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WARMAN SERVICES LIMITED

MICROFILMED

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REF. No 8776/83				

ANNUAL REPORT TO THE MINES DEPARTMENT

E.L. 15/66

OPEN FILE

S. Grieve Brown

King Island

September, 1983

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INTRODUCTION

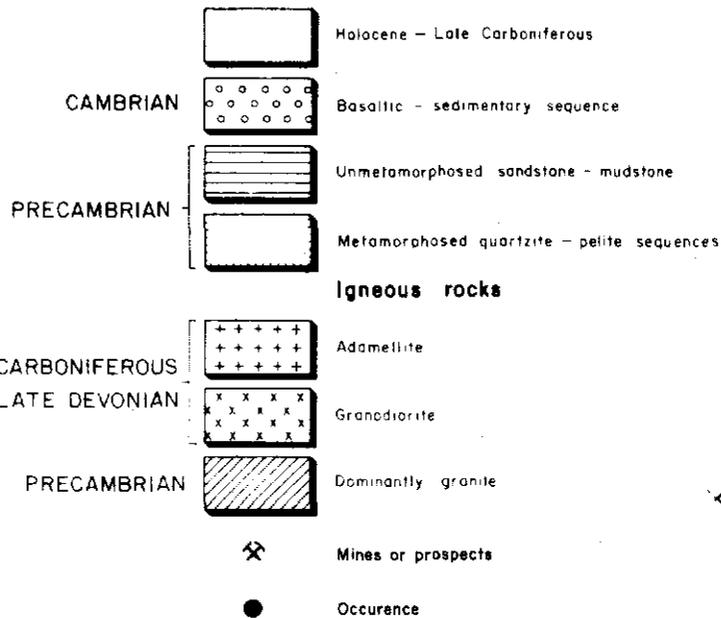
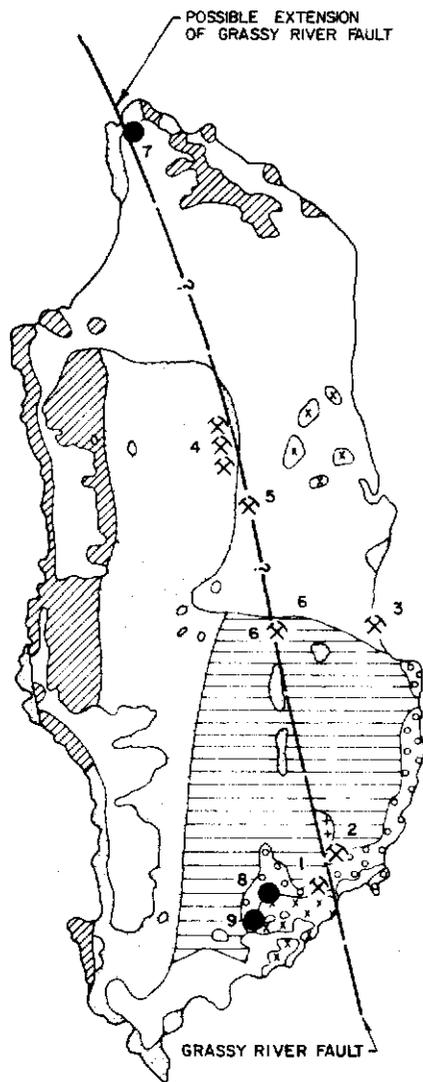
Exploration Licence 15/66 is held by Warman Services Limited in respect of an area of 123 square km in south-east King Island. The Licence is contiguous with E.L. 21/78 and covers the Bold Head Adamellite Contact Zone and the onshore portion of the Grassy Granite Contact Zone (Figures 1 and 2).

Mineral Lease 17/M79 with an area of 22.98 square kilometres, and covering the Dolphin and Bold Head Mine areas, is to a large extent included within the boundaries of E.L. 15/66. Work carried out on M.L. 17M/79 for primary exploration purposes has been costed against E.L. 15/66. The work so classified excludes normal oreblocking diamond drilling and local exploratory work within the mines but includes any holes drilled to test for major extensions to the mine series sequence.

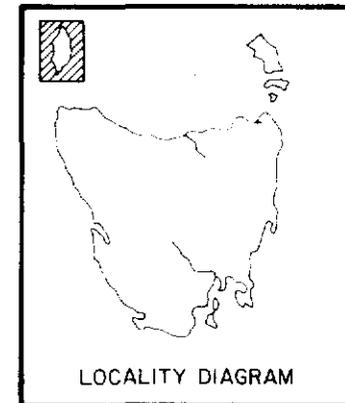
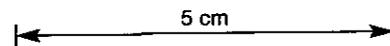
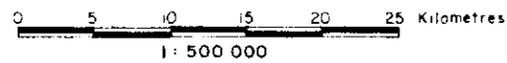
Due to the fact that Exploration Licences 15/66 and 21/78 are contiguous and both cover portions of The Grassy Granite contact it is intended to apply for amalgamation of these licences in conjunction with renewal of E.L. 15/66 due on 24th October 1983.

Although the amount of exploration work undertaken on E.L. 15/66 was restricted due to the current economic situation some very instructive results have been obtained from both the regional geophysical surveys and in-mine diamond drilling at Bold Head.

The purpose of this report is to compile and record all exploration work carried out within the licence area since the last report in August 1982. This report will cover all work up to 31st August 1983, the location of which is shown on Figure 3.



1. DOLPHIN / N^o 1 OREBODY - W, Mo
2. BOLD 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

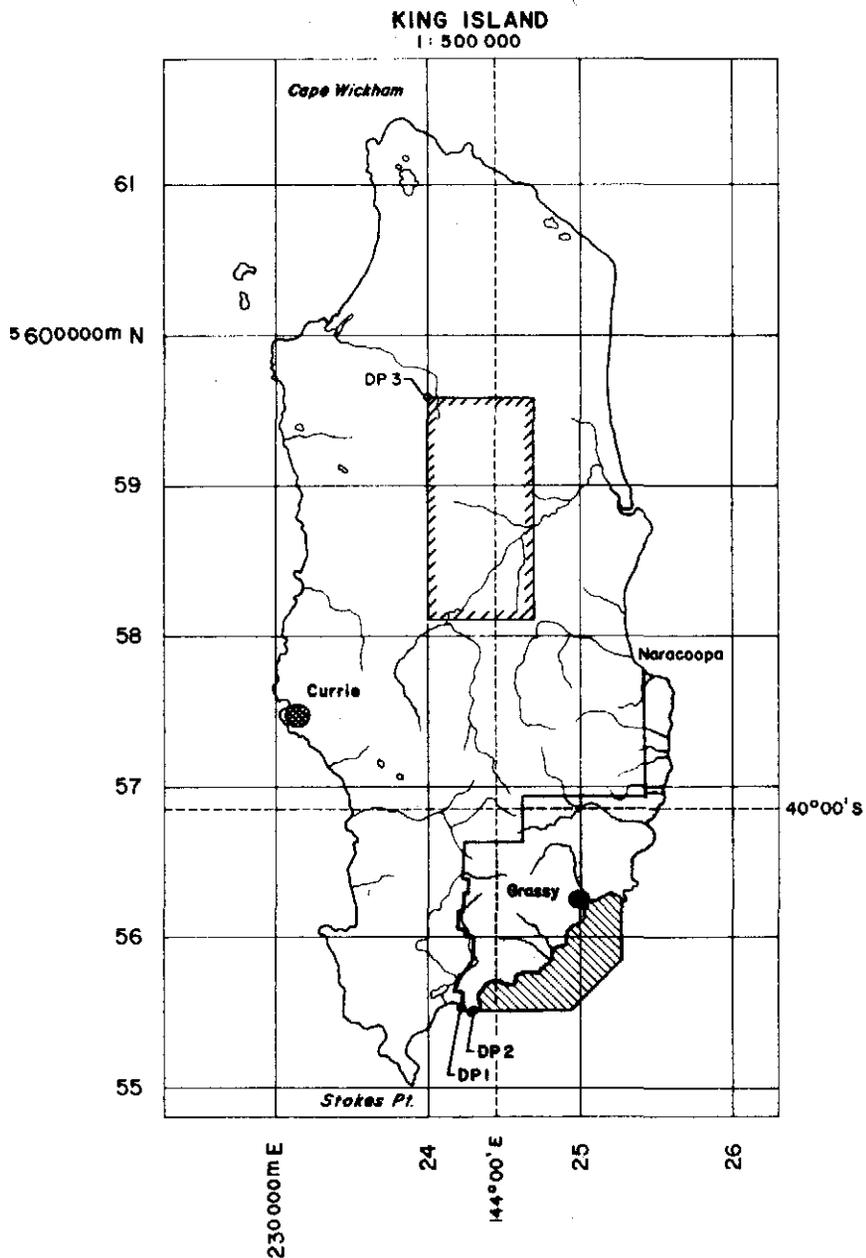


KING ISLAND GEOLOGICAL MAP
FIGURE 1

FIGURE 2
COMPANY EXPLORATION LICENCES - KING ISLAND

-  E. L. 15/66
-  E. L. 21/78
-  E. L. 39/80

5 cm

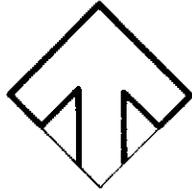


DATA POINTS (DP) CO-ORDINATES

DP1 - E.L. 15/66:	5 555 260m N
	241 330m E
DP2 - E.L. 21/78:	5 555 000m N
	242 000m E
DP3 - E.L. 39/80:	5 596 000m N
	240 000m E

