Open File Envelope No. 3962

EL 705 AND EL 1056

MENINGIE

PROGRESS REPORTS TO LICENCE SURRENDER, FOR THE PERIOD 27/8/1980 TO 5/4/1984

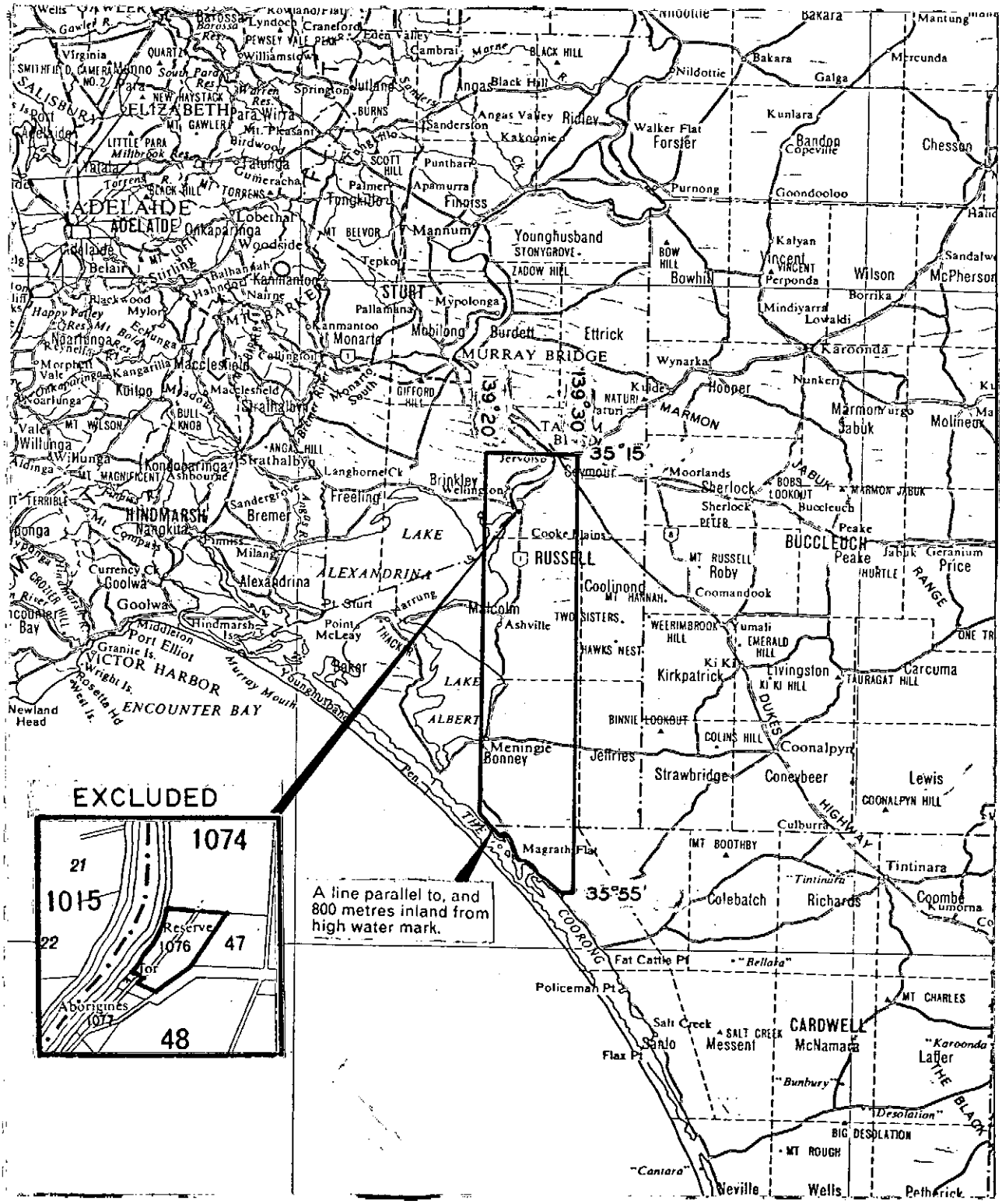
Submitted by
Thiess Bros Pty Ltd and CSR Ltd
1984

Enquiries: Customer Services Branch
Minerals and Energy Resources
7th Floor
101 Grenfell Street, Adelaide 5000

Telephone: (08) 8463 3000
Facsimile: (08) 8204 1880

Government of South Australia
Primary Industries and Resources SA

SCHEDULE A



SCALE 1:1 000 000

KILOMETRES 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 KILOMETRES

EXPIRED

APPLICANT: THIESS BROS. PTY. LTD.

DM: 330/80

AREA: 1303 square kilometres

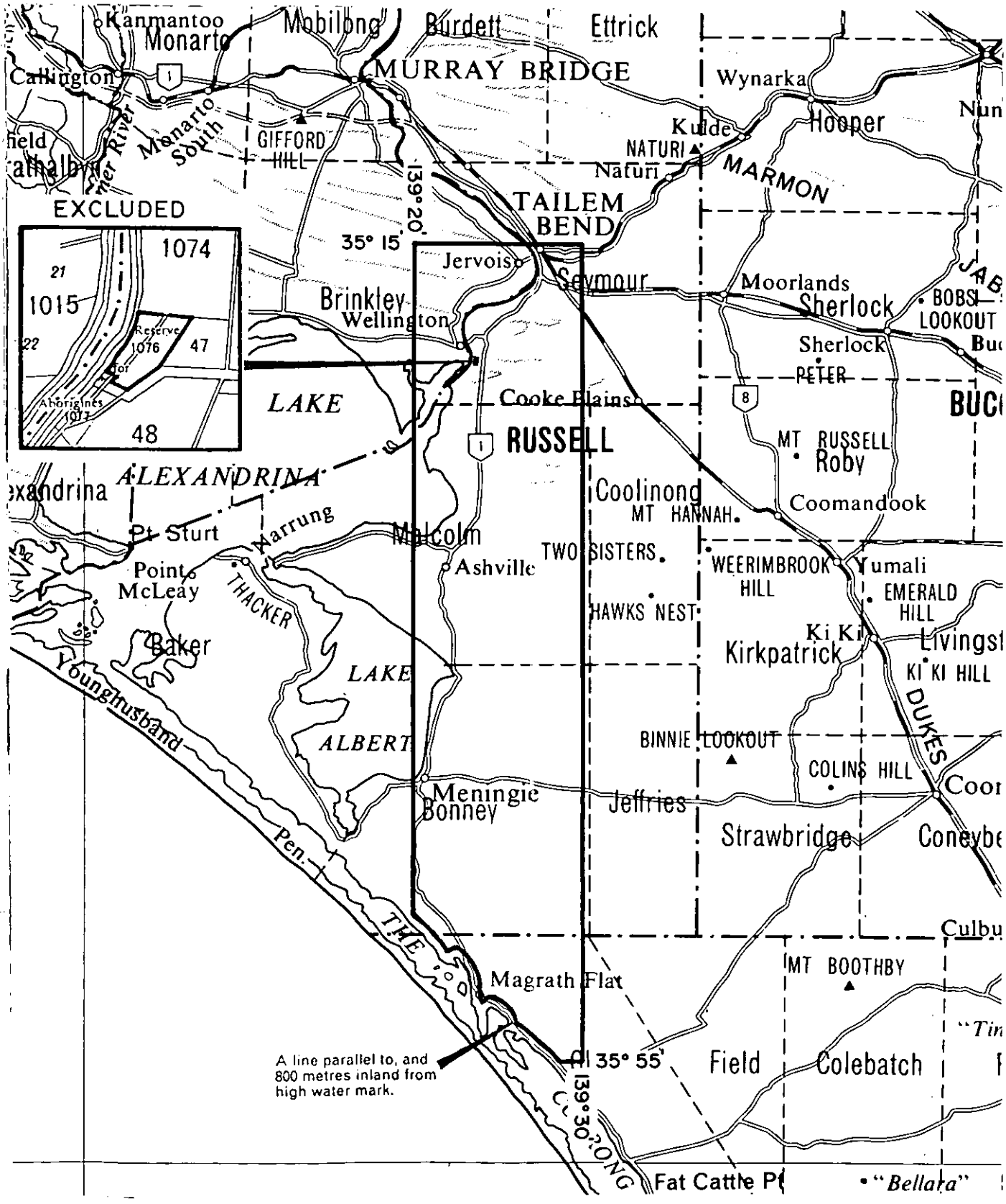
1:250000 PLANS: BARKER

LOCALITY: MENINGIE AREA

DATE GRANTED: 27-8-80

DATE EXPIRED: 26-8-82 (?) EL No: 705

SCHEDULE A



SCALE 1:500,000

KILOMETRES 10 0 10 20 30 40 50 KILOMETRES

SURRENDERED

APPLICANT: CSR LIMITED

DM: 290/82

AREA: 1303 square kilometres

1:250000 PLANS: BARKER

LOCALITY: MENINGIE AREA

DATE GRANTED: 19-10-82

DATE EXPIRED: 18-10-83 84 CS

EL No: 1056

CONTENTS ENVELOPE 3962

Transparencies In Cylinder 3962/1

TENEMENT: E.L.'s 705 & 1056 - Meningie.

TENEMENT HOLDER: Thiess Bros. Pty. Ltd.

I

003

THIESS BROS. PTY. LIMITED - MINING DIVISION

EXPLORATION LICENCE 705 - MENINGIE

EXPLORATION PROGRESS REPORT FOR

3 MONTHS PERIOD ENDED 7TH NOVEMBER, 1980.

146 Kerry Road,
Archerfield,
Qld.....4108.

CONTENTS

TABLES

FIGURES

1.0 INTRODUCTION

Exploration Licence 705 - Meningie (formerly E.L.- 401) covers an area of approximately 1303 KM^2, 120 kilometres south-east of Adelaide on the eastern edge of Lake Alexandrina and Lake Albert, South Australia (Figure 1).

The ground was originally acquired by Thiess Bros. Pty. Limited on 7th June, 1978 (E.L. - 401) for a period of two years to investigate a number of regional aeromagnetic anomalies with coincident gravity highs occurring within the Kanmantoo Group meta-sediments for associated base metal mineralization (Figure 2).

The current area was re-applied for and granted on 27th August, 1980 for a period of one year.

Previous exploration including detailed ground geophysics, rotary-percussion and diamond drilling has confirmed that intense magnetic anomalies within the Kanmantoo Group meta-sediments are attributable to banded magnetite rich amphibolites and gneissic units containing anomalous intersections of copper, pyrite and pyrrhotite.

Drilling has also located within the Kanmantoo Group a unit of scapolite rich calc-silicate rocks with associated sulphide (pyrite, pyrrhotite) mineralization which may be a correlative of the Nairne Pyrite/Talisker calc-silicate horizon.

This report outlines the results of a ground magnetic survey undertaken during the quarter ending November 27th, 1980.

2.0 GEOPHYSICS

2.1 Ground Magnetometer Survey

A detailed ground magnetometer survey was undertaken along eleven traverse lines for a total of 21.075 kilometres (Figure 3). The traverse lines were in a general east-west direction approximately perpendicular to the anticipated regional strike.

The survey commenced October 22nd and was completed on October 27th, 1980.

The purpose of the survey was primarily to geophysically outline and exactly locate on the ground the magnetic response of a scapolite-bearing unit, a correlative of the Nairne Pyrite/Talisker calc-silicate horizon encountered in previous drilling, (see Exploration Licence 401 - Meningie, Exploration Progress Report for 3 months period ended 7th June, 1980) and also to give details of shape, dip and depth of the scapolite-bearing unit as well as drilling targets for follow-up evaluation.

2.2 Field Procedures

Magnetic profiling was carried out using a Barringer Research GM-122 Total Field Proton Precession Magnetometer.

Magnetometer readings were taken every 25.0 metres and a base station was established at the start of each line and re-read every two - three hours. Results have been corrected for diunal drift.

2.3 Presentation of Results

The magnetic results are plotted as profiles for each traverse line as shown in Figures 4, 5 and 6. A vertical linear scale of one centimetre equals 100 nanoteslas and a horizontal scale of one centimetre equals 50 metres was used.

2.4 Interpretation

Examination of the ground magnetic profile results indicate that the magnetic response attributable to the scapolite-bearing unit was located along Lines 5A, 6, 7, 8, 10 and 12.

A quantitative interpretation of these magnetic responses using a standard model for a dyke of finite depth extent and forming a dipole dipping vertically indicates a vertically dipping source with a strike length of about five kilometres and a thickness varying between 150-300 metres, at a depth from the surface of 85-90 metres.

The remaining Lines 9, 11, 13, 14, 15 and 16 failed to locate the characteristic magnetic signature of the scapolite-bearing unit.

A qualitative geological interpretation of the magnetic profiles is tabulated below:-

Table 1 GEOLOGICAL INTERPRETATION OF MAGNETIC PROFILES

Line No.	Interval	Interpreted Geology
5A	000E-250E	Weakly magnetic Kanmantoo Group meta-sediments
	250-575E	Kanmantoo Group scapolite-bearing unit
	575E-800E	Weakly magnetic Kanmantoo Group meta-sediments
6	600W-250W	Strongly magnetic granite
	250W-350E	Strongly magnetic Kanmantoo Group meta-sediments
	350E-975E	Weakly magnetic Kanmantoo Group meta-sediments
	975E-1250E	Strongly magnetic Kanmantoo Group scapolite-bearing unit
	1250E-1550E	Moderately magnetic Kanmantoo Group meta-sediments
	1550E-1650E	Strongly magnetic Kanmantoo Group meta-sediments
	1650E-2200E	Moderately magnetic Kanmantoo Group meta-sediments
	2200E-2300E	Highly magnetic Kanmantoo Group garnet-staurolite gneiss
7	000E-575E	Weakly magnetic, Kanmantoo Group meta-sediments
	575E-800E	Strongly magnetic Kanmantoo Group scapolite-bearing unit
	800E-1000E	Moderately magnetic Kanmantoo Group meta-sediments
8	1000W-600W	Weakly magnetic Kanmantoo Group meta-sediments
	600W-200W	Strongly magnetic Kanmantoo Group scapolite-bearing unit
	200W-200E	Weakly magnetic Kanmantoo Group meta-sediments
	200E-350E	Strongly magnetic Kanmantoo Group meta-sediments
	350E-900E	Moderately magnetic Kanmantoo Group meta-sediments
	900E-1325E	Highly magnetic Kanmantoo Group garnet-staurolite gneiss
	1325E-1500E	Moderately magnetic Kanmantoo Group meta-sediments

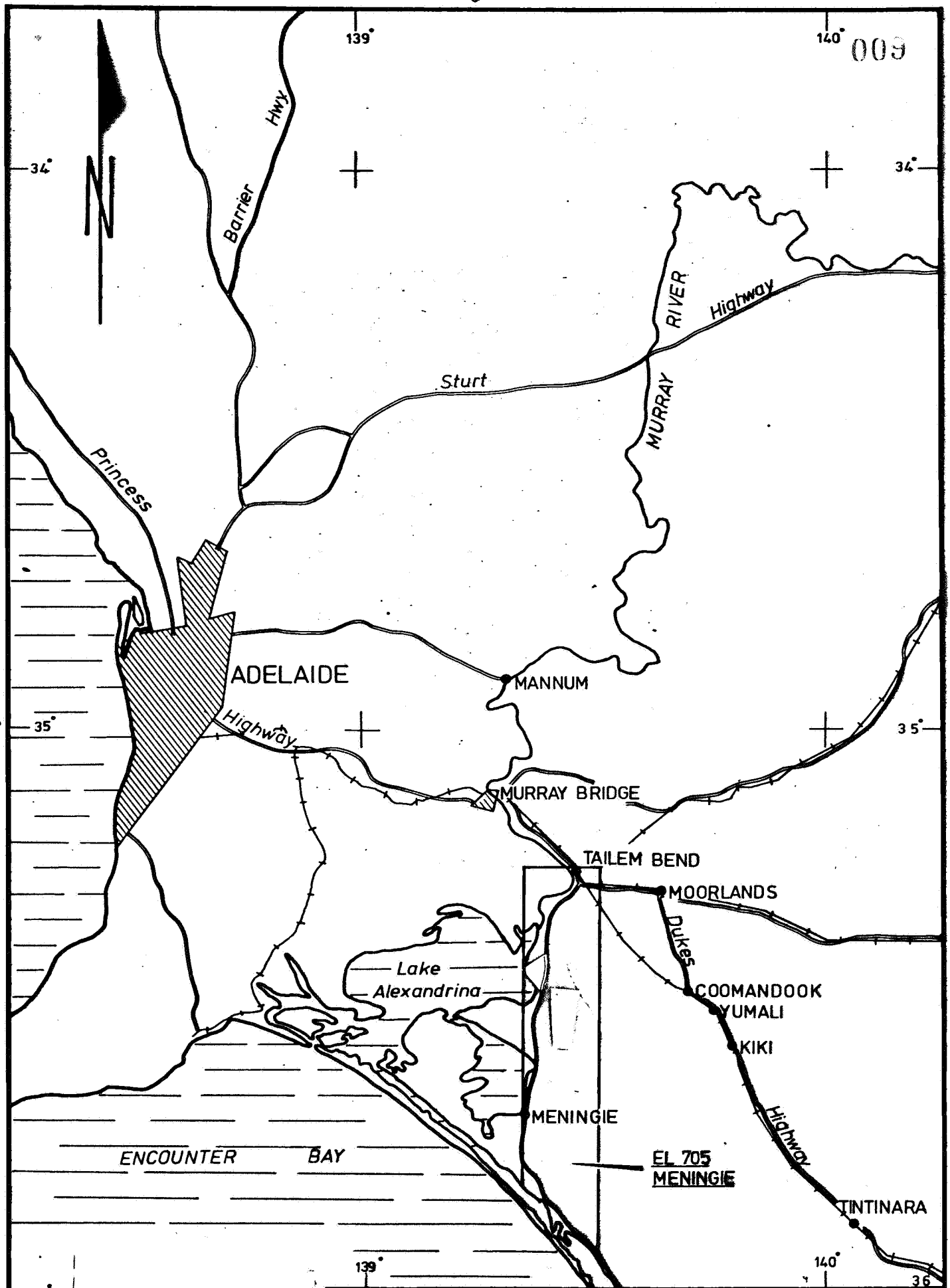
9	3100W-950W	Moderate-weakly magnetic Kanmantoo Group meta-sediments
	950W-225W	Highly magnetic Kanmantoo Group garnet-staurolite gneiss
	225W-000W	Moderately magnetic Kanmantoo Group meta-sediments
10	500W-100E	Strongly magnetic granite
	100E-600E	Strongly magnetic Kanmantoo Group meta-sediments
11	000E-300E	Weakly magnetic Kanmantoo Group meta-sediments
	300E-575E	Strongly magnetic Kanmantoo Group scapolite-bearing unit
	575E-800E	Weakly magnetic Kanmantoo Group meta-sediments
12	500W-150W	Weakly magnetic Kanmantoo Group meta-sediments
	150W-100E	Strongly magnetic Kanmantoo Group scapolite-bearing unit
	100E-450E	Weakly magnetic Kanmantoo Group meta-sediments
	450E-600E	Moderately magnetic Kanmantoo Group meta-sediments
13	000E-950E	Moderately magnetic Kanmantoo Group meta-sediments
	950E-2550E	Weakly to moderately magnetic Kanmantoo Group meta-sediments
	2550E-3300E	Strongly magnetic amphibolite/gneiss unit
	3300E-3475E	Weakly magnetic Kanmantoo Group meta-sediments
14	000E-1250E	Moderately magnetic Kanmantoo Group meta-sediments
15	000E-1000E	Moderately magnetic Kanmantoo Group meta-sediments
16	000E-175E	Weakly magnetic Kanmantoo Group meta-sediments
	175E-725E	Strongly magnetic amphibolite/gneiss unit
	725E-2000E	Weakly magnetic Kanmantoo Group meta-sediments.

