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CRA EXPLORATION PTY LIMITED

RELINQUISHMENT REPORT

ON THE CUPRONA SECTION OF EL 8/77,

RIANA, TASMANIA

DEM	A.O.	B.O.	E.O.	U.S.A.
28 JUN 1985				
DEPT. OF MINES				
6696/85				

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Date: 17 June 1985

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 CRAE Canberra
 Department of Mines, Tasmania
 Billiton Australia

OPEN FILE

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REPORT NO: 13394

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SUMMARY

This report summarises exploration activities under the Billiton Joint Venture from January 1980 to March 1985 on the portion of the Riana Licence (EL 8/77) that is proposed for relinquishment.

1.0 INTRODUCTION

The Riana EL forms part of the Moina Joint Venture between CRAE, Comalco and Billiton Australia. CRAE are managers and operators for the Joint Venture. The Licence is due to be reduced from 173 sq. kms to 117 sq. kms on the 5th of April 1985. This report covers the work completed by Billiton on the areas to be relinquished.

2.0 CONCLUSIONS AND RECOMMENDATIONS

1. Airborne magnetics, radiometrics and EM have been flown over the area and regional stream sediment and gravity programmes have been completed.
2. Detailed follow-up in search for skarns has been performed with little success.
3. Mapping indicates thdt the area does not appear to be prospective for Pb/Zn mineralisation.

The northern portion of the EL is thus recommended for relinquishment.

3.0 PREVIOUS EXPLORATION

Twelvetrees	(1903, 1909)
Bureau of Mineral Resources	(1950's and 1960's)
Quest Exploration	(1966)
B.H.P.	(1968)
Minops	(1969)
Tasminex	(1970, 1974)
CRAE	(1972)
Australian and New Zealand Exploration	(1972-1974)
Comalco	(1977-1980)
Shell/Comalco	(1980-1984)
Shell/CRAE	(1985-)

Further details of previous work are summarised in Banwell (1981).

4.0 EXPLORATION AIMS

Shell's interest in the area originally focussed on the possibilities of replacement sulphide mineralisation within the Gordon Limestone and carbonate units within the Oonah Formation notably around the margins of the Housetop Granite. CRA's target is lead-zinc mineralisation in the Mt Read volcanics and its correlates as it is felt that this presents the best chance of finding a major ore body in this region.

5.0 GEOLOGICAL SETTING

The area has been extensively mapped in the past. It has been well covered by many authors including Twelvetrees (1903, 1909); Burns (1964); Jennings (1959, 1979); Gee (1977) and Williams and Turner (1974).

The oldest rocks on the Licence are the Proterozoic Ulverstone Metamorphics, which form part of the Forth Nucleus (Williams and Turner, 1974), and are composed of quartzite, schist and conglomerate. These rocks outcrop along the coast in the eastern most extension of the Licence in its pre-reduction form. At the margin of the Forth Nucleus on the eastern side of the Dial Range outcrop sandstones and mudstones of the Rocky Cape Group. These are unconformably overlain by the north-south trending belt of Cambrian sediments and acid to basic volcanics deposited in the Dail Range Trough (Burne, 1964). Iron, copper and cobalt mineralisation is associated with the early volcanics in the Penguin area.

To the west of the Dial Range the oldest rocks belong to the Precambrian Burnie Formation which comprises of a sequence of turbidite sandstones, siltstones and shales in part containing intrusive basic igneous rocks (Gee, 1977). These rocks are folded and deformed by at least two phase of deformation with NE trending folds dominant.

This turbidite sequence is unconformably overlain by silicified and ferruginized sandstones and siltstones, dolomites and ironstones of the Cambrian/Precambrian Oonah Formation (Fig 3).

The Oonah Formation is gently dipping and forms a NE outcrop trend from a contact with the Husetop granite near Natone across the Blythe River to Cuprona but pinches out before reaching the north coast. Dolomites of the Oonah Formation host the Natone Skarn.

Cambrian acid/intermediate volcanics and sediments which form the northern correlates of the Mt Read Volcanics outcrop in the southern portion of the Licence. Anomalous Pb/Zn is associated with trachytic intrusions/extrusions within a predominantly sedimentary succession.

Ordovician conglomerates, sandstones and limestones overly the Cambrian stratigraphy, outcropping in the southern part of the Licence near Gunns Plains and are inferred as subcrop beneath Tertiary basalt cover in the Camena/Midgley Falls areas north of Riana.

Sediments of Silurian age may occur in the axis of the Gunns Plains synform.

This succession is passively intruded by the Devonian Husetop granite generally a medium to coarse grained pink adamellite. Porphyritic and fine grained variants have been identified south of Natone and in the Redwater area. The Husetop granite contains Sn-bearing greisen veins at Crane's Tin prospect to the west of the Riana Licence and

is associated with the magnetite/scheelite skarns of Kara. Geophysical (gravity) data suggests that the granite is laccolith shaped with a feeder zone located towards its SE/E margin, (Sheehan, 1969; Oakes, 1983). The roof zones have been removed by Tertiary erosion.

During Tertiary times the region was exposed with weathering producing pockets of sediment. Major basaltic flows covered the area infilling valleys - producing highly variable lava thicknesses.

6.0 WORK COMPLETED

1981/82: The aeromagnetic survey data was reviewed and three anomalies in this area were selected for follow-up, Camena, Cuprona and Natone. An INPUT survey was flown in January 1982 to cover these three features. The lines were flown at 300 metre spacing and a terrain clearance of 120 metres. Eight anomalies of various grades were located in the area being relinquished. In late 1981 to early 1982 a close spaced gravity survey was completed over the area concentrating on the margins of the Housetop granite. A small stream sediment sampling programme was completed.

Ground follow-up and drilling was completed on the Cuprona anomaly. Ground work was continued on the Natone anomaly.

1982/83: The Comalco stream sediment data was recompiled and re-interpreted. A further hole was drilled at the Natone skarn.

1983/84: Dr Teunis Kwak of Latrobe University, Melbourne examined the drill core from the Natone skarn.

7.0 RESULTS7.1 Regional Work7.1.1 Stream sediment sampling

Re-appraisal of the Comalco stream sediment data located anomalies at Natone (Cu) and south of Penguin (WO_3). The Natone anomalies drain the Copper King Mine and the Rutherford copper prospect. At both prospects chalcopyrite occurs in quartz veins hosted by Burnie Formation shales and siltstones close to the Precambrian/Cambrian boundary. No follow-up was considered to be necessary. At Penguin spot highs occur over Cambrian volcanics. These values are low and probably originate from the Tasmanian Iron Mines workings and adjacent Dial Range volcanics.

Spasmodic Cu (110 ppm max) and Zn (290 ppm max) highs over basalt covered areas were considered to reflect minor scavenging by Fe and Mn oxides.

7.1.2 INPUT

An INPUT survey was flown with lines 300 metres apart. Broad regions of high conductivity were found to be associated with basalt cover. Three anomalies were located by Geoterrex in the area and a further six anomalies by a later review of the data. Of the Geoterrex anomalies, IR3 was found to be the Natone skarn, IR2 was believed to have a graphitic source and IR5 was found to be due to cultural effects. The lower order anomalies were all found to lie on basalt.

7.1.3 Gravity

A total of 1186 gravity measurements were taken over the Housetop Granite and surrounding rocks including portions of the area to be relinquished. Three gravity lows were identified in the area. Anomaly GL10 was modelled as having a shallow source. Anomalies GL8 and 9 were defined as 1-3 mgla anomalies with three possible sources: 1) topographic; 2) basalt cover; and 3) granite cusp.