Australian Map Grid Zone 55 (AMG)

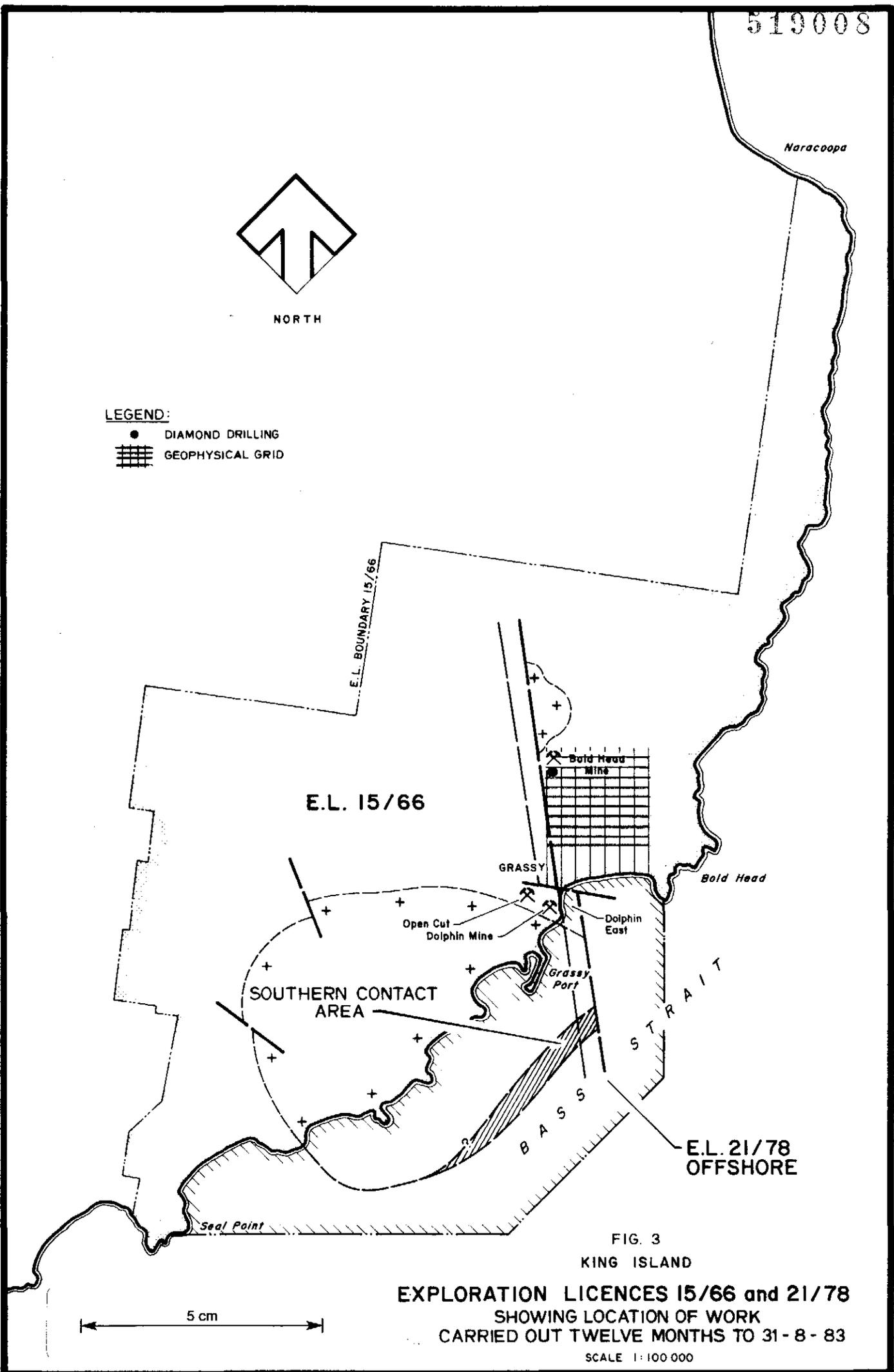
Naracoopa



NORTH

LEGEND:

- DIAMOND DRILLING
- ▤ GEOPHYSICAL GRID



E.L. 15/66

Bold Head Mine

GRASSY

Open Cut Dolphin Mine

Dolphin East

Bold Head

SOUTHERN CONTACT AREA

Grassy Port

BASS STRAIT

E.L. 21/78 OFFSHORE

Seal Point

FIG. 3

KING ISLAND

EXPLORATION LICENCES 15/66 and 21/78
 SHOWING LOCATION OF WORK
 CARRIED OUT TWELVE MONTHS TO 31-8-83

SCALE 1:100 000

5 cm

SUMMARY

Since the last report (Brown, August 1982) the work carried out has consisted of:-

- Establishment of the Phase II (east-west) geophysical grid over the area south from Bold Head to the 566 000 N survey line (I.S.G. Grid). A total of 22.6 line kilometres of gridding was carried out (Figure 3).
- Accurate levelling of the Phase II geophysical grid to an accuracy of 0.1 m or greater.
- Completion of a follow ground magnetics and gravity survey over the Phase II grid.
- Preliminary assessment of the results of the two geophysical surveys.
- Reassessment of the geological structure present in the Bold Head Mine area based on the results of oreblocking diamond drilling carried out at the southern limit of the Bold Head Mine Block.

The most significant results of the past year have been:-

- The confirmation of a large gravity low lying east and south of the Bold Head Mine Block. The results of the magnetic and gravity surveys when taken together suggest that this gravity low could well be due to the presence of a ridge of the Bold Head Granite underlying that area at a relatively shallow depth.
- The confirmation of the presence of a faulted contact between the granite and the mine series rocks at the Western limit of the Bold Head Mine Block. This would tend to confirm the existence of the postulated No. 4 Fault with a positive displacement on the west. Most other known faults in the Bold Head area have a positive displacement on the east side of them (e.g. No. 2 and Boundary Faults).

Future work, currently in progress at the south of the mine confirms the severe downwards drag of the mine series rocks as the Grahams Road Fault is approached.

The aim of the proposed future work programme will be to gain additional structural knowledge of the southern area of Bold Head Mine with a view to understanding the exact nature of the No. 4 and Grahams Road Fault. This will allow an assessment to be made of the exploration potential which may exist west of No. 4 Fault and south of the Grahams Road Fault.

Testing of these two areas will be carried out by diamond drilling, initially from underground drill sites, with additional surface drilling later on.

WORK CARRIED OUT SEPTEMBER 1982 TO AUGUST 1983

Due to the requirement to submit annual reports one month in advance of the renewal date this report covers the twelve months from 1st September 1982 to 31st August, 1983.

A. Gridding

The follow up stage of the Bold Head geophysical grid, Phase II was completed. This secondary grid consisted of ten east-west lines at 250 m spacing over the northern portion of the original grid. The second stage covered the Bold Head Mine and areas of primary interest previously outlined by geophysics on the north-south lines.

The second phase of gridding totalled 22.5 line kilometres, the lines were pegged at 100 m intervals and levelled to an accuracy of greater than 0.1 m.

B. Geophysics

The follow up geophysical work carried out on the east-west lines was restricted to the measurement of gravity and magnetics. The final assessment of this data is not as yet complete. Preliminary results are presented here and a copy of the geophysical report will be submitted when it is complete.

Gravity

A total of 225 stations were occupied during the follow up survey. The contours of residual Bouguer Anomaly shown on Figure 4 were derived from both sets of data and show a number of differences from that derived from the original north-south lines. Figure 5 showing these original contours (December 1981) is included for comparison.

The major zone of low gravity readings labelled "J" on Figure 5 which shows the contours derived from the December 1981 gravity survey, was confirmed by the latest results although it does not appear to be quite as continuous as originally thought. The equivalent anomaly is labelled "C" on the August 1983 Residual Bouguer Anomaly Contour Map.

The latest gravity contour map remains dominated by the Grassy River Fault and the location of the Bold Head Granite. These are clearly shown on Figure 4 on which has been superimposed the outline geology of the area.