3.0 FUTURE WORK

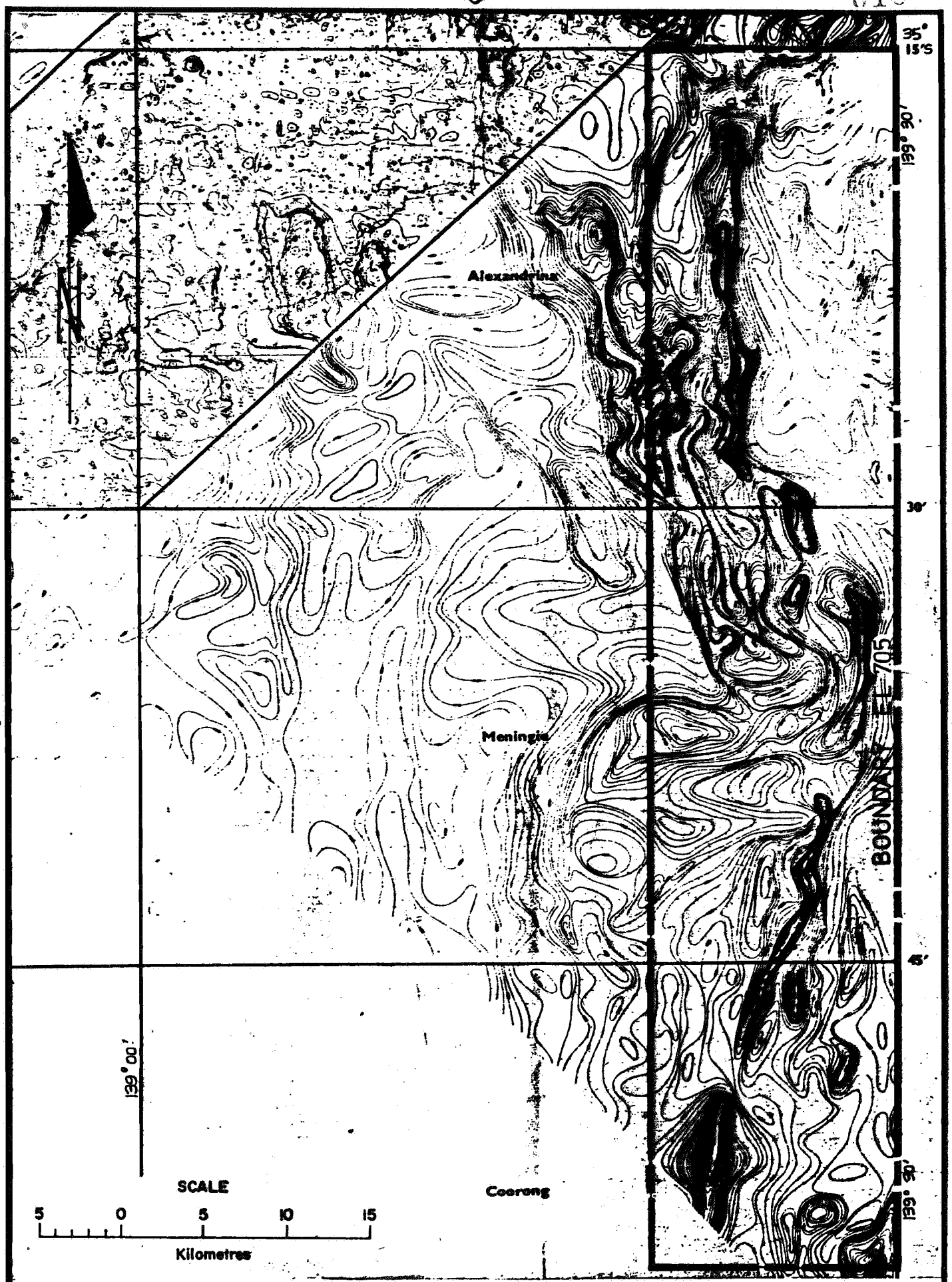
Future work to be undertaken during the next reporting period will include a drilling programme of approximately 6 to 7 holes drilled to basement. Holes will be drilled along strike of the scapolite-bearing unit and into subzones within the Kanmantoo Group as defined by ground magnetics.

C. Dredge

C. Dredge - Project Geologist



SCALE 1:1000000	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN R.L. Sept. '78	EL 705 MENINGIE SOUTH AUSTRALIA LOCATION PLAN	FIGURE 1
CHECKED		REVISION
APPROVED		DRAWING No. SA/6202-3
REVISED June '80		



SCALE	THIESS BROS. PTY. LIMITED MINING DIVISION
DRAWN R.L. Sept. '78	EL 705 MENINGIE AEROMAGNETIC MAP OF TOTAL INTENSITY
CHECKED	FIGURE 2
APPROVED	REVISION
REVISED May '80	DRAWING No. SA/6202-4

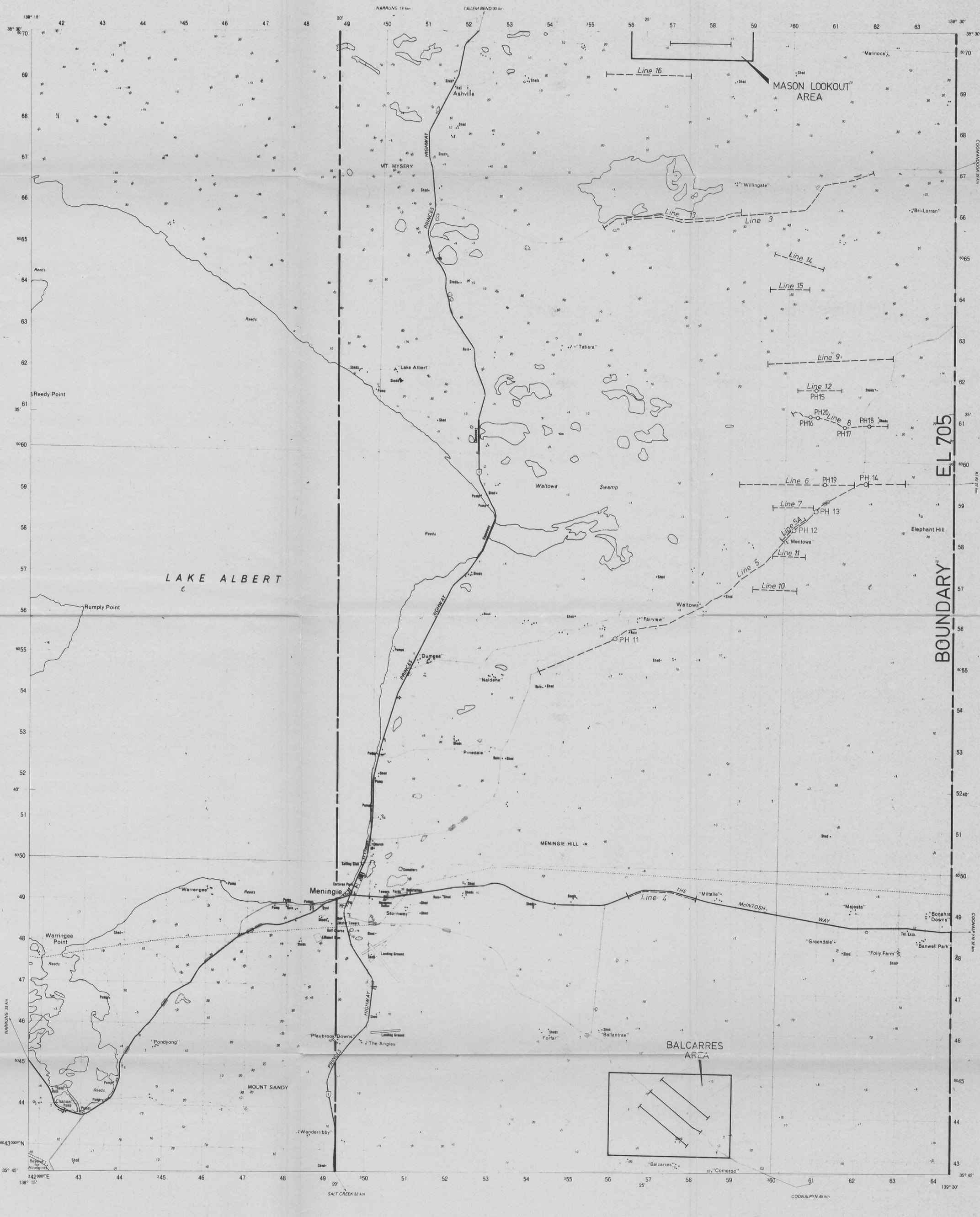
Compiled from Aeromagnetic Map of Total Intensity sheet - Barker (South Australian Mines Dept.)

MENINGIE

SOUTH AUSTRALIA

1:50 000 TOPOGRAPHIC SERIES

FIRST EDITION



AUTHORITY ..... Issued under the authority of the Minister of Lands. Prepared under the direction of the Surveyor General. Crown Copyright Reserved.

PRODUCTION ..... In compliance with National Mapping standards by the Department of Lands.

PROJECTION ..... Transverse Mercator Projection. Australian Geodetic Datum, 1966.

GRID ..... Australian Map Grid. Zone 54, Central Meridian 141°E.

ELEVATION ..... Australian Height Datum. Elevations in metres.

CONTROL ..... Triangulation and Traverse by the Division of National Mapping, the Royal Australian Survey Corps and the South Australian Department of Lands.

DETAIL ..... Aerial Photography, Svy. S.A. 1579, November, 1973.

PHOTOLITHOGRAPHY .. A. B. James, Government Printer, 1975.

The relationship between True North, Grid North and Magnetic North is shown diagrammatically for the centre of this map. Magnetic Value is correct for 1970. Annual Change is 01' Easterly.

SCALE 1:50 000

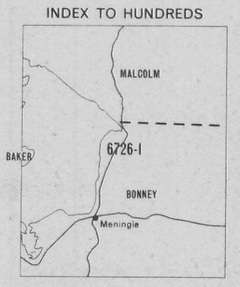
METRES 1000 0 1 2 3 4 5 KILOMETRES

CONTOUR INTERVAL 10 METRES

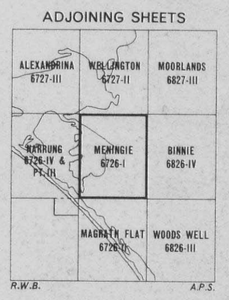
Built-up area; National route marker.
Road, sealed surface, two or more lanes.
Road, sealed surface, one lane.
Road, unsealed surface, two or more lanes; Bridge.
Road, unsealed surface, one lane; Gate; Cattle grid.
Vehicular track.
Railway, multiple track; Station; Siding.
Railway, single track; Cutting; Embankment.
Building; Post office; Police station; School.
Hospital; Church; Mine; Windmill.
Fence; Quarry.
Power transmission line; Levee or bank.
Survey beacon; Spot elevation.
Lake, perennial; Watercourse.
Lake, intermittent; Land subject to inundation.
Lake, mainly dry; Land subject to occasional flooding.
Dam or waterhole on watercourse; Tank or small dam.
Contours; Depression contours.
Rock, bare or awash; Reef.
Sand; Sand ridges.
Pine plantation; Orchard or vineyard.
Windbreak.

The representation of a road on this map is no evidence of the existence of a right of way.

INDEX TO HUNDREDS



ADJOINING SHEETS



MENINGIE
6727-1

LEGEND

Geophysical Survey Lines (Mines Dept. 1977/78)

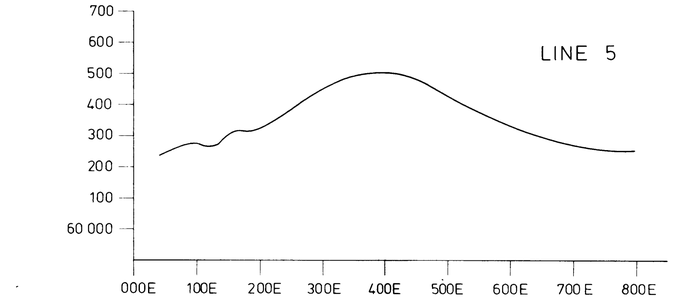
Geophysical Survey Lines—ground magnetics and/or resistivity (Thiess Bros. Pty. Limited)

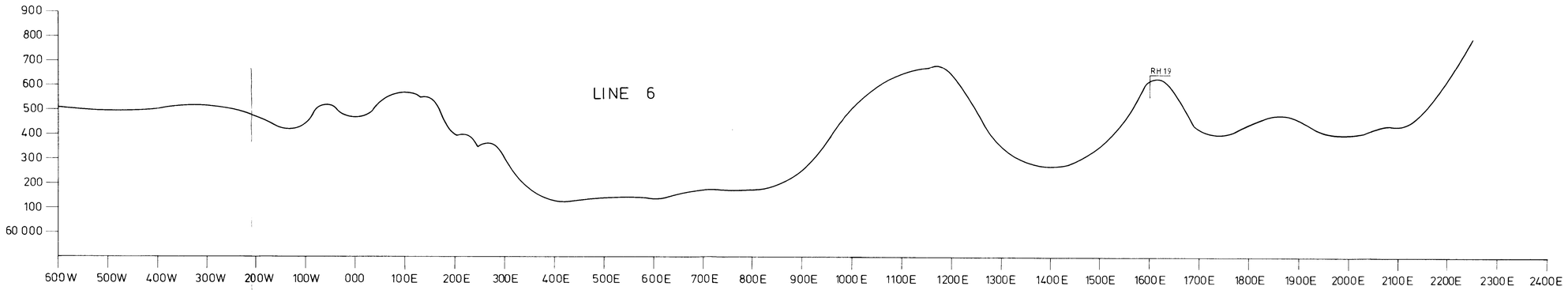
OPH 14 Thiess Rotary / Percussion Drillhole

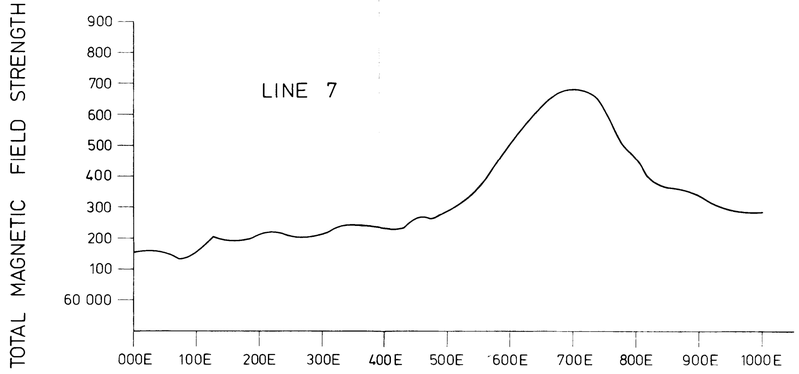
SCALE 1 : 50 000		THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWING	DATE	EL 705 MENINGIE LOCATION OF GEOPHYSICAL EXPLORATION AND DRILLHOLES SOUTHERN AREA	FIGURE 4
DRAWN J. M.	August '78		REVISION
CHECKED			DRAWING No. SA/6202-7
APPROVED			
REVISED	Oct. '81		

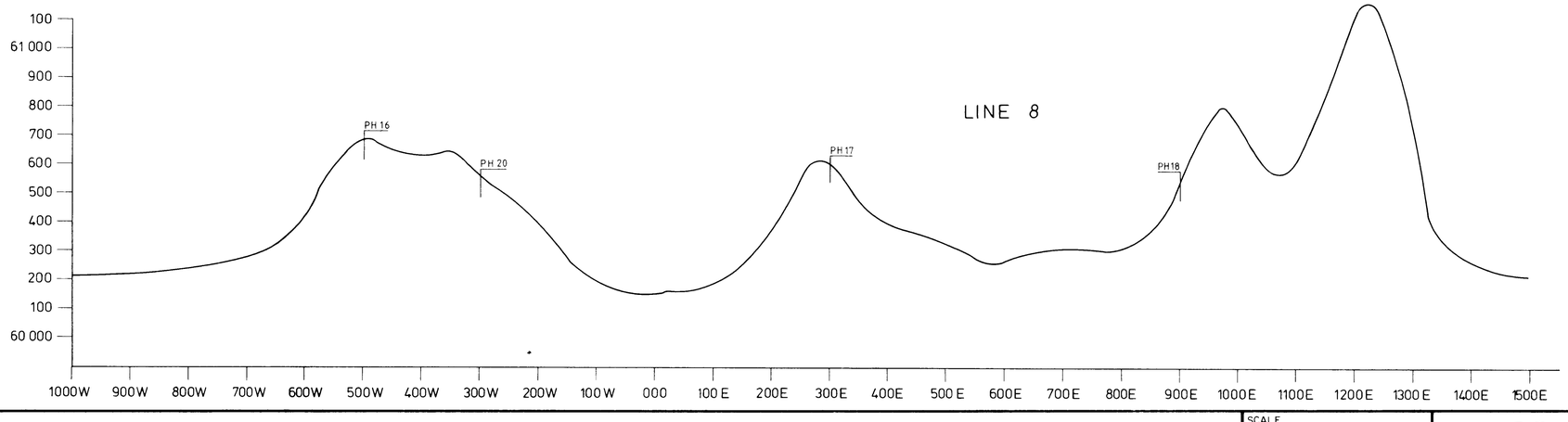
3962(I)-1

TOTAL MAGNETIC FIELD STRENGTH (NANOTESLAS)









DRAWING No.	TITLE REFERENCE DRAWINGS	DATE	REV.	BY	CKD.	APP.	ORIGINAL ISSUE DETAILS REVISIONS

SCALE

DRAWING	DATE
DRAWN C. J.	Nov. '80
CHECKED	
APPROVED	
REVISED	Oct. '81

THIESS BROS. PTY. LIMITED MINING DIVISION

EL 705 MENINGIE

GROUND MAGNETIC SURVEY

FIGURE 5

REVISION

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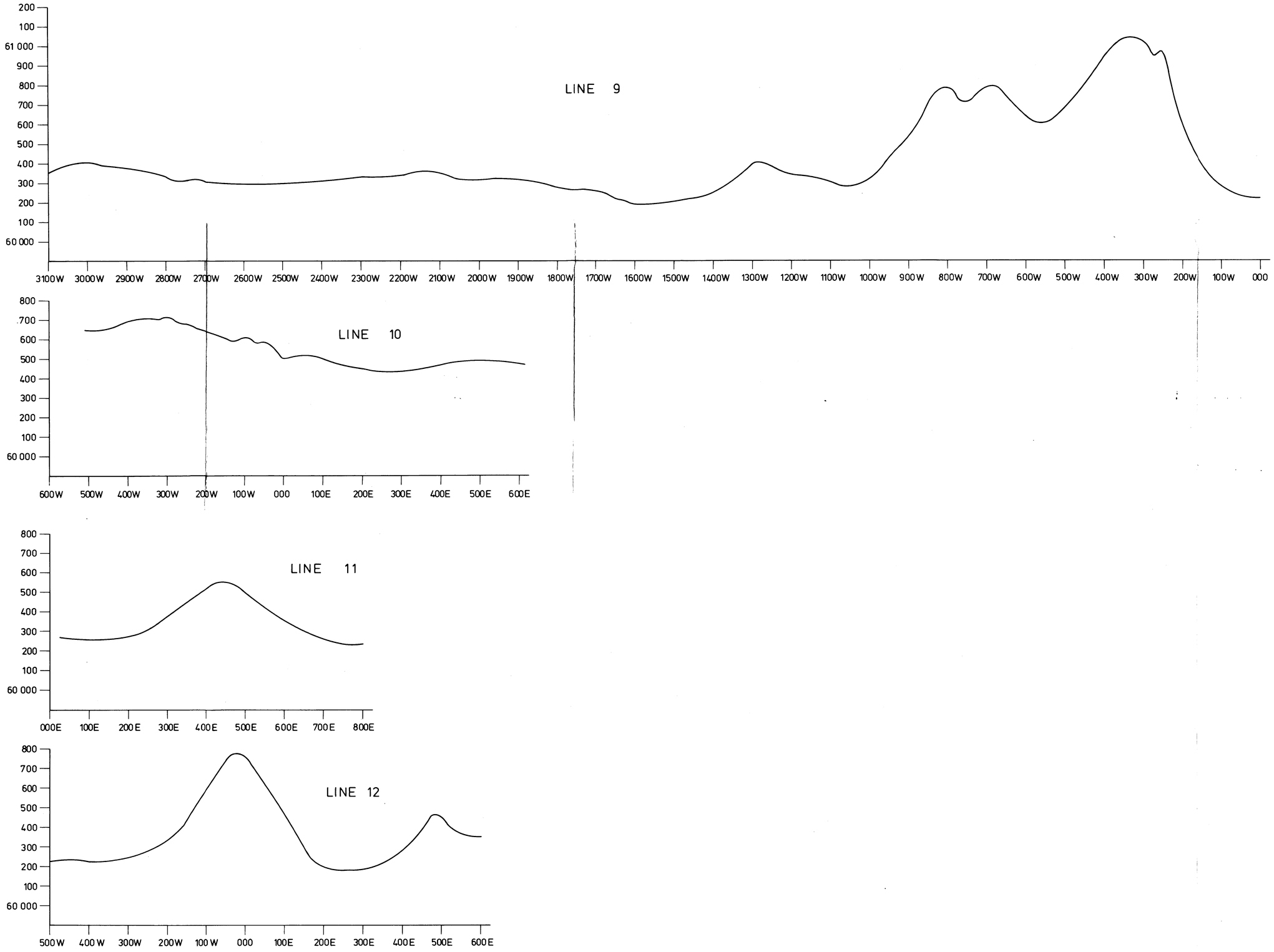
3962 (I)-2

