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GEOPHYSICAL REPORT

on the

GRASSY RIVER FAULT ZONE

by

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Chatswood
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ISG COORDINATES
REFER REPORT 70-0676

93-3455

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INTRODUCTION

Offshore geophysical studies have been carried out in the area east on the Dolphin orebody in an attempt to determine the location and nature of the upper parts of the Grassy River fault zone.

This work was prompted by concern that easterly extensions of the Dolphin workings may intersect the fault zone. Should the upper parts of the fault zone be represented by a structure similar to the Grassy River gorge to the north, and be filled with unconsolidated sediments there would be danger of catastrophic invasion of the underground workings by mud and sea-water.

Geophysical studies included a small offshore seismic and magnetic survey in the area immediately east and to the south of the Dolphin workings. The results of the seismic surveys are inconclusive but the magnetic results suggest that the position of the fault is approximately 150 metres further east than was previously inferred from geological studies.

GEOLOGY AND NATURE OF THE PROBLEM

The position of the Grassy River fault zone is well known in the Bold Head mine area, from drilling and surface mapping. In these parts the fault zone is a very linear structure and is clearly evident in surface and airborne magnetics, due to the strong contrast in magnetic properties of the rock types on either side, i.e. granite and volcanics to the east and quartzites to the west. Further south, geological mapping shows the fault to run parallel to, but slightly east of the Grassy River gorge, crossing the shoreline near the Bold Head ore-haulage road and continuing south under the sea as defined by the aeromagnetic character which, in these parts, is reflecting the magnetic contrast between a large thickness of volcanics to the east and quartzites, mine series and minor volcanics to the west. (see plan No. 1)

Prior to the geophysical survey described in the report, the position of the fault east of the Dolphin Mine was based on southwards extrapolation of the known fault zone to the north, and on the results of DDH No. 215 which intersected 218.6 metres of volcanics, and DDH No. 212 to the west, which intersected 52.6 metres of quartzite, suggesting that the fault zone passes between these drill holes.

In the area of concern, immediately east of the Dolphin Mine, there is no positive geological evidence of the position of the fault. Studies of the fault zone in this area are obviously severely restricted by the ocean, and the proximity of the fault zone to the shoreline, such that it is impossible to effectively cover the complete area with either offshore or surface geophysical methods.

The only geophysical methods that offered any hope of being "in touch" with the fault zone, were offshore seismic and magnetic methods. The only area where these surveys could completely "straddle" the fault zone feature was in the Grassy Bay area between the breakwater and the area of reclaimed land. Offshore studies were therefore concentrated in this area.

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WORK DONE

Seismic work was carried out by Australian Hydrographic Services Pty. Ltd.

Magnetic surveys were carried out by the author in conjunction with the seismic surveys.

Equipment used was as follows:

Seismic

a) Pinger-EDO Western 415 Acoustic Sub-bottom Profiling System - for depth to sea floor.

b) Sparker-Huntec Hydrosonde Mark 2A - for defining geometry of unconsolidated sediments beneath the sea floor.

Navigation control was effected using the MRB2 hydrodist system for distance and a theodolite for line. Traverses were tied to the mine grid.

The vessel used was a locally hired fishing boat.

Tide gauges were installed at the Grassy wharf to monitor tidal variations over the duration of the survey.

Magnetic

Magnetic measurements were carried out using a portable proton precession magnetometer model Geometrics G816. The magnetometer sensor

was mounted in a non-magnetic row-boat which was towed about 10 metres behind the seismic vessel. Readings were taken at about 6-second intervals and recorded on an audio tape recorder.

A total of 6 seismic traverses were carried out. (see plan No. 2) The first attempts to obtain seismic records were frustrated by rough weather, and subsequently abandoned until conditions improved several days later.

Only two magnetic traverses were carried out before the magnetometer sensor was swamped by the rough seas.

RESULTS OF SURVEYS

Seismic records are in the form of long analogue charts and are not included in this report. An example of a Sparker record is shown in Plate No. 1.

The records are extremely "noisy" due to the roughness of the sea. Very little sub-bottom structure can be discerned in the results. Coherent traces do exist in the records, but these are simply "multiples" of sea floor reflections.

The Pinger records clearly define the sea floor, but show little other useful information. Soundings of water depth have been determined from these results and are shown, in metres, on Plan No. 3.

The magnetic profiles are shown on Plate No. 2. They show a smooth, contact type anomaly of approximately 400-500 nT amplitude, on both traverses, with character similar to but more enhanced and accurate than the aeromagnetic anomaly character.

INTERPRETATION

The seismic results were exhaustively examined, but failed to reveal useful sub-bottom information that could be reliably interpreted.

