Renison Mine Sequence was interpreted as being faulted out Stephenson, 1982 and Kilpatrick, 1984 respectively.)

The ground magnetic survey does define an anomaly of potential interest adjacent to these stratigraphic responses (see later).

CRIMSON CREEK ANOMALY.

The Mines Department survey shows this as a weak, broad high with two separate closures. The 1973 Turair survey also shows this high, but with its greater resolution it defined a narrow, elongate and stronger anomaly (of 200+nt) to the south (see Figure 6).



The ground magnetic coverage on the Crimson Creek grid overlies the southern Turair anomaly (labelled 'Crimson Creek -South' on Figure 3) and the contours define a number of narrow elongate responses similar to the Argent Grid responses. DDH's S1026, S650 & S1008, which were sited to test the northern extent of the Federal Fault, have probably intersected the source(s) of these magnetic responses, but they apparently have not been logged for magnetic susceptibility.

The Crimson Creek response proper has not been covered by the ground magnetics and it is recommended that the Crimson Creek grid lines be extended to the north. It is however quite possible that a ground magnetic survey will produce the same result as occurred at Crimson Creek -South and on the Argent grid; ie, a smooth aeromagnetic anomaly will be shown to be caused by a number of shallow unprospective sources. For this reason, no quantitative interpretation of the aeromagnetic data has been carried out.

ARGENT DAM ANOMALY.

This response is defined as a north west trending 'nose' on the Mines Department's survey, but it appears as a discrete high on the Turair survey (Figure 6). It lies within the Renison Mine Lease and is therefore outside the bounds of this report; however if prospective, the area of interest would probably cross into the Argent area.

As mapped, the anomaly overlies Success Creek sediments, however Evans (pers. comm.) has suggested that the logging of the nearby drill-hole S495 and some of the surface mapping within the Argent grid are open to re-interpretation.

AIRBORNE ELECTROMAGNETICS

The north eastern corner of the Argent area was surveyed in 1973 using the Turair system. Part of this area was re-flown with a Dighem system in 1980 and a very small area near the Argent dam was covered by the INPUT and H400 systems, in 1973 and 1975 respectively. (Except for the Turair, these surveys were tests over the Renison ore body.)

The Turair survey recorded one 'good' anomaly (no. 104) in the Argent area (see Figure 7). Although interpreted as indicating a good conductor, the anomaly had no associated magnetic response and was therefore unlikely to be due to pyrrhotite. Further, inspection of the original records shows that the anomaly's validity is very questionable*. The anomaly is located on the boundary of the Dighem survey and thus may not have been covered

* The records show no phase shift excursion corresponding with the field strength response.



by that survey (there being no confirming Digheem response).

The Turair survey defined five weak conductors and the Digheem a total of three possible responses (not including a power line response); there was no correspondence between the two surveys.

Surficial and line conductors were defined (by Turair) to the south west of the Argent dam, but a discrete 4 channel response was recorded by the INPUT system west of the dam on the mine lease boundary (again with no associated magnetic anomaly or confirming Digheem response).

Although none of these anomalies has been specifically followed up (with a ground EM survey), they mostly overlie existing grids and do not appear to be very prospective (ie, there is no other supporting evidence of potentially economic mineralisation). Thus there are no anomalies arising from these surveys which are recommended for further investigation. (There are however, a number of Turair EM anomalies over the Argent Dam.)

GROUND MAGNETICS

In Bishop (1983), the ground magnetic surveys were divided into two categories: vertical field and total field data. In the Argent area, the former has been largely repeated by the latter and the older vertical field need not be further considered. In Bishop's compilation report, the stronger magnetic anomalies were shown at 1:10,000 scale (Figure 3 in this report). A more detailed presentation at 1:5,000 scale (Figure 4) shows that there are no significant responses missed on the smaller scale map*.

There are also few potentially interesting anomalies that were not recorded by the airborne surveys (but see Addendum). One of these may be within the Argent grid anomalies: the response on the baseline near line 19 (362,140mE/5,368,700mN) has a different shape to those around it; ie, it is more rounded than elongate and thus may have a different source. A profile across this anomaly (not shown here) indicates that there are some very shallow sources and these areas should be further investigated (eg at 850W) to help determine the cause of the deeper response. DDH S1207 is located about 200m to the north east of this anomaly: this hole intersected a mineralised fault at about 500m down hole which has been interpreted as faulting out the Mine Sequence (Kilpatrick, 1984).

North of the Argent dam, the gradually increasing values towards the dam suggests that the aeromagnetic anomaly over the dam (labelled 'Argent Dam' in Figure 2) probably has a deep source. Thus a different cause to the near-outcropping magnetite within the Crimson Creek sediments on the Argent grid seems likely.

* Post Script: The recently defined Tallowood anomaly will be evaluated in a later report.



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The proposed Tallowood and Cheeswood grids will largely cover the unsurveyed regions between the Dunkley tramway and the Renison Mine Lease. Carefully executed magnetic surveys over these grids should allow any subtle, deep seated responses to be extracted from the data.

INDUCED POLARISATION

All of the grids in the Argent area, with the exception of the Dunkley Fault grid, have been covered with IP surveys (Figure 8). A number of chargeable zones and regions of low resistivity were defined, some of which have been tested by drill-holes. For example, DDH S495 was drilled "to test (near) coincident IP, geochem and magnetic anomalies on line 13, Argent grid" (Bond, 1978). The likely source of the IP anomaly was black shales and/or disseminated pyrite in a tuff unit (both within the Success Creek Group)*. Other holes have intersected black shales or disseminated pyrite within the Crimson Creek Formation (eg, DDH's S705 and S369) and most, if not all, of the chargeable zones can be ascribed to one or both of these sources.

The resistivity map (Figure 9) shows a number of low resistivity zones. Some of the lower values may be due to conductive (as well as chargeable) black slates (eg, at DDH S705), but others apparently reflect the resistivities of the general sediments rather than a particular unit. These values are significantly lower than those obtained from core measurements of fresh rocks (eg, Bishop, 1983) and presumably reflect surface weathering.

Thus there is a high degree of geological 'noise' associated with the IP surveys and one would not recommend drilling solely on an IP response (and given the similar noise levels in geochemistry (eg, over the Crimson Creek Formation in the southern section of the Argent grid), more than associated anomalous geochemistry would be required).

MISCELLANEOUS METHODS

There has been very little use in the Argent area, of geophysical methods not mentioned above. The Mines Dept's gravity survey of the Zeehan area only just reaches the south west corner of the Dunkley Fault area (and no further coverage is planned here in

* The geochem responses were apparently associated with a "pseudo-gossan" (?ironstone -?similar to that found on the Dunkley Fault grid). A magnetic susceptibility of 0.002cgs units was recorded from core in a fault zone, but this is unlikely to be the cause of the (offset) shallow-sourced, 800nt magnetic anomaly. The rest of the core had even lower susceptibility. (This hole was drilled in Success Creek rocks -Dalcoath and Donah sediments -for its entire length. The fault referred to, assayed 0.32% Sn over 0.4m.)



the immediate future).

The BMR carried out Turam and SP surveys over a number of silver-lead prospects along the Owen Meredith Fault which is a north western extension of the Federal structure (on the so-called 'Mines Dept' grid). The Turam results were disappointing, but some good SP anomalies were obtained over old workings (and black shales; see Bishop, 1983). These apparently have not been followed up. Blissett (1962) suggested that the mineralisation was "fissure vein" style, similar to the Zeehan field and he considered that there was little potential for any further economic mineralisation. This interpretation is shared by the Renison geologists and thus there are no 'miscellaneous' responses which should be further investigated.

DISCUSSION

The geophysical target in the Argent area is a large body of massive pyrrhotite. Therefore the magnetic method should be the most useful. However even magnetics will not 'see' a potentially economic-sized body much below 200m (depending on the level of geological noise). Figure 10 shows the level of response that could be expected from a two million tonne tabular body, buried to a depth of 300m. Such a body would only be recognised in an area with a background variation of 2 to 3nt.

Drilling in the Argent area has shown that the target horizons are often in excess of 400m. Even in areas of outcropping Mine Sequence, these horizons may be of the order of 300m (eg, DDH S835 intersected 15m of no. 3 Dolomite at 273m down hole).

A body such as has been modelled in Figure 10, at a depth of 300m, would probably not be recognised from the present air-borne and ground coverage (also, see Addendum). The airborne coverage has a line spacing of 500m whilst spacings within the Argent and Crimson Creek grids are, in places, over 400m and 300m respectively. A high sensitivity helicopter-borne aeromagnetic survey using a flight-line spacing of 100m would provide the required coverage[#].

However, even a survey such as is proposed above would not detect orebodies (even larger than that modelled here), if buried to the not-improbable depths of 500m or more. Thus the lack of a magnetic anomaly does not preclude the possibility of (deep) mineralisation. Until now, the exploration of such targets around the Renison mine has been on geological grounds and,

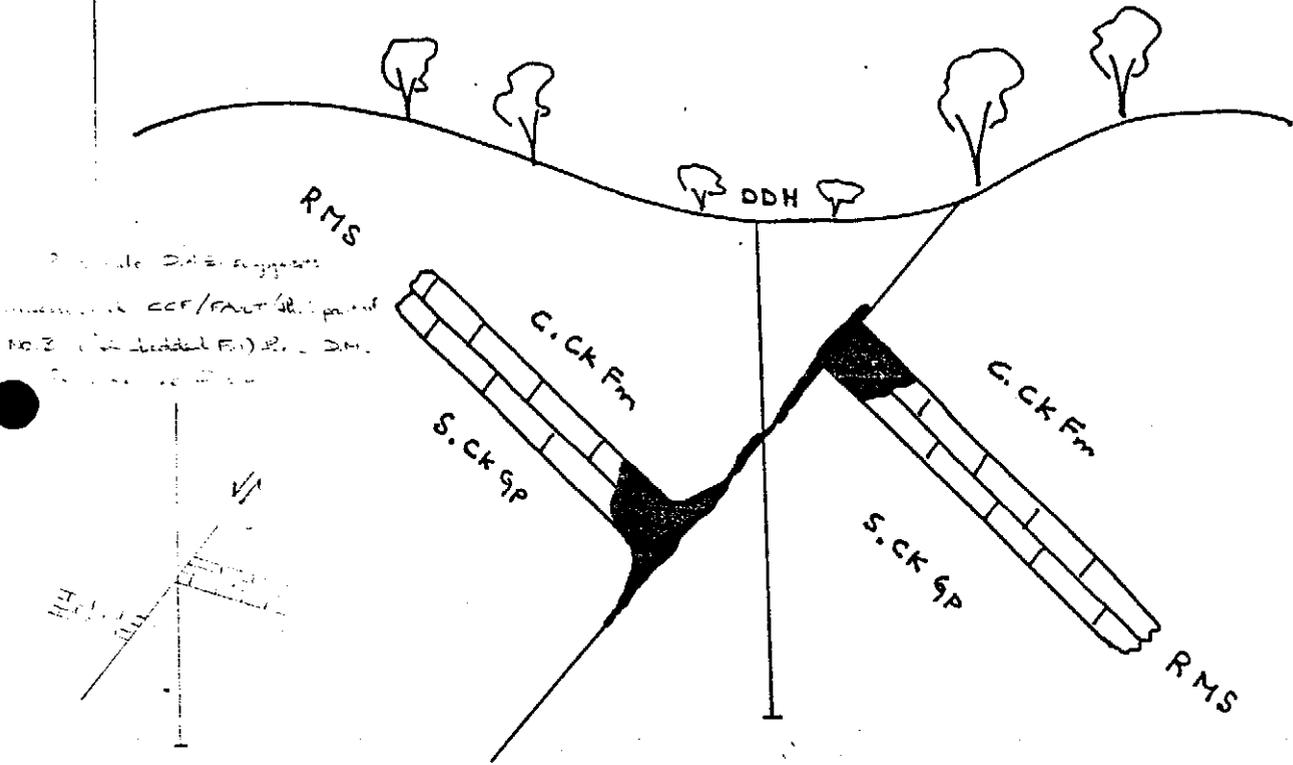
* While deeper sources have a larger radius of influence, a high density of data is required to extract subtle responses.

