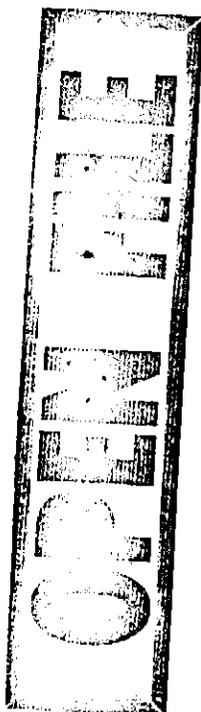


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REPORT No. MI94/13S

EL 26/92 "KING ISLAND"

REPORT FOR THE TWELVE MONTHS ENDED  
1 MARCH 1994

by  
D YOUNG & I MATHISON

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EL 26/92 "KING ISLAND"

Report No. MI94/13S

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Project: KING ISLAND

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ABSTRACT

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## A. SUMMARY

Interpretations of regional gravity data over EL 54/89 indicated that the regional NNW trending Grassy River Fault is intersected by a major east-west fault just north of Pegarah. A gravity high south east of this fault intersection suggested possible deep basinal development in this area. EL 26/92 was acquired so that the potential of this area for McArthur River style lead-zinc mineralisation could be evaluated. Semi-detailed gravity surveys supported by a good geological framework was the initial exploration technique. Deep geochemical sampling and drilling were to be used to test any targets defined by initial exploration.

Gravity and ground magnetic data were acquired and sent to Dr David Leaman for interpretation. He saw no evidence for a deep basin but, instead, interpreted relatively shallow cusps of Devonian granite. Thus, gravity data did not indicate potential for base metal mineralisation. In addition, geological mapping and limited rock chip geochemistry also provided no indications of base metal mineralisation.

Results of initial exploration provided no encouragement for further exploration for base metals.

(ii)

**B. CONCLUSIONS**

Gravity and magnetic data do not support the hypothesis of a substantial depositional sub-basin within the Pre Cambrian sedimentary sequence.

Rock chip samples collected were not anomalous in base metals.

There appears to be little potential for significant base metal mineralisation.

Interpreted cusps of Devonian Granite within the Pre Cambrian sediments could have considerable potential for tin or tungsten mineralisation.

(iii)

## C. RECOMMENDATIONS

The EL should be relinquished. Should tin or tungsten again become preferred metals for North, further exploration in this area would be warranted.

## 1. INTRODUCTION

### 1.1 LOCATION AND ACCESS (Fig 1)

EL 26/92 covers part of central and south eastern King Island. It lies 10 km east of Currie. Access throughout the area is good using the sealed Currie to Grassy road, gravelled council roads and farm and forestry tracks.

### 1.2 TENURE

EL 26/92 was granted to Peko-Wallsend Operations Limited on 10 March 1993. It covers an area of approximately 230 km<sup>2</sup>. The EL schedule is appended as Appendix 1.

### 1.3 PREVIOUS EXPLORATION

The area has had a long history of systematic geological exploration. Most previous exploration has concentrated on the tin/tungsten potential. However, some of Costigan Mining's exploration tested base metal targets and more recent Geopeko exploration investigated the potential for gold mineralisation. Results of previous exploration are summarised in section 3.1.

### 1.4 REGIONAL GEOLOGY AND KNOWN MINERALISATION (Fig 2)

The oldest rocks in the area are the siltstones, mudstones and quartzites of the PreCambrian Rocky Cape Group. These outcrop over the main part of the licence. In the southern and eastern parts of the EL, the PreCambrian rocks are overlain, possibly conformably, by Eo-Cambrian carbonates, clastic sediment and mafic volcanics and their derivatives. This sequence was known previously as the Grassy Group.

Intruding these units are Devonian granites, the Grassy and Bold Head Granite in the south and the Sea Elephant Granite in the north.

#### Pre Cambrian

Three distinct units have been defined within this group as follows:

- The Eastern Sediments, predominantly siltstones, mudstones, quartzites and shales with minor sandstones which have a north-south strike and dip generally to the east although major folding has been mapped. Axes of the folds dip west and plunge south. Pyrite is common to all rock types. These can be correlated with the Rocky Cape Group in Tasmania.
- The Reekara Schists are predominantly muscovite, sericite schists and minor quartzites. Staurolite is developed locally at Reekara school. This unit shows predominantly shallow to moderate west dips.

- West Coast Metasediments, (not represented in the current area of interest), show north-south strikes and steep dips to the west with small scale folding developed. A wide variety of mineralogy implies a wide range of original lithologies (muscovite, quartz muscovite, andalusite muscovite garnet schists and quartzites).

### Grassy Group

Earliest Cambrian (?Eo-Cambrian) basic volcanics and clastics (including tilloids) and dolomitic siltstones dominate this sequence. The base of the group is represented by dolomitic siltstones, shales and tilloids in that order. The tilloids lie with apparent conformity on the PreCambrian sediments. Devonian intrusives have caused wide contact metamorphic aureoles within the sequence with skarns developed in the carbonate rich rocks.

Where altered, the rocks are known as the Mine series. These are overlain by a thick sequence of picritic and spilitic lavas, tuffs and agglomerates inter-bedded with pelitic sediments. Slight folding has affected the group.

### Devonian Granites

Late Devonian to early Carboniferous granites intrude the older sedimentary sequences and are subsequently intruded by quartz feldspar porphyries (late stage?).

Gabbroic bodies occur within the Eastern Sediments and Reekara Schist appearing as thin sills or lopolithic bodies, dark green with pyroxene phenocrysts. Chilled margins are seen and local silicification in the sediments occurs.

Tertiary lateritization has formed ironstones over the gabbro bodies.

## STRUCTURE

A major fault, the Grassy River Fault, has been mapped in the south and is postulated to strike north-north-west cutting the central portion of the current exploration licence. This fault is a fundamental feature to the Dolphin and Bold Head scheelite orebodies and several minor occurrences of tin, tungsten and gold can be related to the fault zone.

Geophysical interpretation by Leaman (1992) has defined a gravity and magnetic linear structure apparently related to this fault extending north at least to Fraser Road. A major gravity linear was also interpreted by Leaman along Fraser Road cutting the island east-west. This corresponds with a topographic escarpment and former postulated faults. These structures are fundamental to the hypothesis of sedimentary exhalative ores in the region.

## KNOWN MINERALISATION

Mineralisation in the south east of the island is dominated by the scheelite skarn deposits of the Grassy and Bold Head intrusives.

At Barrier Creek, a series of quartz sulphide ( $\pm$  carbonate) veins have been tested by adits and shallow shafts. These veins host lead, zinc, arsenic, silver and gold mineralisation. The veins are only a few centimetres wide and mineralisation does not appear to extend into the siltstone host lithologies.

North of the EL, auriferous quartz veins have been tested by shallow adits, trenches and shafts. No production has been recorded. These workings are known as the Sea Elephant River and Fraser River workings.

Further north along the proposed Grassy River Fault, alluvial tin occurrences have been explored at Hawkes alluvials but poor results were obtained.

### 1.5 EXPLORATION PHILOSOPHY AND TARGETS

A compilation of previous gravity data as part of the exploration program for EL 54/89 indicated that two major regional structures intersected near Pegarah. Here the regional NNW trending Grassy River Fault was intersected by a major east-west structure. The data suggested that the south-east block defined by these intersecting faults was down thrown relative to the western and the north-eastern blocks. Earlier Costigan Mining drilling intersected pyritic black shales with weak base metal anomalism. Additional base metal anomalism in the area is demonstrated by the Barrier Creek Pb Zn As mineralisation.

The target model envisaged was a sedimentary exhalative base metal deposit of the McArthur River type. Such a deposit might occur within pyritic black shales in the Late Proterozoic sediments. The Grassy River Fault was interpreted as a basin margin fault and the fault basin SE of Pegarah was interpreted as a possible second order basin.

Geopeko's exploration was directed towards definition of the basinal structure of the Late Proterozoic sequence using a semi detailed gravity survey supported by geological mapping and compilation.

## 2.0 WORK COMPLETED

### 2.1 REVIEW OF PREVIOUS EXPLORATION

A large amount of geological data had been stored in plan cupboards, filing cabinets and various store rooms at the Grassy Mine site. This was sorted and archived prior to demolition and rehabilitation. Data included much detailed outcrop mapping at 1:12,000 scale. Copies of all maps and reports were archived by the Tasmanian Mines Department.

This data, plus other data held at Geopeko's Devonport, Melbourne, Sydney and Perth offices were reviewed.

### 2.2 GEOLOGICAL COMPILATION AND MAPPING

A preliminary geological interpretation map for EL 26/92 was constructed. This combined data from several sources but relied heavily on the 1:12,000 scale outcrop geology.

This interpretation was refined by a limited field mapping program. Field mapping concentrated on the less well understood rocks of the sedimentary sequence east of Pegarah. The contact metamorphosed rocks closer to Grassy and the Eo-Cambrian volcano sedimentary sequence along the east coast had been subjected to detailed mapping previously. Limited check mapping was conducted in these areas.

### 2.3 ROCK CHIP SAMPLING

Sixty-three rock and rock chip samples were collected in conjunction with geological mapping. Rock chip sampling was carried out over areas and lithologies of interest, predominantly over the gravity anomaly, and in the area of strongly anomalous soil samples on Brumby Road. Possible host rocks for lead/zinc mineralisation, black shales, shales and mapped breccias were sampled.

The unusual tremolite hornfels defined in INV 4 was also sampled as a possible evaporite bed. No bedding features were seen and the rock looks like a metamorphosed amygdaloidal basalt. Samples were taken for petrography.

Samples were submitted to Amdel Laboratories in South Australia. Cu, Pb, Zn, Fe, Mn, Cd, Co, Ni and Ag were determined by ICP-OES after aqua regia digest (IC2E). Ba and As were determined by pressed powder XRF (XRF1).

## 2.4 GRAVITY SURVEY

A regional gravity program designed to refine the known positive gravity anomaly was carried out. This program covered 230 stations at a nominal 700 m spacing along available road ways. Gravity was read on a Locoste Romberg (G704) instrument. Initially coordinate and RL information was recorded using a Sercel NR101 GPS unit in Trajectographic mode. This method proved inappropriate for the survey due primarily to regular loss of satellite reception as a result of tree coverage along the road sides (on King Island most road have thick trees lining both sides from 10 to 20 m high). The regular loss of satellite reception reduced the accuracy of the Z coordinate reading to inappropriate levels ( $\pm 20$  m). The program was completed with co-ordinate information being read on a Garmin GPS 100 unit (XY  $\pm 10$  m) and RL information being read on Digibar 2000 barometers (Z  $\pm 1$  m).

## 2.5 GROUND MAGNETIC SURVEY

Ground magnetic readings were taken over the EL area utilising roadways and reading at 25 m intervals. Geometrics G856 Memory magnetometers were used in the survey. The survey was tied to the gravity station locations.

## 2.6 GEOPHYSICAL INTERPRETATION

All new data were forwarded to David Leaman for interpretation. His report is appended (Appendix 5).

### 3. RESULTS OF EXPLORATION

#### 3.1 REVIEW OF PREVIOUS EXPLORATION

Previous work in the area of interest has been carried out by Costigan Mining Australia P/L and Geopeko under former ELs 15/66, 4/68, 5/69, 18/72 and 54/89.

Work carried out in the current EL area during the currency of these authorities is summarised below:

##### Costigan Mining

Costigan carried out regional soil sampling and IP surveys in the Ireland's Farm area (later involved with Geopeko in the Joint Venture known as "INV 15". Strong IP effects associated with geochemical highs (soils) were found to be associated with a gabbro / sediment contact.

Anomalous soils were up to 200 ppm Cu, 110 ppm Pb, 170 ppm Zn against a background of 10 - 30 ppm Cu, 20 - 40 ppm Pb, 5 - 10 ppm Zn. High background copper values were also obtained from the unweathered gabbro, 200 ppm Cu in rocks (note - soil and rock sample assays were not located). IP surveys at 400 ft dipole spacing were followed by 200 ft spacings defining two significant anomalies which were diamond drilled (note - IP information not located).

Two diamond drill holes were drilled for a total of 897 ft (273.4 m). Gabbro and feldspar porphyry intrusives into quartzites, siltstones, mudstones and shales were intersected. Pyrite occurs in the silts and mudstones up to 5% and in shales up to 10%. Pyrite is reported associated with quartz and talc in the shales. Carbonaceous material was also encountered in the shale units.

Low values of base metals up to 700 ppm Cu, 250 ppm Pb, 400 ppm Zn and 500 ppm Ni were intersected. The low base metal values and abundant pyrite and carbonaceous material was considered sufficient to explain the soil geochemistry and IP effects.

##### Geopeko - 15/66

This EL covers the central and southern parts of the area of interest and covers most of the exploration work done to date in the area of interest.

Regional mapping (presented at 1:12 000 base scale) defined six major rock types which can now be identified as PreCambrian sediments (Eastern Sediments), PreCambrian meta-sediments (Western Metasediments and Reekara Schists), Cambrian volcanic / sedimentary sequence, contact altered rocks (essentially Cambrian), granitic intrusives and others (basic gabbroic bodies and ironstones).

Aeromagnetics and radiometrics were flown (1973) and follow-up ground magnetics were carried out. A test infra-red scanning survey was flown over part of the area.

Reconnaissance bedrock geochemical sampling was carried out over magnetic and other targets including percussion drilling of two magnetic anomalies MA 11 (91.44 m) and MA 10 (51.82 m).

Mapping and geochemical sampling of the east coastal strip and Barrier Creek workings was also carried out.

Five areas of interest were defined by this program, Bold Head granite contact (INV 4, 16 17), north-south magnetic features (MA 6, INV 9, 10), circular magnetic feature (MA 11), Ireland's Farm (INV 15) and Barrier Creek workings.

1. Grid based auger sampling was used to test the area of INV 4, 16 and 17, an area considered anomalous due to the presence of spotted shales and tremolite hornfels. Although anomalous tungsten values were obtained, base metal values were poor, best values generally isolated, being 510 ppm Cu, 85 ppm Pb, 460 ppm Zn. The tremolite hornfels rock was considered to have been a siliceous carbonate rich horizon which has been re-mobilised and metamorphosed and now consists almost entirely of radiating laths of tremolite. Common throughout the exposure are small lumps, fragments or ovoids of siliceous cherty material, these being generally isolated and less than 3 cm in size. In one boulder there were distinctly discontinuous horizons of this material, approximately 3 cm thick and separated by 15 to 20 cm. The horizons are up to 30 cm long. Regional mapping originally mapped this unit as volcanic. Further outcrops of mapped volcanic may extend this unit 5 km north to Lancaster Road. This unit is associated with the eastern sediments.

The Grassy River fault in this area is a wide zone of brecciated and re-cemented silica.

The occurrence of carbonate lithologies in the Eastern Sediments is of interest for a sediment hosted base metal deposit. Carbonate lithologies have only been recognised within the Cambrian succession to date except for this occurrence. The nodular nature of the carbonate horizons may indicate nodular evaporites as recognised at McArthur River.

2. The north-south magnetic linear was tested in four locations, MA 6, INV 9, 10 by auger drilling with no geochemically anomalous results found (best 120 ppm Cu, 60 ppm Pb, 170 ppm Zn). The magnetic feature was considered due to variations in magnetite content of the sediments. This unit may prove to be a good marker within the stratigraphy.
3. Percussion drilling of a circular feature MA 111 (91.44 m) found only sediments with no geochemically anomalous features. The magnetic interpretation is of a deep seated body, possibly an intrusive which was not intersected during drilling. Lack of limey rocks downgraded this prospect. Best auger geochem 45 ppm Cu, <20 ppm Pb, 130 ppm Zn.

Percussion drilling was also carried out to test MA 10 (51.82 m). Initially thought to be due to a buried granite body (due to proximity to Bold Head). Auger and percussion drilling of the anomaly encountered hornfelsed pyritic siltstones and shales with no economic potential. (Note - assay results not sighted).

4. At Ireland's farm, INV 15, an ironstone capping regarded as a lateritic veneer overlies siltstones of the eastern sediments, intruded by basic dykes. Erratic high values of Fe, Mg and Mn were obtained but no significant Cr, Ni, Pb, Cu values were found in Jacro auger sampling (best 140 ppm Cu, 60 ppm Pb, 230 ppm Zn). Jacro augering penetrated to 19 m averaging 9.5 m.
5. Barrier Creek workings represent narrow (a few centimetres) discontinuous quartz veins of restricted distribution carrying Pb, Zn, As, Ag and Au but with no significant economic potential. Mineralisation does not extend into the host rocks. They cut siltstones and shales and it was considered at the time that the source of metals was probably syngenetic sulphides.

#### Geopeko - 4/68

This Exploration Licence covers the northern part of the area of interest. Exploration was concentrated on the Mount Counsel granite / sediment contact, the Reekara tin workings and the central west alluvial tin area. These prospect areas are immediately north of the current EL. At Mount Counsel, auger geochemistry revealed only minor tungsten values in 10% of the samples. All results at Reekara were negative and no traces of tin were found in the central west alluvial area.

Regionally metamorphosed sediments found at Reekara (Reekara Schists) are lower grade to the south-west causing postulation of a major east-west trending fault (Fraser River fault?) corresponding with the topographic escarpment. Floaters of fine-grained porphyritic basic rocks with associated ironstone were also found in the Reekara area.

#### Geopeko - 5/69

This Exploration Licence lay predominantly west and north of the current area of interest and overlaps only slightly.

Regional geological mapping at 1:12 000 scale, regional geochemical auger sampling and power auger sampling were completed in the first program of exploration (no holes were drilled on the current area). Negative results lead to the southern portion being relinquished. This included the overlapping area.

#### Geopeko - 18/72

This licence covered a similar area to 5/69 and was taken up in order to review results of the 1973 aeromagnetic survey. Four spot highs were delineated which were identified earlier in 5/69 and interpreted to be sourced by olivine basalt plugs. Linear magnetic highs were confirmed on the ground to be due to magnetite increase within biotite mica schists and quartzites.

Geopeko - 54/89

Collection of water samples for samples for assay by the Huminex method, limited soil sampling on road sides and rock-chip sampling were carried out in the search for gold deposits related to the Grassy Fault. Silica sands potential was reviewed including market investigations. Results were not considered economic.

Elevated base metal soil results are considered spurious and a result of fertiliser contamination. Results of water sampling were very low and did not warrant follow-up.

Although soils were considered contaminated, several were highly anomalous (1000 to 2360 ppm Zn with 190 to 784 ppm Pb, 259 to 451 ppm Cu associated) and should be considered for follow-up.

### 3.2 GEOLOGY and PETROLOGY (Fig 3)

Previous float and outcrop fact mapping by Geopeko at a scale of 1:12,000 (1971) has been found to be accurate although subdivisions into sandstone, quartzite, shale and siltstone would be better defined as extremely fine grained sandstone, quartz rich meta siltstone, banded siltstone/mudstone and fine grained siltstone.

Hornblendite intrusives have been mapped east of Pegarah. In the past these have been interpreted as gabbroic intrusives. However, Tony Crawford interpreted the sample submitted to him (SN24026) as an amphibolite produced by contact metamorphism. Other similar intrusives near Naracoopa have previously been interpreted as lamproites. Field observations support an intrusive origin.

Thin section examination of an unusual tremolite hornfels from just west of Yarra Creek (SN240023) indicated that these were typical contact metamorphosed basaltic lavas. No evidence of former evaporites was observed by Tony Crawford (Appendix 5).

### 3.3 GEOCHEMISTRY - ROCK CHIPS (Appendix 3)

Results of rock chip geochemistry are summarised below. None is considered anomalous. Cu, Co and to a lesser extent Ni, reflect lithology with more elevated values reported from meta basalts and meta gabbros.

Element	Range (ppm)	Elevated
Cu	2 - 185	SN24058 - 185 ppm
Pb	<3 - 44	
Zn	2 - 340	SN24055 - 340 ppm
Fe	0.55 - 45.4%	SN24019, 25, 30, 55 >40%
Mn	10 - 1680	
Cd	<1 - 1	
Co	<1 - 38	
Ni	3 - 62	
Ag	<0.5 - 0.5	
Ba	10 - 4750	SN24033 - 4750 ppm
As	<2 - 52	

### 3.4 GEOPHYSICAL INTERPRETATION (Appendix 4)

Leaman compiled all available gravity data. A discrepancy noted at the time of reporting has since been resolved and corrected in the Mines Department data sets (Leaman pers comm). Ground magnetic data, smoothed for the effect of electric fences, was compared with available aeromagnetic data.

Leaman found little support for the PreCambrian sub basinal hypothesis. Instead, the gravity and magnetic fields appear to be dominated by the effects of the Devonian Grassy - Sea Elephant Granite. Cusps of the granite intruding PreCambrian sediments were interpreted. Leaman suggested that these cusps could have significant exploration significance, presumably for tin / tungsten mineralisation.

4. ENVIRONMENTAL DISTURBANCE AND REHABILITATION

Exploration conducted by Geopeko on EL 26/92 comprised activities with negligible environmental impact. No rehabilitation was necessary.

## 5. CONCLUSIONS

Gravity and magnetic data do not support the hypothesis of a substantial depositional sub-basin within the Pre Cambrian sedimentary sequence.

Rock chip samples collected were not anomalous in base metals.

There appears to be little potential for significant base metal mineralisation.

Interpreted cusps of Devonian Granite within the Pre Cambrian sediments could have considerable potential for tin or tungsten mineralisation.

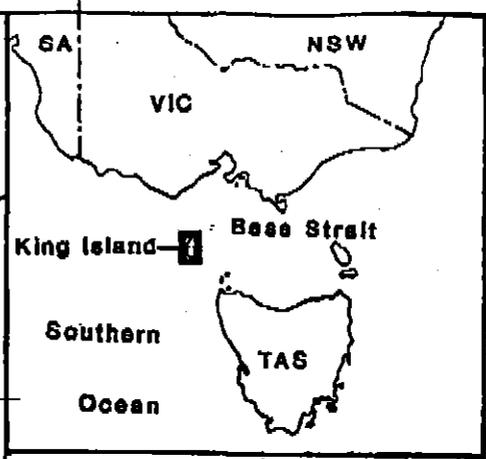
**6. RECOMMENDATIONS**

The EL should be relinquished. Should tin or tungsten again become preferred metals for North, further exploration in this area would be warranted.

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926023



39°40'

39°40'

New Year I.  
Christmas I.

Egg Lagoon

KING ISLAND

Bass

Strait

39°50'

39°50'

u r e a h n o s

Pegarah Gravity High

Naracoopa

Currie

Pegarah

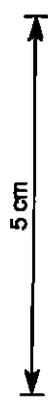
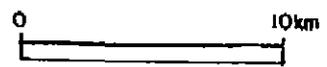
EL 26/92

Grassy

40°00'

40°00'

u b e c o



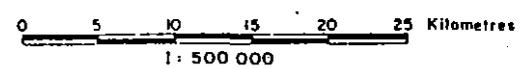
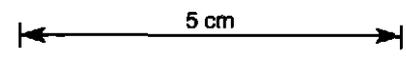
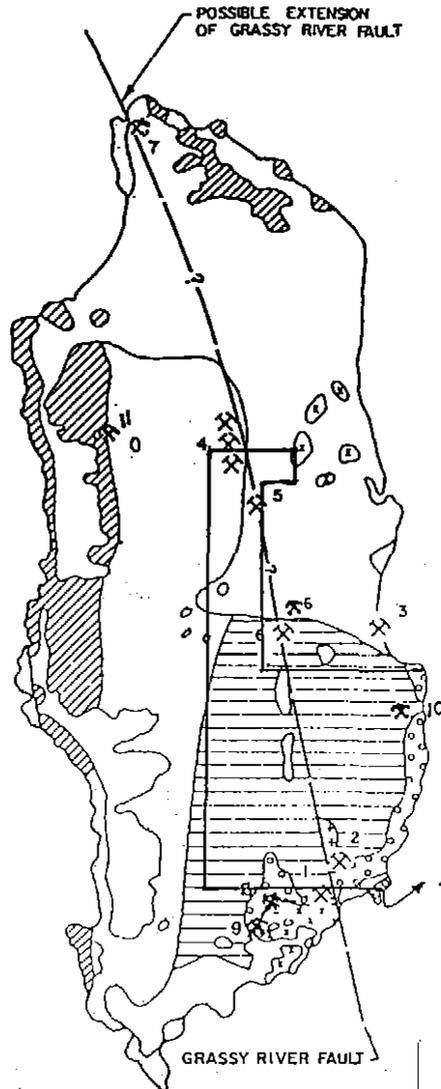
40°10'

40°10'

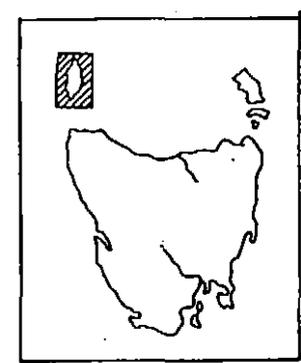
143°50'

144°00'

	<b>GEOPEKO</b> A.C.N. 000 081 434	
	A DIVISION OF PEKO WALLSEND OPERATIONS LTD	
Diagram	No 3117	
<b>EL. 26/92 - PEGARAH</b>		
<b>KING ISLAND</b>		
Fig. 1		
Date: 8/12/92	Map Ref. 7618	Base: PARKES NSW
Geologist: I. M.		
Checked:		
Drawn: R.J.A.		
Amended:		



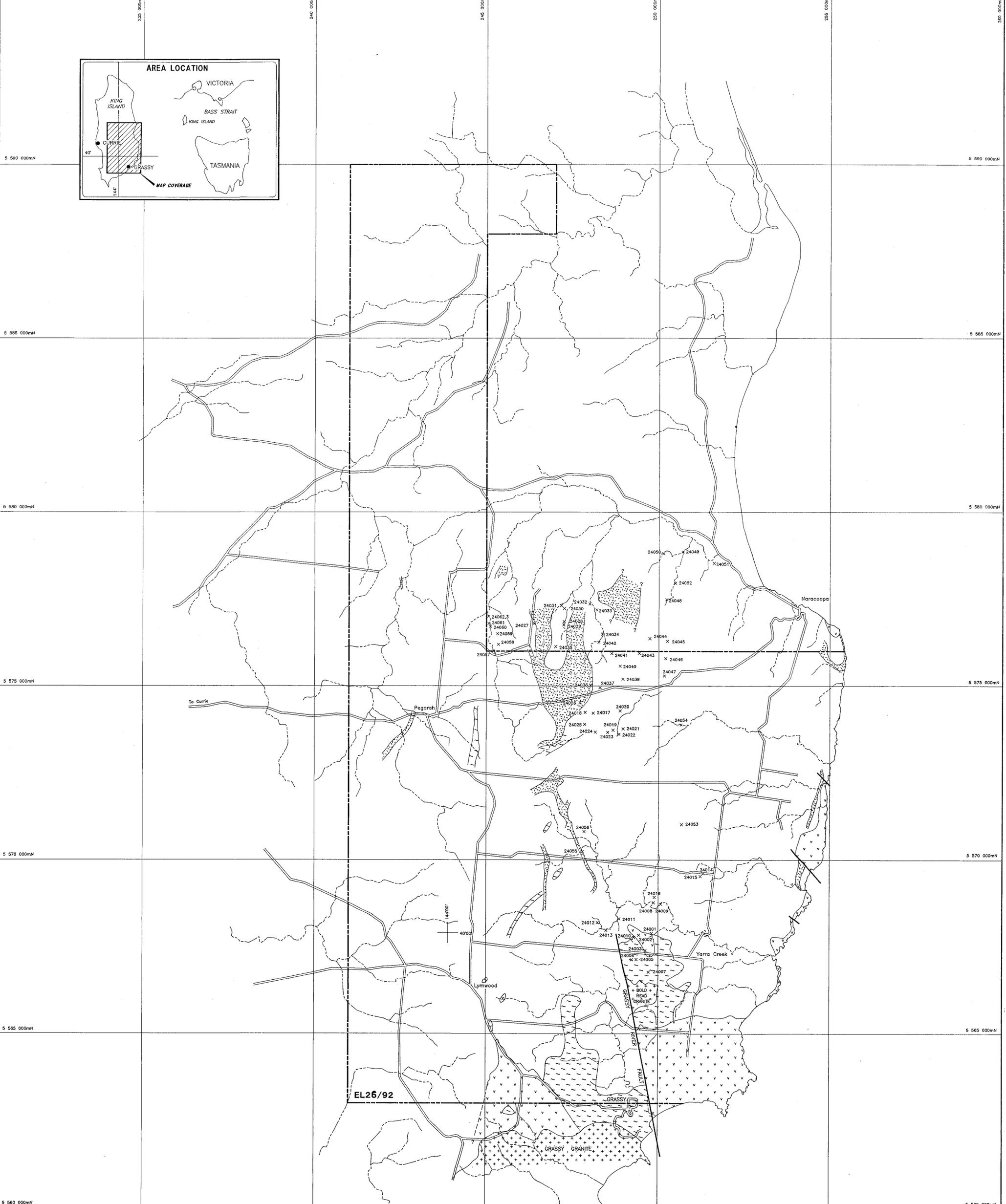
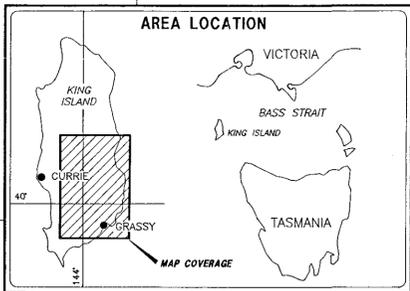
-  Holocene - Late Carboniferous
- CAMBRIAN**
  -  Basaltic - sedimentary sequence
- PRECAMBRIAN**
  -  Unmetamorphosed sandstone - mudstone
  -  Metamorphosed quartzite - pelite sequences
- igneous rocks**
  -  Adamellite
  -  Granodiorite
  -  Dominantly granite
-  Mines or prospects
-  Occurrence



Location Diagram

1. DOLPHIN/NPI OREBODY - W, Mo
2. BOLO HEAD - W, Mo
3. NARACOOPA - Beach Sands
4. REEKARA - W, Sn
5. HAWKES ALLUVIAL - Sn, W
6. FRASER RIVER - Au
7. VICTORIA COVE - W
8. LOOP ROAD - W, Mo
9. INVESTIGATOR 21 - W, Mo
10. Barrier Ck - Pb, Zn, Ag
11. Investigator 19 - Pb, Zn

	<b>GEOPEKO</b>	
	A DIVISION OF PEKO WALLSEND OPERATIONS LTD	
Date: 26/4/94	Scale: 1:500 000	No MI-001
Geologist: IM	REGIONAL GEOLOGY AND MINERALISATION	
Checked:	Fig. 2	
Drawn: CLR	Map Ref. King Island Special	Base: DEVONPORT, TASMANIA
Amendments:		



**LEGEND**

- DEVONIAN Granite
- Contact metamorphic rocks and skarn
- EO-CAMBRIAN Basic volcanics and associated sediments
- ? Basic intrusives - lamproite & hornblende
- PROTEROZOIC Quartz siltstone & fine grained quartz sandstone
- x 24005 Rock chip sample location & number

NB:- Much Palaeozoic & Proterozoic geology is obscured by a thin cover of Tertiary sands or laterite

ACCURACY STATEMENT: The accuracy of topographic detail used in the compilation of this map is unreliable in some areas due to distortions in reproduction.