Modelling of the entire gravity survey data confirmed work by Sheehan (1969) which suggested that the Housetop Granite has a laccolith shape with a gently east dipping western margin, steep northern contact and a complete steep to gently dipping eastern margin.

7.2 Cuprona

The Cuprona aeromagnetic feature was not picked up by the INPUT survey. Previous ground follow-up involved gridding, ground magnetics, soil sampling and remanent magnetic studies (Banwell, 1981). A vertical percussion hole sited on the top of the basalt-covered hill at approximately 2050N 1675E was designed to test this magnetic feature. The hole intersected 132 metres of basalt, 14 metres of Tertiary alluvium and passed into shales of the Precambrian Burnie Formation. The hole was stopped at 200 metres depth. Downhole IP was attempted but failed. A single gravity line was completed along line 2100N.

Modelling indicated that the most likely source of the aeromagnetic anomaly was a basalt hill.

7.3 Camena

Modelling of the aeromagnetic feature suggested a single body with a depth greater than 500 metres and a magnetic susceptibility of about $20,000 \times 10^{-6}$ cgs units. A basic body perhaps of Tertiary age was proposed.

7.4 INPUT Anomaly IR2

A small stream sediment sampling programme to determine regional background values to locate Sn-W or Cu-Pb-Zn mineralisation was conducted adjacent to the Housetop Granite on the Riana and Hayes Peak Licences. No significant anomaly was outlined. Panned concentrates, -20# to +80# and -80# fractions were also assayed.

INPUT IP anomaly IR2 straddles the Riana EL boundary and was rated priority 2 for follow-up by Geoterrex. It has a synclinal shape with its axis parallel to the regional strike of folding and plunges at about 50 degrees to the southwest. This anomaly is covered by the westward extension of the Natone grid, lines 1320N, 7450NE and 1650N. The 1650N line was placed in a relatively culture free position to minimise extraneous geophysical noise. The INPUT anomaly produced a flat magnetic and gravity response but gave a Max-Min and SP anomaly on line 1650N. The discovery of a graphitic and pyritic black shale near this anomaly suggests a lithological source.

7.5 Natone Skarn

The exploration history of the Natone skarn goes back to Mines Department work in the late 1950's. Since then it has been tested by air and ground magnetics, air

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and ground EM, SP, IP, gravity and surface geochemistry. It has been tested by five drill holes and with some down-hole IP. Examination of the data by Shell geologists and consultants has indicated that there is little likelihood that there is an economic orebody present. A detailed summary of the work that has been completed on the prospect is given in Ruxton 1983b.

7.6 Natone East Aeromagnetic Anomaly

The Natone East anomaly is located 800 metres east of Natone itself. It has a magnitude of about 400 gammas centred on a basalt ridge. Sub-basalt geology in Moina Sandstone or Roland Conglomerate of Ordovician age. The anomaly is of interest because of its proximity to the Natone skarn. Four lines of magnetics, one of VLF and one gravity line were completed. The anomaly was not fully tested due to problems with the local farmer, Mr Shepherd, however the coincidence of the anomaly with a basalt ridge and the position of the anomaly over Ordovician sandstones was thought to indicate a basalt source rather than extensions to the Natone skarn.

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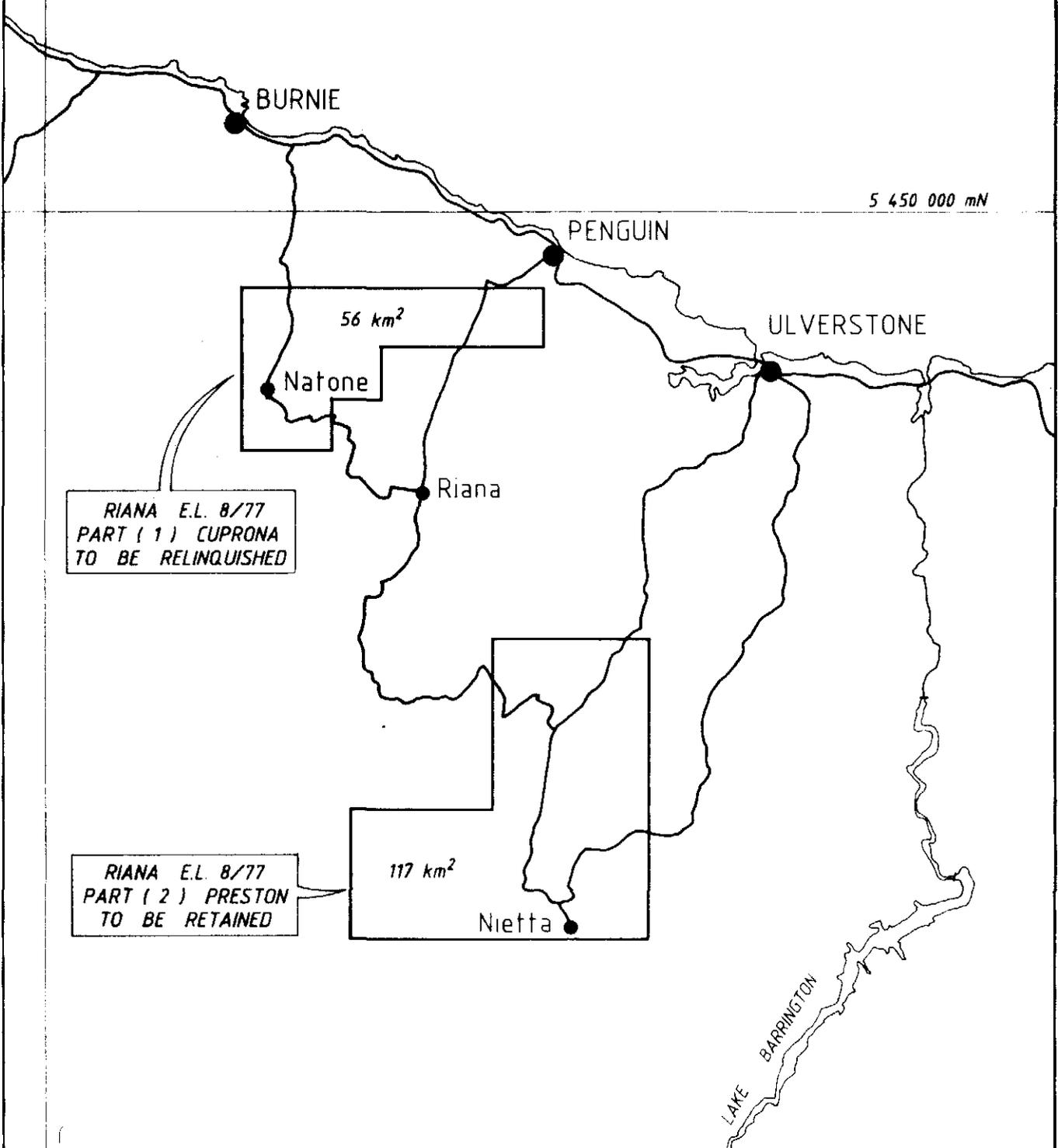
9.0 LIST OF PLANS