Stockdale has such a system which they are prepared to contract out. It also has a VLF receiver which should be extremely useful for mapping structure.



largely, by pattern drilling over the mine lease.

On the Argent grid, the two holes drilled into Crimson Creek sediments (DDH's S966 & S1207) 'missed' the Mine Sequence rocks. In both holes the Sequence was interpreted as being present, but faulted out, as is shown in the diagram below. Several other holes on the mine and exploration leases have been similarly



interpreted; rather more, I suggest, than would be expected if the interpretation were correct. That is, if the Renison Mine Sequence does occur over most of the area, then most holes should intersect it. If most holes 'miss' it, then either its occurrence is patchy, or there are a number of shallow-angled faults with large displacements.

Recently, the effectiveness of the pattern drilling approach has been significantly increased by conducting EM surveys down these holes. These surveys have a search radius well in excess of 100m for potentially economic-sized targets (see Bishop, 1986a).

Nevertheless, a method of mapping the stratigraphy and structure would clearly be useful, if only to position drill holes so that they do intersect the Mine Sequence. The seismic reflection method may be capable of achieving this. Although the depths are considerable and the dips are relatively steep, good contrasts should exist between the carbonate horizons and the surrounding rocks. A test traverse (through at least two drill holes) is suggested.

The results from the recent Controlled Source Audio Magnetotellu-



ric (CSAMT) survey conducted on the mine lease suggest that the method has good lateral resolution, but poor depth accuracy (Bishop, 1986b). In the test survey, the technique detected a conductor buried to approximately 275m. If possible, the method's penetration capabilities need to be further evaluated.

Deep-penetrating, large-loop time-domain EM systems are finding increasing use for locating buried conductors. However, these can only be used when the location of the target is reasonably well-known and, for a Renison-style body, I do not believe that a better (ie, more recognisable) response would be obtained from such a survey than would be obtained from magnetics. Thus these methods are not recommended for reconnaissance surveys.

It is believed that faults play an important part in the mineralising process at Renison. Specifically, it is thought that steeply dipping faults have provided a pathway for hydrothermal solutions to move upwards and replace the carbonate horizons. The VLF method was mentioned above as one possible tool to help locate these faults (which are not necessarily mineralised to the surface). This technique has been already tried on E.L. 42/71 with mixed success, but it is recommended that its use be continued.

It would be of considerable assistance to the geological interpretation of the area if it could be determined, with some confidence, whereabouts in the Crimson Creek Formation (or, to a lesser extent, the Success Creek Group) any given length of drill-hole intersection occurred. It is possible that logging of drill-holes with natural gamma, density and magnetic susceptibility would greatly assist this task, since there may be persistent layers in the stratigraphy with marked physical properties, which cannot be distinguished in the hand sample. A magnetic susceptibility logger would also be useful in its own right to determine whether drill-holes had hit their targets (eg, DDH S1200 on the Dunkley Fault grid) and to generally assist in the magnetic interpretation of the area.

Although this report has concentrated on a massive pyrrhotite target, a pyritic body is a possibility. I understand that the tin at Aberfoyle's Queen Hill (Zeehan) deposit is pyrite-hosted. Presumably pyrite mineralisation might also act as a 'pathfinder' towards a pyrrhotite deposit.

Even a massive pyrite deposit would (probably) be much less

* Several structures were clearly defined by VLF in the Grand Prize area, but not the Grand Prize Fault itself. Mostly poor responses were obtained on the Dunkley Fault Grid.

A test program of gamma and density logging was started around the Dalcoath cut during the 1984-85 field season. However, the holes to be surveyed were blocked either at the collar or at relatively shallow depths.



conductive than pyrrhotite and it would not be magnetic*. It should however be highly chargeable and thus make a good IP target; but with the high level of geological noise in the area, this may be hard to recognise. Given Renison's large reserves of pyrrhotite ore and the difficulties in finding a buried body of stanniferous pyrite, such a target probably does not make a worthwhile target in the present economic climate and with the time constraints on E.L. 42/71.

CONCLUSIONS AND RECOMMENDATIONS

The only targets which have arisen from an evaluation of the geophysical data over the Argent area are from magnetic surveys. There are a number of untested chargeability anomalies, but I have suggested that these are most likely due to either graphitic shales or disseminated pyritic horizons. In any case, none have associated magnetic responses and thus are unlikely to be due to pyrrhotite.

The magnetic targets are: the Argent Dam; the Crimson Creek; Dunkley Fault (East); the Tramway; Western Hills; and possibly a response on the Argent grid. It must be admitted that a large part of the interest in these responses may be due to the fact that none is properly defined (ie, properly defined, the anomalies may be shown to be due to superficial sources). To outline the Argent Dam anomaly, it is possible that some surveying will have to be done over the water. (As previously mentioned, most if not all of the source of this anomaly is expected to lie within the Renison Mine lease.)

The Crimson Creek response is of particular interest since this lies over the only mapped area of Crimson Creek Formation within the Argent area which has not been gridded. It is recommended that all of this north eastern corner of the Argent be gridded and covered with magnetics, soil geochemistry and VLF. The mine lease boundary here does not relate to the geology and the northern part of the mine lease should be integrated with any exploration program. The section of the proposed grid within the Argent area is shown in Figure 11.

The Dunkley Fault (East) anomaly should be better defined by a series of north-south traverses (see Figure 11) and the ground covered by these lines should be mapped and sampled to help assess the area's potential.

The Tramway anomaly lies over apparently unprospective rocks. However, this area is ungridded and hence has received little attention. It is recommended that the proposed Cheesewood grid be extended to the west of the Dunkley Tramway so that the magnetic

* Although there have not been exhaustive tests, all of the pyrrhotite in the Renison mine and the surrounding occurrences is believed to be of the magnetic type.



responses can be properly defined. The suggested additions are indicated in Figure 11.

Apart from some stream traverses, there are no programs planned for the north western corner of the Argent area. However, it is recommended that some lines (shown in Figure 11) be cut so that the Western Hills anomaly can be located and defined.

There are no more specific targets in the Argent area*, however I suggested above that more may be defined if a high-sensitivity, helicopter-borne magnetic survey were carried out; particularly since the recent ground magnetic survey on the Tallowood grid has demonstrated the inadequacy of the present data (see Addendum).

It was also suggested above that a further test of the CSAMT method be carried out over deep (500-800m) mineralisation. It is possible that potential sites for such tests may be determined from the results of the recent down-hole EM surveys.

I suggest that the seismic reflection survey, recommended above, be carried out in the south-west corner of the Renison mine lease where there is good drill-hole control.

A summary of the targets recognised within the Argent area and a list of specific recommendations is given in Table 2.

J.R. Bishop
March, 1986.

* A low priority goal should be to determine the source of the (deep-seated) Dunkley Fault magnetic anomaly. If it is a granitic cupola, then the area still has a high potential for (buried) mineralisation.



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ADDENDUM

A Comparison Between Aeromagnetic And Ground Magnetic Results
Over The Tallowood Grid.

A recent ground magnetic survey over the Tallowood grid has defined a strong (350nt plus), positive anomaly with a strike length of at least 700m (see Figure A1). Although not dissimilar in character to the stratigraphic anomalies on the Argent Grid, it warrants further investigation: it is a prospective response (eg, a narrow mineralised fault might well give rise to such an anomaly).

The 1981 Tasmanian Mines Dept aeromagnetic survey shows a well-defined 'low' over the Tallowood grid (see Figure A2): there is no indication of the prospective 'high'.

Superposition of these two sets of results clearly demonstrates the inadequacy of the present aeromagnetic data for exploration of discrete targets. A detailed, helicopter-borne survey, over all of E.L. 42/71 and the Renison mine lease is strongly recommended.



TABLE 1

Petrophysical Measurements

SAMPLE No.	RENISON No.	MAGNETIC SUSCEPTIBILITY (CGS units x 10 ⁻⁶)	PETROLOGY	COMMENTS
24/1	C1081	90.	'ironstone' (goethite-limonite)	Dunkley Fault (East) Anomaly; surficial deposit on (?)basic rocks (eg, gabbro or basic tuff within the CCF).
24/2	C1082	20.	lithic fragment breccia with visible Po. & Sph.	Tramway Anomaly; possibly ballast for tramway or ore spilled from a tram wagon.
24/3	C1083	100.	altered litharenite (?)hornfelsed.	Tramway Anomaly; from sub-outcrop along edge of tramway.

Samples: surface hand specimens.

Measurements by: University of Sydney Petrophysical Laboratory

Date: February, 1986.



TABLE 2

Recommendations for Geophysical Surveys in the Argent Area,
(E.L. 42/71).

MAGNETIC TARGETS (in order of priority).

- * Argent Dam (centred at 368,750mE/5,370,950mN).
- * Crimson Creek (centred at 368,000mE/5,373,300mN).
- * Dunkley Fault (East) (centred at 365,060mE/5,368,490mN).
- * Tramway (centred at 363,750mE/5,370,750mN).
- * Western Hills (centred at 365,000mE/5,372,900mN).
- * Argent Grid (centred at 362,140mE/5,368,700mN).

(to be evaluated in a later report)

- * Tallwood Grid (probably centred at 366,710mE/
5,368,740mN).

For each target, proper definition (and location, for the aeromagnetic anomalies) is needed. The recommended ground magnetic coverage is shown in Figure 11.

- * Dunkley Fault: to determine the source of the deep-seated anomaly.

OTHER TARGETS

- * Dunkley Fault 'Area B' (geochemical anomaly): the accurate location of the fault and possible mineralisation might be determined from an EM survey.

.....22



Table 2 (continued)

GENERAL RECOMMENDATIONS.

- * Down-hole EM surveys to be carried out down all exploration drill-holes.
- * A test of the seismic reflection method: to be carried out in the south-west section of the Renison mine lease.
- * A further trial of CSAMT over a deep (500m - 800m) conductor.
- * A test of down-hole logging with natural gamma; density and magnetic susceptibility for stratigraphic mapping of the Crimson Creek Formation.
- * A high-sensitivity, detailed air-borne magnetic survey is expected to reveal deep-seated sources not evident in the present data sets.

160

MINES	
File Ref. EL42/71	
21 JAN 1987	
Doc. Ref.	
Action Officer	Initials
Resubmit to	Date

976175

INTERPRETATION OF THE GEOPHYSICAL SURVEYS
OVER THE ARGENT AREA OF E.L. 42/71

for

Renison Ltd.

