PLUTONIC OPERATIONS LIMITED

ACN 004 680 997

EXPLORATION LICENCE 7/92

HIGH ROCKY POINT

SORELL PENINSULA

Report on the Southern Area Relinquished in September 1996

ORIGINAL

R J Close

26 November 1996

REF:RJC:JM:RPT001

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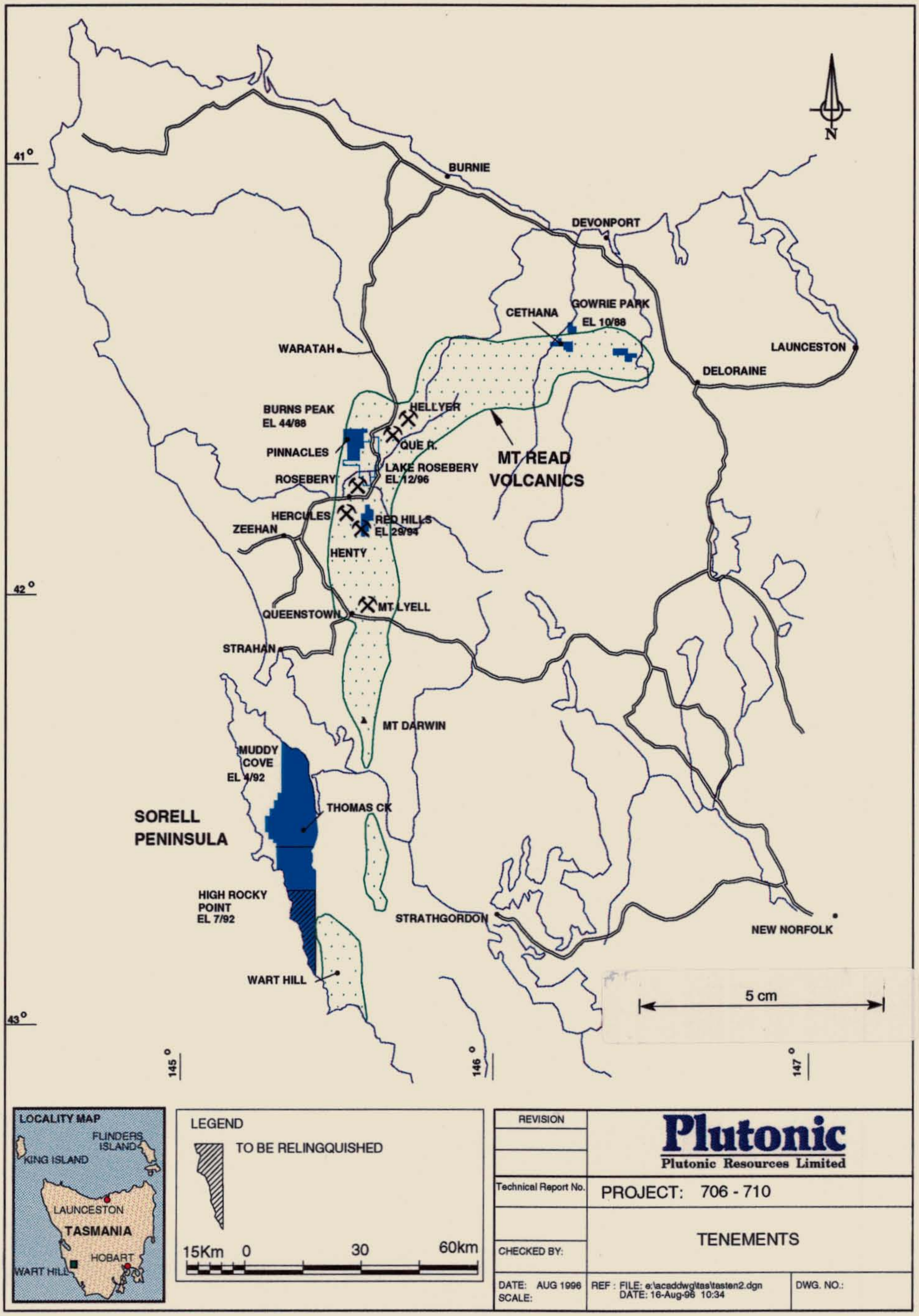

FIGURE 1

1.0 SUMMARY

Plutonic Operations Limited was granted EL 7/92 High Rocky Point in the southern part of the Sorell Peninsula as part of a regional search of Mt Read-style VHMS mineralisation in Cambrian Volcanics. On the basis of minimal previous exploration, aeromagnetic interpretation of geological units and the results of a GeoTem deep electromagnetic survey conducted in 1996, Plutonic concluded that the southern portion of EL7/92 had limited potential for polymetallic massive sulphide mineralisation.

Therefore this area of 83 km^2 was relinquished in September 1996 in favour of concentrating exploration efforts in the northern part of the Sorell Peninsula where extensive sequences of the Noddy Creek Volcanics were thought to have better potential for a major base metal mineral deposit.

2.0 INTRODUCTION

2.1 Tenure

EL's 4/92 "Muddy Cove Creek" (243 km^2) and 7/92 "High Rocky Point" (183 km^2) were granted to Plutonic Operations Limited on 11 September 1992. The EL's are located in south-west Tasmania within the Sorell Peninsula as shown in Figures 1 and 2.

Following Plutonics initial assessment of the Sorell Peninsula tenements in 1993 it was evident that substantial exploration over a number of years would be required to bring any prospect to the development stage. Given that the Wilderness Society has proposed the Sorell Peninsula be added to the Tasmanian Wilderness World Heritage Area (TWWHA), it was therefore decided to quantify the sovereign risk perceived to be posed by conservation interests in inhibiting mining development within the South-West Conservation Area.

Assessment of this risk was achieved by presenting a hypothetical mining proposal for the Sorell Peninsula to the Tasmanian Department of Resources and Energy for its evaluation of environmental and conservation issues and the likelihood of approval for development. The Department responded in July 1994 with a document entitled "Issues for Consideration" which outlined the approval process and the requirement of any development to be declared a project of State Significance. In consideration of the fact the area has been declared a Strategic Prospectivity Zone and the strong support the Tasmanian Government has declared for any significant development in the area, Plutonic subsequently decided to proceed with the exploration of these tenements.

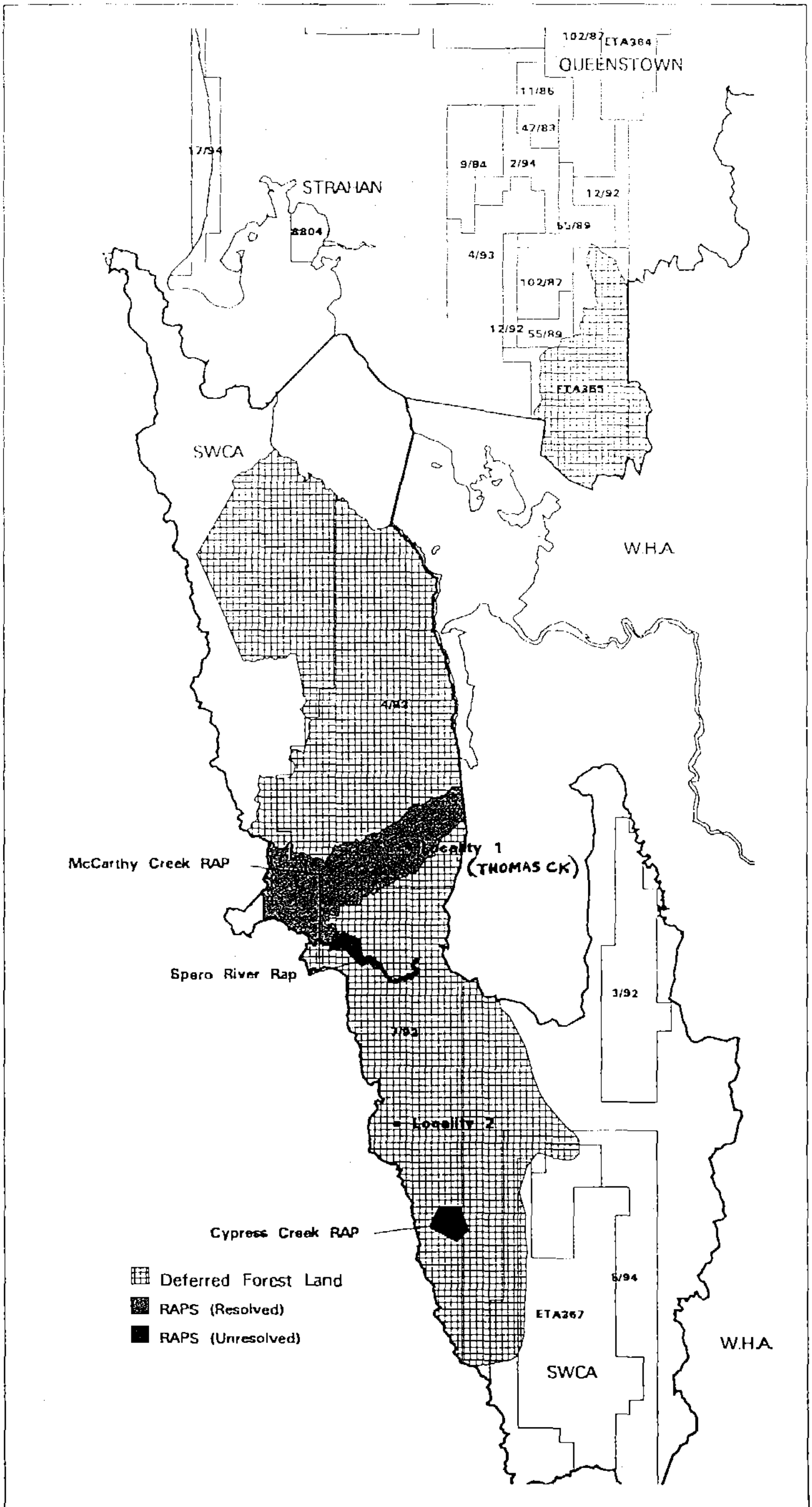
102/87
ETA364
QUEENSTOWN
11/86
47/83
17/94
9/84
2/94
STRAHAN
12/92
55/89
4/93
102/87
12/92
55/89
ETA365
SWCA
W.H.A.
4/93
McCarthy Creek RAP
Locality 1
(THOMAS CK)
Spero River Rap
3/92
7/93
Locality 2
Cypress Creek RAP
Deferred Forest Land
RAPS (Resolved)
RAPS (Unresolved)
6/94
ETA367
SWCA
W.H.A.

FIGURE 2

During 1993, whilst this assessment process was being conducted, no field exploration was undertaken and Plutonic was unable to fulfil its expenditure commitment for the second year of these licences. However, Tasmania Development and Resources waived the expenditure commitment in August 1994 provided Plutonic completed the postponed programme the following field season. This was duly undertaken but the results were considered negative for the southern portion of EL 7/92 and the area south of AMG 5270000N totalling 83 km^2 was relinquished on the 11 September 1996.

2.2 Access and Land Usage

Access and movement within these tenements is problematic with no roads or passable tracks for vehicles except for trail bikes in a few peripheral areas in the north. The prospective rocks are invariably under thick bush or forest with few natural helipads. Passage through this terrain is generally slow and physically demanding especially along creeks which are usually overgrown and difficult to travel along.

The Sorell Peninsula along the south-west coast, receives the full brunt of the roaring forties so that exploration in the winter months is not advisable and the field season is generally November to April.

All of the area is included in the South-West Conservation Area. This means that although exploration is allowed, there are more stringent guidelines than in Crown Land elsewhere. This applies in particular to three Recommended Areas for Protection (RAPS) covering flora habitats within the tenement areas. Refer Figure 2. Given due care to minimise environmental disturbance and adherence to approved and safe exploration practice, work programmes in these areas can be conducted satisfactorily.

3.0 REGIONAL GEOLOGY

3.1 Introduction

Due to the difficulty of access, lack of outcrop and minimal exploration to date, the geology of Sorell Peninsula is relatively poorly understood. For this reason an account of the geological work conducted in the area is presented.

The main belt of the Mt Read Volcanics extends for 170 km south from Hellyer, through Queenstown, along the West Coast Range to South Darwin Peak where it disappears under a Tertiary graben, to re-appear along the D'Aguillar Range and further south to the coast at Elliott Bay.

To the west of the D'Aguillar Range in the Sorell Peninsula, the Noddy Creek Volcanics are correlated with the Mt Reads on the basis of their petrology and calc-alkaline geochemical characteristics by a number of workers. However, it is difficult to structurally relate these volcanics with the main belt.

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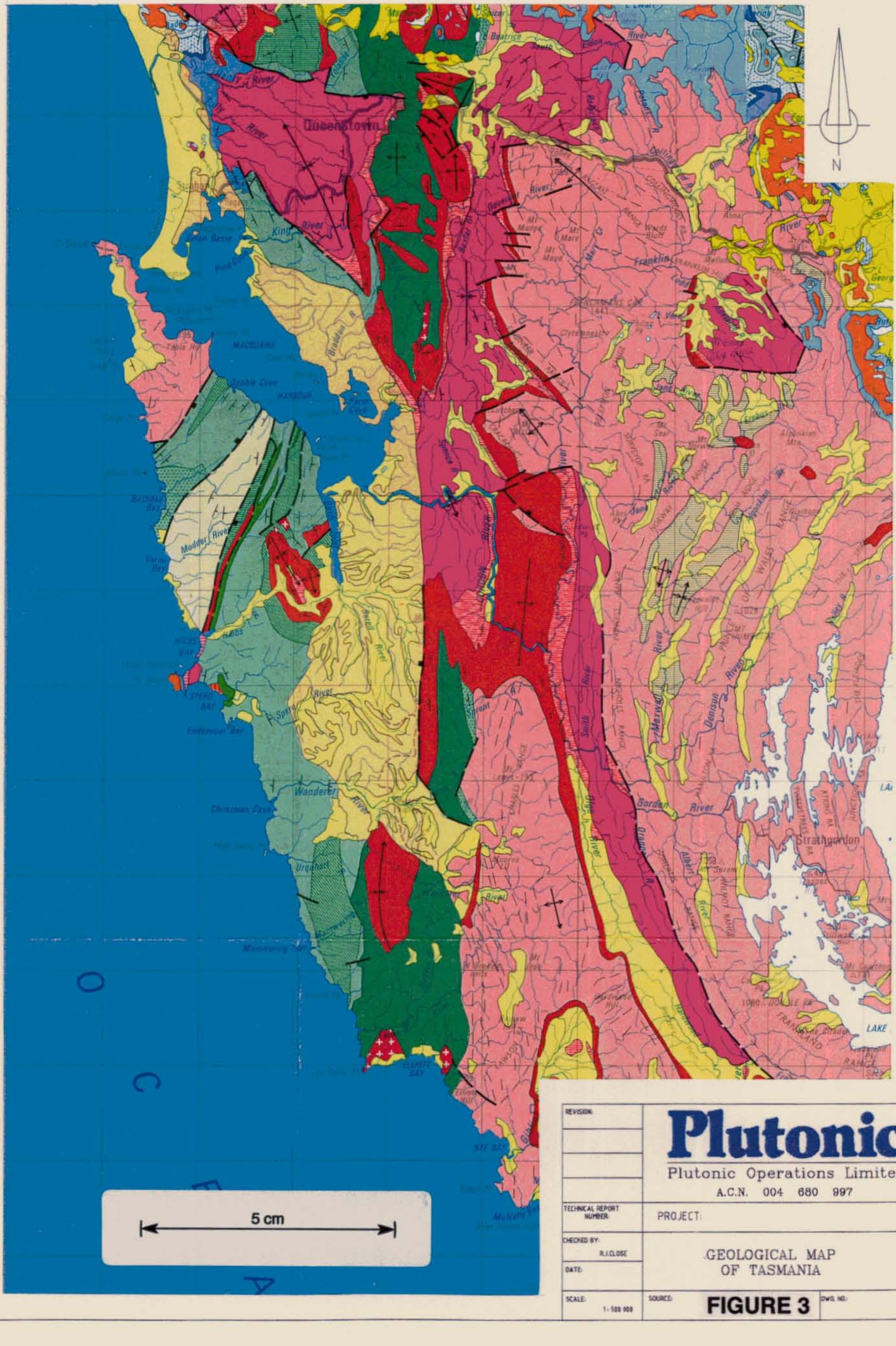

REVISION:	**Plutonic** Plutonic Operations Limited A.C.N. 004 680 997
TECHNICAL REPORT NUMBER:	PROJECT:
CHECKED BY: R.J.CLOSE	GEOLOGICAL MAP OF TASMANIA
DATE:	
SCALE: 1: 500 000	SOURCE: **FIGURE 3** DWG. NO.:

From regional scale magnetics and gravity it is clear that there is a major structure running north-south through Birch's Inlet on the east side of the Sorell Peninsula and a second north-westerly trending structure along the north side of Macquarie Harbour. The whole Sorell Peninsula may have been faulted south from a position west of Zeehan and the possibility of a separate sub-arc should not be discounted.

3.2 Stratigraphy

The geology of the Sorell Peninsula and the volcanics in particular has been described in company reports for BHP and Amoco/Cyprus, in White's PhD thesis and in recent Mines Department mapping by A Brown, D Seymour, M McClenaghan and D Findlay.

The first regional mapping of the area was completed by BHP in the late 1960s, however, it was based upon coastal and a few inland traverses and relied to a large degree on photo interpretation with the Cambrian and Precambrian left largely undifferentiated. Nevertheless Amoco/Cyprus (Ferris, 1984) relied heavily upon this mapping in their exploration and produced no map of their own other than the rough maps of their areas of interest.

In order to rectify this situation the Tasmanian Mines Department instituted a 1:50,000 regional geological survey in the late 1980s, however due to funding restrictions this programme remains uncompleted. The area north of Varna Bay is covered by the Macquarie Harbour (1989) sheet and the area south of High Rocky Point covered by the Montgomery (1988) sheet. Unfortunately the central Point Hibbs sheet area covering the major area of interpreted Noddy Creek Volcanics and related intrusives has not been mapped apart from a few reconnaissance traverses.

The significant differences between the Mines Department mapping and the earlier BHP/Amoco/Cyprus mapping is the extension of the prospective Noddy Creek Volcanics south to the coast at High Rocky Point and the associated sediments down to Veridian Point. Noddy Creek Volcanics in the Point Hibbs quadrangle are interpreted mainly from aeromagnetics as well as limited reconnaissance mapping.