926025  
5 cm

**94-3557**

FIG. 3

DRAWING REVISION	
DATA TYPE	UPDATED

**NORTH**  
BRISBANE

Geo I.M.  
Drawn N.P.  
Checked  
Date 18-3-94

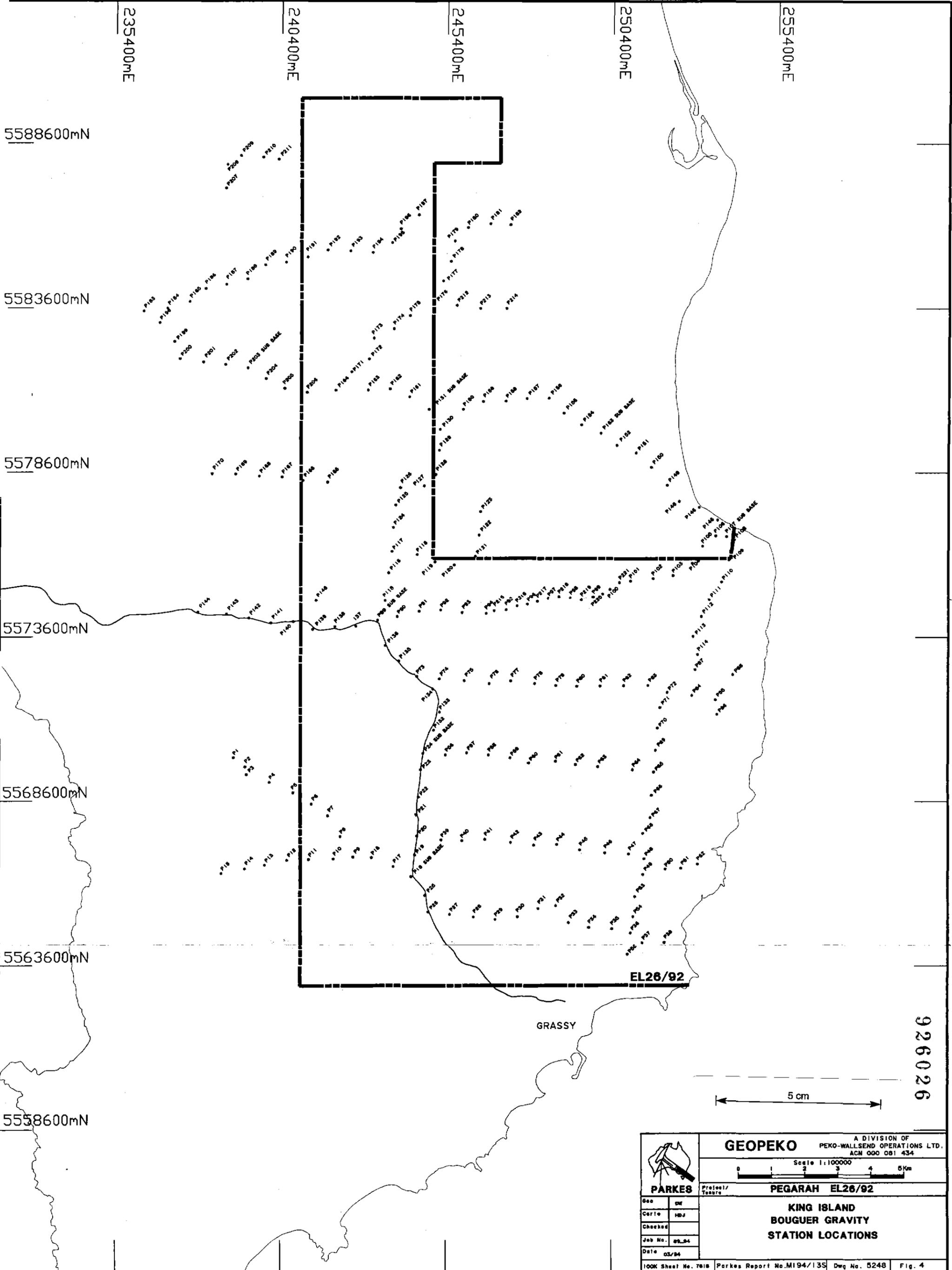
**NORTH EXPLORATION**  
A DIVISION OF NORTH MINING LIMITED - A.C.N. 000 081 434

Scale 1:50000

Map Ref **KING ISLAND SK 55-1 / 7618**

**EL 26/92 PEGARAH**  
**SOLID GEOLOGY AND**  
**SAMPLE LOCATIONS**

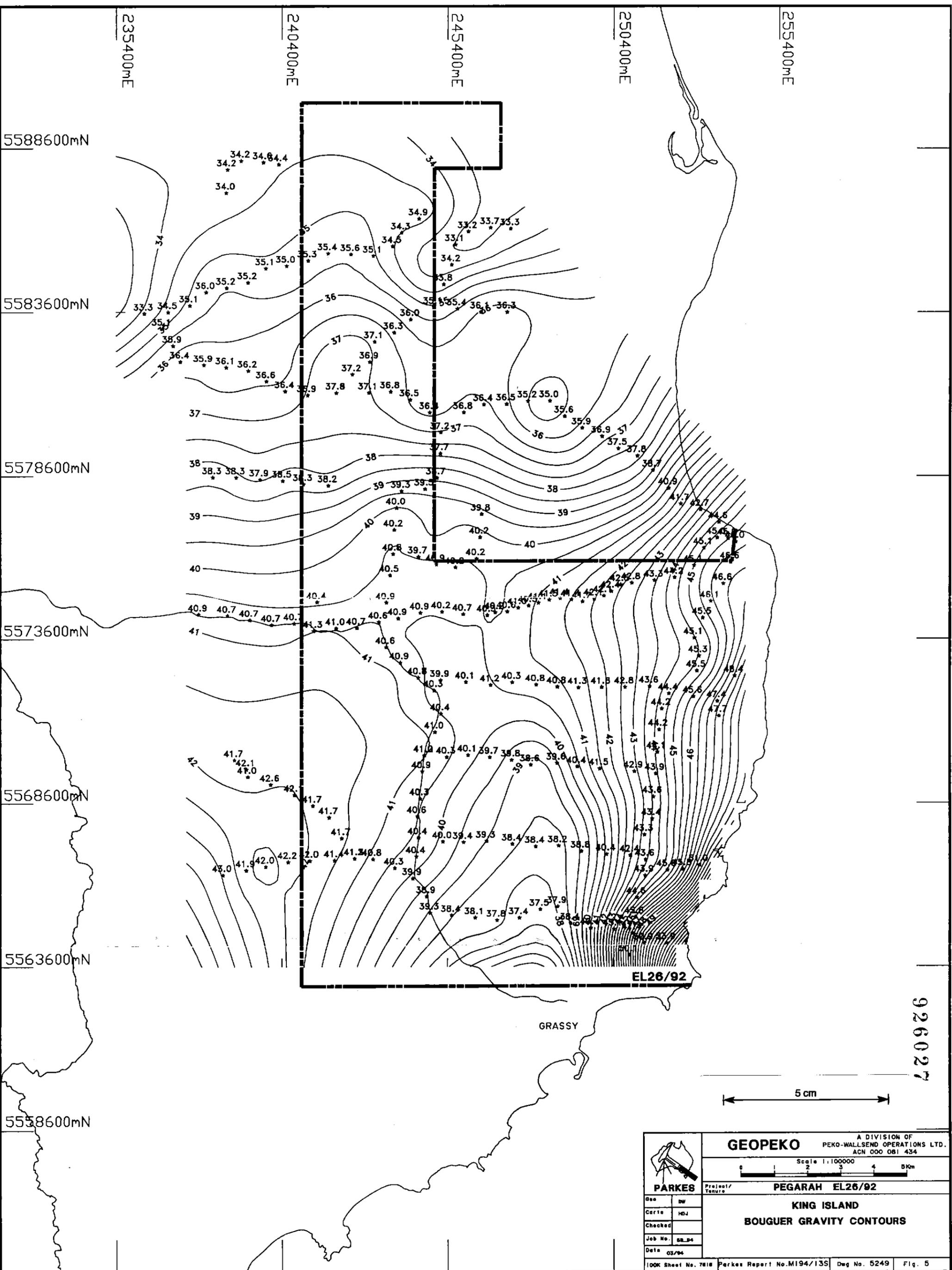
Dwg. No **QLD 1450**



926026

5 cm

	<b>GEOPEKO</b> <small>A DIVISION OF PEKO-WALLSEND OPERATIONS LTD.          ACN 000 081 434</small>	
	Scale 1:100000 	
<b>PARKES</b> <small>Project/          Tonere</small>		<b>PEGARAH EL26/92</b>
<b>KING ISLAND          BOUGUER GRAVITY          STATION LOCATIONS</b>		
<small>Geo</small> <small>Carto</small> <small>Checked</small> <small>Job No.</small> <small>Date</small>	<small>DR</small> <small>MBJ</small> <small></small> <small>08/94</small> <small>03/94</small>	<small>100K Sheet No. 7818</small>   <small>Parkes Report No. M194/135</small>   <small>Dwg No. 5248</small>   <small>Fig. 4</small>



926027

5 cm

	<b>GEOPEKO</b> <small>A DIVISION OF PEKO-WALLSEND OPERATIONS LTD.          ACN 000 081 434</small>	
	Scale 1:100000 	
<b>PARKES</b> <small>Prepared/Tenure</small>	<b>PEGARAH EL26/92</b>	
<small>Drawn</small> <small>Checked</small> <small>Job No.</small> <small>Date</small>	<b>KING ISLAND</b> <b>BOUGUER GRAVITY CONTOURS</b>	
<small>100K Sheet No. 7818</small>	<small>Perkes Report No. M194/13S</small>	<small>Dwg No. 5249</small>
		<small>Fig. 5</small>

**APPENDICES**

All abbreviations are from the list of  
BMR Preferred Abbreviations, 1981.

All stratigraphic abbreviations are from  
BMR / GSQ 1:100,000 Geological Maps.

APPENDIX 1  
EL SCHEDULE

## SCHEDULE

926030

Commencing at the northwest corner at grid co-ordinates 241 000 metres E. 5 590 000 metres N. thence grid east to 247 000 metres E. grid south to 5 588 000 metres N. grid west to 245 000 metres E. again grid south to 5 576 000 metres N. again grid east to the low water mark on the east coast of King Island by that low water mark in a general south westerly direction to its intersection with 5 563 000 metres N. again grid west to 241 000 metres E. aforesaid thence grid north to the point of commencement.

The area excludes:            Kentford Forest State Reserve (37 ha)  
                                  Crown Reserve (0.5 skm)  
                                  Mining Lease (6.5 skm)

### Land Tenure:

The area comprises:        Private Property  
                                  Crown Land  
                                  State Forest  
                                  Reekara Wildlife Sanctuary (Australian Heritage  
                                  Commission Act Registered Entry)

This land tenure table is a guide only.

APPENDIX 2

DATA ACQUISITION AND OPERATIONS REPORT  
DR D.E. LEAMAN, 1993a

926032

# LEAMAN GEOPHYSICS

Survey Review, Specification, Reduction, Interpretation  
Gravity, Magnetic and Seismic Methods  
Structure and Prospect Evaluation

Registered office:

3 MALUKA STREET, BELLERIVE, TAS. 7018

All correspondence to:

GPO BOX 320 D, HOBART, TAS. 7001

Telephone: (002) 44 1233

Fax: (002) 44 6674

## DATA ACQUISITION AND OPERATIONS REPORT

EL 26/92 PEGARAH, KING ISLAND

for

GEOPEKO

by

D.E. Leaman

July, 1993

KINGIS3

## INTRODUCTION

Geopeko completed semi-regional gravity and magnetic surveys across tenement EL 26/92 on King Island during the period January to March 1993. The surveys were largely restricted to the licence area (shown in Figure 1) but some gravity loops extended beyond this region in order to check older data and tie pre-existing surveys undertaken on behalf of the company when operating the Grassy Mine.

Leaman (1992) reported on all pre-existing regional data sets and commented on the misfits and problems within them. An attempt was made to recover all old surveys and reductions are tabulated in that report. Several recommendations concerning base values assumed and the status and differences between declared tie points were made; principally that these be rechecked and the entire data base consistently reduced in order to extract the greatest benefit with respect to the Pegarah area.

## OBJECTIVES OF SURVEY

There were two principal objectives for the new regional surveys.

1. To link all older surveys and so utilise their relativity and detail, and
2. To infill previous surveys and define the location of any anomalous host materials or granitoids which might be associated with mineralization.

## SURVEY DETAILS

The ground magnetic survey was restricted to the main roads and was observed between February 6 and 12, and March 5 and 7, 1993. The operator was J. McPherson assisted by M. Hambridge. Both base and roving magnetometers were Geometrics model G856 (serial numbers 27737, 27100). Observations were taken at 25 m intervals.

All magnetic data are supplied as a set of files under directory KIMAG and includes files of the form KI100293.XXX where XXX may be BSM, CRD, DR, LOG, FLD. Each subset defines base values, traverse readings, corrections, locations notes for each day - the date forms the basis of the primary file name.

The corrected results are best viewed in profile form (Figures 4 to 10) and summarised in the contour map of Figure 11. Noise in the data represents fences and similar cultural features.

Gravity observations were also recorded across the same road net but some loops extend the survey area to north, west and south. The survey was undertaken between January 26 and February 2, 1993 with M. Hambridge as observed and J. McPherson as assistant.

The gravity survey was tied to the Isogal base station at King Island Airport at Currie (6491-9143) using the defined observed value of 980196.73. The coordinates of this site are 233 244 mE, 5580 759 mN with an elevation of 36.69 m.

Due to the possible future reconstruction of the terminal building a new site was also observed at the weather station (PM12) (see Figure 12 for description of new primary base). The observed value and geographic details of this site are 980196.32, 233 105 E, 5580 852 N, 33.81 m. These stations, the alternate Isogal Powerhouse base and tie points to Reekara area surveys were linked by multiple, drift-corrected loops.

LaCoste & Romberg meter G704 was used throughout with an average scale constant of 0.9932 mgal/div.

Stations A25, A1, C1 defined in Figure 3 and data table represent ties to the older Reekara Survey (see Leaman, 1992).

Positions were determined using GPS methods in differential mode based on three trig stations. Coordinates may be considered accurate within 10 to 20 m. Some elevation trials were undertaken using the same procedures and, although complete results are provided on disk for these, it was not found practicable to use these methods for the entire survey and barometric methods were used in support. Portion of a typical GPS survey file is shown in Figure 2 with station status, quality and corrected and transformed positions.

Barometric files are also available as a set of the form KI020393.XXX where XXX may be AVD, BSE, ELS, FLD, PRT representing files for base, calculated levels, observations and printer output.

All level calculations were provided by Geopeko staff and software and this has only been reviewed by Leaman Geophysics. No significant problems or anomalies have been identified and it may be assumed, in view of the control available, that any errors in elevation are generally much less than 1m.

Gravity observations files have a similar format within directory KIGRAV and extensions GGF, TMP and RAW. Files GGF summarise the reduced results in loop format.

This awkward file format has been converted to a standard data base compatible with TASGRAV as used by the Mines Department. Figure 14 presents this in table form with some base repetitions. The data base, without such repeats, is provided as file KIGDBASE.

All data has been compensated for instrumental drift and the likely precision of the Bouguer anomalies, at the reduction density of 2.67

gm/cc, is likely to be about 0.1 mgal. No terrain correction is included and for most stations this will be less than 0.05 mgal.

A contour plot of the Bouguer anomalies is shown in Figure 14.

#### COMMENTS

The new magnetic surveys have confirmed the general character of available aeromagnetic data sets and located the sources for many large responses. These can be recognised even though the profile data is affected by cultural noise.

The gravity surveys have established a consistent link between the Currie base and the Reekara Surveys and defined the offset between the older Powerhouse survey and the present survey. These data sets may now be combined. A problem clearly exists in the older TASGRAV data base set which presents a random correlation with these surveys.

(Subsequent review of the data base and the levels defined by Geopeko surveys indicates that the elevations of the older survey are systematically in error by a factor of about 0.712 (half of root 2) which suggests a computation error sometime in the past 25 years. I understand that this data base has now been corrected and matches Geopeko data sets well.)

All observations and reductions for all surveys have been supplied on three floppy disks.

#### REFERENCES

- Leaman, D. E., 1992. King Island. Review of gravity and magnetic data for Geopeko. Report by Leaman Geophysics, October.

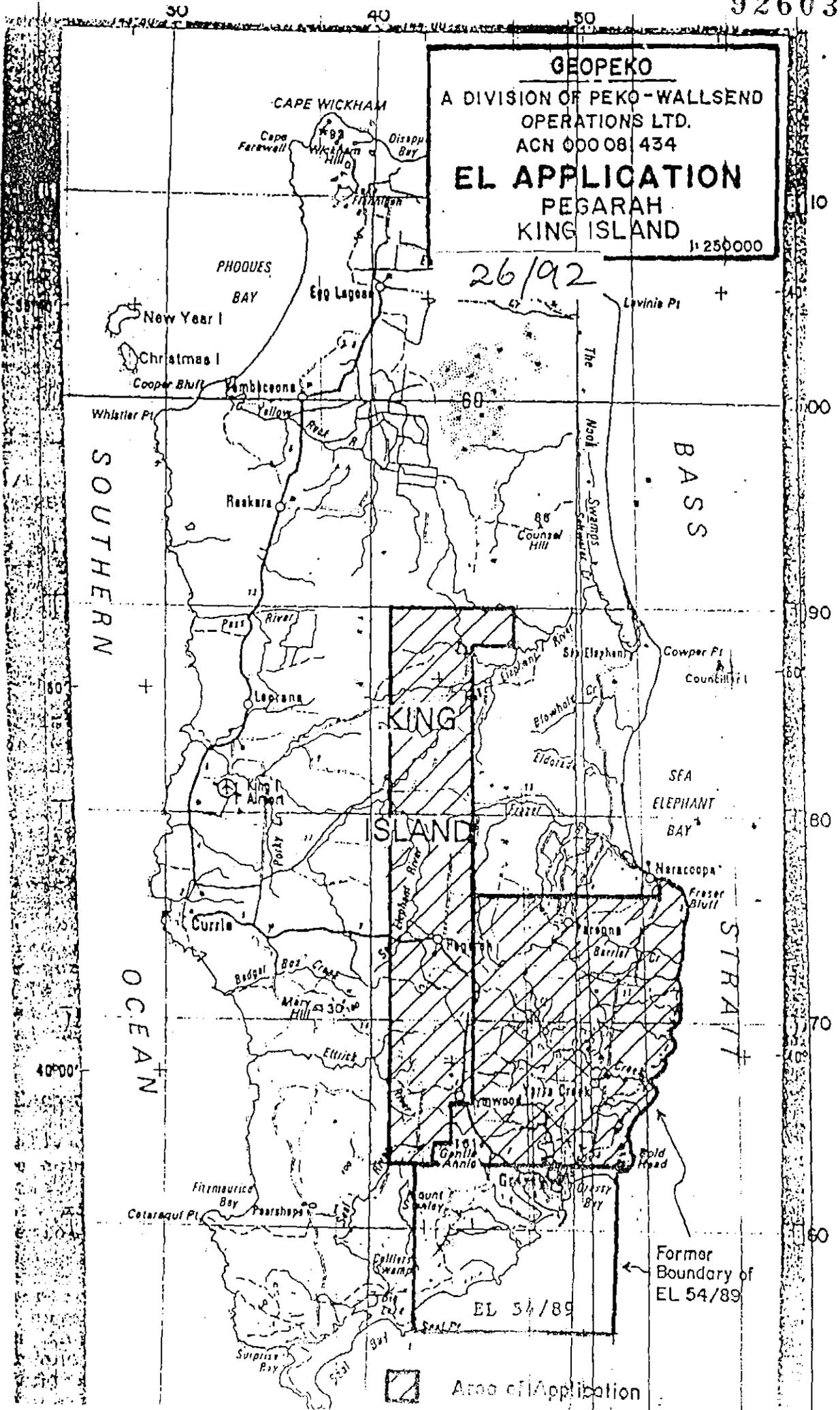
Report submitted on behalf of Leaman Geophysics

by



Dr. D. E. Leaman, B.Sc., Ph.D.,  
F. Aus. I.M.M., M.M.I.C.A.

Date: 19-7-93



EL 26/92 PEGARAH KING ISLAND

FIGURE 1

Path: B:\
File: KI260193.GGF 3.767 .a.. 31-03-93 7:22:06

Page 1 GGF file

HOPEKO GRAVITY FILE

Prospect: KING ISLAND REGIONAL Operator: MH/JM Date: 26 JAN 1993 Gravity Meter: LRG704

Table with columns: UTM Coordinates (East, North), Geographic Coordinates (Latitude, Longitude), RL (m), Observed Gravity (milligals), Theoretical Gravity (milligals), Bouguer G. (mgals), Station Name, Local Grid (East, North). Rows include station IDs like 233244 5580759.

Path: B:\
File: KI270193.TLS 1.735 .a.. 24-03-93 18:13:16

THS file

OUT\KI270193.TRA

ERCEL TRAJECTO V3.1 Oct 29, 1992

Out File: KI270193

Begin: Jan 27, 1993 10h23m 0.0s

End: Jan 27, 1993 16h23m57.0s

Sampling: 3.0s

Ref: 39°52'38.8950"S 143°52'42.0340"E 19.325 m

Ref. Antenna Height: 1.661

Obs. Antenna Height: 1.883

Time: LOCAL; Shift: 11.0

Max Pdrop: 8

Min Elev: 10

Disabled SVs:

ANG Co-ORDS

R.L.

Table with columns: Station ID, UTM East, UTM North, RL, Observed Gravity, Theoretical Gravity, Bouguer G., Station Name, Local Grid. Rows include station IDs like MK, 1, 1, B PM12.

Path: B:\KING\_ISL\REV\_RLS
File: KI110293.ELS 3.472 .a.. 24-03-93 11:52:54

ELS FILE

Table with columns: Station ID, STN, RL, meter reading (gravity). Rows include station IDs like 230211 1504.

FIG 2

926038

Path: B:\  
File: K1270193.GGF 5.373 .a.. 31-03-93 9:25:30

Page 1

GGF file

-----  
GEOPEKO GRAVITY FILE

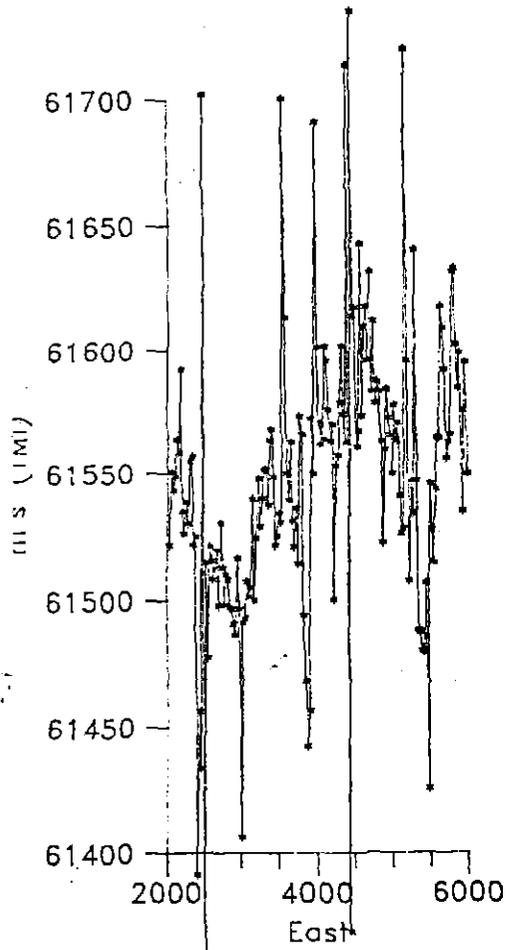
Page 1 of 1

Prospect: KING ISLAND REGIONAL Operator: MH/JM Date: 27 JAN 1993 Gravity Meter: LRG704  
-----

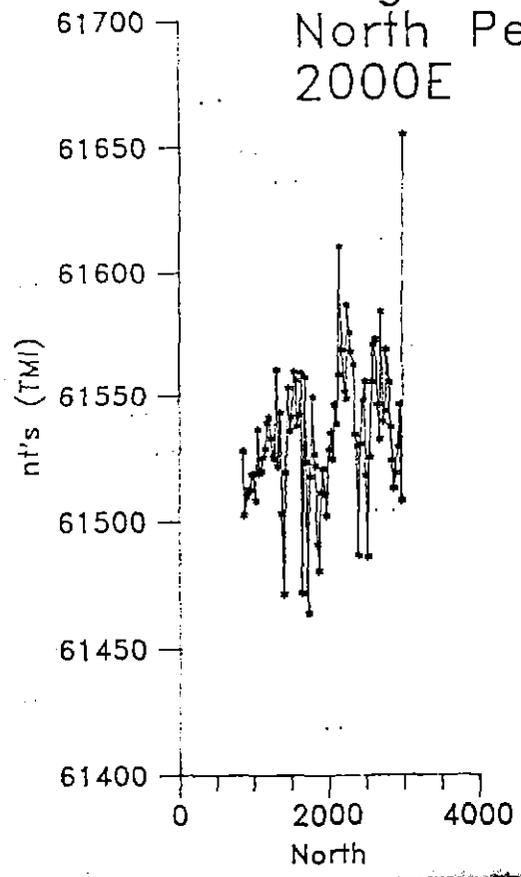
AMG Coordinates		Geographic Coordinates			RL	Observed	Theoretical	Bouguer G.	Station	Local Grid	
Zn	East North	Latitude	Longitude	(AHD)	Gravity	Gravity	(rho=2.67)	Name	East	North	
		dd mm ss.ss	ddd mm ss.ss	(m)	(milligals)	(milligals)	(mgals)				
55	233244 5580759	-39 52 52.17	143 52 50.17	36.69	980196.73	980169.93	34.02	6491-9143	233244	5580759	
55	233105 5580852	-39 52 49.01	143 52 44.50	37.30	980196.32	980169.85	33.81	PM12	233105	5580852	
55	239214 5594711	-39 45 26.95	143 57 21.17	38.44	980185.22	980158.95	33.83	A25-RPT	239214	5594711	
55	235671 5594880	-39 45 17.54	143 54 52.71	46.48	980184.01	980158.72	34.43	A1-RPT	235671	5594880	
55	234789 5591827	-39 46 55.45	143 54 11.28	39.04	980185.79	980161.13	32.33	C1-RPT	234789	5591827	
55	233105 5580852	-39 52 49.01	143 52 44.50	37.30	980196.30	980169.85	33.79	PM12	233105	5580852	
55	233244 5580759	-39 52 52.17	143 52 50.17	36.69	980196.73	980169.93	34.02	6491-9143	233244	5580759	
55	233244 5580759	-39 52 52.17	143 52 50.17	36.69	980196.73	980169.93	34.02	6491-9143	233244	5580759	
55	233105 5580852	-39 52 49.01	143 52 44.50	37.30	980196.33	980169.85	33.81	PM12	233105	5580852	
55	238968 5569922	-39 58 49.59	143 56 35.19	97.22	980201.28	980178.74	41.67	PEGARAH1	238968	5569922	
55	239332 5569640	-39 58 59.13	143 56 50.15	88.22	980203.70	980178.98	42.08	PEGARAH2	239332	5569640	
55	239373 5569408	-39 59 6.68	143 56 51.53	83.06	980203.78	980179.16	40.96	PEGARAH3	239373	5569408	
55	240062 5569171	-39 59 15.13	143 57 20.18	89.77	980204.35	980179.37	42.63	PEGARAH4	240062	5569171	
55	240786 5568853	-39 59 26.23	143 57 50.21	81.02	980205.78	980179.65	42.07	PEGARAH5	240786	5568853	
55	241339 5568525	-39 59 37.45	143 58 13.04	89.36	980204.05	980179.92	41.71	PEGARAH6	241339	5568525	
55	241827 5568171	-39 59 49.45	143 58 33.08	99.84	980202.32	980180.22	41.74	PEGARAH7	241827	5568171	
55	242203 5567541	-40 0 10.27	143 58 48.03	106.07	980201.53	980180.73	41.66	PEGARAH8	242203	5567541	
55	242590 5566922	-40 0 30.76	143 59 3.42	106.73	980201.51	980181.24	41.27	PEGARAH9	242590	5566922	
55	233105 5580852	-39 52 49.01	143 52 44.50	37.30	980196.33	980169.85	33.81	PM12	233105	5580852	
55	233244 5580759	-39 52 52.17	143 52 50.17	36.69	980196.73	980169.93	34.02	6491-9143	233244	5580759	