<u>Plan No</u>		<u>Scale</u>
TASh 2666	Riana EL 8/77 Location Plan Part (1) Cuprona and Part (2) Preston	1:250 000
TASh 2667	Riana EL 8/77 Geology & Anomaly Plan Part (1) Cuprona	1:50 000
TASh 2668	Riana EL 8/77 Geology & Grid Plan Part (1) Cuprona	1:50 000
TASh 2669	Riana EL 8/77 Aeromagnetic Contour Map Part (1) Cuprona	1:50 000
TASh 2670	Riana EL 8/77 Radiometric Contour Map Part (1) Cuprona	1:50 000

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<u>Plan No</u>		<u>Scale</u>
TASh 2671	Riana EL 8/77 Bouguer Gravity Contour Map Part (1) Cuprona	1:50 000
TASh 2672	Riana EL 8/77 INPUT EM Anomaly Map from Geoterrex, NW Quadrant	1:20 000
TASh 2673	Riana EL 8/77 INPUT EM Anomaly Map from Geoterrex, SW Quadrant	1:20 000
TASh 2674	Riana EL 8/77 INPUT EM Anomaly Map from Geoterrex, NE Quadrant	1:20 000
TASh 2675	Riana EL 8/77 INPUT EM Anomaly Map from Geoterrex, SE Quadrant	1:20 000

B A S S S T R A I T



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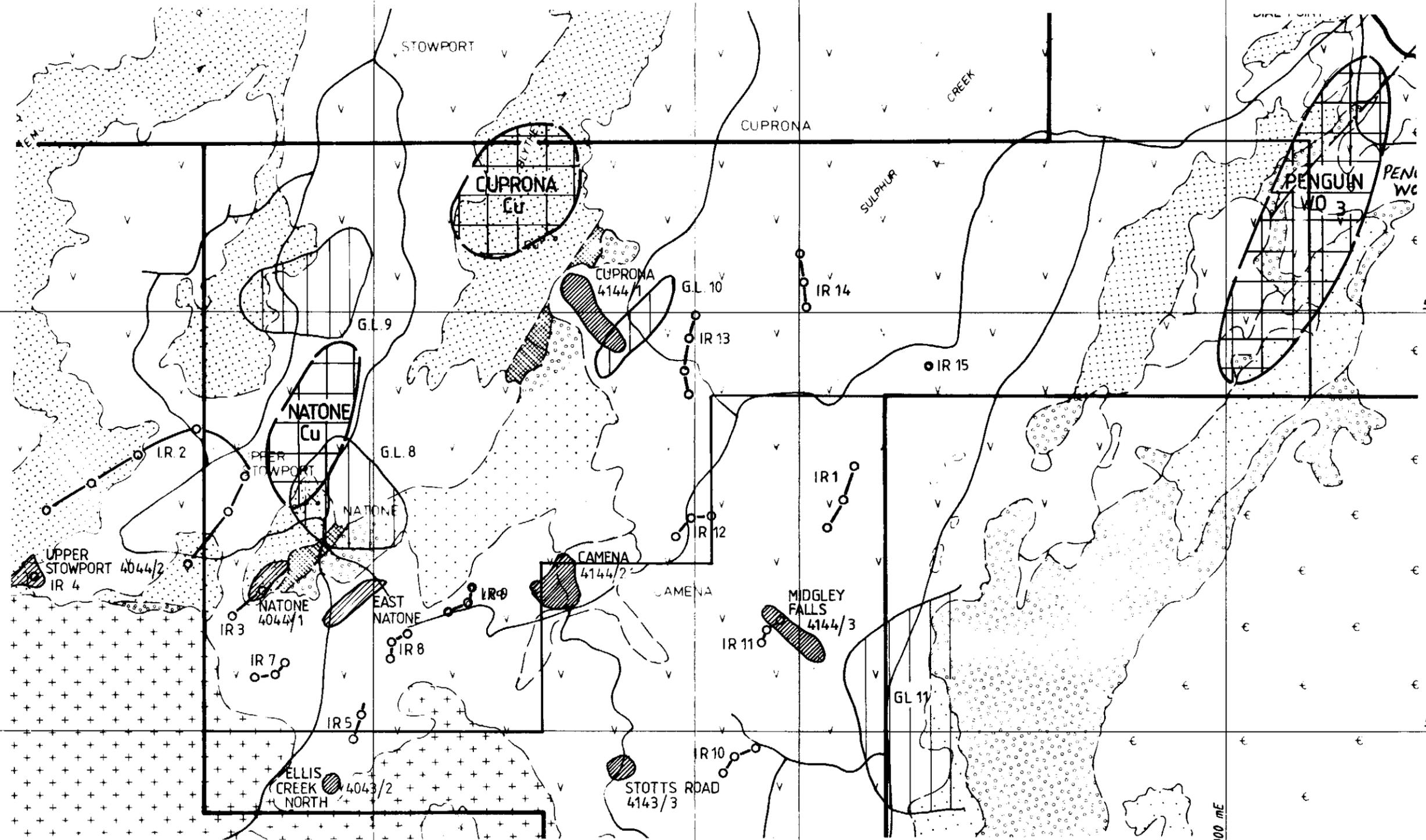
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 PART (2) PRESTON
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CRA EXPLORATION PTY. LIMITED			
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SCALE	1 : 250.000	DRAWN	R.T.
AUTHOR	T.v.S.	REPORT No.	13394
DATE	3 - 7 - 1985	PLAN No.	TASh 2666



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RIANA E.L. 8/77
 GEOLOGY & ANOMALY PLAN
 PART (1.) CUPRONA 1372A

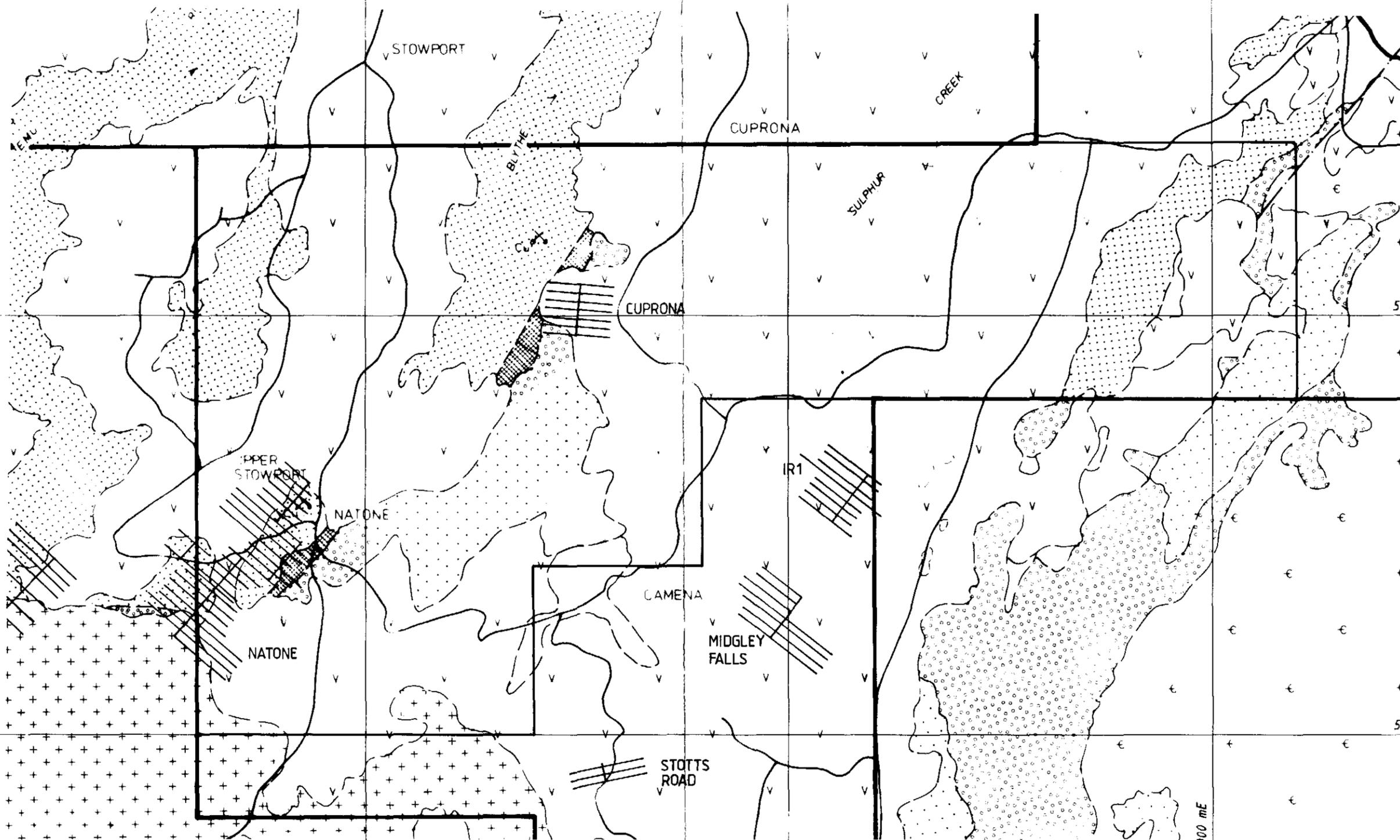
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AUTHOR	SHELL T.V.S.	REPORT No. 13394
DATE	3 - 7 - 1985	PLAN No. TASH 2667