A1

TOTAL MAGNETIC FIELD STRENGTH (NANOTESLAS)



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	REFERENCE DRAWINGS						DETAILS
							REVISIONS

SCALE	
DRAWING	DATE
DRAWN C.J.	Nov. '80
CHECKED	
APPROVED	
REVISED	

THIESS BROS. PTY. LIMITED MINING DIVISION

EL 705 MENINGIE

GROUND MAGNETIC SURVEY

FIGURE 5

REVISION

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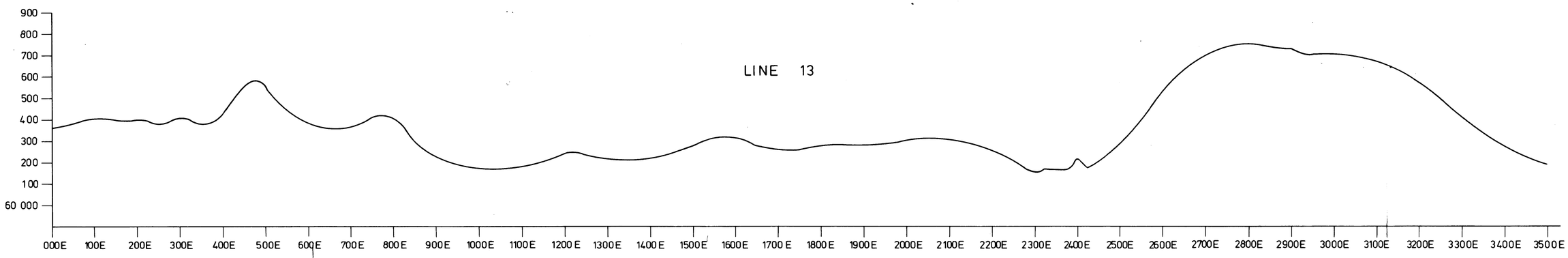
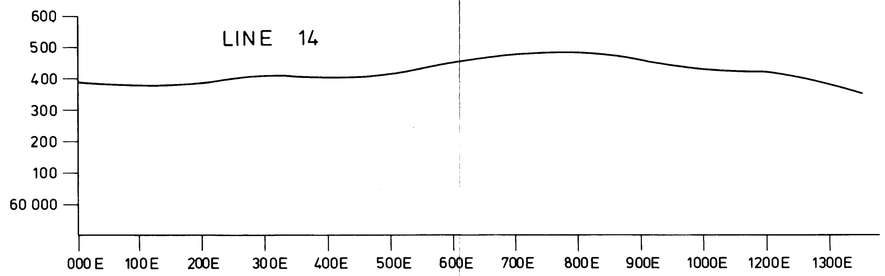
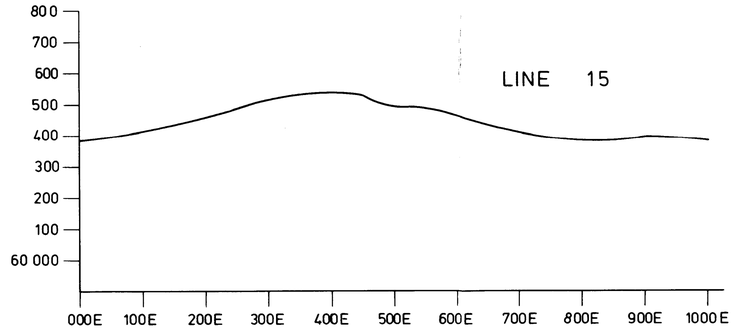
3962 (I)-3

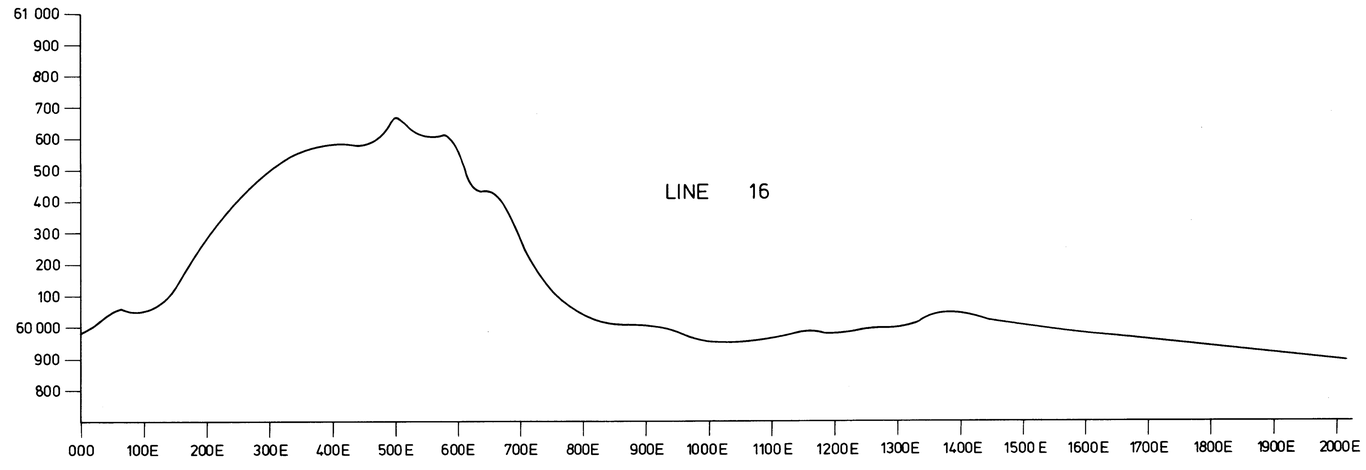
A1

TOTAL MAGNETIC FIELD STRENGTH (NANOTESLAS)









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	REFERENCE DRAWINGS						ORIGINAL ISSUE
							REVISIONS

SCALE

DRAWING	DATE
DRAWN C.J.	Nov '80
CHECKED	
APPROVED	
REVISED	

THIESS BROS. PTY. LIMITED MINING DIVISION

EL 705 MENINGIE

GROUND MAGNETIC SURVEY

FIGURE 6

REVISION

DRAWING No. SA/6202-35

3962(I)-4

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CSR

Energy Division

ENERGY DIVISION
CSR LIMITED
~~1 O'CONNELL STREET~~
~~SYDNEY AUSTRALIA~~
~~BOX 483 GPO~~
~~SYDNEY AUSTRALIA 2001~~
~~TELEPHONE (02) 237 5111~~
~~TELEX AA20285~~
~~CABLE "CSRMINDIV" SYDNEY~~
13th Floor, AMP Bldg.,
10 Eagle St.,
Brisbane, Q. 4000
Telephone: (07) 221.6955

WG/dn

6th March, 1981.

The Director General
Department of Mines & Energy
P.O. Box 151
EASTWOOD, S.A. 5063

Attention Mr. I. Grant

Dear Sir,

E.L. 705 Meningie - Exploration Progress Report for 3 months ended 27th February, 1981.

During the period tenders were called to drill 6 - 8 open holes within E.L. 705 Meningie. The contract was let to Diamond Drilling Pty. Ltd. of Adelaide.

The holes were designed to follow up a moderate magnetic anomaly overlying a unit which earlier drilling indicated was equivalent to the Nairne Pyrite/ Talisker calc-silicate horizon.

Drilling commenced on the 26th February 1981 and is continuing.

Results of the drilling programme will be more fully outlined in the next quarterly report.

We enclose a summary of expenses incurred on E.L. 705 - Meningie during the three month period ending 27th February, 1981.

Yours faithfully,
CSR ENERGY DIVISION

W. Gould
Manager - Exploration Services.

Encl.

MENINGIE EL705

December, January, February 1981

Salaries & Wages	$ 5 420.50
Drafting Services	65.30
Field Technical Stores	42.39
Vehicle Hire	34.50
Travel & Accommodation	37.25
	$ 5 599.94

For the 3 months ended 27th February, 1981

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CSR

Exploration and Evaluation Group

CSR ENERGY DIVISION
13th FLOOR, AMP PLACE
10 EAGLE STREET
BRISBANE AUSTRALIA 4000
GPO BOX 650
BRISBANE AUSTRALIA 4001
TELEPHONE (07) ~~228 2444~~ 228. 4444
TELEX AA42395
FACSIMILE (07) 229 4520

WG/hpr

23rd June 1981

The Director General,
Department of Mines & Energy,
P.O. Box 151,
EASTWOOD. S.A. 5063.

Attention: Mr. I. Grant

Dear Sir,

EL 705 Meningie - Exploration Progress Report for 3 months ended 27th May 1981.

During the period 6 open holes were drilled within EL 705 Meningie. (Figure 1).

The holes were designed to follow up a moderate magnetic anomaly overlying a unit which earlier drilling indicated was equivalent to the Nairne Pyrite/Talisker calc-silicate horizon.

The drilling, which was carried out by Diamond Drilling Pty. Ltd. of Adelaide totalled 604 metres as shown below:

Drill Hole	Total Depth (metres)
PH15	80
PH16	96
PH17	108
PH18	120
PH19	104
PH20	96
Total	604

Some 163 chip samples, taken at 1-2 metre intervals within bedrock, were submitted for anlaysis for copper, lead and zinc.

A more detailed report outlining the results of the drilling programme will be forwarded when the assay results are received.

We enclose a summary of expenses incurred on EL 705 Meningie during the three month period ended 27th May 1981.

Yours faithfully,
CSR ENERGY DIVISION

W. Gould
Manager - Exploration Services

Encls.

EL 705 MENINGIE

EXPENDITURE FOR 3 MONTHS ENDED 27TH MAY 1981

Salaries & Wages	$11 837.05
Field Technical Stores	197.15
Vehicle Hire	34.50
Accommodation	1 030.20
Travel	2 248.87
Drafting Services	61.79
Contract Drilling & Materials	22 895.00
Analytical Services - Other Lab.	625.00
Freight	603.80
Compensation to Landowners	640.19
	$40 173.55

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THIESS BROS. PTY. LIMITED - MINING DIVISION

EXPLORATION LICENCE 705 - MENINGIE

EXPLORATION PROGRESS REPORT FOR

3 MONTHS PERIOD ENDED 27TH AUGUST 1981

146 Kerry Road,
Archerfield,
Qld.....4108.

CONTENTS

TABLES

FIGURES

1.0 INTRODUCTION

- Exploration Licence 705 - Meningie (formerly E.L. - 401) covers and area of approximately 1303 KM^2, 120 kilometres south-east of Adelaide on the eastern edge of Lake Alexandrina and Lake Albert, South Australia (Figure 1).

The ground was originally acquired by Thiess Bros. Pty. Limited on 7th June 1978 (E.L. - 401) for a period of two years to investigate a number of regional aeromagnetic anomalies with coincident gravity highs occurring within the Kanmantoo Group meta-sediments for associated base metal mineralization (Figure 2).

The current area was re-applied for and granted on 27th August 1981 for a period of one year.

Previous exploration including detailed ground geophysics, rotary-percussion and diamond drilling has confirmed that intense magnetic anomalies within the Kanmantoo Group meta-sediments are attributable to banded magnetite rich amphibolites and gneissic units containing anomalous intersections of copper, pyrite and pyrrhotite.

Drilling has also located within the Kanmantoo Group a unit of scapolite rich calc-silicate rocks with associated suphide (pyrite, pyrrhotite) mineralization which may be a correlative of the Nairne Pyrite/Talisker calc-silicate horizon.

This report outlines the results of rotary-percussion drilling programme undertaken during the quarter ending 27th May 1981, designed to follow up moderate magnetic anomalies.

2.0 REGIONAL GEOLOGY

2.1 General

The surface and subsurface Palaeozoic geology and structural features of the Meningie area has been interpreted on a regional scale using regional aeromagnetic data, gravity, water bore and company drilling and outcrop information. (Figure 3).

2.2 Cambrian

2.2.1 Kanmantoo Group meta-sediments

The oldest rocks in the region are those of the Cambrian Kanmantoo Group which crop out in the north and to the north-east of E.L. 705 - Meningie. (Figure 3). The main lithologies recorded are of low grade meta-sediments consisting dominatly of quartz-feldspar-mica schists (biotite, muscovite and chlorite) slates, metasiltstones and quartzites. Gneiss, carbonates and basic igneous rocks have also been recorded in the region.

Petrological examination of exposures and drill hole cuttings of Kanmantoo rocks within the vicinity of the Exploration Licence indicated that these rocks are of similar lithology and metamorphic grade to Kanmantoo sediments outcropping along the eastern edge of the Mt. Lofty Ranges.

The Kanmantoo Group have been interpreted as representing zones of weak to high aeromagnetic and gravity responses, displaying prominent north-south magnetic trends. On this criteria the group has been divided into three broad divisions depending on associated magnetic susceptibility, ranging from weak (EKw) through moderate (EKm) to strongly (EKs) magnetic (Figure 3).

2.3 Ordovician

Deposition of the Kanmantoo Group ended in Late Cambrian time with the onset of the Delamerian Orogeny. The orogeny ended during the Early Ordovician with intrusions of granitic, intermediate and basic plutonic rocks and some with associated localised extrusive suites of basic to intermediate volcanics.

These rocks form the major part of a basement high trending north-westerly, referred to as the Padthaway Ridge.

Ordovician granites and related rocks which intruded Kanmantoo Group rocks during the Delamerian Orogeny are outline in the interpretive map (Figure 3).

3.0 EXPLORATION ACTIVITIES

3.1 General

A rotary-percussion drilling programme was undertaken in March 1981. Six rotary-percussion holes were drilled on targets defined by a ground magnetic survey conducted in November 1980 (Dredge 1980). The location of these holes are shown in Figure 4.

A total of 604m of rotary-percussion drilling was completed during the programme. An Ingersoll Rand TR3 drilling rig owned by Diamond Drillers Pty. Ltd. was contracted to undertake the drilling.

All drillholes were drilled to Palaeozoic basement using mud circulation and tungsten blade bits. Upon intersecting basement the drillhole was cleansed of cuttings and the hole was cased to the surface. A downhole percussion hammer was then used to obtain basement samples over 1 and 2m intervals.

3.2 Drilling Results

Six drillholes were sited on or adjacant to strongly magnetic Kanmantoo Group meta-sediments interpreted to be garnet, staurolite gneisses and a sca polite bearing unit (Dredge 1980).

Four percussion holes were drilled on magnetic anomalies intersected on line 8 (Figure 5). The lithological logs of these boreholes are presented in Figures 6, 7, 8 and 9.

One drillhole PH 19 (Figure 10) was drilled on line 6 to intersect highly magnetic Kanmantoo Group meta-sediments interpreted as being similar to the basement rock associated with a magnetic high on line 8 1500m E to 1650m E.

Drillhole PH 15 (Figure 11) was sited on line 12 to intersect an interpreted scapolite bearing unit in the Kanmantoo Group.

The results of the drilling was at variance with the magnetic profile interpretation indicating the basement geology to be more complex than was expected.

The banded nature of the basement sediments is apparent in all drillholes. Drillholes PH 17 and PH 18 have intersected major rock type boundaries and contain the two dominant rock types. Both the schist and gneisses intersected contain pyrite with PH 18 containing anomalous zinc and copper associated with the schist.

Drillholes PH 17 contains an assemblage of quartz - actinolite, calcite and tremolite (?) minerals associated with the contact between a biotite schist and a quartz, biotite gneiss. This interval however does not contain anomalous zinc, lead or copper.

3.3 Geochemical Results

The Kanmantoo Group sediments were sampled over 1 and 2m intervals. 163 chip samples were then submitted to Australian Laboratory Services, Brisbane, for analysis of copper, lead and zinc. The results of these analysis are presented in Tables 1, 2, 3 and 4.

The concentrations of copper, lead and zinc are generally low and are not considered anomalous with the exception of percussion hole No. 18. Chip samples from 88 to 104 in the later hole indicate that anomoulous concentrations of copper and zinc are present in schists which contain pyrite and pyrrhotite mineralisation.

4.0 SUMMARY AND CONCLUSIONS

The Kanmantoo Group meta-sediments intersected during the recent drilling programme consists predominantly of interbanded calcsilicate gneisses, meta quartzites and garnet rich gneisses. Late stage orogenic development and retrograde metamorphism have resulted in partial melting and/or minor hydrothermal alteration of the host rocks to produce a migmatic quartz - mafic differentiative and the associated presence of actinolite and rare carbonates.

The generally retrograde nature of the Kanmantoo sediments in E.L. 705 has resulted in magnetic anomalies being due to high magnetite concentrations masking all other responses.

The analytical results of the chip samples recovered indicates no economic lead, zinc or copper mineralisation is associated with this later alteration of the Kanmantoo sediments as found in PH 17.