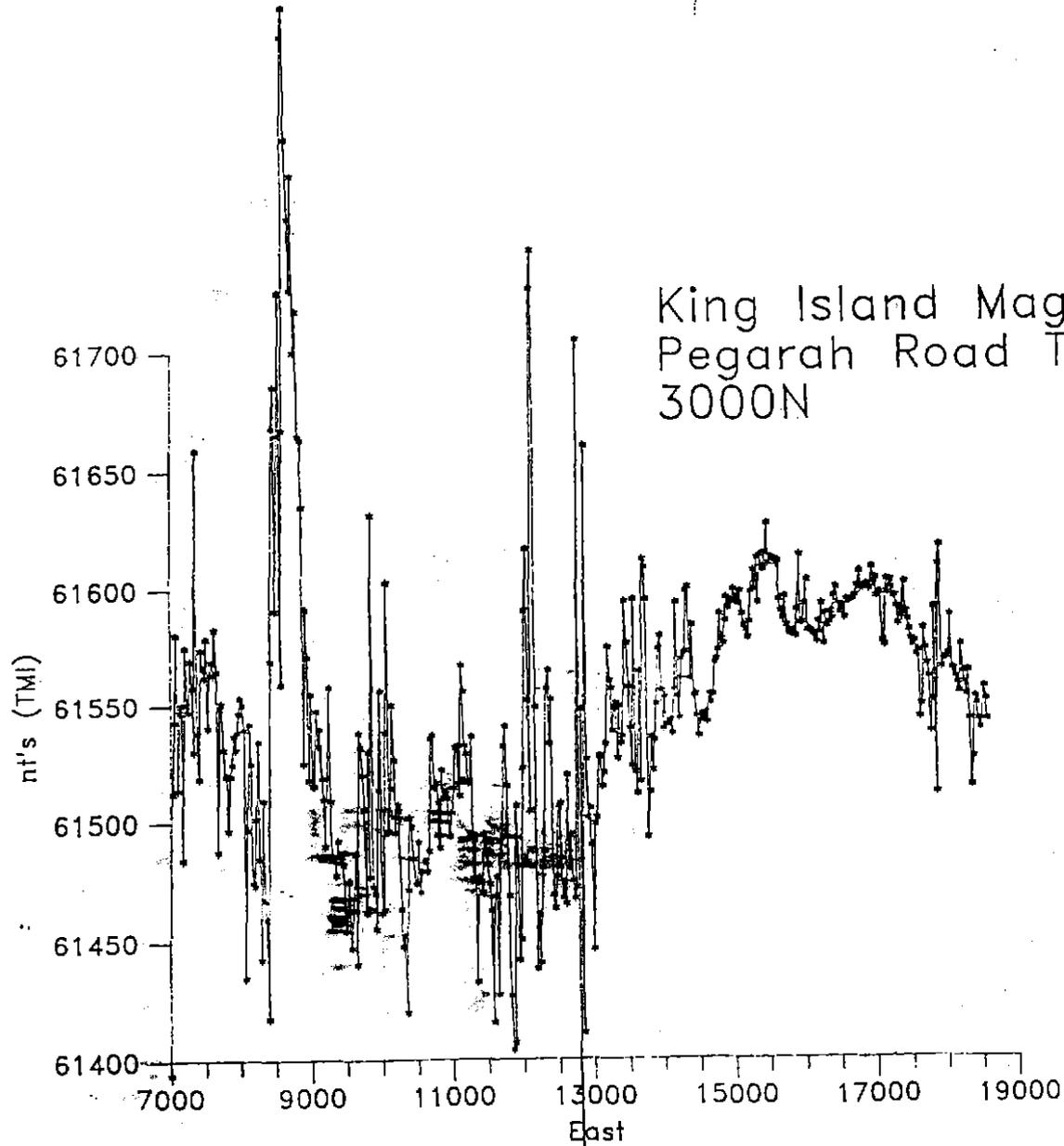
FIG 3

King Island Magnetics  
Brumby Road  
1000N



King Island Magnetics  
North Pegarah Road Traver:  
2000E

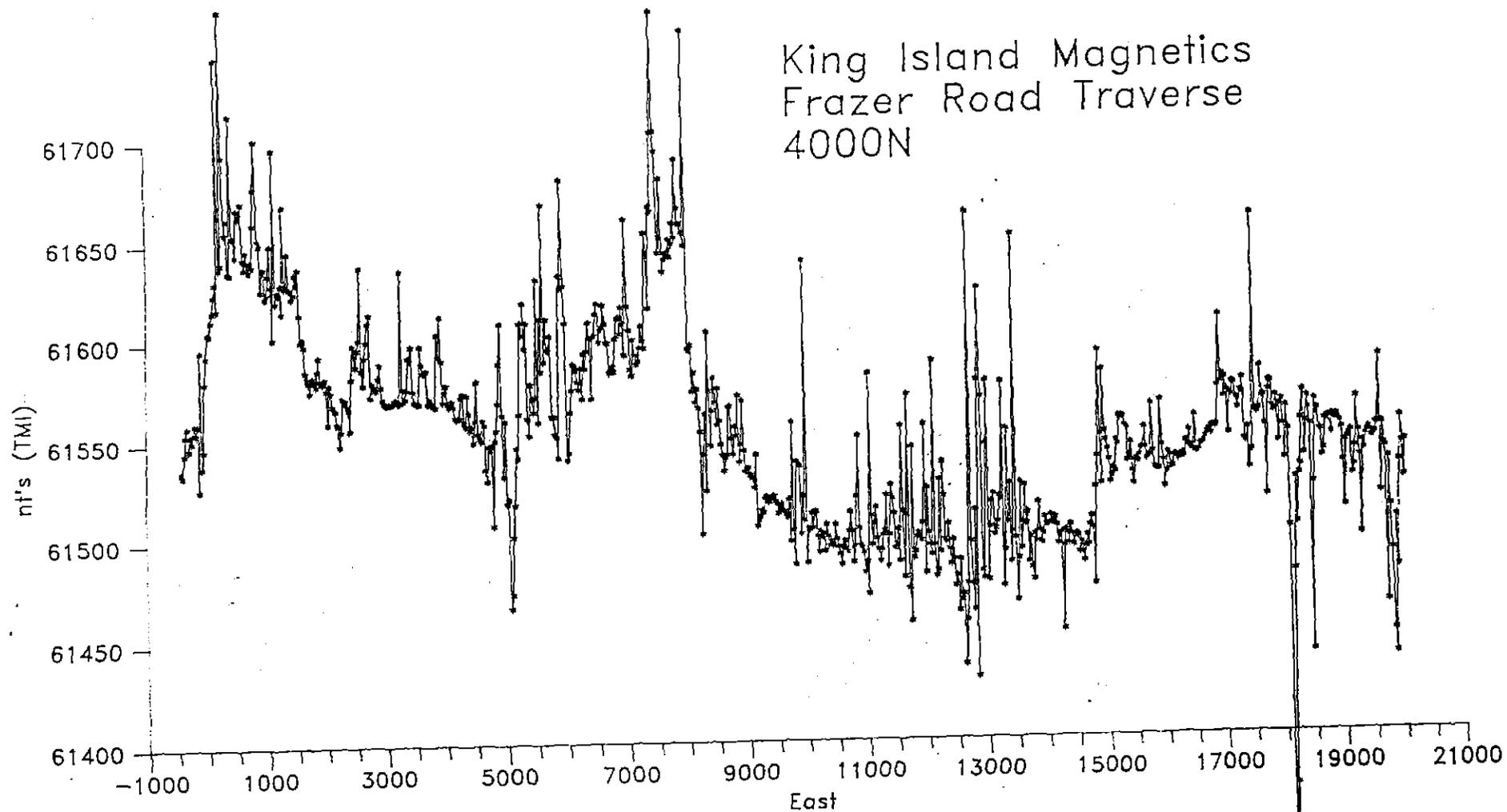




EL 26/92 PEGARAH

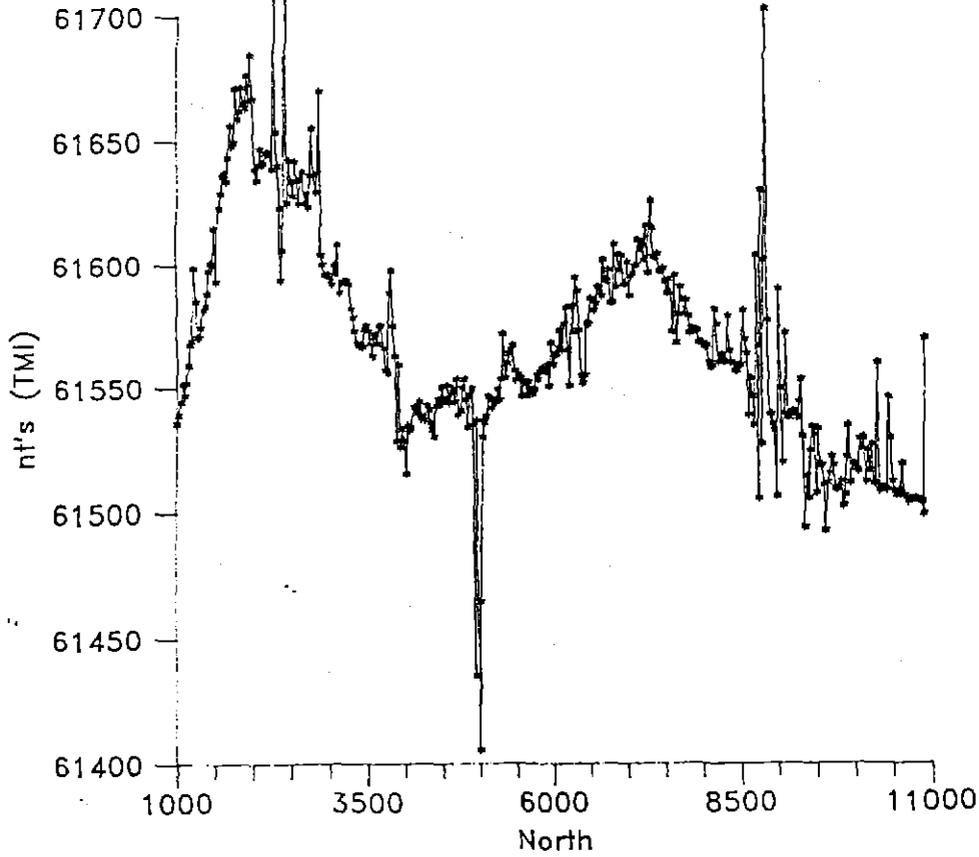
MAGNETIC PROFILE 4000N

FIGURE 6

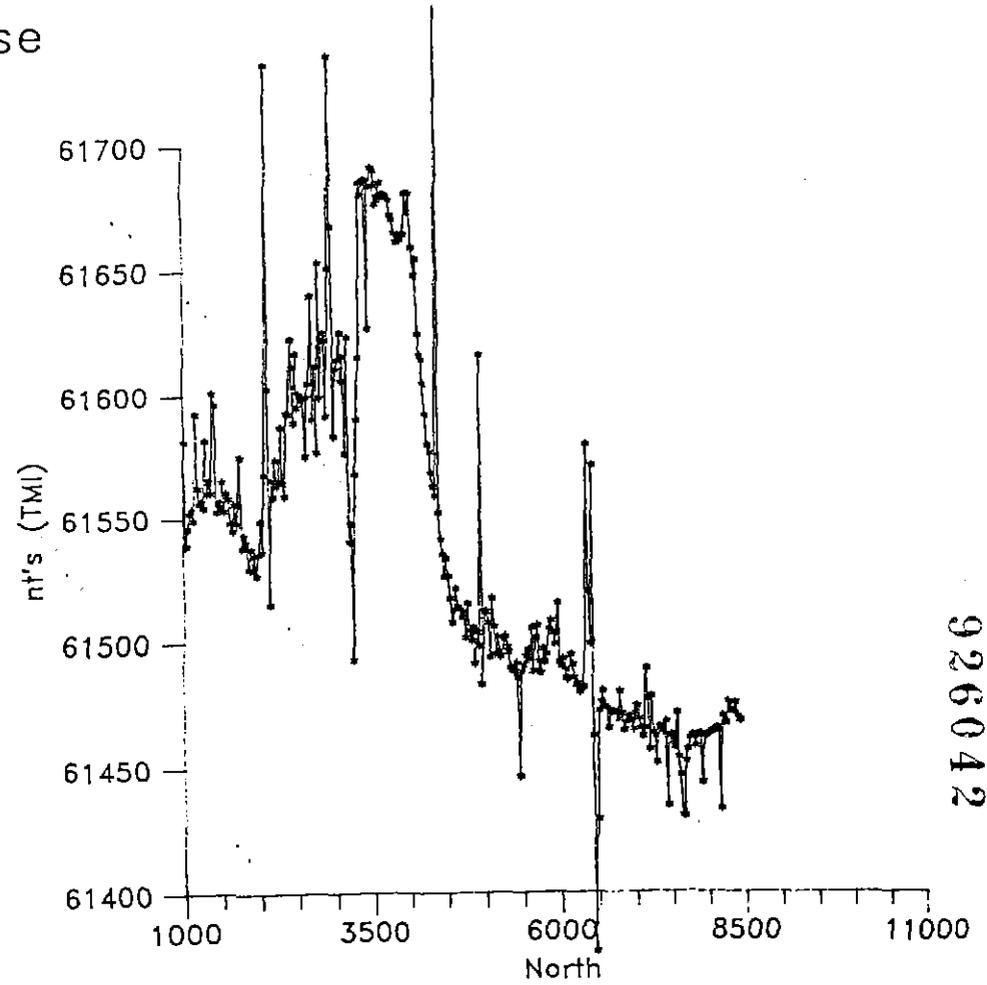


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King Island Magnetics  
Old Tin Mine Road Traverse  
5000E



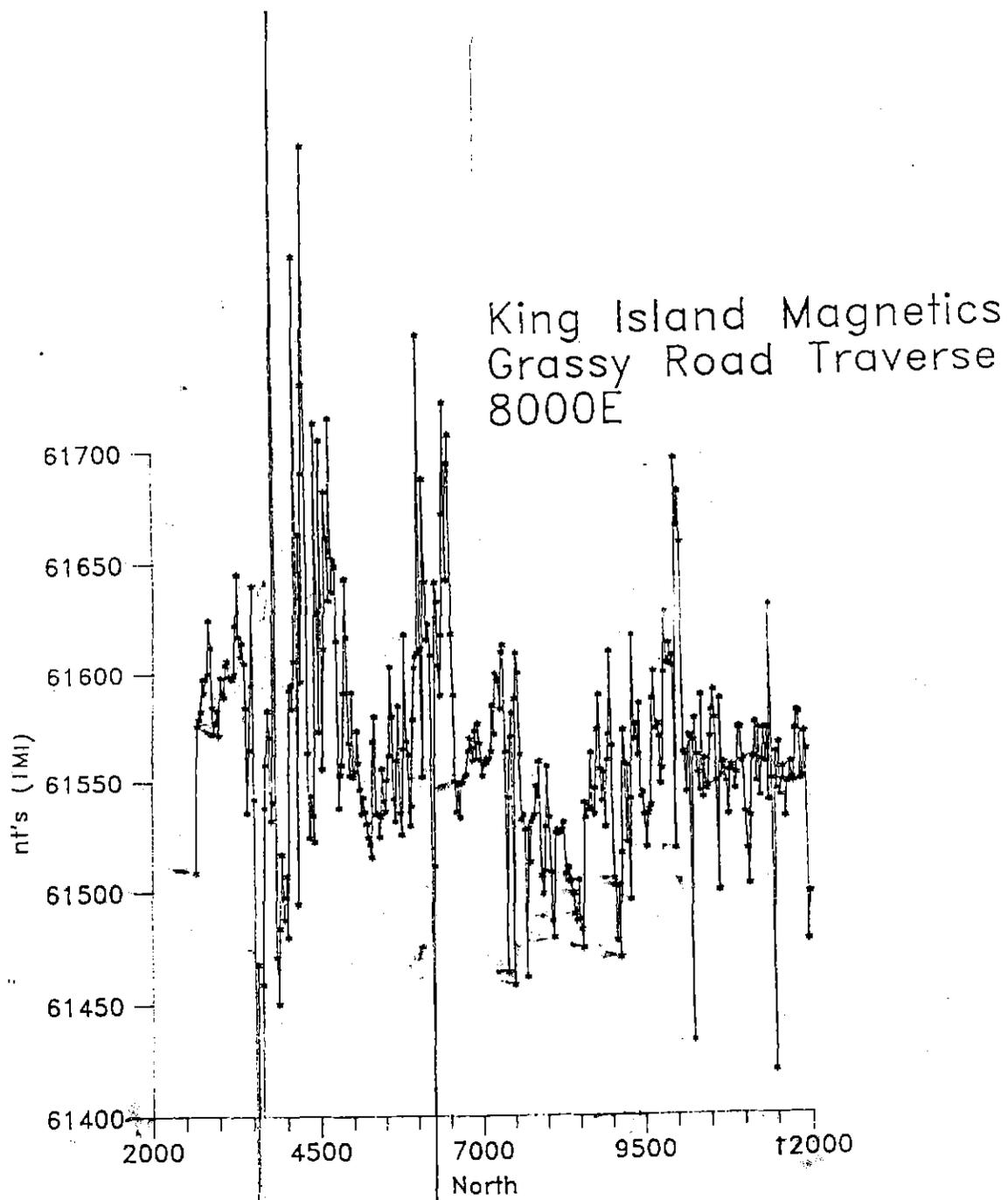
King Island Magnetics  
Ridges Road Traverse  
7000E



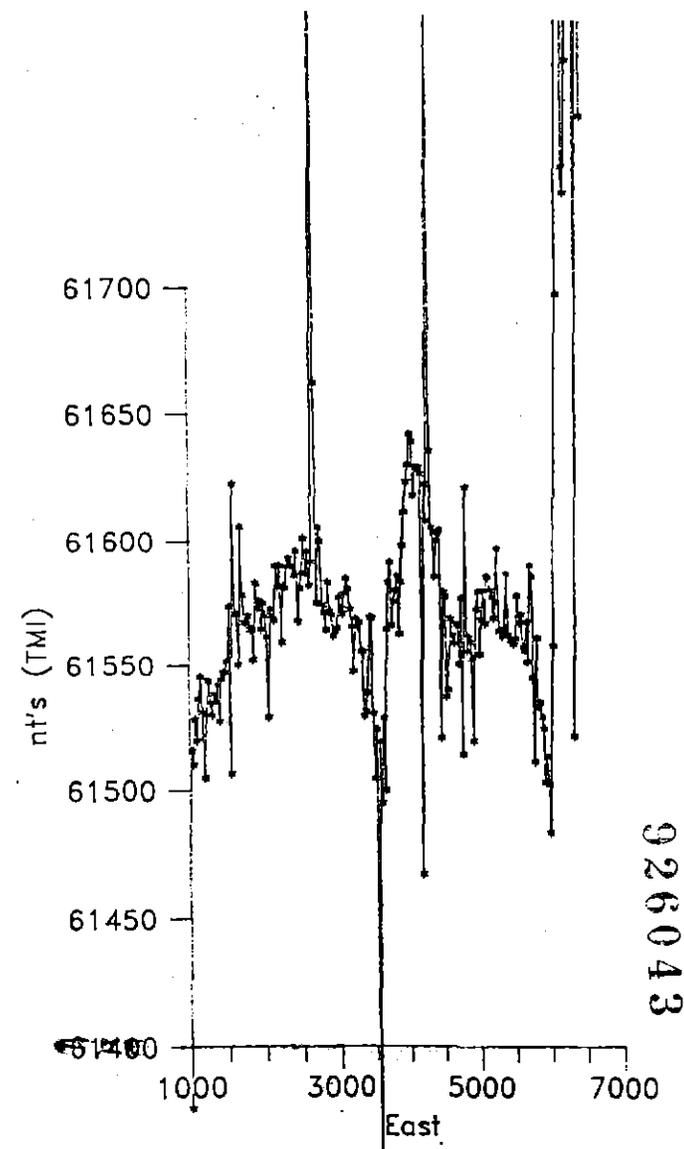
EL 26/92 PEGARAH

MAGNETIC PROFILES 8000E, 9000N

FIGURE 8



King Island Magnetics  
Grahams Road Traverse  
9000N



926043

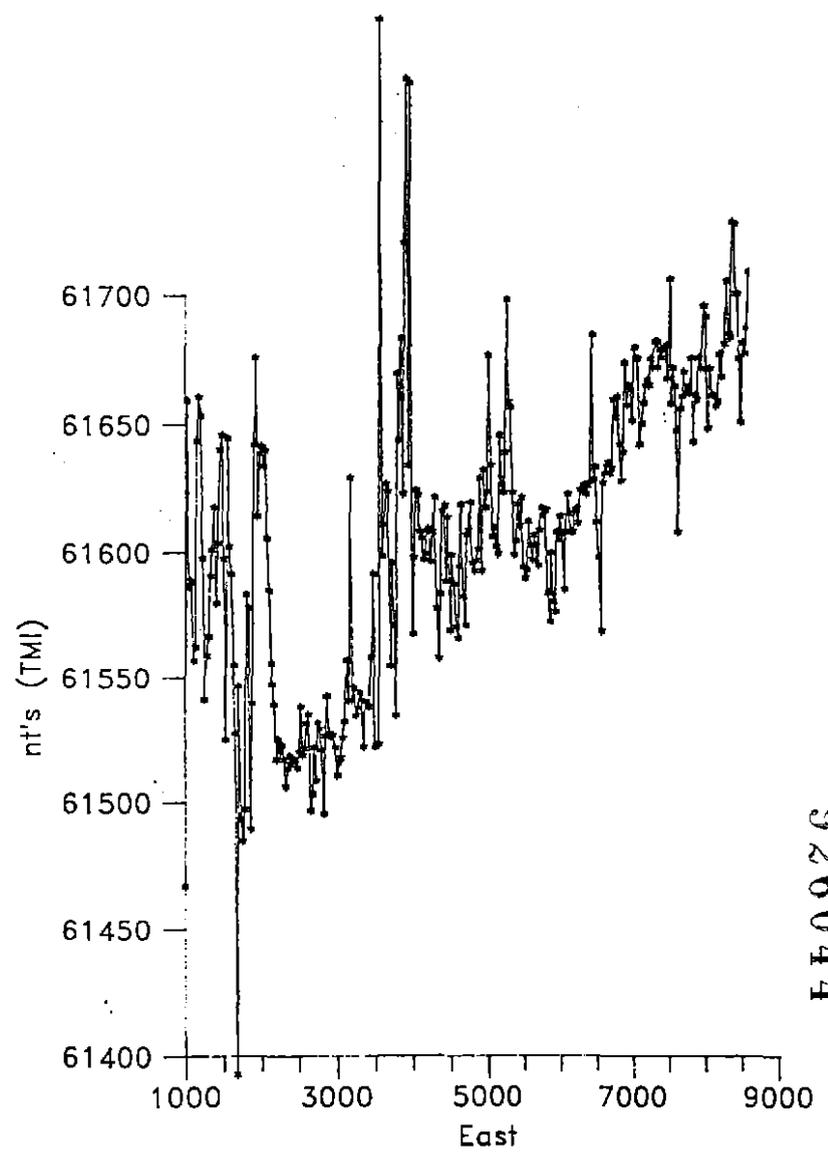
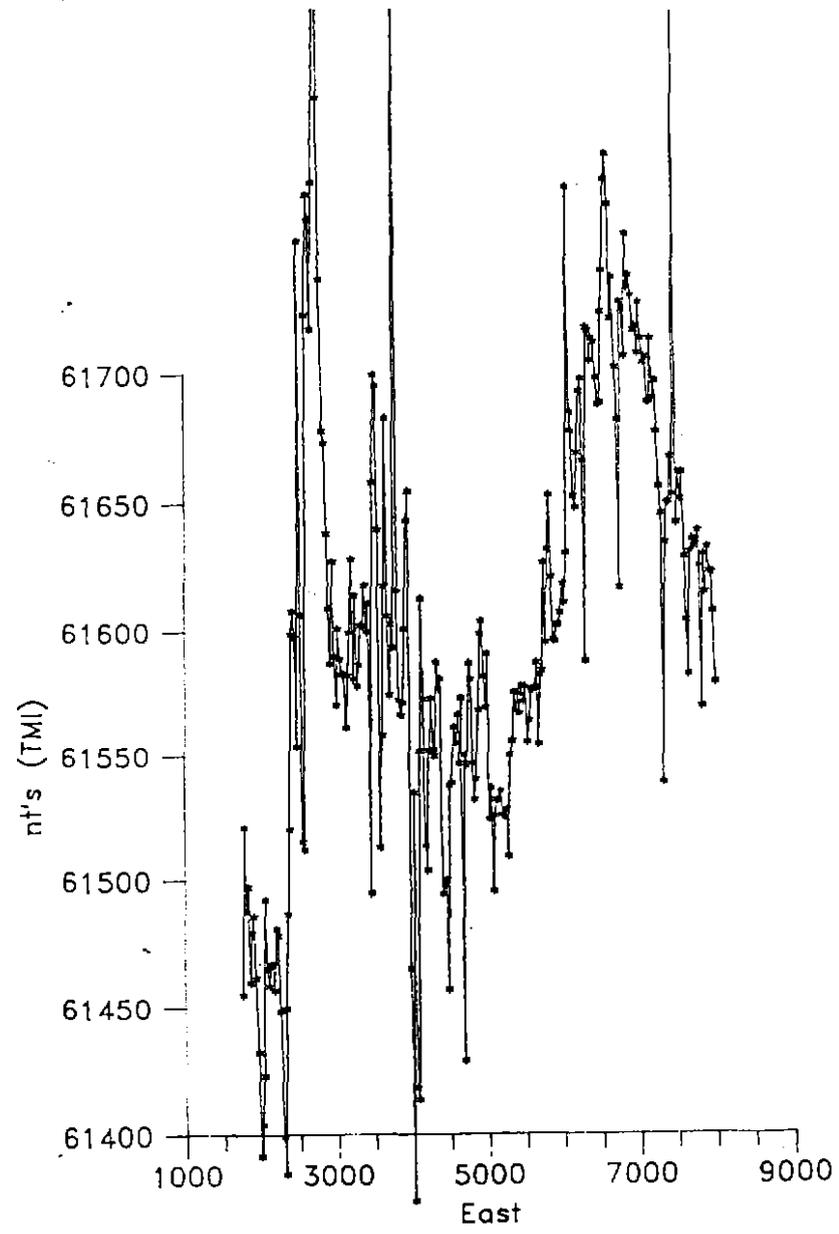
King Island Magnetics  
Yarrah Creek Road Traverse  
10000N

King Island Magnetics  
Lancaster Road Traverse  
11000N

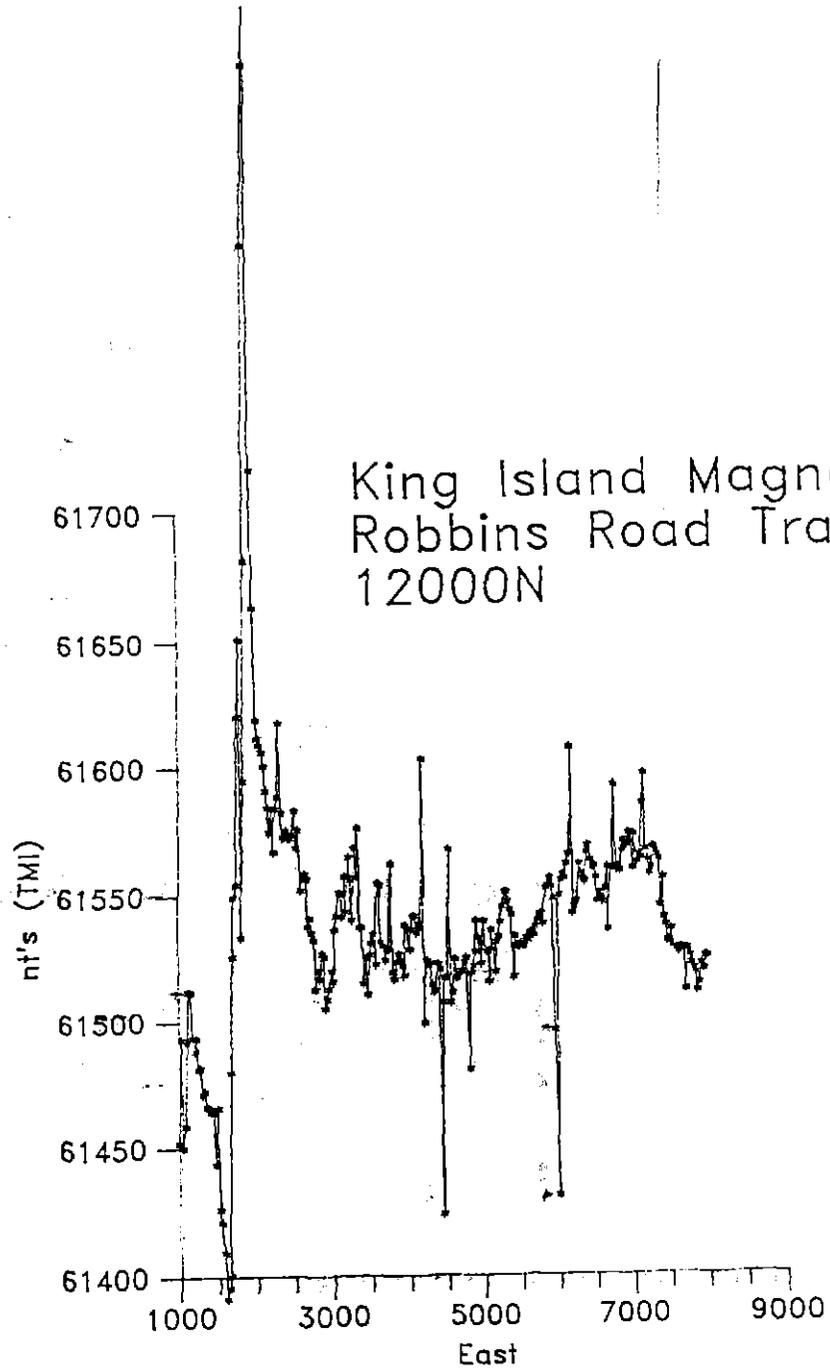
EL 26/92 PEGARAH

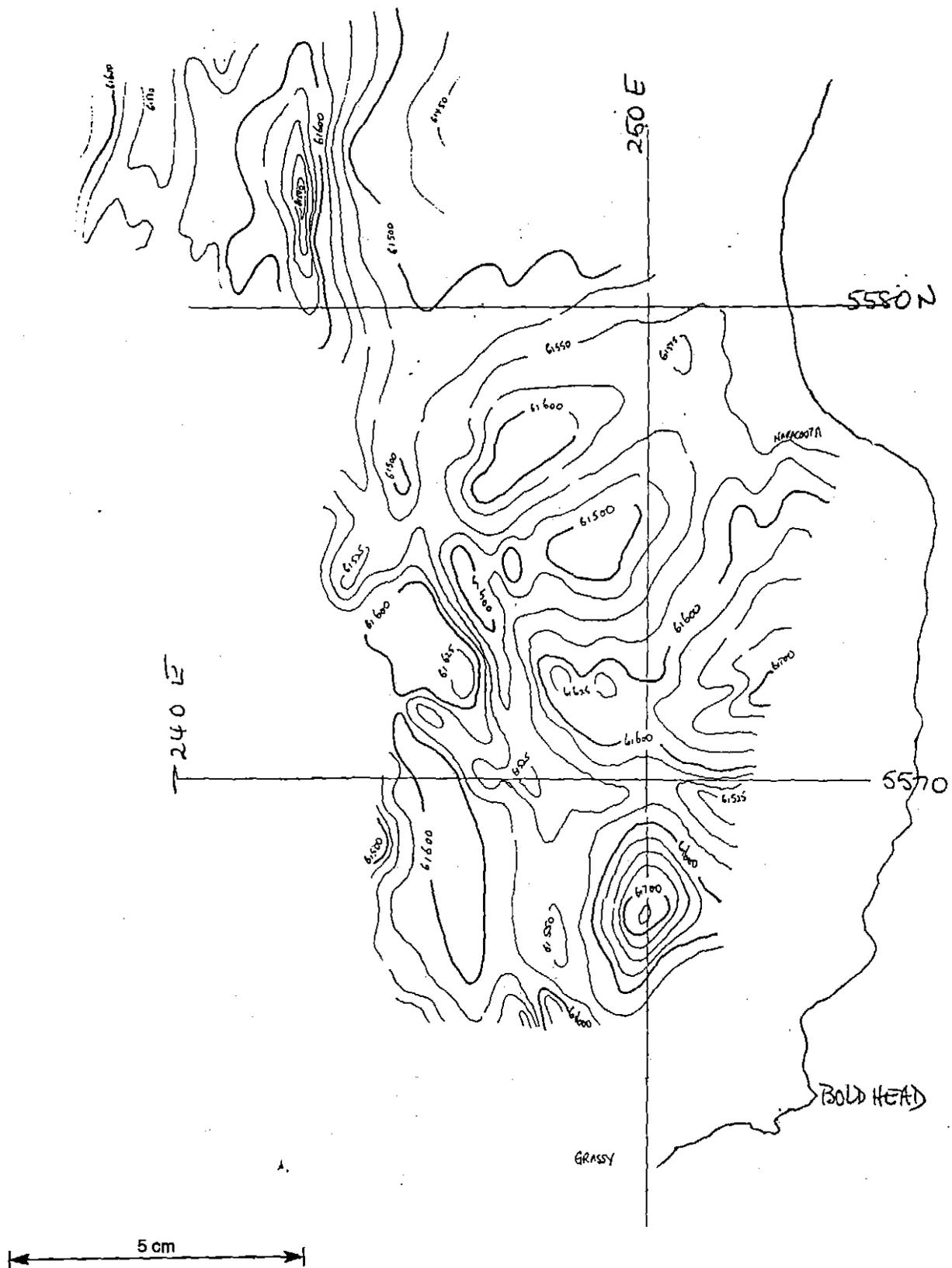
MAGNETIC PROFILES 10000N, 110000N

FIGURE 9



926044

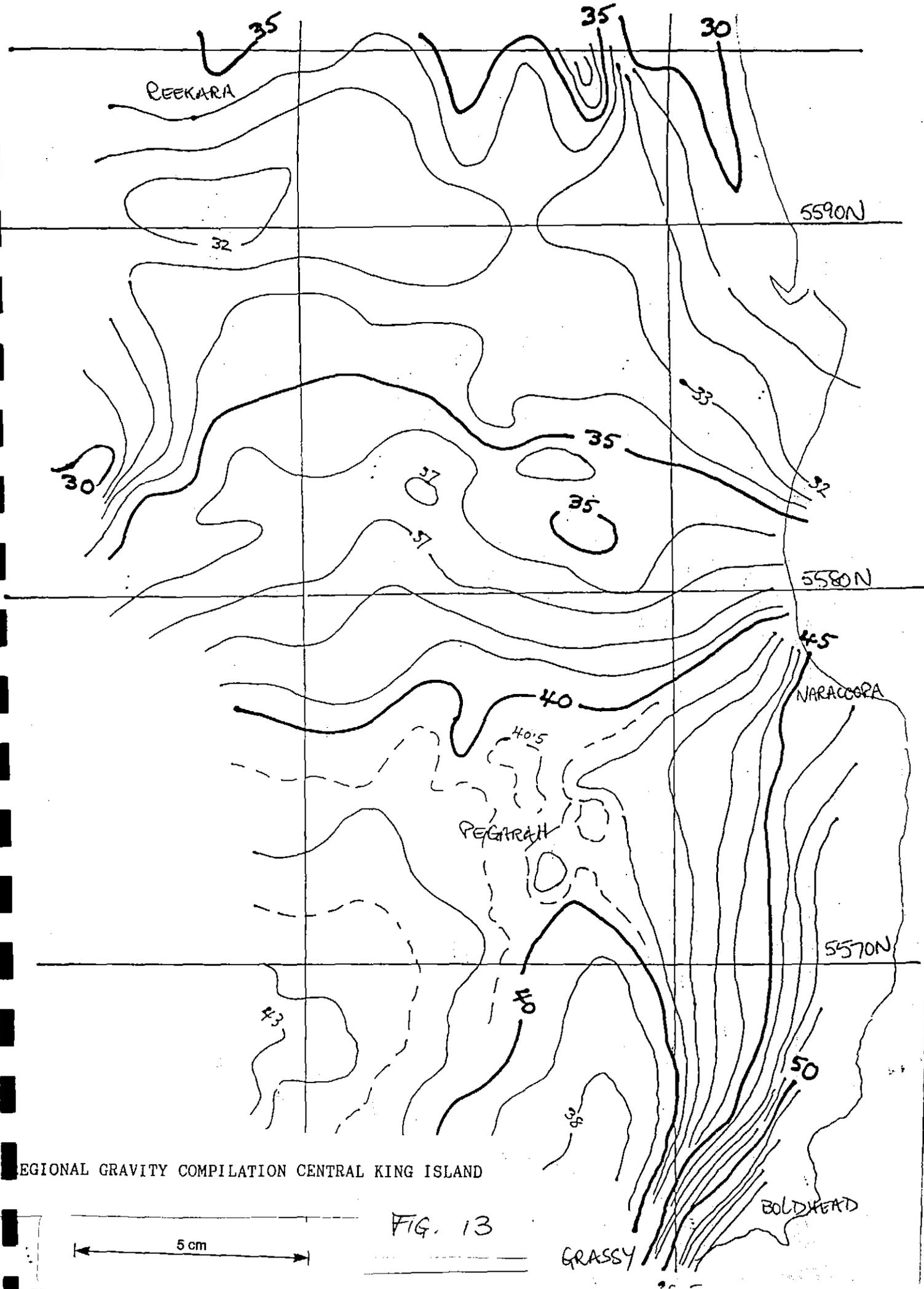




EL 26/92 PEGARAH CONTOURS OF TOTAL MAGNETIC FIELD

FIGURE 11





REGIONAL GRAVITY COMPILATION CENTRAL KING ISLAND

FIG. 13

5 cm

## GRAVITY DATA REDUCTION TABLE      PEGARAH, KING ISLAND      GEOPEKO

Columns in this table represent

AMG easting  
AMG northing  
AHD elevation  
Observed gravity (mgal)  
Theoretical gravity (1930 ellipsoid)  
Bouguer anomaly (density 2.67)  
Station description

TABLE  
(FIG 14)