The large low designated "A" lying over the Bold Head Granite, which is less dense than the other rock types in the area can be seen to extend south to low "B" and can be interpreted to extend south to low "C". This zone of low gravity results is interpreted as being probably due to a ridge of granite material at a relatively high level underlying this area.

Lows "D", "E" and "F" are considered to reflect horizons of sedimentary rocks within the volcanic sequence.

Magnetics

The results of the magnetic survey are presented only as line profiles since no magnetic intensity readings were taken on the Phase I north-south survey lines and hence the data is too sparse to provide a meaningful contour plan.

The plotting of the line profiles for both the gravity and magnetics allows comparison of the results in each area. Lines 566 400 N and 566 600 N which pass through gravity low "C" (Figure 4) show that the gravity low coincides with a magnetic high. This suggests that the gravity low is not due to a thinning of the volcanics sequence but rather to the presence of a ridge of light material underlying the volcanics. It is currently considered that the most likely material to occur in this area would be granitic material occurring as a ridge extending south from the Bold Head Granite.

From the profiles it can be seen that gravity lows "D", "E" and "F" occur in areas of low magnetic intensity and this is compatible with the interpretation of their cause as sedimentary horizons within the volcanic sequence.

Fig. 4

Bold Head South - King Island

Contours of Residual Bouguer Anomaly - (PRELIMINARY)

Contour Interval - 2.5 gms^{-2} Scale 1:10 000 Instrument: Sodin # 188 Worden # 592 Bouguer Density: 2670 kg m^{-3}

Observer: R.G.

Drawn: R.Tog

Date Aug 1983

22 0000 E

22 0500 E

22 1000 E

22 1500 E

22 2000 E

56 7500 N

56 7500 N

56 7000 N

56 7000 N

56 6500 N

56 6500 N

56 6000 N

56 6000 N

56 5500 N

56 5500 N

56 5000 N

56 5000 N



- F**
- VOLCANICS
- MINE SERIES
- QUARTZITES
- GRANITE

519013

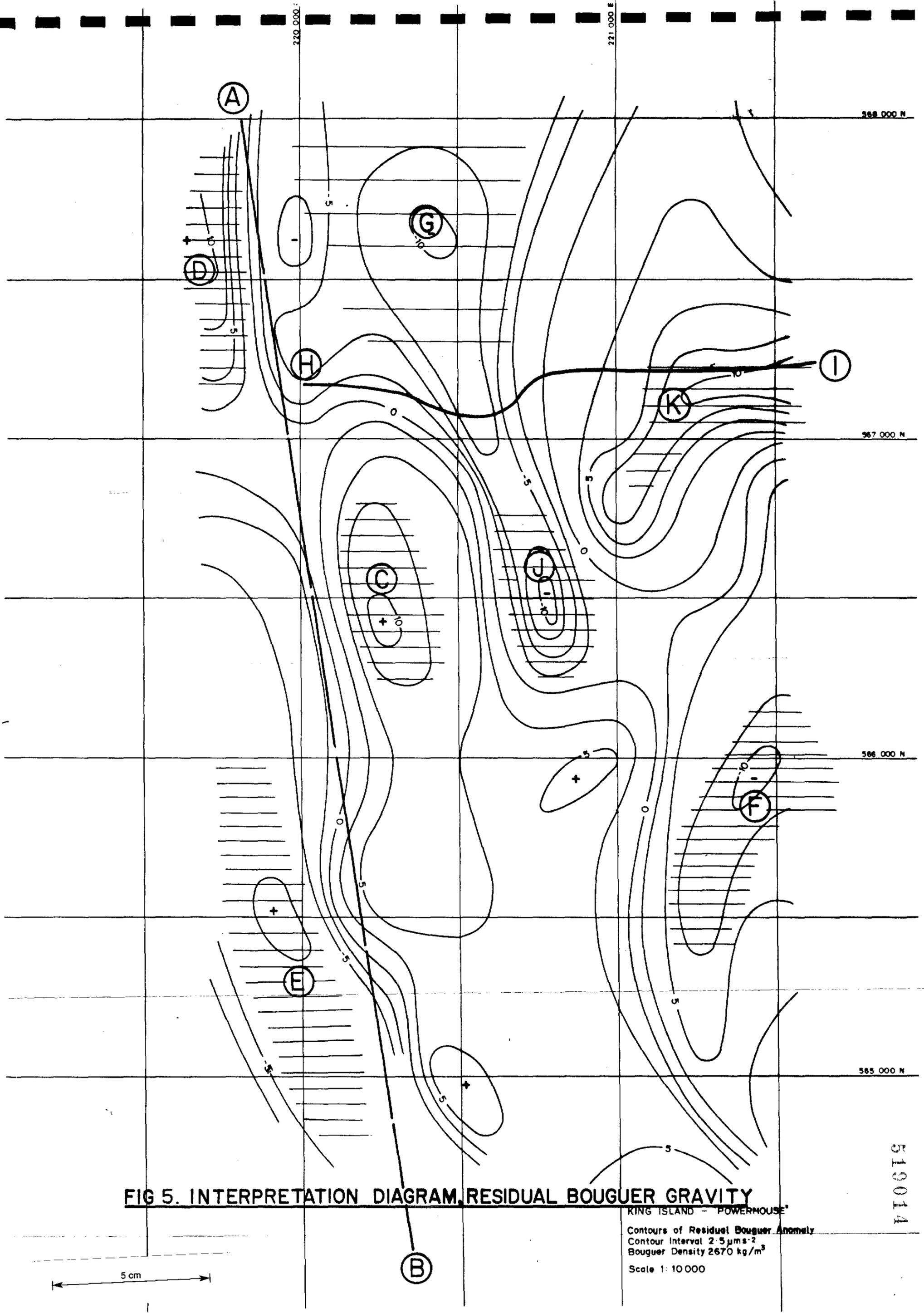


FIG 5. INTERPRETATION DIAGRAM, RESIDUAL BOUGUER GRAVITY

RING ISLAND - POWERHOUSE*

Contours of Residual Bouguer Anomaly
 Contour Interval $2.5 \mu\text{ms}^{-2}$
 Bouguer Density 2670 kg/m^3
 Scale 1: 10 000

519014

C. Diamond Drilling

Four oreblocking diamond drill holes, BH 325/17 to BH 325/20 were drilled at the southern end of the Bold Head mine to test for mineralisation adjacent to the granite contact.

These drill holes, together with development heading in the same area, showed that the contact between the mine series and the Bold Head Granite to the west of the current mine block is a faulted contact rather than an intrusive contact as previously interpreted (Figure 6). This has significant implications for the ore potential of both the Bold Head South and Bold Head West areas as it tends to confirm the interpretation of No. 4 fault as a major structural fault rather than a local minor fracture.

The various zones of exploration potential in the immediate Bold Head area are shown on Figure 7.

DISCUSSION

The major results of the work carried out over the past twelve months have been:

- a) The confirmation of the gravity low, possibly reflecting the existence of a ridge of granite, in the area east of the Bold Head Mine.

The second set of gravity has allowed a better interpretation of the contours of Residual Bouguer Anomaly to be made, and this has effectively broadened the low ("C", Figure 4) thought to be due to the presence of a granite ridge at a relatively high level underlying the volcanics.

Examination of the original 1968 - 1971 diamond drilling carried out in the area has shown that none of these holes were drilled to a sufficient depth to test the possibility of a granite high in this area.

All original diamond drilling was carried out north of the interpreted position of the Graham's Road Fault and encountered only a truncated mine series sequence. Although the cores have yet to be examined in detail to test the hypothesis, one way for such a truncated sequence to occur would be for the Graham's Road Fault to have been active immediately post mine series deposition or during the early part of the volcanic deposition phase. Since the Graham's Road Fault has a proven throw in excess of 100 m, north side up, this would allow erosion of the mine series rock on the northern side of this fault.

If this is the case then a normal mine series sequence would exist south of the Graham's Road Fault possibly in close relationship to the inferred ridge of granite interpreted from the gravity results.

- and b) The indication, from diamond drilling, that the granite-mine series contact at the west of the Bold Head Mine area is, at least partially, fault controlled.

Drilling and mapping at the Bold Head Mine has shown that the contact between the granite and the mine series at the west of the Bold Head Mine Block is, at least in part, fault controlled. This fault appears to be coincidental with the No. 4 fault located in two holes at the north of the mine block.