The structure of the Sorell Peninsula is discussed in Brown *et al.* (1991), Carey and Berry (1988) McClenaghan and Corbett (1989) and McClenaghan and Findlay (1993). Two thrust fault bounded belts of Cambrian rocks separated by Precambrian sedimentary sequences occur on the northern part of the Sorell Peninsula. The western-most belt contains the tholeiitic mafic to intermediate Lucas Creek Volcanics and associated carbonate and greywacke-mudstone sequences. The eastern belt, however contains a complex sequence of volcanic suites and associated volcanic derived sediments, intruded by mafic-ultramafic bodies and felsic to intermediate plutons. Refer Figure 3 and Plate 1.

The Cambrian-Ordovician sequences are confined by major north-north-east trending and easterly dipping thrust faults of probable Devonian age, along which late transcurrent movement is indicated by McClenaghan and Findlay (1993). This faulting together with limited mapping, poor exposure and the presence of isoclinal folding in sediment-dominant sequences, has combined to reduce the overall understanding of the relationships between major stratigraphic packages in this region.

However, Brown *et al* (1991) and McClenaghan and Findlay (1993) recognise the following Cambrian associations in the tenement areas:-

1. Calc-alkaline Noddy Creek Volcanics;
2. Boninitic Timbertops Volcanics;
3. Tholeiitic basalt Mainwaring-Birch's Inlet Volcanics;
4. Point Hibbs Melange Belt - mafic-ultramafic intrusives.

3.2.1 Noddy Creek Volcanics

The Noddy Creek Volcanics differ from the other volcanics on the Sorell Peninsula by the fact that they are a calc-alkaline island arc suite of rocks as opposed to the more exotic alkaline, tholeiitic and picritic basalts and boninitic andesites and ultramafics elsewhere on the peninsula.

It is possible that the Noddy Creek Volcanics are a correlate of the VHMS mineralised Mt Read Volcanics in the Queenstown to Hellyer region. Based upon correlations with the other volcanic suites on the Peninsula, Brown (pers.comm.) feels that they may have been faulted south from around Zeehan. An alternative explanation suggested by McClenaghan and Corbett (1989) is that they are a separate sub-arc volcanic terrain.

The Noddy Creek Volcanics and associated sediments were originally mapped by BHP in the 1960's, however they concentrated to the north of EL 7/92 in the Timbertops area and the Point Hibbs ultramafic intrusives which are faulted against the western side of the Cambrian volcanics and sediments. (Close 1972.) Amoco/Cyprus gave a few localities some attention but not to the degree warranted by the prospectivity of the rocks.

Rocks considered by Brown (1988), McClenaghan and Findlay (1989), Brown *et al.* (1991), Brown (pers. comm.) and Seymour (pers. comm.) to be part of the Noddy Creek volcano-sedimentary association have been previously described in Hall *et al* (1969), White (1975), McClenaghan and Corbett (1989). BHP and Amoco/Cyprus considered most of the sediments associated with these volcanics, from Macquarie Harbour to south of High Rocky Point, to be part of the Dundas Group.

Brown (1988), McClenaghan and Findlay (1993), Brown *et al* (1991) and Seymour (pers. comm.) define the Noddy Creek volcano-sedimentary association in their mapping as being either pyroclastic, extrusive or intrusive, predominantly intermediate-acidic, calc-alkaline Cambrian volcanics or volcaniclastics and epiclastics derived from these volcanics.

Where the association is dominated by the sedimentary component the volcanic units occur as pillowed and sheet lavas, breccia flows and porphyritic flows with volcanic xenoliths, interbedded with vitric tuff or volcaniclastic siltstone and volcanicwacke beds.

Within the sediment dominated part of the section south of the Wanderer River, the sedimentary rocks form a flyschoid sequence with includes channellised sandstone and pebble-cobble conglomerate, suggesting a proximal submarine fan origin. The main clastic component is derived from a quartz-rich acid volcanic terrain with a minor component of metamorphic rock, exotic volcanic clasts and quartz fragments showing graphic intergrowths with feldspar.

In the south, around High Rocky Point, three groups of pyroxene/plagioclase basaltic-andesite to andesitic rocks, and a later group of hornblende-bearing andesite-dacite dykes have been recognised, defining a chemically evolving suite of volcanic rocks consistent with the generally east facing nature of the sequence.

Geochemically the basaltic andesite and andesitic rocks have similarities with the Que-Hellyer Volcanics whilst the andesitic-dacite dykes from the southern part and the rhyolitic rocks from the northern part have geochemical similarities with the bulk of the acid to intermediate rocks of the Mt Read Volcanics.

3.2.2 Timbertops Volcanics

In the Timbertops region in EL 4/92, outcrops of boninitic (high-Mg andesitic) lavas, breccias and crystal lithic tuffs, with interbedded mudstones and siltstones (McCleghan and Findlay 1993), are juxtaposed against the calc-alkaline Noddy Creek volcanics with the unexposed contact possibly a low angle thrust. These rocks are invariably altered with relatively pristine rocks consisting of talc and chlorite pseudomorphs of pyroxene in a matrix of talc, chlorite and spinel.

3.2.3 Birch's Inlet-Mainwaring River Volcanics

Brown *et al.* (1991) consider that the mafic volcanics and associated sediments south of Urquhart River and those outcropping immediately to the west of Birch's Inlet but east of the Noddy Creek Volcanics, are from the same north-south trending belt with the central part hidden by Tertiary cover. Previous workers have considered the two mafic groups separately with the Mainwaring River Volcanics receiving by far the most attention because of their copper anomalous signature.

The two volcanic areas are correlated as a single belt on the basis of geochemical affinities, similar stratigraphy and the presence of a broad aeromagnetic high joining the two areas of outcrops separated by Tertiary sediments.

Brown *et al.* refer to this belt as being a picritic basalt-basalt association with intra-plate and island-arc affinities. The sequence is described as consisting of vesicular, pillow and sheet flows of pyroxene phyric and/or plagioclase phyric basaltic rocks interlayered with hyaloclastite and basalt breccia.

The proportion of sedimentary rocks in the sequence increases to the south. These consist of interbedded mudstones and chert, volcaniclastics siltstone, lithicwacke, carbonates, siliceous pebbly conglomerates and lithicwackes. Brown (1988) noted the northern sequence was east facing whilst in the south isoclinally folded sediments predominate.

Two groups of lavas have been identified in both volcanic areas, with the lower group generally picritic and the upper group tholeiitic. The lower group resembles lavas from the Miners Ridge basalt further north at Queenstown which are considered to represent the base of the Mt Read Volcanic sequences.

This is in contrast to Ferris (1984) who, tentatively correlated the volcanics with the calc-alkaline basic-intermediate Que-Hellyer Volcanics from the uppermost part of the Mt Read Volcanics.

In the Birch's Inlet area, McGregory and Bumstead (1969) on behalf of BHP described a sequence of spilitic basalts and laminated siltstone, whereas White (1975) refers to the Birch's Inlet Volcanics as spilite with thin bands of basaltic tuff, volcanic greywacke and serpentinite. The lack of significant drainage anomalism over these volcanics and their tholeiitic mafic composition has not encouraged any detailed exploration of their economic potential.

In contrast, the volcanics in the Mainwaring River area to the south have received considerable attention, and they were perhaps the main focus of early BHP and late Amoco/Cyprus exploration because of their copper anomalous character.

Amoco/Cyprus (Ferris 1984) considered the Mainwaring Volcanics occurred within a discrete vent area due to the abnormal amount of explosive mafic volcanic rocks "agglomerates and breccias" interbedded with tuffaceous sediments. Only a minor acid volcanic component was recognised.

BHP (Hall and Corbett 1969) describe the lower (western) part of the Mainwaring Group as consisting of argillites, phyllites and greywackes cross-cut by diorite and gabbro bodies and intruded by andesitic sills. The upper part described as consisting predominantly of thick basaltic to andesitic tuffs with minor conglomerate also cut by small sill-like gabbro and diorite intrusives, corresponds to the Mainwaring River Volcanics of Brown *et al.*(1991). They consider the western sediment-dominated package is definitely not related to these mafic volcanics and is probably a distal correlate of the Noddy Creek Volcanics, faulted against the Mainwaring River Volcanics.

3.2.4 Point Hibbs Melange Belt

A major thrust bound sequence across the Sorell Peninsula consists variously of massive to highly sheared, talcose and/or serpentinised peridotite with minor layered pyroxenite, intruded by gabbro-norite bodies and late lamprophyric dykes. West of the Timbertops area, the ultramafics are apparently associated with sheared, talc-rich boninitic andesite lavas (McClenaghan and Findlay, 1993). A similar association in the Dundas Trough near Zeehan may indicate an original spatial relationship between these two areas.

3.2.5 Post Cambrian Stratigraphy

Ordovician sequences in the Sorell Peninsula are restricted to isolated fault slivers on the western side of the Point Hibbs Melange Belt and the major north-west trending Timbertops Syncline. The Ordovician sequence at Timbertops unconformably overlies Cambrian strata, and consists of basal quartz sandstone with conglomerate interbeds and fossiliferous micaceous siltstone-sandstone correlated with the Denison Group. In the core of the syncline recessive outcrops of Gordon Limestone have been recognised (McClenaghan and Findlay, 1993).

Mid to Upper Palaeozoic sedimentary sequences and Jurassic dolerite are restricted to faulted zones between Hibbs Bay and Point Hibbs. Apart from thick unconsolidated quartzose Tertiary sediment cover in the Birch's Inlet to Wanderer River area, no other significant Palaeozoic or younger sequences exists on the Sorell Peninsula.

4.0 EXPLORATION PHILOSOPHY

The Sorell Peninsula tenements were acquired by Plutonic Resources to explore primarily for VHMS deposits related to the Noddy Creek Volcanics which were thought to correlate with mineralised felsic to intermediate volcanic sequences of the Mt Read Volcanics.

In addition, some of the more mafic sequences have been equated with the Que-Hellyer basalts and therefore they may also be base metal prospective.

5.0 EXPLORATION HISTORY

Apart from minor copper workings at Birthday Bay on the West Coast of the northern part of the Sorell Peninsula and a small asbestos quarry at Asbestos Point, no significant mining has ever been conducted.

Earliest exploration by Lyell-EZ Exploration (LEE) from 1956 to 1962, concentrated on the volcanic sequences west of Birch's Inlet in search for VHMS mineralisation. They conducted airborne magnetics and a restricted EM survey which defined a series of anomalies mainly associated with the Point Hibbs Melange Belt. These anomalies were field checked with negative results and no further work was conducted.

From 1964 to 1972 BHP held title over most of South Western Tasmania which they regionally mapped and explored for various base metal mineralisation styles. On the Sorell Peninsula, BHP exploration involved follow-up of LEE geophysical anomalies as well as reconnaissance mapping and drainage surveys which were concentrated in the Cypress Creek area south of the Mainwaring River, and the Hibbs River-Noddy Creek area.

Copper mineralisation with associated Zn and Ni anomalism was outlined in several areas of Mainwaring River Volcanics with native copper and chalcopyrite identified in sheared or brecciated chlorite-epidote altered intermediate tuffs and gabbro in the Cypress Creek area. Semi-detailed grid surveys failed to locate a source for the copper mineralisation and because the mineralisation was not considered of VMS character no drilling or further work was undertaken.

Subsequent exploration during 1983-1988 by a joint venture involving Placer, Poseidon and Amoco (Cyprus) as managers, initially comprised a detailed airborne aeromagnetic and radiometric survey of the whole Sorell Peninsula with selected volcanic areas covered with DIGHEM surveys. Exploration targets were volcanic-hosted massive sulphides and gold mineralisation.

No significant primary DIGHEM anomalies were recognised, although a number of second class anomalies and other aeromagnetic anomalies were recommended for follow-up. In 1983-84 Amoco conducted reconnaissance mapping and sampling of the Noddy Creek Volcanics around Timbertops north to Briggs Creek and south to Thomas Creek to assess various aeromagnetic anomalies.

No mineralisation directly related to felsic or intermediate volcanics was discovered. However, some weak base metal veining was reported adjacent to diorite at Timbertops, and more significantly a Cu-As (Ba) association with diorites and intermediate volcanics was recognised in the "Warrens to Thomas Creek" area of EL 4/92.

Elsewhere Amoco evaluated the Lucas Creek Volcanics and Mainwaring River Volcanics for gold without success and no significant fieldwork was undertaken after a full interpretation of DIGHEM surveys by Bishop in 1986.

No other company exploration was conducted in the Sorell Peninsula until Plutonic Operations was granted the current licences in 1992.

6.0 WORK CONDUCTED

6.1 Introduction

Initial exploration by Plutonic consisted of a review of previous exploration data which has been summarised in the Exploration History section of this report. Subsequently in 1993 fieldwork was mainly focussed in the northern part of the Sorell Peninsula following up DIGHEM targets and geochemical anomalies identified by Amoco Minerals.

6.2 Reconnaissance Fieldwork

Within EL 7/92, a reconnaissance survey was conducted of gold anomalous drainages in the lower section of the Wanderer River. The anomalies were defined by the Huminex Waters technique being developed by the Tasmania Department of Mines.

A two man crew were ferried to the area by helicopter and spent three days collecting twelve BLEG drainage samples from two tributaries north and south of the Wander River within the Huminex anomalous zone.

Sample results which gave a maximum value of 0.84 ppb Au are presented in Appendix I and sample locations are shown in Figure 5. These results were not considered encouraging and no further work was conducted in this area.

Geological mapping showed the northern creek traversed volcanic derived sediments presumed to represent a distal expression of the Noddy Creek Volcanics to the north. The southern creek also exhibited this volcaniclastic package, however the sediments are intruded by a diorite body which locally has a weak pyritic halo but otherwise appears unmineralised.

This diorite may be responsible for a minor linear aeromagnetic high which had been interpreted to represent a basaltic unit within the Noddy Creek volcaniclastic package as shown in Plate 1.

A more extensive drainage reconnaissance survey covering the northern portion of EL7/92 down to the Urquart River was planned for the 1994 season. However, this was never undertaken due to delays caused by the sovereign risk evaluation of this region discussed previously.

6.3 Airborne Geophysical Surveys

6.3.1 Introduction

As a result of Plutonic's exploration in 1993, it was considered that the most appropriate method to regionally evaluate the tenements for VHMS deposits was to fly a detailed fixed wing airborne EM-MAG survey over the prospective volcanics. Accordingly, in July 1994 Geoterrex was requested to conduct a 1600 line km GeoTem survey as soon as the equipment was available. Unfortunately, the system was not scheduled to be in Australia until Easter 1995, and when it did arrive the fixed wing platform was unserviceable whilst suitable weather and conditions for flying existed in Tasmania.

As no other comparable EM system was available during this period, the survey had to be rescheduled for the 1995/96 summer season.

6.3.2 Aeromagnetic - Radiometric Interpretation

Due to the delays in organising new airborne surveys over the tenements, it was decided to reprocess the 1984 Amoco Minerals aeromagnetic-radiometric survey of the region in an attempt to obtain a sufficiently detailed coverage to be useful for regional geological interpretation. Austirex International Ltd was commissioned to microlevel, verify and format the data from the original magnetic tapes onto Exabyte tape, which was then presented to Tasmania Development and Resources to integrate into its regional database for Western Tasmania. In return Development and Resources undertook digital manipulation of the data to produce relevant imaged and contoured data sets for presentation and interpretation purposes.