The results were also studied by Mr. J. Ringis, (New South Wales Mines Department) who is a recognised expert in this field. Mr. Ringis agreed that the records were too noisy to be used reliably.

The magnetic results show character indicative of a contact between two magnetically contrasting rock types. An interpretation based on computer modelling of a 2-dimensional polygon is shown in Plate No. 3. Other interpretations may be possible, but it is clear that a major contact structure exists in the vicinity of the steep magnetic gradient part of the profile. The interpretation is likely to be fairly accurate for the lateral and vertical position of the contact, but dip is likely to be less certain.

This inferred magnetic contact may not necessarily represent the Grassy River fault. However if the assumption that the fault in this area is defining the contact between volcanics to the east and mainly mine-series and granite to the west, is accepted, it is reasonable to assume that this interpreted magnetic feature is at least closely related to the fault zone.

However, this interpreted contact may only represent the eastern margin of the fault zone, and other major related faults may exist further to the west; probably without any observable magnetic manifestation. Geologists believe, however, that the fault zone is unlikely to be wider than 50 metres.

CONCLUSIONS AND RECOMMENDATIONS

The magnetic results and interpretation provide strong evidence to believe that the Grassy River fault zone lies approximately 150 metres further east than was previously thought. If this is so, it would appear that the risk to further easterly extension of the mine workings is considerably reduced, as sub-surface geology suggests that the orebody will terminate down-dip before the fault is reached.

However, the interpretation is heavily dependent on the assumptions stated previously, and it is strongly recommended that any underground development in this area be preceded by adequate investigation by drilling.

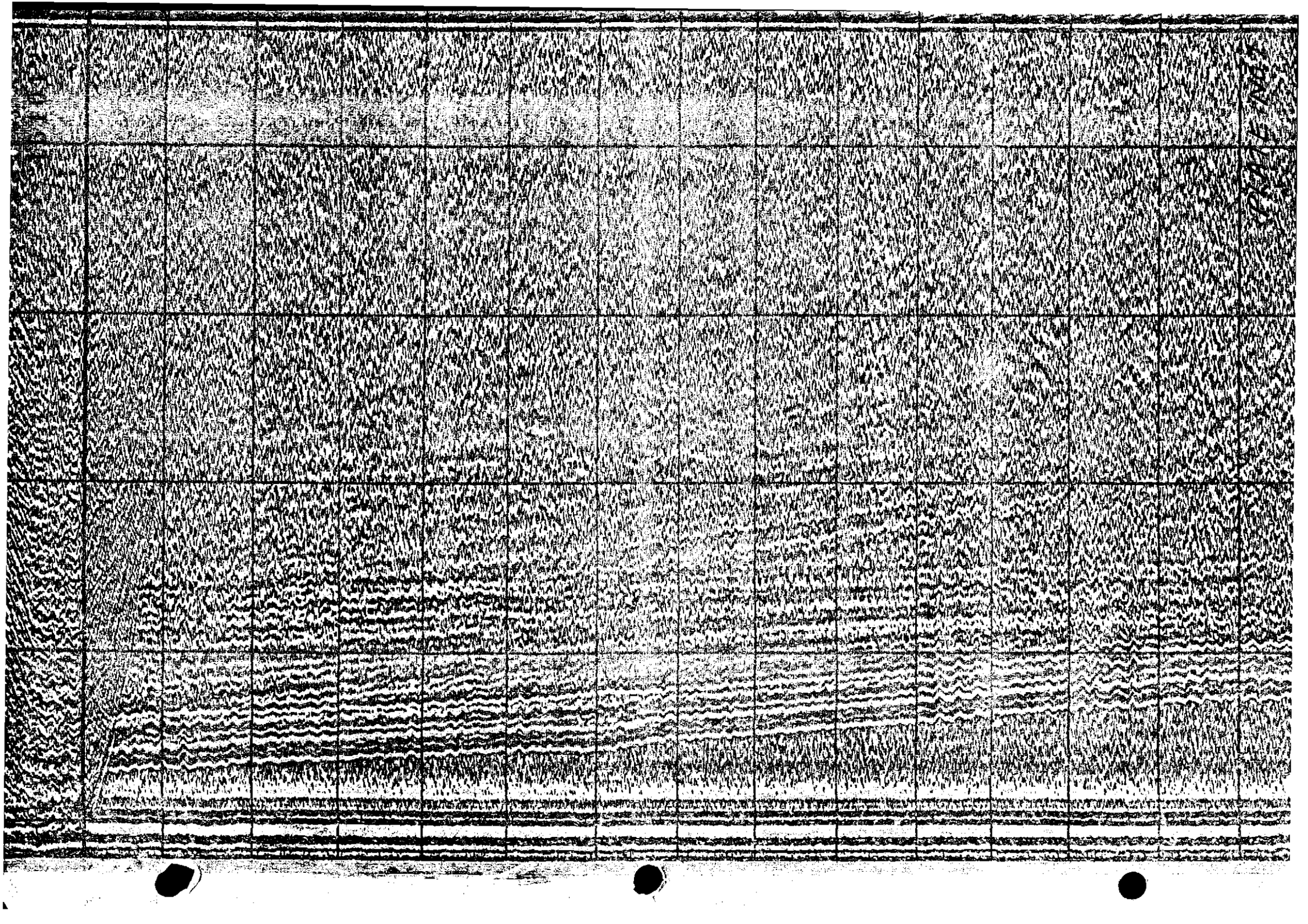
The survey did not provide any useful information concerning the nature of the upper parts of the fault zone, and it is still possible that a deeply weathered submarine trench exists.