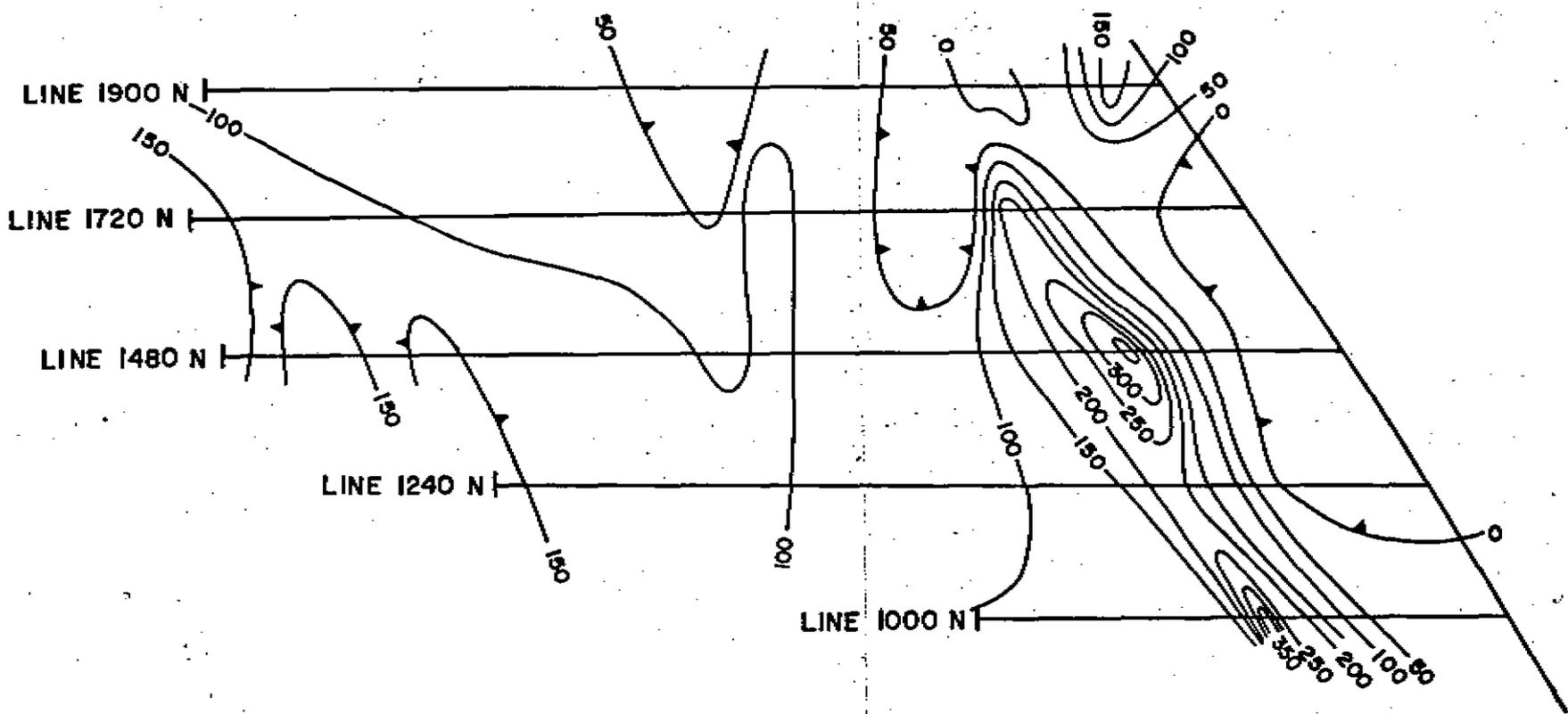
by

Mitre Geophysics Pty. Ltd.

RN/MG85/03

Dec., 1985

161
976176

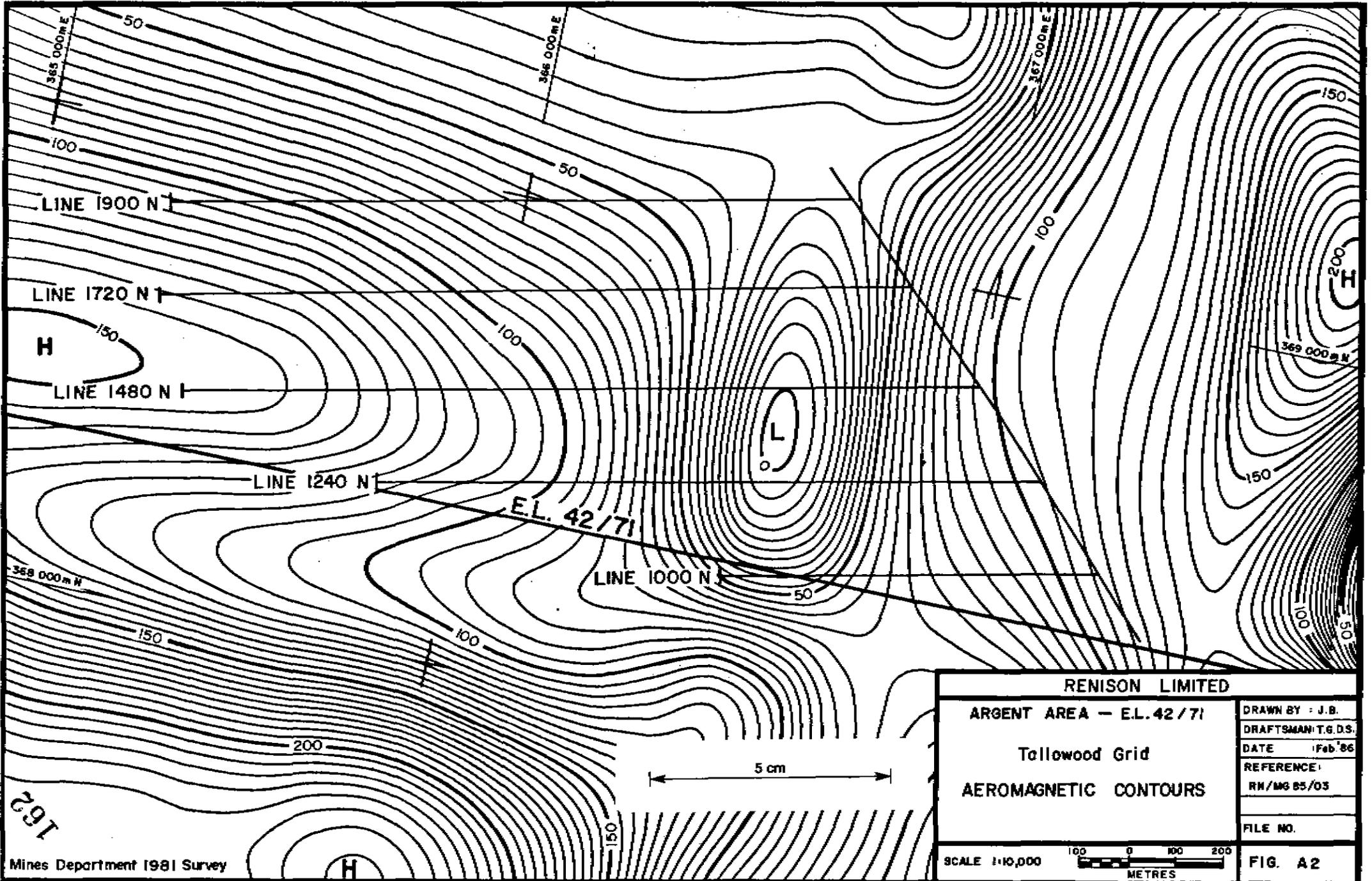


Renison 1986 Ground Magnetic Survey (preliminary data).
 Contour Interval = 50 nt
 N.B. Variations near Argent baseline not shown.

86-2605

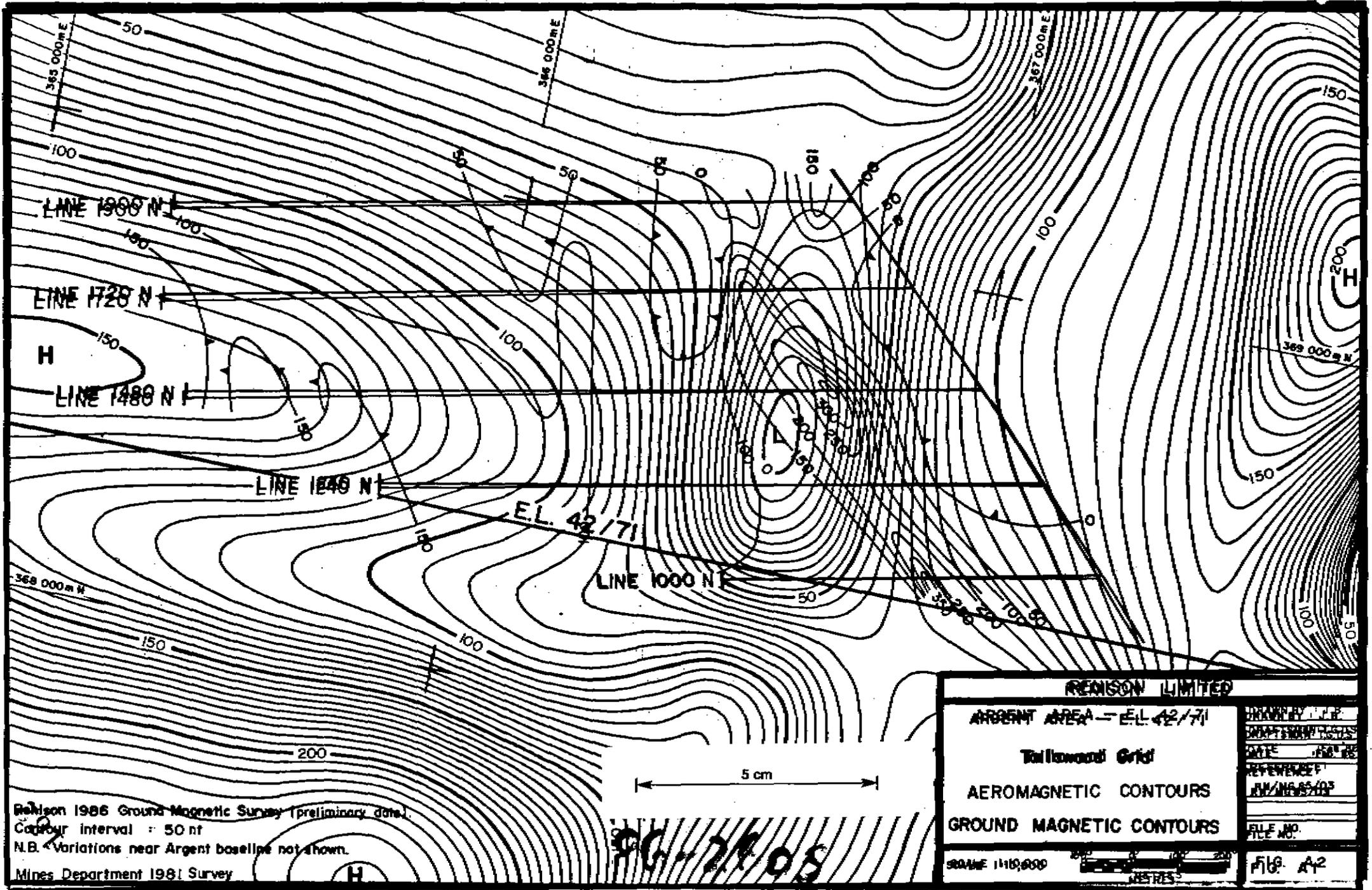
RENISON LIMITED	
ARGENT AREA — E.L. 42/71	
Tallowood Grid	
GROUND MAGNETIC CONTOURS	DRAWN BY: J.B. DRAFTSMAN: T.G.D.S. DATE: Feb. '86 REFERENCE: RN/M085/03
SCALE 1:10,000 	FILE NO. FIG. A1