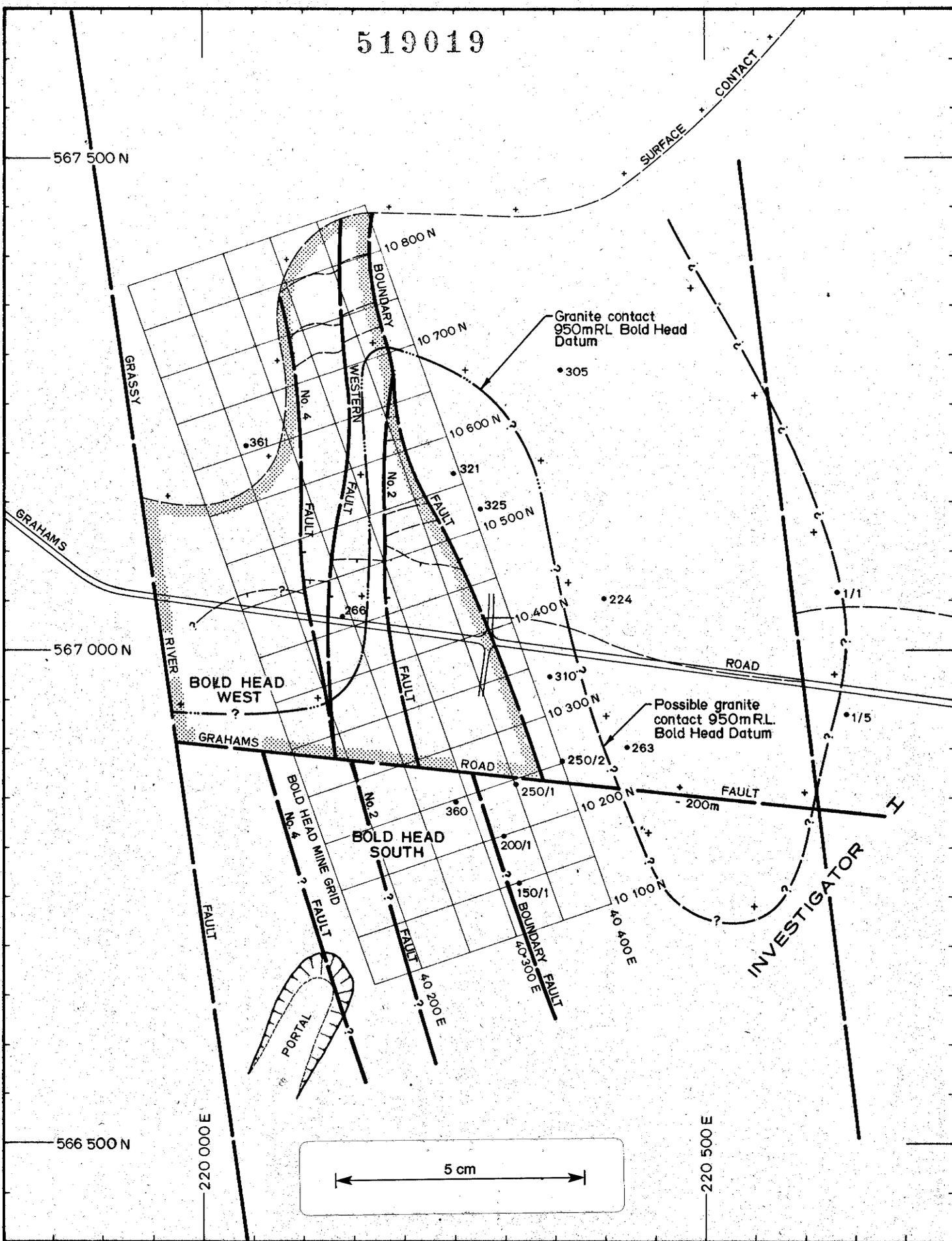
At present the data is apparently contradictory, in that the volcanics appear faulted down to the west and the granite faulted up to the west of the No. 4 fault. It is possible that this fault has been active over a long period of time and that the early movement was west side down and the later movement was west side up. There is considerable evidence elsewhere in the mine for two periods of movement on some faults which are interpreted to have been active pre-mineralization and post mineralization. The movement planes are not always coincident e.g. the Western Fault Zone, and in these areas the relationship is fairly clearly seen.

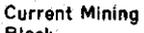
Work at the southern end of Bold Head has shown that the mine series rocks in this area are dragged down by movement on the Graham's Road Fault with the dip increasing from about 25 degrees over the majority of the mine area to about 60 degrees in a zone immediately north of the fault.

It would appear from two surface drill holes, which are located south of the Graham's Road Fault, 200/1 and 150/1 (Figure 7) that the granite contact either steepens in dip to the south of that fault or is down faulted by it. If the former is the case then the zone of potential for the occurrence of further mine series rocks could be located only a few hundred metres south of the Graham's Road Fault. A possible interpretation of the structure of the Bold Head area is shown on Figure 8. There is currently no supportive data for the horst type structure shown at about 565 100 N on this section but it is theoretically possible.

No holes have been drilled south of the Graham's Road Fault, and its inferred eastern extension, except in the Bold Head South Area (Plan KF3) and further work will therefore be required in the Investigator I area which lies to the east of the inferred granite high.

519019



REF PLAN		GEOLOGY	1 : 5000	 KING ISLAND SCHEELITE GRASSY KING ISLAND
LEGEND:		SURVEY	SCALE	
	Upper volcanics	PLANNING	BOLD HEAD AREA SHOWING ZONES OF EXPLORATION POTENTIAL	
	Mine series	ROCK. MEC.		
	Quartzites and siltstones	GRADE CON.		
	Adamellite	DRAFTING		
	Current Mining Block	T.S.S.	DRAWING NUMBER	FIGURE 7

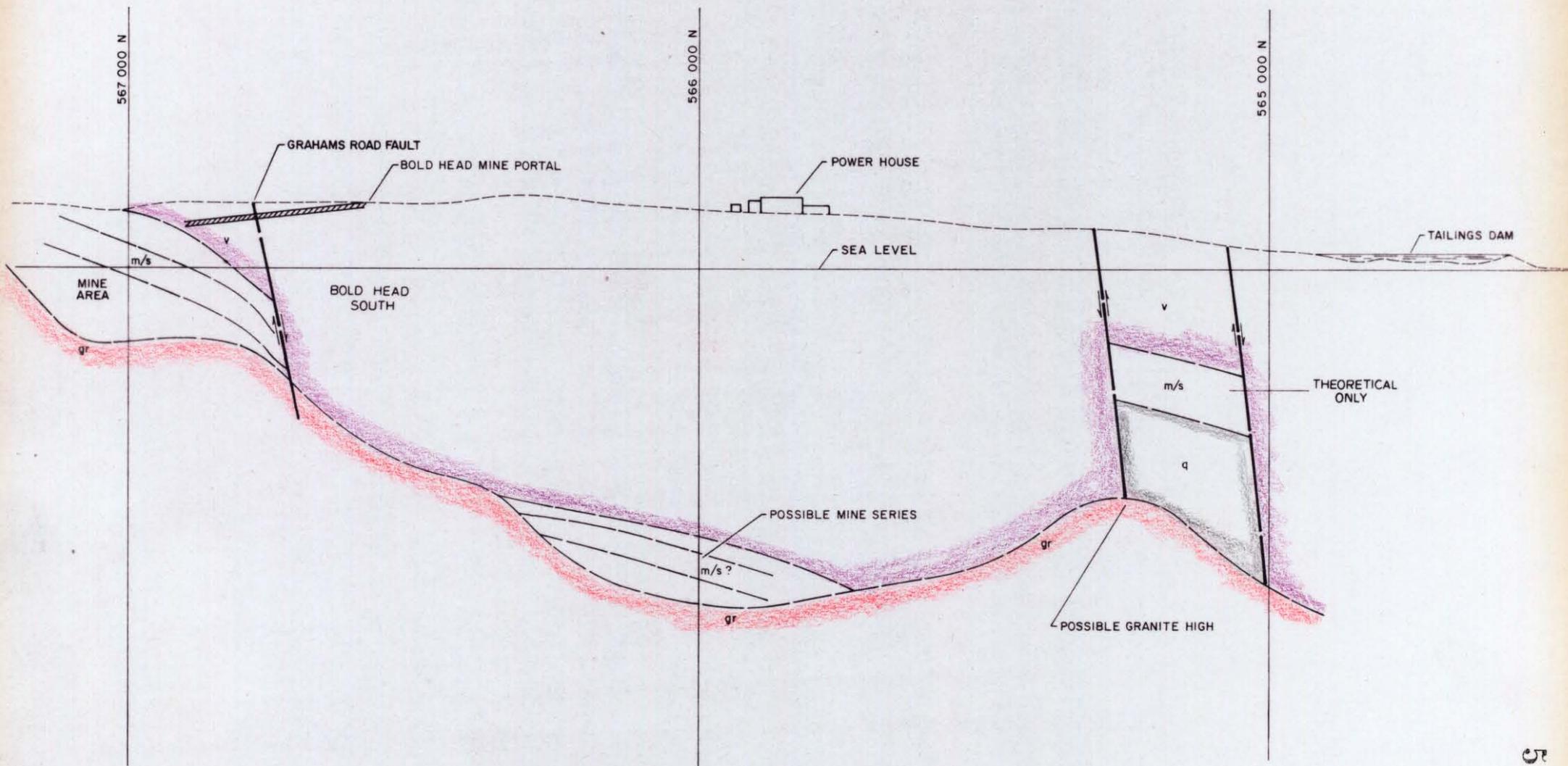
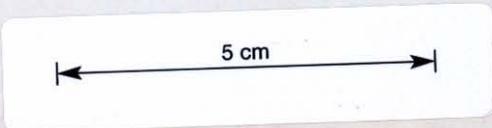


Fig. 8

BOLD HEAD AREA SCHEMATIC SECTION
 SHOWING POSSIBLE SITUATIONS WITH ORE POTENTIAL
 SCALE 1:10 000



519020

Neither geophysics nor geochemistry can give a definitive target for even the location of mine series rocks under the 300 or more metres of volcanic cover which is interpreted to overlie the areas of best potential. For this reason our exploration effort will have to be a relatively slow painstaking process of unravelling the structure of the area to the best of our ability, using all available data including the old surface exploration holes, prior to the drilling of a number of surface stratigraphic holes in areas considered to have the best potential.