T. LONERGAN
Project Geologist

TABLE 1

PERCUSSION HOLE 15

Depth (m)	CU	Pb (ppm)	Zn
48-50	5	25	70
50-52	10	15	35
52-54	5	15	20
54-56	5	20	40
56-58	5	10	50
58-60	<2	5	20
60-62	<2	10	25
62-64	5	10	25
64-66	5	15	65
66-68	5	15	100
68-70	5	10	60
70-72	5	10	80
78-80	10	20	40

PERCUSSION HOLE 16

Depth (m)	CU	Pb (ppm)	Zn
46-50	15	25	60
50-52	10	25	80
52-54	35	60	90
54-56	5	25	60
56-58	5	20	45
58-60	10	25	50
60-62	5	20	50
62-64	5	20	50
64-66	5	20	40
66-68	5	15	45
68-70	5	10	45
70-72	5	20	70
72-74	5	15	70
74-76	5	15	55
76-78	10	20	50
78-80	15	20	95
80-82	10	20	75
	5	30	60
82-86	10	25	50
86-88	5	20	55
88-90	10	25	70
90-92	20	20	75
92-94	5	20	75
94-96	10	25	70

TABLE 2

PERCUSSION HOLE 17

Depth (m)	CU	Pb (ppm)	Zn
48- 50.0	55	15	30
50- 52.0	80	20	15
52- 54.0	70	20	20
54- 56.0	80	15	25
56- 58.0	30	10	20
58- 60.0	45	15	15
60- 62.0	20	15	20
62- 64.0	15	15	15
64- 66.0	50	20	25
66- 68	25	20	25
68- 70.0	10	15	20
70- 72.0	10	15	10
72- 74.0	5	15	20
74- 76.0	45	15	15
76- 78.0	30	10	10
78- 80.0	65	20	50
80- 81.0	45	5	15
81- 82.0	50	10	15
82- 83.0	75	20	55
83- 84.0	70	20	55
84- 85.0	35	25	160
85- 86.0	35	25	90
86- 87.0	50	25	65
87- 88.0	50	30	65
88- 89.0	50	30	50
89- 90.0	45	30	55
90. 91.0	85	25	70
91- 92.0	85	25	65
92- 93.0	45	25	105
93- 94.0	40	30	100
94- 95.0	30	35	90
95- 96.0	35	35	85
96- 97	45	30	80
97- 98	40	30	70
98- 99	45	30	55
99-100	45	30	60
100-101	50	30	70
101-102	50	35	75
102-103	100	35	60
103-104	95	30	60
104-105	55	25	70
105-106	50	25	65
106-107	100	20	35
107-108	80	20	40

TABLE 3

PERCUSSION HOLE PH 18

Depth (m)	CU	Pb (ppm)	Zn
44- 46	35	20	50
46- 48	25	10	30
48- 50	35	20	95
50- 52	35	20	45
52- 54	20	15	60
54- 56	20	15	60
56- 58	40	15	95
58- 60	35	15	60
60- 62	45	50	65
62- 64	45	20	100
64- 66	15	10	65
66- 68	55	20	95
68- 70	30	15	55
70- 72	15	15	65
72- 74	5	20	40
74- 76	10	15	65
76- 78	15	20	65
78- 80	55	20	100
80- 82	55	25	145
82- 84	75	30	95
84- 86	70	20	80
86- 88	95	20	100
88- 90	120	15	105
90- 92	380	15	205
92- 94	430	10	220
94- 96	245	10	150
96- 98	210	15	235
98-100	320	10	320
100-102	660	20	110
102-104	300	15	55
104-106	105	10	95
106-108	60	15	130
108-110	175	20	165
110-112	165	15	130
112-114	70	15	95
114-116	30	15	120
116-118	130	25	130
118-120	95	20	115

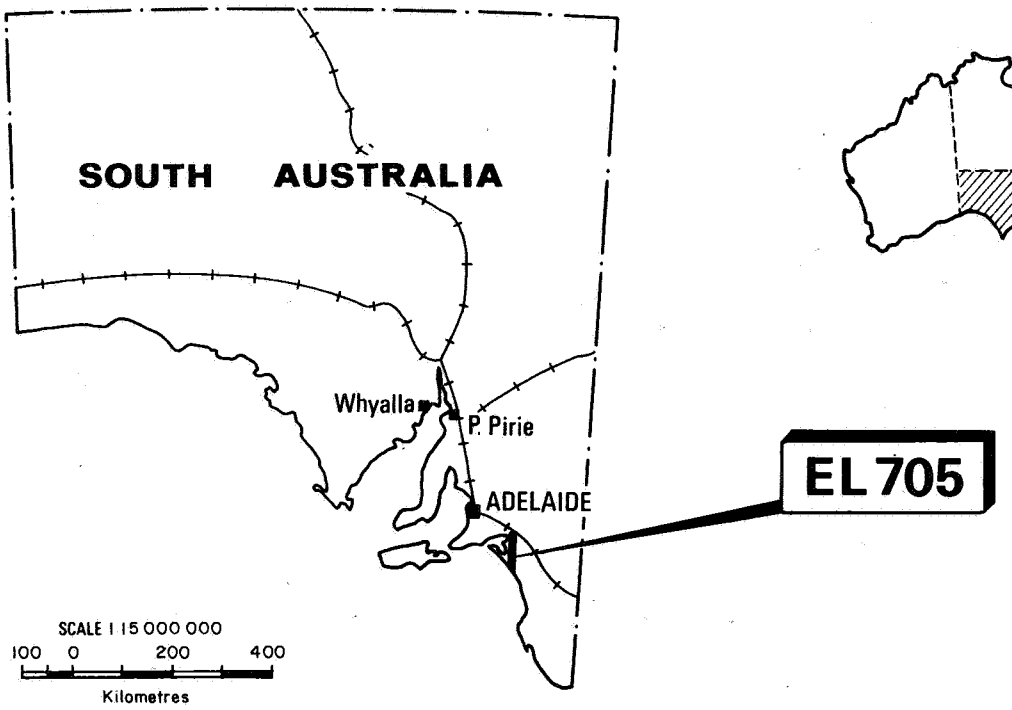
TABLE 4

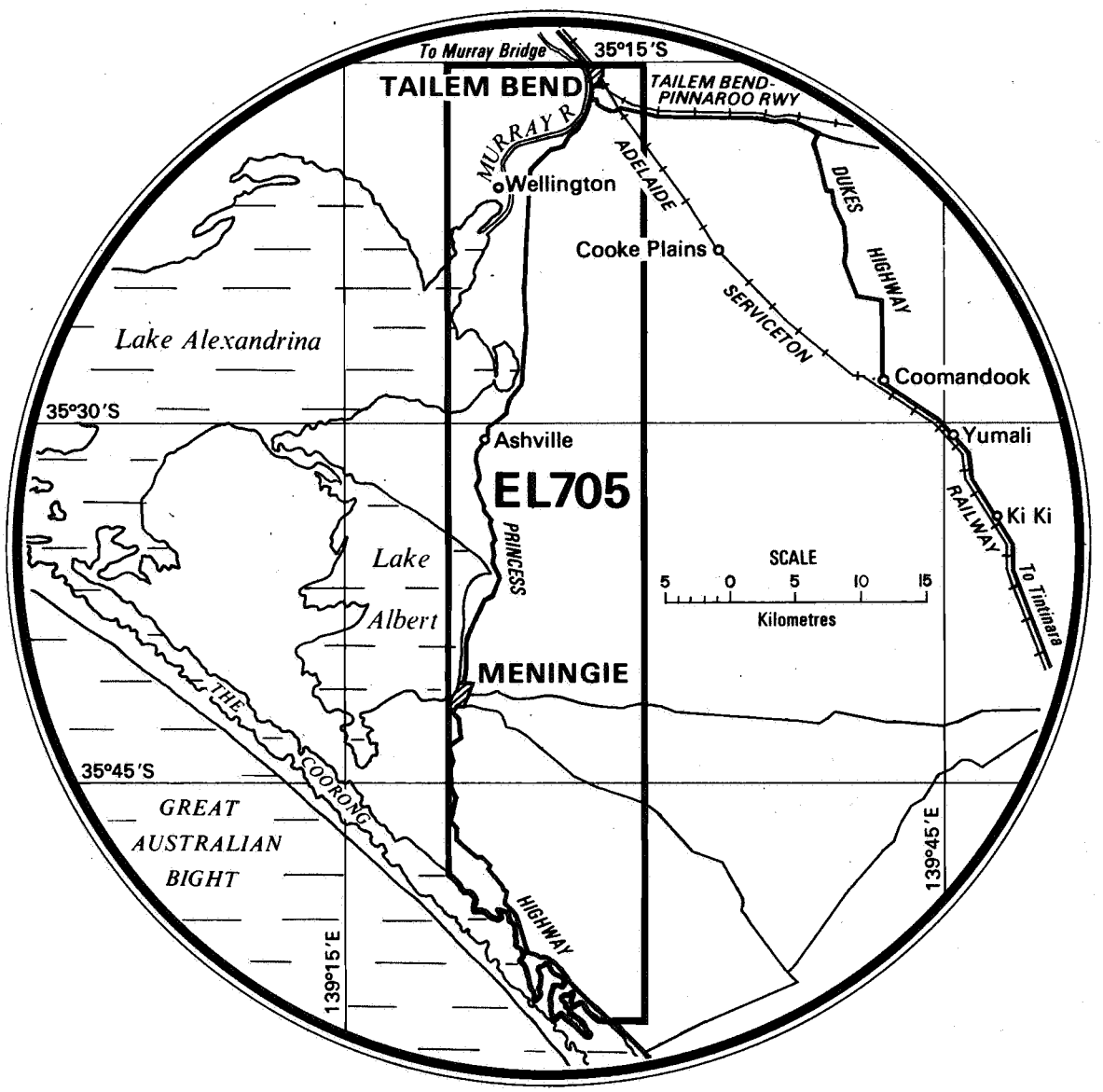
PERCUSSION HOLE 19

Depth (m)	CU	Pb (ppm)	Zn
56- 72	20	20	60
72- 74	20	20	90
74- 76	15	10	30
76- 78	15	5	35
78- 80	10	5	40
80- 82	25	10	55
82- 84	15	15	25
84- 86	10	15	35
86- 88	15	10	35
88- 90	60	10	40
90- 92	90	10	25
92- 94	30	5	50
94- 96	20	10	40
96- 98	15	10	65
98-100	10	5	40
100-102	20	10	40
102-104	25	5	25

PERCUSSION HOLE 20

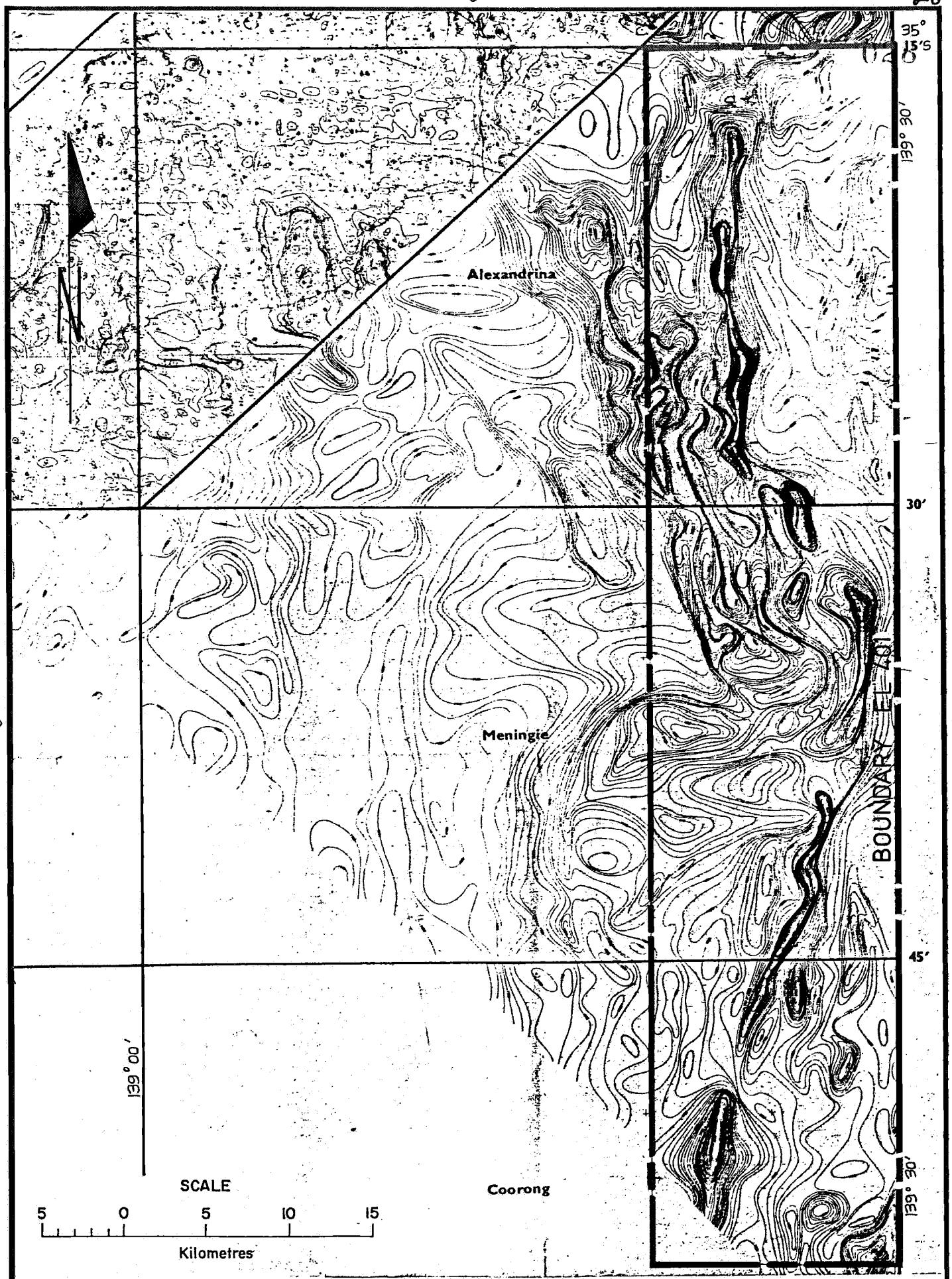
Depth (m)	CU	Pb (ppm)	Zn
44- 46	25	20	125
46- 48	20	20	105
48- 50	15	15	70
50- 52	15	20	90
52- 54	10	15	85
54- 56	10	15	95
56- 58	10	10	85
58- 60	25	25	100
60- 62	20	20	85
12- 64	15	20	90
64- 66	15	25	95
66- 68	15	20	85
68- 70	15	25	90
70- 72	15	25	85
72- 74	15	15	115
74- 76	10	20	120
76- 78	25	20	100
78- 80	20	20	85
80- 82	15	20	100
82- 84	30	15	80
84- 86	20	20	115
86- 88	15	15	95
88- 90	10	20	75
90- 92	10	15	70
92- 94	10	15	70
94- 96	15	15	70





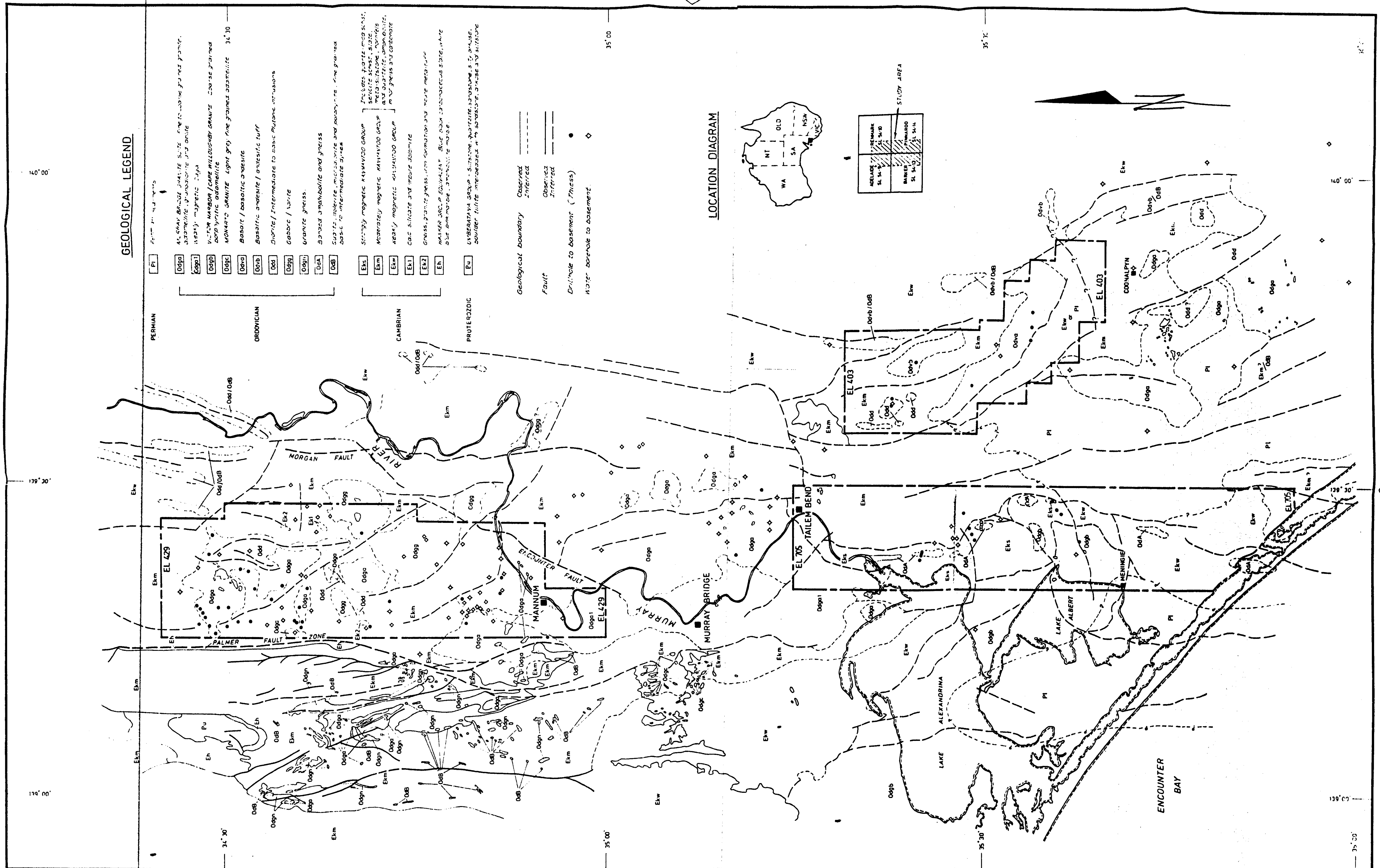
EL705 MENINGIE LOCALITY MAP

FIGURE 1
SA/6202-36



SCALE:	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN R.L. Sept. '78	EL 401 MENINGIE AEROMAGNETIC MAP OF TOTAL INTENSITY	FIGURE 2
CHECKED		REVISION
APPROVED		DRAWING No. SA/6202-4
REVISED Oct. '81		

Compiled from Aeromagnetic Map of Total Intensity sheet - Barker (South Australian Mines Dept.)



SCALE 1:250 000

5 0 5 10 15 20 25

Kilometres

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	REFERENCE DRAWINGS						REVISIONS

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DRAWING	DATE
DRAWN MRN	Dec.'79
CHECKED	
APPROVED	
REVISED	Oct. '81

THIESS BROS. PTY. LIMITED MINING DIVISION

EL 705 MENINGIE

INTERPRETED REGIONAL PROTEROZOIC AND PALAEOZOIC GEOLOGY FROM AEROMAGNETIC DATA

FIGURE 3

REVISION

DRAWING No SA/6201-15

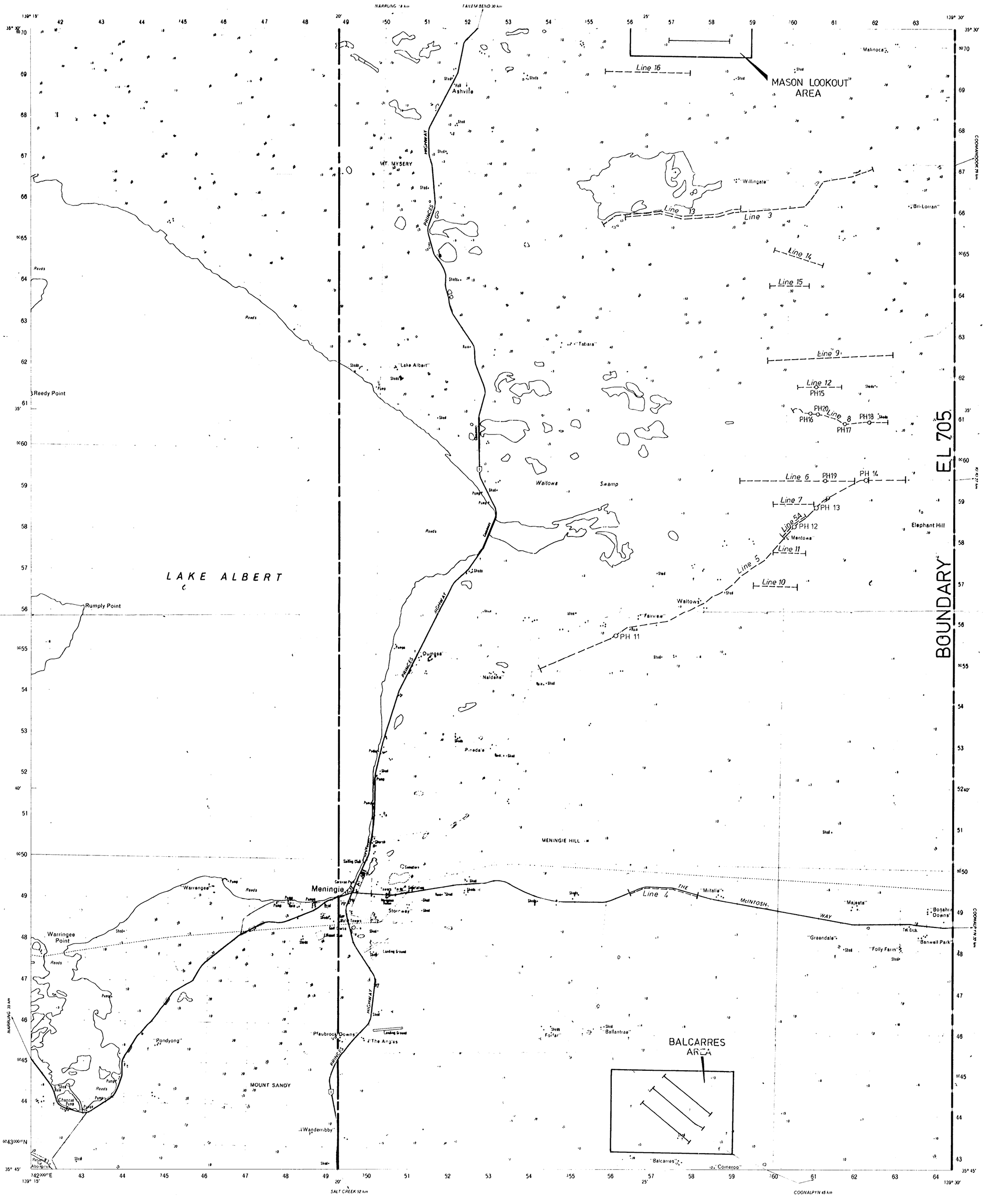
3962(I)-5

MENINGIE

SOUTH AUSTRALIA

1:50 000 TOPOGRAPHIC SERIES

FIRST EDITION



SCALE 1:50 000

METRES 1000 0 1 2 3 4 5 KILOMETRES

CONTOUR INTERVAL 10 METRES

The representation of a road on this map is no evidence of the existence of a right of way.