233244	5580759	36.69	980196.73	980169.93	34.02	6491-9143
233105	5580852	37.30	980196.32	980169.85	33.81	PM12
239214	5594711	38.44	980185.22	980158.95	33.83	A25-RPT
235671	5594880	46.48	980184.01	980158.72	34.43	A1-RPT
234789	5591827	39.04	980185.79	980161.13	32.33	C1-RPT
239332	5569640	88.22	980203.70	980178.98	42.08	PEGARAH2
239373	5569408	83.06	980203.78	980179.16	40.96	PEGARAH3
240062	5569171	89.77	980204.35	980179.37	42.63	PEGARAH4
240786	5568853	81.02	980205.78	980179.65	42.07	PEGARAH5
241339	5568525	89.36	980204.05	980179.92	41.71	PEGARAH6
241827	5568171	99.84	980202.32	980180.22	41.74	PEGARAH7
242203	5567541	106.07	980201.53	980180.73	41.66	PEGARAH8
242590	5566922	106.73	980201.51	980181.24	41.27	PEGARAH9
242590	5566922	106.73	980201.47	980181.24	41.22	PEGARAH9
241992	5566869	104.27	980202.14	980181.26	41.39	PEGARAH10
241248	5566856	87.23	980206.09	980181.25	42.00	PEGARAH11
240592	5566820	82.24	980207.26	980181.27	42.18	PEGARAH12
239911	5566679	88.38	980205.96	980181.36	41.99	PEGARAH13
239325	5566570	95.26	980204.57	980181.43	41.88	PEGARAH14
238617	5566426	102.63	980204.35	980181.53	43.01	PEGARAH15
243148	5566905	110.67	980200.32	980181.27	40.82	PEGARAH16
243805	5566639	113.95	980199.35	980181.50	40.27	PEGARAH17
244350	5566326	118.71	980198.31	980181.76	39.90	PEGARAH18
244457	5566984	132.26	980195.58	980181.24	40.36	PEGARAH19
244522	5567565	118.38	980197.88	980180.78	40.39	PEGARAH20
244495	5568202	111.82	980198.88	980180.27	40.61	PEGARAH21
244577	5568740	120.43	980196.40	980179.84	40.26	PEGARAH22
244640	5569568	116.66	980197.15	980179.18	40.92	PEGARAH23
244701	5570060	113.41	980197.49	980178.79	41.01	PEGARAH24
244770	5565770	129.31	980195.64	980182.22	38.86	PEGARAH25
244877	5565263	133.83	980195.62	980182.63	39.33	PEGARAH26
245524	5565190	120.35	980197.46	980182.70	38.44	PEGARAH27
246236	5565115	112.06	980198.82	980182.78	38.08	PEGARAH28
246897	5565035	111.00	980198.85	980182.86	37.83	PEGARAH29
247573	5565112	106.16	980199.35	980182.82	37.42	PEGARAH30
248200	5565370	102.80	980199.92	980182.63	37.52	PEGARAH31
248730	5565456	80.38	980204.69	980182.57	37.93	PEGARAH32
249120	5564940	84.63	980204.76	980183.00	38.42	PEGARAH33
249730	5564790	118.38	980200.28	980183.13	40.43	PEGARAH34
250427	5564752	125.61	980203.61	980183.18	45.14	PEGARAH35
250990	5564630	131.86	980204.80	980183.29	47.44	PEGARAH36
251349	5564324	122.90	980210.31	980183.55	50.94	PEGARAH37
252020	5564335	88.22	980220.13	980183.56	53.93	PEGARAH38
233105	5580852	37.30	980196.30	980169.85	33.79	PM12
233244	5580759	36.69	980196.73	980169.93	34.02	6491-9143
245262	5567443	117.48	980197.74	980180.89	39.96	PEGARAH39
245885	5567420	111.16	980198.41	980180.93	39.35	PEGARAH40
246579	5567455	103.21	980199.88	980180.92	39.26	PEGARAH41
247364	5567365	101.05	980199.51	980181.01	38.38	PEGARAH42
248060	5567290	97.52	980200.26	980181.09	38.35	PEGARAH43
248750	5567310	98.09	980200.04	980181.09	38.24	PEGARAH44
249444	5567141	106.71	980199.05	980181.25	38.80	PEGARAH45
250202	5567052	111.56	980199.81	980181.34	40.42	PEGARAH46
250927	5567014	107.20	980202.74	980181.39	42.44	PEGARAH47
251393	5566885	95.47	980206.28	980181.50	43.56	PEGARAH48
251374	5566405	105.48	980204.99	980181.89	43.85	PEGARAH49
252041	5566570	94.89	980208.75	980181.77	45.64	PEGARAH50
252512	5566595	75.64	980212.64	980181.76	45.75	PEGARAH51
253010	5566717	50.15	980222.79	980181.68	50.98	PEGARAH52
251127	5565736	92.31	980208.85	980182.41	44.60	PEGARAH53
251070	5565130	114.85	980206.13	980182.90	45.83	PEGARAH54
250900	5563960	110.42	980212.19	980183.83	50.09	PEGARAH55
245381	5570011	116.17	980196.32	980178.84	40.33	PEGARAH56
246024	5570072	101.74	980198.89	980178.81	40.09	PEGARAH57

246678	5570007	99.20	980199.05	980178.88	39.69	PEGARAH58
247340	5569920	97.88	980199.50	980178.97	39.79	PEGARAH59
247914	5569773	98.37	980198.30	980179.10	38.55	PEGARAH60
248710	5569821	97.47	980199.48	980179.08	39.57	PEGARAH61
249327	5569714	99.43	980200.01	980179.19	40.39	PEGARAH62
250006	5569654	99.68	980201.09	980179.25	41.45	PEGARAH63
251050	5569570	104.34	980201.68	980179.35	42.86	PEGARAH64
251696	5569497	94.37	980204.71	980179.42	43.85	PEGARAH65
251623	5568798	99.90	980203.92	980179.98	43.60	PEGARAH66
251585	5568125	96.37	980204.99	980180.52	43.44	PEGARAH67
251355	5567646	81.95	980208.03	980180.89	43.26	PEGARAH68
251743	5570157	92.98	980204.69	980178.90	44.09	PEGARAH69
251802	5570840	91.76	980204.54	980178.35	44.24	PEGARAH70
251881	5571470	84.98	980205.35	980177.85	44.22	PEGARAH71
252096	5571930	85.47	980205.09	980177.49	44.42	PEGARAH72
233244	5580759	36.69	980196.73	980169.93	34.02	6491-9143
233244	5580759	36.69	980196.73	980169.93	34.02	6491-9143
244517	5572422	96.99	980198.50	980176.89	40.69	PEGARAH73
245198	5572342	111.08	980195.05	980176.98	39.93	PEGARAH74
245957	5572288	98.22	980197.86	980177.04	40.14	PEGARAH75
246706	5572195	99.53	980198.76	980177.13	41.21	PEGARAH76
247364	5572277	104.98	980196.72	980177.09	40.29	PEGARAH77
248082	5572204	109.64	980196.39	980177.16	40.79	PEGARAH78
248723	5572138	114.30	980195.54	980177.23	40.80	PEGARAH79
249362	5572115	116.84	980195.55	980177.27	41.27	PEGARAH80
250065	5572121	113.56	980196.75	980177.28	41.81	PEGARAH81
250769	5572128	97.95	980200.81	980177.29	42.78	PEGARAH82
251516	5572148	86.61	980203.85	980177.30	43.59	PEGARAH83
252833	5571836	75.63	980208.34	980177.58	45.64	PEGARAH84
253552	5571698	70.72	980211.17	980177.71	47.37	PEGARAH85
253600	5571252	74.30	980211.13	980178.07	47.68	PEGARAH86
252933	5572625	73.00	980208.10	980176.95	45.50	PEGARAH87
254075	5572469	69.89	980211.79	980177.11	48.43	PEGARAH88
243330	5574118	89.36	980198.50	980175.51	40.58	PEGARAH89
243915	5574227	89.60	980198.71	980175.44	40.90	PEGARAH90
244581	5574401	92.71	980197.94	980175.31	40.87	PEGARAH91
245236	5574433	92.54	980197.31	980175.31	40.20	PEGARAH92
245878	5574356	98.59	980196.64	980175.39	40.65	PEGARAH93
246603	5574329	110.60	980194.00	980175.43	40.33	PEGARAH94
247212	5574438	113.47	980193.64	980175.36	40.61	PEGARAH95
247859	5574619	124.28	980191.30	980175.23	40.52	PEGARAH96
249148	5574806	92.71	980198.27	980175.11	41.40	PEGARAH98
249842	5574830	92.53	980199.02	980175.11	42.11	PEGARAH99
250351	5575066	89.86	980199.61	980174.94	42.35	PEGARAH100
250967	5575319	85.52	980200.73	980174.75	42.80	PEGARAH101
251654	5575399	84.52	980201.37	980174.70	43.29	PEGARAH102
252259	5575484	82.03	980202.74	980174.65	44.22	PEGARAH103
252841	5575859	73.95	980204.96	980174.37	45.14	PEGARAH104
253141	5576394	64.22	980206.40	980173.95	45.08	PEGARAH105
253544	5576701	32.88	980212.21	980173.71	44.96	PEGARAH106
253874	5576681	13.77	980216.91	980173.74	45.88	PEGARAH107
254108	5576579	50.90	980209.77	980173.82	45.95	PEGARAH108
253951	5575958	64.56	980208.23	980174.32	46.62	PEGARAH109
253730	5575293	71.39	980207.44	980174.84	46.64	PEGARAH110
253356	5574754	74.05	980206.80	980175.26	46.10	PEGARAH111
253113	5574241	77.55	980205.90	980175.67	45.49	PEGARAH112
252854	5573632	63.98	980208.63	980176.15	45.07	PEGARAH113
252994	5573080	68.56	980208.45	980176.59	45.34	PEGARAH114
243557	5574718	90.15	980198.21	980175.03	40.91	PEGARAH115
243665	5575562	91.54	980196.90	980174.36	40.54	PEGARAH116
243756	5576215	93.18	980196.26	980173.84	40.75	PEGARAH117
244523	5576127	99.05	980194.19	980173.93	39.74	PEGARAH118
245061	5575894	96.68	980195.98	980174.13	40.86	PEGARAH119
245645	5575803	95.30	980196.24	980174.22	40.77	PEGARAH120
246273	5576072	101.26	980194.29	980174.02	40.18	PEGARAH121
246381	5576720	98.56	980194.34	980173.51	40.22	PEGARAH122

246427	5577431	92.11	980194.60	980172.94	-39.77	PEGARAH123
243789	5576948	85.68	980196.64	980173.26	40.24	PEGARAH124
243865	5577623	92.19	980194.62	980172.72	40.03	PEGARAH125
244010	5578145	83.13	980195.25	980172.31	39.30	PEGARAH126
244723	5578208	82.47	980195.56	980172.28	39.51	PEGARAH127
245077	5578549	66.35	980197.70	980172.01	38.74	PEGARAH128
245184	5579277	57.31	980197.86	980171.44	37.70	PEGARAH129
245196	5579916	52.23	980197.88	980170.93	37.23	PEGARAH130
244865	5580527	51.57	980196.66	980170.43	36.37	PEGARAH131
233244	5580759	36.69	980196.73	980169.93	34.02	6491_9143
233244	5580759	36.69	980196.73	980169.93	34.02	6491_9143
244701	5570060	113.41	980197.44	980178.79	40.96	PEGARAH24
245023	5570770	119.61	980195.67	980178.23	40.97	PEGARAH132
245204	5571322	111.33	980196.24	980177.79	40.35	PEGARAH133
245001	5572033	111.41	980195.57	980177.22	40.27	PEGARAH134
244517	5572422	96.99	980198.57	980176.89	40.75	PEGARAH73
243975	5572881	92.46	980199.25	980176.51	40.93	PEGARAH135
243552	5573352	90.34	980198.92	980176.13	40.57	PEGARAH136
243330	5574118	89.36	980198.54	980175.51	40.61	PEGARAH89
242666	5573939	84.71	980199.70	980175.63	40.73	PEGARAH137
242038	5573928	83.49	980200.19	980175.62	40.99	PEGARAH138
241364	5573850	83.57	980200.51	980175.67	41.28	PEGARAH139
240775	5574074	89.03	980198.69	980175.47	40.73	PEGARAH140
240093	5574036	87.24	980199.05	980175.49	40.73	PEGARAH141
239434	5574186	88.63	980198.62	980175.35	40.71	PEGARAH142
238761	5574315	84.22	980199.36	980175.23	40.71	PEGARAH143
237890	5574358	87.07	980198.91	980175.17	40.88	PEGARAH144
241467	5574731	83.98	980198.81	980174.97	40.37	PEGARAH145
253599	5577180	6.18	980216.67	980173.33	44.55	PEGARAH146
253041	5577566	10.64	980213.62	980173.01	42.71	PEGARAH147
252439	5577739	15.02	980211.59	980172.85	41.69	PEGARAH148
252079	5578228	15.51	980210.26	980172.45	40.86	PEGARAH149
251602	5578769	17.91	980207.20	980172.01	38.71	PEGARAH150
251137	5579207	21.21	980205.24	980171.65	37.76	PEGARAH151
250555	5579426	24.19	980204.22	980171.46	37.52	PEGARAH152
250064	5579798	31.51	980201.82	980171.15	36.87	PEGARAH153
249473	5580051	33.56	980200.23	980170.93	35.90	PEGARAH154
248942	5580411	36.32	980199.11	980170.63	35.62	PEGARAH155
248489	5580880	36.56	980198.03	980170.24	34.98	PEGARAH156
247833	5580873	35.10	980198.55	980170.23	35.23	PEGARAH157
247190	5580782	36.97	980199.52	980170.29	36.51	PEGARAH158
246498	5580770	41.67	980198.45	980170.28	36.37	PEGARAH159
245892	5580530	46.40	980198.08	980170.45	36.76	PEGARAH160
244865	5580527	51.57	980196.64	980170.43	36.35	PEGARAH131
244272	5580913	50.31	980196.69	980170.10	36.49	PEGARAH161
243688	5581160	48.83	980197.08	980169.89	36.79	PEGARAH162
243024	5581123	47.76	980197.57	980169.90	37.06	PEGARAH163
242044	5581121	49.24	980198.05	980169.88	37.86	PEGARAH164
241801	5578314	71.99	980196.13	980172.11	38.18	PEGARAH165
241056	5578356	69.36	980196.69	980172.06	38.27	PEGARAH166
240426	5578459	68.20	980197.05	980171.96	38.51	PEGARAH167
239742	5578494	64.92	980197.02	980171.91	37.88	PEGARAH168
239025	5578559	66.40	980197.09	980171.84	38.31	PEGARAH169
238313	5578565	70.84	980196.18	980171.82	38.30	PEGARAH170
242044	5581121	49.24	980198.02	980169.88	37.83	PEGARAH164
242527	5581689	51.41	980196.56	980169.44	37.24	PEGARAH171
243059	5582081	44.85	980197.24	980169.14	36.93	PEGARAH172
243200	5582700	34.61	980198.95	980168.65	37.11	PEGARAH173
243786	5582979	47.19	980195.46	980168.44	36.30	PEGARAH174
244284	5583377	43.94	980195.46	980168.14	35.96	PEGARAH175
244984	5583743	42.32	980194.62	980167.86	35.08	PEGARAH176
245285	5584440	30.16	980195.20	980167.31	33.82	PEGARAH177
245524	5585037	26.51	980195.82	980166.84	34.19	PEGARAH178
245639	5585660	32.18	980193.10	980166.35	33.08	PEGARAH179
246026	5586069	26.03	980194.12	980166.03	33.21	PEGARAH180

246695	5586187	22.87	980195.16	980165.96	33.71	PEGARAH181
247307	5586154	29.67	980193.50	980166.00	33.34	PEGARAH182
233244	5580759	36.69	980196.73	980169.93	34.02	6491_9143
236243	5583555	42.07	980192.76	980167.78	33.26	PEGARAH183
236966	5583601	50.39	980192.31	980167.76	34.46	PEGARAH184
237619	5583800	58.89	980191.15	980167.62	35.11	PEGARAH185
238113	5584204	61.70	980191.13	980167.31	35.96	PEGARAH186
238733	5584331	68.39	980189.01	980167.23	35.24	PEGARAH187
239381	5584496	69.10	980188.74	980167.11	35.23	PEGARAH188
239917	5584925	66.88	980188.72	980166.78	35.10	PEGARAH189
240540	5585003	64.33	980189.12	980166.74	35.04	PEGARAH190
241195	5585165	58.74	980190.33	980166.63	35.26	PEGARAH191
241795	5585385	52.18	980191.57	980166.47	35.36	PEGARAH192
242484	5585354	47.01	980192.83	980166.51	35.57	PEGARAH193
243162	5585306	44.06	980193.01	980166.57	35.11	PEGARAH194
243739	5585606	36.93	980193.54	980166.34	34.47	PEGARAH195
244009	5586029	28.00	980194.78	980166.01	34.28	PEGARAH196
244537	5586462	27.76	980195.11	980165.68	34.89	PEGARAH197
236795	5583103	45.70	980194.28	980168.15	35.12	PEGARAH198
237111	5582581	53.94	980193.87	980168.58	35.91	PEGARAH199
237338	5582090	58.81	980193.77	980168.98	36.37	PEGARAH200
238047	5581989	64.84	980192.24	980169.08	35.92	PEGARAH201
238719	5581914	72.11	980191.08	980169.15	36.11	PEGARAH202
239389	5581810	63.85	980192.90	980169.26	36.21	PEGARAH203
239940	5581478	54.74	980195.34	980169.54	36.57	PEGARAH204
240503	5581172	41.45	980198.00	980169.80	36.36	PEGARAH205
241182	5581050	33.84	980200.18	980169.91	36.93	PEGARAH206
238720	5587256	54.72	980188.15	980164.89	34.03	PEGARAH207
238761	5587959	52.18	980188.29	980164.33	34.23	PEGARAH208
239173	5588228	50.70	980188.36	980164.13	34.21	PEGARAH209
239842	5588178	53.41	980188.29	980164.18	34.61	PEGARAH210
240307	5588116	50.04	980188.84	980164.25	34.44	PEGARAH211
245700	5583700	40.45	980195.40	980167.92	35.44	PEGARAH212
246400	5583600	45.64	980195.16	980168.02	36.12	PEGARAH213
247200	5583600	43.78	980195.68	980168.04	36.26	PEGARAH214
233244	5580759	36.69	980196.73	980169.93	34.02	6491_9143
233244	5580759	36.69	980196.73	980169.93	34.02	6491_9143
246844	5574409	114.86	980192.92	980175.37	40.15	PEGARAH215
247541	5574555	118.79	980192.90	980175.27	41.00	PEGARAH216
248150	5574706	110.19	980194.54	980175.17	41.05	PEGARAH217
248805	5574842	96.05	980197.61	980175.07	41.43	PEGARAH218
249488	5574743	92.36	980198.74	980175.17	41.74	PEGARAH219
250128	5574923	86.86	980200.09	980175.04	42.13	PEGARAH220
250634	5575265	89.11	980199.70	980174.78	42.45	PEGARAH221

APPENDIX 3

ROCK CHIP SAMPLING, SAMPLE LEDGER AND ASSAY RESULTS

Sample	Easting	Northing	Property	Sample Type	Description
24001	249820	5567900	Coopers	Rack / Float	Mid grey, fine grained META-SILTSTONE, micaceous flake, FeOx coated voids and unsp. pyrite, iron replaced zone (carbonate?)
24002	249825	5567930	Coopers	Rack / Float	Dark grey META-BASALT with radial to malite? crystal grains in matrix, trace disseminated pyrite
24003	249860	5567905	Coopers	Rack	Medium grained dark grey META-BASALT with large voids of malite? original rock horizontal
24004	236000	55612300	Cape Wick	Rack / Float	Medium grained (biotite) MUSCOVITE SCHIST, interbedded paragneissic & pelitic layers, minor all pelitic, minor quartz pebbles in matrix & minor sulphide
24005	249370	5567180	De Beau	Rack / Float	Mid grey META-SILTSTONE, medium grained, moderate micaceous, FeOx coated voids disseminated throughout, spotted (quartz) in sandy layers
24006	249240	5567155	De Beau	Rack	Spalte (slightly mafic) medium grained META-SILTSTONE, weak to moderate micaceous, FeOx coated voids in part, FeOx retained voids in part, mid grey
24007	249735	5566775	De Beau	Rack	Mafic part of BANDED SHALE (black shale?), same FeOx replaced zone in part
24008	249850	5566650	Coopers	Rack	Moderate to well banded SHALE, anisotropic, dark grey bands and lighter more porous bands, some FeOx retained in part
24009	250070	5568715	Coopers	Rack	Well banded, grey black MUDSTONE or shale?
24010	249300	5567790	Barnett	Rack / Float	Basaltic hornfels META-BASALT, non-magnetic, massive
24011	248870	5568295	Barnett	Rack / Float	LIMESTONE BRECCIA, possibly dolomitic with siliceous infill, some containing black pyrite, particles and clasts are metamorphic
24012	248225	5568220	Buller	Rack / Float	Coarse grained interstratified VOLCANIC LITHIC ARENITE, with coarse feldspar frags, minor chlorite, some oxidized to iron, pale green. Minor igneous
24013	248430	5568065	Buller	Rack	Grey (mid-dark) MUDSTONE, moderate porosity, weak FeOx on fracture
24014	251200	5569600	Skippantha	Rack / Float	Grey banded META-SILTSTONE, with sandy mud part, sandy areas highly spotted and FeOx stained
24015	251220	5569550	Skippantha	Rack / Float	Quartz vein, bleached META-SILTSTONE, bleached, possibly dolomitic, trace FeOx in quartz vein
24016	249370	5568940	Astrich	Rack / Float	Quartz vein, black shaly druse grained META-SILTSTONE, weakly biotite spotted, no iron
24017	248150	5574230	Barratta	Rack / Float	Dark grey META-MUDSTONE, moderate banding, FeOx on more permeable bands after pyrite?
24018	247875	5574260	Barratta	Rack / Float	Dark grey META-MUDSTONE, moderately pyritic (FeOx in voids), weakly banded
24019	248700	5573740	Barratta	Rack	PISOLITIC LATERITE
24020	248290	5574270	Barratta	Rack	Fine grained light grey moderately banded hard META-SILTSTONE / quartzite
24021	249475	5573775	Barratta	Rack	Fine grained light grey SILTSTONE, minor dark grey muddy bands
24022	249900	5573620	Barratta	Rack / Float	Mid grey SILTSTONE, raft very weakly banded
24023	249525	5573160	Barratta	Rack	PISOLITIC LATERITE
24024	248140	5573710	Barratta	Rack / Float	Fine grained mid grey META-SILTSTONE with 15% black shaly bands, weak biotite spotted and moderate porosity
24025	247860	5573910	Barratta	Rack	PISOLITIC LATERITE
24026	247710	5574515	Barratta	Rack	Coarse grained META-GABBRO, non-magnetic, non-foliated
24027	246340	5576810	Barratta Har	Rack / Float	Fine grained META-SILTSTONE, moderate spotting, FeOx in voids, generally massive with very minor grey shaly bands
24028	247260	5576890	Daniels	Rack / Float	Fine grained mid grey META-SILTSTONE, minor black shaly bands with FeOx in voids
24029	247245	5576820	Barratta	Rack / Float	Dark grey MUDSTONE, 5-10% disseminated FeOx in voids
24030	247245	5577285	Daniels	Rack	PISOLITIC LATERITE
24031	247150	5577320	Daniels	Rack / Float	Soft light grey weakly micaceous SILTSTONE
24032	247990	5577260	State Forest	Rack	Bleached dark light grey META-SILTSTONE, very weakly micaceous, mottled, lateritized
24033	248190	5577200	State Forest	Rack	Well banded mid grey META-SILTSTONE, fine grained, weakly porosity
24034	248360	5576500	Daniels	Rack	Fine grained hard META-SILTSTONE / quartzite, mid grey, trace pyrite
24035	247015	5576130	Barratta	Rack / Float	Dark grey banded SILTSTONE, weakly ferruginous in part
24036	248025	5575030	Daniels	Rack	Coarse grained META-GABBRO
24037	248290	5574960	Daniels	Rack	Dark grey SHALE, weakly porosity, moderately foliated, trace pyrite
24038	248500	5575120	Daniels	Rack	Sand, PISOLITIC LATERITE
24039	248980	5575230	Daniels	Rack / Float	Fine grained grey, META-SILTSTONE, massive
24040	248860	5575260	Daniels	Rack / Float	Fine grained light grey META-SILTSTONE, weakly banded in part
24041	248640	5576010	Daniels	Rack / Float	Fine grained light grey META-SILTSTONE, and moderate quartz float (grey smoky untraced)
24042	248280	5576270	Daniels	Rack / Float	Medium grained light grey hard SILTSTONE / quartzite
24043	249465	5576025	State Forest	Rack	Light grey META-SILTSTONE, bleached and weathered
24044	249700	5576370	State Forest	Rack	Mid grey hard siliceous SILTSTONE, or quartzite, weakly banded, minor spotting in voids
24045	250250	5576305	State Forest	Rack	Well banded dark grey to light grey SILTSTONE
24046	250210	5575645	State Forest	Rack / Float	Moderate well banded dark grey - light grey SILTSTONE, weakly spotted (FeOx) in sandier layers
24047	250160	5575315	State Forest	Rack	Very well banded SILTSTONE - minor FeOx on fracture
24048	250210	5577475	State Forest	Rack	BLACK SHALE, well banded, true black shale
24049	250675	5578870	State Forest	Rack	Grey MUDSTONE, moderate voids, trace FeOx on fracture

Sample	Carting	Marketing	Property	Sample Type	Description
24050	250120	5578820	State Forest	Rock	Light gray weakly foliated SILTSTONE, moderate mica flakes
24051	251560	5578560	State Forest	Rock	Light gray weakly foliated SILTSTONE/PHYLLITE, weak to moderate mica flakes
24052	250480	5577940	State Forest	Rock	Gray SILTSTONE, soft, weakly foliated
24053	250660	5571030	Forest	Rock	Weak banded dark to light gray SILTSTONE/MUDSTONE
24054	250855	5572900	Creek	Rock / Float	Bleached weathered zone massive SILTSTONE, moderate iron staining
24055	247760	5570250	Phillips	Rock / Float	Folded porphyritic (lethy) rock - BASALT, moderate strongly metamorphosed, FeOx casting fractures
24056	247970	5570830	Phillips	Rock	Dark green gray banded SHALE? or volcanic - lacks amygdaloidal, numerous voids after?
24057	245205	5576025	Horz	Rock	Moderately chertose foliated SILTSTONE, - dark gray, moderate mica
24058	245345	5576210	Horz	Rock	Moderately zirconitic META-SILTSTONE / PHYLLITE, moderate iron spotted
24059	245300	5576510	Horz	Rock	META-SILTSTONE, moderate mica content, weakly FeOx staining, moderate mafic spots in part
24060	245115	5576730	Horz	Rock / Float	Banded META-SANDSTONE, or quartzite, epidote? and biotite developed, minor iron stained quartz and veinlets
24061	245085	5576805	Horz	Rock / Float	Bleached weakly ferruginous SILTSTONE, minor quartz veins, FeOx spotted
24062	245055	5577010	Horz	Rock / Float	QUARTZ (white to dark gray) with pyrite
24063	245040	5577025	Horz	Rock / Float	Moderate micaceous GREYWACKE? or meta-sandstone, weak FeOx en fractures



## ANALYTICAL REPORT

Job: 3AD0951

O/N: 6184

Sample	Ba	As
24001	1000	18
24002	170	20
24003	185	4
24004	610	22
24005	680	3
24006	780	4
24007	840	6
24008	800	2
24009	660	4
24010	710	<2
24011	70	<2
24012	740	<2
24013	450	2
24014	960	8
24015	55	<2
24016	125	<2
24017	600	<2
24018	670	52
24019	35	10
24020	840	6
24021	520	3
24022	810	10
24023	15	7
24024	900	3
24025	60	12
24026	40	10
24027	490	6
24028	510	52
24029	560	18
24030	10	14
24031	210	<2
24032	520	11
24033	4750	9
24034	230	2
24035	560	4
24036	35	2
24037	590	<2
24038	15	20
24039	310	<2
24040	410	2
24041	155	<2
24042	1100	4
24043	250	4
24044	290	<2
24045	590	6
Units	ppm	ppm
DL	10	2
Scheme	XRF1	XRF1

Job: 3AD0951  
O/N: 6184

## ANALYTICAL REPORT

Sample	Ba	As
24046	840	3
24047	640	6
24048	440	9
24049	470	15
24050	530	<2
24051	600	2
24052	600	6
24053	700	3
24054	560	26
24055	55	32
24056	430	15
24057	750	13
24058	300	13
24059	450	7
24060	310	13
24061	450	32
24062	35	9
24063	370	24
Units	ppm	ppm
DL	10	2
Scheme	XRF1	XRF1

ANALYTICAL REPORT

Sample	Cu	Pb	Zn	Fe	Mn	Cd	Co
24001	30	14	52	5.10	185	<1	6
24002	100	10	56	4.72	630	<1	28*
24003	150	12	42	3.44	310	<1	32
24004	26	7	35	2.32	175	<1	3
24005	44	13	22	3.46	60	<1	3
24006	38	20	16	3.44	50	<1	1
24007	52	44	46	3.92	150	<1	3
24008	25	13	46	3.72	170	<1	4
24009	19	18	54	3.28	220	<1	8
24010	50	10	120	5.70	430	<1	22*
24011	2	<3	2	0.25	20	<1	<1
24012	10	20	68	5.75	350	<1	8
24013	40	16	50	5.25	75	<1	3
24014	26	15	32	3.84	125	<1	1
24015	4	<3	2	0.55	40	<1	1
24016	4	3	17	1.07	55	<1	2
24017	90	15	13	3.74	10	<1	<1
24018	48	12	14	4.70	10	<1	<1
24019	8	20	24	45.4	100	<1	3*
24020	6	11	28	3.54	100	<1	4
24021	8	13	36	5.40	220	<1	7
24022	22	25	70	4.38	270	<1	10
24023	3	14	13	37.5	320	<1	3*
24024	7	13	46	4.56	250	<1	10
24025	4	15	42	44.7	370	<1	4*
24026	68	6	70	6.15	760	1	38
24027	26	13	18	4.04	165	<1	1
24028	45	12	66	4.80	290	<1	3
24029	28	12	48	4.44	170	<1	2
24030	4	18	22	46.5	100	<1	3*
24031	7	10	20	2.06	90	<1	2
24032	22	12	12	7.05	10	<1	<1
24033	32	12	42	3.98	90	<1	3
24034	8	15	32	2.94	190	<1	5
24035	12	22	160	6.95	210	<1	4
24036	70	5	54	4.94	650	<1	28*
24037	17	17	62	3.10	200	<1	2
24038	3	12	16	38.1	270	<1	3*
24039	2	4	4	0.55	60	<1	1
24040	4	10	26	3.90	125	<1	4
24041	6	7	18	2.40	100	<1	3
24042	8	13	26	3.26	125	<1	3
24043	3	7	24	3.70	80	<1	3
24044	2	9	7	0.68	55	<1	1
24045	15	14	48	4.20	300	<1	7
Units	ppm	ppm	ppm	%	ppm	ppm	ppm
DL	1	3	1	0.01	5	1	1
Scheme	IC2E						

Job: 3AD0951  
 O/N: 6184

## ANALYTICAL REPORT

Sample	Cu	Pb	Zn	Fe	Mn	Cd	Co
24046	6	9	40	3.64	185	<1	6
24047	12	22	42	3.26	100	<1	3
24048	14	8	25	1.47	110	<1	<1
24049	34	17	68	4.20	105	<1	3
24050	11	14	74	4.24	310	<1	3
24051	52	16	38	4.34	90	<1	2
24052	58	14	18	5.30	35	<1	<1
24053	8	11	46	4.08	210	<1	8
24054	48	18	44	6.20	80	<1	5
24055	60	25	340	42.3	500	<1	34*
24056	150	13	22	12.3	10	1	<1
24057	25	13	72	4.88	310	<1	12
24058	185	24	78	6.05	550	<1	17
24059	11	17	44	4.42	200	<1	7
24060	32	16	25	4.20	1680	<1	4
24061	62	7	8	3.98	15	<1	1
24062	64	4	4	2.06	95	<1	14
24063	25	10	14	3.40	75	<1	1
Units	ppm	ppm	ppm	%	ppm	ppm	ppm
DL	1	3	1	0.01	5	1	1
Scheme	IC2E						

## ANALYTICAL REPORT

Job: 3AD0951  
O/N: 6184

Sample	Ni	Ag
24001	12	<0.5
24002	60	<0.5
24003	66	<0.5
24004	7	<0.5
24005	8	<0.5
24006	4	<0.5
24007	17	<0.5
24008	10	<0.5
24009	13	<0.5
24010	48	<0.5
24011	3	<0.5
24012	7	<0.5
24013	13	<0.5
24014	4	<0.5
24015	6	<0.5
24016	8	<0.5
24017	3	<0.5
24018	2	<0.5
24019	5	0.5
24020	11	<0.5
24021	18	<0.5
24022	24	<0.5
24023	6	<0.5
24024	28	<0.5
24025	6	0.5
24026	64	<0.5
24027	8	<0.5
24028	7	<0.5
24029	5	<0.5
24030	6	0.5
24031	8	<0.5
24032	4	<0.5
24033	6	<0.5
24034	12	<0.5
24035	24	<0.5
24036	35	<0.5
24037	5	<0.5
24038	5	<0.5
24039	5	<0.5
24040	10	<0.5
24041	11	<0.5
24042	9	<0.5
24043	14	<0.5
24044	5	<0.5
24045	16	<0.5
Units	ppm	ppm
DL	1	0.5
Scheme	IC2E	IC2E

Job: 3AD0951  
O/N: 6184

## ANALYTICAL REPORT

Sample	Ni	Ag
24046	14	<0.5
24047	11	<0.5
24048	3	<0.5
24049	9	<0.5
24050	6	<0.5
24051	6	<0.5
24052	2	<0.5
24053	22	<0.5
24054	22	<0.5
24055	62	<0.5
24056	3	<0.5
24057	26	<0.5
24058	24	<0.5
24059	17	<0.5
24060	16	<0.5
24061	11	<0.5
24062	30	<0.5
24063	7	<0.5
Units	ppm	ppm
DL	1	0.5
Scheme	IC2E	IC2E

BULK DENSITY

Sample Identification	Bulk Density g/ml
24026	2.96
24036	3.01

APPENDIX 4

PRELIMINARY INTERPRETATION OF GRAVITY AND MAGNETIC DATA  
DR D.E. LEAMAN, 1993b

# LEAMAN GEOPHYSICS

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## PRELIMINARY INTERPRETATION GRAVITY AND MAGNETIC DATA

EL 26/92 PEGARAH, KING ISLAND

for  
GEOPEKO

by  
D. E. Leaman

April 1993

KINGIS2

## SUMMARY

This report outlines an indicative and very preliminary interpretation of new ground magnetic and gravity data acquired by Geopeko across eastern King Island in early 1993.