Due to the high cost of bringing a sufficiently large diamond drill rig onto the island it is not a viable option to drill only one hole and then re-interpret the structure before drilling another hole. A series of four holes, including completion of D360/14 would be the best minimum programme under the present climate and we therefore have to have a high degree of confidence that our interpreted structure fits all existing data.

FUTURE WORK PROGRAMME

A definite timing on the work programme presented for the licence area will depend on the availability of funds for expenditure on major exploration work.

The following is currently planned:

1. Complete the study of the Phase II geophysical data and produce preliminary plans of the theoretical base of the volcanics and the granite contact.
2. Assess this interpretation in the light of the currently available drilling and re-interpret as required.
3. Construct a series of 1:1 000 scale cross sections, long sections and plans for the whole Bold Head - Investigator I area showing all available data obtained from diamond drilling.
4. Diamond drill a minimum of 3 holes from underground to test the Graham's Road Fault and the stratigraphy to the south of that fault.
5. Diamond drill a minimum of 1 hole from underground to test the stratigraphy west of the No. 4 Fault.
6. Subject to economic considerations, drill at least two stratigraphic diamond drill holes south of the Graham's Road Fault to test the geophysical and geological interpretations and the stratigraphy of that area.
7. Subject to economic considerations drill at least one hole west of No. 4 Fault and one hole at Investigator I south to test the geological interpretations and stratigraphy of these areas.

EXPENDITURE

Exploration Licence 15/66 twelve months to 31st August 1983.

Geology	\$ 2 524.00
Drafting	500.00
Diamond Drilling	Nil
Surveying	15 395.00
Geophysics	3 763.00
Field Expenses	1 655.00
Administration	2 110.00
	<hr/>
	\$25 947.00
	<hr/>

The diamond drilling figure is Nil as, although the results obtained were pertinent to the exploration of E.L. 15/66 the holes were primarily targetted for oreblocking purposes.

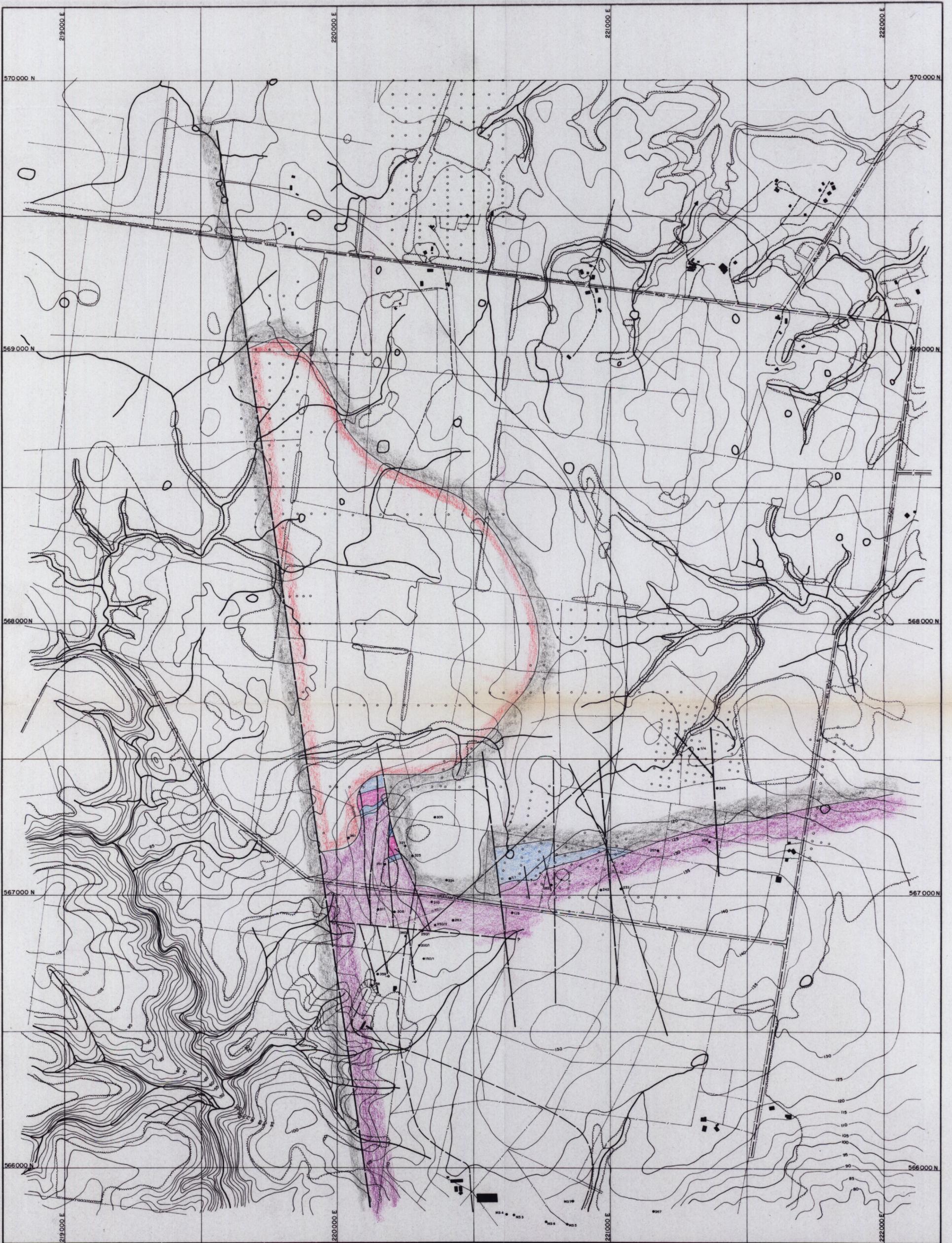
The drafting figure is estimated since it was carried out by King Island Scheelite staff and not costed to this project.



S.G. Brown,
SUPERVISING GEOLOGIST

BIBLIOGRAPHY

- Brown S.G. 1975 Progress Report on the Exploration of the Grassy Granite Contact Zone. Unpublished Company Report.
- Brown S.G. 1982 Annual Report E.L. 15/66 for the twelve months ended 24th October 1982. Unpublished Company Report.
- Brown S.G. 1982 Annual Report to the Mines Department E.L. 21/78. Unpublished Company Report.
- Brown S.G. 1982 An assessment of the Overall Tungsten Potential of King Island. Unpublished Company Report.
- Deakin R.C. 1977 Geophysical Progress Report on the Grassy Granite Contact Zone, King Island. Unpublished Company Report.
- Edwards A.B.,
Baker C. and
Callow D.J. 1955 Metamorphism and Metasomatism at King Island Scheelite Mine. J. Geol. Soc. Aust., 3.
- Haynes P.A. 1973 The Petrology and Geochemistry of the King Island Scheelite Deposits and Associated Intrusion. B Sc. (Hons) Thesis, Uni. Qld. Unpublished.
- Large R.R. 1971 Metasomatism and Scheelite Mineralisation at Bold Head, King Island. Pro. Aust. Min. 235, pp 31-45.
- Richardson R.L. 1976 Geophysical Report on the Grassy River Fault Zone. Unpublished Company Report.
- Rogers M.C. 1976 The King Island Scheelite Deposits: A Review of their Features and Metallogenesis. Unpublished Company Report.
- Rogers M.C. 1974 Evidence Supporting that Cotton's Breccia and the Pyroxene Garnet Hornfels Unit have the same Origin. Geoscript, Vol. 1, No. 11 (House Journal).
- Scott B.W. 1950 The Petrology of the Volcanic Rock of South East King Island, Tasmania. Papers and Proc. of Royal Soc. of Tasmania, 1950, pp 113 - 136.
- Soloman M 1969 The Nature and Possible origin of the Pillar Lava and Hyalaclastic Breccia of King Island, Australia. Q.J.G.S. London Vol. 124, pp 153-159.
- Sumpton J. 1982 Progress Report on Geophysics, Powerhouse, King Island, Tasmania. Unpublished Company Report.