AUTHORITY	Issued under the authority of the Minister of Lands. Prepared under the direction of the Surveyor General. Crown Copyright Reserved.
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GRID	Australian Map Grid. Zone 54, Central Meridian 141° E.
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CONTROL	Triangulation and Traverse by the Division of National Mapping, the Royal Australian Survey Corps and the South Australian Department of Lands.
DETAIL	Aerial Photography, Svy. S.A. 1579, November, 1973.
PHOTOLITHOGRAPHY	A. B. James, Government Printer, 1975.

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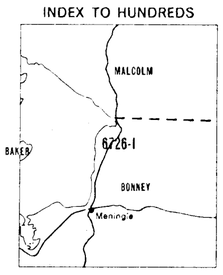
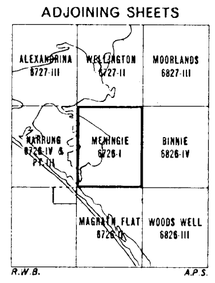
The relationship between True North, Grid North and Magnetic North is shown diagrammatically for the centre of this map. Magnetic Value is correct for 1978. Annual Change is 01' Easterly.

Built-up area; National route marker.
Road, sealed surface, two or more lanes.
Road, sealed surface, one lane.
Road, unsealed surface, two or more lanes; Bridge.
Road, unsealed surface, one lane; Gate; Cattle grid.
Vehicular track.
Railway, multiple track; Station; Siding.
Railway, single track; Cutting; Embankment.
Building; Post office; Police station; School.
Hospital; Church; Mine; Windmill.
Fence; Quarry.
Power transmission line; Levee or bank.
Survey beacon; Spot elevation.
Lake, perennial; Watercourse.
Lake, intermittent; Land subject to inundation.
Lake, mainly dry; Land subject to occasional flooding.
Dam or waterhole on watercourse; Tank or small dam.
Contours; Depression contours.
Rock, bare or awash; Reef.
Sand; Sand ridges.
Pine plantation; Orchard or vineyard.
Windbreak.

INDEX TO HUNDREDS



ADJOINING SHEETS



LEGEND

Geophysical Survey Lines (Mines Dept. 1977/78)

Geophysical Survey Lines—ground magnetics and/or resistivity (Thiess Bros. Pty. Limited)

OPH 14 Thiess Rotary / Percussion Drillhole

MENINGIE
6727-1

SCALE 1 : 50 000		THIESS BROS. PTY. LIMITED MINING DIVISION
DRAWING	DATE	EL 705 MENINGIE LOCATION OF GEOPHYSICAL EXPLORATION AND DRILLHOLES SOUTHERN AREA
DRAWN J. M.	August '78	FIGURE 4
CHECKED		REVISION
APPROVED		DRAWING No. SA/6202-7
REVISED	Oct. '81	

3962(I)-1

TOTAL MAGNETIC FIELD STRENGTH (NANOTESLAS)

LINE 5

700
600
500
400
300
200
100
60 000

000E 100E 200E 300E 400E 500E 600E 700E 800E

LINE 6

900
800
700
600
500
400
300
200
100
60 000

RH 19

500W 500W 400W 300W 200W 100W 000 100E 200E 300E 400E 500E 600E 700E 800E 900E 1000E 1100E 1200E 1300E 1400E 1500E 1600E 1700E 1800E 1900E 2000E 2100E 2200E 2300E 2400E

LINE 7

900
800
700
600
500
400
300
200
100
60 000

000E 100E 200E 300E 400E 500E 600E 700E 800E 900E 1000E

LINE 8

100
61 000
900
800
700
600
500
400
300
200
100
60 000

PH 16
PH 20
PH 17
PH 18

1000W 900W 800W 700W 600W 500W 400W 300W 200W 100W 000 100E 200E 300E 400E 500E 600E 700E 800E 900E 1000E 1100E 1200E 1300E 1400E 1500E

DRAWING No.	TITLE	DATE	REV.	BY	CKD	APP	ORIGINAL ISSUE
	REFERENCE DRAWINGS						DETAILS REVISIONS

SCALE

DRAWING	DATE
DRAWN C. J.	Nov. '80
CHECKED	
APPROVED	
REVISED	Oct. '81

THIESS BROS. PTY. LIMITED MINING DIVISION

EL 705 MENINGIE

GROUND MAGNETIC SURVEY

FIGURE 5

REVISION

DRAWING No. SA/6202 - 33

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A1

CO-ORDINATES .....
CO ORD. SYSTEM .....
REDUCED LEVEL .....
INCLINATION .....
MAP REFERENCE .....

HOLE TYPE Percussion
DEPTH 96·0 m
COMMENCED 25-2-81
FINISHED 26-2-81
WATER LEVEL 48·0 m

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0 – 5		Sand, fine and clean quartz, soft and loose, well rounded.
5 – 10		Calcarenite, marly, buff with orange clay clasts.
10 – 15		Calcarenite, light cream - buff, hard and brittle with yellow oxidised bands.
15 – 20		Gravel, well rounded milky and yellow quartz pebbles.
20 – 25		Aeolinite ? 100% finely broken shell fragments, uniform sorting, cream - white colour. Soft and friable.
25 – 30		Calcarenite, glauconitic in parts, buff - green colours, chert bands at base.
30 – 35		
35 – 40		
40 – 45		Limestone, light cream - buff, hard and tough.
45 – 50		Limestone, light pink - red, hard and tough.
50 – 55		Gravel, buff - brown, composed of basement, sub angular quartz and minor ironstone pebbles.
55 – 60		Calc - silicate - quartz gniess, green - black with minor quartz banding, very hard and tough, waxy lustre. Clay bands (dark grey) at 52-53m and 54-56m.
60 – 65		Calc - silicate - quartz gneiss, green - black with minor quartz banding, waxy lustre.
65 – 70		Calc - silicate - quartz gniess, green - black with minor quartz banding, dense with a waxy lustre. Minor veins of milky quartz.
70 – 75		Brown dense metaquartzite or intermediate intrusive associated with green black gniess.
75 – 80		Calc. - silicate, quartz gniess with minor brown meta - quartzite minor pyrite and very rare chalcopyrite, also very minor purple mineral and rare garnet.
80 – 85		
85 – 90		Calc. - silicate - gniess with rare quartz, banded hard, tough and dense, finely crystalline.
90 – 95		
95 – 100		
100 – 105		
105 – 110		
110 – 115		
115 – 120		

T.D. 96·0 m

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SCALE 1: 250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN BC/MRN Oct.'81	EL 705 MENINGIE	FIGURE 6
CHECKED	DRILLHOLE LITHOLOGICAL LOG	REVISION
APPROVED	PH 16	DRAWING No. SA/6202 - 37
REVISED		

CO-ORDINATES .....
CO ORD SYSTEM .....
REDUCED LEVEL .....
INCLINATION .....
MAP REFERENCE .....

HOLE TYPE Percussion
DEPTH 108·0 m
COMMENCED 24-2-81
FINISHED 25-2-81
WATER LEVEL 46·0 m

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Sand, fine, light red-orange, soft loose, with minor ferruginous - calcareous concretions.
5		Sand, fine-medium, light orange, soft loose, with bands of clean white quartz grains (well rounded).
10		Calcarenite, light cream-buff, hard brittle, with bands of pink limestone and well rounded quartz.
15		
20		Calcarenite, white, soft-brittle with minor glauconite.
25		Silt, green-buff, soft-friable, with minor glauconite.
30		
35		Calcareous silt, dark grey, soft friable, with minor hard limestone.
40		Limestone, dark brown hard and tough. Glauconitic sand, dark brown, fine and loose.
45		Limestone, pink, hard-tough with pebbly quartz bands. Limestone, pink-red, hard-tough, becoming softer toward base.
50		Slightly weathered, biotite quartz schist, buff-yellow, with quartz (milky, pink coloured) veins.
55		
60		Slightly weathered biotite, quartz, muscovite, feldspar, migmatite buff-cream colour, moderately hard. Biotite, quartz, muscovite, feldspar migmatite, mottled buff-grey - white, with minor actinolite associated with quartz Minor pyrite and calcite (hydrothermal alteration?)
65		Quartz, biotite, amphibolite gniess, dark grey-black with white bands of quartz and calcite, pyrite mineralisation.
70		
75		Quartz, biotite amphibolite gniess, dark grey-black, hard and tough, with pyrite, sphalerite? actinolite galena?
80		Biotite, amphibolite, gniess with lesser quartz, dark grey-black, fine banding, white pyrite.
85		
90		Quartz (>50%), biotite, amphibolite gniess, dark grey-black with white bands with abundant pyrite? chalcopyrite? galena?
95		
100		Quartz (40%), biotite, amphibolite gniess, dark grey-black with white bands with abundant pyrite? chalcopyrite? galena?
105		
110	T.D. 108 m	Gniess dark grey-black, very hard with minor quartz bands & pyrite.
115		
120		

Hole abandoned due to water conditions in hole.

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SCALE 1:250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN BC/MRN Oct.'81	EL 705 MENINGIE DRILLHOLE LITHOLOGICAL LOG PH 17	FIGURE 7
CHECKED		REVISION
APPROVED		DRAWING No. SA/6202-38
REVISED		

CO-ORDINATES .....
CO ORD. SYSTEM .....
REDUCED LEVEL .....
INCLINATION .....
MAP REFERENCE .....

HOLE TYPE Percussion
DEPTH 120·0 m
COMMENCED 4-3-81
FINISHED 5-3-81
WATER LEVEL 43·0 m

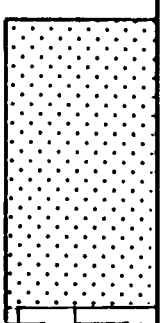
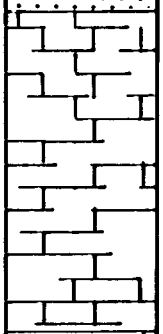
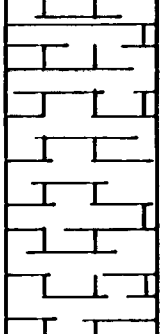
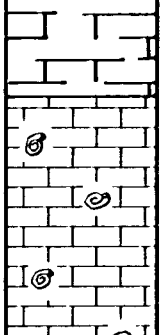
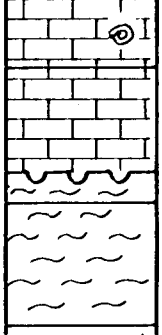
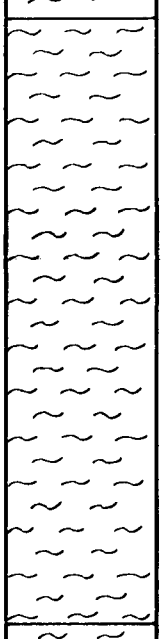
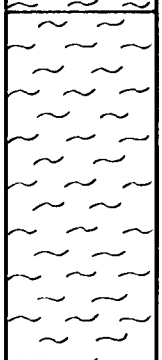
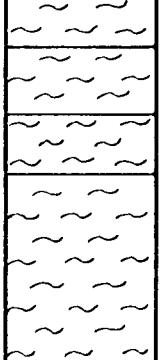
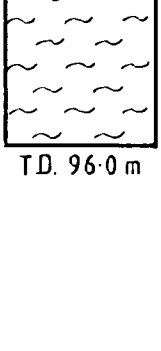
DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Sand. fine - medium, light buff-grey, loose.
5		Weathered calcarenite, marly in places, buff-yellow, green tinge, glauconitic, soft - friable.
10		Unweathered calcarenite, white - cream, fine grained soft and friable.
15		
20		Aeolianite, white, soft and friable, very well sorted, composed dominantly of fine fossil fragments.
25		Glauconitic silt, light grey, soft - friable with minor limestone and fine sand lenses.
30		
35		Limestone, mottled pink-red colour, clean fossiliferous limestone.
40		
45		Weathered gniess dark grey - black moderately hard and friable.
50		Garnet, muscovite biotite serricite gniess. banded with light grey - black, brown - white free quartz bands, abundant $Fe_2\emptyset_3$ staining. and magnetite, rare K-feldspar.
55		Garnet quartz biotite schist, dark grey black with quartz bands, fine grained.
60		Quartz biotite schist, banded black and white, with rare pyrite. Altered dyke?
65		Quartz biotite muscovite serricite schist to gniess, hard and tough with rare pyrite.
70		Quartz biotite schist to gniess with Fe stained oxidised faces perpendicular to strike and very rare garnet.
75		Biotite quartz muscovite gniess, banded black and white less than 25% free quartz, hard and tough.
80		Garnet, quartz, biotite, pyrite schist to gniess hard and tough, dark grey to black with white bands. white to green quartzose bands with pyrite. Rare pyrite in the mafics.
85		
90		Garnet, biotite, quartz, amphibolite gniess. Dark grey - black with white bands, pyrite associated with the quartz bands and rarely associated on cleavage plane. Hard and tough. Greater 15% quartz less than 30%.
95		
100		Biotite, garnet, quartz schist, dark green-black. Quartz decreasing towards base green-white vuggy quartz with pyrite rare chalcopyrite Au ? Red garnets (fine) on strike planes.
105		
110		Biotite, garnet, quartz, schist as above but without chalcopyrite.
115		
120	T.D. 120 m	

3962 (I)-8

SCALE 1:250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN BC/MRN Oct.'81	EL 705 MENINGIE	FIGURE 8
CHECKED	DRILLHOLE LITHOLOGICAL LOG	REVISION
APPROVED	PH 18	DRAWING No. SA/6202-39
REVISED		

CO-ORDINATES .....
CO ORD. SYSTEM .....
REDUCED LEVEL .....
INCLINATION .....
MAP REFERENCE .....

HOLE TYPE Percussion
DEPTH 96·0 m
COMMENCED 2-3-81
FINISHED 3-3-81
WATER LEVEL 45·0 m

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0 – 5		Sand, fine, well rounded, buff, loose with minor calcrete concretions at base.
10 – 15		Calcarenite, buff-cream moderately hard and brittle fossiliferous and minor glauconite.
20 – 25		Calcarenite, buff-cream soft and brittle glauconitic bands and minor pink-buff limestone bands.
30 – 35		Glauconitic marl, green-buff, fossiliferous soft and friable.
40 – 45		Limestone, pink-red, hard and tough, fossiliferous. Quartz, biotite, gniess, hard and tough, dark grey-black, slightly weathered.
50 – 55		Calc-silicate-quartz gniess, dark green-black with alteration with pyrite, calcite, quartz and unknown green mineral → garnet or amphibolite?
60 – 65		Calc-silicate-quartz gniess, dark green-black containing milky, pink and grey quartz. Minor pyrite, abundant ilmenite.
70 – 75		Calc-silicate-quartz gniess dark green black with quartz banding, containing brown translucent bands of metaquartzite.
80 – 85		Quartz biotite calc-silicate gniess hard and tough waxy lustre. fine to medium grainsize. Almandine amphibolite gniess-dark brown-black very fine grained and dense. Minor quartz.
90 – 95		Amphibolite gniess, dark green-black with calcite, and yellow green mineral.
T.D. 96·0 m		
100 – 105 – 110 – 115 – 120		

3962 (I)-9

SCALE 1:250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN BC/MRN Oct.'81	EL 705 MENINGIE	FIGURE 9
CHECKED	DRILLHOLE LITHOLOGICAL LOG	REVISION
APPROVED	PH 20	DRAWING No. SA/6202-40
REVISED		

CO-ORDINATES .....
CO ORD. SYSTEM .....
REDUCED LEVEL .....
INCLINATION .....
MAP REFERENCE .....

HOLE TYPE Percussion
DEPTH 104·0 m
COMMENCED 5-3-81
FINISHED 6-3-81
WATER LEVEL .....

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0 – 17		Sand, fine clean well rounded quartz, grains, loose. Hard calcified band at 4-5·5m and minor clay lenses at 10-17m.
17 – 26		Calcarenite, light buff-yellow, soft and brittle, with bands of loose quartz sand (fine) and minor limestone bands towards the base.
26 – 30		Limestone, buff-cream, moderately hard and brittle.
30 – 37		Calcareous siltstone, buff-cream, with minor limestone and calcarenite bands.
37 – 43		Glauconitic silt and sand, fine and light green-grey, with red oxidised ferruginous grains.
43 – 47		Dark brown clay with minor lignite and root traces? Soft and plastic with minor limestone weathered, buff, with lesser calcarenite (fossiliferous).
47 – 55		Limestone, moderately weathered, red-pink, soft & friable.
55 – 57		Gravel - coarse - very coarse, black and grey and white composed of quartz, weathered basement and fossiliferous limestone.
57 – 74		Clay (weathered basement) blue-steel grey with trace muscovite, biotite, with green and blue clay blebs.
74 – 75		Clay, as above, also with minor quartz (crystalline) generally less weathered.
75 – 104		Garnet, muscovite, biotite, quartz-slate-phylitic schist, black, very fine grained, perfectly fissile, 2 schistositypes at 90° to each other and a lineation defined by the pink-red garnets.

T.D. 104 m

3962 (I)-10

SCALE 1:250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN BC/MRN Oct.'81	EL 705 MENINGIE	FIGURE 10
CHECKED	DRILLHOLE LITHOLOGICAL LOG	REVISION
APPROVED	PH19	DRAWING No. SA/6202-41
REVISED		

CO-ORDINATES .....
CO ORD. SYSTEM .....
REDUCED LEVEL .....
INCLINATION .....
MAP REFERENCE .....

HOLE TYPE Percussion
DEPTH 80·0 m
COMMENCED 28-2-81
FINISHED 2-3-81
WATER LEVEL .....