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410 000 mE

415 000 mE

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RIANA E.L. 8/77
 GEOLOGY & GRID PLAN
 PART (1) CUPRONA 1373

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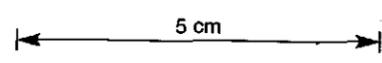
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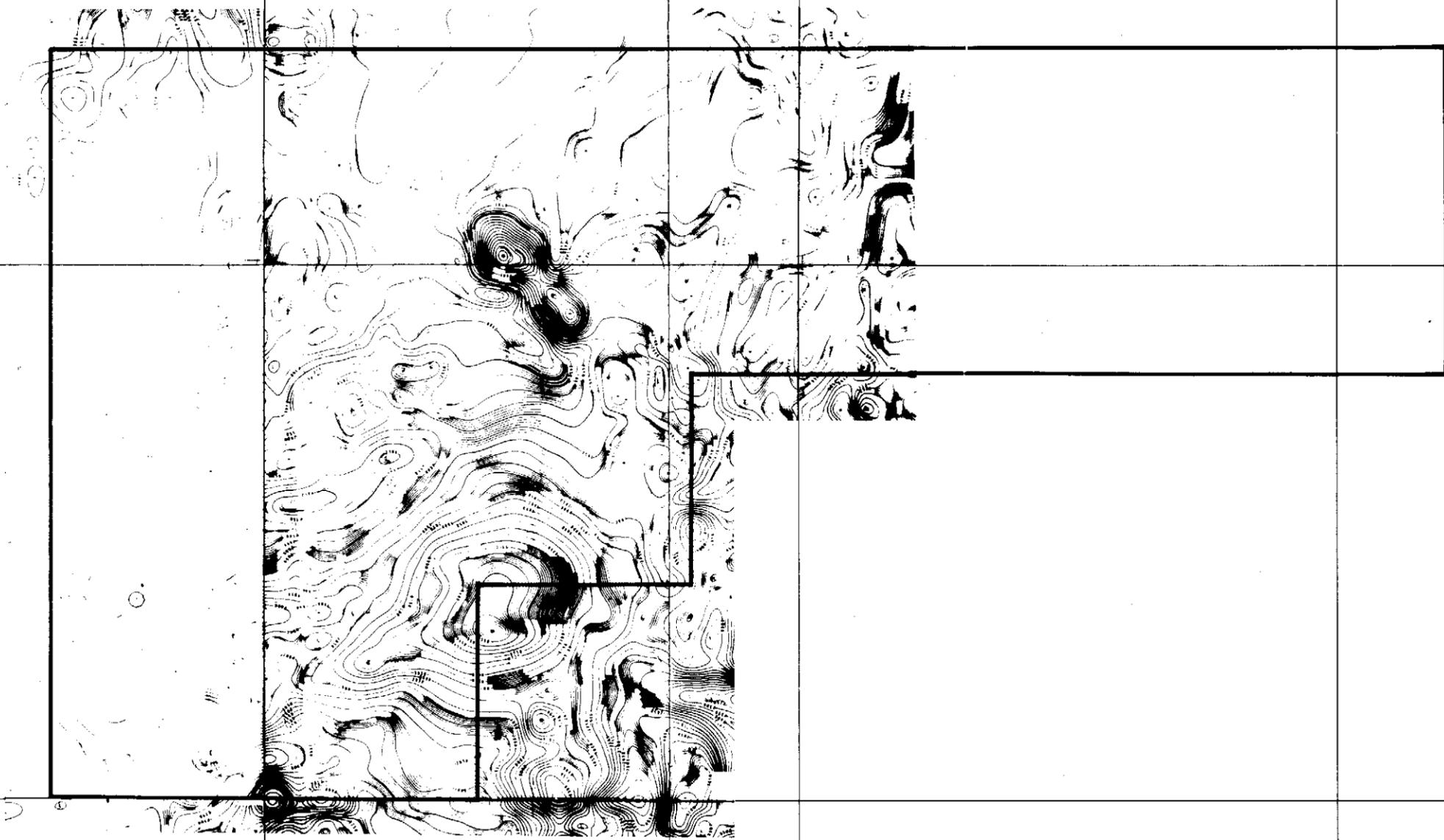
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RIANA E.L. 8/77
 AEROMAGNETIC CONTOUR MAP
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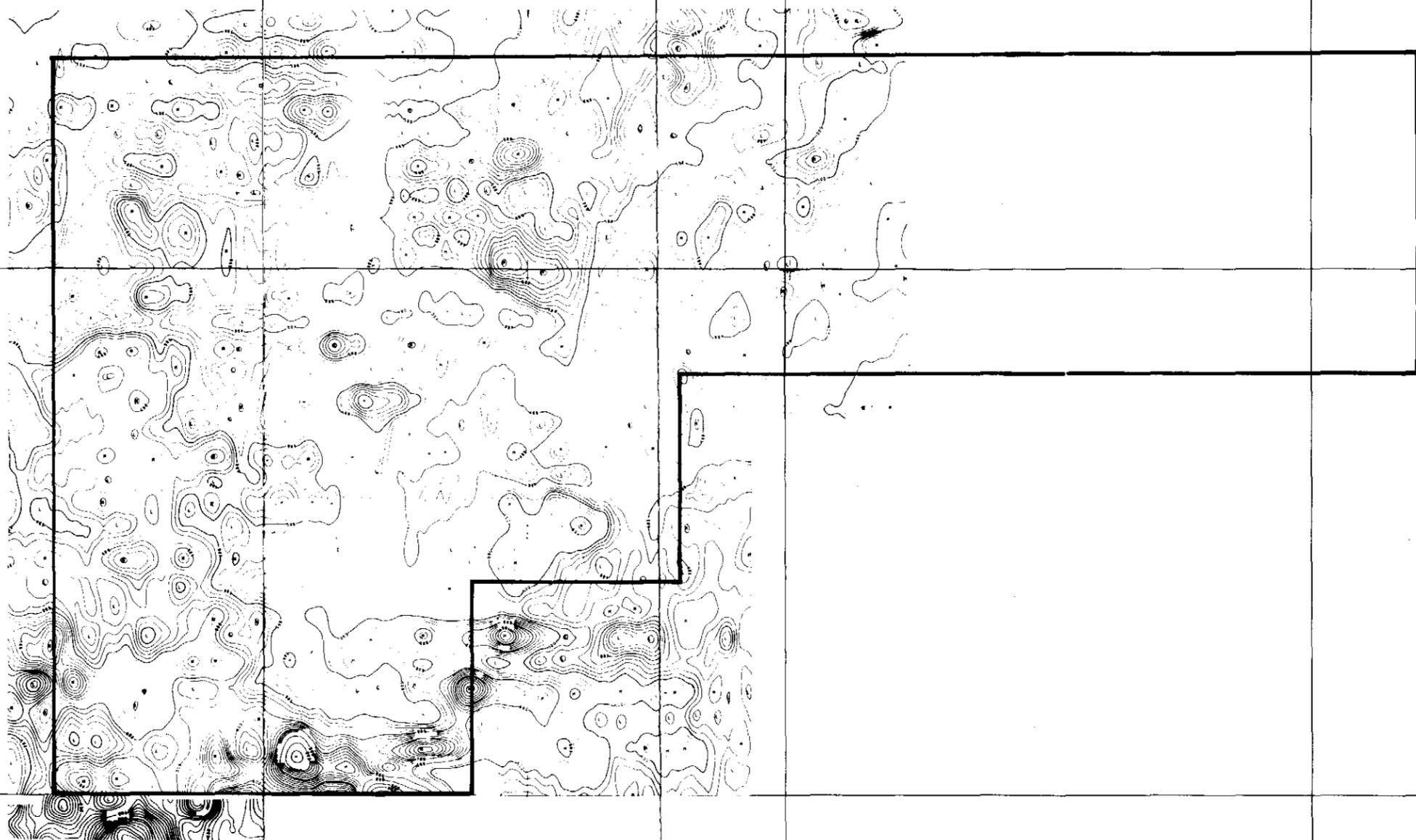
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AUTHOR	SHELL T. v.S.	REPORT No. 13394
DATE	4 - 7 - 1985	PLAN No. TASH 2669