NOTE:
 1. Co-ordinate system is the integrated co-ordinate system based on Australian Geodetic Datum.
 2. Level Datum is mean low water ordinary spring (MLW) as established by NMAS, Tasmania, 1949.
 3. Compiled from aerial photographs, Tasmania Land Dept.

DATE: JUNE, 1974
 GEOLOGIST: S.G.B.
 DRAWN: R.F.
 CHECKED: M.C.R.

GEOPEKO LIMITED
 KING ISLAND GROUP

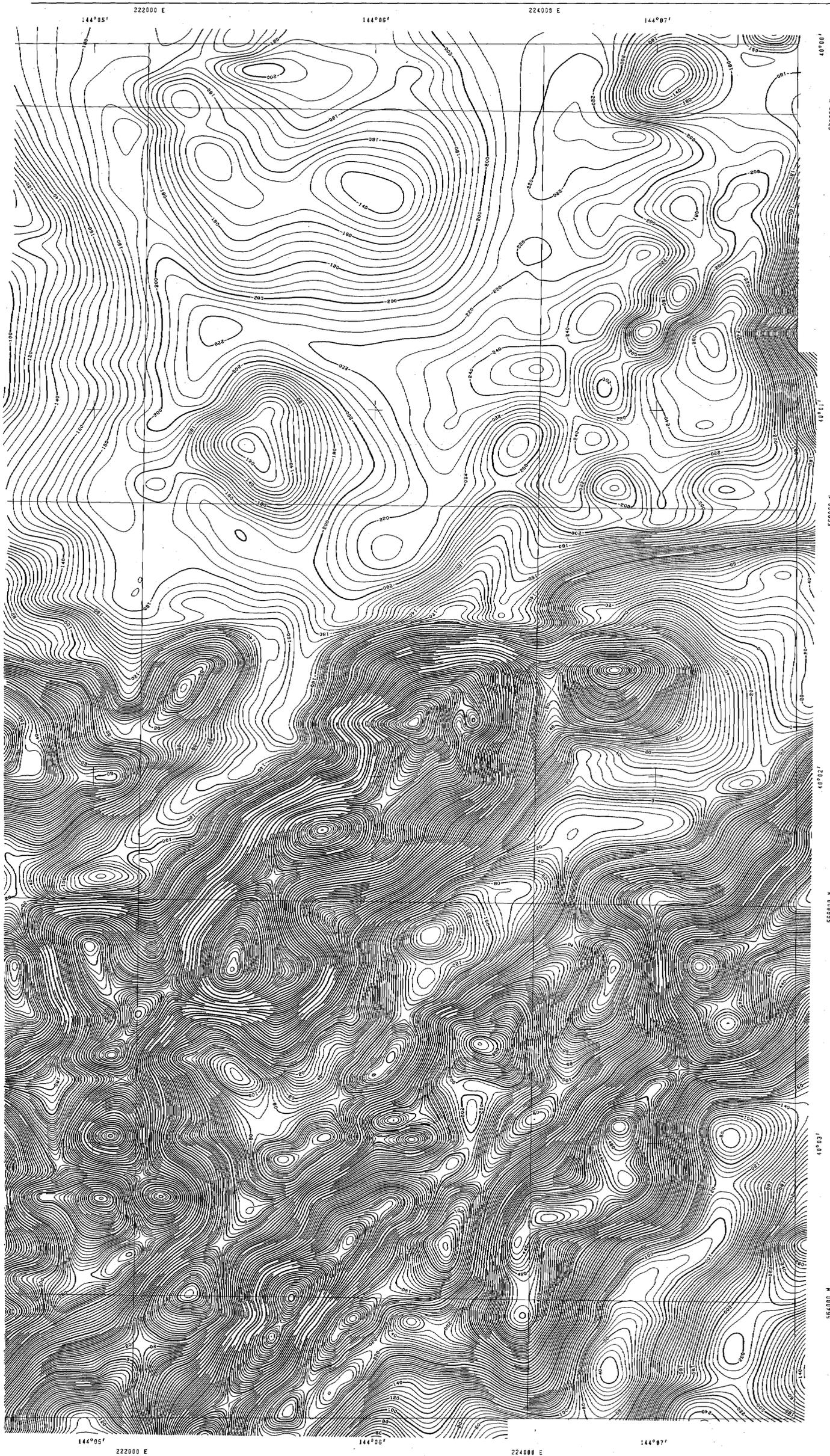
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**TOPOGRAPHICAL BASE MAP
 SHOWING
 DRILL HOLE LOCATIONS
 AND
 INTERPRETED GEOLOGY**

No. KF 3

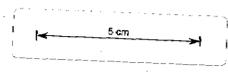
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KF4	KF5	KF6
KF7	KF8	KF9

83-2034

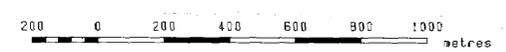


KING ISLAND SPECIAL GRASSY 7717-IV-NW-1

GEOPEKO



SCALE 1:10 000



LOCATION INDEX

7717-IV-NW

7717 -IV-NW-4	7717 -IV-NW-1
7717 -IV-NW-3	7717 -IV-NW-2



INTEGRATED SURVEY GRID
ZONE 55/1

GRASSY

AIRBORNE GEOPHYSICAL SURVEY

Total Magnetic Intensity

FLIGHT DATA

Nominal traverse line separation: 150m
 Nominal tie line separation: 1.5km
 Nominal data spacing along flight lines: 70m
 Nominal terrain clearance: 50m onshore - 15 m offshore
 Navigation and recovery using Motorola Mini-Ranger MRS-3
 Aircraft: Austirex Nomad N 22 B - Reg No: VH-FZP
 Magnetometer Type: Sonotek 6039 in stinger

Survey Date: August 1980

MAP DATA

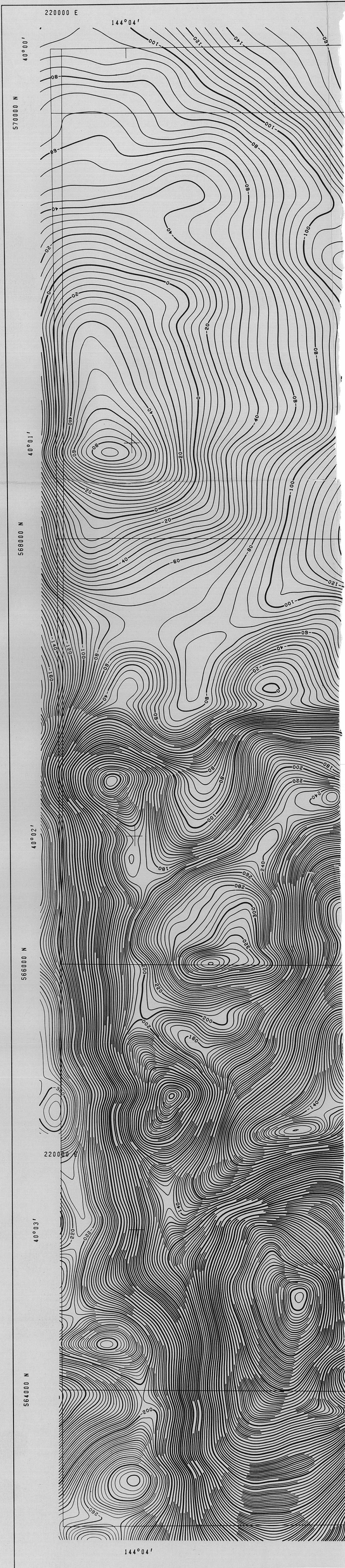
Contour Interval: 5nT
 IGRF subtracted prior to contouring

Survey flown and compiled by Austirex International Ltd
 Project management by Geopeko geophysical group