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0	Q	Sand, buff cream, loose fine and well rounded.
5		Sand, fine, loose buff yellow with minor clay clasts.
		Sand, medium grained, light buff-yellow, loose.
10		Sandy limestone, light-buff-yellow, iron stained hard limestone nodules.
15		Calcarenite, light buff-brown, with well rounded quartz pebbles.
	Bw	Aeolianite, light-cream-white, soft and brittle, composed of fine shell fragments.
20		
25		
30	Ecm	Glauconitic marl with sandy intervals, light green-grey, moderate and brittle, with glauconitic fecal pellets at 30-40m
35		
40		Calcareous mud, light buff grey, soft and friable, abundant very fine calcareous fossil fragments.
45		Limestone, cream-pink, hard and tough, sandy in places.
50		Quartz-calc silicate gniess, banded, dark grey-black, white and minor brown bands, rare bands of coarse granular quartz, very dense.
55		
60		Calc silicate-quartz gniess, black with brown, green, white - pink bands, translucent.
65		
70		
75		
80	TD 80·0 m	
85		
90		
95		
100		
105		
110		
115		
120		

3962-(I)-11

SCALE 1:250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN BC/MRN Oct'81	EL 705 MENINGIE	FIGURE 11
CHECKED	DRILLHOLE LITHOLOGICAL LOG	REVISION
APPROVED	PH 15	DRAWING No. SA/6202-42
REVISED		

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CSR 029

Minerals Division

CSR LIMITED
MINERALS DIVISION
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BOX 483 GPO
SYDNEY AUSTRALIA 2001
TELEPHONE (02) 237 5111
TELEX AA20285
CABLE 'CSRMINDIV' SYDNEY

Ref: DGT/seh/415

9th December, 1981

The Director-General,
Department of Mines & Energy,
P.O. Box 151,
EASTWOOD, S.A. 5063

Dear Sir,

E.L. 705 MENINGIE
FIFTH QUARTERLY REPORT ON EXPLORATION
PERIOD ENDING 27th NOVEMBER, 1981

During the period, E.L. 705 became the operational responsibility of CSR Minerals Division, following transfer of title, effective 1st April, 1981, from Thiess Bros. Pty. Ltd.

Records and data on exploration to date were transferred to CSR Minerals Division. Past work is now being evaluated prior to determining the future exploration programme.

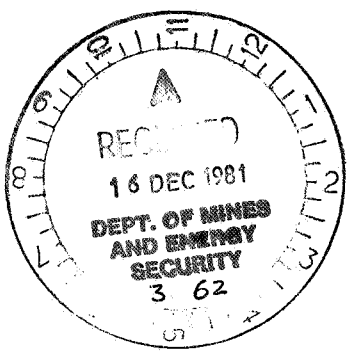
It is proposed that a broad Landsat based structure study be undertaken, to determine the regional tectonic setting of the Meningie area.

A statement of expenditure for the three month period ending 27th November, 1981 is attached.

Yours faithfully,

J.H. Rattigan
Exploration Manager

Encl.



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Minerals Division

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CABLE 'CSRMINDIV' SYDNEY

Ref: GCS/SS/415

25th March 1982

The Director General,
Department of Mines and Energy,
P.O. Box 151,
EASTWOOD, S.A. 5063

Dear Sir,

E.L. 705 - MENINGIE, S.A.
SIXTH QUARTERLY REPORT ON EXPLORATION
PERIOD ENDING 27TH FEBRUARY, 1982

Exploration during the period consisted of ongoing evaluation of past work carried out by Thiess Bros. Pty. Ltd. Published plans and data pertaining to E.L. 705 were purchased to aid in project planning.

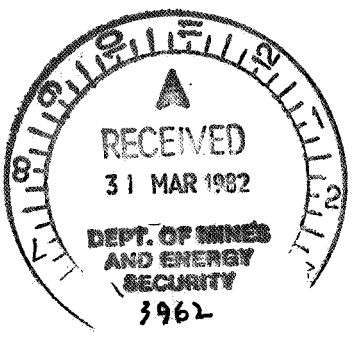
Assessment of previous exploration was completed at the end of the period and a report incorporating assessment and redefinition of targets and exploration philosophy is being written.

There has been no change in the prospectiveness of the Licence.

A statement of expenditure for the 3 month period ending 27th February 1982, is attached.

Yours faithfully,

J.H. RATTIGAN
Exploration Manager



EXPLORATION LICENCE 705 (MENINGIE)

SUMMARY OF EXPENDITURE

PERIOD ENDING 28TH FEBRUARY 1982

The quarterly expenditure was incurred as follows :-

LOGISTICS Equipment Rental	$ 76
GENERAL INVESTIGATIONS Photogeological Studies	$2,772
SALARIES	$ 180
ADMINISTRATION	$ 428
TOTAL	$3,456

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Prospect 415

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CSR LIMITED - MINERALS DIVISION
EXPLORATION GROUP

A REVIEW AND ASSESSMENT OF EXPLORATION IN E.L. 705 MENINGIE, SOUTH AUSTRALIA

EMR 64/82

ADELAIDE
March 1982

G.C. STOKOE

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CONTENTS

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LIST OF ILLUSTRATIONS

KEYWORDS

SOUTH AUSTRALIA
EXPLORATION
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MENINGIE
PETROLOGY
GEOCHEMISTRY
GEOPHYSICS
PERCUSSION DRILLING
DIAMOND DRILLING
SI 54-3
KANMANTOO GROUP
AMPHIBOLITE
METASEDIMENTS
COPPER
LEAD
ZINC
AEROMAGNETICS
GROUND MAGNETICS
RESISTIVITY
BARKER

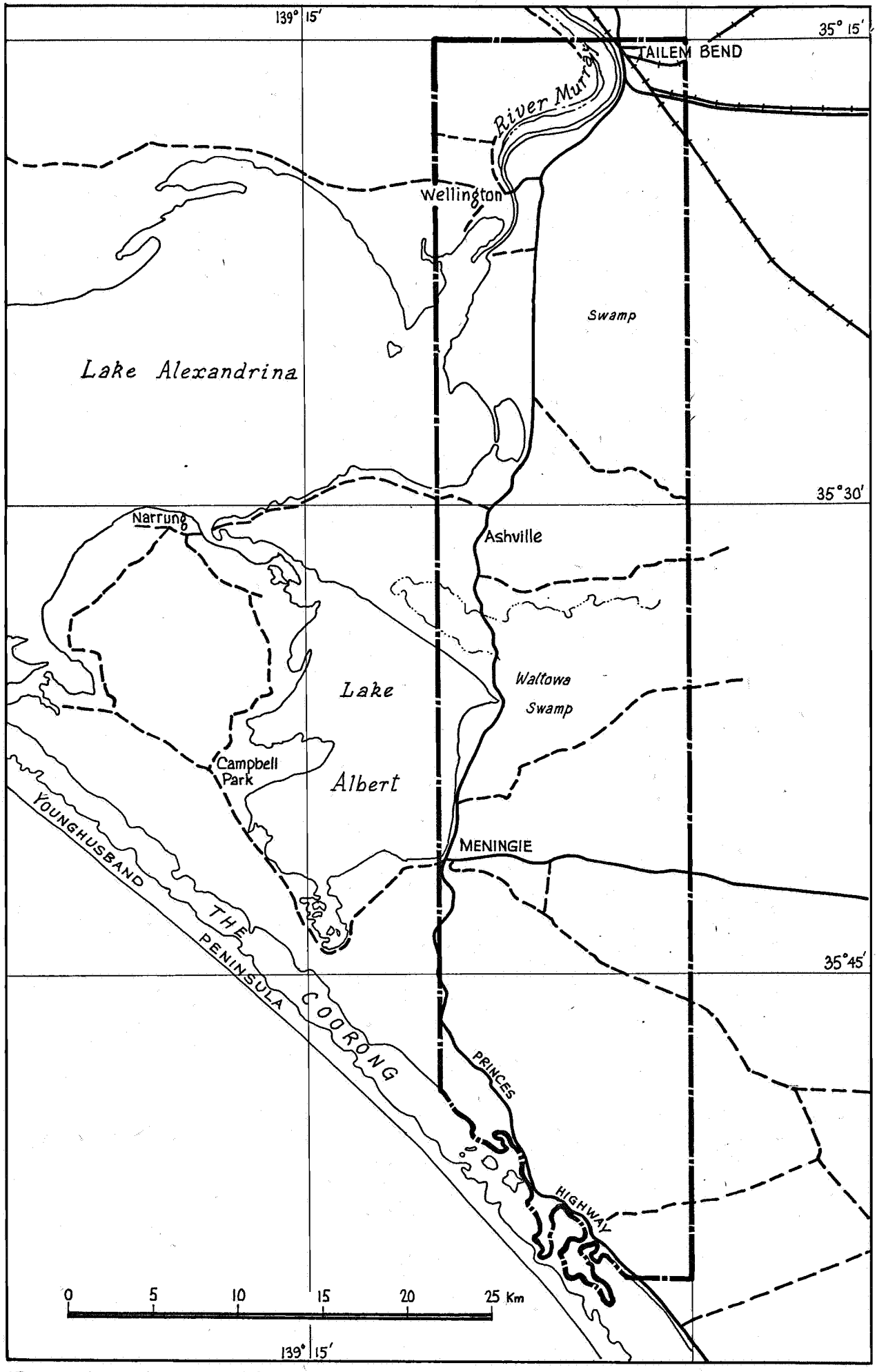

FIG. 1 E.L. 705 MENINGIE, SOUTH AUSTRALIA

1. INTRODUCTION

Thiess Bros. Pty. Ltd. was granted Exploration Licence 401 in the Meningie area, S.A. (Figure 1) commencing 7th June 1978, for a period of 12 months. A 12 month extension was granted in June 1979, the licence was renewed (as E.L. 705) in August 1980, and extended again in August, 1981.

Transfer of title to CSR Limited, Minerals Division, became effective in April 1981, and reports and data were subsequently forwarded to this office in the latter half of 1981.

This report incorporates a review of exploration carried out by Thiess Bros. Pty. ltd. and an assessment of data thus gained. Proposals for further exploration are given.

/....

TABLE 1 : DRILL HOLE SUMMARY, E.L. 705, MENINGIE, S.A.

DRILL HOLE NO.	TOTAL DEPTH (m)	HOLE TYPE	DIP	PROSPECT	CO-ORDINATES (AMG)	DATE COMMENCED	DATE COMPLETED	REDUCED LEVEL (m)
PH 1	31.0	Percussion	Vertical	Blind Creek	354170E 6079120N	12/1/79	13/1/79	5
PH 2	52.0	Percussion	Vertical	Blind Creek	353920E 6079200N	13/1/79	13/1/79	5
PH 3	44.0	Percussion	Vertical	Blind Creek	354320E 6079070N	14/1/79	14/1/79	5
PH 4	21.0	Percussion	Vertical	Mason Lookout	357320E 6071000N	14/1/79	14/1/79	10
PH 5	28.0	Percussion	Vertical	Mason Lookout	357870E 6071000N	15/1/79	15/1/79	9
PH 6	48.0	Rotary percussion	Vertical	Mason Lookout	355650E 6040400N	10/3/80	10/3/80	3
PH 7	48.0	Rotary percussion	Vertical	Mason Lookout	356480E 6071020N	10/3/80	11/3/80	3
PH 8	44.0	Rotary percussion	Vertical	Mason Lookout	358180E 6072310N	11/3/80	11/3/80	8
PH 9	70.0	Rotary	Vertical	Mason Lookout	359950E 6072480N	11/3/80	12/3/80	9
PH 10	40.0	Rotary percussion	Vertical	Blind Creek	353250E 6079400N	12/3/80	12/3/80	5
PH 11	68.0	Rotary	Vertical	-	355825E 6055550N	13/3/80	13/3/80	5
PH 12	87.0	Rotary	Vertical	-	360250E 6058360N	14/3/80	15/3/80	8
PH 13	85.0	Rotary percussion	Vertical	-	360800E 6058850N	19/3/80	19/3/80	8
PH 14	92.0	Rotary percussion	Vertical	-	361950E 6059500N	20/3/80	21/3/80	8
PH 15	80.0	Rotary percussion	Vertical	-	360700E 6061700N	28/2/81	2/3/81	
PH 16	96.0	Rotary percussion	Vertical	-	360575E 6061075N	25/2/81	26/2/81	
PH 17	108.0	Rotary percussion	Vertical	-	361425E 6060825N	24/2/81	25/2/81	
PH 18	120.0	Rotary percussion	Vertical	-	362025E 6060875N	4/3/81	5/3/81	
PH 19	104.0	Rotary percussion	Vertical	-	360950E 6059425N	5/3/81	6/3/81	
PH 20	96.0	Rotary percussion	Vertical	-	360750E 6061050N	2/3/81	3/3/81	
DDH 1	159.75	Diamond (NQ)	60^{o} to east	Mason Lookout	357570E 6071000N	15/1/79	13/2/79	10
DDH 2	240.0	Diamond (NQ)	60^{o} to	Blind Creek	354030E 6079170N	21/1/79	10/2/79	5

2. SUMMARY

Exploration be Thiess Bros. Pty. Ltd. from 1978 to 1981 comprised :-

2.1 Drilling of 20 percussion holes for a total of 1,362 m, and 2 diamond holes for a total of 399.95 m (Table 1).

2.2 Assays of 310 samples for Cu, Pb and Zn, and scans of 27 samples for Ag, As, Au, Ba, Bi, Co, La, Mn, Mo, Ni, P, Sb, Sn, V, W and Y.

2.3 Magnetic susceptibility measurements over 123.95 m of drill core, completion by contractor of 5 resitivity and ground magnetic traverses with a total length of 29.5 km, and completion of 11 additional ground magnetic traverses with a total length of 21.075 km.

2.4 Petrological examination, by consultant, of 20 specimens.

It is concluded that detailed magnetics and electrical soundings are of little value in the area. Gravity coverage should be more extensive and VLF-EM should be implemented. It is proposed that :-

(a) prospects should be generated along strike of the amphibolite unit, taking into account the likelihood of structural control of mineralisation within this unit, and

(b) the Balcarres Prospect should be more closely examined.

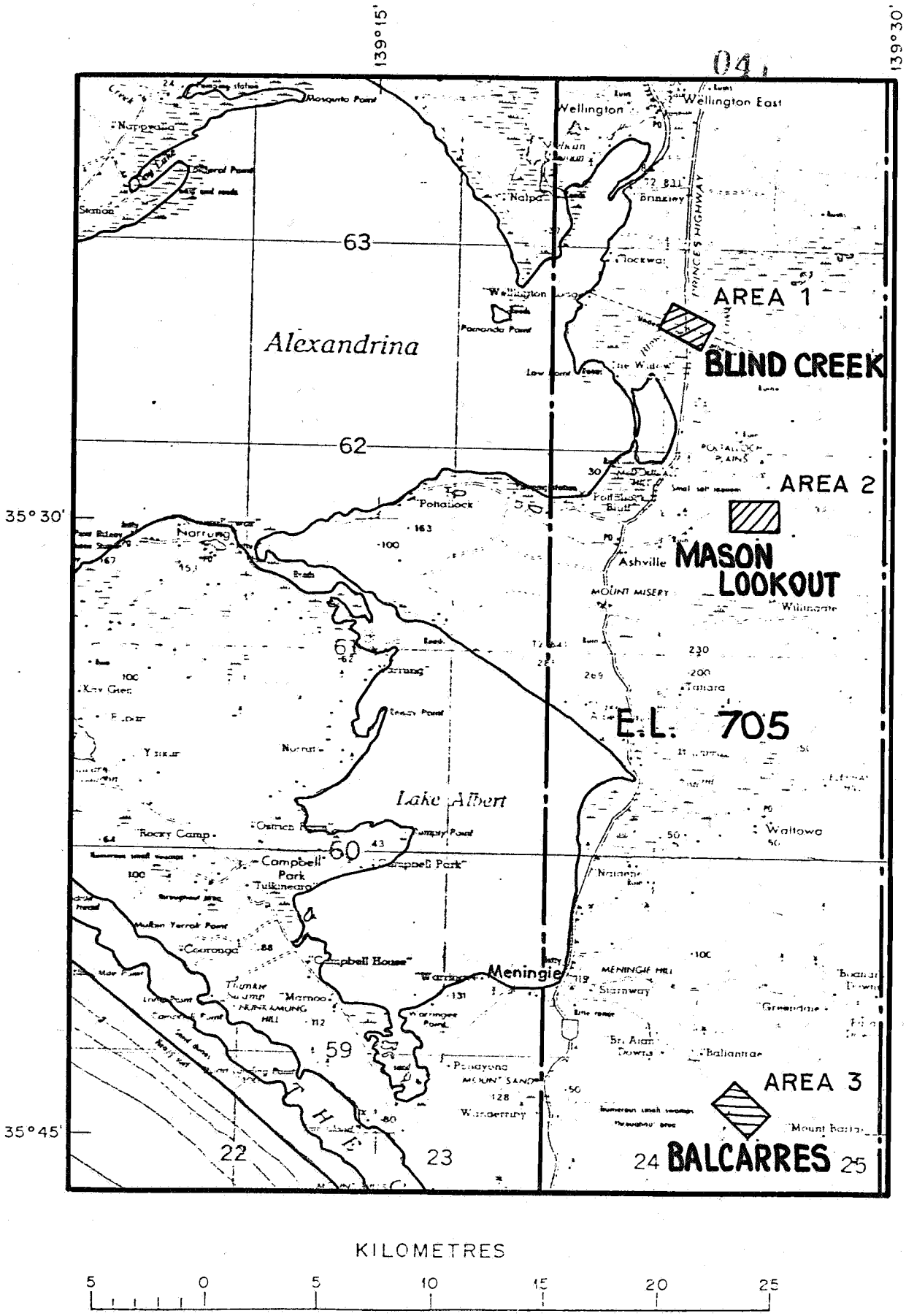

FIG. 2 LOCATION MAP- AREAS 1, 2 and 3
E.L. 705 MENINGIE SOUTH AUST.

3. EXPLORATION 1978-1981

Exploration in the Meningie E.L. was initially directed at three aeromagnetic anomalies investigated and modelled (using ground magnetics, gravity and IP) by the South Australian Department of Mines and Energy in 1977/1978 (Taylor, 1978). These were designated the Blind Creek, Mason Lookout and Balcarres Prospects (Figures 2 and 3). Four targets were proposed as the possible cause of the anomalies (Dredge, 1978) :-

(a) Nairne Pyrite type beds within the Kanmantoo Group;

(b) Mineralisation (Cu, Pb, Zn) within Kanmantoo Group sediments;

(c) Unmineralised basic dykes or sills in the Kanmantoo Group, and

(d) Mineralised dykes or sills in the Kanmantoo Group.

Five percussion holes and two diamond holes were drilled on the Blind Creek and Mason Lookout Prospects in early 1979 (Dredge, 1979a). Metamorphic rocks were intersected beneath the Oligocene Ettrick Formation in all holes. The two diamond drill holes cored through similar sequences of banded amphibolites and leucocratic gneisses. Petrology on core samples (Pontifex, 1979) indicated that the amphibolites and gneisses were metamorphosed primary differentiates of either :-

(i) a quartz-dolerite to mafic (and sodic) diorite magma; or

(ii) a basic magma with quartz and soda introduced during metamorphism

Isolated occurrences of a massive, coarse biotite rock are equated to a pegmatitic or lamprophyric phase. Sulphides (pyrite, pyrrhotite and chalcopyrite) were noted in the amphibolite and the biotite rock. Magnetite was most prominent in the amphibolite.