The aim of the interpretation has been to assess the implications of the potential fields observed and to suggest the possible geological and exploration options. Neither the time allotted for this review, nor the supporting geological information available, allowed more comprehensive study.

The new data has led to considerable revision of previous gravity maps and some old data must now be rejected unless original observation sheets can be located and the data completely verified and adjusted.

The assessment confirms previous work suggesting that the Grassy and Sea Elephant granitoids are contiguous and extensive. The roof of these intrusions lies typically at depths less than 3 km but elements are of high relief. The more magnetic Grassy Granite may be diapiric to the main pluton.

Some large displacements can be inferred in the region of the Grassy River Fault and it is likely that these reflect some older structuring (including a possible Cambrian basin margin) and roof uplift during intrusion. Younger offsets are relatively minor.

Magnetic responses appear to be related to pelitic units - or some other variation within the Precambrian rocks, the Grassy Granite phase and its metamorphic halo. The extension of the Grassy River Fault is marked by a depression in the magnetic field and, although control profiles are widely spaced, it seems likely that there are some offsets on the alignment. These appear to be associated with granite crests and overall distribution and the fault may have controlled the western margin of the Sea Elephant Pluton at high levels. Magnetic responses thought to be due to halo alteration do not appear to be universal and this may be of exploration significance.

The composition and stratigraphy of the Precambrian rocks should be examined since these may offer host potential where the granite has crested or there are evident structural controls, and a substantial alteration halo is indicated. Some confirmation of physical properties and more detailed geological basemap would be essential for more detailed analysis.

## INTRODUCTION

Leaman (1992) reviewed existing gravity and magnetic data in the King Island region and was able to show that granites dominated the structures on the island. The subtler roof elements were either not defined or not covered by old surveys and there was also some doubt about the consistency and reliability of available gravity data.

It was evident that some expansion of the magnetic coverage as well as some infill and checking of the gravity data was worthwhile. The Pegarah licence area (EL 26/92, see Figure 1) has now been resurveyed gravimetrically and several lengthy magnetic profiles have been completed. Full details of these surveys will be reported directly by Geopeko and are beyond the scope of this assessment report.

This report considers the data quality-consistency issue and outlines revised or refined interpretation implications. These are very rudimentary due to the limited time allotted for the study and it should be considered indicative only.

## DATA USED

This revised/update interpretation has employed a revised, if more regionally limited, data base than previous analyses (e.g. Leaman, 1992).

Gravity

The recent review of extant gravity data (Leaman, 1992) showed that every major previous survey, while apparently consistent internally, could not be properly linked to each other against a standard datum. This, notwithstanding the fact that all surveys had used the national datum reference station at King Island Airport at Currie. The review compilation accepted the form of the gravity field but normalised the values in order to produce a nominally coherent map.

In order to resolve these issues and add detail to the current picture of the gravity field, Geopeko undertook a new survey of its Pegarah licence area and linked this work to earlier surveys at Bold Head and Reekara. The new coverage also allows an automatic comparison with the previous 1967 regional survey. The new survey has established that the Reekara survey was valid and properly tied and that a small observed base shift may be involved in the Bold Head survey due to a difference in value at the Powerhouse base. This shift appears in practice to amount to about 0.7 mgal with all Bold Head survey values being high by this amount. The new Powerhouse value is estimated at 980197.84 mgal. It should be noted that this differs from the value quoted in old Peko documents (by 4 mgal) and also from the BMR isogal value (by 1 mgal). Some further links may be justified although comparison of four overlapped stations has been used to infer the actual resultant difference in the survey datums used.

The new compilation included in this report (Figure 3) ignores the apparent contradictions in these base values and has used direct height and observed gravity comparisons at repeated stations.

The regional data set poses different problems. There is no consistent deviation between it and either the Reekara survey or the new southern survey and many of the values appear random. The general deviation against Reekara data is about +2.5 mgal but for other stations the range is +5 to +10 mgal with a mean of about 7.5 mgal. This lack of consistency in Bouguer anomalies cannot be linked to a simple false base value - unless more than one mistake has been made - or positional problems, even though these are recognisable. There is an apparent height-related pattern, however, such that acceptable comparisons can be made near sea level but discrepancies increase with elevation. This would account for the Reekara consistency; there is very low relief at about 60 m.

Unfortunately this problem cannot be resolved without the original station and survey maps and barometer data (including details of the pre 1967 levels used as control). These do not appear to have been archived. The problem is also unpredictable since parts of some loops may be approximately correct. Because of this doubt, however, this data set has now been rejected.

A revised compilation of central and eastern King Island based on accepted (or new) data is shown in Figure 3. The regional geology is shown at the same scale in Figure 2.

#### Magnetics

Several ground magnetometer traverses were observed by Geopeko during February 1993. The results, after diurnal and base correction, were supplied by Geopeko and are shown in Figures 4 to 10. The data files have been despiked by hand and slightly smoothed in order to allow some basic contouring and modelling (Figures 11, 17 to 20). No direct filtering can be recommended on this data set unless despiked due to risk of transforming the frequency characteristics of the profiles. The spikes reflect various types of cultural noise (including road surfaces, pipes, fences etc).

Some minor plotting uncertainties are disguised in the final contour plot. These reflect the noise envelope in the data due to noise and high gradient instability and the fact that no reading was duplicated to check for validity. The precision of the nominal 25 m station interval along kinked traverses also introduces some lack in resolution. The descriptions of the end points of some traverses are also not rigorous (especially Ridges Road, East Frazer Road) but all other road profiles have been satisfactorily located. These minor deficiencies are not serious at the scale presented or in terms of this regional cover.

## INTERPRETATION

Eight gravity profiles and four magnetic profiles have been assessed provisionally. Each is discussed briefly below. Each has been interpreted in terms of consistent rock property and curve fit parameters using the regional geology as a guide.

The location of the modelled profiles is shown in Figure 12.

Gravity

## Profile G1 (Figure 13)

This profile samples the southern limit of "reliable" gravity data and includes the Grassy area as control.

The solution offered shows the crest of the Grassy Granite and the truncation of the Precambrian rocks including the Currie Granitoid. The mass balance between the Currie and Grassy bodies is not uniquely defined due to interaction of denser pelites and underlying granites but the granite surface must be at least 4 km below surface. The critical element of this section lies east of Grassy where the extreme positive effects imply a thick Cambrian pile. Much more than a simple onlap is involved here and considerable displacement and/or deposition is indicated. The Grassy River Fault is adjacent to this major change in sequence and structure but now trends acute to it (about 30 degrees to the west of the granite margin, and possibly the original trough edge).

## Profile G2 (Figure 13) at 5570 N.

The section includes the broad relatively negative gravity response north of Grassy but contains a much reduced coastal effect where true onlapping of the Cambrian rocks may be demonstrated. Otherwise the results are very similar to those presented in G1 but the granite crest is at a shallow depth. No thick Cambrian sequence is indicated. Cresting of the granite appears to have occurred near the axis of the Grassy River Fault.

## Profile G3 (Figure 14) at 5574 N.

This profile samples the ill-defined field near Pegarah. The coastal gradient is also weak. The model presented is consistent with G1 and G2 but the granite surface is deeper and not well defined. Some local variations would be possible. The change in pelite (?) distribution within the Precambrian roof rocks can be linked to the Grassy River Fault although some mass exchanges are possible. Also see magnetic solution (Figure 20).

Profile G4 (Figure 15) traverses the Elephant River plain south of the mapped exposures of the Sea Elephant Granite.

The deduced relationships at the western end of the profile are similar to those shown in previous profiles but the granite is very deep mid section. The interpreted roof form is suggested of two bodies or very broad regional roof forms. Further exposures of the Sea Elephant Granite may occur near the coast.

## Profile G5 (Figure 15) at 5595 N.

This profile reviews exposures of the Sea Elephant Granite and the

Reekara area. The solution presents structural patterns similar to those at G4 but shows that the granite roof is much shallower overall. The crest at mid section may have considerable exploration significance.

Profile G6 (Figure 15).

This profile extends SE toward Naracoopa and stresses the irregular nature of the granite roof and its general shallowness to the west. The implied distribution of denser pelites (?) is consistent with other profiles.

Profile G7 (Figure 16).

This N-S tie line was modelled in order to test the consistency of the western ends of the profile interpretations. The simple granitic form revealed is wholly consistent with all other profiles and consistent model and rock parameters and confirms the general shallowing toward Reekara.

Profile G8 (Figure 16).

This N-S tie line provides a test of the eastern extremities of the interpretation. The interpretation may be compared with model G3, Figure 11 of Leaman (1992). The differences and refinements are apparent and reflect the higher quality of the gravity data now available.

The solution correlates well with all other profiles in terms of form and relative depths but is not consistent in curve fit criteria since 2D assumptions cannot be satisfied at this orientation since the line is sub parallel to the most important structures in the region (the Grassy River Fault and the margin of the pluton). The offset, shown by the fit details, is 4 mgal and this is consistent with the indicated lateral 3D effect which can be inferred from the dip lines. The interpretation reveals a granite crest near Paranna, about 12 km north of Grassy, and this region is magnetically anomalous (below) with a sub circular response pattern.

#### Magnetics

Profile M11 (Figures 9, 17, 18). Yarra Creek Road.

This profile samples the largest anomaly noted in the survey. This feature had been observed near the northern limit of previous aeromagnetic surveys (Leaman, 1992) where it was linked directly to exposure of the Grassy Granite.

Figures 17 and 18, however, illustrate the potential ambiguities in the interpretation of the magnetic data pending more geological information and control. These apparent ambiguities may also be considered to express possible geological options or explanations although some cannot be supported regionally or from line to line. Such options have been discarded here but further information may cause review of such decisions.

Version 1 accounts for the main anomaly by an alteration halo or relatively marked magnetisation of rocks near the Grassy Granite. Note that pelites (?) have been suggested in the gravity analysis. Critical problems with this view, however, are posed by the exposure of the granite itself, the shape of the granite (gravity analysis) and the curve fit parameters which cannot be sustained throughout

the data set (below). There is also no explanation of the origin of the relative low field nearby.

Version 2 uses the granite alone to account for the main effect. This can be sustained in terms of outcrop distribution and use of properties comparable to those of the Housetop Granite of NW Tasmania but the solution does not account for the curve fit and low field factors.

Version 3 uses two crests from the pluton to provide a better fit. This view is not sustainable gravimetrically without marked changes in composition and density within the pluton.

Version 4 offers one of the only two other viable solutions; hidden volcanics or effect of pelites. The effect of the pelites (?) is considered in following profiles. Version 4 is based on the premise that King Island is essentially similar to the Rocky Cape region of NW Tasmania and that the Precambrian rocks have been overthrust upon units comparable to those of the Smithton Trough. It is thus possible to have remnants of the primary onlap of these units, such as exposed along the east coast, and concealment of a large volume of the same materials if the displacement has been from the west. This is a viable solution whose validity would need considerably more evaluation than offered here. It is, however, both structurally and geophysically possible. And there is space in the roof of the pluton to retain significant volumes of the overthrust rocks. This option has not been followed in this analysis; I have preferred to develop the shallower variation concept and linked this to presumed pelites(?). It may be very important that this issue be resolved since the exploration consequences are transformed due to changes in lithology.

Profile M2 (Figures 10, 19) Robins Road.

This profile crystallizes some of the options illustrated above by providing an extension of the Grassy Granite solution which is consistent with the gravity view but which also uses local variations in the Precambrian rocks to account for the western higher frequency effects.

Profile M21 (Figures 9, 19) Lancaster Road.

This profile is much more irregular than others examined and the fit requires much more than granite effects, or simply pelites, to the west. The halo of the granite is also magnetised in this area and the reversely magnetised effect of the volcanics along the coast also contribute to the response pattern. The halo effect is anomalous since it cannot be definitively recognised elsewhere and this may have important implications. The gravity survey suggests some irregular roof forms to the granite in this region and immediately to north and south.

Profile M3 (Figures 5, 20) Pegarah Road.

This profile displays similar effects to those described above. The halo response affects the magnetic field and the irregular crestal implications are consistent with the gravity field. Pelites (?) can account for most other responses.

## CONCLUDING COMMENTS

These preliminary assessments suggest some consistent structures and intrusion patterns and some anomalies. The halo effect about the granite crests is not always present. Why? Does this response reflect phase or compositional changes in the pluton or different country rock alteration? This variation may well have exploration significance but a more extended examination of the data, and more data, would be required to determine this. Improved mapping and property control would also be essential. No map better than that shown in Figure 2 was available during this evaluation.

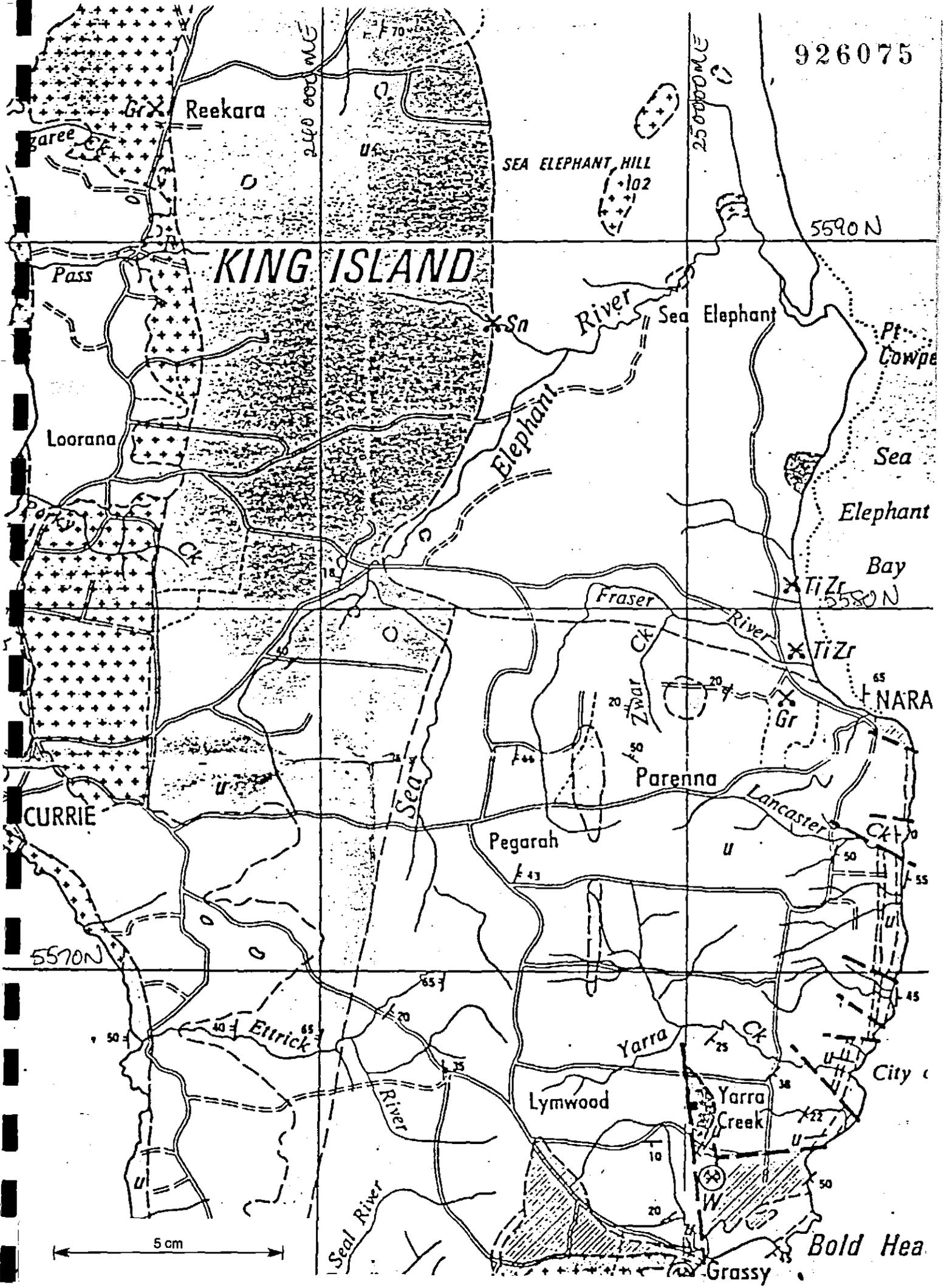
A summary view of current interpretation status is shown in Figure 21. This also includes suggestions of the extensions of major faults and intrusive boundaries based on all analysis and potential field character. Although the magnetic data do not offer high resolution control it seems likely that the extension of the Grassy River Fault is marked by some slight trend changes and local offsets. These sites may also be significant since two occur near major changes in pluton roof form (due west of Naracoopa and near Pegarah).

## REFERENCES

- Leaman, D. E., 1992. King Island. Review of gravity and magnetic data for Geopeko. Report by Leaman Geophysics, October.

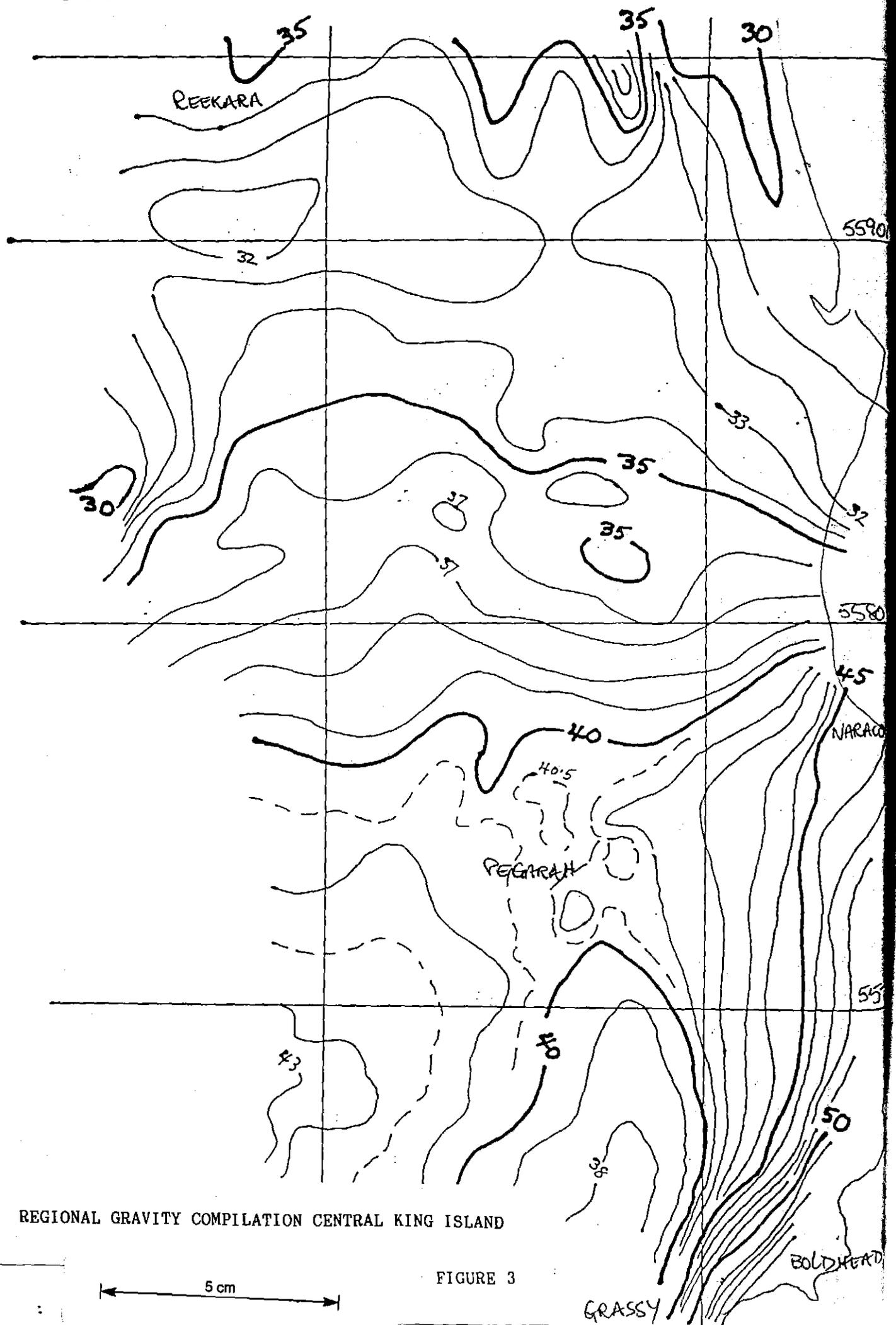


926075



REGIONAL GEOLOGY (MINES DEPARTMENT) CENTRAL KING ISLAND FIGURE 2

926076



REGIONAL GRAVITY COMPILATION CENTRAL KING ISLAND

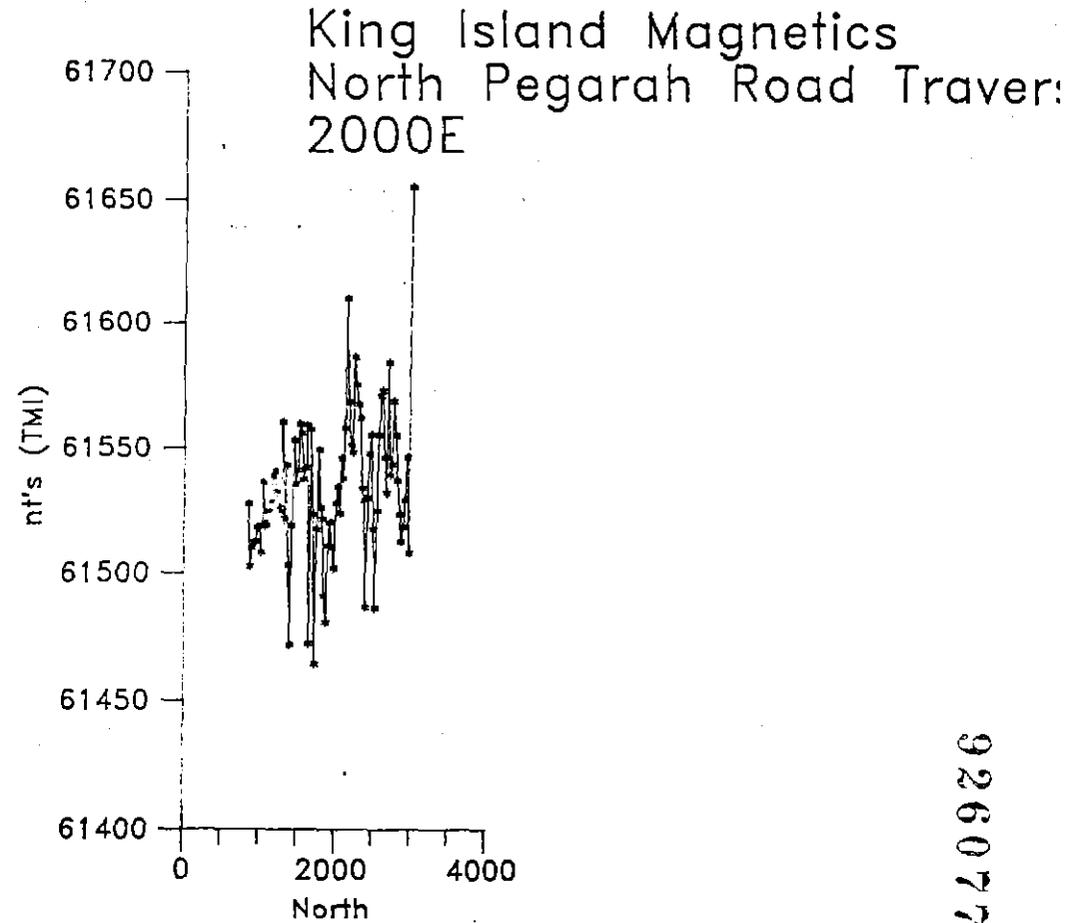
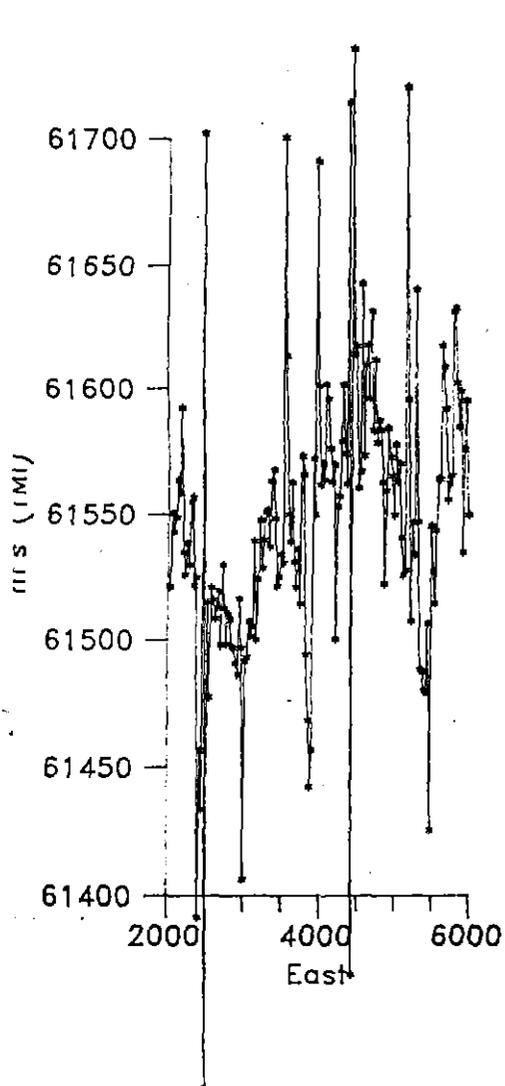
FIGURE 3