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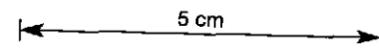
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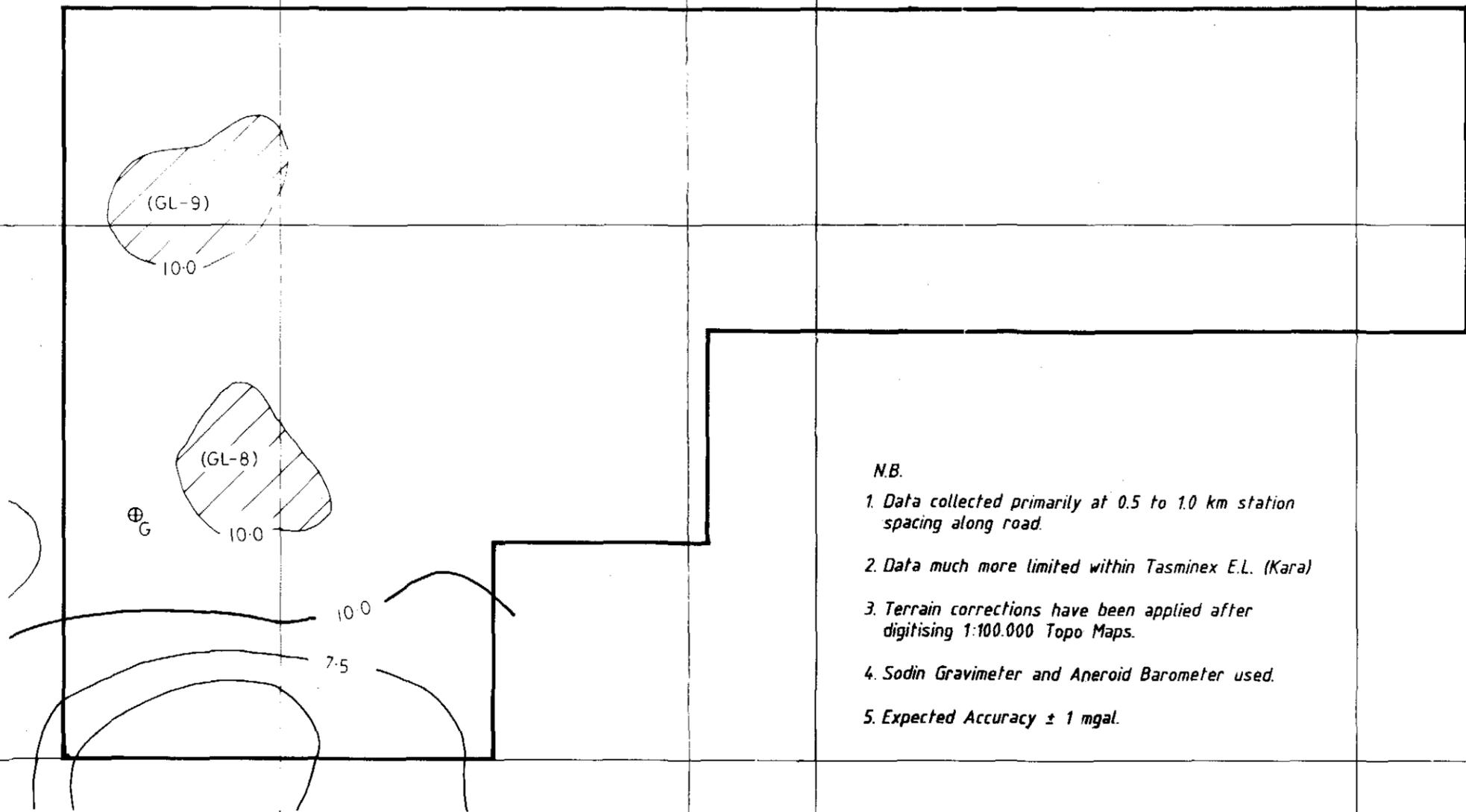
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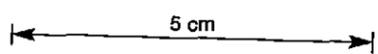
RIANA E.L. 8/77
 RADIOMETRIC CONTOUR MAP
 PART (1) CUPRONA 1375



REF.	SK55 - 3	(8015 - 8115)
SCALE	1 : 50,000	DRAWN SHELL R.T.
AUTHOR	SHELL T. v.S.	REPORT No. 13394
DATE	4 - 7 - 1985	PLAN No TASH 2670



- N.B.**
1. Data collected primarily at 0.5 to 1.0 km station spacing along road.
 2. Data much more limited within Tasminex E.L. (Kara)
 3. Terrain corrections have been applied after digitising 1:100,000 Topo Maps.
 4. Sodin Gravimeter and Aneroid Barometer used.
 5. Expected Accuracy ± 1 mgal.