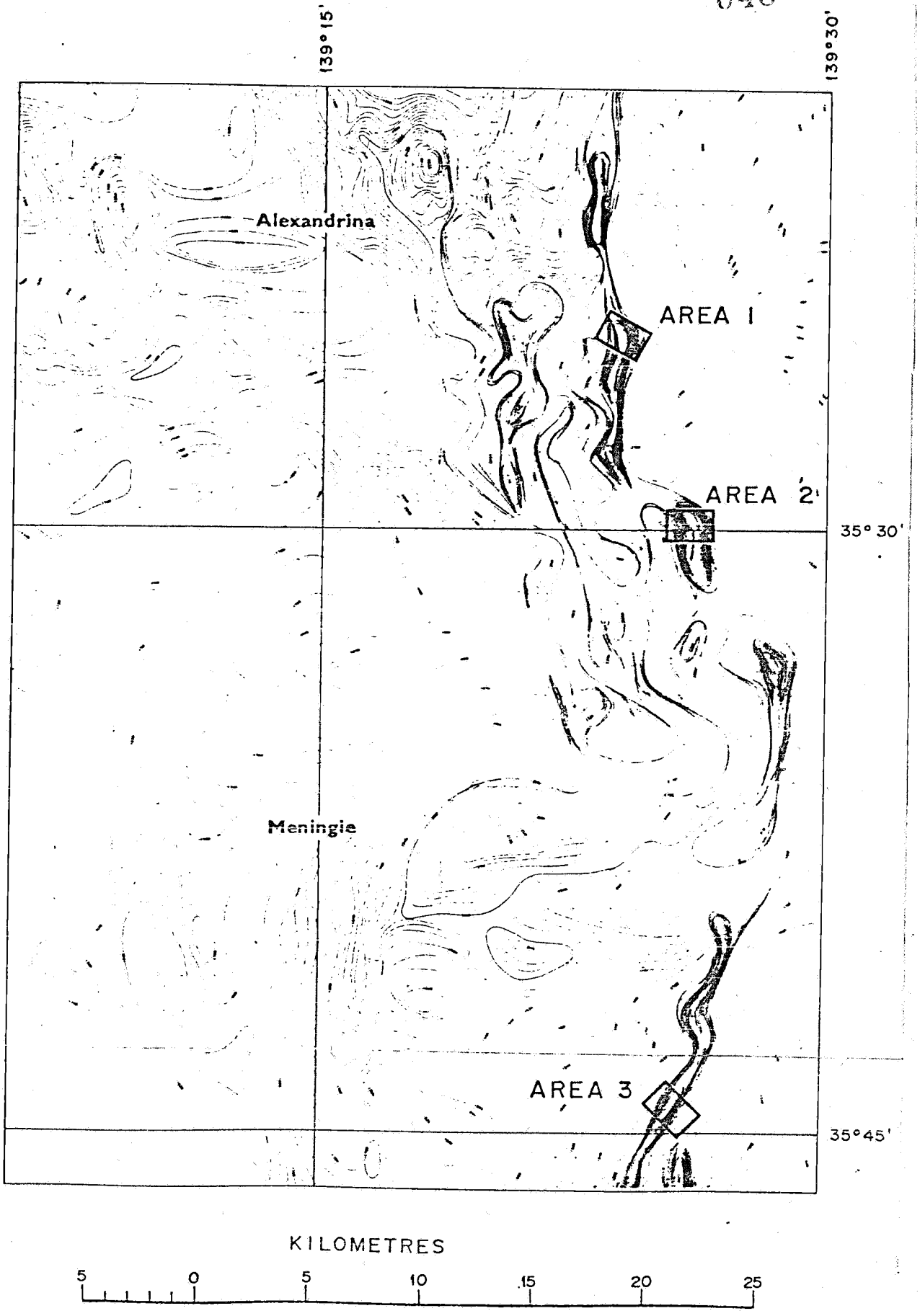

FIG. 3 AEROMAGNETIC CONTOURS AREAS 1, 2 & 3
E.L. 705 MENINGIE S. AUST.

Measurements on DDH 1 indicated moderate to high magnetic susceptibilities on both the amphibolites and gneisses, though susceptibilities of the amphibolite were consistently high (Dredge, 1979b).

One to two metre intervals of DDH 1 were sampled and assayed for Cu, Pb and Zn by AAS (Dredge, 1979b). Average values for Cu and Zn were substantially higher in the amphibolites (68 ppm Cu, 45 ppm Zn) than in the gneisses (14 ppm Cu, 18 ppm Zn) although the best copper intersections (2.4 m @ 0.078%, 1 m @ 0.082%) occurred in the gneisses. Lead values were uniformly low, with the majority registering below the 2 ppm detection limit.

Six samples were analysed for 16 additional elements (Ag, As, Au, Ba, Bi, Co, La, Mn, Mo, Ni, P, Sb, Sn, V, W, Y) by emission spectroscopy. Results indicated the amphibolite contained more V and Mn than the gneissic rocks which were moderately higher in La.

A resistivity and ground magnetics survey was carried out at five locations between Blind Creek and Balcarres by Murdoch Geophysics Pty. Ltd. in September and October 1979 (Dredge, 1979c). The purpose was to map basement units, structure and formational boundaries in order to more accurately locate favourable loci for mineralisation.

An interpretation, based on all available geophysical and geological data available, of Palaeozoic and Proterozoic geology was made for the Meningie E.L. and surrounds by Dredge (1979c). This shows interpreted areas of granite, Permian sediments and Cambrian Kanmantoo Group metasediments. The banded amphibolite/gneiss units are interpreted as having intruded the Kanmantoo Group along north-south trending faults, probably during the Ordovician. Nine percussion drill holes were drilled along Murdoch's lines to test the interpretation (Dredge, 1980a). All but one hole intersected Kanmantoo Group metasediments. PH12 (DRG No. I5413-1) intersected a clinopyroxene

hornblende-quartz-plagioclase-scapolite schist with patches of massive sulphide (pyrite-pyrrhotite). This has been equated to the Nairne Pyrite/Talisker calc-silicate horizon. PH11 bottomed in a grey, leuocratic granite (Victor Harbour Granite). Assays for Cu, Pb and Zn and a multi-element scan (for 15 elements) showed no anomalous values.

In October 1980, ground magnetics were carried out over 11 traverses, the purpose of which was to trace the interpreted correlative of the Nairne Pyrite/Talisker calc-silicate horizon and to deduce its disposition (Dredge, 1980b). Six percussion holes were subsequently drilled, sited on or adjacent to strongly magnetic Kanmantoo Group meta-sediments interpreted to be garnet, staurolite, gneisses and the scapolite-bearing calc-silicate unit (Lonergan, 1981). Holes drilled to intersect the interpreted calc-silicate horizon (PH15, PH16, PH20) did just that. PH18 was successful in intersecting an interpreted garnet-bearing schist. PH17, drilled for an interpreted garnet-staurolite schist, in fact intersected a pyritiferous amphibolite gneiss with development of hydrothermal(?) actinolite, calcite and pyrite in the adjacent (uphole) Kanmantoo Group schist. PH18 intersected a banded sequence of garnet schists with minor amphibolite and garnet schist.

Two metre samples of basement in the six holes were assayed for Cu, Pb and Zn. High (though not anomalous) copper values occurred in PH17 amphibolite. Anomalous values of Cu and Zn were recorded in garnet schists in PH18, the best Cu intersections being 14 m @ 0.04% (90 m to 104 m), including 2 m @ 0.07% (100 to 102 m).

4. REVIEW

4.1 Lithology

(a) Banded amphibolite/leucocratic gneiss (PH1, PH2, PH3, PH4, PH5, PH17, PH18, DDH1 and DDH2).

These are interpreted to be metamorphosed differentiates of a diorite-dolerite magma intruded into the Kanmantoo Group during the Delamerian Orogeny. They are generally magnetite-rich (up to 20% modal magnetite in amphibolite) and sometimes pyritiferous.

(b) Quartz-feldspar-mica schist (PH6, PH7, PH8, PH9, PH10, PH13 and PH17).

Most probably a metagreywacke in the Kanmantoo Group.

(c) Garnet-staurolite schist (PH14, PH18 and PH19).

These interpreted metasiltstones are occasionally pyritiferous.

(d) Calc-silicate rocks (PH12, PH15, PH16 and PH20).

These scapolite-bearing rocks are associated with sub-massive pyrite and are tentatively correlated to the Nairne Pyrite/Talisker calc-silicate horizon.

(e) Victor Harbour Granite (PH11).

4.2 Geochemistry

Assays for Cu, Pb and Zn have been carried out on 310 samples; 122 split core samples from DDH 1, and the remainder from percussion chips. In addition, multi-element scans have been carried out on 27 selected samples.

Anomalous copper intersections are recorded in the banded amphibolite/gneiss unit and in metasiltstone adjacent to amphibolite (Table 2). Pyrite and pyrrhotite mineralisation is evident in all cases. Lead values are considerably low. Anomalous zinc is associated with the Cu anomaly in PH18.

4.3 Geophysics

Interest in the Meningie area was generated by the presence of a north-south trending, somewhat sinuous zone of intense aeromagnetic anomalies. Three of these anomalies were examined by SADME and two subsequently drilled by Thiess Bros. The anomalies are attributable to the banded amphibolite/gneiss unit.

Ground magnetics and resistivity were carried out with inconclusive results. The saline nature of the Cainozoic cover rocks renders electrical sounding ineffective for anything but regional interpretation. Sporadic magnetite contents of the retrograded Kanmantoo Group metasediments hinders delineation of specific rock units by ground magnetics.

5. FUTURE EXPLORATION

5.1 Redefinition of Target

Geochemistry has indicated no copper concentrations in the calc-silicate unit and so potential for finding economic mineralisation in this host must be considered low.

The banded amphibolite/gneiss unit should still be considered prospective and the anomalous intersection in PH18 suggests that the presence of the metastiltstone may have some influence on concentration of metals, although the available evidence is too inconclusive to defend this hypothesis with confidence.

Structural control on mineralisation has yet to be considered. The amphibolite appears to have been emplaced along north-south trending fractures, therefore any cross-cutting features should be regarded as providing possible loci for mineralisation.

Thus, the target should be a massive sulphide body associated with the banded amphibolite/gneiss unit.

5.2 Procedure

The amphibolite/gneiss is easily traceable by virtue of its strong magnetic signature. A structural analysis incorporating regional gravity and aeromagnetic interpretation, photogeology and Landsat imagery should delineate the cross-cutting features of possible importance in ore localisation. With prospects thus defined, gravity and VLF-EM may be used to further resolve targets. Percussion drilling and geochemistry will then provide concrete information with regards to final prospectivity.

5.3 Balcarres Prospect

Whereas the Blind Creek and Mason Lookout magnetic anomalies are composite, reflecting the banded nature of the causative bodies, the Balcarres magnetic anomaly is a single and, as yet, unclosed feature. The existence of a dispalced (to the east) gravity anomaly has led Taylor (1978) to suggest the possibility of an additional dense but non-magnetic source (conceivably a massive sulphide body flanking the amphibolite unit). It is recommended that the area be more thoroughly covered with ground magnetics and gravity (and VLF-EM?) to close the anomalies and better facilitate modelling. Follow-up with drilling and goechemistry could then proceed if results are favourable.

6. REFERENCES

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GCS/SS
April 1982

APPENDIX I

PERCUSSION DRILL HOLE LITHOLOGICAL LOGS

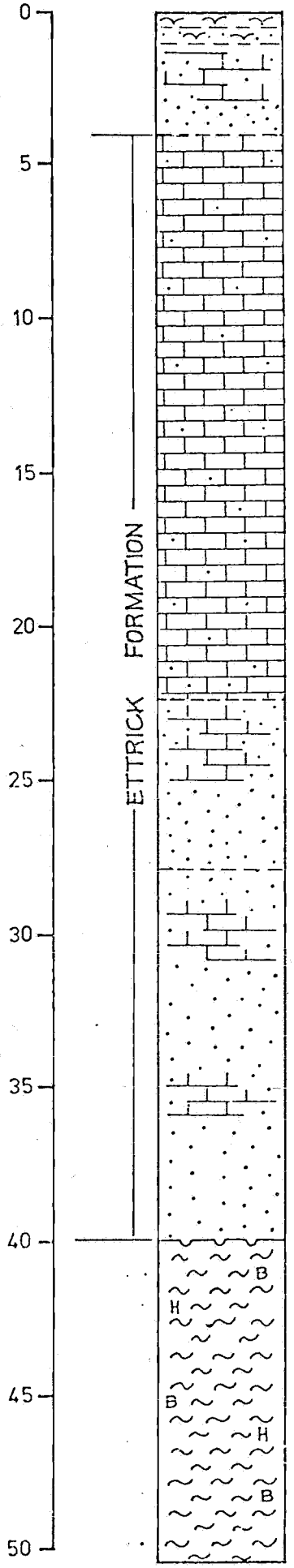
PH1 TO PH20

CO-ORDINATES	000 N 425 W	HOLE TYPE	Percussion
CO-ORD. SYSTEM	SADM Geoph. Survey	DEPTH	31·0m
REDUCED LEVEL	5·0 m.	COMMENCED	12-1-79
INCLINATION	Vertical	FINISHED	13-1-79
MAP REFERENCE	Barker 1:250 000 5154-13	WATER LEVEL	3·0 m

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Black soil
		Light brown, sandy soil with secondary calcification
5		Light brown, sandy clayey marl with kunkar bands
	ETTRICK FORMATION	
10		Pale green to light olive green, glauconitic marl. Shell fragments increasing in size with depth. Generally unconsolidated. Numerous consolidated bands up to 0·5m. thick. Minor fine grained quartz
15		
20		Light brown, medium grained, well sorted, well rounded unconsolidated sand, with 20% shell fragments. (Possible contamination from above). Increase in shell fragments with depth.
25		20-26 m. very poor sample return.
30		Light grey-green, coarse grained amphibolite with minor magnetite and pyrite.
	31·0	
35		

SCALE 1:200	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN I.W. Mar '79	EL 401 MENINGIE	FIGURE
CHECKED	BLIND CREEK PROSPECT	REVISION
APPROVED	DRILLHOLE LITHOLOGICAL LOG	DRAWING No
REVISED	PH 1	

CO-ORDS.. 000N, 650 W | INCLINATION Vertical | COMMENCED 13-1-79
CO-ORD. SYSTEM.. SADM | HOLE TYPE .. Percussion | FINISHED 13-1-79
REDUCED LEVEL.. 5·0 m. | DEPTH 50·50 m. | WATER LEVEL 2·0 m.



Black soil
Light brown, sandy soil with secondary calcification.

Light brown, sandy clayey marl with kunkar bands

Pale green to light olive green, glauconitic marl with minor fine grained quartz.

Light brown, fine grained, well sorted, well rounded unconsolidated sand with 40% shell fragments. (Possible contamination from above)

30-40 m. V. poor sample return.

Light brown medium grained, moderate sorted, well rounded unconsolidated sand. 40% shell fragments (Possible contamination from above)

Light grey-green, coarse grained, subidioblastic, feldspar-quartz-hornblende - biotite gneiss with minor chlorite. No magnetite present.

SCALE 1:200	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN IW. Mar '79	EL 401 MENINGIE BLIND CREEK PROSPECT DRILLHOLE LITHOLOGICAL LOG PH 2	FIGURE
CHECKED		REVISION
APPROVED		DRAWING No Q/C202-11
REVISED		

CO-ORDINATES . . . . . 000 N, 225 W
CO-ORD. SYSTEM . . . . SADM Geoph. Survey
REDUCED LEVEL . . . 5·0 m.
INCLINATION . . . . . Vertical
MAP REFERENCE . . Barker 1:250 000 5154-13

HOLE TYPE . . . . . Percussion
DEPTH . . . . . 44·0 m.
COMMENCED 14-1-79
FINISHED 14-1-79
WATER LEVEL . . . . 2·5 m.

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Black soil
		Light brown, sandy soil with secondary calcification & kunkar bands.
	ETTRICK FORMATION	Light brown, sandy, clayey marl
5		
10		Pale green to light olive green, glauconitic marl with minor fine grained quartz.
15		
20		
25		Light brown, medium grained, well sorted, well rounded, unconsolidated sand with 40% shell fragments (possible contamination from above)
30		
35	B H	Light grey-green, coarse grained feldspar-quartz-biotite-hornblende gneiss. Minor magnetite & minor garnets from 37-44 m.
40	B H	
45	44·0	

SCALE 1:200	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN J.H. 14 Mar '79.	EL 401 MENINGIE	FIGURE
CHECKED	BLIND CREEK PROSPECT	REVISION
APPROVED	DRILLHOLE LITHOLOGICAL LOG	DRAWING No. Q/6202-12
REVISED	PH 3	

CO-ORDINATES ..... 750 N, 200 E
CO-ORD. SYSTEM .... SADM Geoph. Survey
REDUCED LEVEL .... 9·5 m.
INCLINATION ..... Vertical
MAP REFERENCE .... Barker 1:250000 S154-13

HOLE TYPE ..... Percussion
DEPTH ..... 21·0m.
COMMENCED 14-1-79
FINISHED 14-1-79
WATER LEVEL ... 3·0 m.

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Light yellow-brown, fine-medium grained, moderately sorted, sub-angular-rounded sand. White.-light brown, sandy clay with kunkar bands & minor shell fragments.
5	ETTRICK FORMATION	
10		Pale green-light olive green glauconitic marl with minor fine grain sand.
15		
20	T.D.-21·0	Coarse grained amphibolite. (foliated hornblende gneiss). 60-70% hornblende, 20% feldspar & minor quartz & fine grained magnetite.
25		

SCALE 1:200	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN J.M. Mar'79	EL 401 MENINGIE MASON LOOKOUT DRILLHOLE LITHOLOGICAL LOG PH 4	FIGURE
CHECKED		REVISION
APPROVED		DRAWING No Q/6202-13
REVISED		

CO-ORDINATES ____ 750 N, 400 E
COORD SYSTEM ____ SADM Geoph. Survey
REDUCED LEVEL ____ 9.0 m.
INCLINATION ____ Vertical
MAP REFERENCE ____ Barker 1:250 000

HOLE TYPE ____ Percussion
DEPTH ____ 28.0 m.
COMMENCED ____ 15-1-79
FINISHED ____ 15-1-79
WATER LEVEL ____ 3.0 m.

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Brown, fine-medium grained, sub-angular sand. Brown-light yellow-brown, sandy clay with kunkar bands and minor shell fragments.
5		
10	ETTRICK FORMATION	Pale green to light olive green, glauconitic marl with minor fine grained quartz.
15		
20		Quartz content increasing to 15-20 %
25		Quartz medium grained, moderate sorted, well rounded, increasing to 20-30 %.
30	28.0	Light grey-green, coarse grained, well rounded amphibolite.

SCALE 1:200	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN IW. Mar. '79	EL 401 MENINGIE	FIGURE
CHECKED	BLIND CREEK PROSPECT	REVISION
APPROVED	DRILLHOLE LITHOLOGICAL LOG	
REVISED	PH 5	DRAWING No Q/6202-14

CO-ORDINATES 355 650E 6040400N
CO-ORD. SYSTEM AMG
REDUCED LEVEL ..... 3.0 m
INCLINATION ..... Vertical
MAP REFERENCE ..... Barker SI. 54-13

HOLE TYPE ..... Rotary / Percussion
DEPTH ..... 48.0 m
COMMENCED 10-3-80
FINISHED 10-3-80
WATER LEVEL .... 1.25m.