FOR INTERNAL  
USE ONLY

EL 26/92 PEGARAH

MAGNETIC PROFILES 1000N, 2000E

FIGURE 4

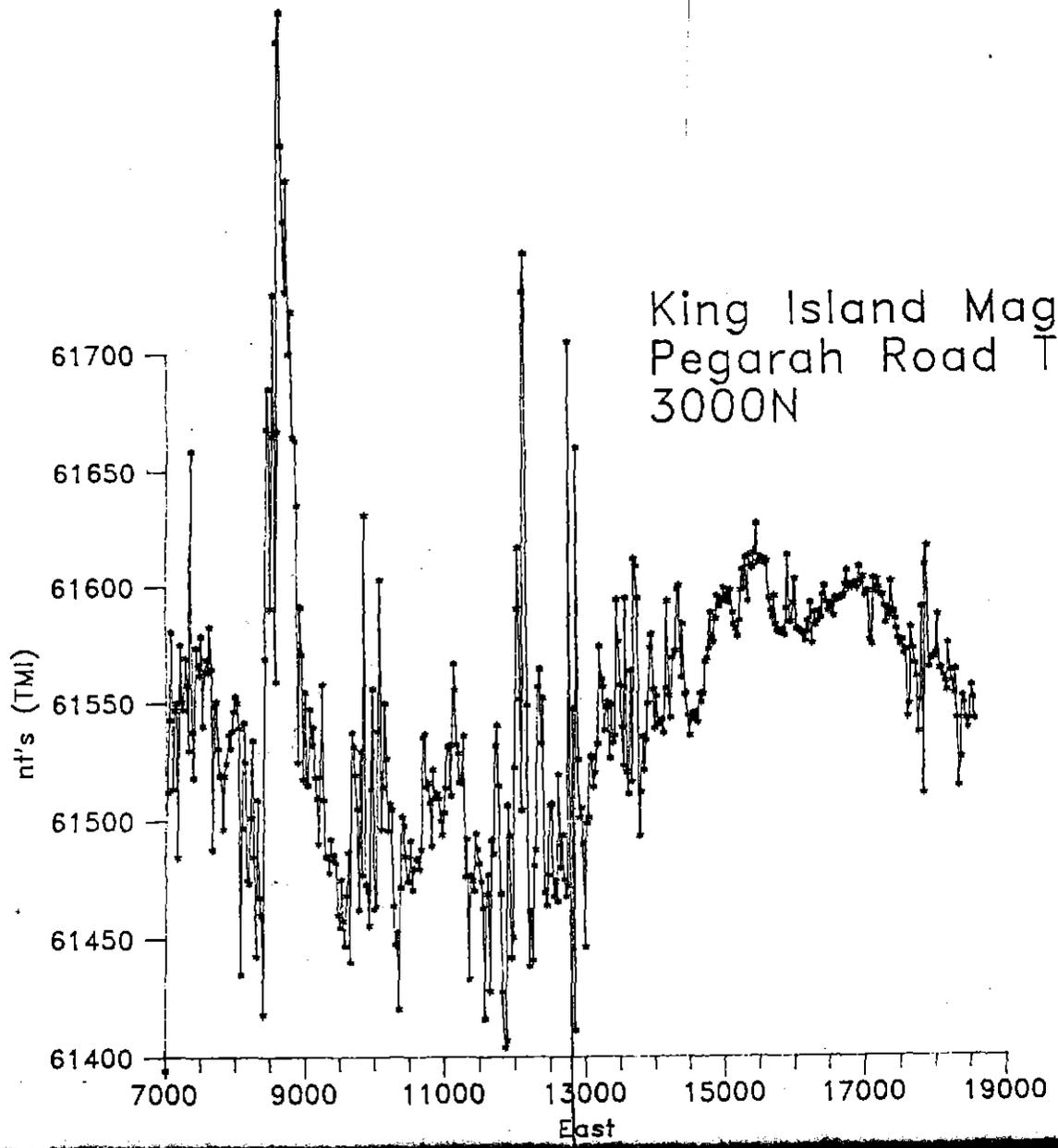


926077

EL 26/92 PEGARAH

MAGNETIC PROFILE 3000N

FIGURE 5

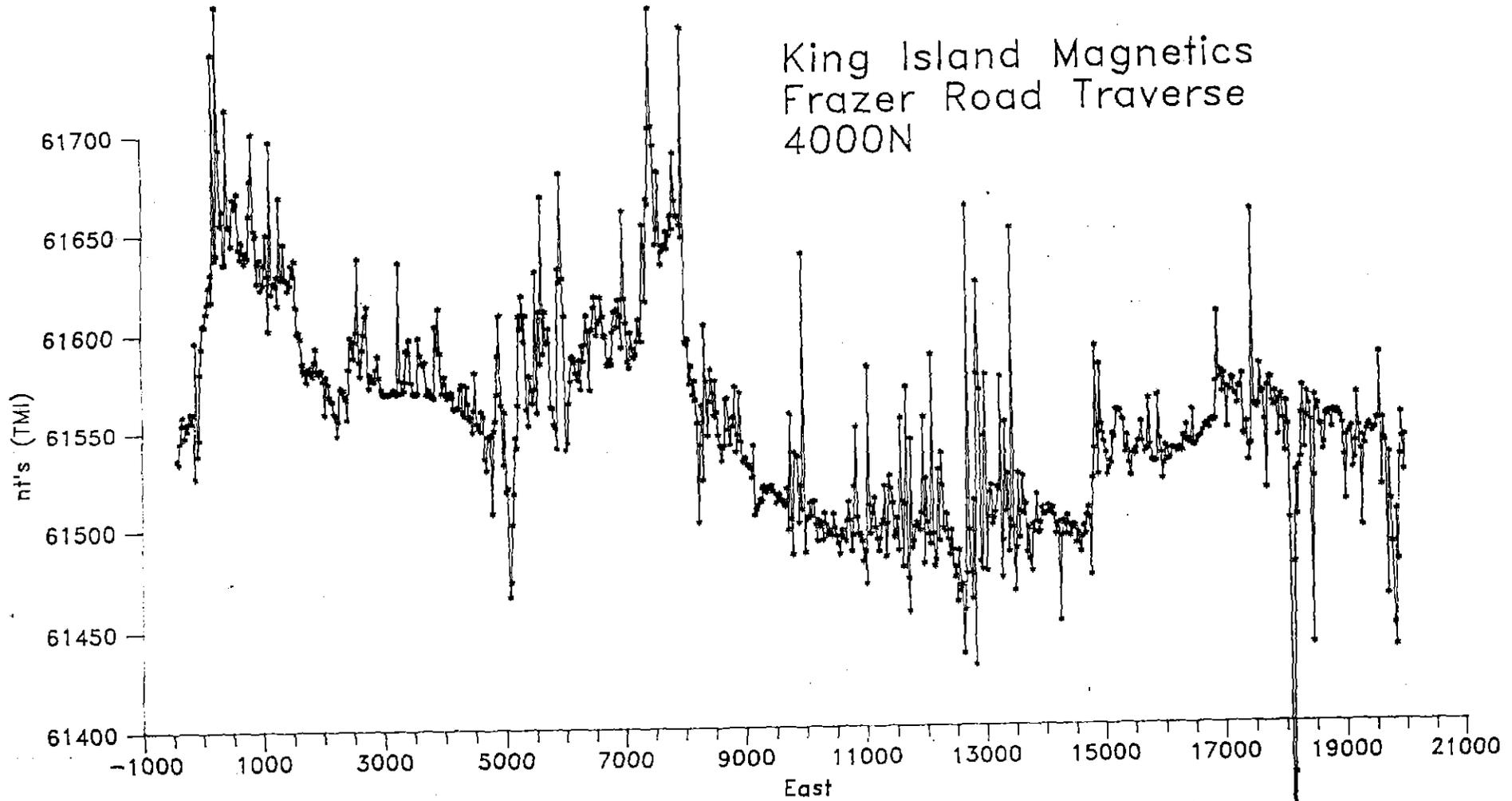


926078

EL 26/92 PEGARAH

MAGNETIC PROFILE 4000N

FIGURE 6



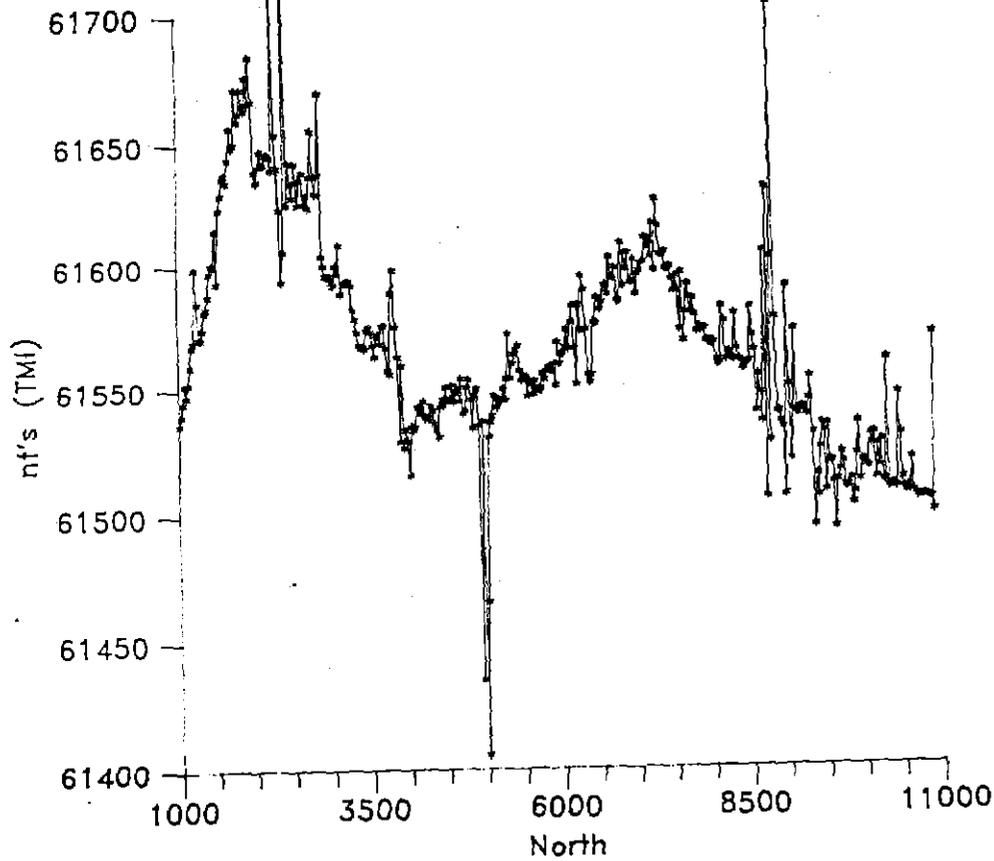
926079

EL 26/92 PEGARAH

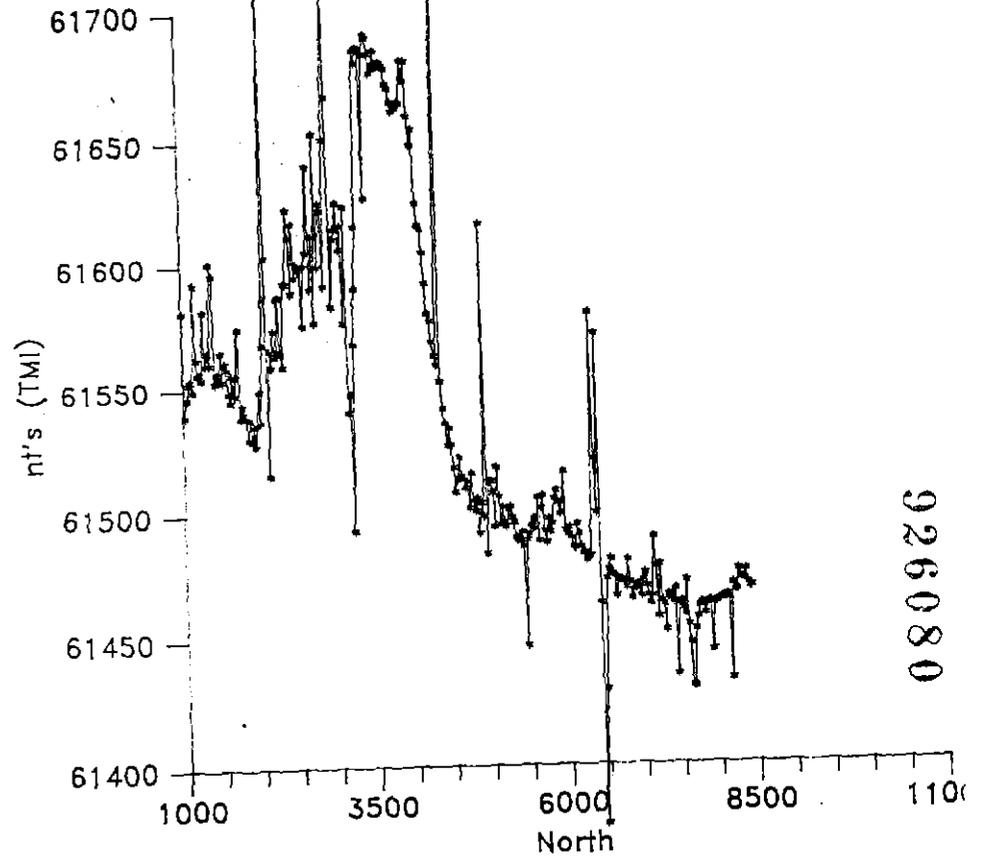
MAGNETIC PROFILES FOJGE, 7000E

PICTURE 7

King Island Magnetics  
Old Tin Mine Road Traverse  
5000E



King Island Magnetics  
Ridges Road Traverse  
7000E

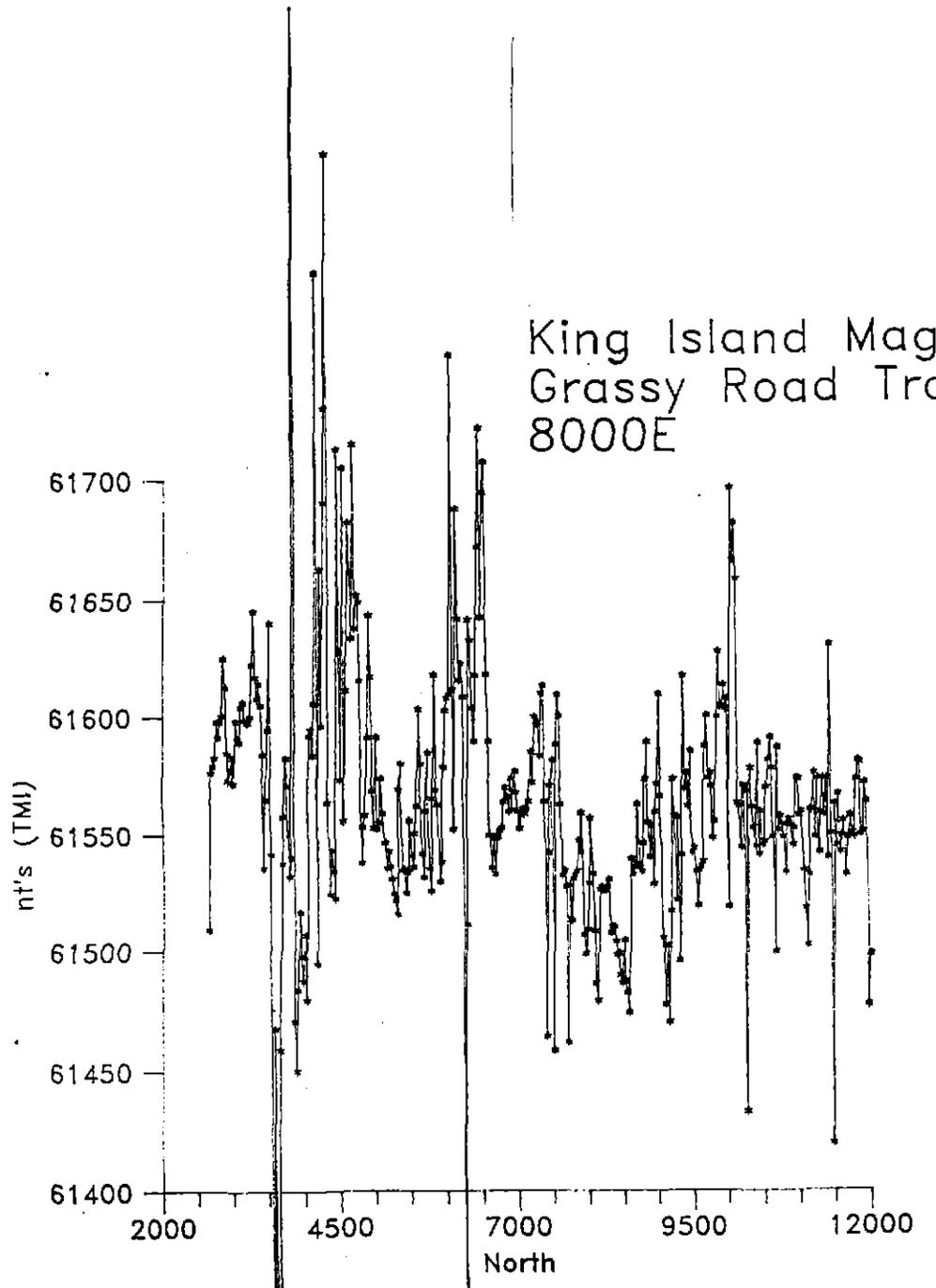


926080

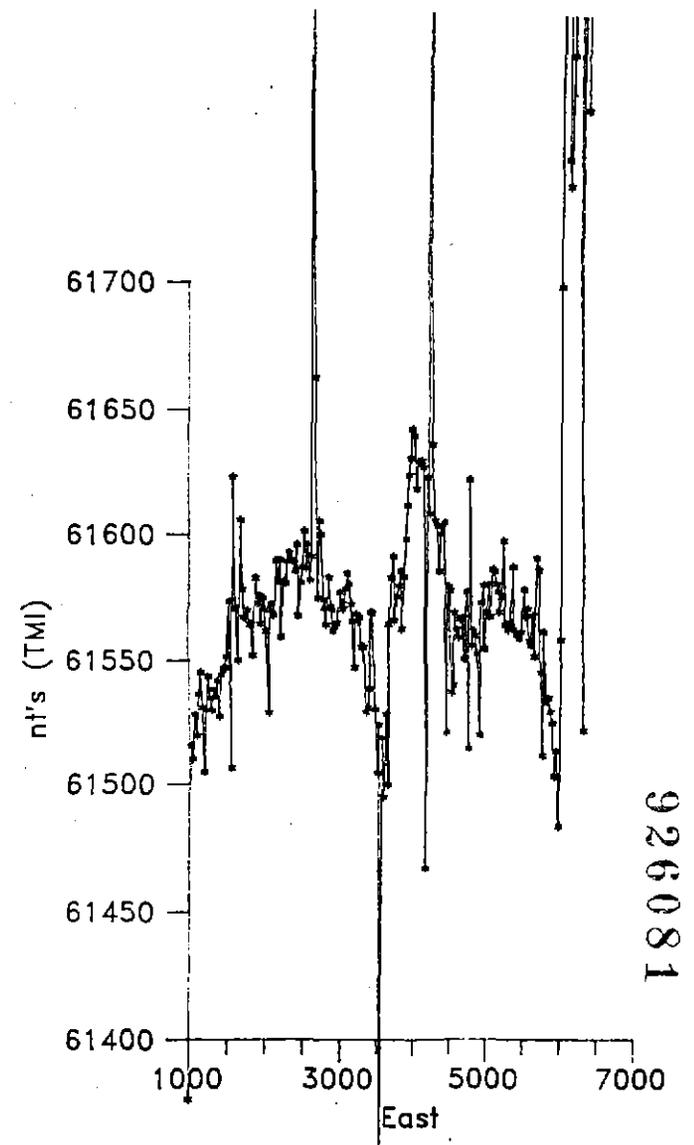
EL 26/92 PEGARAH

MAGNETIC PROFILES 8000E, 9000N

FIGURE 8



King Island Magnetics  
Grahams Road Traverse  
9000N



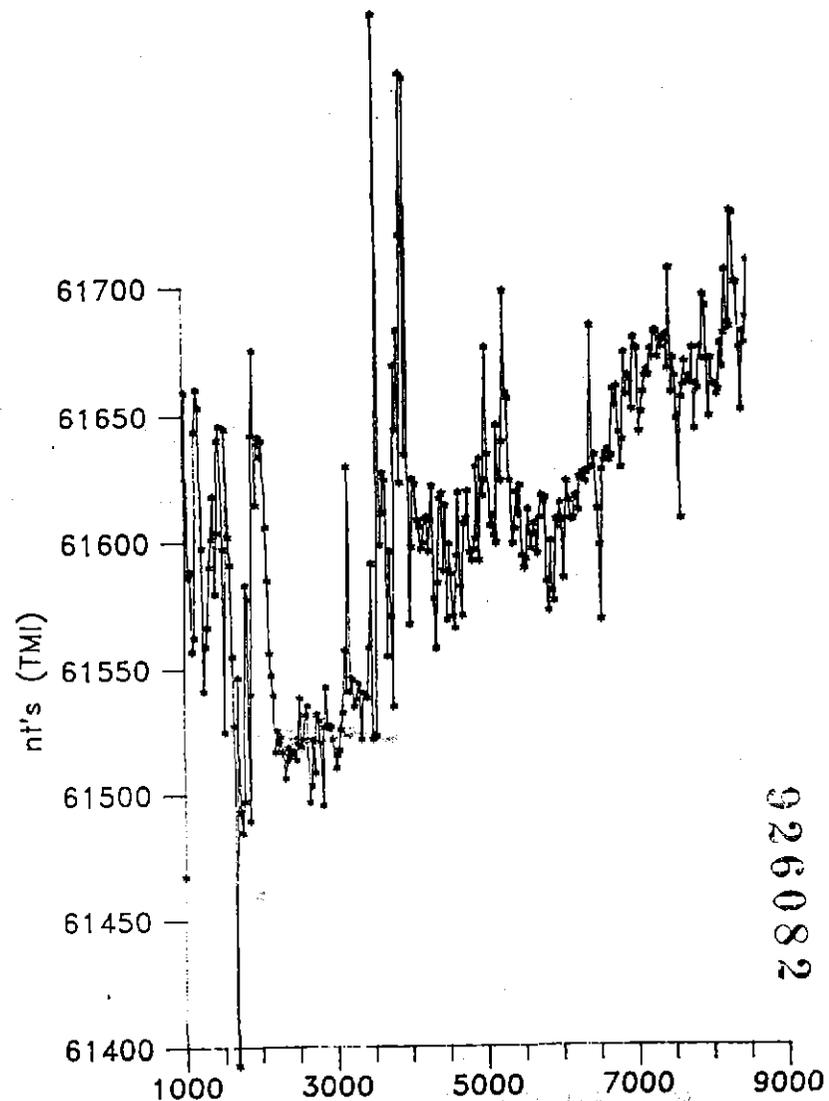
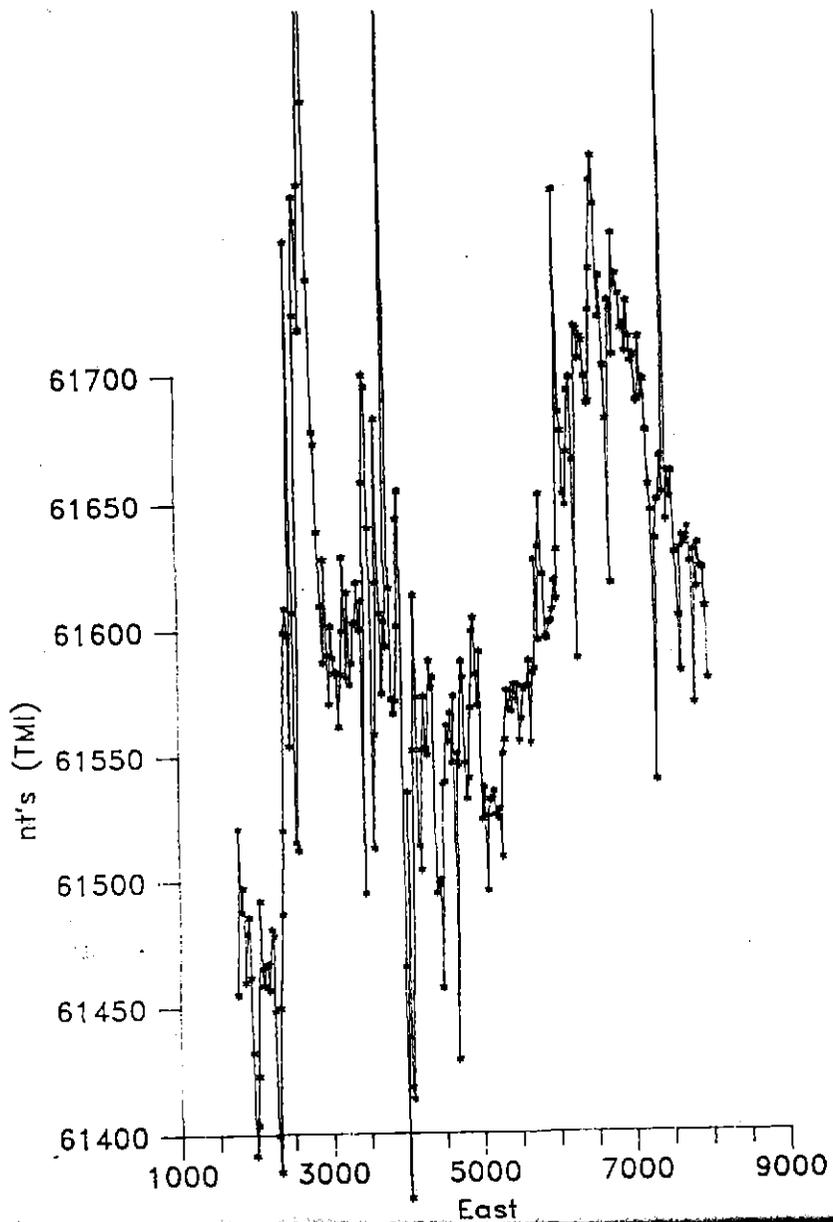
King Island Magnetics  
Yarrah Creek Road Traverse  
10000N