86-2605 B



86-26058

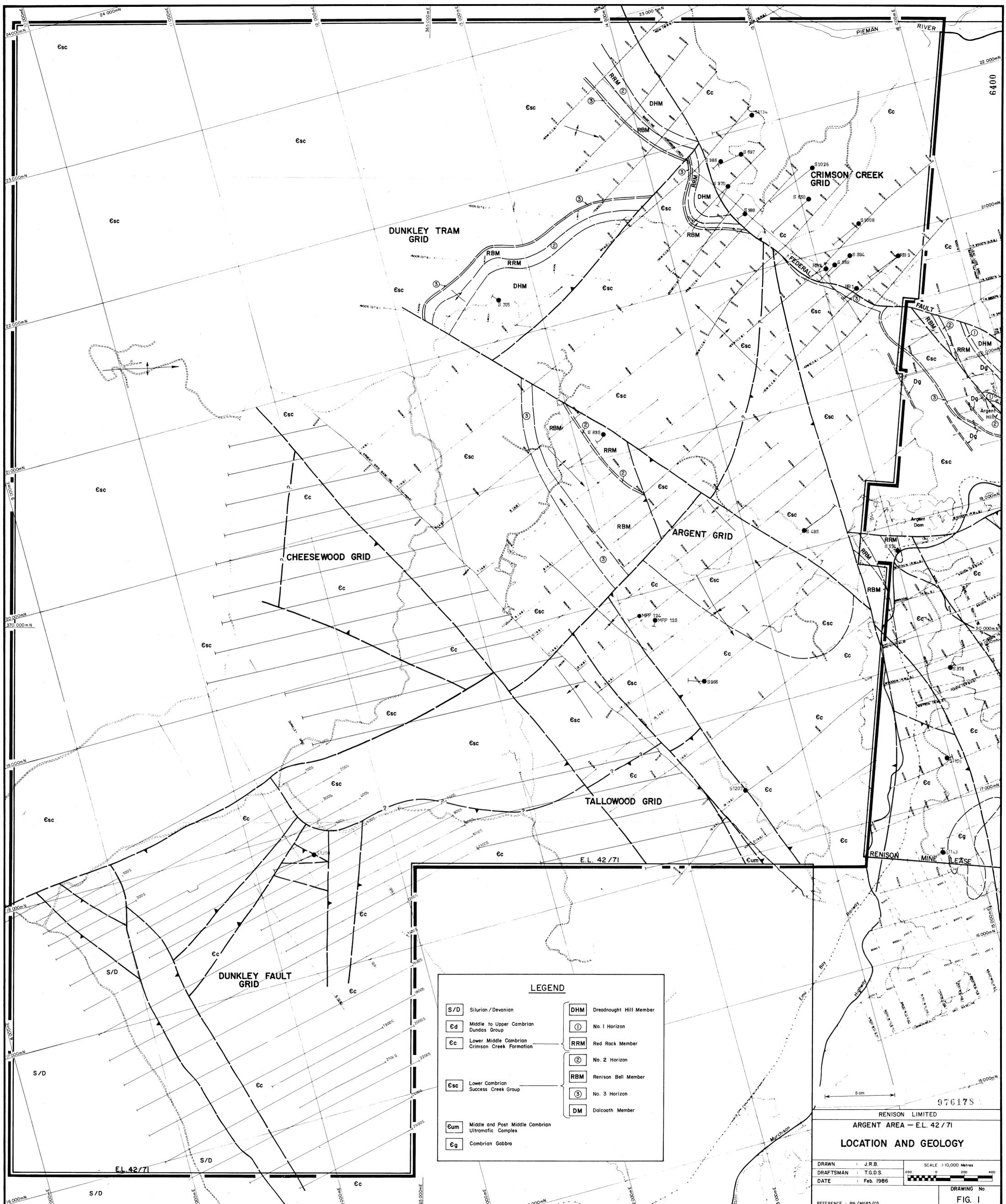
161
976177



Reinson 1986 Ground Magnetic Survey (preliminary data).
 Contour interval : 50 nT
 N.B. Variations near Argent baseline not shown.
 Mines Department 1981 Survey

REINSON LIMITED	
ARGENT AREA - E.L. 42/71	
Tollwood Grid	
AEROMAGNETIC CONTOURS	
GROUND MAGNETIC CONTOURS	
SCALE 1:110,000	FILE NO.
WESTRES	FIG. A2

976177



LEGEND

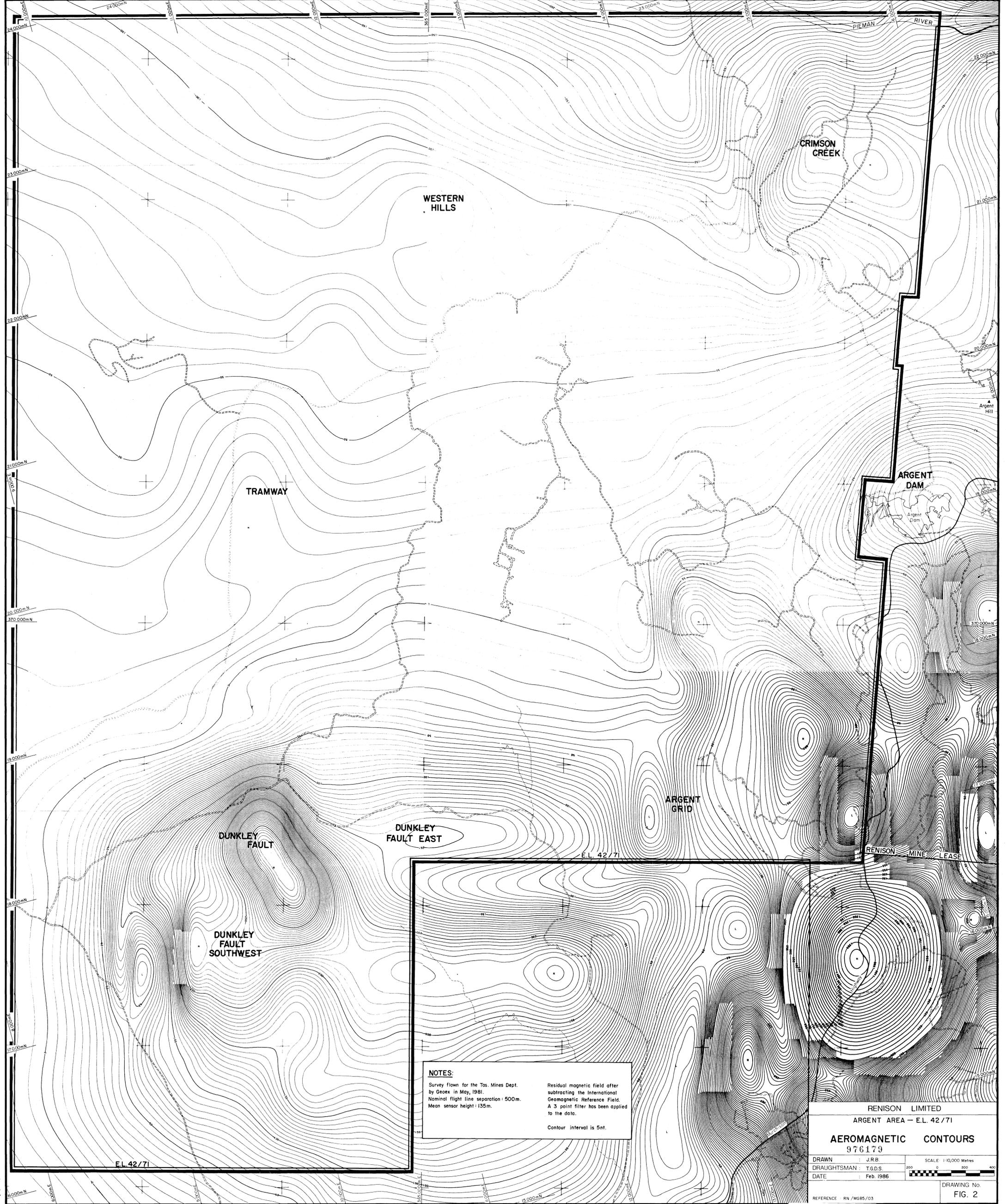
S/D Silurian / Devonian	DHM Dreadnought Hill Member
Ecd Middle to Upper Cambrian Dundas Group	① No. 1 Horizon
Ec Lower Middle Cambrian Crimson Creek Formation	RRM Red Rock Member
	② No. 2 Horizon
Esc Lower Cambrian Success Creek Group	RBM Renison Bell Member
	③ No. 3 Horizon
Cum Middle and Post Middle Cambrian Ultramafic Complex	DM Dalcoath Member
Eg Cambrian Gabbro	

976178

RENISON LIMITED
ARGENT AREA — E.L. 42/71
LOCATION AND GEOLOGY

DRAWN : J.R.B.	SCALE 1:10,000 Metres
DRAFTSMAN : T.G.D.S.	200 0 200 400
DATE : Feb. 1986	
REFERENCE : RN/MG85/03	DRAWING No. FIG. I

86-2605 V3



NOTES:

Survey flown for the Tas. Mines Dept. by Geox in May, 1981.
Nominal flight line separation: 500m.
Mean sensor height: 135m.

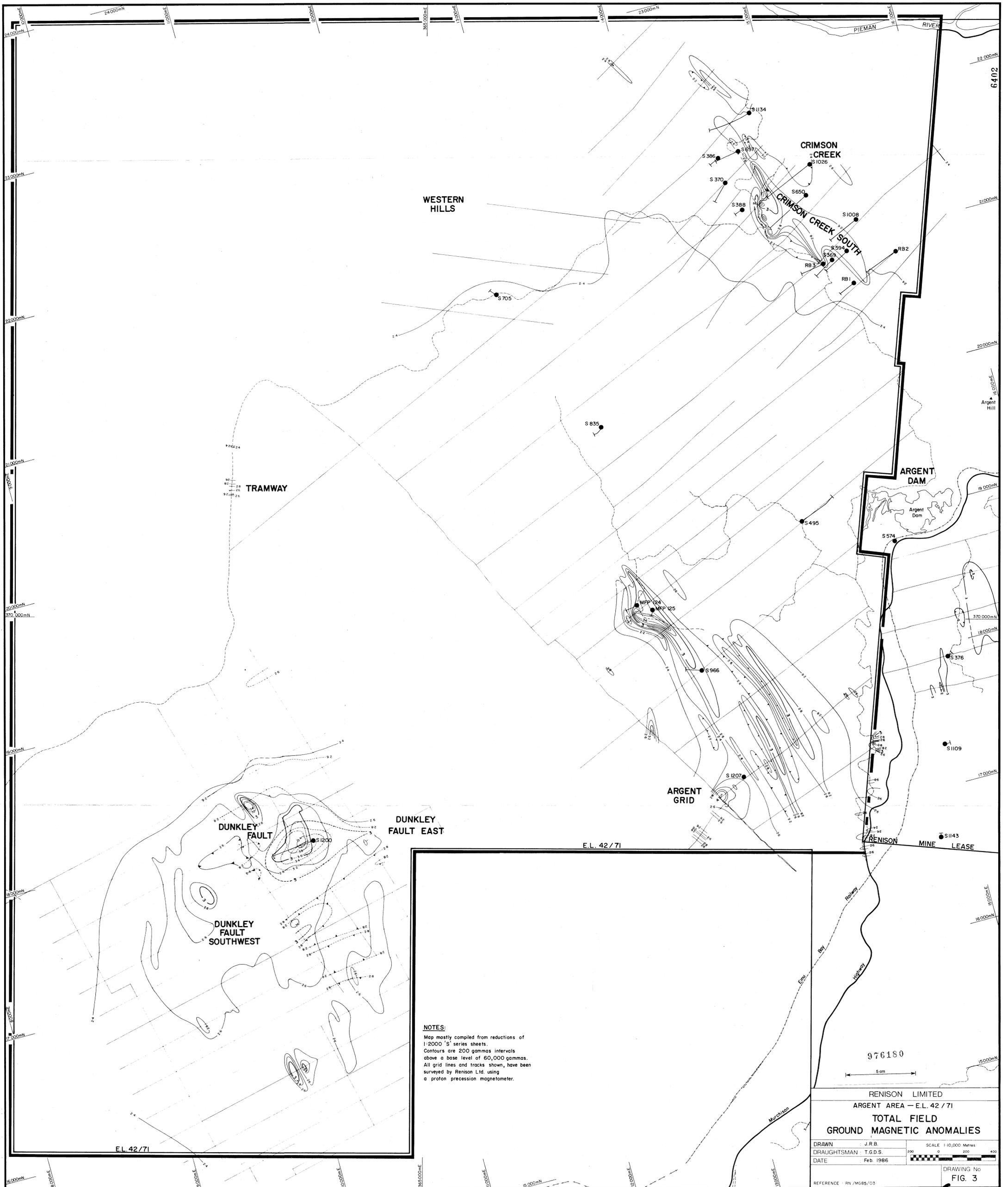
Residual magnetic field after subtracting the International Geomagnetic Reference Field. A 3 point filter has been applied to the data.