137026

CRA EXPLORATION PTY. LIMITED

RIANA E.L. 8/77
BOUGUER GRAVITY CONTOUR MAP
PART (1) CUPRONA 1376

REF.	SK55 - 3	(8015 - 8115)
SCALE	1 : 50,000	DRAWN SHELL R.T.
AUTHOR	SHELL T. v.S.	REPORT No. 13394
DATE	4 - 7 - 1985	PLAN No. TASH 2671

4.05 000mE

4.10 000mE

4.15 000mE

4.20 000mE

5.445 000mN

5.440 000mN

545000 N

5447500 N

5445000 N

5442500 N

5440000 N

400000 E

402500 E

405000 E

407500 E

410000 E

AIRBORNE SURVEY SPECIFICATIONS

EM SYSTEM : INPUT MARK V
 Channel centres: 500, 700, 900, 1200, 1600 and 2100 microseconds after transmitter switch off.

EM RECORDING INTERVAL : 0.2 sec (approx 13 metres)

MAGNETOMETER : Geometrics G803, sensitivity 1.0nT.

MAG RECORDING INTERVAL : 1.0 sec (approx 60 metres)

DATA RECORDING : Geotrex Madacs system, digital to mag tape

NOMINAL SPEED : mean ground speed 220 km per hour.

NOMINAL TERRAIN CLEARANCE : Mag and spectrometer in aircraft at 120m.
 EM transmitter in aircraft at 120m.
 EM detector in bird at 40m.

FLIGHT PATH RECORD : Geocam continuous 35mm tracking camera

NOMINAL LINE SPACING : Traverses 300m SE-NW, tie lines not flown

E.M. ANOMALY MAP

Sheet 20/4044
 Grid notation refers to Australian Map Grid
 Path recovery digitized from 1:20000 topo maps

Large 6 channel response

6 channel response

5 channel response

4 channel response

3 channel response

2nd & 5th channel amplitudes

Altitudes (metres)

Offset magnetic anomaly

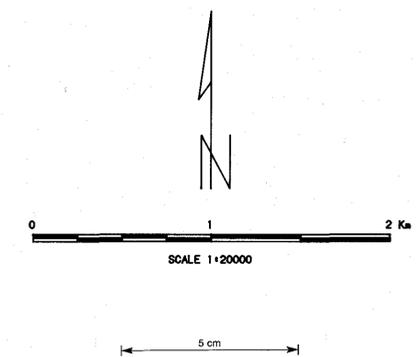
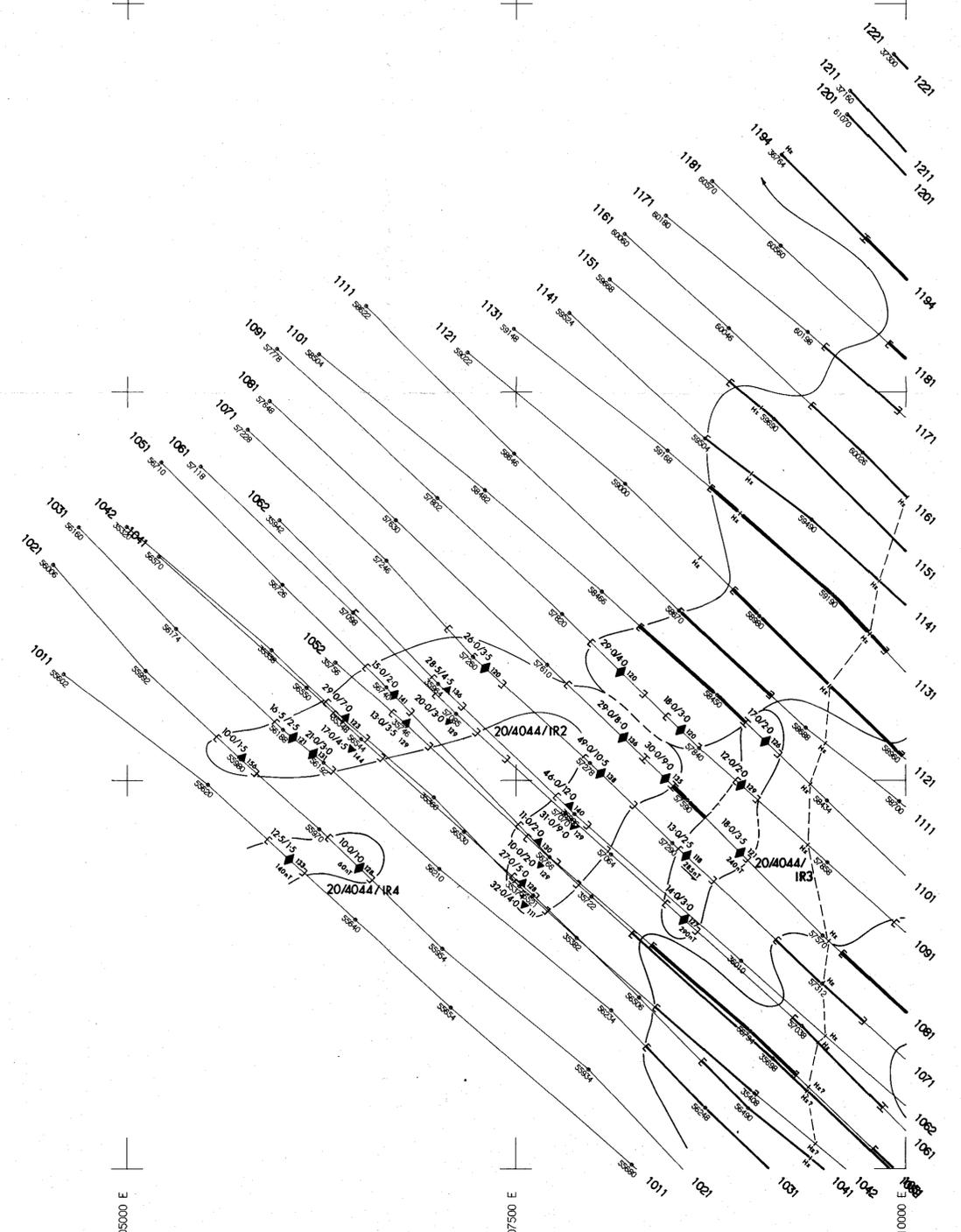
Hertz response