519026

83-2024

DRAWING NO: 6226 S/B



BOLD HEAD SOUTH KING ISLAND

PROFILES OF RESIDUAL BOUGUER ANOMALY AND TOTAL MAGNETIC INTENSITY

SHEET 1

HOR SCALE 1:10 000
VER SCALE GRAVITY 1cm=5gu T M I 1cm=200nT
DATUM GRAVITY B_{GU}, T M I 61800nT

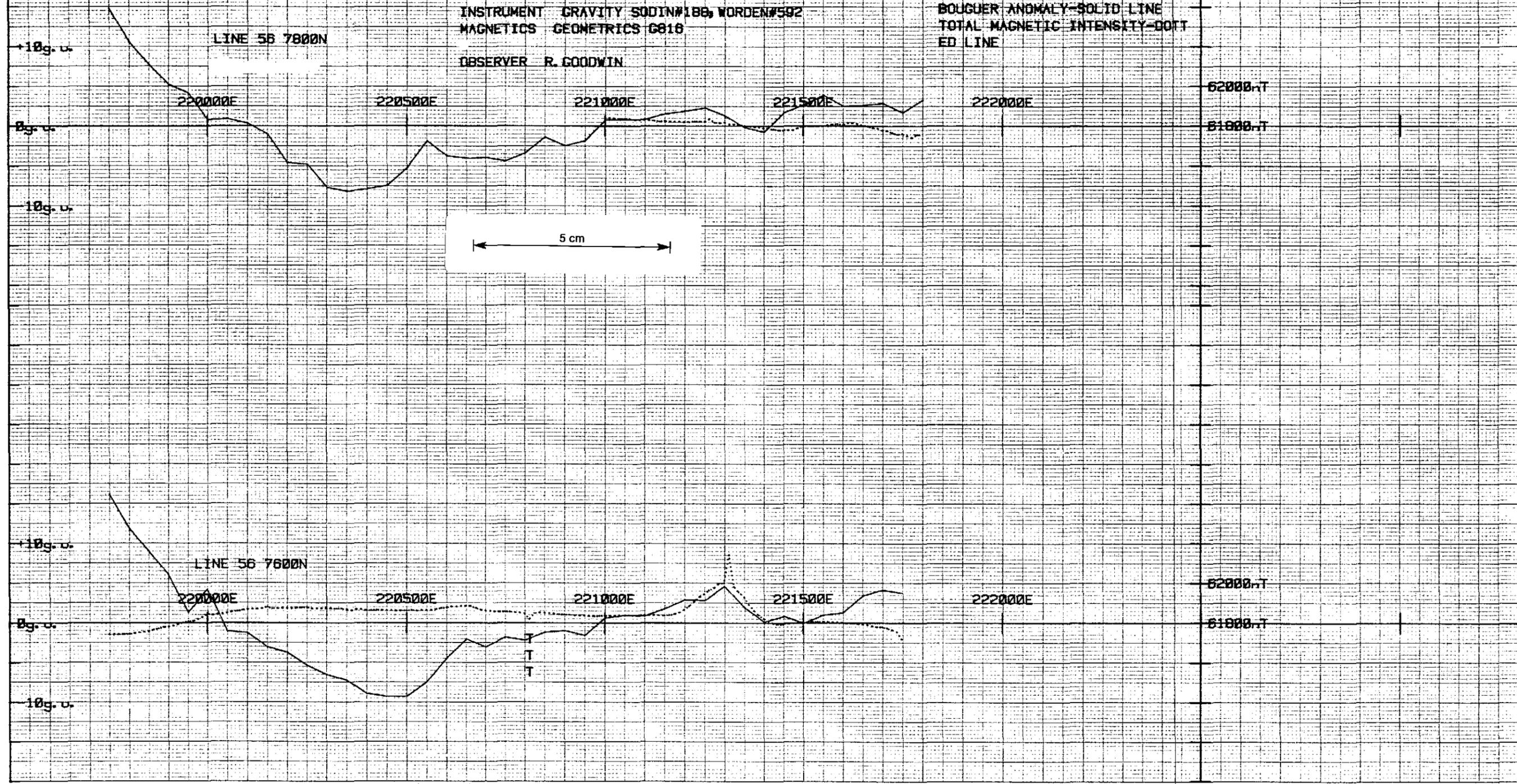
DATE
JANUARY 1983
DECEMBER 1981

FENCE OR OTHER
CULTURE

INSTRUMENT GRAVITY SODIN#188, WORDEN#592
MAGNETICS GEOMETRICS G810

BOUGUER ANOMALY-SOLID LINE
TOTAL MAGNETIC INTENSITY-DOTTED LINE

OBSERVER R. GOODWIN



HEWLETT PACKARD J 70 30 4

SHEET 2

5 cm

LINE 56 7400N

15g. u.

8g. u.

5g. u.

62000-T

61000-T

22000E

221500E

221000E

220500E

220000E

LINE 56 7200N

18g. u.

8g. u.

10g. u.

62000-T

61000-T

22000E

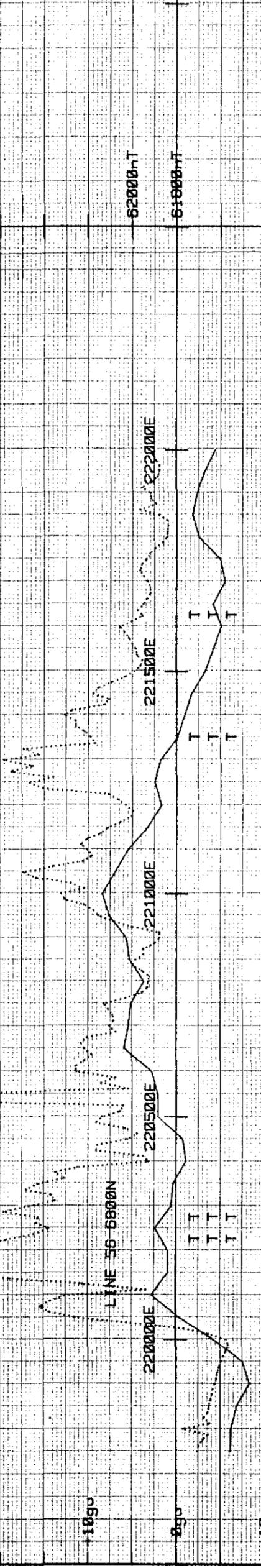
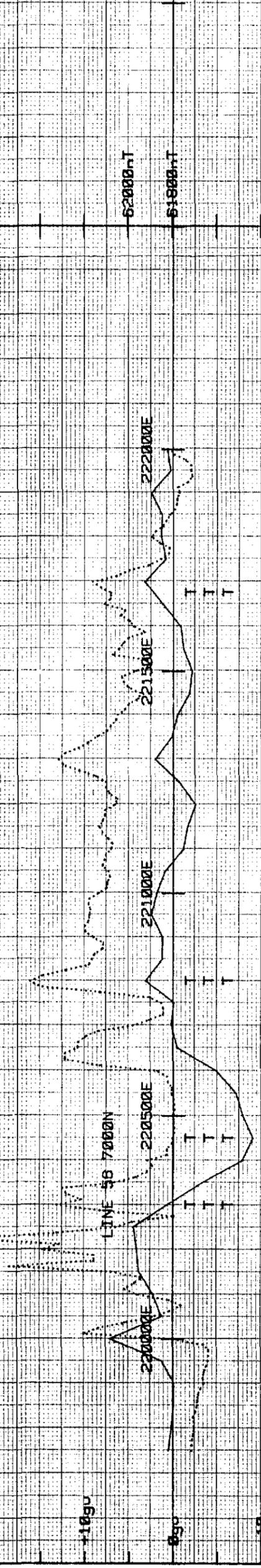
221500E