Contour interval is 5m.

RENISON LIMITED	
ARGENT AREA - E.L. 42/71	
AEROMAGNETIC CONTOURS	
976179	
DRAWN : J.R.B.	SCALE 1:10,000 Metres
DRAUGHTSMAN : T.G.D.S.	
DATE : Feb. 1986	DRAWING No. FIG. 2
REFERENCE RN/MG85/03	

5 cm **86-2605 V3**

6401



NOTES:
 Map mostly compiled from reductions of
 1:2000 'S' series sheets.
 Contours are 200 gammas intervals
 above a base level of 60,000 gammas.
 All grid lines and tracks shown, have been
 surveyed by Renison Ltd. using
 a proton precession magnetometer.

976180

5 cm

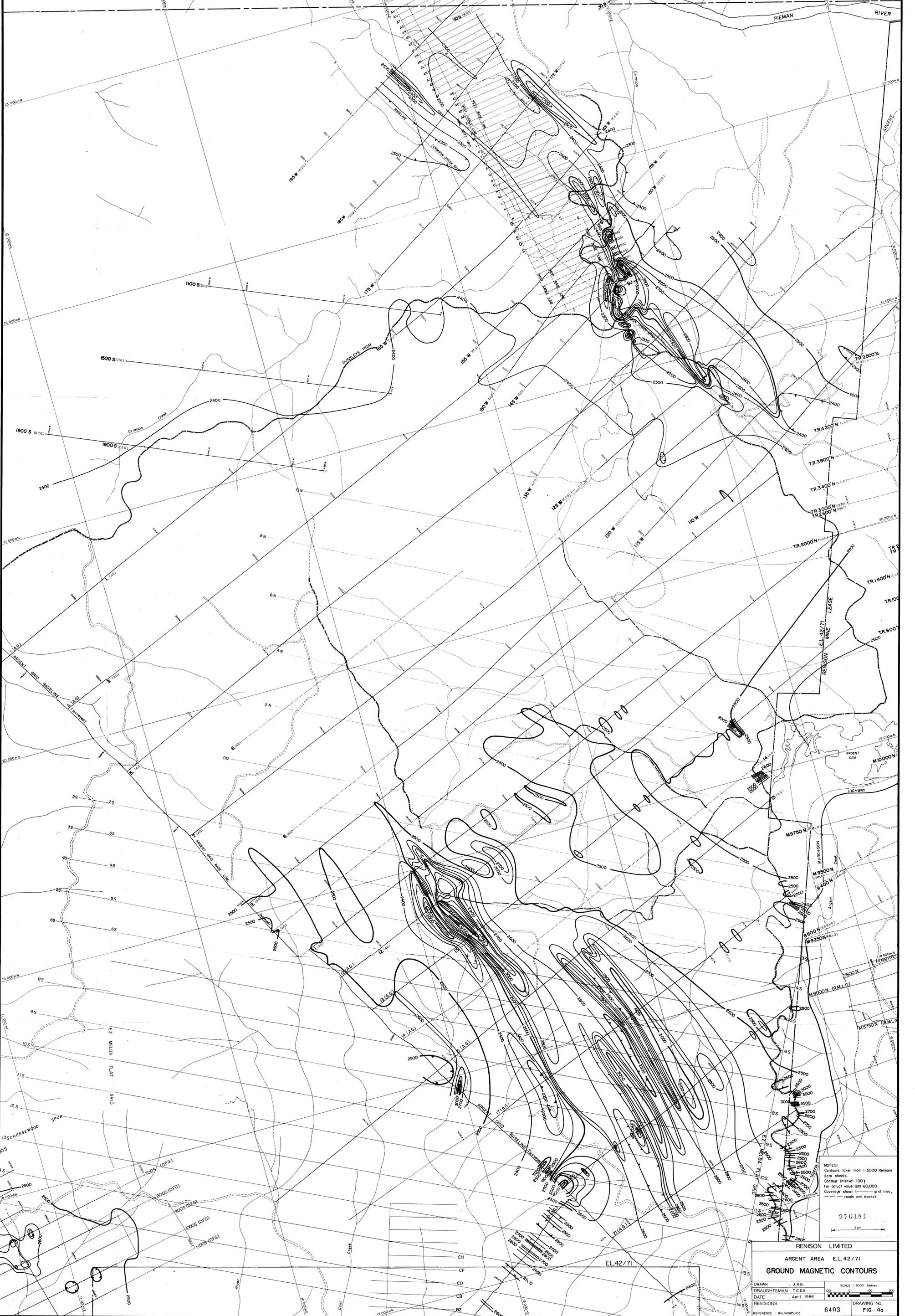
RENISON LIMITED
 ARGENT AREA — E.L. 42 / 71
**TOTAL FIELD
 GROUND MAGNETIC ANOMALIES**

DRAWN : J.R.B. SCALE 1:10,000 Metres
 DRAUGHTSMAN : T.G.D.S. 200 0 200 400
 DATE Feb. 1986

DRAWING No
FIG. 3

REFERENCE RN / M685 / 03

86-2605 V3



NOTES:
 Contours taken from 1:5000 Renison data sheets.
 Contour interval 100'
 For actual value add 60,000.
 Coverage shown (--- grid lines, - - - roads and tracks).

976181
 5 cm

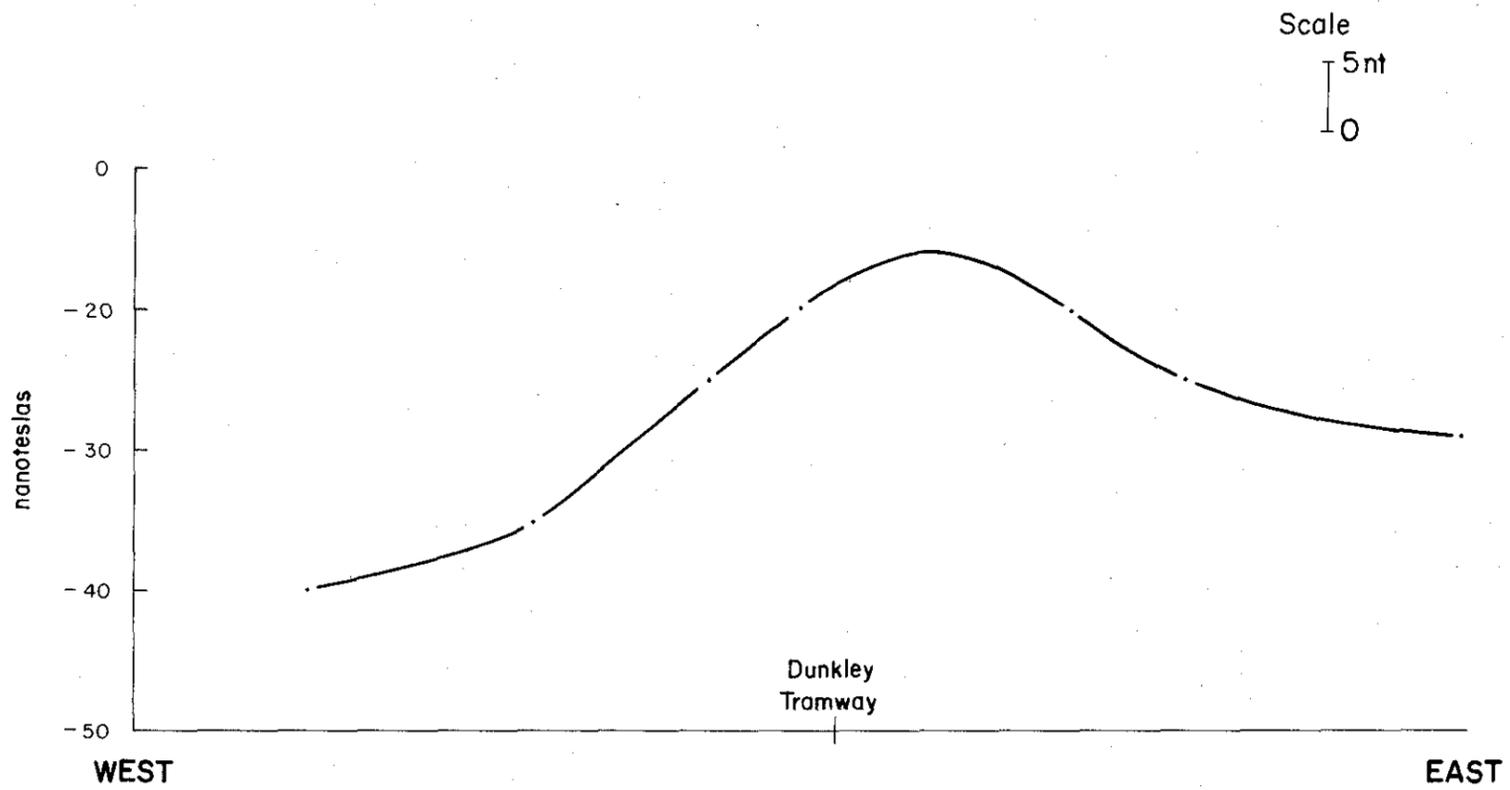
RENISON LIMITED
 ARGENT AREA E.L. 42/71
GROUND MAGNETIC CONTOURS
 DRAWN: J.R.B.
 DRAUGHTSMAN: T.G.D.S.
 DATE: April 1986
 REVISIONS:
 REFERENCE: RN/1695/03
 SCALE: 1:5000 Metres
 0 50 100 200
 DRAWING No. 6403
 FIG. 4a



NOTES
 Contours taken from 1:5000 Renison data sheets.
 Contour Interval 100 ft.
 For actual values add 60,000.
 Coverage shown (---) grid lines,
 (---) roads and tracks.