An inconsistency remains between the geophysical interpretation and the results obtained in DDH's 115 and 112. This may possibly be explained by cross-faulting to the south of these drill holes which has shifted the Grassy River fault further east. However, there appears to be little evidence of this.

Another possible explanation is that the geology in the vicinity of these drill holes is more complex than is assumed. Further shallow drilling in this area may help to resolve the problem.

No further geophysical work is recommended at this stage.

R. L. Richardson



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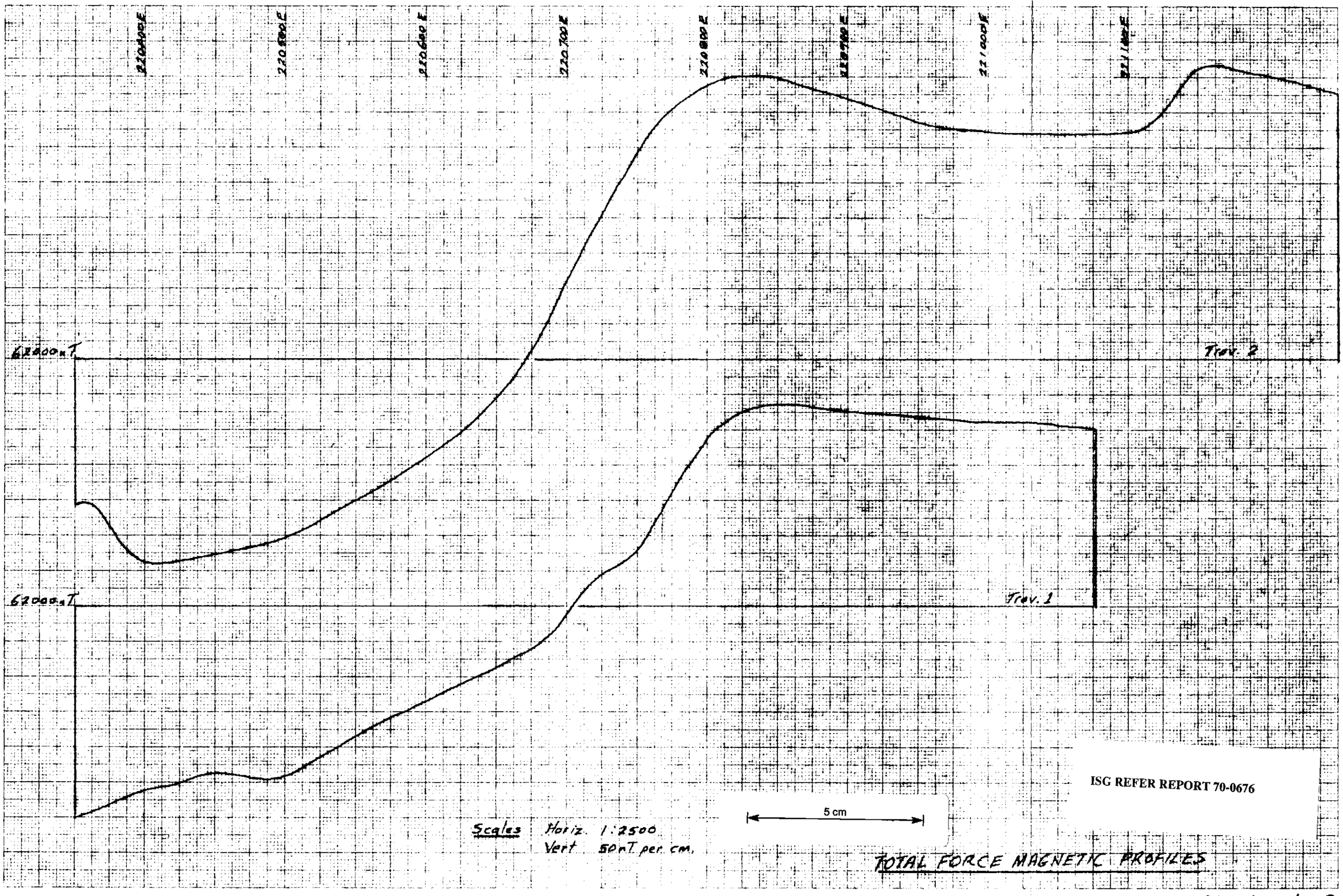