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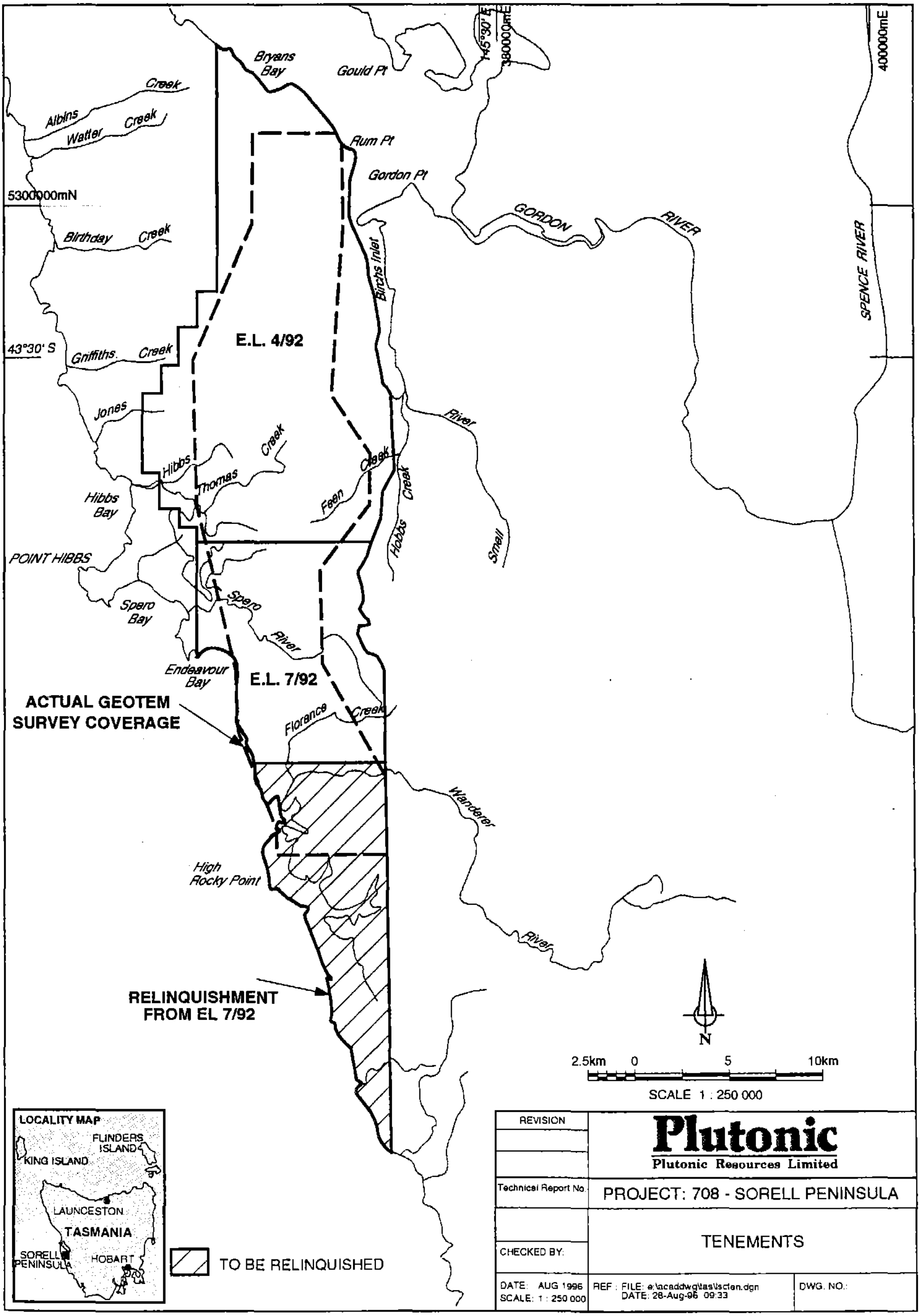
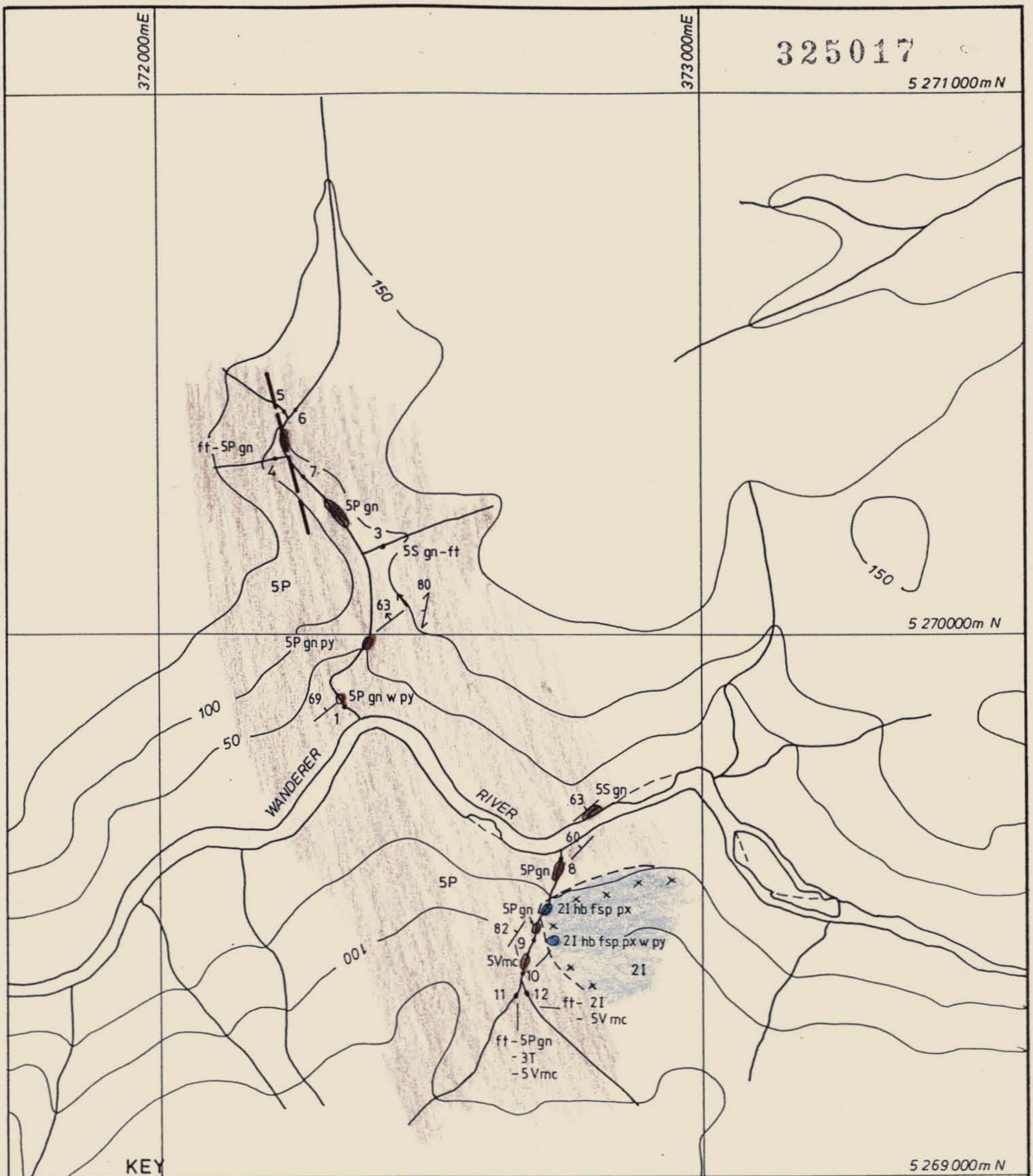


FIGURE 4



KEY

5P	Green > beige siltstones & lesser sandstones - volcanic derived & intermediate derived volcaniclastics
2I	Mafic intrusive horneblende - pyroxene plagioclase phyric
80	bedding; younging direction
80	cleavage
— —	fault
⬭	outcrop
5P	siltstones
5S	sandstones
5V	volcaniclastics
3T	intermediate tuff
fsp	feldspar
ft	float
gn	green
hb	hornblende
mc	mafic
px	pyroxene
py	pyrite
w	with

SAMPLE RESULTS

Sample no.	Res.-Au(ppb)
1. (S01901)	0·57
2. (S01902)	0·07
3. (S01903)	0·07
4. (S01904)	0·84
5. (S01905)	0·12
6. (S01906)	<0·05
7. (S01907)	<0·05
8. (S01908)	0·05
9. (S01909)	0·24
10. Not assayed	
11. (S01911)	0·26
12. (S01912)	0·34

REVISION	PLUTONIC OPERATIONS LIMITED ACN 004 680 997 (INC IN NSW)	
TECH. REP. No.	PROJECT 708 - SORELL PENINSULA	
COMPILED BY G. MacDONALD	WANDERER RIVER GEOLOGY AND GEOCHEMISTRY	
DRAWN BY O. HEDDITCH		
DATE AUG. 93 SCALE 1:10,000	REFERENCE	DWG. No. 6

FIGURE 5

The process worked well and a series of contour plans and imaged plots of the magnetic and radiometric data were produced for Plutonic at 1:100,000, 1:50,000 and 1:25,000 scales. Representative plans are presented in Plates 2 and 3.

Preliminary interpretation of the aeromagnetic imagery had the primary aim of defining areas of felsic to intermediate volcanic stratigraphy correlated with the prospective Noddy Creek Volcanics. All these areas .were then incorporated within the proposed GeoTem survey area (Figure 4) which effectively excluded the bulk of the less prospective Birch's Inlet and Mainwaring River Volcanics in the eastern and southern portions of the tenements.

The regional geological interpretation outlined in Plate 1 relies heavily on previous mapping and imagery prepared by Tasmania Development and Resources. The magnetics in particular are useful in defining structural and stratigraphic trends whereas the radiometrics were mainly relied on to outline broad lithological packages.

In the Hibbs River to Wanderer River areas, the magnetic data indicates a folded sequence of sediments and interbedded intermediate to mafic Noddy Creek Volcanics, transected by NNW to NE trending structures.

The abrupt truncation of the magnetic high zone east of Birch's Inlet is interpreted to mark a major N-S fault zone correlated to the south with the Copper Creek Fault Zone and related high angle thrusts which mark the eastern termination of the Sorell Peninsula stratigraphy.

In the Mainwaring to Urquart River areas mapped by Brown *et al* (1991), the more potassium-rich sediments and felsic-mafic tuffs correlated with the Noddy Creek Volcanics have a strong radiometric signature compared with the highly magnetic mafic sequences of the Mainwaring River Volcanics to the east.

Further south from Cypress Creek the coastal sediment-rich package may also be correlated with the Noddy Creek Volcanics but it could represent a separate strongly folded sequence in faulted contact with the Mainwaring River Volcanics. From the Mainwaring Inlet to the Shank this sequence may form the faulted core of a north-north-west plunging syncline in which the mafic volcanics are wrapped around the sediments and extend offshore as a fault bounded block along NNW trending faults which are prominent in this area.

6.3.3 GeoTem Deep Survey

During the 23 to 28 March 1996, Geoterrex Pty Ltd conducted the first survey in Tasmania of their newly developed GeoTem Deep airborne electromagnetic system over the Sorell Peninsula. The proposed survey of 1600 line kilometres at 200 metre line spacing and 105 metres near terrain elevation, had to be marginally reduced due to poor flying conditions. Consequently only 1520 line kilometres were flown and the area south of the 5265000N line over the less prospective Mainwaring Volcanics between Urquart River and Cypress Creek was not covered. Refer Figures3,4.

Details of the survey are presented in a report by Geoterrex in Appendix 2 and Plates 4 - 7. Comments by Plutonic's geophysicist, Llew Wynn, relevant to the relinquished portion of EL 4/72 are discussed below.

In summry the GeoTem survey failed to locate any major late time conductive responses which could be confidently related to significant massive sulphide mineralisation. Given that Plutonic is searching for large targets to justify the high cost of exploration and development in this district it was decided that the two relatively weak anomalous responses apparent to Channel 7 and numbered 7 and 10 on Plate 4 in the relinquished area did not justify followup at this stage.

These AEM anomalies appear to lie along the contact between greywacke sediments and a prominent magnetic basalt unit extending north from High Rocky Point, which Brown (1989) correlated with the Noddy Creek Volcanics further north.

There are no significant magnetic anomalies in the GeoTem survey that have not been previously interpreted from the reprocessed 1984 Amoco Minerals aeromagnetic survey (Plate 2). Therefore, the recent aeromagnetic data shown on Plate 4 is not discussed in this report.

7.0 CONCLUSION

The relinquished portion of EL 7/92 contains a western sequence of volcaniclastic sediments and basalt units thought to represent distal equivalents to the Cambrian Noddy Creek Volcanics which are mainly localised north of the Spero River. To the east are undifferentiated sequences dominated by highly magnetic mafic volcanics and related volcaniclastic sediments which have been mapped previously as Mainwaring Volcanics of Early Cambrian age. The latter volcanics were found by BHP to contain broad areas of disseminated copper mineralisation in the Cypress and Copper Creek areas but no detailed evaluation was undertaken because the mineralisation was not VHMS in character. Subsequently no systematic exploration has been conducted to assess the mineral potential of this area.

Plutonic does not consider these mafic volcanic sequences or the volcaniclastic sediments to be prospective for typical Mt Read style VHMS mineralisation and therefore decided to relinquish the southern portion of EL 4/92 in September 1996.

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APPENDIX 1

RECONNAISSANCE ANALYTICAL RESULTS

325023

ANALABS

A Division of Inchcape Testing Services (Australia) Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT No.	REPORT DATE	CLIENT ORDER No.	PAGE
	111715.60.09266	16/02/93	2.2.93	2 OF 2

TUBE No.	SAMPLE No.	Cu	Cu	Pb	Pb	Zn	Zn	Au ppm	From	To
1	S00896	3500	–	68	–	48	–	–	252.5	253.5
2	S00897	5450	–	163	–	125	–	0.026	253.5	254.5
3	S00898	>10000	1.83	>5000	0.59	4200	–	0.039	283.2	283.6
4	S00901	–	–	–	–	–	–	Au ppb 0.57	⇑	Sample No 1.
5	S00902	–	–	–	–	–	–	0.07		2.
6	S00903	–	–	–	–	–	–	0.07		3.
7	S00904	–	–	–	–	–	–	0.84	results	4.
8	S00905	–	–	–	–	–	–	0.12		5.
9	S00906	–	–	–	–	–	–	<0.05	7/92	6.
10	S00907	–	–	–	–	–	–	<0.05		7.
11	S00908	–	–	–	–	–	–	0.05	EL	8.
12	S00909	–	–	–	–	–	–	0.24		9.
13	S00911	–	–	–	–	–	–	0.26		11.
14	S00912	–	–	–	–	–	–	0.34	⇓	12.
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	4	0.01	5	0.01	4	0.01	0.05		
24	UNITS	ppm	%	ppm	%	ppm	%	ppb		
25	METHOD	GA101	GA104	GA101	GA104	GA101	GA104	GG340		

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
– = element not determined

AUTHORISED OFFICER

APPENDIX II

GEOTERREX REPORT ON THE GEOTEM SURVEY

LOGISTICS AND INTERPRETATION OF A GEOTEM$_{DEEP}$ AIRBORNE ELECTROMAGNETIC AND MAGNETIC SURVEY OVER THE SORELL PENINSULA, TASMANIA EL4/92 AND EL7/92 FOR PLUTONIC OPERATIONS LTD.

JOB NO. 8-735
May, 96

Compiled by:
Matthew Chamberlain
and Michael Hallett
GEOTERREX PTY. LTD.
7-9 GEORGE PLACE,
ARTARMON NSW 2064
AUSTRALIA

ABSTRACT

A **GEOTEM**$_{DEEP}$ time-domain airborne electromagnetic and magnetic survey was flown by Geoterrex Pty Ltd for Plutonic Operations Ltd over the Sorell Peninsula, Tasmania, during March 1996.

Data was collected using the **GEOTEM**$_{DEEP}$ airborne electromagnetic and magnetic system, with a base operating frequency of 25 Hz, employing a two component electromagnetic receiver (X and Z). GPS and Doppler velocity data were used for navigation. The survey aircraft was a CASA C212-200 Turbo Prop.

GEOTEM$_{DEEP}$ field data was processed to remove atmospheric and system noise. Algorithms were applied to create Amplitude Decay Index (ADI) and altitude corrected data sets for both X and Z components.

The final processed data was recorded as located data and grids on Exabyte tapes. Hard copies of the processed data were produced as multi-parameter profile plots at 1 : 25 000 scale. Other products provided were 1 : 25 000 magnetic contour maps, ADI images and Channel 2 response images.

Interpretation of the data reveals a number of conductive lithologies throughout the survey area which may be considered prospective for further investigation. Local geological and geophysical studies should be consulted if available to assess the prospectivity of these areas. The most obvious electromagnetic conductor is a unit mapped as a serpentinite dunite. Other lithologies which respond to the primary electromagnetic field include the Noddy Creek Volcanics and the Birch's Inlet Volcanics. Various faults and lithological boundaries appear as conductors. The electromagnetic properties of these areas may be related to alteration.

Some of these inferred bedrock conductors may warrant further investigation using appropriate surface exploration techniques. Areas of interest may be assigned priorities on the basis of supporting geophysical, geochemical and geological information.

CONTENTS

FIGURES

TABLES

INTRODUCTION

From the 23rd of March to the 28th of March 1996, Geoterrex Pty Ltd conducted a **GEOTEM**$_{DEEP}$ airborne electromagnetic survey over the Sorell Peninsula, Tasmania, for Plutonic Operations Ltd. The base of operations was Strahan. This report summarises the logistics, survey parameters, calibration procedures and processing details of the survey. Interpretation maps of the results and explanatory notes are included.

In total, 1520 line kilometres of **GEOTEM**$_{DEEP}$ electromagnetic data was collected in 6 flights over the survey area at a base operating frequency of 25 Hz. Traverse lines were east-west with a 200 metre line spacing. Tie lines were flown along the eastern and western boundaries with a spacing of approximately 5 kilometres.

Surveying was stopped before the completion of the originally planned area due to difficult flying conditions.

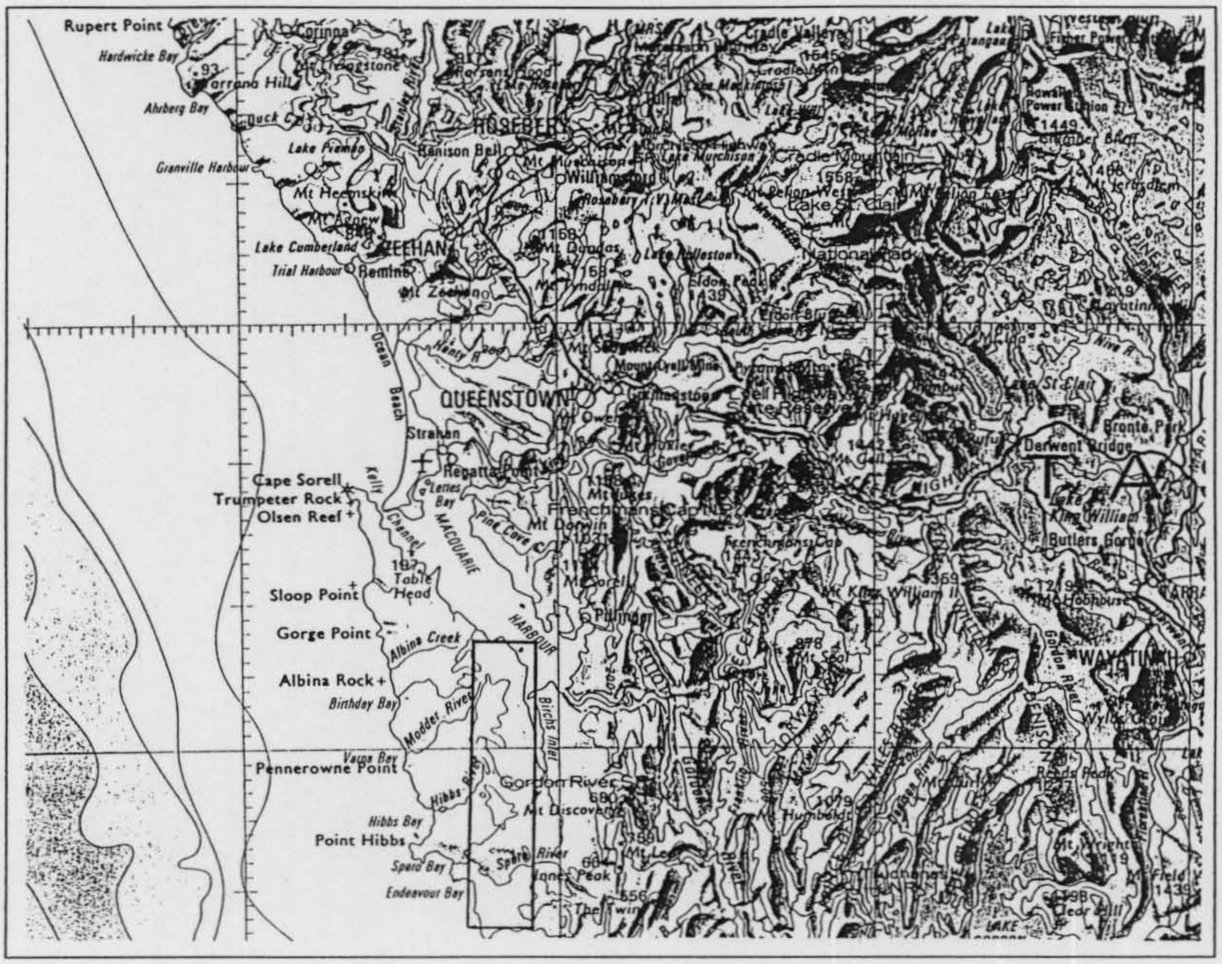
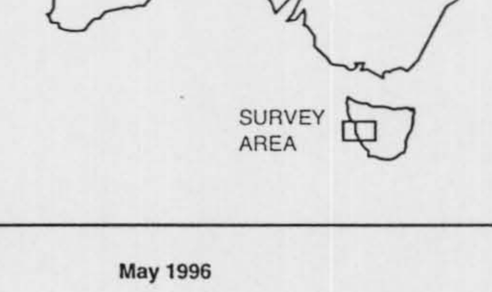