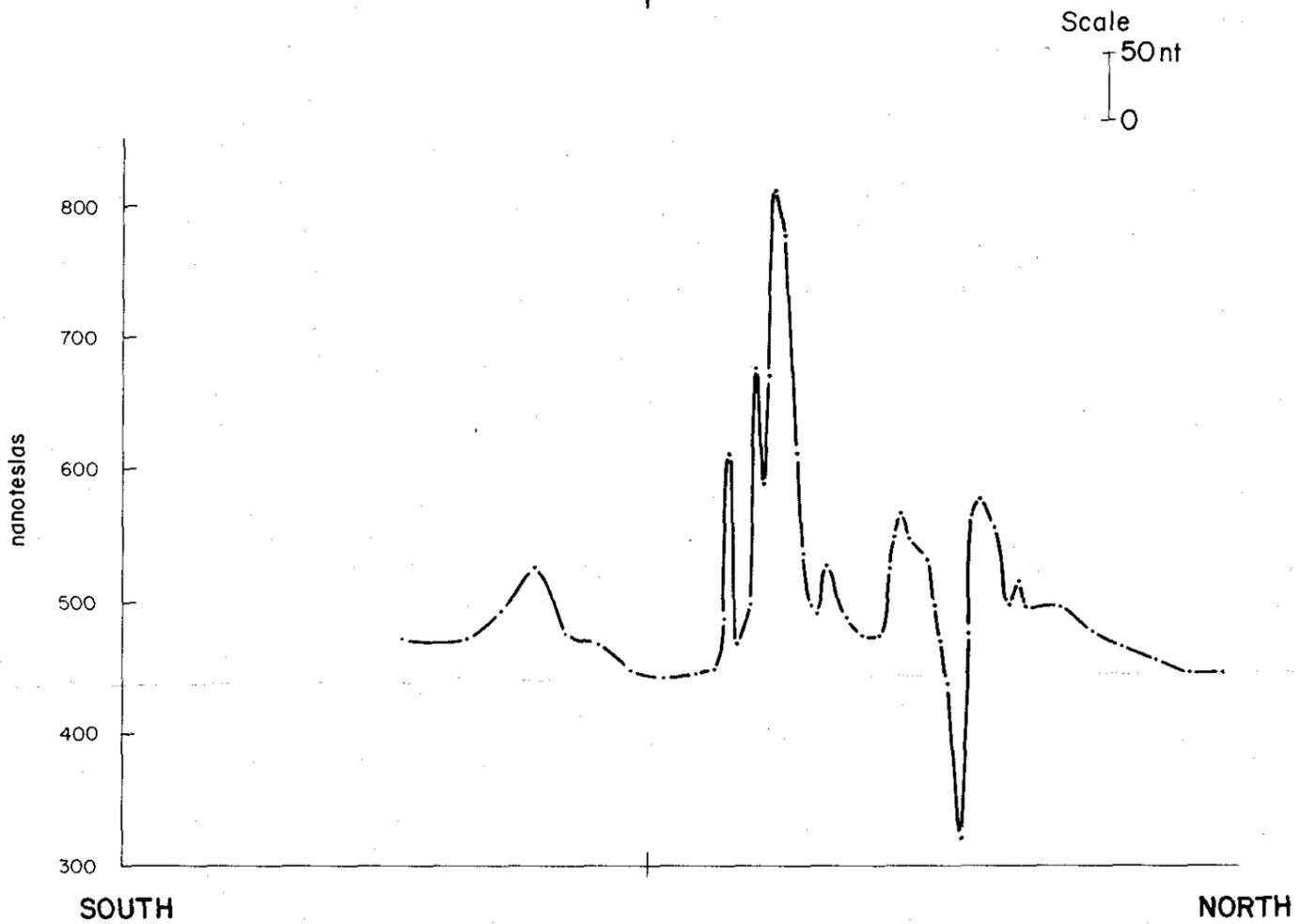
976182
 5 cm

RENISON LIMITED	
ARGENT AREA E.L. 42/71	
GROUND MAGNETIC CONTOURS	
DRAWN: J.R.B.	SCALE: 1:5000 Meters
DRAUGHTSMAN: T.G.D.S.	DATE: April 1986
REVISIONS:	DRAWING No. 6404
REFERENCE: RN/M385/03	FIG. 4b



West - east profile across aeromagnetic contour map along 5,370,750m N.
(Mines Department 1981 West Coast Survey).

363,600m E
5,370,750m N



South - north ground magnetic traverse along Dunkley Tramway.

976183

RENISON LIMITED	
ARGENT AREA (E.L. 42/71)	
Tramway Anomaly Aeromagnetic and Ground Magnetic Profiles	
DRAWN BY : J.B.	DRAFTSMAN : T.G.D.S.
DATE : Feb 86	REVISIONS :
FILE NO.	FIG. 5

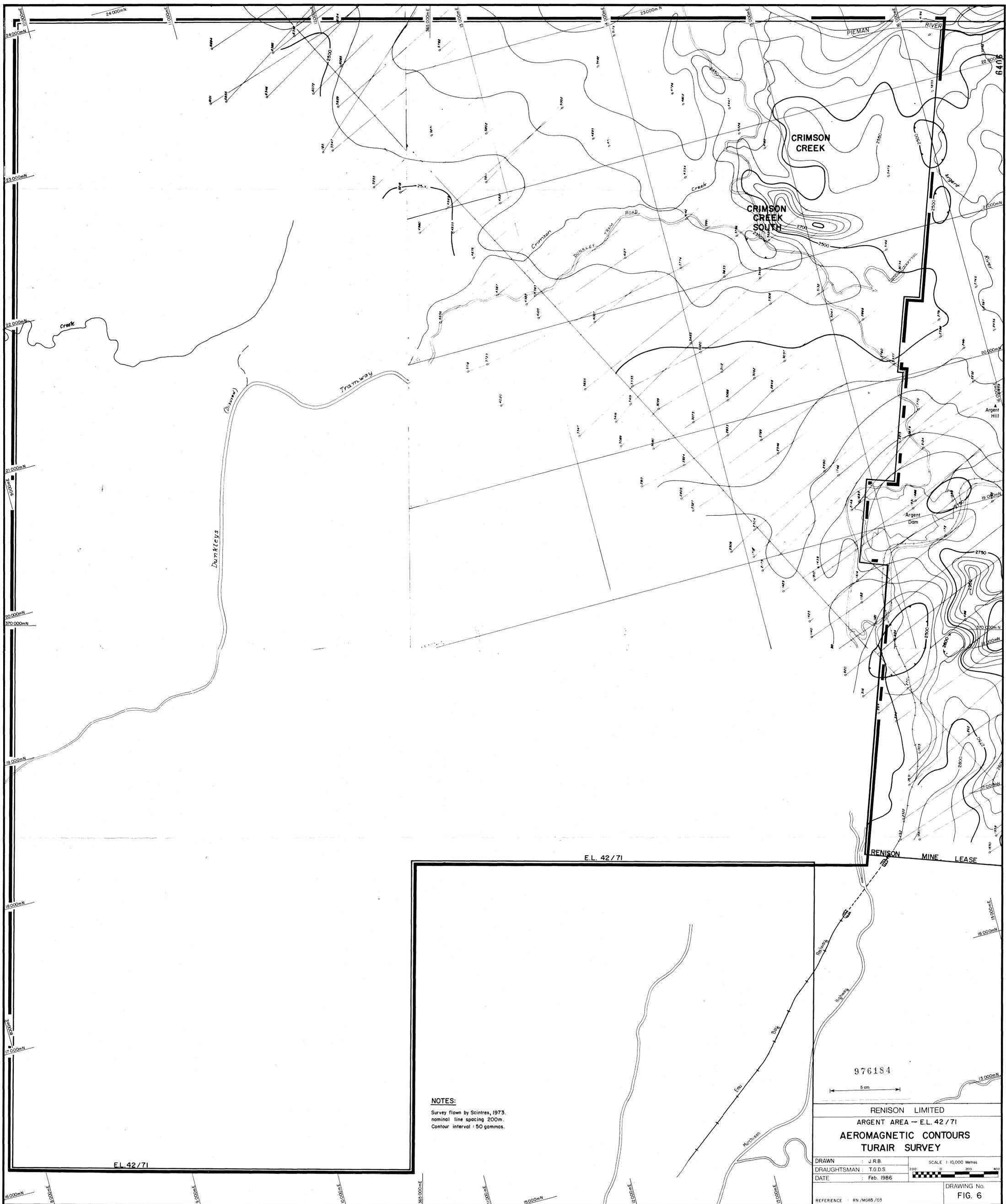
5 cm

Ref. RN/MG85/03

SCALE 1:10,000 100 0 100 200 Metres

86-2605 V.3

6405



NOTES:
 Survey flown by Scintrex, 1973.
 nominal line spacing 200m.
 Contour interval : 50 gammas.

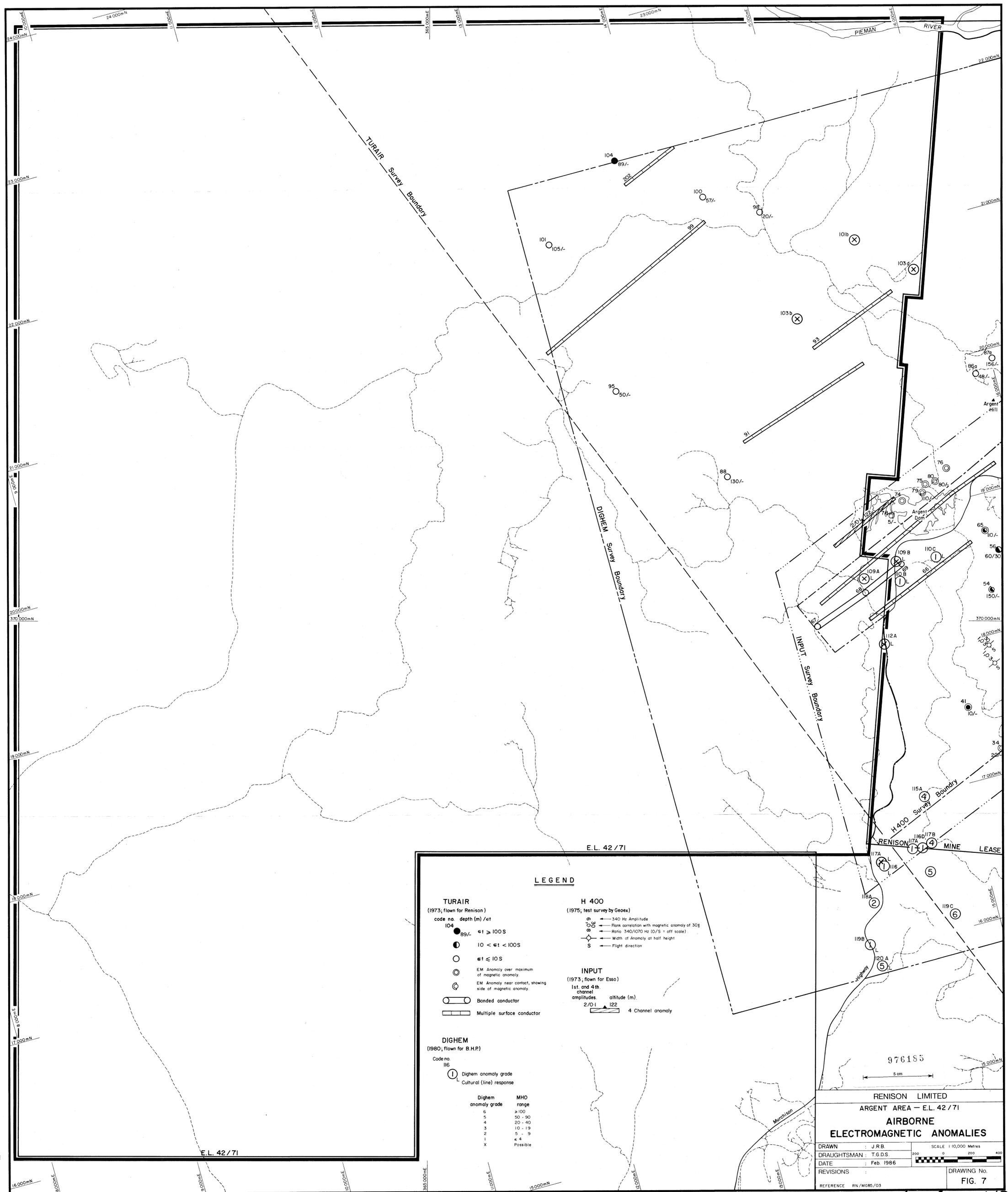
976184

5 cm

RENISON LIMITED
 ARGENT AREA - E.L. 42/71
 AEROMAGNETIC CONTOURS
 TURAIR SURVEY

DRAWN	: J.R.B.	SCALE	: 1:10,000 Metres
DRAUGHTSMAN	: T.G.D.S.		
DATE	: Feb. 1986	DRAWING No.	: FIG. 6
REFERENCE	: RN / MGRS / 03		

86-2605 V.3



LEGEND

TURAIR
(1973; flown for Renison)

code no. depth (m) / c/t

- 104 $\leq t \geq 100S$
- 89/- $10 < t < 100S$
- $t \leq 10S$
- ⊙ EM Anomaly over maximum of magnetic anomaly.
- ⊙ EM Anomaly near contact, showing side of magnetic anomaly.
- ▭ Banded conductor
- ▭ Multiple surface conductor

DIGHEM
(1980; flown for B.H.P.)

Code no.

- ① Dighem anomaly grade
- ⊙ Cultural (line) response

Dighem anomaly grade	MHO range
6	≥ 100
5	50 - 90
4	20 - 40
3	10 - 19
2	5 - 9
1	≤ 4
X	Possible

H 400
(1975; test survey by Geox)

- ⊙ 340 Hz Amplitude
- ⊙ Flank correlation with magnetic anomaly of 30%
- ⊙ Ratio 340/1070 Hz (O/S = off scale)
- ⊙ Width of Anomaly at half height
- Flight direction

INPUT
(1973; flown for Esso)

1st. and 4th. channel amplitudes. altitude (m).