Zone number **20/4044/IR3**

Conductor boundary

Inferred boundary

20/4044	20/4144
20/4043	20/4143



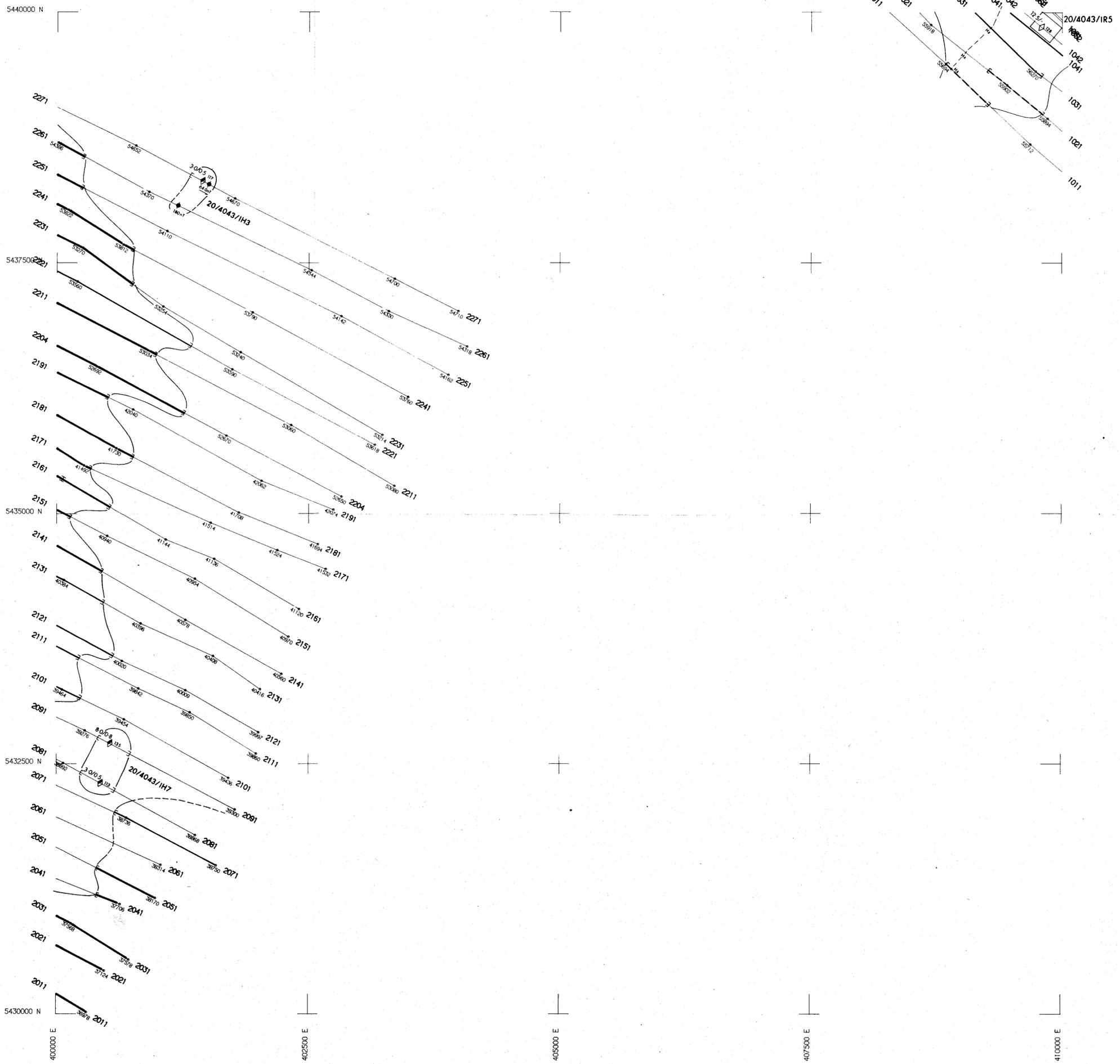
JOB NO : 83-548
 Flown by GEOTERREX PTY LTD : JANUARY 1982
 Compiled by EXPLORATION COMPUTER SERVICES PTY LTD

THE SHELL COMPANY OF AUSTRALIA LIMITED 137027

RIANA, TASMANIA
E.M. ANOMALY MAP
SHEET 20/4044 1377

PROJ NO. CRAE PLAN No. TASH 2672 DATE: 3-MAR-82
 REPORT No. 13394

85-2435



AIRBORNE SURVEY SPECIFICATIONS

EM SYSTEM : INPUT MARK V
 Channel centres: 500, 700, 900, 1200, 1600 and 2100 microseconds after transmitter switch off.

EM RECORDING INTERVAL : 0.2 sec (approx 13 metres)

MAGNETOMETER : Geometrics G803, sensitivity 1.0nT.

MAG RECORDING INTERVAL : 1.0 sec (approx 60 metres)

DATA RECORDING : Geotrex Madacs system, digital to mag tape

NOMINAL SPEED : mean ground speed 220 km per hour.

NOMINAL TERRAIN CLEARANCE : Mag and spectrometer in aircraft at 120m.
 EM transmitter in aircraft at 120m.
 EM detector in bird at 40m.

FLIGHT PATH RECORD : Geocam continuous 35mm tracking camera

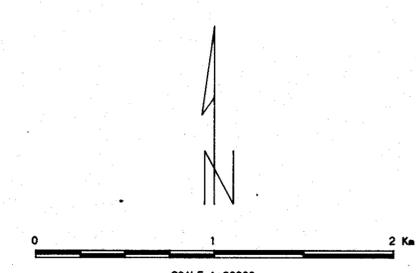
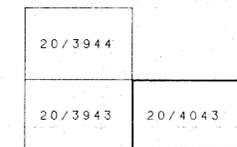
NOMINAL LINE SPACING : Traverses 300m SE-NW, tie lines not flown

E.M. ANOMALY MAP

Sheet 20/4043
 Grid notation refers to Australian Map Grid
 Path recovery digitized from 1:20000 topo maps

Large 6 channel response		
6 channel response		
5 channel response		
4 channel response		
3 channel response		
2nd & 5th channel amplitudes		
Altitudes (metres)		
Offset magnetic anomaly		
Heriz response		
Zone number		
Conductor boundary		
Inferred boundary		

20/3943/1H1



137028

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 Compiled by EXPLORATION COMPUTER SERVICES PTY LTD

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85-2435	1378
HIGHCLERE, TASMANIA E.M. ANOMALY MAP SHEET 20/4043	
PROJ NO. CRAE PLAN No. TASH 2673	DATE: 3-MAR-82