Figure 1 LOCATION MAP: Sorell Peninsula, Tasmania
Scale: 1 : 1 000 000

5 cm



1. SURVEY OPERATIONS SUMMARY

Table 1: SURVEY OPERATION SPECIFICATIONS

Aircraft		CASA C212-200 Turbo Prop, VH-TEM
Type of survey		Electromagnetic
Base of Operations		Strahan
Nominal Aircraft Terrain Clearance (m)		105
Nominal Aircraft Speed (m/sec)		65
Navigation		GPS / Doppler
Field Personnel	Pilots Electronics Technician Geophysicist/Processor Crew Manager	T Haldane, H Thompson T Green M Schneider, M Cooper A Cole

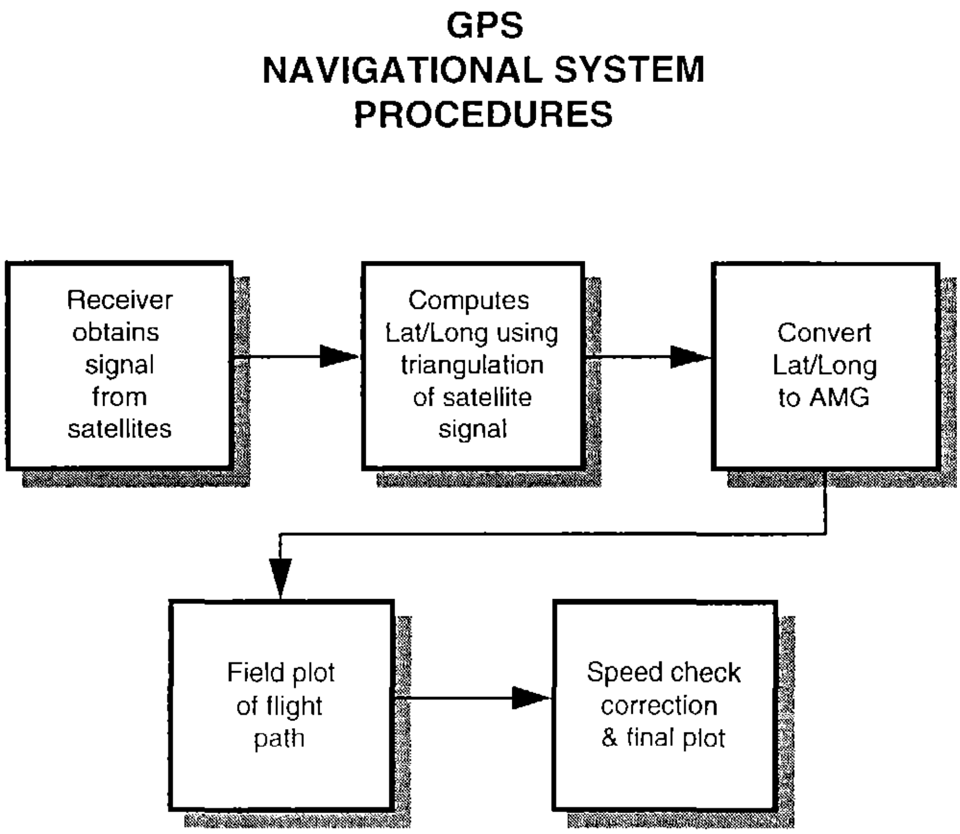
Table 2: FLIGHT PLAN SPECIFICATIONS

Specification	Sorell Peninsula
Survey Size (line km)	1660 - planned, 1520 - flown
Traverse line direction	East/West
Traverse line spacing (m)	200
Tie line direction	North/South
Tie line spacing (km)	5

Table 3: SURVEY PROGRESS

Date	Progress
18 March	Flights 1,2 & 3 : tests and calibration
19 - 22 March	poor weather
23 March	Flight 4 : tie lines and traverses
24 March	Flight 5 & 6 : traverses
25 March	Flight 7 & 8 : traverses
26 - 27 March	poor weather
28 March	Flight 9 : traverses

2. FLIGHT PATH RECOVERY



A GPS receiver is mounted in the aircraft. This determines satellites in operation and uses 3D triangulation of satellite signals to calculate the position of the aircraft in real time and provides the pilots with steering information. The GPS data are read into the field computer and plotted on a daily basis to ensure data quality control and determine any necessary reflights. The positioning data is stored digitally as Latitudes and Longitudes (Lat / Longs) and later converted to Australian Map Grid (AMG) co-ordinates.

The Doppler system is a radar velocity sensor that determines the three components of aircraft velocity from measurements of the Doppler frequency shift in radar energy transmitted toward, and received back from the ground. These velocity data considered with the heading data from the aircraft's compass are used to determine the aircraft position.

To obtain the optimum level of positioning accuracy the Doppler velocity information is combined with the GPS coordinates using least squares techniques. The integrated solution has greater accuracy and repeatability than either of the individual components. The integrated aircraft track was plotted on a daily basis at 1 : 25 000 scale to ensure data quality and to determine any necessary reflights.

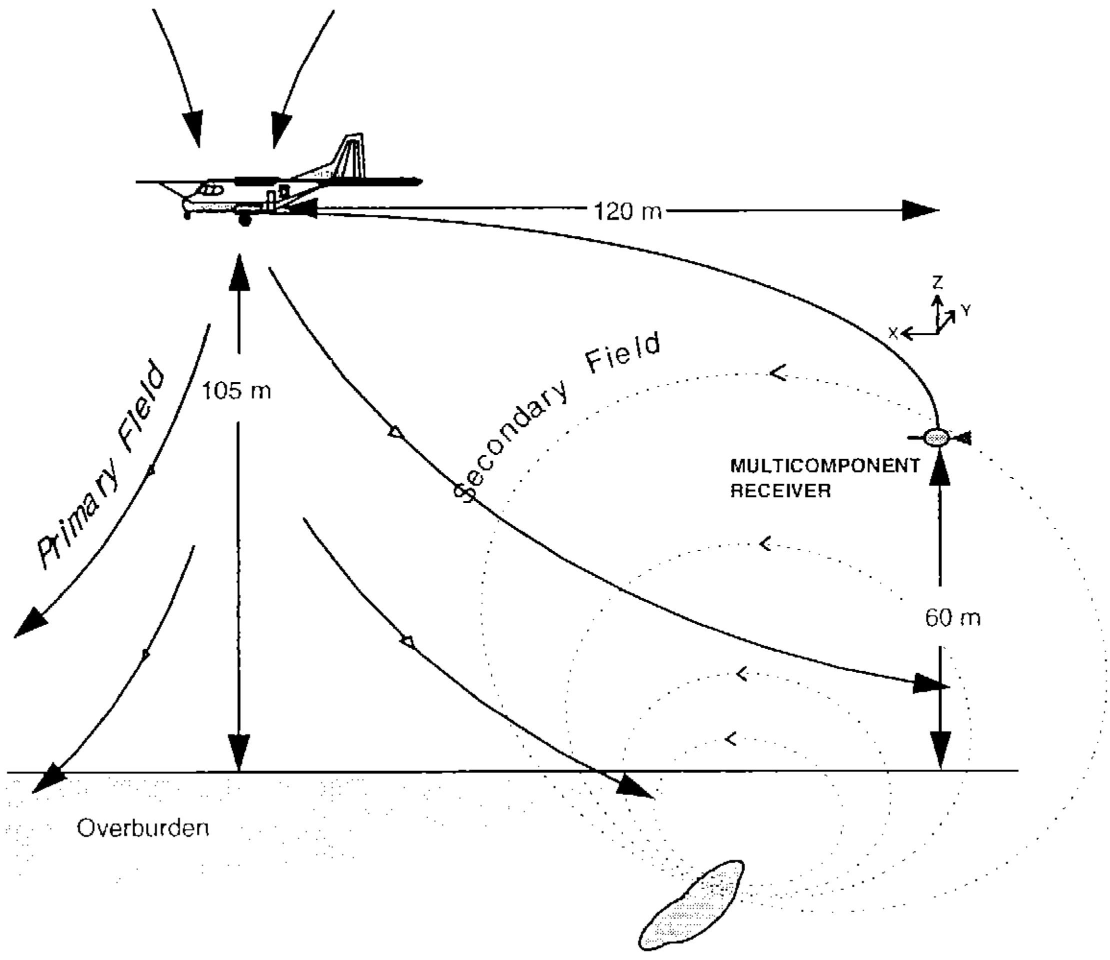
3. GEOTEM$_{DEEP}$ ELECTROMAGNETIC SYSTEM

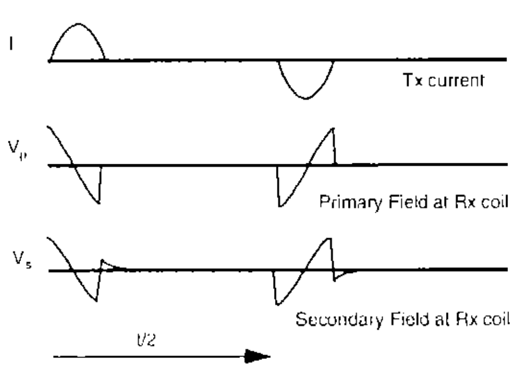
3.1 EQUIPMENT SPECIFICATIONS

Table 4: EQUIPMENT SPECIFICATIONS

System Specifications		GEOTEM$_{DEEP}$
Geometry	Transmitter Height (m) (above ground level (agl))	105
	Receiver Bird Height (agl, m)	60
	Tx-Rx horizontal separation (m)	120
Transmitter	Coil Axis	Vertical
	Signal	Half sine wave current pulse
	Base frequency (Hz)	25
	Repetition rate (pulses per second)	40
	Pulse width (microseconds)	4 108
	Loop area (square metres)	231
	Number of turns	6
	Peak Current (amps)	480
	Tx loop dipole moment (Am^2)	6.65×10^5
Receiver	Coil Axes	X and Z
	Sample Interval (seconds)	0.25
	Channel times	see Table 5

Figure 2: GEOTEM$_{DEEP}$ SYSTEM GEOMETRY AND WAVEFORM





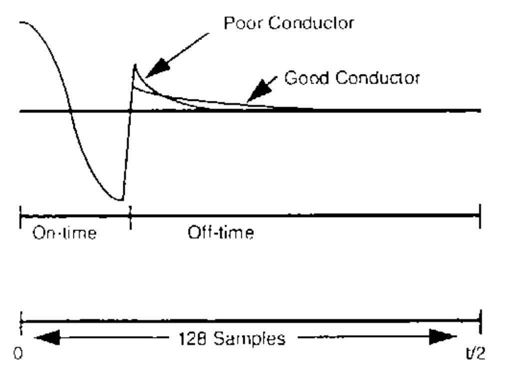
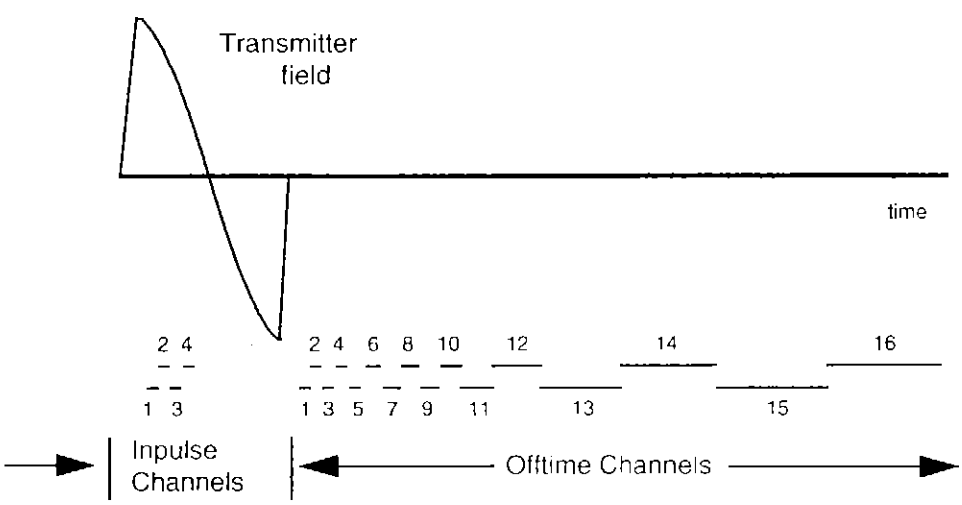


Table 5: X and Z COMPONENT CHANNEL POSITIONS

Channel	Channel Centre µsec after Tx	Channel Width µsec
Inpulse 1	-3 788	313
Inpulse 2	-3 476	313
Inpulse 3	-3 163	313
Inpulse 4	-2 851	313
Offtime 1	352	156
Offtime 2	509	156
Offtime 3	665	156
Offtime 4	899	313
Offtime 5	1 212	313
Offtime 6	1 602	469
Offtime 7	2 071	469
Offtime 8	2 618	625
Offtime 9	3 321	781
Offtime 10	4 181	938
Offtime 11	5 196	1 094
Offtime 12	6 368	1 250
Offtime 13	7 774	1 563
Offtime 14	9 493	1 875
Offtime 15	11 681	2 500
Offtime 16	14 337	2 813

Figure 3: X AND Z COMPONENT CHANNEL POSITIONS



3.2 SYSTEM DESCRIPTION

GEOTEM$_{DEEP}$ is a time domain towed bird electromagnetic system incorporating a high speed EM receiver. The primary electromagnetic pulses are created by a series of discontinuous half-sine current pulses fed into a multi turn transmitting loop surrounding the aircraft and fixed to the nose, tail and wing tips. The pulse repetition rate is 25 Hz (40 bipolar pulses per second).

The EM sensor is a pair of orthogonal air cored coils mounted in a "bird", towed behind the aircraft on a long cable. The cable is demagnetised to reduce noise levels. The geometry of the system is displayed in Figure 2. Two coil orientations are available, the X component having an axis which is horizontal and in the direction of flight, and the Z component having a vertical axis.

For each primary pulse a secondary magnetic field is produced by decaying eddy currents in the ground (The transmitted and received waveforms are depicted in Figure 2). These in turn induce a voltage in the receiver coil which is in proportion to the electromagnetic field. This voltage is sampled over 20 time channels (for both X and Z components) whose centres and widths are software selectable and which may be placed anywhere within or outside the transmitter pulse.

The time varying EM signals received at the sensor pass through anti-aliasing filters and are then digitised with an A/D converter. The digital data stream from the A/D converter passes into an array processor where all the numerically intensive processing tasks are carried out. The array processor is under control of a multi-tasking minicomputer. The on-board processing sequence is as follows:

<u>Transient Analysis</u>: Transient analysis enables the separation of noise from signal in real time;

<u>Digital Stacking</u>: The stacking of transients to produce 1 recorded reading, of which 4 are recorded every second;

<u>Windowing of Data</u>: The transient is initially sampled over 128 time windows which are then binned to form 20 channels.

3.3 SYSTEM CALIBRATION

All checks and adjustments are performed at high altitude at the start of each flight to allow for automatic compensation and calibration at survey altitude. The calibrations and compensations are as follows:

<u>Compensation</u>: During the flight, the transmitter creates eddy currents within the structure of the aircraft that have measurable effects at the receiver coil. Compensation for this signal is effected numerically within the receiver by a statistical analysis of the signal at the bird in the absence of ground response (by flying at an altitude in excess of 600 m above ground level). The observed signal is used to define a compensation signal that is removed from the observed signal to produce a null and thus effectively buck out any response due to changing geometry between receiver and transmitter (ie between the bird and the aircraft);

<u>Normalisation</u>: All EM response channels are automatically calibrated and reduced to parts per million of the primary field in the receiver.

3.4 DATA PROCESSING

Data collected was loaded onto a UNIX workstation and processed using GMAPS software.

Levelling

Since the **GEOTEM**$_{DEEP}$ receiver constantly normalises and calibrates during data acquisition there is no levelling of data at the post-survey processing stage.

Synchronisation Lag

All **GEOTEM**$_{DEEP}$ and auxiliary geophysical data has been synchronised with the navigation data so that there is no "peak position" offset between the responses obtained from lines flown in opposite directions over a narrow vertical conductor.

Noise Reduction

Noise reduction in the digital data is accomplished by identification of the noise type (atmospheric, system or cultural), analysis of the spectral content of the entire signal (geological + noise) and selective filtering.

Atmospheric Noise — The first stage of processing is atmospheric (sferic) noise removal which is achieved by using a method based loosely on cross correlation and non linear filtering, since most sferic events are single reading (impulse response) features which cannot be properly removed by linear filtering.

Cultural noise — Cultural noise (which includes sources such as 50 Hz powerlines, electric fences, cathodic protected metal structures) is measured by the 50 Hz monitor. Normally cultural noise is not removed during processing

System noise — System noise is removed by filtering using strict amplitude and wavelength thresholds to correctly isolate noise from geological signal. The filter shape and amplitude thresholds are determined on a flight by flight basis from raw data plots of at least 2 flight lines flown in opposite directions at the beginning and end of the flight. This allows customisation of filtering for directional, diurnal and flight noise, ensuring that the minimal amount of filtering is performed so that real signal is not degraded by using a "lowest common denominator" philosophy of applying one filter (usually the maximum) for all noise conditions.