King Island Magnetics  
Lancaster Road Traverse  
11000N

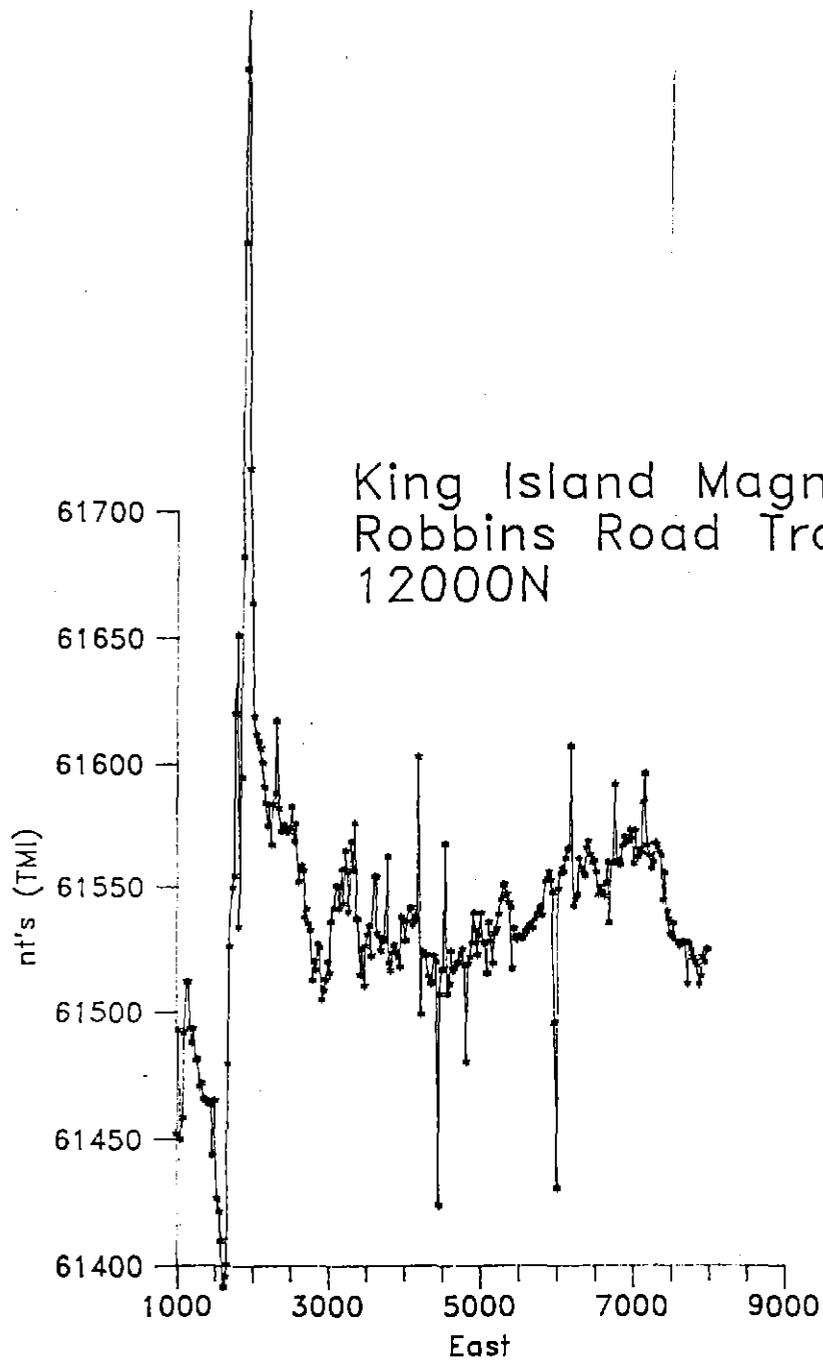
EL 26/92 PEGARAH

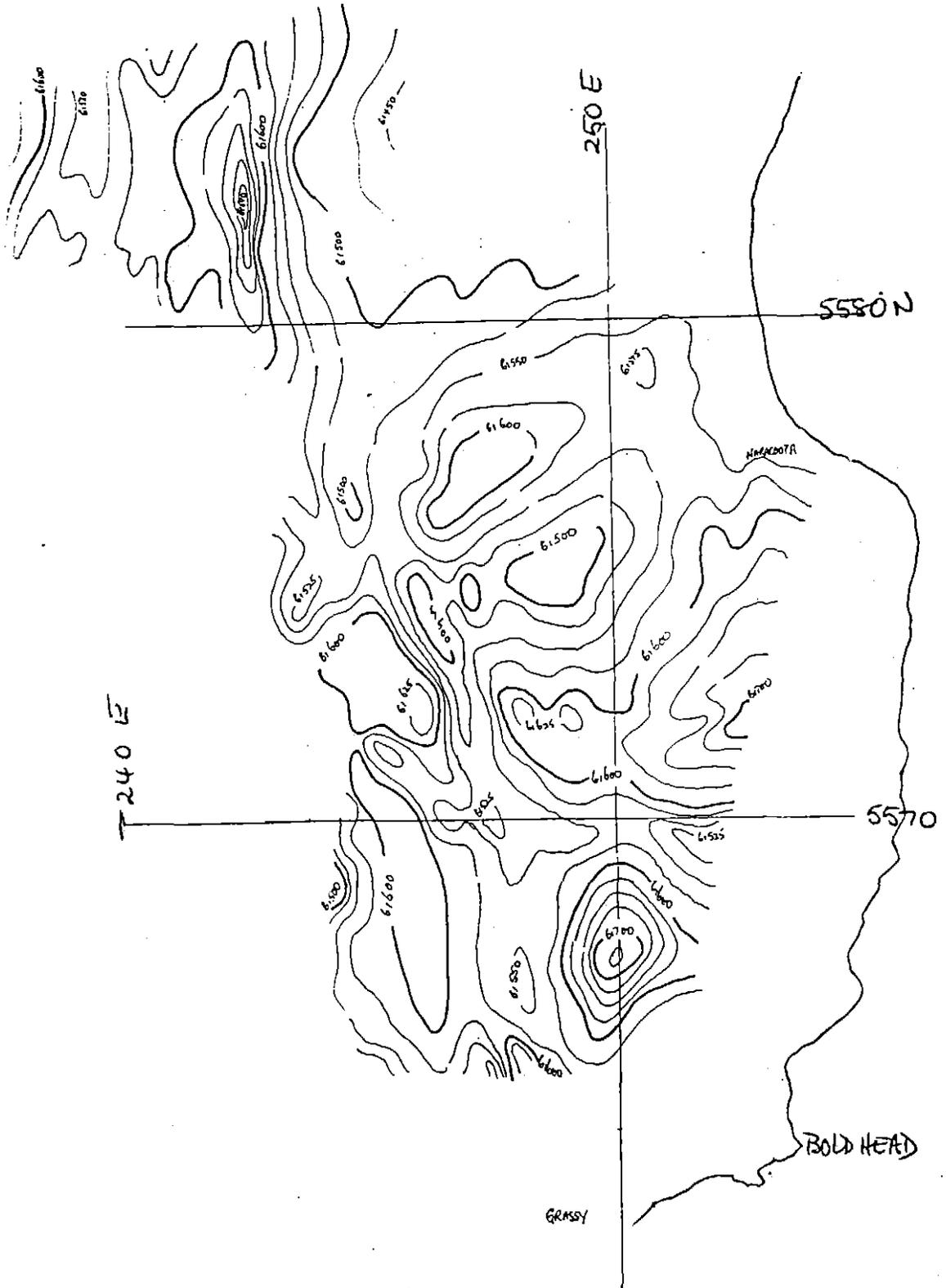
MAGNETIC PROFILES 10000N, 11000N

FIGURE 9



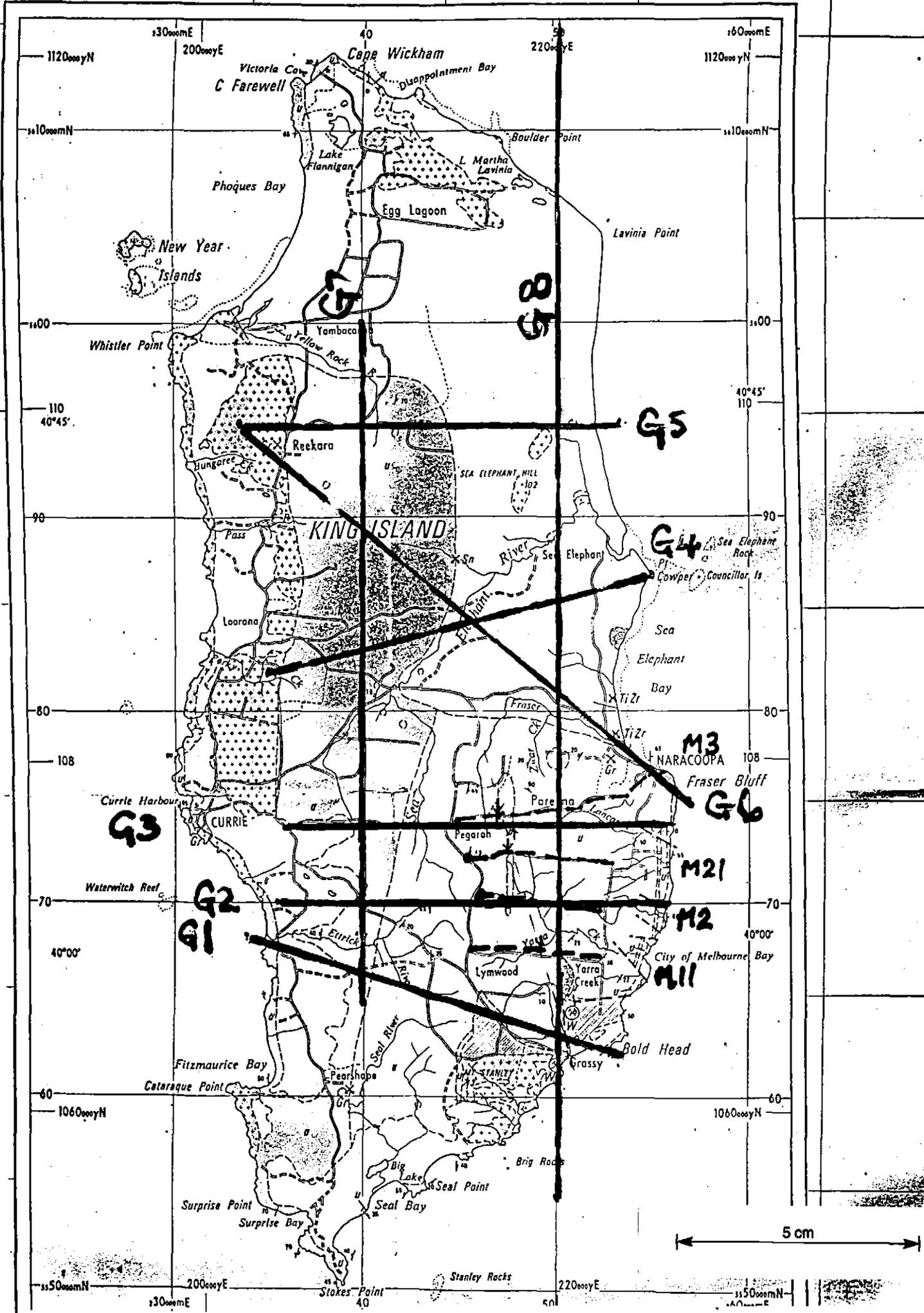
926082





EL 26/92 PEGARAH CONTOURS OF TOTAL MAGNETIC FIELD

FIGURE 11

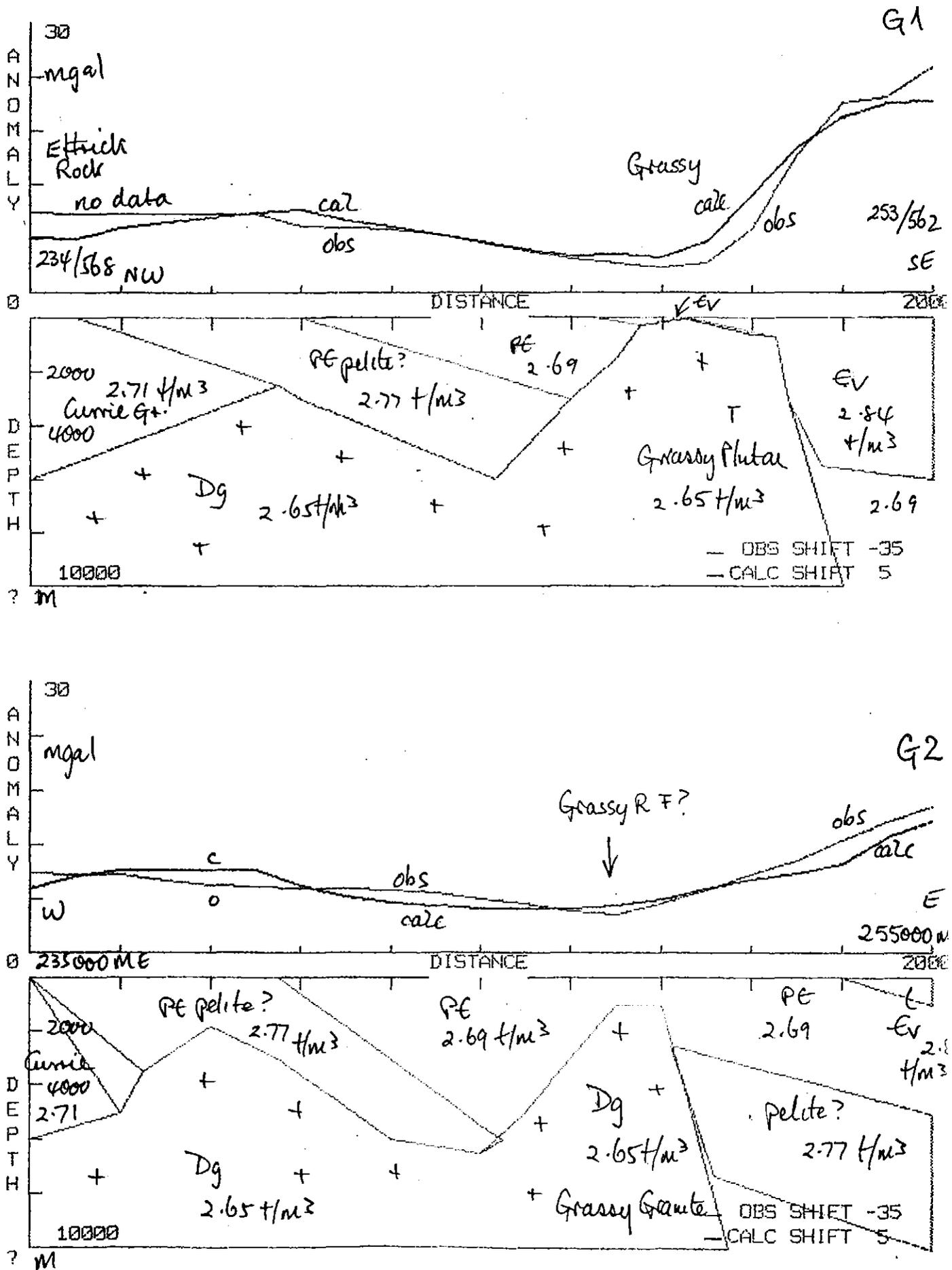


EL 26/92 PEGARAH LOCATION OF MODELLED PROFILES

FIGURE 12

04/93

926086

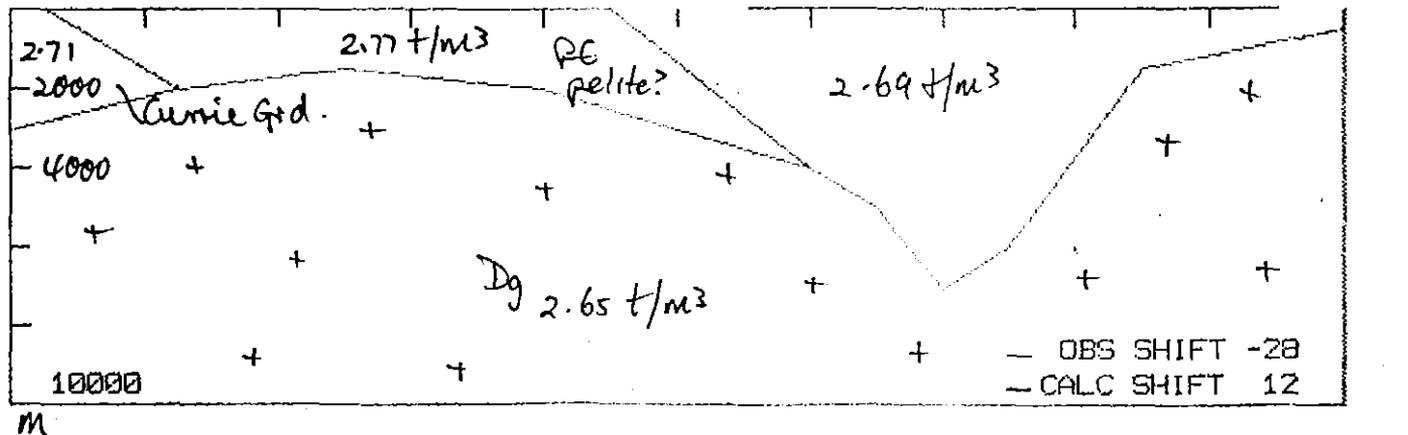
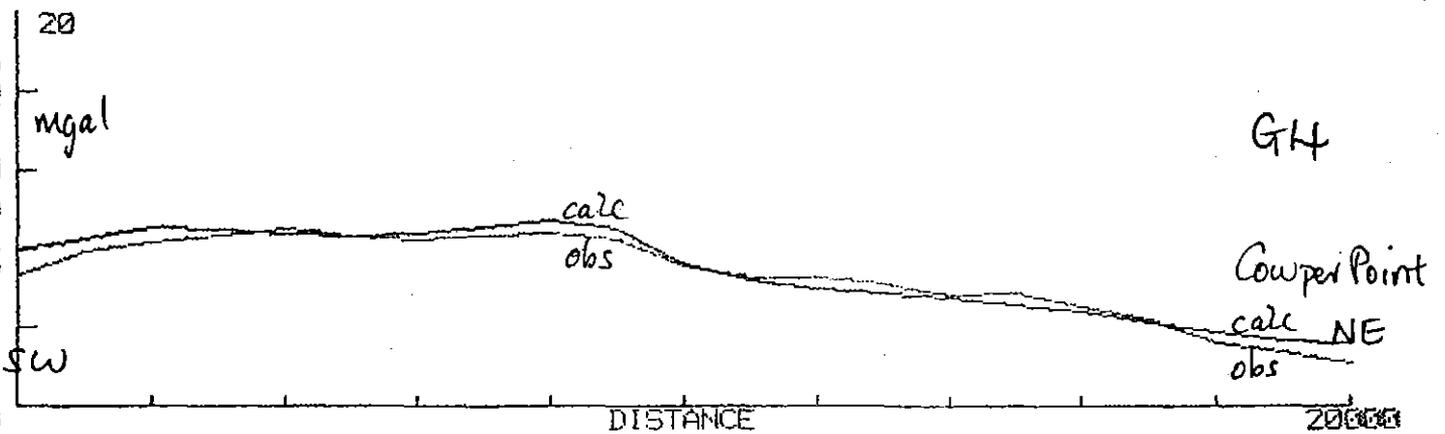
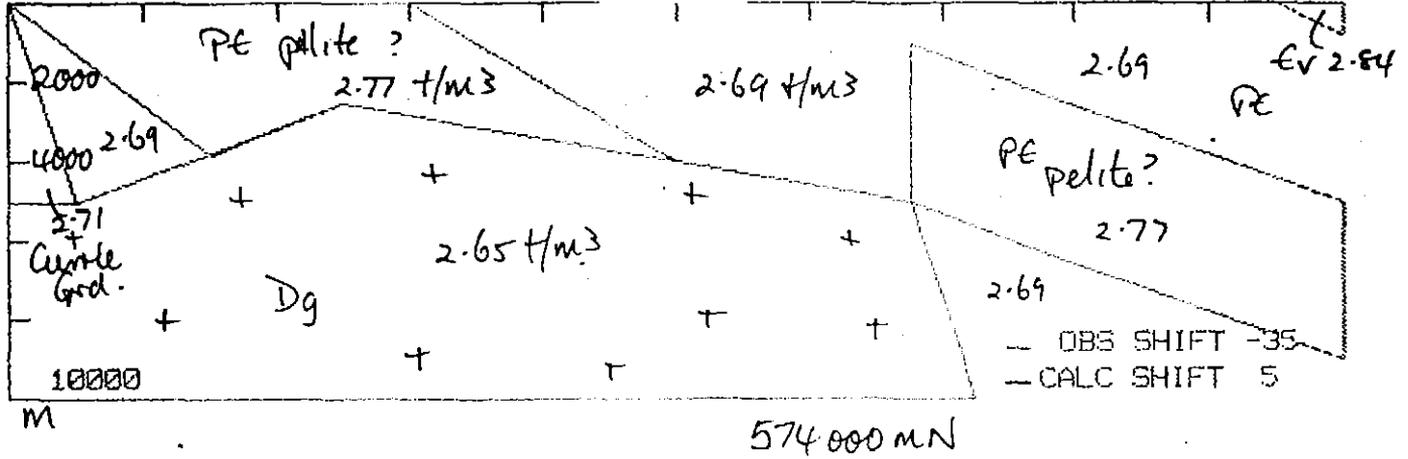
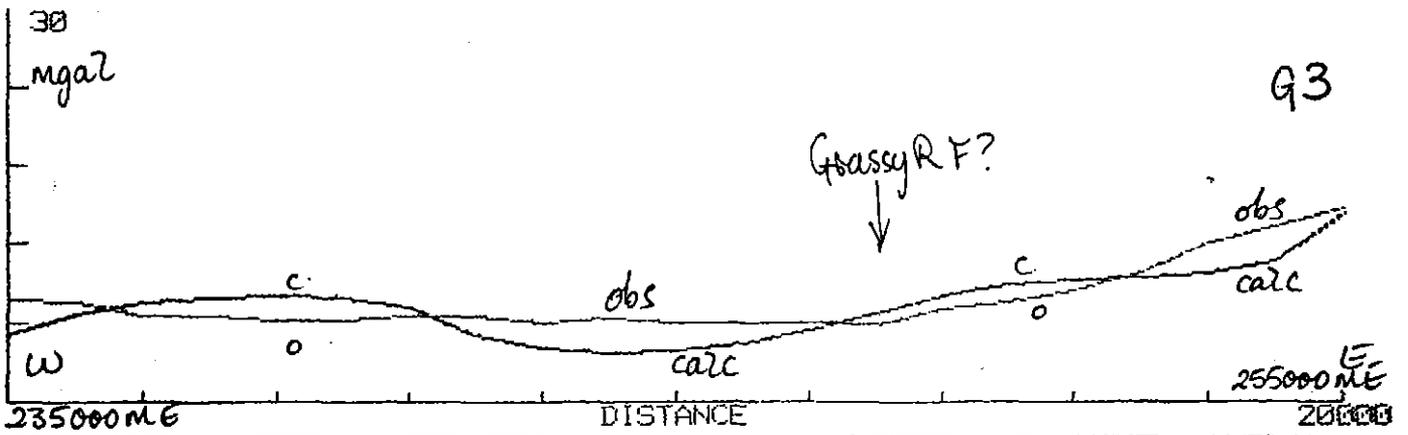


KING ISLAND GRAVITY INTERPRETATION PROFILES G1, G2

FIGURE 13

04/93

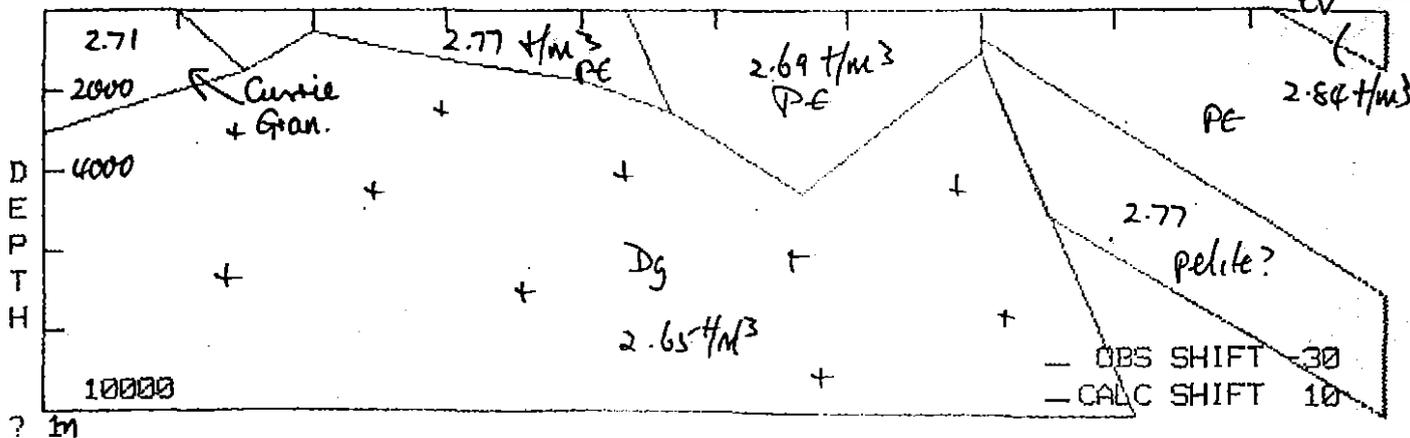
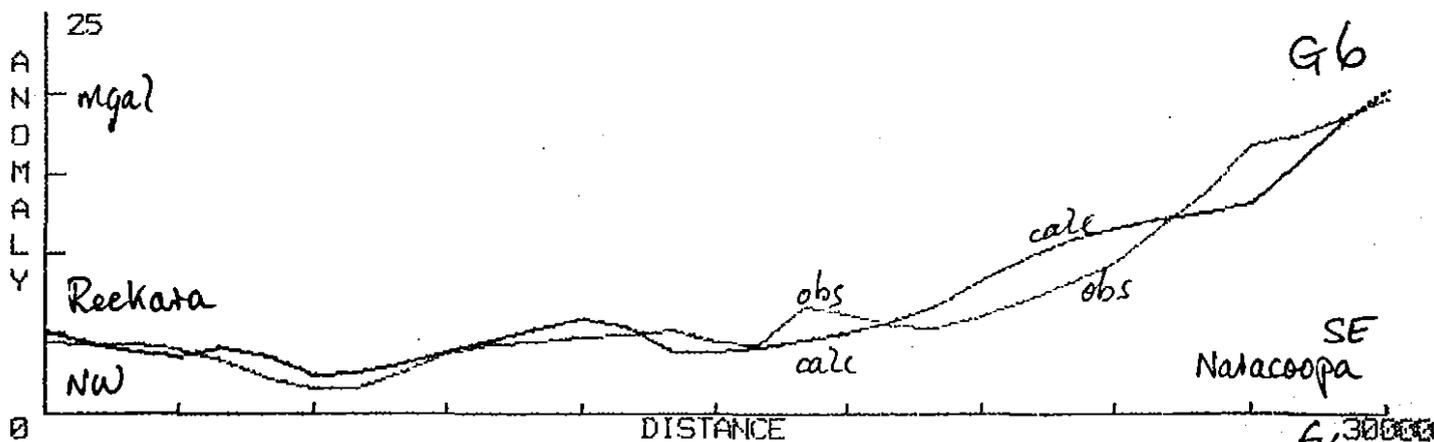
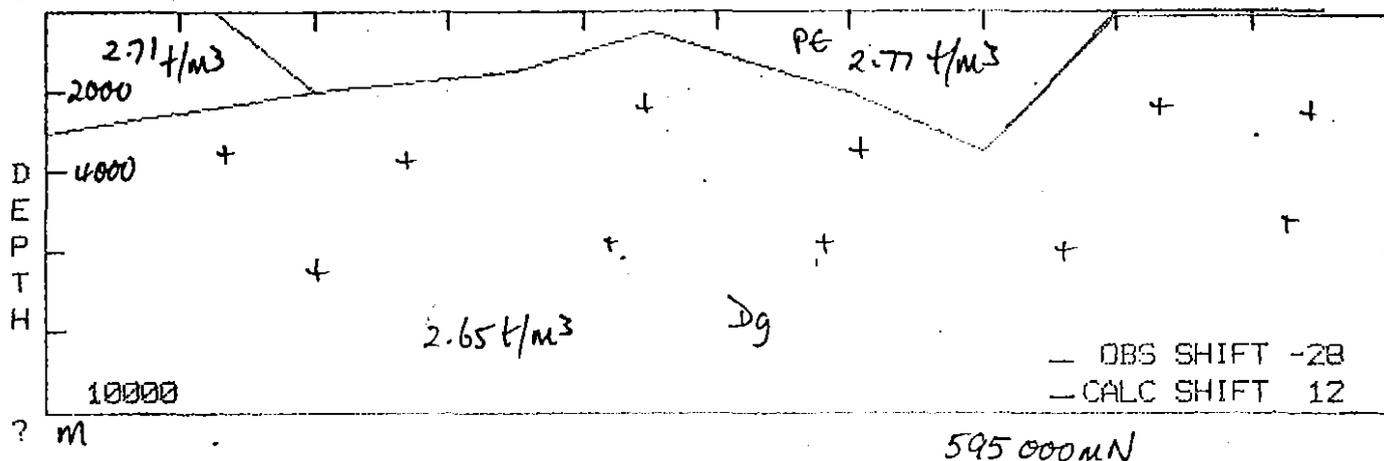
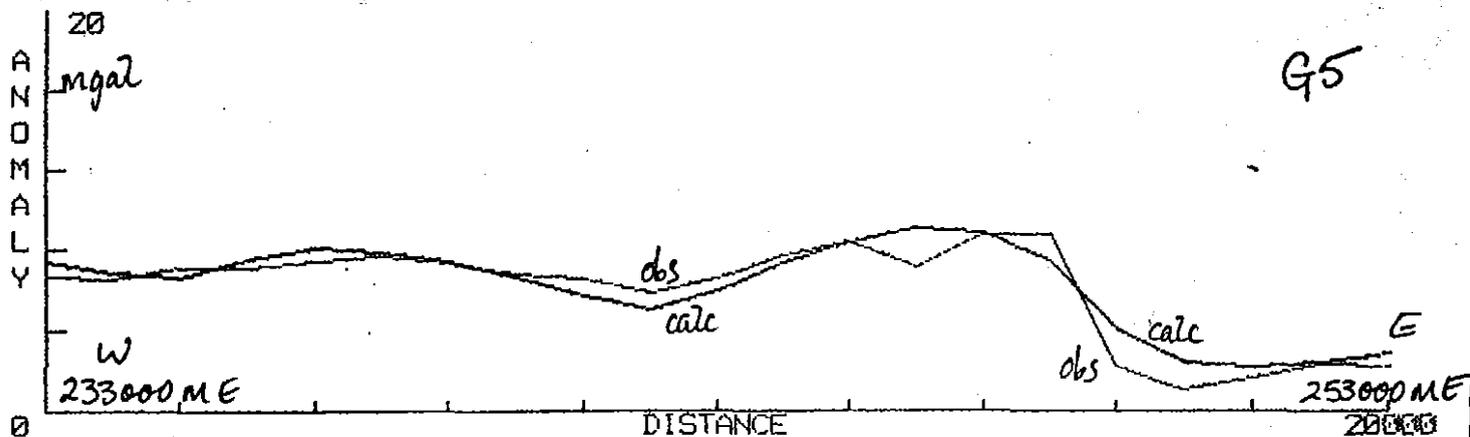
926087



KING ISLAND GRAVITY INTERPRETATION PROFILES G3 AND G4 - FIGURE 14

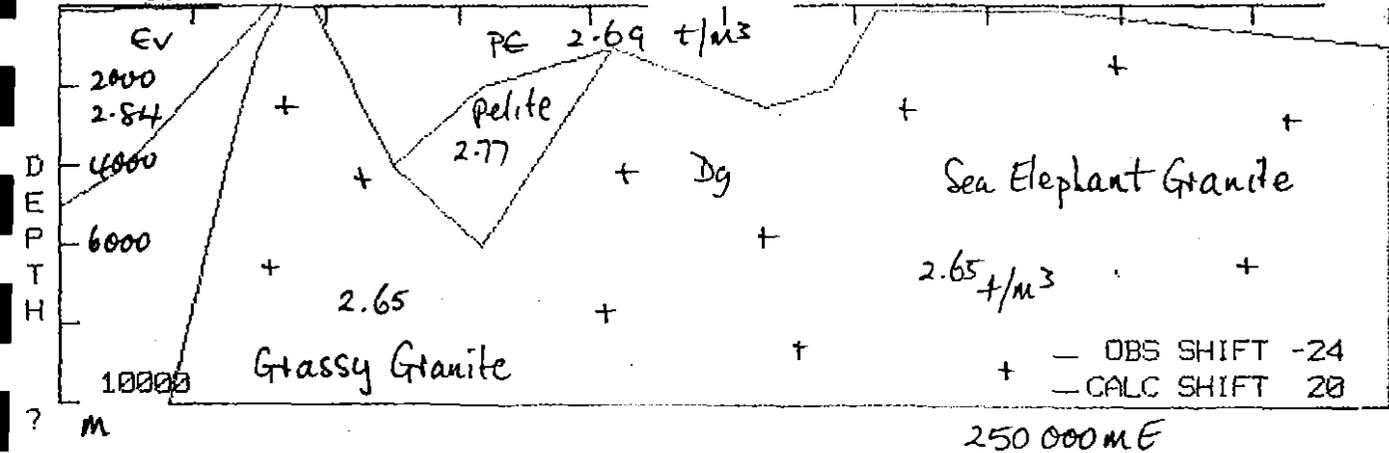
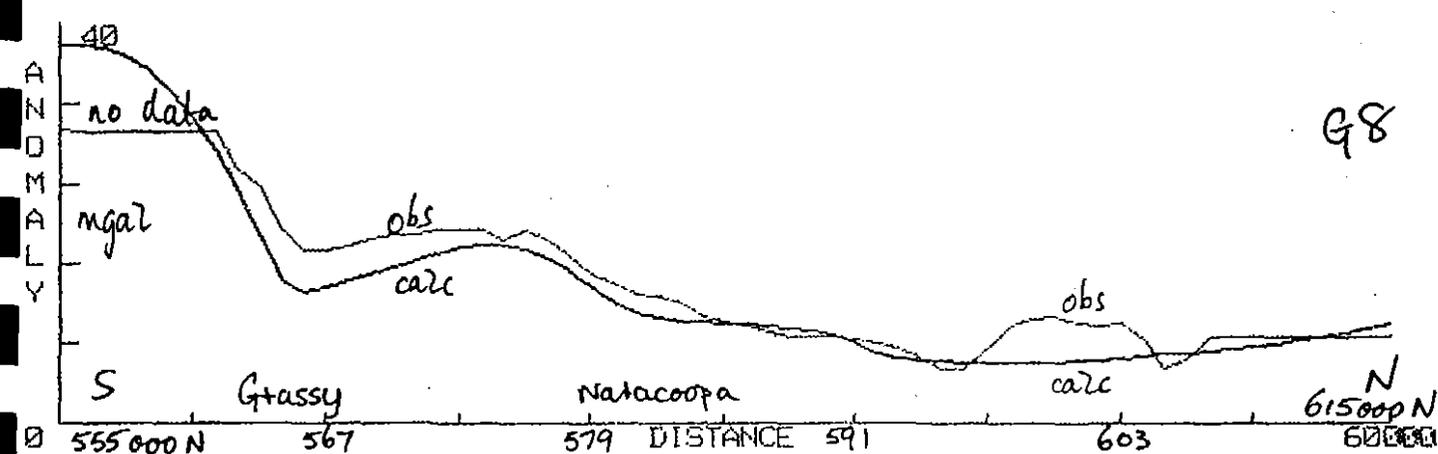
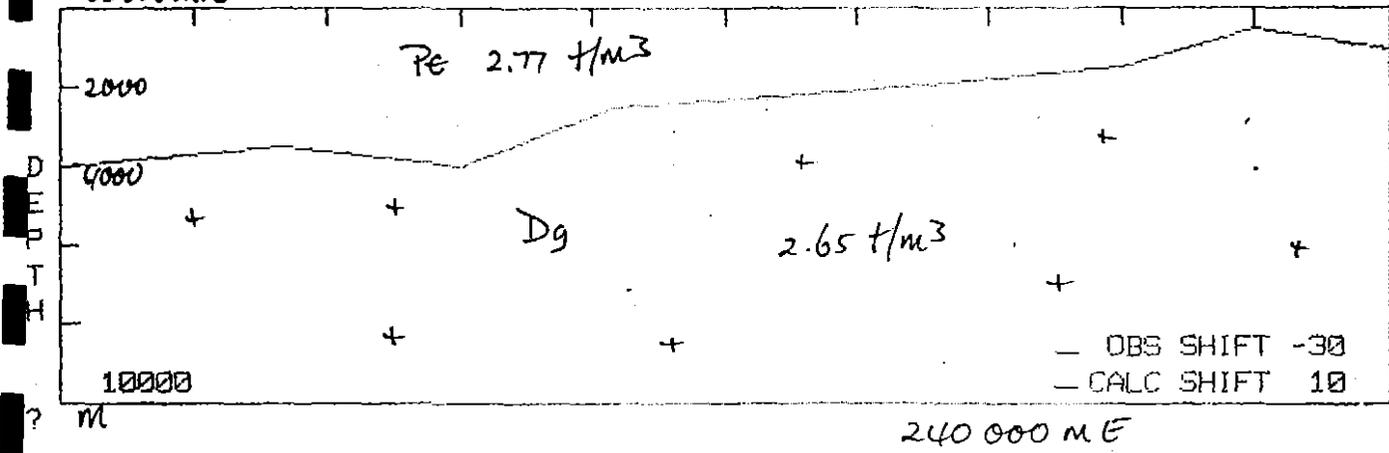
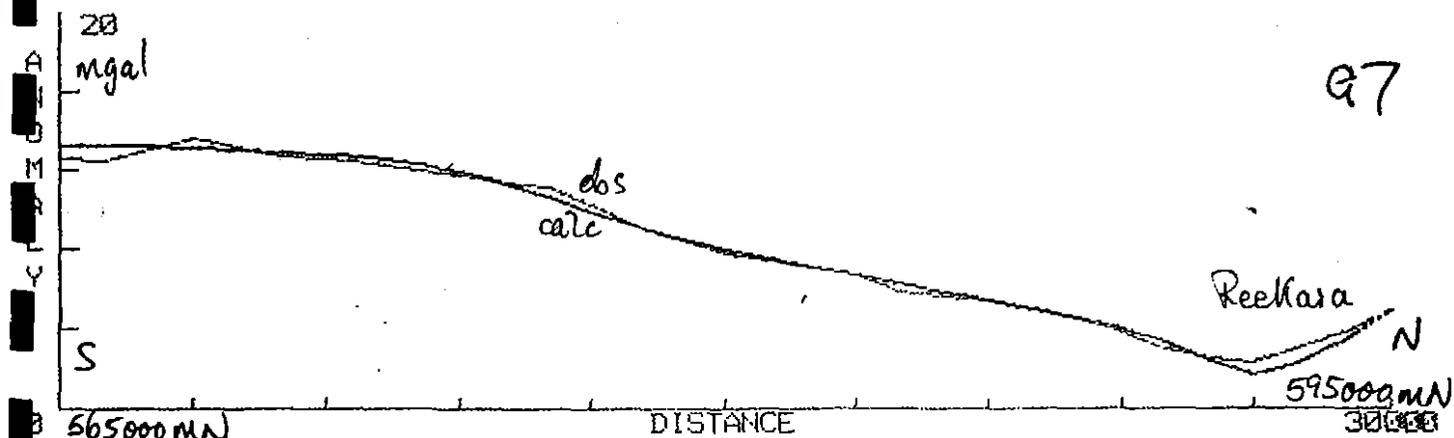
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926088

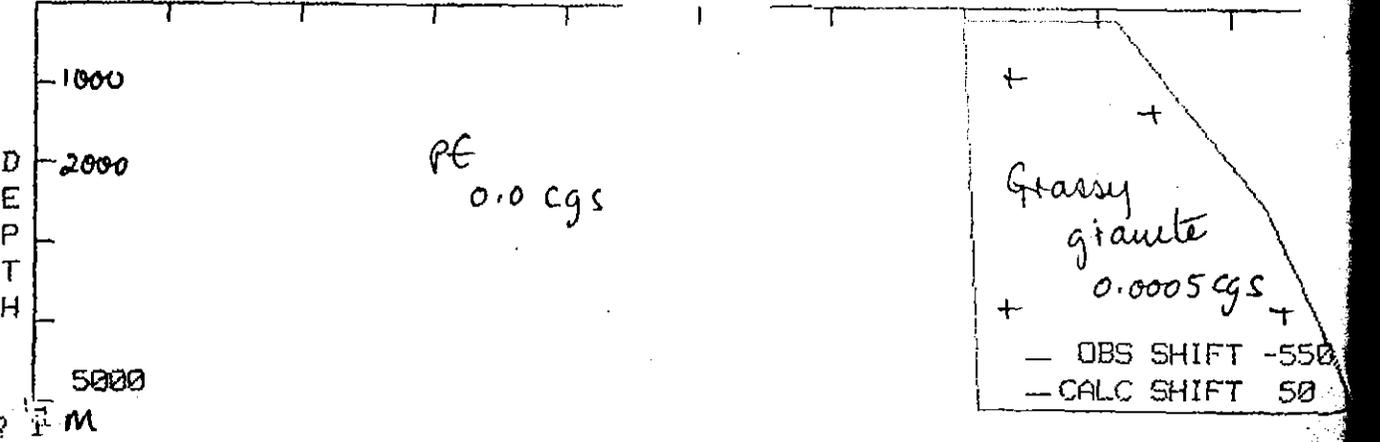
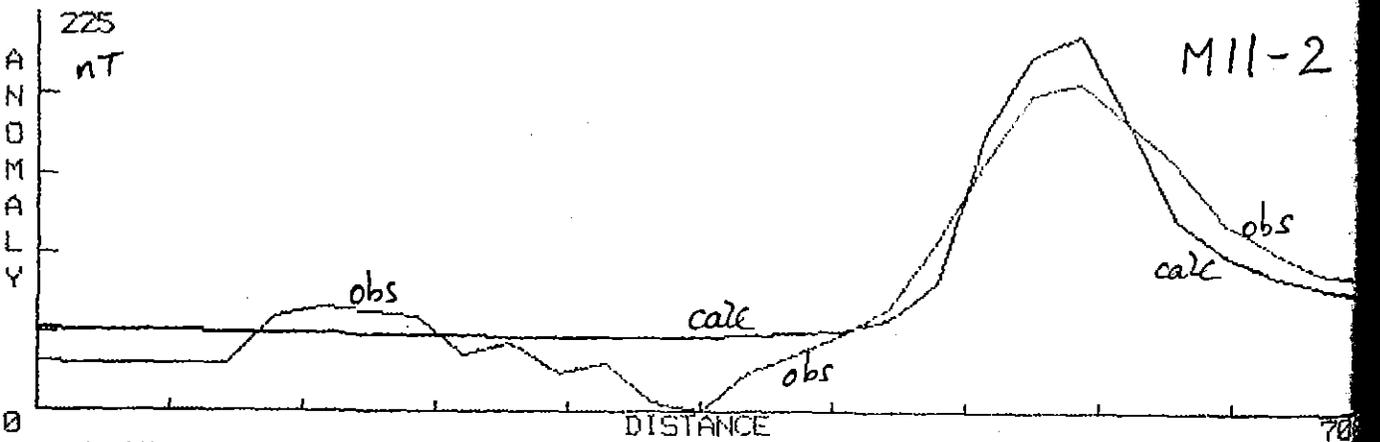
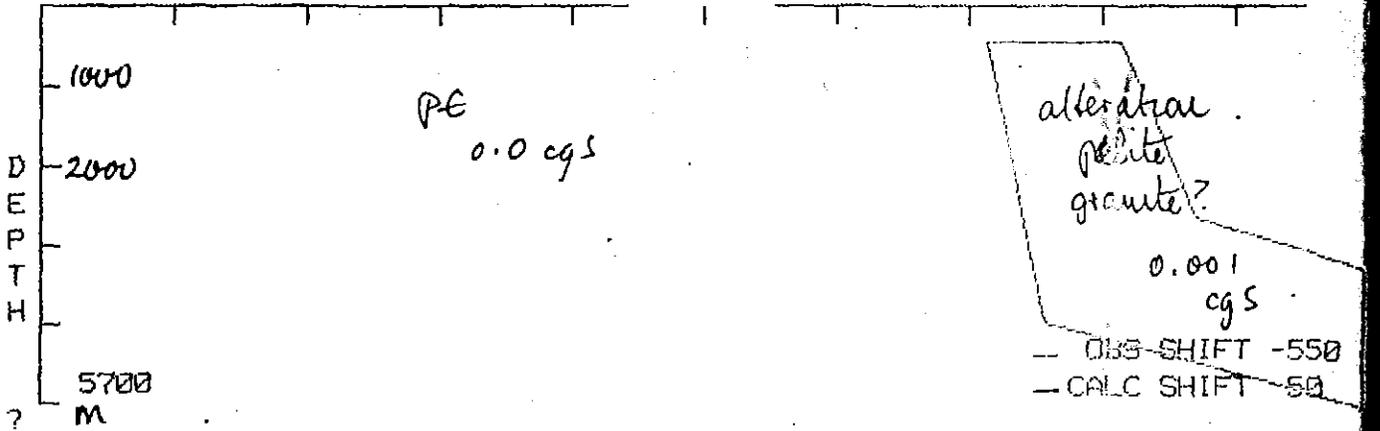
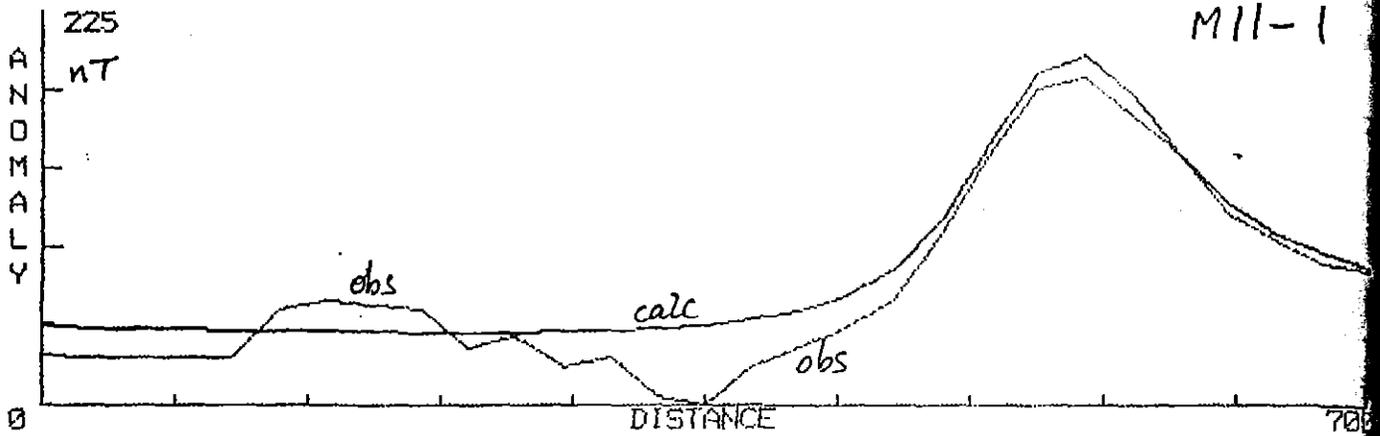