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TOTAL FORCE MAGNETIC PROFILES

PLATE NO. 2

151014

L. A. RICHARDSON & ASSOC.

Sea level

2D Magnetic model
$\chi = .001$

Computed total force magnetic profile

Observed total force magnetic profile

5 cm

Scale 1:2500

MAGNETIC INTERPRETATION

PLATE NO. 3

151015

220 000 E | 220 100 E | 220 200 E | 220 300 E | 220 400 E | 220 500 E | 220 600 E | 220 700 E | 220 800 E | 220 900 E | 221 000 E | 221 100 E

00 R.L. Sea Level

Sea Floor

Volcanics

Volcanics

Volcanics

Previously inferred position of Grassy R. Fault

Grassy R. Fault as inferred from geophysics

5 cm

Scale 1:2500

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GEOLOGICAL INTERPRETATION

CROSSECTION 563560 N

PLATE NO. 4

144°00'E

144°05'E

40°00'S

40°05'S

L 1425

1500

H1561

1400

H1540

H1728

L 1475

L 1449

1500

1750

1500

H1610

H1769

H1781

H2346

L 1436

H1792

H1790

1750

2000

1500

L 1476

H1806

1750

5 cm

Scale 1:25000

151016

AEROMAGNETIC CONTOURS

GRASSY R. FAULT AREA

93-3455

PLAN NO 1

Australia – South Coast

Bass Strait – King Island

GRASSY BAY

Surveyed by

Australian Hydrographic Services Pty Ltd.

for

Geopeko Ltd.

October – 1975

NATURAL SCALE 1:1000

5 cm

ISG REFER REPORT 70-0676

SCALE OF METRES

100 0 500 1000

SOUNDINGS IN METRES & DECIMETRES

Reduced to zero on a tide park in Grassy Bay

UNIVERSAL TRANSVERSE MERCATOR PROJECTION

INTEGRATED SURVEY GRID ZONE 55T

TRACK PLOT

563 900N

563 700N

563 500N

563 300N

563 100N

219 900E

220 100E

220 300E

220 500E

220 700E

220 900E

221 100E

RECLAIMED LAND

APPROX OLD COASTLINE

ROCK AND SAND

RUINED JETTY

ROCK AND SAND

151017

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PLAN NO. 2

ISG REFER REPORT 70-0676

Australia — South Coast

Bass Strait - King Island

GRASSY BAY

Surveyed by

Australian Hydrographic Services Pty. Ltd.

for

Geopeko Ltd.

October - 1975

NATURAL SCALE 1:1000

5cm

SCALE OF METRES

100 0 500 1000

SOUNDINGS IN METRES & DECIMETRES

Reduced to zero on a tide gave in Grassy Bay

UNIVERSAL TRANSVERSE MERCATOR PROJECTION

INTEGRATED SURVEY GRID ZONE 55/1

563 900N

563 700N

563 500N

563 300N

563 100N

219 900E

220 000E

220 300E

220 600E

220 700E

220 900E

221 000E

RECLAIMED LAND

APPROX. GAS PIPELINE

ROCK AND SAND

RUINED JETTY

ROCK AND WEED

BM6

BM4

BM7

BM8

BM5

BM17

151018

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PLAN NO. 3

3961/1

DDH 215

DDH 212

Previously inferred position of Grassy R. Fault

Grassy R. Fault inferred from geophysics

Magnetic Traverse No 2.

Magnetic Traverse No 1.

584 200 N

584 100 N

584 000 N

583 800 N

583 700 N

583 600 N

583 500 N

583 400 N

583 300 N

583 200 N

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5 cm

KING ISLAND SCHEELITE

SCALE 1:1000 AO

KING CROSS & APPROACH ROADS

Scale 1:2500

PLAN SHOWS POSITIONS OF MINE WORKINGS AND GRASSY R. FAULT

151019

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PLAN NO. 4