4. MAGNETOMETER SYSTEM

4.1 EQUIPMENT SPECIFICATIONS

Model:	Cesium vapour optical absorption magnetometer
Mounting:	Tail stinger
Sample period:	50 milliseconds
Sample interval:	1.0 seconds *
Sensitivity:	0.01 nanoteslas (nT)

* To operate both the **GEOTEM$_{DEEP}$** system and the magnetometer system simultaneously, the transmitter is switched off for a period of 200 milliseconds every second to allow for a noise free magnetometer reading.

Base Station

Model:	*G856 Proton Procession*
Sample interval:	5 seconds
Sensitivity:	0.1 nT

4.2 DATA PROCESSING

Corrections

Diurnal Levelling

The base station data is edited so that all significant spikes, level shifts and null data are eliminated. It is resampled and synchronised to the airborne fiducial system prior to subtraction from the airborne magnetic readings.

Synchronisation Lag

A lag of 2 seconds (130 metres) was applied to synchronise the magnetic data with the navigation data.

5. AUXILIARY EQUIPMENT

5.1 DATA ACQUISITION SYSTEM

Model: Geoterrex Pty Ltd GEODAS

The GEODAS is a computer-based software system using a 486DX/25 field PC. It runs multiple DOS programs in a multi-tasking environment. The modular design of the GEODAS allows for reconfiguring the system to record different types of surveys by adding, removing or changing task modules.

The GEODAS is currently installed in a rugged, totally enclosed, moisture and dust proof system, originally designed for military use. Currently, it uses a 486DX CPU on a plug-in module card which can be upgraded. Data is recorded on 220 Mb hard disks. A Q10150 cartridge tape system is used for data transfer to the field processing centre.

The following are recorded digitally using the GEODAS:

Each second	Flight number Navigation data including GPS height of the aircraft Total magnetic field Fiducial number (Time in seconds) Barometric pressure Altitude (Radar and Barometer) Temperature outside the cabin in degrees Celsius
Each 0.25 secs:	20 X & Z Component GEOTEM$_{DEEP}$ Channels X & Z Component Transmitter primary field Power Line Noise Monitor (X & Z Component) Earth Field Monitor (X & Z Component) Earth Field Correction

5.2 TRACKING CAMERA

Model: Sony DXC101P Video Camera

The tracking camera is equipped with a 4 mm wide-angle lens. The video tape is synchronised with the geophysical record by a digital fiducial display that increments every tenth of a second. These fiducials are recorded on the video tape and displayed on the bottom left of the video screen. Times are recorded from the digital information provided by the GEODAS system.

5.3 ALTIMETER

Barometric Altimeter

Model:	Geoterrex Barometric Altimeter (SENSYM 142SC15A)
Sample Interval:	1.0 seconds
Sensitivity:	0.24 mV/foot (6.5 mV/mb)

Radar Altimeter

Model:	Sperry Stars AA200 radio altimeter system
Sample interval:	1.0 second
Accuracy:	+/- 3% of indicated altitude.

The Sperry radio altimeter is a high quality instrument whose output is factory calibrated. It is fitted with a test function which checks the calibration of a terrain clearance of 100 feet and altitudes which are multiples of 100 feet.

5.4 ELECTRONIC NAVIGATION

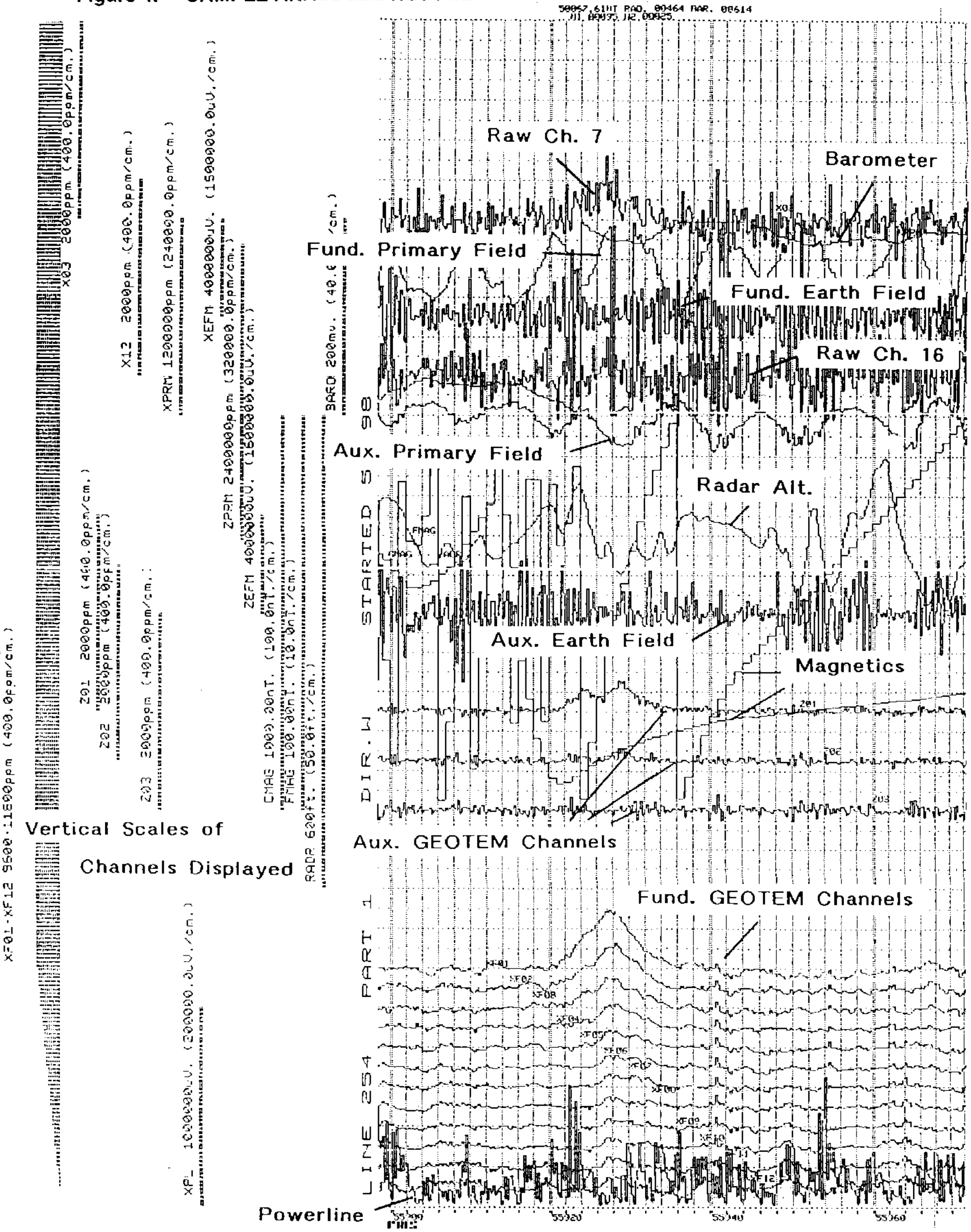
GPS Equipment:	Sercel NR103 GPS receiver and antennae mounted in aircraft and equipped with steering indicators.
Doppler Equipment:	Singer Kearfott AN/ASN 128, Sperry VG-14 Vertical Gyroscope, Sperry C-12 Compass.

5.5 ANALOGUE RECORDER

A sample analogue record is shown in Figure 4.

Model:	RMS GR33 Thermal Dot Matrix Printer
Chart speed:	11 cm/minute; *time increases from left to right*
Chart width:	30.5 cm
Event marks:	20 second marks are recorded on the bottom of the chart with the associated fiducial numbers being printed at the base of the chart.
GEOTEM$_{DEEP}$ Traces:	The scales for the **GEOTEM**$_{DEEP}$ traces are displayed on the analogue charts. The zero line for each channel is separated by 0.5 cm with the latest channel always being plotted closest to the bottom of the page.
Synchronisation:	A lag of approximately 5.0 seconds occurs between the **GEOTEM**$_{DEEP}$ channels and the magnetometer and altimeter traces.
Channels Displayed:	Channel 7 noise monitor X Component Primary Field Monitor Z Component Primary Field Monitor X and Z Component Earth Field Monitors Channel 16 noise monitor Total Magnetic Field - Fine Scale Total Magnetic Field - Coarse Scale Terrain Clearance - Radar Barometer **GEOTEM**$_{DEEP}$ X channels 5-16 Powerline Monitor

Figure 4: SAMPLE ANALOGUE RECORD



6. SURVEY PRODUCTS

6.1 MULTI-PARAMETER PROFILE PLOTS

The final **GEOTEM$_{DEEP}$** data (and the altitude corrected **GEOTEM$_{DEEP}$** data) is presented as multi-parameter profiles plotted at suitable scales from top to bottom, as listed below. The x-axes of alternate sections of each plot are annotated with fiducial numbers or AMGs. The scales for the **GEOTEM$_{DEEP}$** traces vary according to the channel, to allow resolution in late channels, whilst keeping early channels on scale. The base level for each channel is separated by 0.5 cm with the latest channel always being plotted closest to the bottom of the page. Each plot has a title containing line number, job number, area name, frequency, pulse width and average northing or easting.

Table 6 MULTI-PARAMETER PROFILE PLOT SCALES (1 : 25 000 horizontal scale)

AXIS	Channel	Trace Colour	Scale
1 (top)	Residual Magnetics Coarse Scale	Red	100nT/cm
	Residual Magnetics Fine Scale	Green	10nT/cm
	Barometric Altimeter	Black	50m/cm
	Radar Altimeter	Blue	20m/cm
2	Z Inpulse Channel 1 Z Inpulse Channel 2 Z Inpulse Channel 3 Z Inpulse Channel 4	Black Blue Green Red	10000 ppm/cm
3	ADI (9-16) Z Component	Red	8000 units/cm
	Z Offtime Channels 1-4 Z Offtime Channels 5-8 Z Offtime Channels 9-11 Z Offtime Channels 12-16 50 Hz Monitor - Z Component	Black Blue Green Red Blue	1000 ppm/cm 800 ppm/cm 600 ppm/cm 400 ppm/cm 0.1 volts/cm
4	X Inpulse Channel 1 X Inpulse Channel 2 X Inpulse Channel 3 X Inpulse Channel 4	Black Blue Green Red	10000 ppm/cm
5 (bottom)	ADI (9-16) X Component	Red	8000 units/cm
	X Offtime Channels 1- 4 X Offtime Channels 5- 8 X Offtime Channels 9-11 X Offtime Channels 12-16 50 Hz Monitor - X Component	Black Blue Green Red Blue	1000 ppm/cm 800 ppm/cm 600 ppm/cm 400 ppm/cm 0.1 volts/cm

6.2 FLIGHT PATH MAPS

Flight path maps were produced on film at 1 : 25 000 scale. These were annotated with line numbers, flight direction and fiducial position.

6.3 MAGNETIC CONTOURS

Magnetic data was gridded and used to create 1 : 25 000 contour maps that were printed on film.

6.4 IMAGES

Channel 2 response images and ADI images were produced on laminated paper at 1 : 25 000 scale. Images were made for both X and Z components. The channel 2 response and calculated ADI values were used to produce a 50 x 50 metre grid. A 5 point, triangular, no threshold filter was applied to the grid and the result displayed with a colour scale and contours.

6.5 DATA TAPES AND FORMAT

A set of located data files were produced and copied to 8mm Exabyte tape in 8505 uncompressed format. The structure of the data files is described in Tables 7 and 8.

The gridded data used to create magnetic contours, ADI and channel 2 images were provided in ER Mapper format on Exabyte tape.

6.6 ITEMS DELIVERED

A set of the following was delivered for each survey area.

Analogue Charts
Videotape records of the aircraft track
Flight logs
Mileage list
Final flight line list
Multi-parameter profile plots at 1 : 25 000 scale
Flight path maps at 1 : 25 000 scale on film
Magnetic contours at 1 : 25 000 scale on film
ADI images at 1 : 25 000 scale, laminated
Channel 2 response at 1 : 25 000 scale, laminated
Located data tapes and associated documentation
Gridded data tapes
Logistics and Interpretation report
Exabyte tapes of multi-parameter profile plots

Table 7 LOCATED DATA TAPE FORMAT - Processed Data

Columns	Field Description
1 - 4	1 Flight number
5 - 10	2 Line identifier
11 - 18	3 Fiducial
19 - 26	4 AMG Zone 54 Easting - metres
27 - 34	5 AMG Zone 54 Northing - metres
35 - 42	6 X Inpulse Channel 1 - ppm
43 - 50	7 X Inpulse Channel 2 - ppm
51 - 58	8 X Inpulse Channel 3 - ppm
59 - 66	9 X Inpulse Channel 4 - ppm
67 - 74	10 X GEOTEM Channel 1 - ppm
75 - 82	11 X GEOTEM Channel 2 - ppm
83 - 90	12 X GEOTEM Channel 3 - ppm
91 - 98	13 X GEOTEM Channel 4 - ppm
99 - 106	14 X GEOTEM Channel 5 - ppm
107 - 114	15 X GEOTEM Channel 6 - ppm
115 - 122	16 X GEOTEM Channel 7 - ppm
123 - 130	17 X GEOTEM Channel 8 - ppm
131 - 138	18 X GEOTEM Channel 9 - ppm
139 - 146	19 X GEOTEM Channel 10 - ppm
147 - 154	20 X GEOTEM Channel 11 - ppm
155 - 162	21 X GEOTEM Channel 12 - ppm
163 - 170	22 X GEOTEM Channel 13 - ppm
171 - 178	23 X GEOTEM Channel 14 - ppm
179 - 186	24 X GEOTEM Channel 15 - ppm
187 - 194	25 X GEOTEM Channel 16 - ppm
195 - 202	26 X GEOTEM ADI Chs 9-16 - units
203 - 210	27 Z Inpulse Channel 1 - ppm
211 - 218	28 Z Inpulse Channel 2 - ppm
219 - 226	29 Z Inpulse Channel 3 - ppm
227 - 234	30 Z Inpulse Channel 4 - ppm
235 - 242	31 Z GEOTEM Channel 1 - ppm
243 - 250	32 Z GEOTEM Channel 2 - ppm
251 - 258	33 Z GEOTEM Channel 3 - ppm
259 - 266	34 Z GEOTEM Channel 4 - ppm
267 - 274	35 Z GEOTEM Channel 5 - ppm
275 - 282	36 Z GEOTEM Channel 6 - ppm
283 - 290	37 Z GEOTEM Channel 7 - ppm
291 - 298	38 Z GEOTEM Channel 8 - ppm
299 - 306	39 Z GEOTEM Channel 9 - ppm
307 - 314	40 Z GEOTEM Channel 10 - ppm
315 - 322	41 Z GEOTEM Channel 11 - ppm
323 - 330	42 Z GEOTEM Channel 12 - ppm
331 - 338	43 Z GEOTEM Channel 13 - ppm
339 - 346	44 Z GEOTEM Channel 14 - ppm
347 - 354	45 Z GEOTEM Channel 15 - ppm
355 - 362	46 Z GEOTEM Channel 16 - ppm
363 - 370	47 Z GEOTEM ADI Chs 9-16 - units
371 - 378	48 GEOTEM 50Hz Monitor
379 - 386	49 Radar Altimeter - metres
387 - 394	50 Barometric Altimeter - metres
395 - 404	51 Diurnally Levelled Magnetics - nT
405 - 405	**<newline>**

Table 8 LOCATED DATA TAPE FORMAT - Altitude Corrected Data

Columns	Field	Description
1 - 4	1	Flight number
5 - 10	2	Line identifier
11 - 18	3	Fiducial
19 - 26	4	AMG Zone 54 Easting - metres
27 - 34	5	AMG Zone 54 Northing - metres
35 - 42	6	X GEOTEM Altitude Corrected Channel 1 - ppm
43 - 50	7	X GEOTEM Altitude Corrected Channel 2 - ppm
51 - 58	8	X GEOTEM Altitude Corrected Channel 3 - ppm
59 - 66	9	X GEOTEM Altitude Corrected Channel 4 - ppm
67 - 74	10	X GEOTEM Altitude Corrected Channel 5 - ppm
75 - 82	11	X GEOTEM Altitude Corrected Channel 6 - ppm
83 - 90	12	X GEOTEM Altitude Corrected Channel 7 - ppm
91 - 98	13	X GEOTEM Altitude Corrected Channel 8 - ppm
99 - 106	14	X GEOTEM Altitude Corrected Channel 9 - ppm
107 - 114	15	X GEOTEM Altitude Corrected Channel 10 - ppm
115 - 122	16	X GEOTEM Altitude Corrected Channel 11 - ppm
123 - 130	17	X GEOTEM Altitude Corrected Channel 12 - ppm
131 - 138	18	X GEOTEM Altitude Corrected Channel 13 - ppm
139 - 146	19	X GEOTEM Altitude Corrected Channel 14 - ppm
147 - 154	20	X GEOTEM Altitude Corrected Channel 15 - ppm
155 - 162	21	X GEOTEM Altitude Corrected Channel 16 - ppm
163 - 170	22	Z GEOTEM Altitude Corrected Channel 1 - ppm
171 - 178	23	Z GEOTEM Altitude Corrected Channel 2 - ppm
179 - 186	24	Z GEOTEM Altitude Corrected Channel 3 - ppm
187 - 194	25	Z GEOTEM Altitude Corrected Channel 4 - ppm
195 - 202	26	Z GEOTEM Altitude Corrected Channel 5 - ppm
203 - 210	27	Z GEOTEM Altitude Corrected Channel 6 - ppm
211 - 218	28	Z GEOTEM Altitude Corrected Channel 7 - ppm
219 - 226	29	Z GEOTEM Altitude Corrected Channel 8 - ppm
227 - 234	30	Z GEOTEM Altitude Corrected Channel 9 - ppm
235 - 242	31	Z GEOTEM Altitude Corrected Channel 10 - ppm
243 - 250	32	Z GEOTEM Altitude Corrected Channel 11 - ppm
251 - 258	33	Z GEOTEM Altitude Corrected Channel 12 - ppm
259 - 266	34	Z GEOTEM Altitude Corrected Channel 13 - ppm
267 - 274	35	Z GEOTEM Altitude Corrected Channel 14 - ppm
275 - 282	36	Z GEOTEM Altitude Corrected Channel 15 - ppm
283 - 290	37	Z GEOTEM Altitude Corrected Channel 16 - ppm
291 - 298	38	GEOTEM 50Hz Monitor
299 - 306	39	Radar Altimeter - metres
307 - 314	40	Barometric Altimeter - metres
315 - 324	41	Final Magnetics - nT
325 - 325		<newline>

7. SURVEY RESULTS

7.1 General

The operation of a towed-bird time domain electromagnetic system involves the measurement of decaying secondary electromagnetic fields induced in the ground by a series of short current pulses generated from an aircraft mounted transmitter. Variations in the decay of the secondary field (sampled and displayed as channels) are analysed and interpreted to provide information about the sub-surface geology. The response of such a system, utilising a vertical axis transmitter dipole and a horizontal axis receiver coil, has been documented by various authors, including *Palacky and West (1973, Geophysics, v. 38, p. 1145-1158)*.