KING ISLAND GRAVITY INTERPRETATION PROFILES G5 AND G6

FIGURE 15



KING ISLAND GRAVITY INTERPRETATION PROFILES G7 AND G8 - FIGURE 16

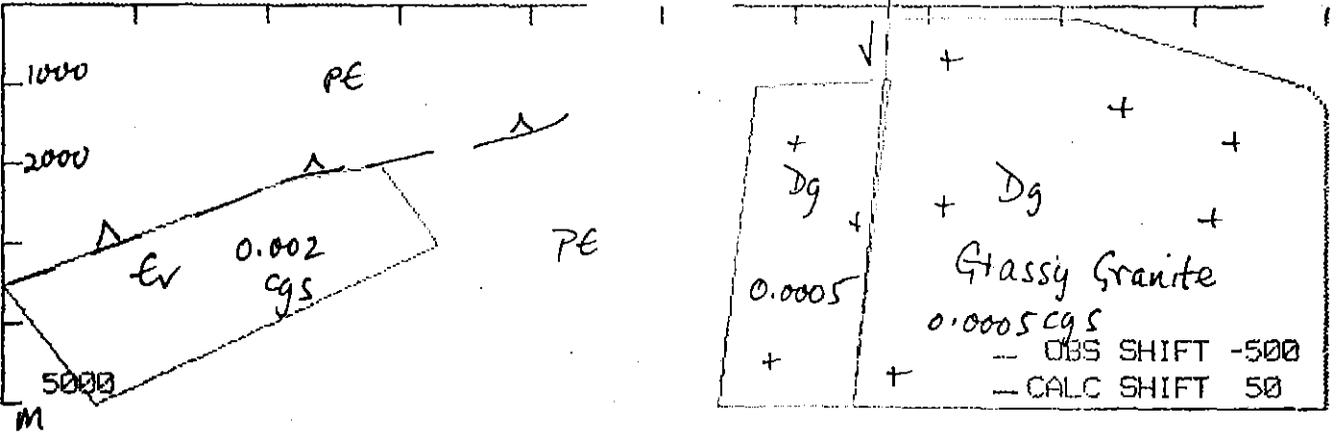
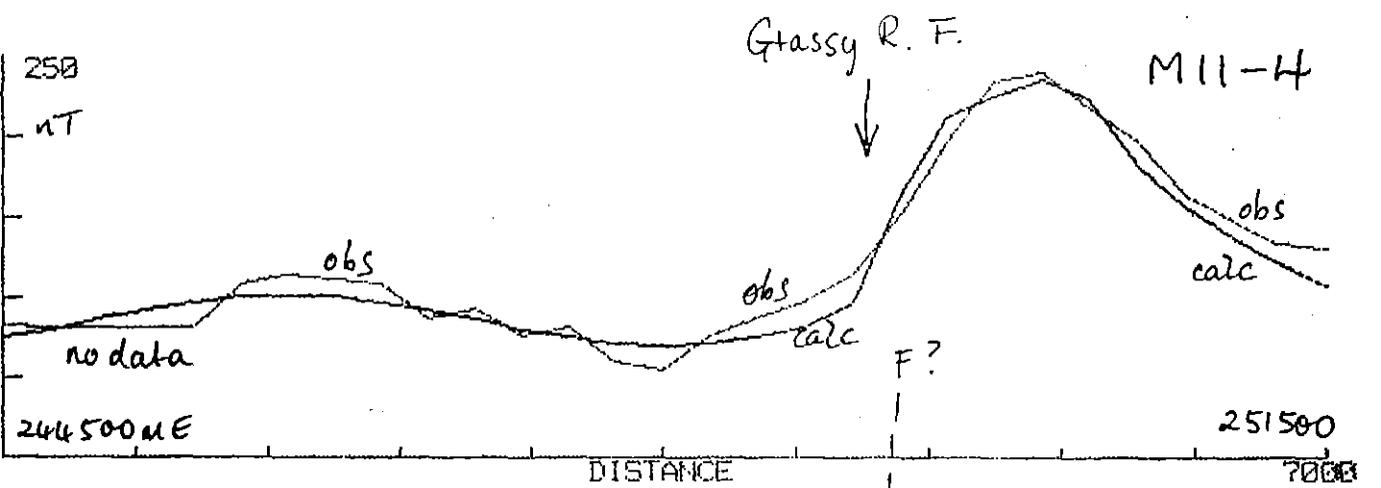
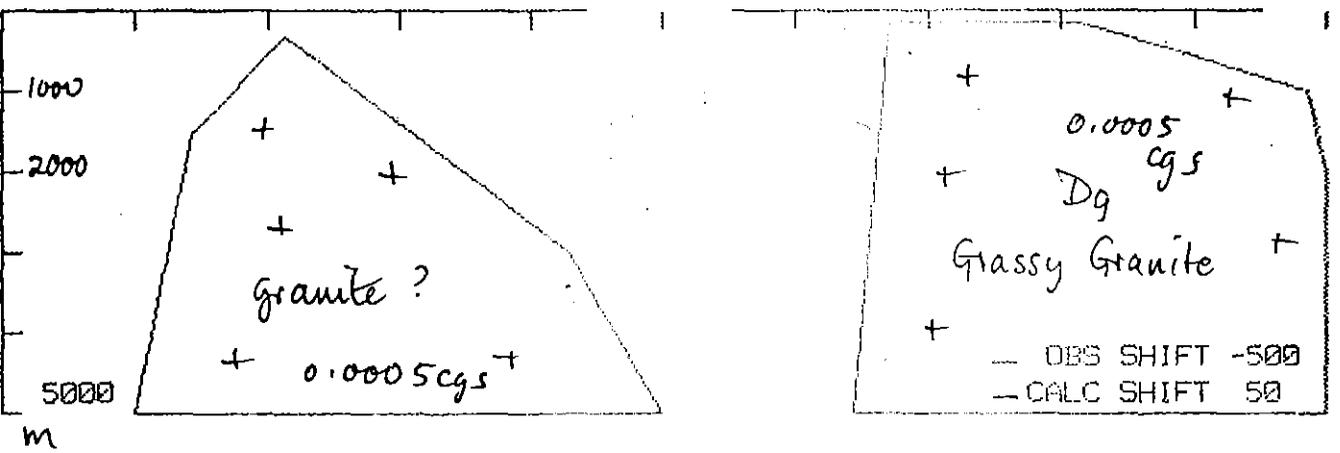
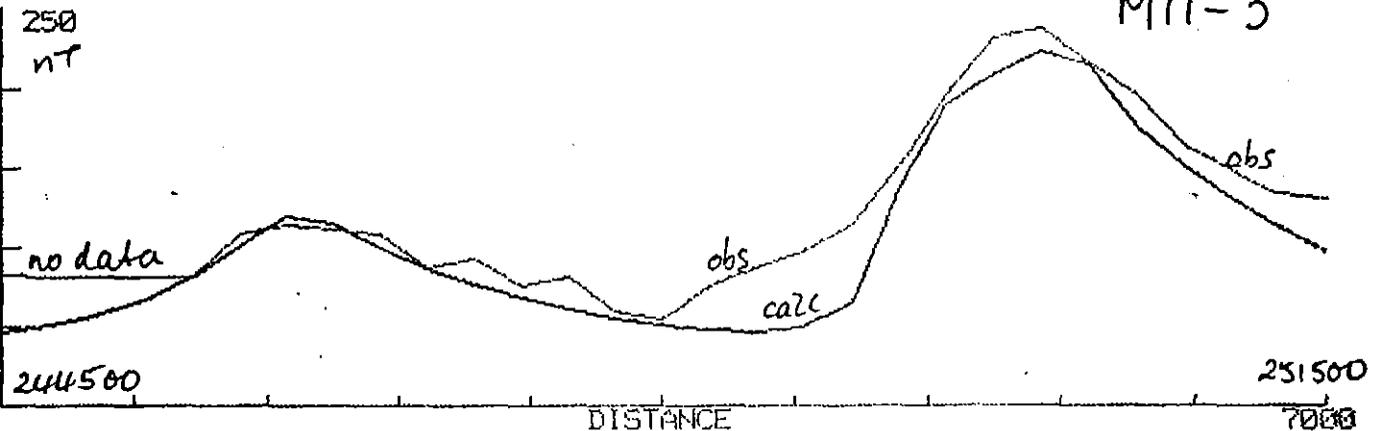


EL 26/92 PEGARAH MAGNETIC INTERPRETATION PROFILE M11  
 VERSIONS 1 AND 2

FIGURE 17

04/93

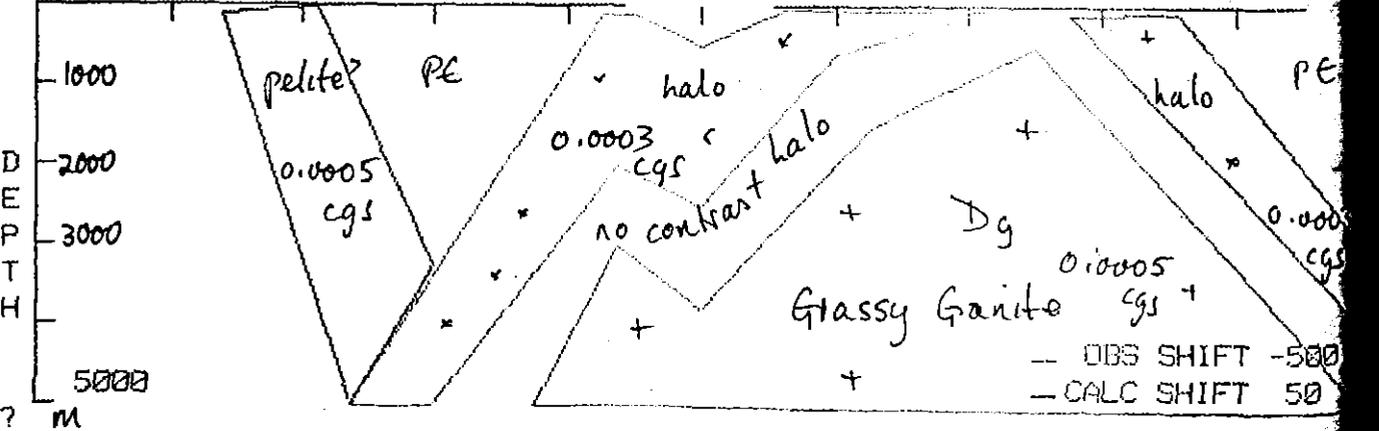
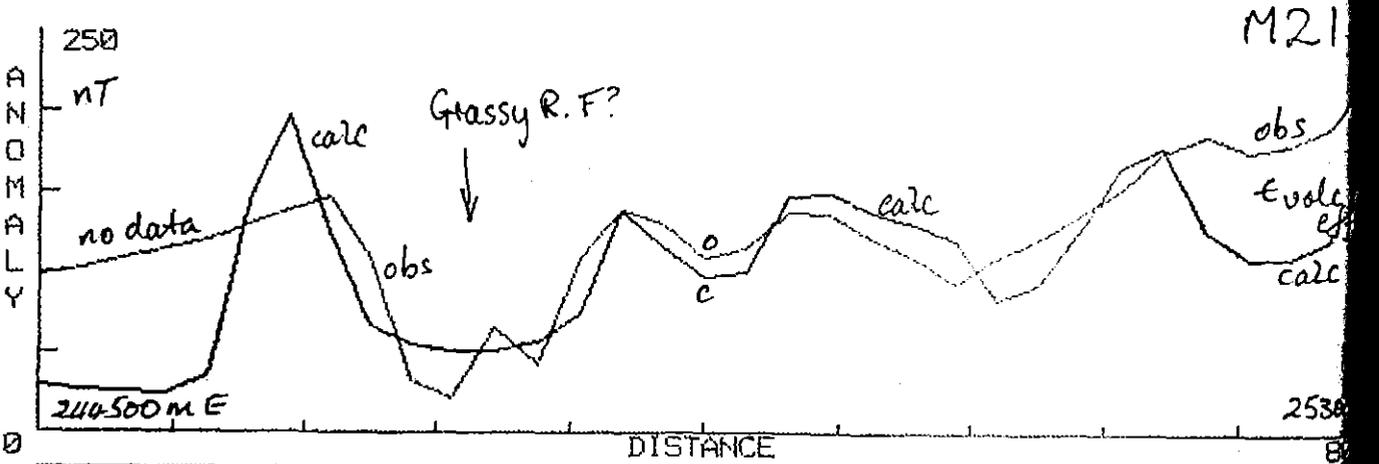
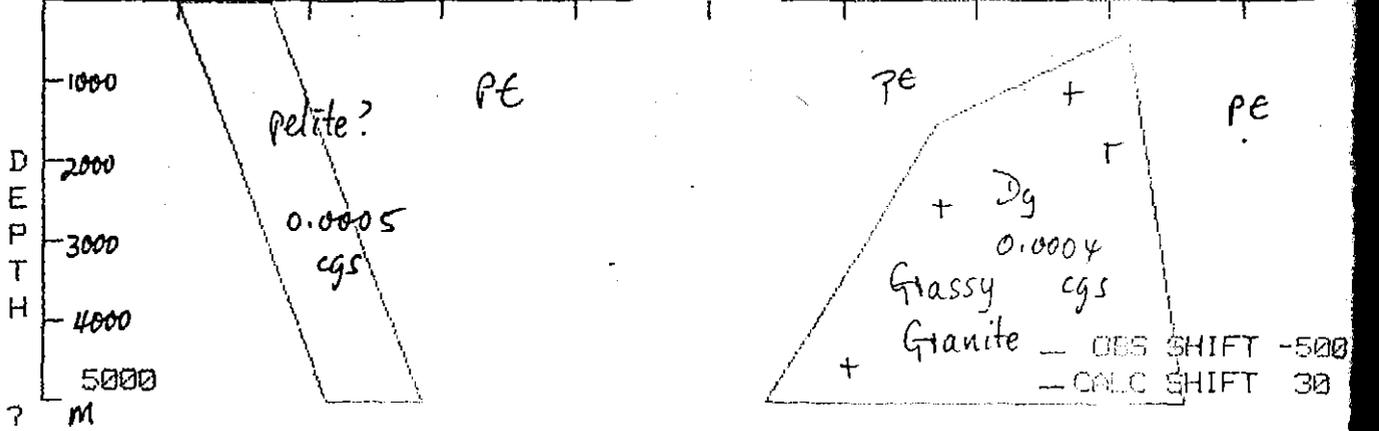
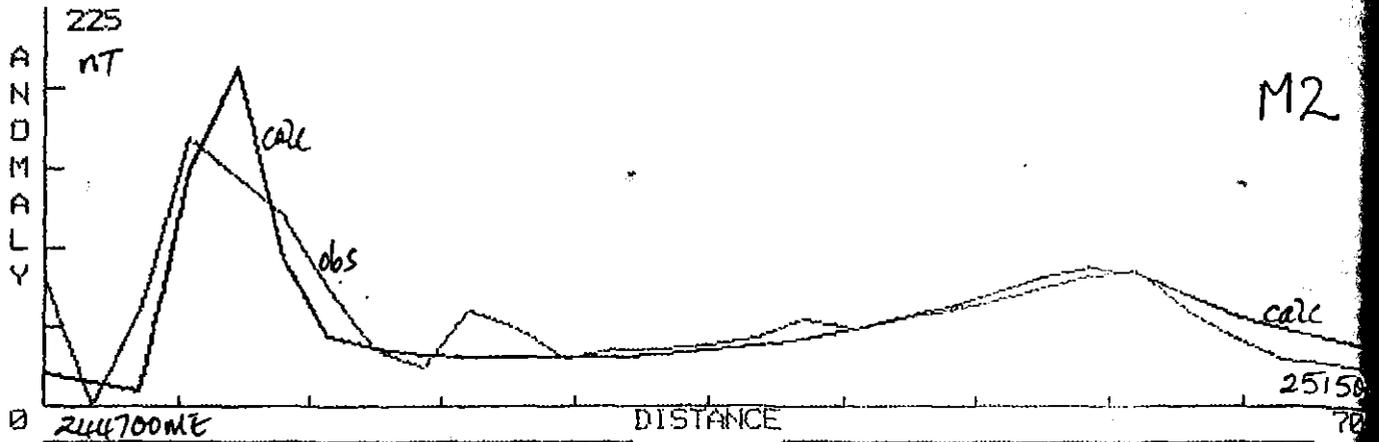
M11-3



EL 26/92 PEGARAH MAGNETIC INTERPRETATION PROFILE M11 VERSIONS 3 AND 4

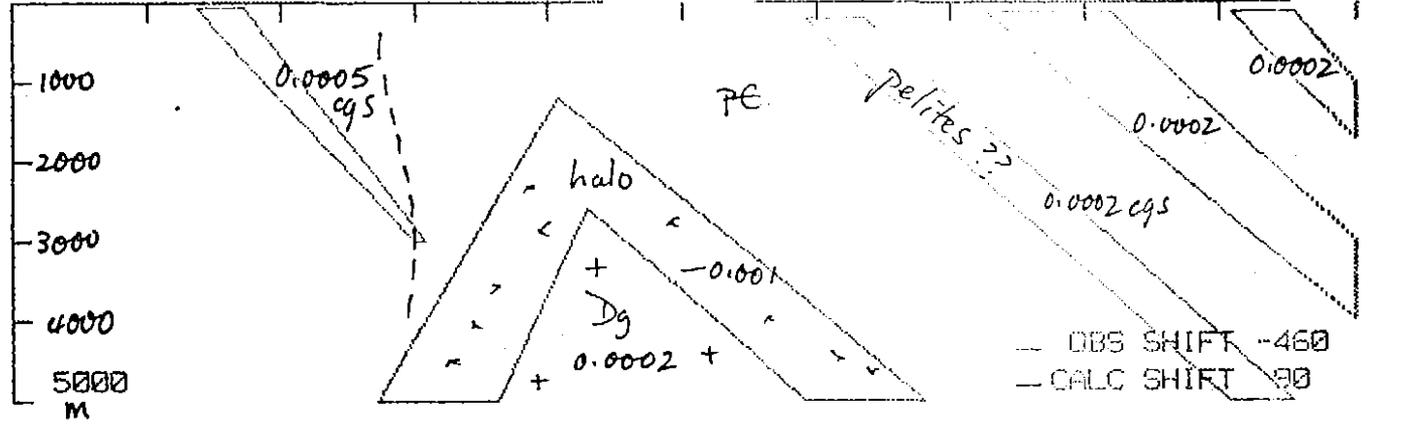
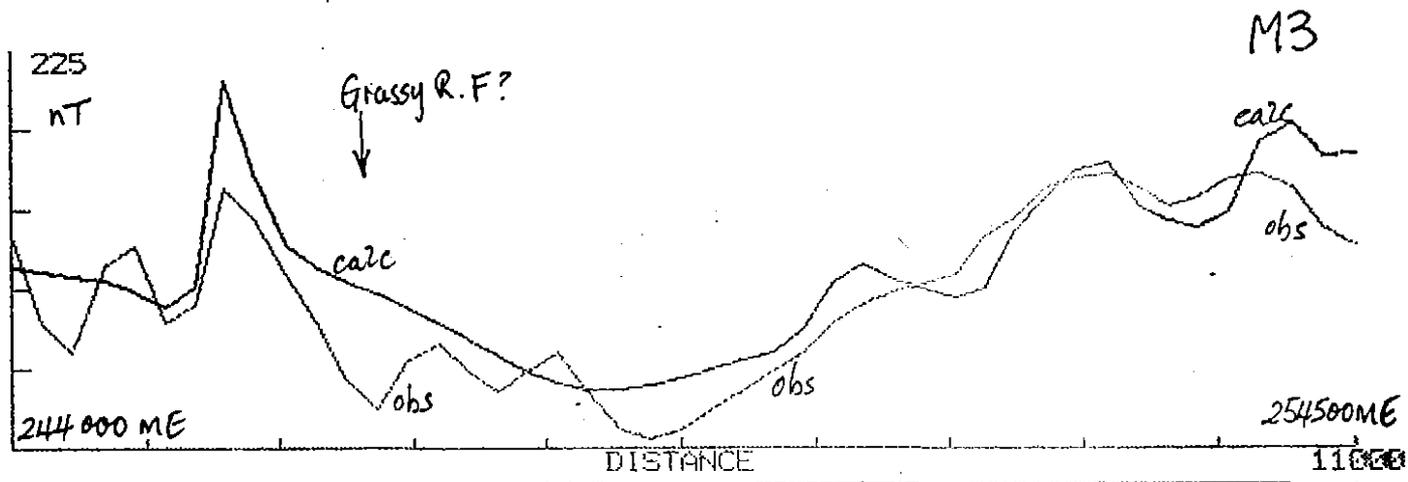
FIGURE 18

04/93



EL 26/92 PEGARAH MAGNETIC INTERPRETATION PROFILES M2, M21

FIGURE 19



LEAMAN GEOPHYSICS  
 G.P.O. Box 320 D,  
 Hobart, Tasmania 7001

04/93

NOTE: Basemap may place roads/coastline SE of true position of grid as related to observations Fig 3, 11.  
 CAUTION: check feature positions before drilling, making conclusions etc

xx alteration of anomalous granite response

240E

250E

926094

granite exposed of

5590N

very shallow

granite roof step shallower deeper

5580N

deeper granite step roof shallower

NARACOOPA

OFFSET ZONE irregular granite

PEGARAH

MAGNETIC CREST

MAGNETIC CREST

MAGNETIC CREST

shallow margin of granite deep limit granite

5570N

OFFSET ZONE

CRESTAL AXIS

(GRASSY) GRANITE

on lapped volcanic  
 limit which Cambrian Volcanics  
 Bold Head

APPENDIX 5  
PETROGRAPHY  
DR TONY CRAWFORD

**SAMPLE NUMBER:** King Island 24002

**SUMMARY:** This sample is a hornfelsic, thoroughly statically recrystallized former basaltic lava now composed of a silica-actinolite-tremolite-magnetite-biotite-epidote assemblage typical of upper greenschist to epidote actinolite facies of contact metamorphism.

**HAND SPECIMEN:**

This is an almost black hornfelsic metabasaltic lava that has recrystallized to contain abundant fans of actinolite.

**THIN SECTION DESCRIPTION:**

This rock is a thoroughly recrystallized probably former metabasaltic lava with a typical contact metamorphic hornfelsic texture. The matrix of the rock is a rather fine-grained sugary-textured intergrowth of anhedral quartz grains and probably minor feldspar, with average grainsize considerably less than 0.1mm long. Growing throughout the rock and embedded in this quartzose matrix are abundant mm-sized radial aggregates of acicular crystals of almost colourless tremolite-actinolite. However, up to 20 modal% of the rock consists of much larger and more massive (to 7mm long) tremolite grains, often curved and with ragged edges. These are not pseudomorphing pre-existing mafic phenocrysts, but have grown in situ. Less abundant throughout the matrix are small spots of chlorite, often rimming tremolite, and about 1-2 modal% of rather euhedral magnetite grains around 0.5mm long. Small crystals of biotite and clinozoisite are also present in the rock, but make up an extremely small proportion of the matrix.

This rock was probably basaltic originally, but has suffered intense upper greenschist to epidote amphibolite facies static recrystallization during contact metamorphism. The unusually fine-grained groundmass may indicate that the rock was originally

largely glassy. Without any extra information about this rock, I can't make any useful correlations or comments. It may be a contact metamorphosed (and often originally glassy) picritic to tholeiitic basalts from the southeast coast of the island.

**SAMPLE NUMBER: KING ISLAND 24003**

**SUMMARY:** This sample is a hornfelsic high greenschist or epidote amphibolite facies metabasaltic lava (silica-tremolite-actinolite-magnetite±minor biotite and epidote-clinozoisite). It contains several unusual spheroidal structures to 3cm across, possibly former vugs, now filled with a zoned clinozoisite, silica-tremolite/actinolite-quartz assemblage..

**HAND SPECIMEN:**

This is a grey actinolite-tremolite-rich metabasic rock with several unusual globular segregations up to 3cm across containing silica-hematite.

**THIN SECTION DESCRIPTION:**

This rock is essentially very similar to the previous sample in that it is an hornfelsic intergrowth of actinolite-tremolite and much less abundant magnetite, all set in fine-grained sugary-textured quartz with minor biotite and chlorite. Unlike 24001, this rock contains a lot more rather large (2-5mm long), curved pale green to colourless porphyroblasts of actinolite-tremolite crystals with ragged edges that show no preferred orientation, and generally a pale green to clear pleochroism. The magnetite porphyroblasts are blocky, but a bit moth-eaten, commonly with tiny inclusions of actinolite. It is clearly a contact metamorphosed mafic to ultramafic volcanic

The unusual globular intergrowth, more than 1cm across in this thin section, has an outer rim of colourless clinozoisite, passing in to a coarser-grained quartz intergrowth containing ragged actinolite, long bladed hematite crystals, and minor granular clinozoisite. This structure seems too large and too lonely (there appear to be only 2 such structures in the big hand

specimen) to be a recrystallized amygdale. However, the zoning of minerals, from a clinozoisite rim to a quartz-hematite core, certainly resembles a filled large vesicle or vug that may originally have had a chlorite-epidote rim and a quartz core; this is a common vesicle-filling paragenesis in mafic lavas.

Alternatively,, it may be a clot produced by selective diffusion of Al and Ca, although why this should form a globular structure rather than a 'diffusion front' is not obvious.

**SAMPLE NUMBER: KING ISLAND 24007**

**SUMMARY: This sample is a former siltstone recrystallized statically in the high greenschist facies to a quartz-muscovite-biotite±sparse tourmaline assemblage.**

**HAND SPECIMEN:**

This is a dark, bedded or banded, recrystallized siltstone to mudstone containing dark spots in some beds or bands, and narrow bands of the same dark material usually less than 1 mm thick.

**THIN SECTION DESCRIPTION:**

This rock is a quite strongly recrystallized finely banded metasediment, probably a metapelite, composed of a dense banded intergrowth of fine-grained anhedral quartz, anhedral brown biotite and more crystalline euhedral muscovite. The muscovite crystals show a general preferred orientation along the banding visible in hand specimen, but are not abundant enough to form a foliation. Grainsize variations are obvious from band to band, varying from extremely fine-grained quartz-muscovite intergrowths peppered with exceptionally fine-grained Fe oxides, to more coarse-grained granoblastic textures with much larger muscovite and quartz crystals. Some bands contain notably more biotite than others. An interesting feature of this sample is the presence of occasional (<<<1 modal%) well-formed, rather elongate narrow prisms of strongly pleochroic brownish-olive green

tourmaline, and these are usually growing almost perpendicular to the banding; they are not restricted to any particular band, but often grow across from one band into another. The dark spots obvious in hand specimen are simply rather more dense Fe oxide spotting of the very fine-grained quartz-mica intergrowths.

This sample was probably an impure siltstone with a pre-existing foliation, that has recrystallized in a static contact metamorphic environment in the high greenschist facies.

**SAMPLE NUMBER: KING ISLAND 24010**

**SUMMARY:** This sample is a hornfels composed of a quartz-biotite intergrowth with subordinate muscovite, magnetite and tourmaline.

**HAND SPECIMEN:**

This is a massive, structureless, almost black metabasic lava or very fine-grained hornfels.

**THIN SECTION DESCRIPTION:**

This rock is a thoroughly recrystallized, fairly even-textured rock composed essentially of a matrix of fine-grained quartz or quartzo-feldspathic material heavily shot through by abundant red-brown biotite, with occasional unusual 'clearer' areas up to about 1mm across that have the appearance of once having been sieved cordierite. Biotite occasionally forms patches up to almost a mm across, but it shows no tendency to define bands or layers. Quite large (to 0.6mm long) blocky magnetite porphyroblasts with rather ragged edges, and often containing quartz- or mica inclusions, are relatively common. The possible former cordierite crystals appear to be altered to silica, and minor biotite and chlorite, but are extremely fine-grained. If they were cordierite, they imply pressures around 3kb at 500°C; similar or slightly pressures, and similar temperatures are recorded by the associated amphibolites and greenschists in this set. Minor phases include tiny crystals of colourless muscovite set in the quartzose matrix, and plentiful long narrow prisms of tourmaline showing similar brownish-olive to clear pleochroism as the tourmaline in sample 24007.

The texture of this rock is hornfelsic, and it definitely is not derived from a metabasic precursor. Rather, it probably crystallized from a contact metamorphosed Fe-rich muddy siltstone or tuffaceous siltstone, although the paucity of feldspar probably argues against the latter origin.

**SAMPLE NUMBER: KING ISLAND 24011**

**SUMMARY:** This sample is a brecciated and silicified former fine-grained conglomerate derived from pelitic metasediments. It is likely to be Precambrian rather than Tertiary.

**HAND SPECIMEN:**

This is a cream coloured massive, unbedded rock on the scale of the hand specimen, possibly silicified limestone, with occasional clasts or fragments of quartzose material varying from angular to subrounded, and up to almost 1 cm across.

**THIN SECTION DESCRIPTION:**

This rock is a brecciated and silicified former conglomerate or grit, composed of clasts to about 1 cm maximum, but mostly much smaller, of a variety of metapelitic lithologies. These are recrystallized and vary from exceptionally fine-grained quartzose- or quartzo-feldspathic material with abundant fine-grained muscovite or sericite, to more coarse-grained and clearly recrystallized clasts composed of polycrystalline silica with patchy coarse muscovite and minor chlorite. The matrix of the rock is composed of a very fine-grained, rather murky quartz-dominated recrystallized mud liberally riddled with muscovite and occasional patches rich in Fe oxide dust. Angular, apparently detrital grains of quartz to about 0.1 mm are not uncommon in the matrix, which also contains common very fine-grained muscovite.

The rock has suffered a strong brecciation event, producing angular fragments on all scales. The fractures and gashes have been healed with clear polycrystalline silica that contains occasional muscovite and tourmaline crystals. This assemblage in places has 'soaked' into the matrix leading to patchy recrystallized, clearer areas of matrix.

This was a fine, matrix-supported conglomerate derived from pelitic metasediments. It has been brecciated and silicified, and is

more likely in my opinion to be a rock from the Precambrian sequence than any Tertiary rock from King Island.

**SAMPLE NUMBER: KING ISLAND 24026**

**SUMMARY:** This sample is a rather coarse-grained amphibolite composed of hornblende-actinolite and intermediate plagioclase, with minor FeTi oxides. It is derived from thorough contact metamorphic recrystallization in low amphibolite facies conditions of a metabasaltic or metadoleritic rock.

**HAND SPECIMEN:**

This is an almost black, very coarse-grained amphibolite dominated by platy large (to almost 1 cm across) hornblendes, with subordinate interstitial feldspathic material.

**THIN SECTION DESCRIPTION:**

This is a thoroughly recrystallized mafic-rich, plagioclase-poor dolerite, now best classified as an amphibolite. It consists mainly of large patchy and ragged pale to mid-green actinolite-hornblende series amphiboles that are riddled with small tabular plagioclase laths. The latter range from albite to intermediate Ca compositions, and occur both as discrete subhedral crystals to about 0.5mm long included in amphibole, to trails and veins of intergrown anhedral crystals. Both types show significant intra-crystal zoning. Between coarse crystals of amphibole are interstitial patches composed of intergrown acicular to prismatic small crystals of hornblende-actinolite, and small plagioclase laths, usually with small aggregates of ragged edged, anhedral FeTi oxides. If there is any chlorite in this sample, it is very difficult to find (or distinguish from the commonly anomalously low-birefringent actinolite patches).

This is a amphibolite almost certainly derived from contact metamorphic recrystallization of a metabasalt or metadolerite in the uppermost greenschist facies or lower amphibolite facies. The absence of chlorite and epidote, and the abundance of plagioclase more calcic than albite, argues for low amphibolite facies conditions of recrystallization.