- ▭ 2/0:1
- ▭ 122
- ▭ 4 Channel anomaly

976185

5 cm

RENON LIMITED
ARGENT AREA - E.L. 42 / 71

**AIRBORNE
ELECTROMAGNETIC ANOMALIES**

DRAWN : J.R.B. SCALE: 1:10,000 Metres
 DRAUGHTSMAN : T.G.D.S. 200 0 200 400
 DATE : Feb. 1986
 REVISIONS
 REFERENCE RN/M685/03

DRAWING No. **FIG. 7**

86-2605 V.3

6407



CRIMSON CREEK GRID:
 - Gradient array
 - Pole-dipole detailing
 - M.I.P. detailing
 Original data (in mv/v) contours at 1:5000,
 (modified here to fit grid lines).
 Scintrex 1974, Report Tos-019C.

REINSON BELL WEST GRID (Crimson Creek)
 - Dipole-dipole array,
 McPhar 1964 for Comstaff.
 Original data: pseudosections at 1:3600.

DUNKLEY TRAM GRID:
 - Gradient array, Scintrex 1980.
 Report Tos-074B.
 Original data (in mv/v) contours at 1:5000.

ARGENT GRID:
 - Gradient array, Scintrex 1976,
 Report Tos-032.
 Original data (in mV) profiles at 1:5000.
 Presentation here is diagrammatic (due to
 large line spacing).

MELBA FLAT GRID:
 - Dipole-dipole array,
 McPhar 1962 for E.Z.
 Original data (in PFE) pseudosections
 at 1:200.

976186
 5 cm

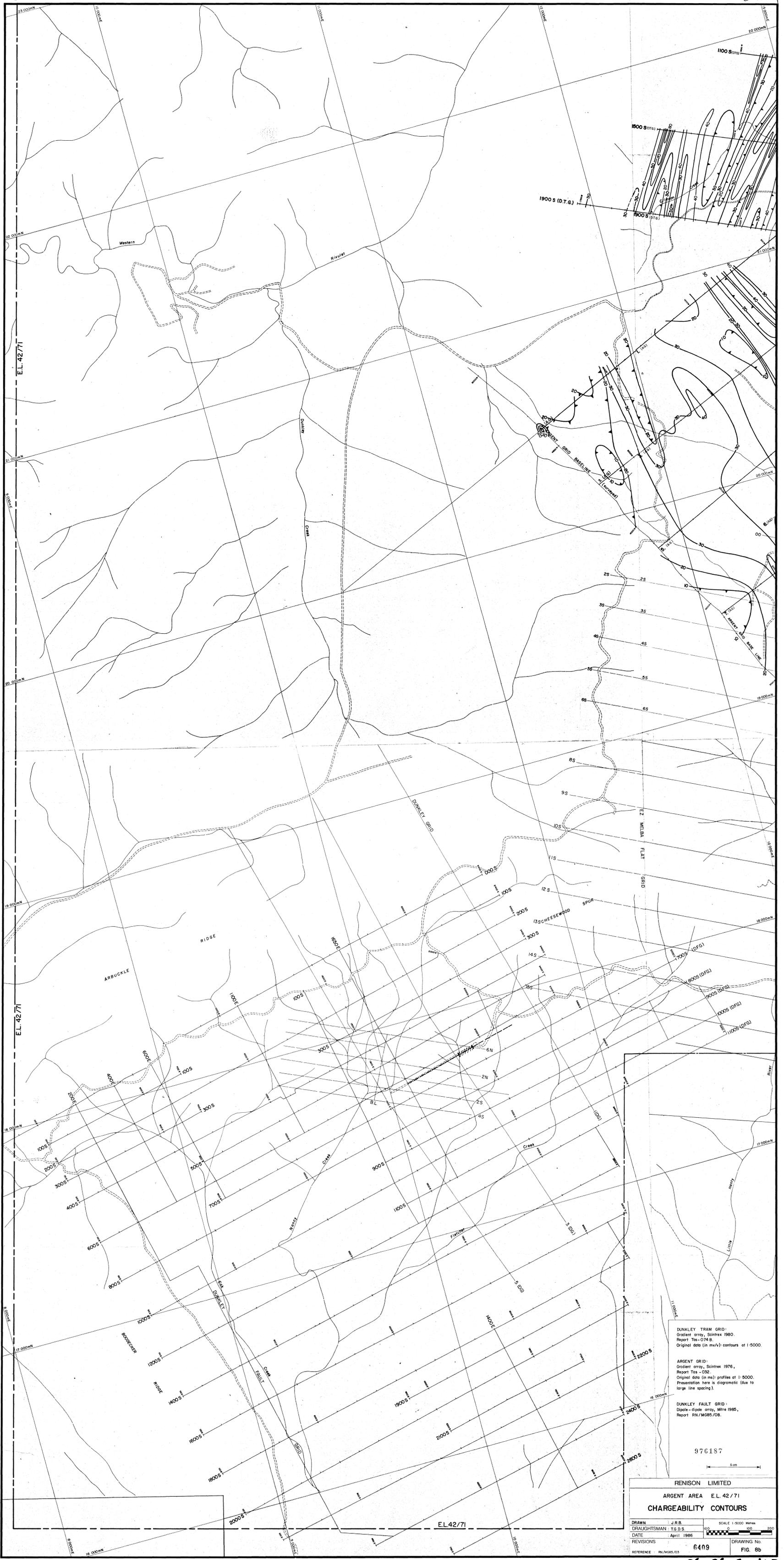
REINSON LIMITED
 ARGENT AREA E.L. 42/71
CHARGEABILITY CONTOURS

DRAWN: J.R.B. SCALE: 1:5000 Metres
 DRAUGHTSMAN: T.G.D.S. 0 50 100 200
 DATE: April 1986
 REVISIONS: DRAWING No. 6408 FIG. 8a
 REFERENCE: RN/406/03

CH
 CF
 CD
 CB
 BZ

EL 42/71

17 000m N
 17 000m E



DUNKLEY TRAM GRID:
 Gradient array, Scintrex 1980.
 Report Tas-074 B.
 Original data (in mv/v): contours at 1:5000.

ARGENT GRID:
 Gradient array, Scintrex 1976.
 Report Tas-032.
 Original data (in ms): profiles at 1:5000.
 Presentation here is diagrammatic (due to large line spacing).

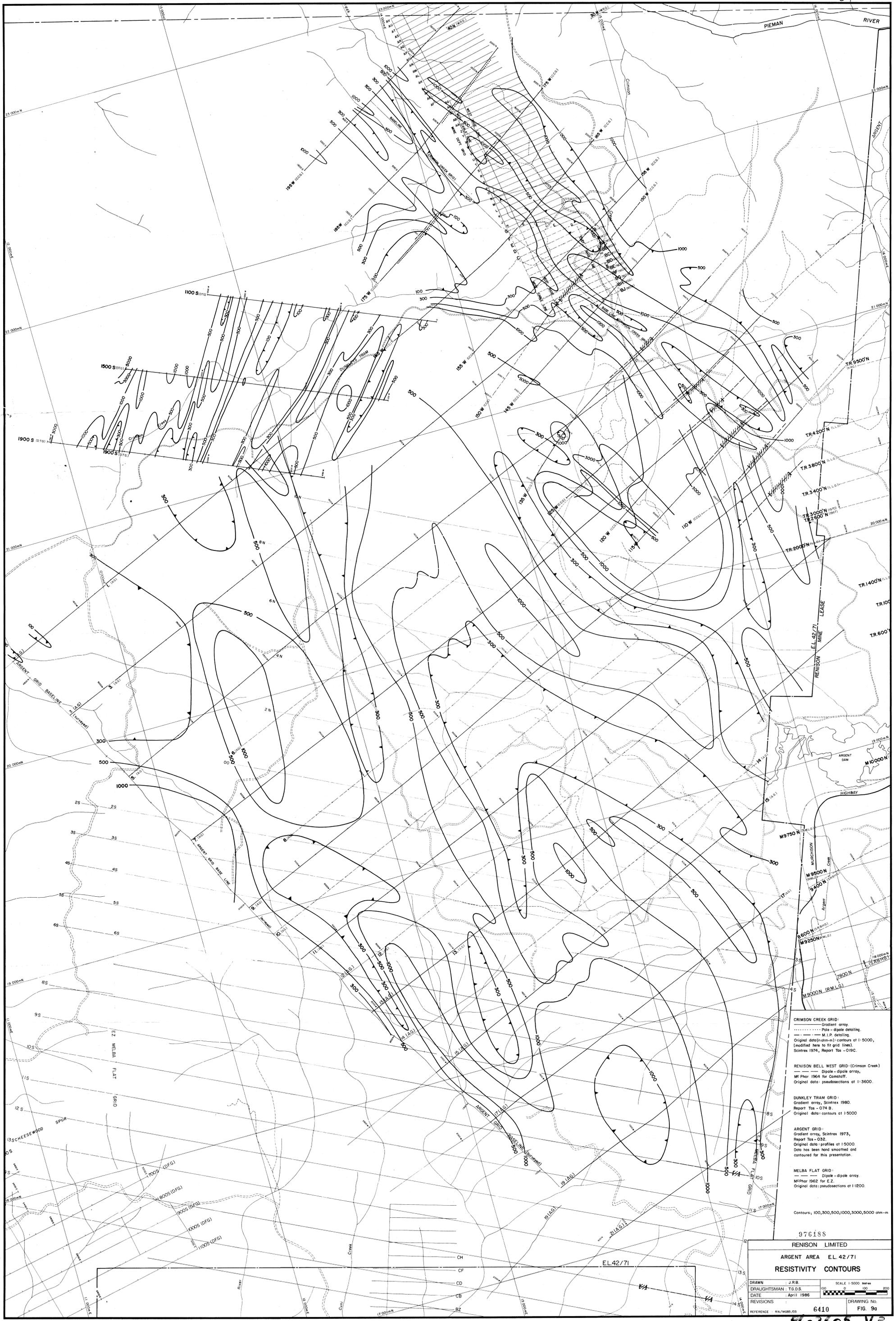
DUNKLEY FAULT GRID:
 Dipole-dipole array, Mitra 1985.
 Report RN/MGS/08.

976187
 5m

RENISON LIMITED
 ARGENT AREA E.L. 42/71
CHARGEABILITY CONTOURS

DRAWN: J.R.B. SCALE: 1:5000 Metres
 DRAUGHTSMAN: T.G.D.S. 100 200 300
 DATE: April 1986
 REVISIONS: REFERENCE: RN/MGS/03 6409 DRAWING NO. FIG. 8b

EL.42/71



CRIMSON CREEK GRID:
 Gradient array
 Pole - dipole detailing
 M.I.P. detailing
 Original data (nom-m): contours at 1:5000, (modified here to fit grid lines)
 Scitrex 1974, Report Tas - O19C

REINSON BELL WEST GRID: (Crimson Creek)
 Dipole - dipole array
 MC Phar 1964 for Comstaff
 Original data: pseudosections at 1:3600

DUNKLEY TRAM GRID:
 Gradient array, Scitrex 1980
 Report Tas - O74 B
 Original data: contours at 1:5000

ARGENT GRID:
 Gradient array, Scitrex 1973,
 Report Tas - O32
 Original data: profiles at 1:5000
 Data has been hand smoothed and
 contoured for this presentation.

MELBA FLAT GRID:
 Dipole - dipole array
 MC Phar 1962 for C.Z.
 Original data: pseudosections at 1:1200

Contours: 100,300,500,1000,3000,5000 ohm-m

976188

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ARGENT AREA EL. 42/71

RESISTIVITY CONTOURS

DRAWN: J.R.B. SCALE: 1:5000 metres

DRAUGHTSMAN: T.G.D.S. 0 100 200

DATE: April 1986

REVISIONS: DRAWING No. 6410 FIG. 9a

REFERENCE: R14/M085/03



DUNKLEY TRAM GRID:
Gradient array, Scintrex 1990,
Report TAs - 074B.
Original data: contours at 1:5000.