GEOTEM$_{DEEP}$ data may be presented through a number of parameters depending on the application and target sought. These include multiparameter profiles, Channel amplitude maps, ADI maps, CDTs and apparent conductance maps. Channel amplitude maps are valuable as a raw guide to the electromagnetic response of the halfspace beneath the aircraft. Early channel amplitudes will reflect shallow material, overburden and weak conductors. X component data emphasises vertical conductors, Z component data reflects large conductors which may be flat-lying and obscured by large amounts of flat-lying conductive overburden.

Free air model studies using plate and layered earth modelling programs demonstrate that the depth of investigation of the system depends upon the geometry of the target and the conductivity regime. Time domain systems respond to a wide range of conductors and the method is capable of high resolution of conductor geometry, thus discrimination of bedrock from surficial conductors.

7.2 Conductor Type

Differentiation between types of bedrock conductors and between bedrock and surficial conductors can be made through analysis of various **GEOTEM**$_{DEEP}$ output parameters. Bedrock conductors respond to the primary field with long decay times and elevated amplitudes in late-time channels. This feature of the secondary field response can be accentuated through appropriate application of the amplitude-weighted decay index, by selecting a number of mid to late-time channels which should typify the kind of conductive response sought. For instance, in an area where relatively shallow, weak conductors are the target, early to mid time channels may be selected. However in an environment typified by conductive overburden and suspected deep conductors, late-time channels utilising a low frequency **GEOTEM**$_{DEEP}$ system configuration would be more appropriate.

Bedrock conductors may be caused by a number of geological circumstances. Carbonaceous sediments resulting in graphitic horizons are characterised by long, narrow, generally linear conductive zones. Graphitic layers may also be concentrated along faults and shear zones. These units are generally very conductive and strike-bound, displaying multiple peaks on the multiparameter profiles. The signature of graphitic horizons is usually quite recognisable.

Massive syngenetic sulphide bodies often correspond to long multiple conductors and their conductivities vary considerably. Pyrrhotite associated with mineralisation can cause coincident magnetic anomalies. Massive sulphide bodies of long strike length are rare, however a strong discrete conductor may suggest the presence of massive sulphide mineralisation.

Magnetite in bedrock lithology may appear primarily as a magnetic units with some weak associated conductance. Serpentinised ultrabasic rocks may be both conductive and magnetic and may host mineralisation. Manganese oxide in bedrock may result in a weak secondary field responses. Long strike-bound structures associated with strong magnetic character may be indicative of banded iron formations. 20 to 400 gamma magnetic anomalies associated with EM responses may infer the presence of pyrrhotite.

Surficial conductors include clayey alluvium, residual soils, swamps, brackish ground-water and lateritic formations. Many surficial features are broad horizontal sheets of low to moderate conductivity. Such features produce an asymmetric response with the **GEOTEM$_{DEEP}$** system. If anomaly location is strongly dependent on line direction, a surficial source is probable.

Many surficial materials are low to moderate conductors and are not easily mistaken for conductive bedrock features. Surficial conductors are generally broad and result in anomaly characteristics typical of horizontal sheets. When surficial conductivity is high it is possible to distinguish between a conductive horizontal layer and a conductive vertical body, as a horizontal conductor will display the asymmetric characteristics delineated in the previous paragraph.

An ambiguous situation may occur if surface conductivity is related to bedrock lithology. For example, surficial alteration of a bedrock unit. It may also be difficult to distinguish between a weak conductor within bedrock and a surficial source, depending on the dip and strike of the bedrock.

Interpretation of surficial conductors may be a survey goal. The electromagnetic characteristics of soils, weathered or altered surficial materials can be a useful aid to geologic mapping. Shear zones and faults may also be identified by weak, narrow anomalies. Surficial conductivity characteristics can be used in exploration for lignite deposits and kimberlites, and for definition of palaeodrainage features and groundwater. In coastal or arid areas, surficial responses may serve to define spatial limits of fresh, brackish or salty water.

7.3 Channel Amplitude Maps

Channel amplitude maps provide a simplified representation of the electromagnetic features of an area. The channel selected for plotting as a colour image is targeted to a specific type of conductor. Data presented in this form is useful as a guide to the overall surficial conductivity within an area rather than as a method for distinguishing individual targets. Channel amplitude maps permit the degree of isolation of conductors to be determined and the mapping of structural features. Early-time channel amplitude maps reflect shallow sources, weak conductors and overburden effects, late-time channel amplitude maps reflect deeper conductors and so on.

A feature that may appear on X component channel amplitude maps is a "herringbone" pattern which may be seen along the margins of some conductive regions. This pattern is due to the asymmetric responses generated by the **GEOTEM$_{DEEP}$** system when flying over thin horizontal conductors. The leading edge of a conductor has a different electromagnetic response size, decay rate and position than the trailing edge. Stronger coupling between the conductor and primary field occurs at the leading edge of a horizontal sheet and a weaker response occurs at the trailing edge. This is due to the position of the receiver a considerable distance behind the transmitter. As alternate survey lines are generally flown from opposite directions, a staggered peak amplitude occurs. The degree of stagger is reduced as the conductor dip becomes greater or as the horizontal plate becomes thicker.

7.4 Amplitude-weighted Decay Index (ADI)

To aid interpretation of GEOTEM$_{DEEP}$ data, time constants can be calculated to quantify the rate of decay of the electromagnetic response. The Amplitude Decay Index (ADI) measures the rate of decay and weights it relative to the amplitude of the response. In this respect the Amplitude Decay Index is also a measurement of the area under the decay curve rather than just an estimate of the rate of decay. The ADI is derived from the best fitting exponential to the decay curve using data from selected **GEOTEM**$_{DEEP}$ channels (a minimum of four) as indicated on the multi-parameter profile plots and this index is included on the final located data tape.

Channels 5 to 10 were used in the calculation of ADI over the Sorell Peninsula.

7.4 Altitude Correction

In addition to the final processed channels of data, multi-parameter profile plots may also display altitude corrected **GEOTEM**$_{DEEP}$ data. This data may be presented as hashed lines along the same axes, using the same base lines and scaling applicable for the solid lines which represent the other processed channels of **GEOTEM**$_{DEEP}$ data. This presentation highlights those areas where the electromagnetic response has been affected by variation in aircraft terrain clearance. This aids data interpretation by correcting the data to the mean survey altitude. Unexpectedly large variations in altitude are not corrected, so avoid drastic distortion of the **GEOTEM**$_{DEEP}$ data does not occur. This is achieved by the use of tapering functions.

7.4 Interpretation

The objective of the survey was to detect conductors which may represent massive metallic sulphides. Magnetic and electromagnetic plan maps provide an overall view of the geophysical environment and relate directly to structure and lithological boundaries. Conductors have been selected from the maps and profiles by analysing shape, relationship to geology and structure, rate of decay, magnetic responses and other diagnostic characteristics. Geological references have been made with the aid of the Poseidon, Placer Regional Geology 1 : 50 000 Geological Map and the Queenstown 1 : 250 000 Geology Map.

Geological and structural characteristics of the survey area are clearly seen through study of the magnetic maps and the Channel 2 amplitude map. These maps permit a more detailed understanding of the conductive units, which may be responsible for enhanced **GEOTEM**$_{DEEP}$ amplitudes or highly magnetic zones. Prospectivity of the units highlighted by these maps can be better defined utilising the ADI maps.

The survey area has a complex geological structure, the definition of which is improved by the geophysical maps. The area is transected by numerous faults and lineaments which trend north-northwest to south-southeast through to north-northeast to south-southwest. These appear as breaks and discontinuities in the magnetic signatures and may also appear in the processed Channel amplitude maps as changes in conductor shape and direction. The geophysical and geological maps generally correspond well, however, there are areas where divergences occur. These areas may be of interest, particularly if they are notable for distinctive geophysical characteristics such as elevated conductivity or increased magnetic intensity. These areas may represent places where the geology has been incompletely mapped, or they may reflect geological features buried by rock or other overburden. In many areas, geophysical mapping may elucidate geological responses from under weathered surficial material or unconsolidated Quaternary sediments.

The lithologies showing the highest electromagnetic responses are the Noddy Creek Volcanics and the Birch's Inlet Volcanics, as well as undifferentiated sediments of the Dundas Group and various igneous rocks associated with the Dundas Group (including a very conductive pyroxenite serpentinite).

Conductive zones marked on the Interpretation Maps represent both prospective conductors and other structural and lithological features. The selection and classification of conductors is based on the following criteria :

- Structurally favourable context (ie. along contacts, near faults or intrusive units)
- Strike length and degree of isolation of the conductor
- Associated magnetic characteristics
- Localised characteristics of the conductive zone. Particular reference is made to changes in the decay rate, although other features may be relevant
- The position of the conductor with respect to strike of local geological structures

Conductive regions marked on the interpretation maps are labelled "C-1" etc, regions of anomalous ADI responses are labelled "A-2" etc and regions of elevated magnetic intensity are labelled "M-1" etc.

Sheet 3

A-7 / C-7: This trend continues south from Sheet 2 and represents Noddy Creek Volcanics and a broad area of Dundas Group sediments which continue south to Endeavour Bay.

C-10: This conductive region continues in a southerly direction from Sheet 2, along the eastern margin of the survey area. It is interpreted as an area of undifferentiated sediments and Tertiary gravels and sands.

A-10 / C-12: This conductive region extends along the western margin of the survey area and is an electromagnetic response to the sea water off the west coast of the survey area.

A-11: This is a region of anomalous ADI response, probably an unmapped extension of the magnetic M-6 zone, but in contrast to M-6, it is conductive and has a lower magnetic signature. This conductor also lies along a faulted boundary and may be considered prospective for further investigation.

C-11: This area corresponds well to a mapped region of Noddy Creek Volcanics (Evn) and Dundas Group sediments (Ed(s)). The electromagnetic trends within this large zone can be correlated to volcanics (Evn) interbedded with Ed(s) as well as some fault lineaments.

M-7: A basalt unit (Evnb) which lies almost on the western coast.

C-13: This is a moderate - low conductivity zone with a small area of high ADI associated with it. Two EM lineaments pass through this region. Both of these lineaments appear to strike NNW to SSE in contrast to mapped geology, which strikes N-S or NNE-SSW. These lineaments may represent faults or volcanics (Evn).

M-8: This magnetic unit is a continuation of the M7 Noddy Creek Volcanics basalt which has been displaced to the east by faulting.

A-12 / C14: A-12 corresponds closely to a mapped border of Tertiary gravel and alluvium, which is possibly saturated and quite conductive. C-14 lies in the same region but is the response of felsic tuffs of the Noddy Creek Volcanics (Evnt). The electromagnetic trends marked on the interpretation map in this area are interpreted to be caused by volcanic units (Edv).

8. CONCLUSIONS AND RECOMMENDATIONS

This report provides a description of the survey results and describes the equipment, procedures and logistics of the survey.

The survey was successful in defining conductivity contrasts associated with contacts and fault zones. Such anomalous regions were targets of the survey and may warrant additional work. The various maps included with this report display the magnetic and conductive properties of the survey area. It is recommended that the survey results be reviewed in detail, in conjunction with all available geophysical, geological and geochemical information. Particular reference should be made to the computer generated data profiles which clearly define the characteristics of the anomalous zones.

Most anomalies in the area are moderately weak and poorly-defined. Many have been attributed to conductive overburden or deep weathering, although a few appear to be associated with conductive clays possibly overlying basalts.

Interpreted conductors and suspected alteration zones defined by the survey should be subjected to further investigation, using appropriate surface exploration techniques. Anomalies which are currently considered to be of moderately low priority may require upgrading if follow-up results are favourable.

It is also recommended that image processing of existing geophysical data be considered, in order to extract the maximum amount of information from the survey results. Current software and imaging techniques often provide valuable information on structure and lithology, which may not be clearly evident on the contour and colour maps. These techniques can yield images which define subtle, but significant, structural details.

APPENDIX A: RMS THERMAL PAPER STORAGE INSTRUCTIONS

PAPER STORAGE AND HANDLING, RMS 2030 THERMAL PAPER

STORAGE:

Ambient Temperature:	Less than 25°C
Relative Humidity:	Less than 65%
Storage Location:	In darkness before and after exposure.

Under these conditions, the paper should retain its characteristics and the printed images will remain legible for at least 5 years, although in the case of blue image paper, there may be some slight fading.

TO ELIMINATE PREMATURE PAPER DEVELOPMENT:

- Colour development begins at temperatures between 70 to 100°C, and reaches saturation density between 80 and 120°C. Premature development of the paper may occur at lower temperatures, and particularly if the humidity is greater than 65%.
  eg. If the paper is stored for 24 hours at a temperature of 60°C, some development may occur. Or if the paper is stored for 24 hours at a temperature of 45°C when the relative humidity is 90%, development may also occur.

- Avoid use of solvent-type adhesives. Adhesives containing volatile organic solvents such as alcohol, ester, ketone, etc causes colour formation and therefore rubber-type adhesives etc should not be used. Starch, PVA and CMC type adhesives are recommended.

- Frictional heat generated by rubbing a finger nail or sharp object over the surface will cause images to develop.

- Thermal paper will develop colour if brought into contact with freshly processed Diazo copying paper.

TO ELIMINATE PAPER FADING:

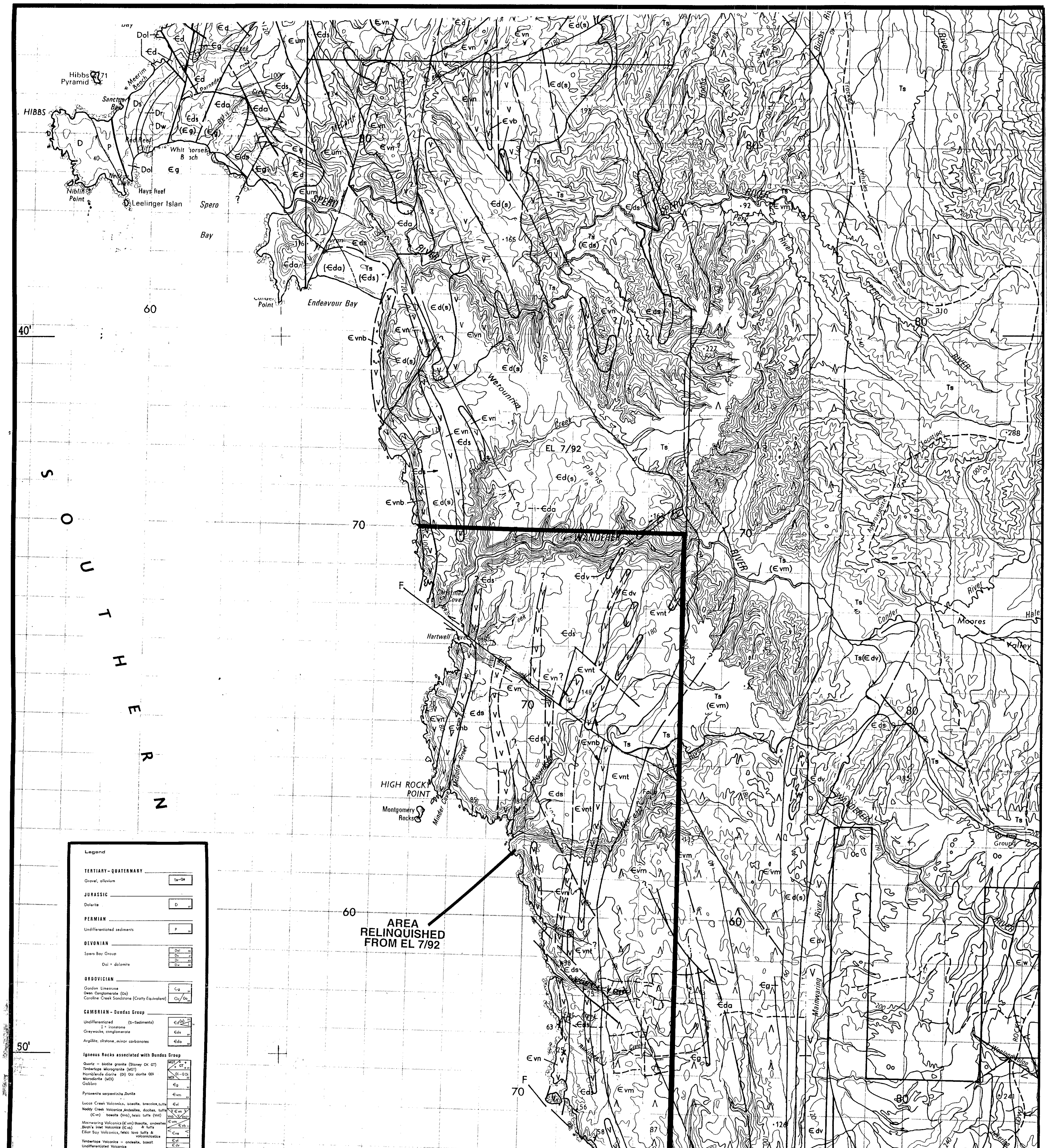
- Thermal paper will turn yellow, and blue printed images will fade if exposed to direct sunlight or to fluorescent lighting for long periods. File exposed paper in the dark immediately after exposure. Do not store paper near windows.

- Prolonged contact with PVC film containing plasticisers such as ester phthalate will reduce the image forming ability of the paper and cause printed images to fade. We recommend that files made of polyethylene, polypropylene, polyester, etc be used.