221000E

220500E

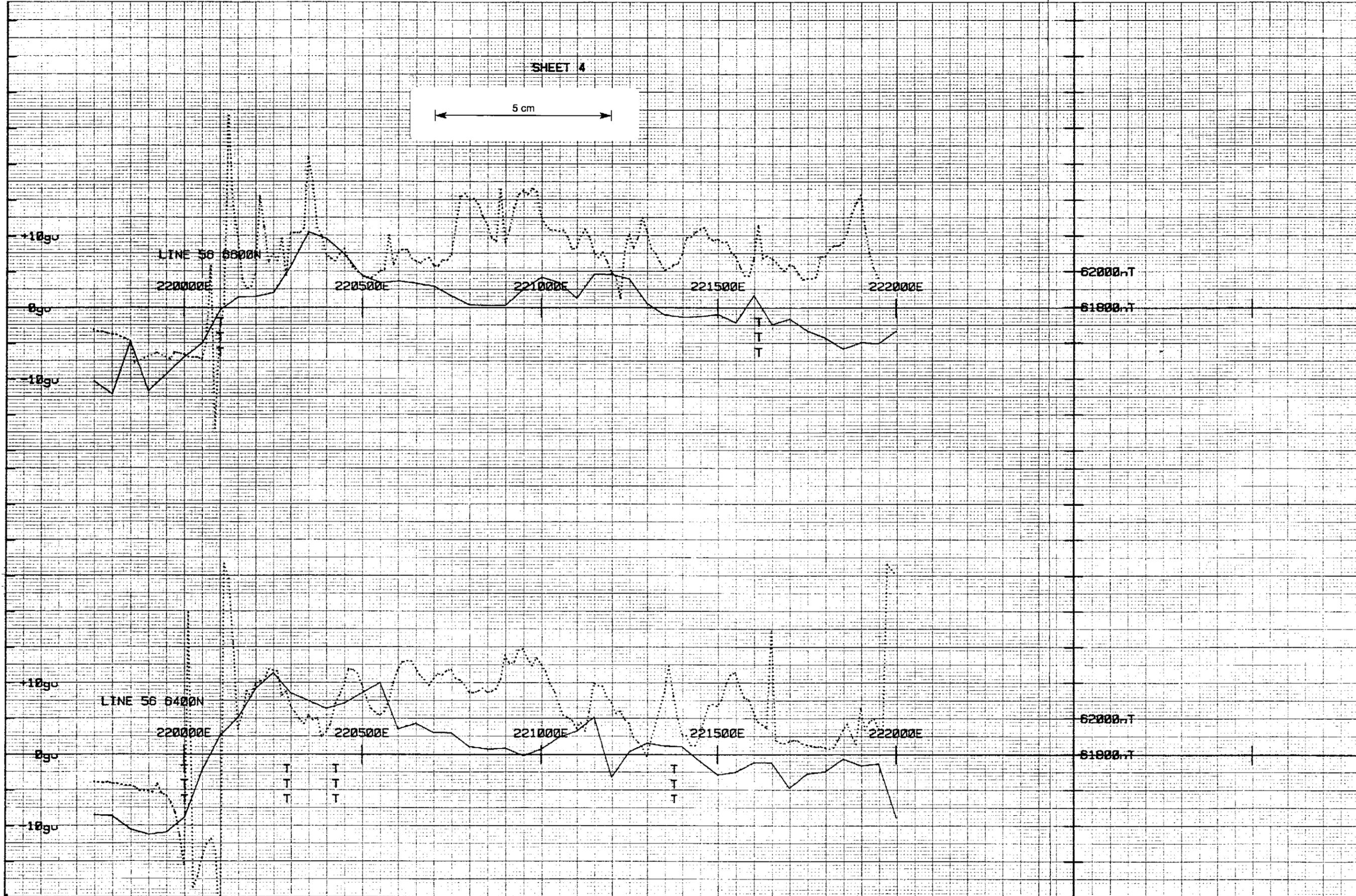
220000E

SHEET 3



SHEET 4

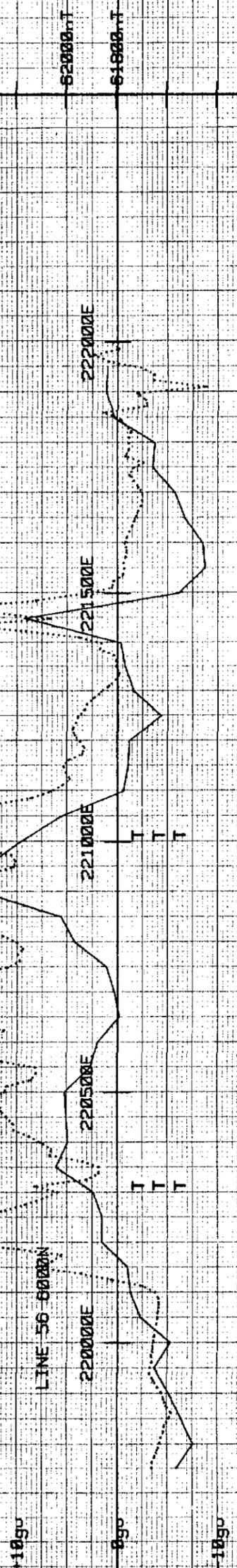
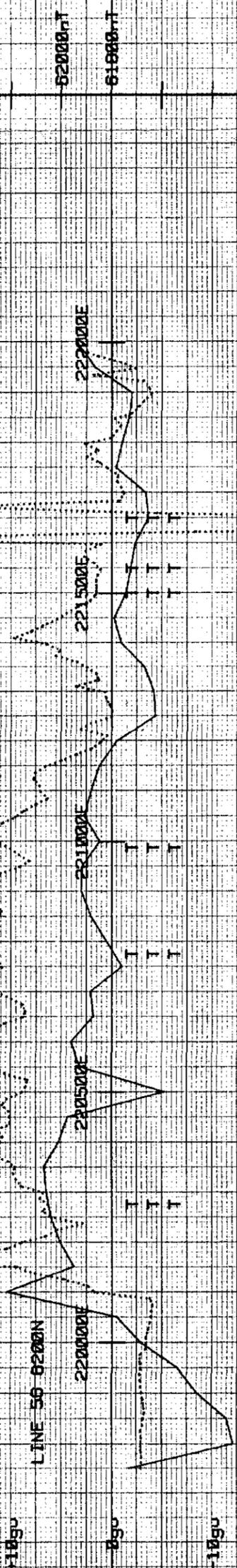
5 cm

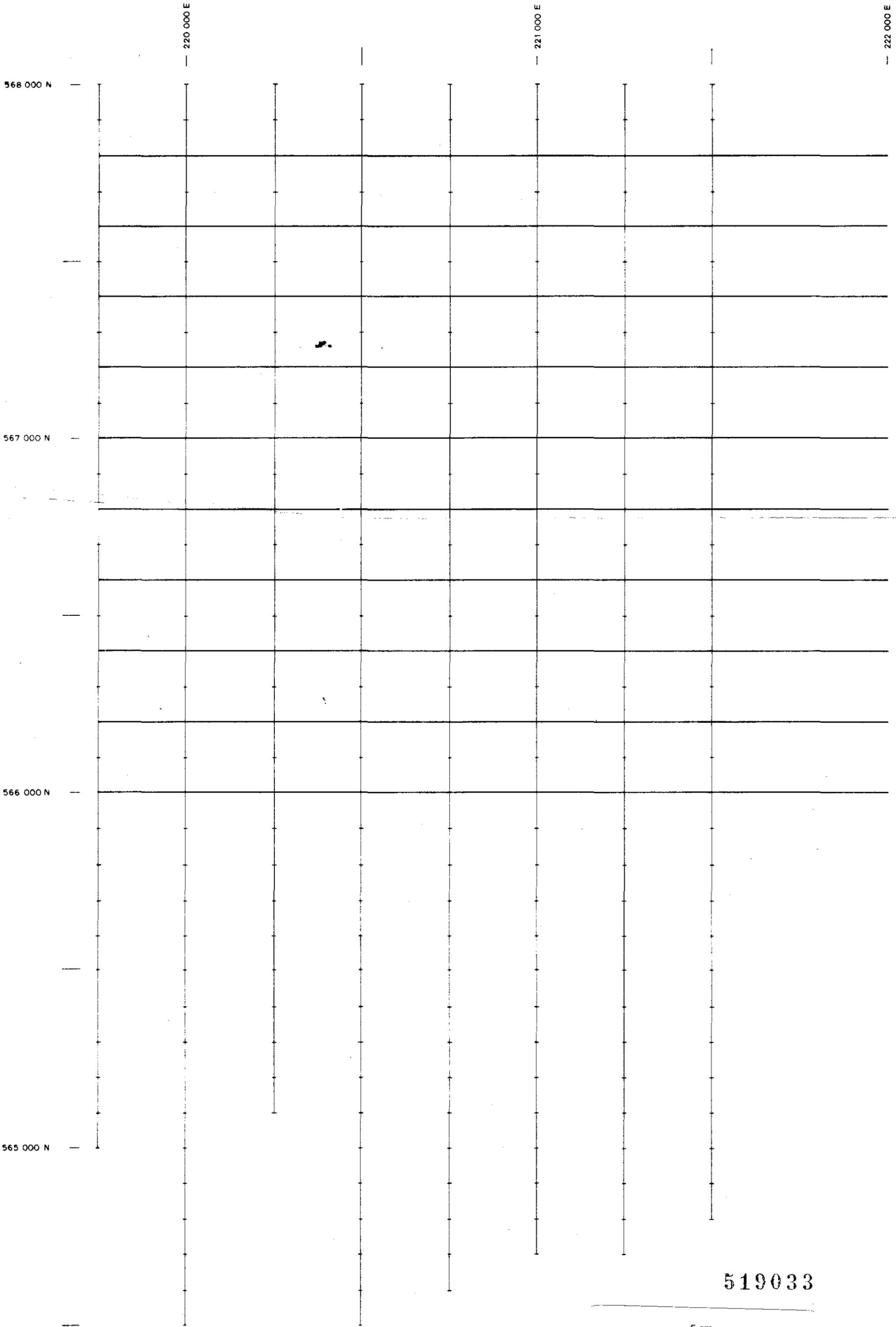


HEWLETT-PACKARD 9270-1024

SHEET 5

5 cm





519033

5 cm

LEGEND:
| Phase I
--- Phase II

KING ISLAND SCHEELITE
BOLD HEAD SOUTH - GEOPHYSICAL GRID
SCALE 1:10 000

93-2034