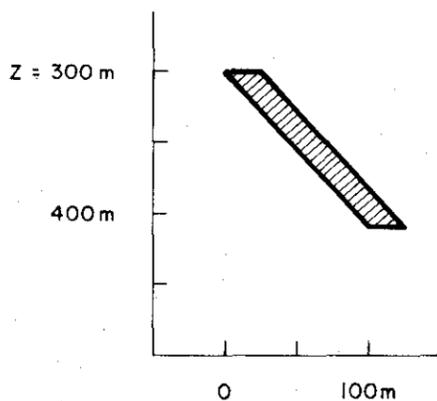
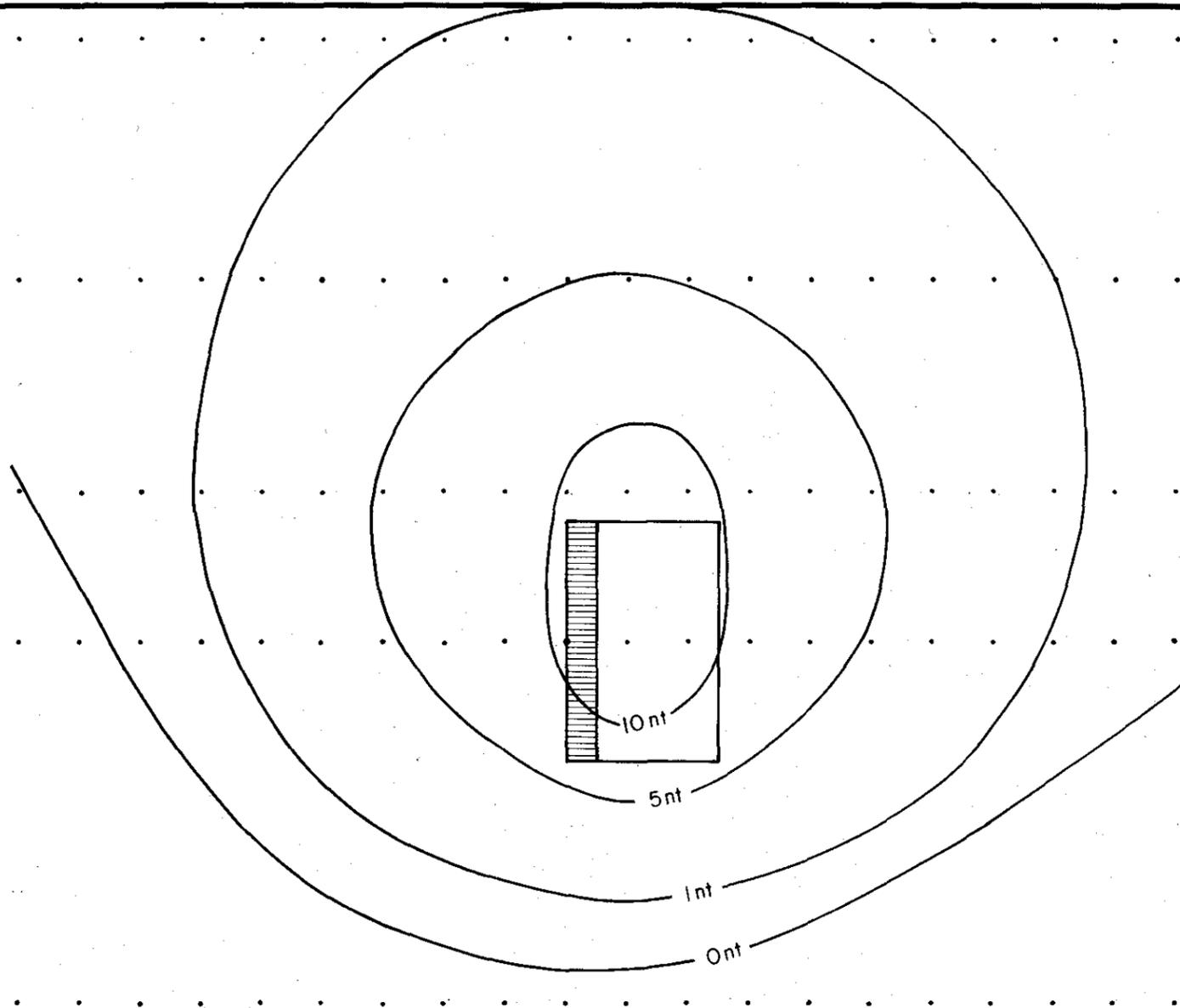
ARGENT GRID:
Gradient array, Scintrex 1973,
Report TAs - 032.
Original data: profiles at 1:5000.
Data has been hand smoothed and
contoured for this presentation.

DUNKLEY FAULT GRID:
Dipole - dipole array, Mitre 1985,
Report RN/MG85/08.

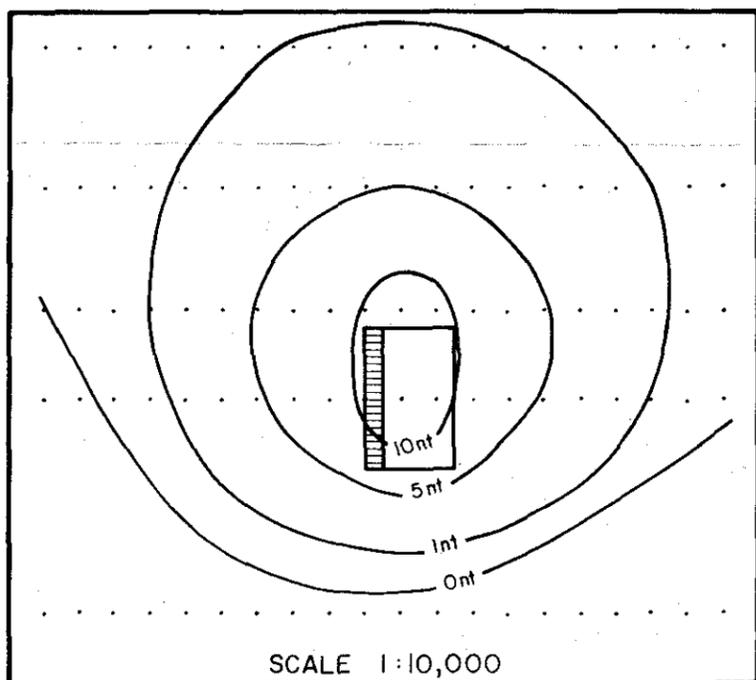
976189
5 cm

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ARGENT AREA E.L. 42/71
RESISTIVITY CONTOURS

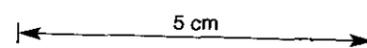
DRAWN	J.R.B.	SCALE	1:5000 Metres
DRAUGHTSMAN	T.G.D.S.	100	0 100 200
DATE	April 1986		
REVISIONS			
REFERENCE	RN/MG85/03	6411	DRAWING No. FIG. 9b



Target : Massive pyrrhotite body
 Dimension : 200m x 150m x 16.7m
 long deep thick
 (≈ 2 million tonnes
 for density of 4t/c.m.)
 Magnetic susceptibility : 0.01 cgs
 Depth below sensor : 300 m
 Strike : magnetic north
 Dip : 45° east



976190

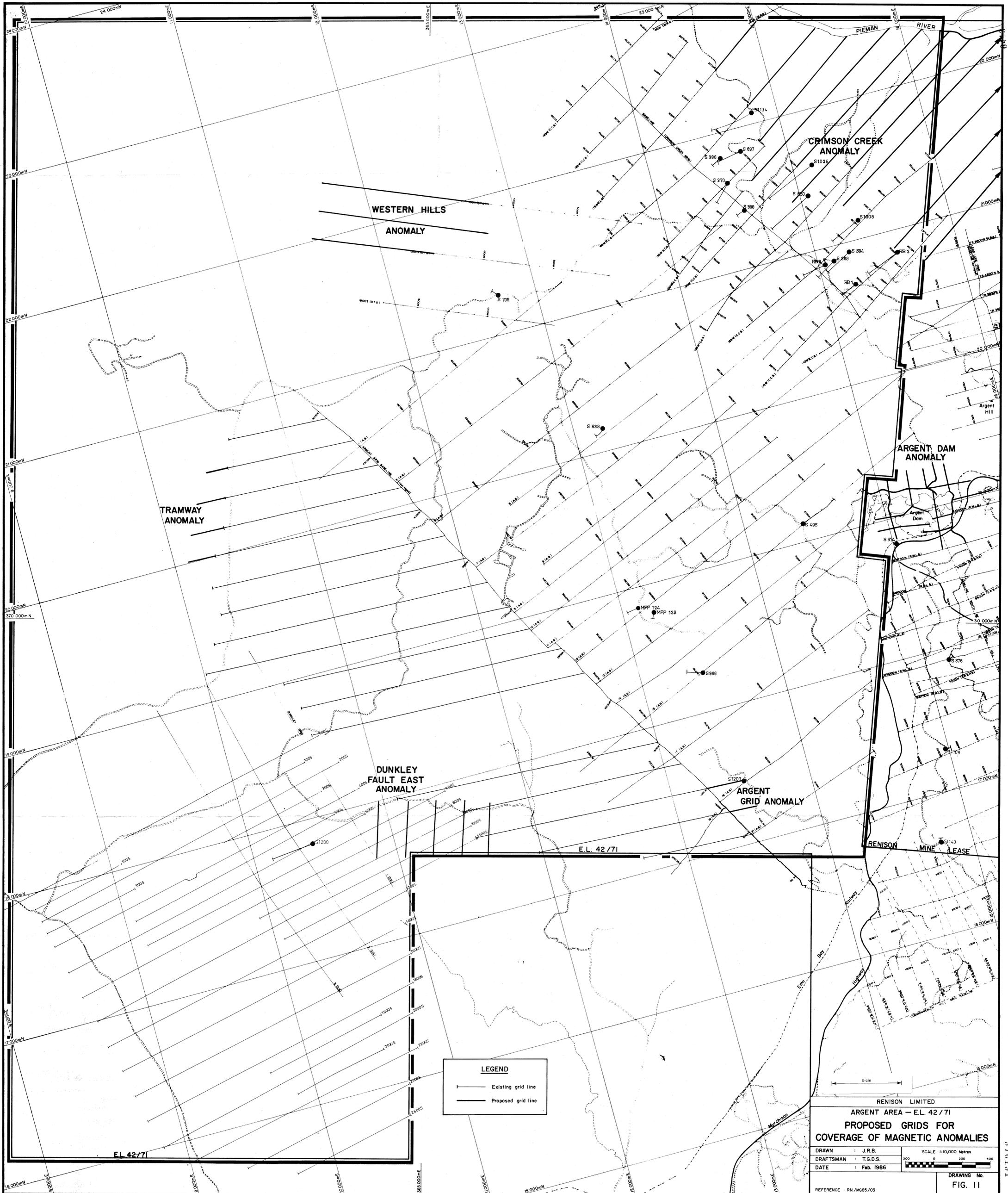


RENISON LIMITED	
ARGENT AREA (E.L.42/71)	
Response of Idealised Magnetic Target	
DRAWN BY : J.B.	REVISIONS :
DRAFTSMAN : T.G.D.S.	FILE NO.
DATE : Feb '86	FIG. 10
SCALE 1:5,000	50 0 50 100 Metres

Ref RN/MG85/03

86-2605 V3

6412



LEGEND

— Existing grid line

— Proposed grid line

RENISON LIMITED
 ARGENT AREA - E.L. 42/71
**PROPOSED GRIDS FOR
 COVERAGE OF MAGNETIC ANOMALIES**

DRAWN : J.R.B. SCALE 1:10,000 Metres
 DRAFTSMAN : T.G.D.S. 0 200 400
 DATE : Feb 1986

DRAWING No. FIG. II
 REFERENCE : RN/MG85/03

86-2605 V.3

6413

161976