- Self-adhesive cellophane tapes containing an alcohol type plasticiser will cause the image to fade. Double-sided adhesive tape is recommended for use instead of paste.

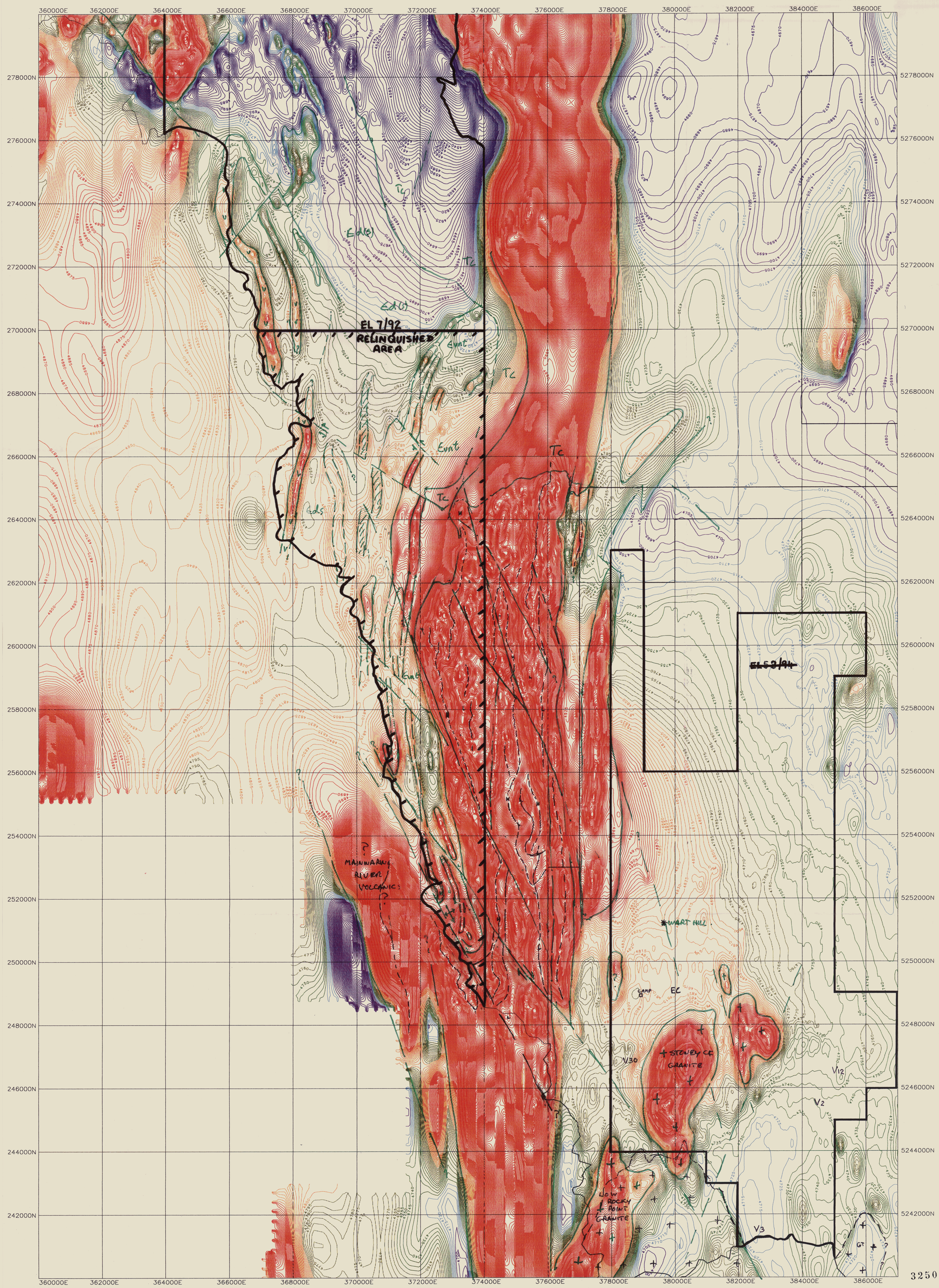
- Handling thermal paper with dirty or sweaty fingers may cause images to fade.

- Do not store developed paper with the sensitised surfaces touching as images might be transferred from one sheet to another.


SOUTHERN OCEAN
Endeavour Bay
Spero Bay
HIBBS
Hibbs Pyramid
Sanctuary Bay
Red Reef
Whitehorses Beach
Hays Reef
Leelinger Island
Niblin Point
Endeavour Bay
Weraunna
Creek
Plains
EL 7/92
WANDERER
RIVER
Christmas Cove
Hartwell Cove
HIGH ROCKY POINT
Montgomery Rocks
AREA RELINQUISHED FROM EL 7/92
Mainwaring Inlet
Mainwaring
River
Acacia Rocks
The Shank
Diorite Point
Veridian Point
Conder
Moores
Valley
Mt Osmond
WART HILL
Wart Hill
EL 53/94
145°30' E
40'
50'
20'
5250000 N AMG
360 000 E AMG
Legend
TERTIARY – QUATERNARY
Gravel, alluvium — Ts–Qs
JURASSIC
Dolerite — D
PERMIAN
Undifferentiated sediments — P
DEVONIAN
Spero Bay Group — Dol, Ds, Dr, Dw
Dol = dolomite
ORDOVICIAN
Gordon Limestone — Og
Owen Conglomerate (Oo)
Caroline Creek Sandstone (Crotty Equivalent) — Oc/Oo
CAMBRIAN – Dundas Group
Undifferentiated (S–Sediments) I = ironstone — Єd(s)
Greywacke, conglomerate — Єds
Argillite, siltstone, minor carbonates — Єda
Igneous Rocks associated with Dundas Group
Quartz – biotite granite (Stoney CK GT)
Timbertops Microgranite (MGT)
Hornblende diorite (Di) Qtz diorite QDi
Microdiorite (MDI)
Gabbro — Єg
Pyroxenite serpentinite, Dunite — Єvm
Lucas Creek Volcanics, basalts, breccias, tuffs — Єvl
Noddy Creek Volcanics, Andesites, dacites, tuffs (Єvn) basalts (Vnb), felsic tuffs (Vnt)
Mainwaring Volcanics (Єvm) Basalts, andesites & tuffs
Birch's Inlet Volcanics (Єvb)
Elliot Bay Volcanics, felsic lava tuffs & volcaniclastics — Єve
Timbertops Volcanics – andesite, basalt — Єvt
Undifferentiated Volcanics — Єdv
Albina Creek Group
Argillite – Mudstone, lithicwacke, phyllite, basalt — Єam
Dolomite, (Єad) calcareous siltstone (Єac)
He – haematitic
Tyndall Group
Waterloo CK formation — Єw
PROTEROZOIC
Nielson River Group
Meta quartzwacke, siltstone (Pnq)
Meta impure dolomite, siltstone
Liberty point Group
Meta orthoquartzite, siltstone, conglomerate
Geology modified from BHP and Mines Department 1 : 50 000 geology sheets
Inferred fault
Geological contact
Geological contact inferred
Unconformity
325053
REVISION :
Plutonic
Plutonic Operations Limited
TECHNICAL REPORT NUMBER :
PROJECT: 708 - SORELL PENINSULA
DATE: 27-Nov-96 12:10
HIGH ROCKY POINT
EL 7/92
GEOLOGY
SCALE :
SOURCE :
DWG No :
PLATE 1

96-3951

Southwest Tasmania



Mesh size 40m Contour Interval 5nT

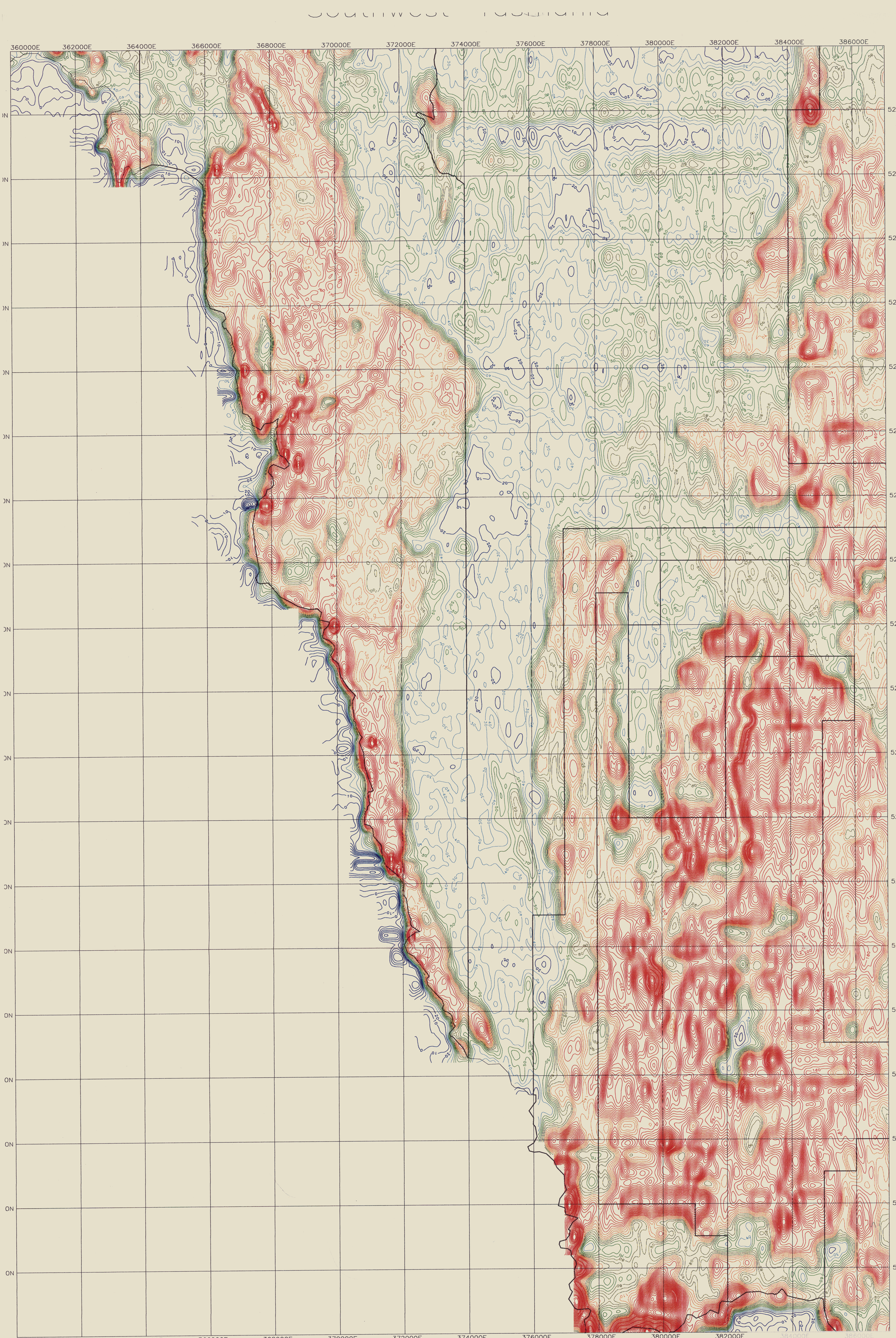
Total Magnetic Intensity Contours

Sheet 1

96-3951

PLATE 2

RELINQUISHMENT REPORT-EL 7/92
PLUTONIC OPERATIONS
R.J.CLOSE



Mesh size 40m Contour Interval 10cps

Radiometric Total Count Contours

Sheet 1 of 2

96-3951

RELINQUISHMENT REPORT-EL 7/92
PLUTONIC OPERATIONS
R.J.CLOSE

PLATE 3

325055

AIRBORNE SURVEY SPECIFICATIONS

EM SYSTEM :	GEOTEM III 25 Hz Pulse width : 4108 microseconds Components : X and Z Channel centres : 501,658,814,1048,1361 1751,2220,2767,3470,4330,5345,6517,7923 9642,11830,14486 microseconds after transmitter turn off Inpulse channel centres : 469,781,1094,1406 microseconds after transmitter turn on
RECORDING INTERVAL :	0.25 sec (approx 16 m sampling) at mean ground speed of 235 km/hour
MAGNETOMETER :	Cesium Vapour optical absorption Sensitivity : 0.01 nT
RECORDING INTERVAL :	1.0 sec (approx 65 m sampling) at mean ground speed of 235 km/hour
DIGITAL RECORDING :	Geoterrex GEODAS acquisition system
NOMINAL TERRAIN CLEARANCE :	Magnetometer sensor in aircraft at 105 m EM transmitter in aircraft at 105 m EM receiver in towed bird at 62 m
NOMINAL LINE SPACING :	Traverse lines 200 m Tie lines peripheral
NOMINAL LINE DIRECTION :	Traverse lines 090/270 degrees Tie lines various
FLIGHT PATH NAVIGATION :	SERCEL NR103 GPS navigation system and a SINGER KEARFOTT AN/ASN 128 Doppler system with SPERRY C12 compass and VG14 vertical gyro
FLIGHT PATH RECORD :	GPS positioning corrected for selected availability integrated with Doppler track

TOTAL MAGNETIC FIELD CONTOURS

Magnetics :	Diurnally levelled
Grid mesh size :	50 x 50 metres
Grid filter :	None
Contour interval :	25, 250 and 2500

LEGEND

x A.E.M. anomaly (apparent to 2.22 millisecs.-channel 7)

o Amplitude Decay Index (A.D.I.) anomaly

□ Low amplitude response with slow decay

① Anomaly number

② Dighem anomaly and number

Grid line

Flown by Geoterrex

Date: March 1996

5 cm

GN
TN
MN

Grid Convergence = 1.07°
Declination = 11.60°

SCALE 1:50000

1 0 1 2 3 4 km

325056

96-3951

RELINQUISHMENT REPORT-EL 7/92
PLUTONIC OPERATIONS
R.J.CLOSE

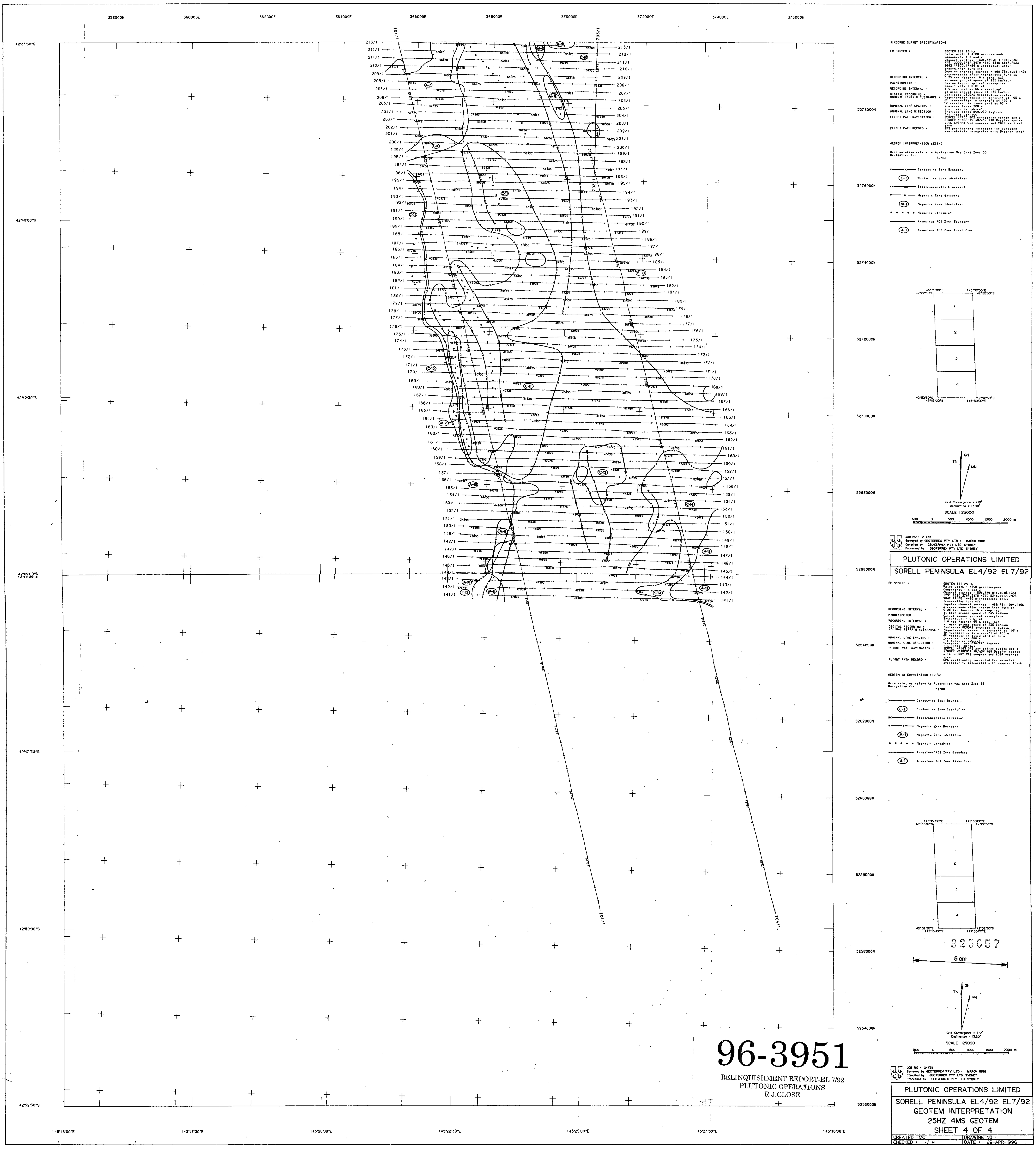
SORELL PENINSULA

A.E.M.(GEOTEM) SURVEY
INTERPRETATION 2

DRAWN BY L.H.B.
SURVEYED BY L.F.W.