REPORT No. 13394

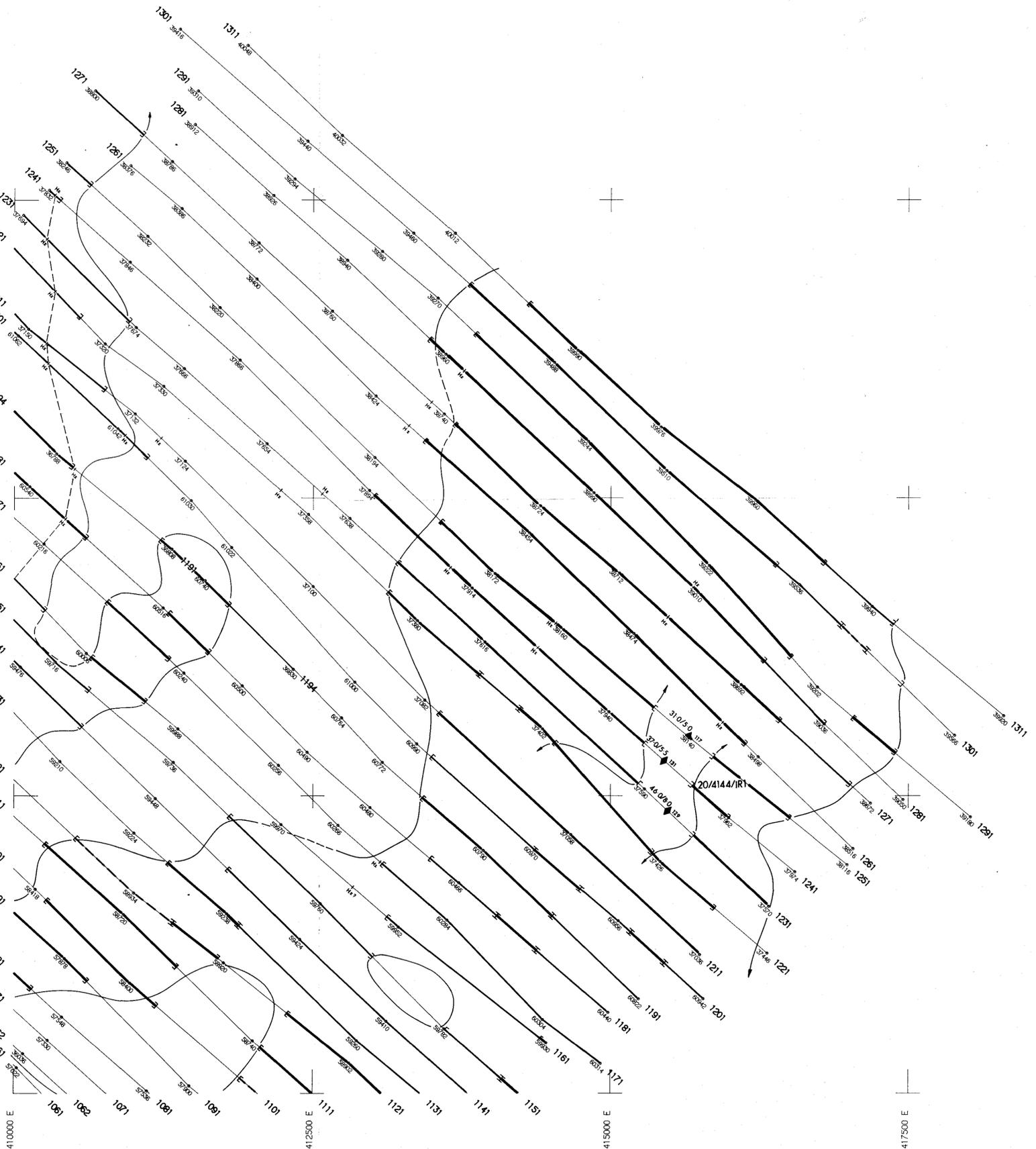
545000 N

5447500 N

5445000 N

5442500 N

5440000 N



AIRBORNE SURVEY SPECIFICATIONS

EM SYSTEM : INPUT MARK V
 Channel centres+500,700,900,1200,
 1600 and 2100 microseconds after
 transmitter switch off.

EM RECORDING INTERVAL : 0.2 sec (approx 13 metres)
 MAGNETOMETER : Geometrics G803 ,sensitivity 1.0nT.
 MAG RECORDING INTERVAL : 1.0 sec (approx 60 metres)
 DATA RECORDING : Geotrex Madaco system,digital to mag tape
 NOMINAL SPEED : mean ground speed 220 km per hour.
 NOMINAL TERRAIN CLEARANCE : Mag and spectrometer in aircraft at 120m.
 EM transmitter in aircraft at 120m.
 EM detector in bird at 40m.

FLIGHT PATH RECORD : Geocam continuous 35mm tracking camera
 NOMINAL LINE SPACING : Traverses 300m SE-NW, tie lines not flown

E.M. ANOMALY MAP

Sheet 20/4144
 Grid notation refers to Australian Map Grid
 Path recovery digitized from 1:20000 topo maps

Large 6 channel response

6 channel response

5 channel response

4 channel response

3 channel response

2nd & 5th channel amplitudes

Altitudes (metres)

Offset magnetic anomaly

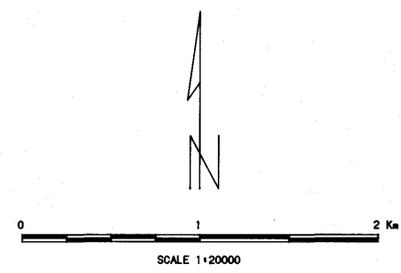
Hertz response

Zone number

Conductor boundary

Inferred boundary

20/4044	20/4144
20/4043	20/4143



137029

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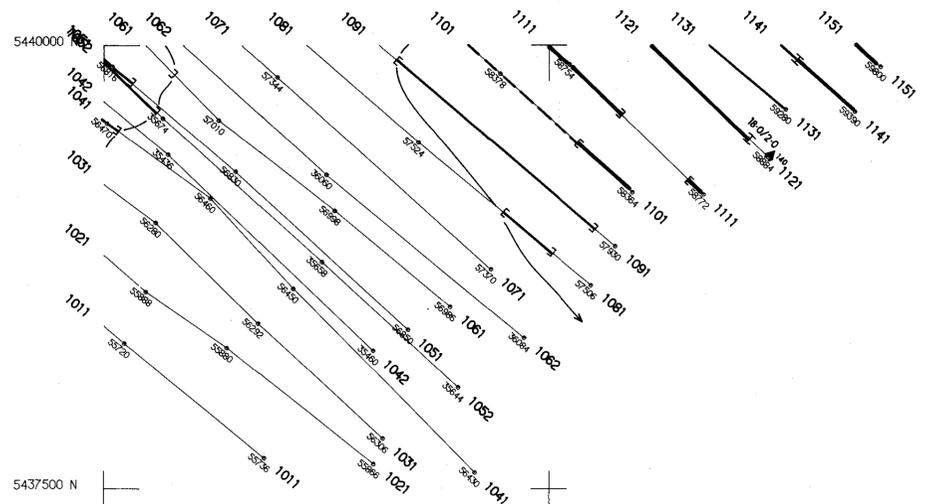
85-2435

RIANA, TASMANIA
 E.M. ANOMALY MAP
 SHEET 20/4144

1379

REPORT No. 13394

PROJ NO. CRAE PLAN No. TASH 2674 DATE: 3-MAR-82



AIRBORNE SURVEY SPECIFICATIONS

EM SYSTEM : INPUT MARK V
 Channel centres: 500, 700, 900, 1200, 1600 and 2100 microseconds after transmitter switch off.

EM RECORDING INTERVAL : 0.2 sec (approx 13 metres)

MAGNETOMETER : Geometrics G803, sensitivity 1.0nT.

MAG RECORDING INTERVAL : 1.0 sec (approx 60 metres)

DATA RECORDING : Geotrex Madaos system, digital to mag tape

NOMINAL SPEED : mean ground speed 220 km per hour.

NOMINAL TERRAIN CLEARANCE : Mag and spectrometer in aircraft at 120m.
 EM transmitter in aircraft at 120m.
 EM detector in bird at 40m.

FLIGHT PATH RECORD : Geocam continuous 35mm tracking camera

NOMINAL LINE SPACING : Traverses 300m SE-NW, tie lines not flown

E.M. ANOMALY MAP

Sheet 20/4143
 Grid notation refers to Australian Map Grid
 Path recovery digitized from 1:20000 topo maps

Large 6 channel response

6 channel response

5 channel response

4 channel response

3 channel response

2nd & 5th channel amplitudes

Altitudes (metres)

Offset magnetic anomaly

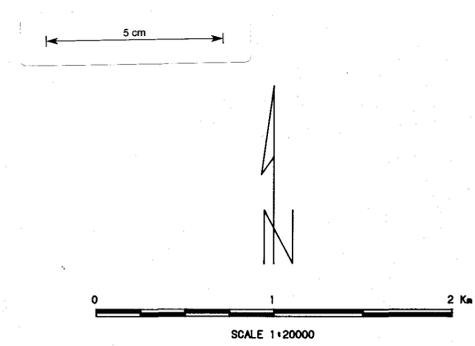
Hertz response

Zone number **20/4044/IR3**

Conductor boundary

Inferred boundary

20/4044	20/4144
20/4043	20/4143



137030

JOB NO : 83-548
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THE SHELL COMPANY OF AUSTRALIA LIMITED	
RIANA, TASMANIA E.M. ANOMALY MAP SHEET 20/4143	1380 <small>REPORT No. 13394</small>
<small>PROJ NO. CRAE PLAN No. TASH 2675</small>	<small>DATE: 3-MAR-82</small>