PLAN 14

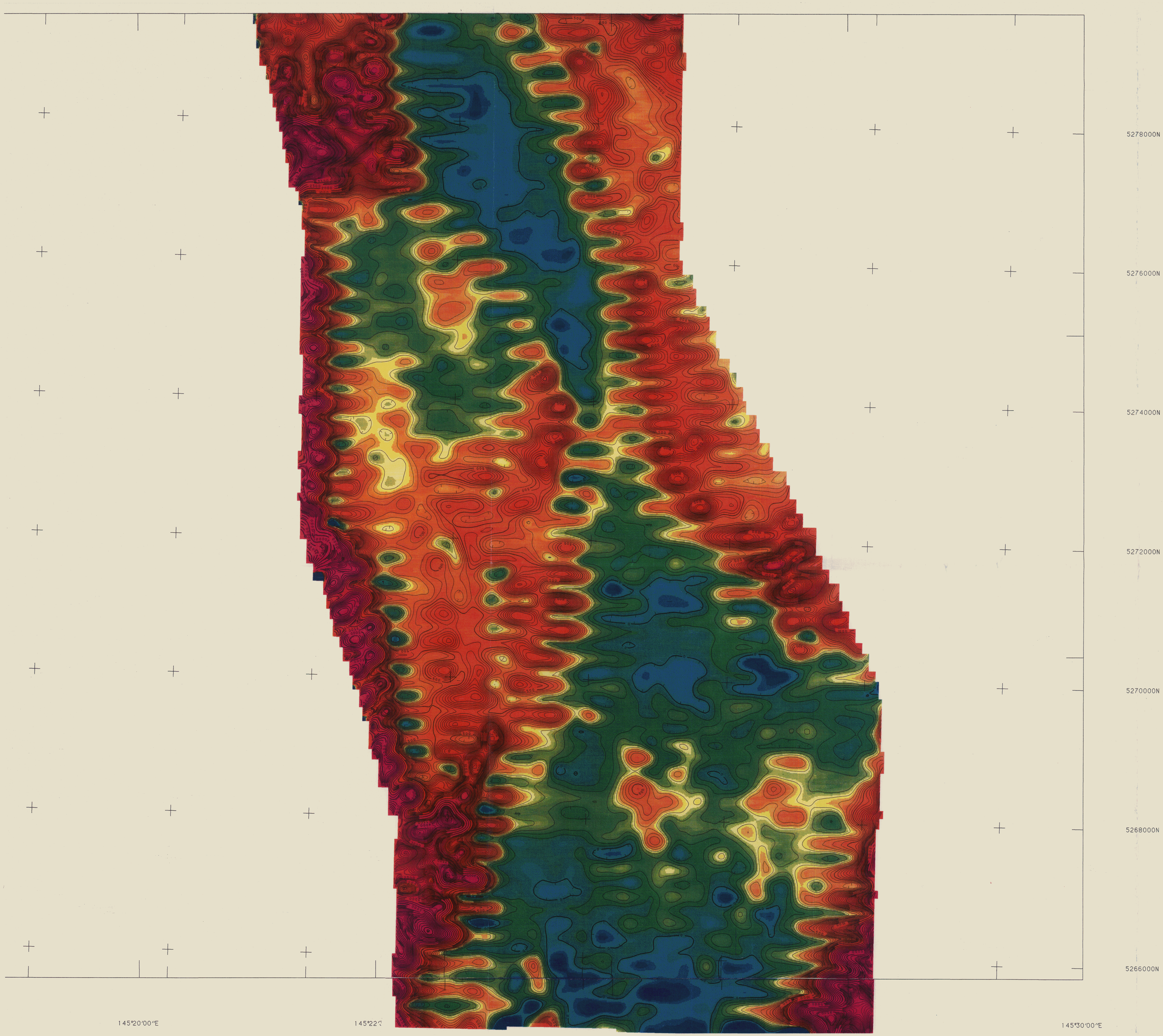
PLATE 4



96-3951

RELINQUISHMENT REPORT-EL 7/92
PLUTONIC OPERATIONS
R J.CLOSE

PLATE 5



AIRBORNE SURVEY SPECIFICATIONS

EM SYSTEM :	GEOTEM III 25 Hz Pulse width : 4108 microseconds Components : X and Z Channel centres : 501,658,814,1048,1361 1751,2220,2767,3470,4330,5345,6517,7923 9642,11830,14486 microseconds after transmitter turn off Inpulse channel centres : 469,781,1094,1406 microseconds after transmitter turn on
RECORDING INTERVAL :	0.25 sec (approx 16 m sampling) at mean ground speed of 235 km/hour
MAGNETOMETER :	Cesium Vapour optical absorption Sensitivity : 0.01 nT
RECORDING INTERVAL :	1.0 sec (approx 65 m sampling) at mean ground speed of 235 km/hour
DIGITAL RECORDING :	Geoterrex GEODAS acquisition system
NOMINAL TERRAIN CLEARANCE :	Magnetometer sensor in aircraft at 105 m EM transmitter in aircraft at 105 m EM receiver in towed bird at 62 m
NOMINAL LINE SPACING :	Traverse lines 200 m Tie lines peripheral
NOMINAL LINE DIRECTION :	Traverse lines 090/270 degrees Tie lines various
FLIGHT PATH NAVIGATION :	SERCEL NR103 GPS navigation system and a SINGER KEARFOTT AN/ASN 128 Doppler system with SPERRY C12 compass and VG14 vertical gyro
FLIGHT PATH RECORD :	GPS positioning corrected for selected availability integrated with Doppler track

X COMPONENT Ch 2 IMAGE

Grid notation refers to Australian Map Grid Zone 55

Grid mesh size :	50 x 50 metres
Grid filter :	5pt triangular, no threshold
Contour Interval :	50, 500 and 5000 ppm

COLOUR KEY - ppm

-120.0	210.0
-75.0	230.0
-55.0	255.0
-35.0	275.0
-15.0	295.0
5.0	315.0
25.0	335.0
45.0	355.0
65.0	395.0
90.0	460.0
110.0	540.0
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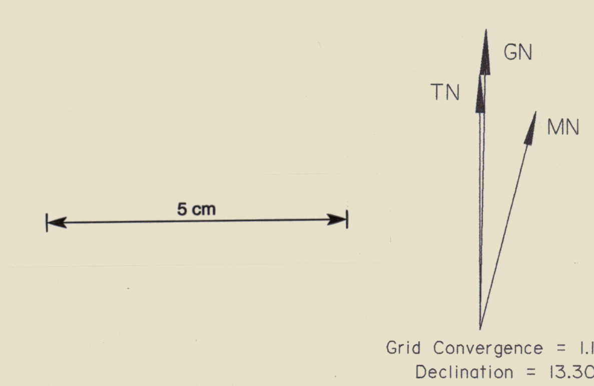
150.0	850.0
170.0	1245.0
190.0	2070.0
210.0	3780.0



96-3951
RELINQUISHMENT REPORT-EL 7/92
PLUTONIC OPERATIONS
R.J.CLOSE

SCALE 1:25000

500 0 500 1000 1500 2000 m

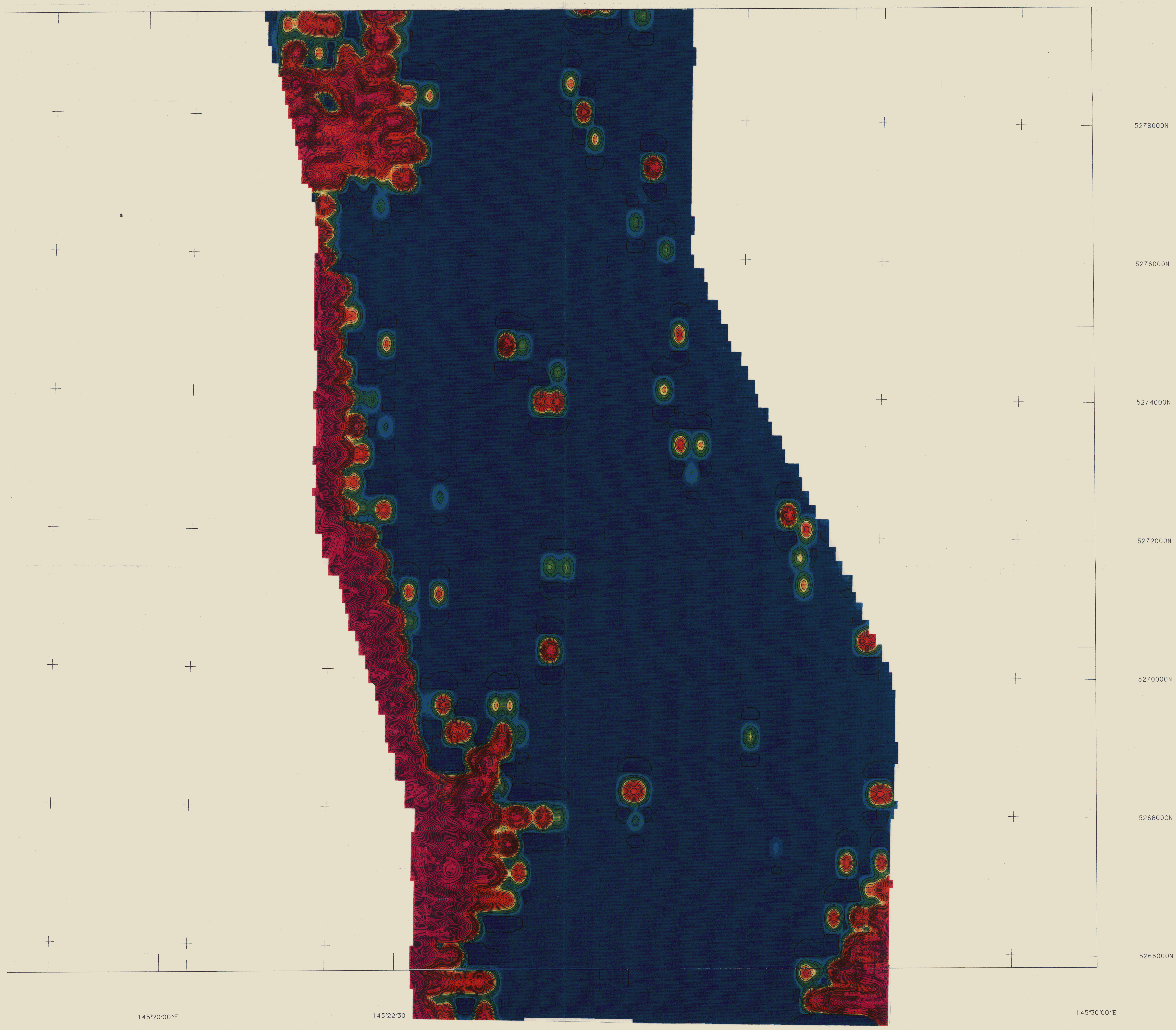
JOB NO : 2-735
Surveyed by GEOTERREX PTY LTD : MARCH 1996
Compiled by GEOTERREX PTY LTD, SYDNEY
Processed by GEOTERREX PTY LTD, SYDNEY

325058

PLUTONIC OPERATIONS LIMITED

SORELL PENINSULA EL4/92 EL7/92
X COMPONENT Ch 2 IMAGE
25HZ 4MS GEOTEM
SHEET 3 OF 4

PLATE 6



AIRBORNE SURVEY SPECIFICATIONS

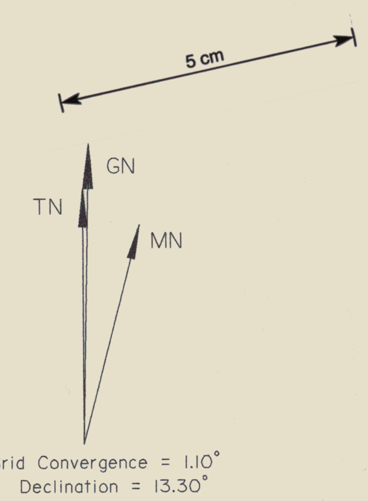
EM SYSTEM :	GEOTEM III 25 Hz Pulse width : 4108 microseconds Components : X and Z Channel centres : 501,658,814,1048,1361 1751,2220,2767,3470,4330,5345,6517,7923 9642,11830,14486 microseconds after transmitter turn off Inpulse channel centres : 469,781,1094,1406 microseconds after transmitter turn on
RECORDING INTERVAL :	0.25 sec (approx 16 m sampling) at mean ground speed of 235 km/hour
MAGNETOMETER :	Cesium Vapour optical absorption Sensitivity : 0.01 nT
RECORDING INTERVAL :	1.0 sec (approx 65 m sampling) at mean ground speed of 235 km/hour
DIGITAL RECORDING :	Geoterrex GEODAS acquisition system
NOMINAL TERRAIN CLEARANCE :	Magnetometer sensor in aircraft at 105 m EM transmitter in aircraft at 105 m EM receiver in towed bird at 62 m
NOMINAL LINE SPACING :	Traverse lines 200 m Tie lines peripheral
NOMINAL LINE DIRECTION :	Traverse lines 090/270 degrees Tie lines various
FLIGHT PATH NAVIGATION :	SERCEL NR103 GPS navigation system and a SINGER KEARFOTT AN/ASN 128 Doppler system with SPERRY C12 compass and VG14 vertical gyro
FLIGHT PATH RECORD :	GPS positioning corrected for selected availability integrated with Doppler track

X COMPONENT ADI IMAGE

Grid notation refers to Australian Map Grid Zone 55
ADI calculated from channels 5 to 10
Grid mesh size : 50 x 50 metres
Grid filter : 5pt triangular, no threshold
Contour interval : 50, 500 and 5000 units

COLOUR KEY - adi units

-5.0	165.0
5.0	175.0
15.0	190.0
30.0	200.0
40.0	210.0
50.0	225.0
60.0	235.0
75.0	245.0
85.0	255.0
95.0	270.0
110.0	280.0
120.0	290.0
130.0	305.0
145.0	315.0
155.0	760.0
165.0	1955.0



Grid Convergence = 1.10°
Declination = 13.30°

SCALE 1:25000

500 0 500 1000 1500 2000 m

JOB NO : 2-735
Surveyed by GEOTERREX PTY LTD : MARCH 1996
Compiled by GEOTERREX PTY LTD, SYDNEY
Processed by GEOTERREX PTY LTD, SYDNEY

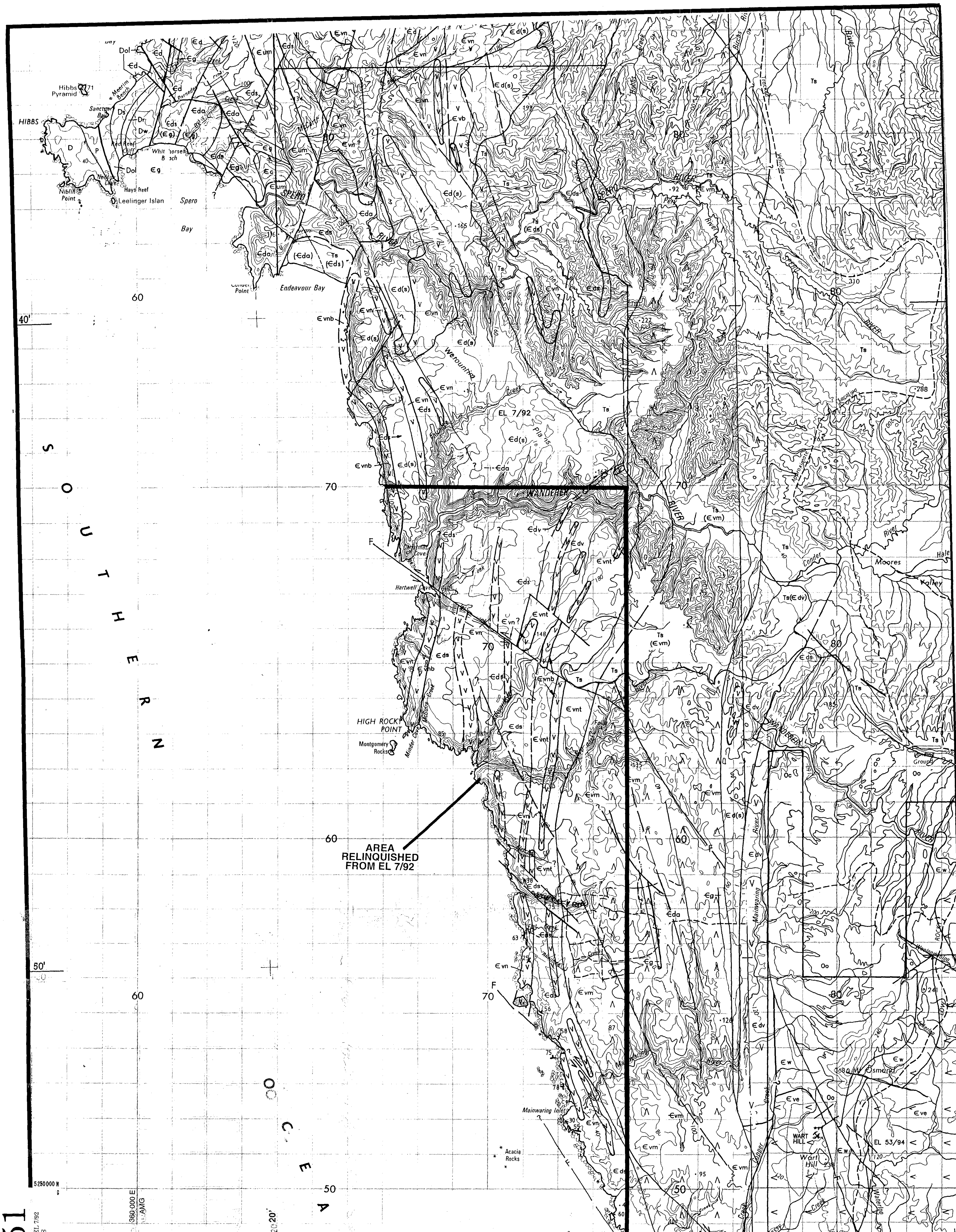
325059

PLUTONIC OPERATIONS LIMITED

SORELL PENINSULA EL4/92 EL7/92
X COMPONENT ADI IMAGE
25HZ 4MS GEOTEM
SHEET 3 OF 4

CREATED : MC | DRAWING NO : PLATE 7

96-3951
RELINQUISHMENT REPORT EL 7/92
PLUTONIC OPERATIONS
R.J.CLOSE



96-3951

RELINQUISHMENT REPORT-EL 7/92
PLUTONIC OPERATIONS
R.J.CLOSE

325060

Plutonic
Plutonic Operations Limited

PROJECT: 708 - SOREILL PENINSULA

HIGH ROCKY POINT
EL 7/92
GEOLOGY

-Nov-96 12:10

SOURCE :

DWG No : PLATE 1