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Light brown, fine grained, sand with kunkar layers
		Light olive green, sandy clay
		Light olive green, sandy, clayey marl.
5		
		Light olive green, fine grained, glauconitic marl
10		
		Light olive green, fine grained, glauconitic marl
15		
20		Light olive green, medium-coarse grained, glauconitic marl
		Pink, fine-medium grained marl
25		
		Weathered basement ie. brown, fine grained clayey sand with sericite flakes
30		
35		
		Dark green, fine grained muscowite-biotite-quartz-schist.
40		
45		
50		

Ettrick Formation

Kanmantoo Group

48.0

SCALE 1:250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN	EL 401 MENINGIE DRILLHOLE LITHOLOGICAL LOG PH 6	FIGURE
CHECKED		REVISION
APPROVED		DRAWING No SA/6202-23
REVISED		

056

CO-ORDINATES 356 480E 6071 020N
CO-ORD. SYSTEM AMG
REDUCED LEVEL 3 0m
INCLINATION ..... Vertical
MAP REFERENCE .... Barker SI. 54-13

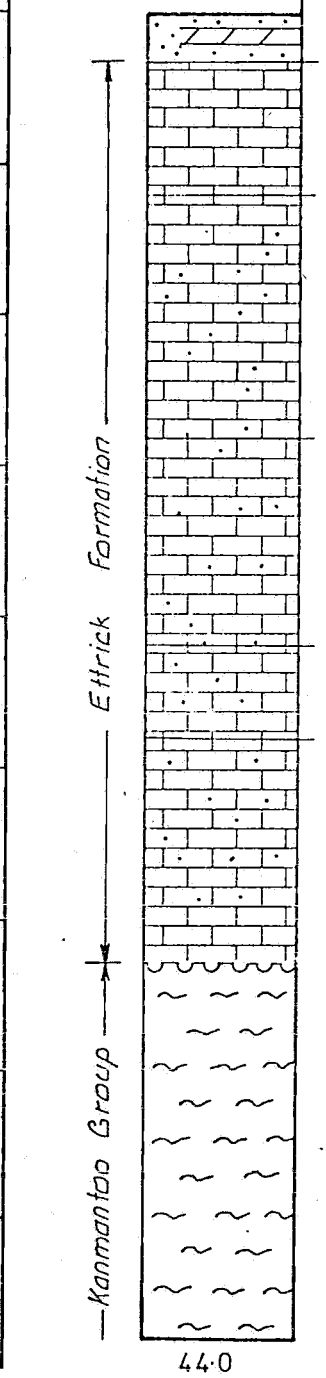
HOLE TYPE ..... Rotary / Percussion
DEPTH ..... 48·0 m
COMMENCED ..... 10·3·80
FINISHED ..... 11·3·80
WATER LEVEL ..... 1·0 m.

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Dark brown, fine grained sand
		Light brown clay with thin kunkar layers
5		Light brown clayey, sandy marl, grades into below
10	Ettrick Formation	Light olive green, fine grained glauconitic, sandy marl Marl becomes coarser grained with depth
15		
20		
25		Light olive green-yellow, medium coarse grained glauconitic, sandy marl.
30		
35		Dark green, fine grained albite - muscouite - chlorite - quartz schist, slightly weathered.
40	Kanmantoo Group	
45		Dark green, fine grained albite - muscouite - chlorite - quartz schist.
50	48·0	

SCALE 1:250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN	EL 401 MENINGIE DRILLHOLE LITHOLOGICAL LOG PH 7	FIGURE
CHECKED		REVISION
APPROVED		DRAWING No SA / 5202 - 24
REVISED		

CO-ORDINATES ..... 358 180 E 60 72 310 N
CO-ORD. SYSTEM AMG
REDUCED LEVEL ..... 8·0 m.
INCLINATION ..... Vertical
MAP REFERENCE ..... Barker SI. 54-13

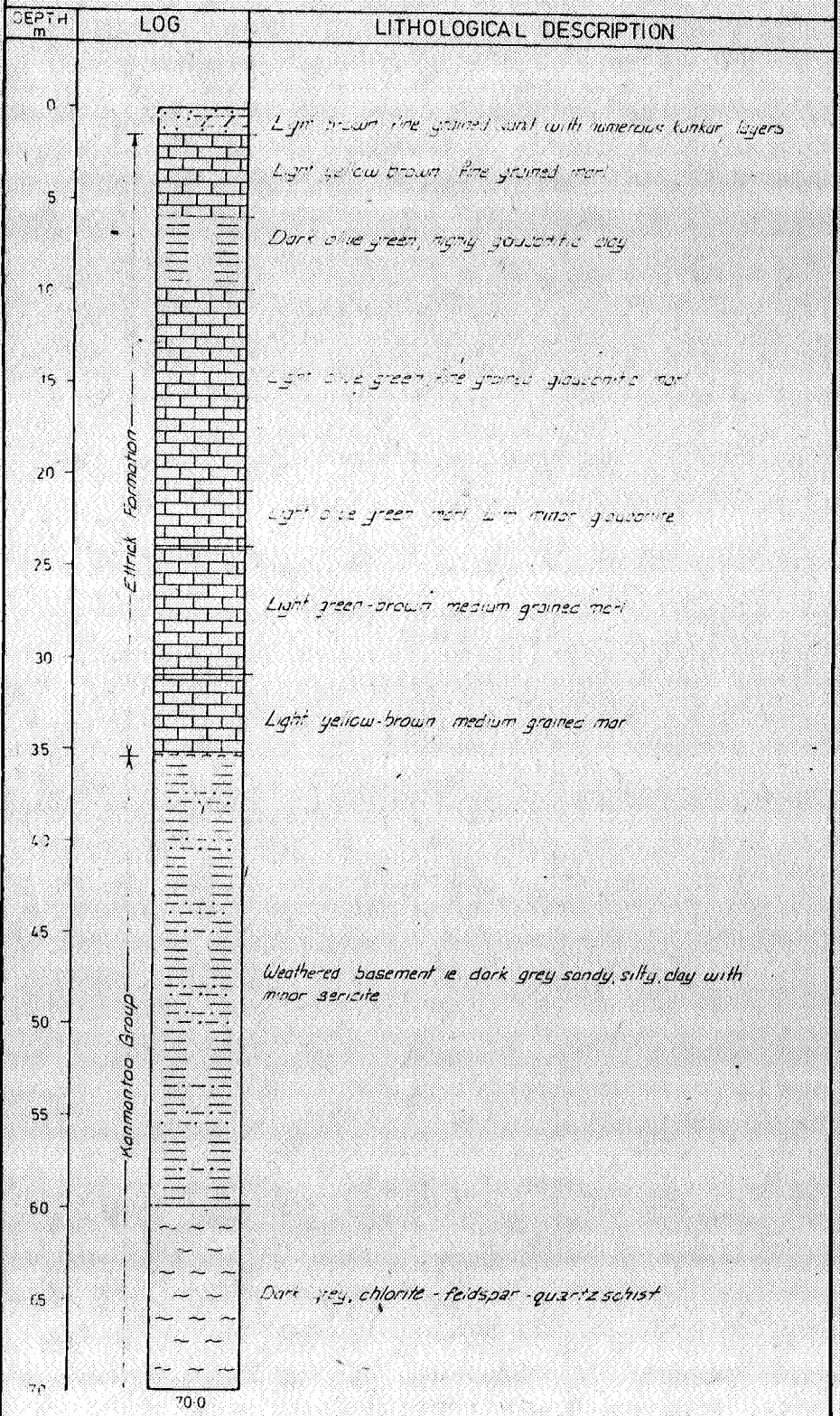
HOLE TYPE ..... Rotory / Percussion
DEPTH ..... 44·0 m.
COMMENCED ..... 11·3·80
FINISHED ..... 11·3·80
WATER LEVEL ..... 2·5 m

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Dark brown, silty, fine grained sand, are numerous thin kunkar layers
5		Light yellow-brown, fine grained clayey marl, clay content decreases with depth.
10		Light, olive green, fine grained, sandy glauconitic marl
15		
20		Light, olive green, fine-medium grained, sandy glauconitic marl
25		Light brown, fine-medium grained, sandy marl
30		Light brown, medium grained, sandy marl, are coarse-very coarse shell fragments
35		Grey, fine grained (? grophitic) quartz-biotite schist.
40		
45	44·0	

SCALE 1: 250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN	EL 401 MENINGIE	FIGURE
CHECKED	DRILLHOLE LITHOLOGICAL LOG	REVISION
APPROVED	PH 8	
REVISED		DRAWING No SA / 6202-25

060

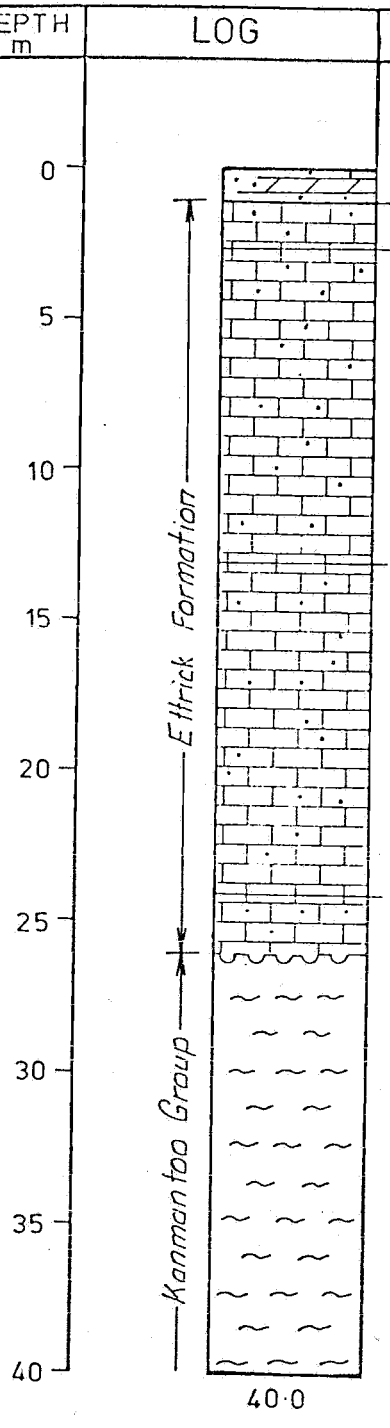
CO-ORDINATES	359 950E 6072 480N	HOLE TYPE	Rotary
CO-ORD SYSTEM	AMG	DEPTH	70.0m
REDUCED LEVEL	9.0m	COMMENCED	11.3.80
INCLINATION	Vertical	FINISHED	12.3.80
MAP REFERENCE	Barker Sh. 6454-3	WATER LEVEL	2.0m



1:250	THIESS BROS PTY LIMITED MINING DIVISION	
	EL 401 McBRIDE, DRILLHOLE LITHOLOGICAL LOG PH 9	FIGURE
		REVISION
		DRAWING No. SA/5202-76

CO-ORDINATES 353 250E 6079 400N
CO-ORD. SYSTEM AMG
REDUCED LEVEL ..... 5 0 m.
INCLINATION ..... Vertical
MAP REFERENCE ..... Barker SI 54-13

HOLE TYPE ..... Rotary / Percussion
DEPTH ..... 40·0 m.
COMMENCED ..... 12·3·80
FINISHED ..... 12·3·80
WATER LEVEL .... 2·0 m.



LITHOLOGICAL DESCRIPTION

Light brown, fine grained sand with numerous kunkar layers
Light yellow brown, fine grained marl.

Light olive green, fine grained glauconitic sandy marl

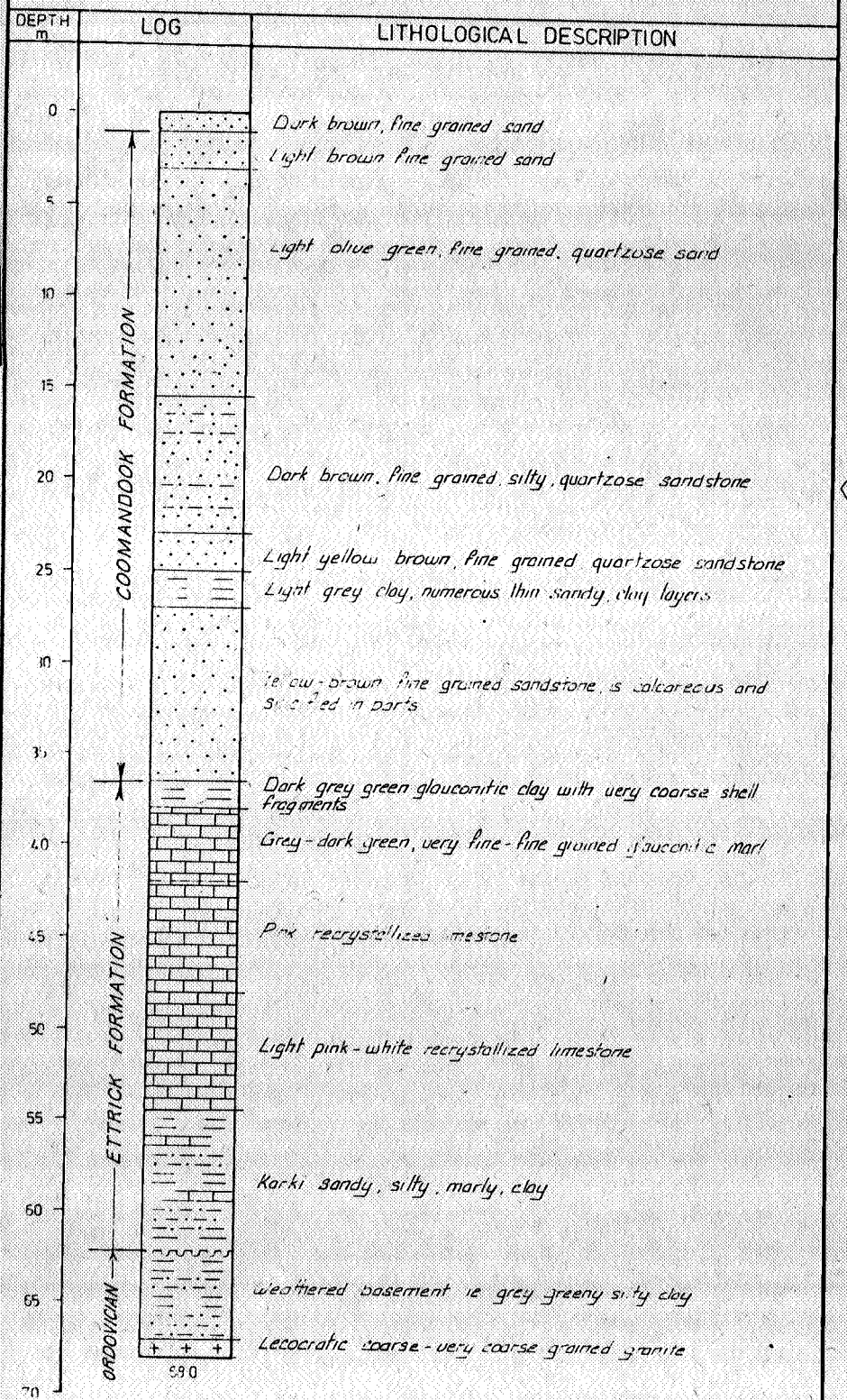
Light brown, fine grained sandy marl, are numerous bands of glauconitic marl. Increase in quartz content with depth

Light brown, fine - medium grained sandy marl up to 30% sand and coarse to very coarse shell fragments

Dark grey - green, fine grained muscovite - biotite - feldspar - quartz schist.

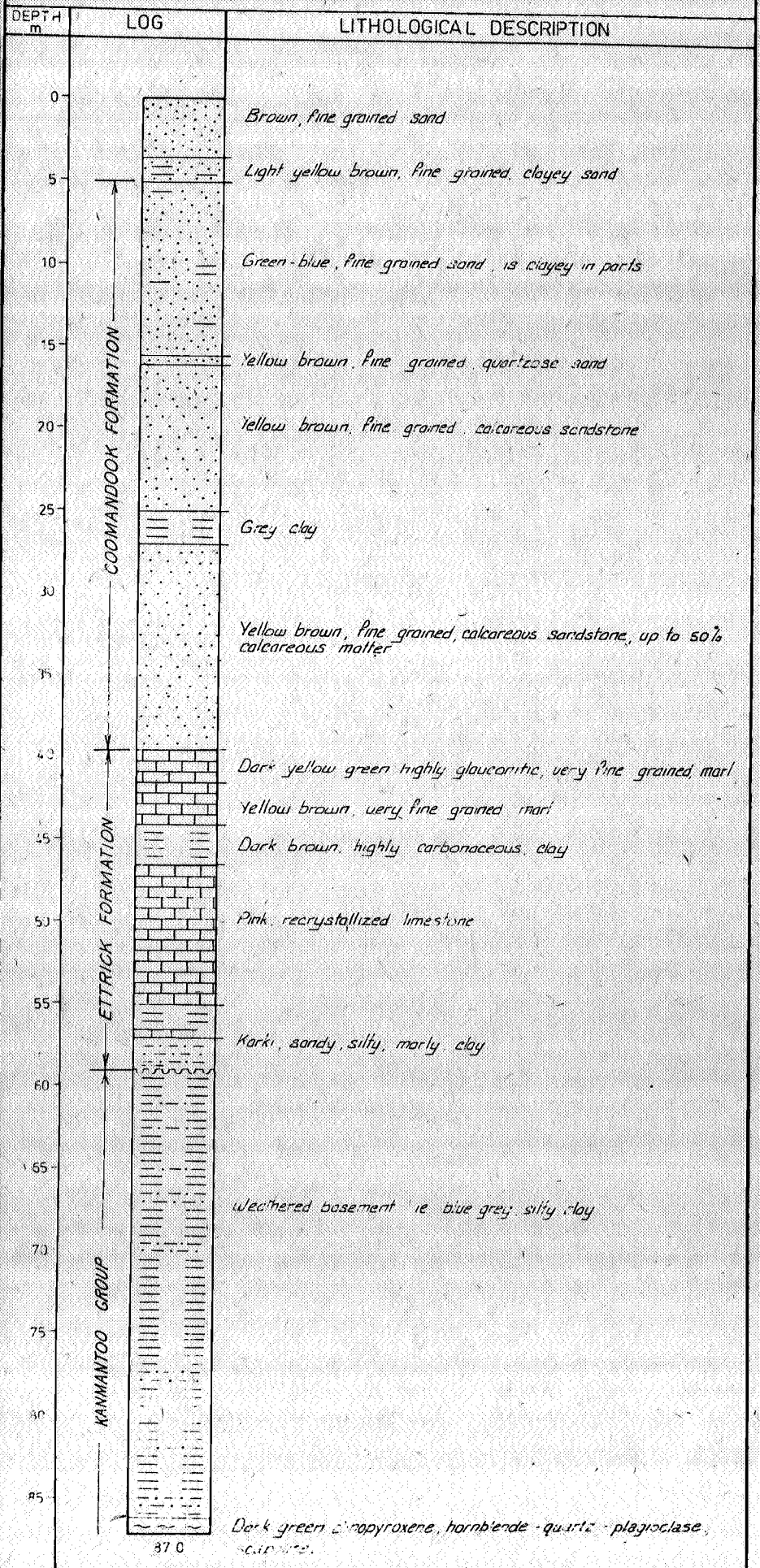
SCALE 1:250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN	EL 401 MENINGIE	FIGURE
CHECKED	DRILLHOLE LITHOLOGICAL LOG	REVISION
APPROVED	PH 10	DRAWING No SA/6202-27
REVISED		

CO-ORDINATES	355 825 E 6055 550 N	HOLE TYPE	Rotary
CO-ORD. SYSTEM	AMG	DEPTH	68.0 m
REDUCED LEVEL	5 m	COMMENCED	13.3.80
INCLINATION	Vertical	FINISHED	13.3.80
MAP REFERENCE	Barker SI 54-3	WATER LEVEL	1.5 m



SCALE 1:250	THIESS BROS PTY LIMITED MINING DIVISION		
DRAWN	EL 401 MENINGIE	FIGURE	
TRACED	DRILLHOLE LITHOLOGICAL LOG	DIVISION	
APPROVED	DH 11	DRAWING No	SA / 5202-28
REVISED			

CO-ORDINATES	350 250E 6298 350N	HOLE TYPE	[illegible]
CO-ORD SYSTEM	AMG	DEPTH	87.0 m
REDUCED LEVEL	8.0m	COMMENCED	4.3.80
INCLINATION	Vertical	FINISHED	5.3.80
MAP REFERENCE	Barker SI 54-13	WATER LEVEL	?



PH 12

CO-ORDINATES	150 800 E 168 450 N	HOLE TYPE	Rotary / Percussion
CO-ORD SYSTEM	AMG	DEPTH	56.0 m
REDUCED LEVEL	8.0 m	COMMENCED	19 3 80
INCLINATION	Vertical	FINISHED	19 3 80
MAP REFERENCE	Barker SL 54-13	WATER LEVEL	?

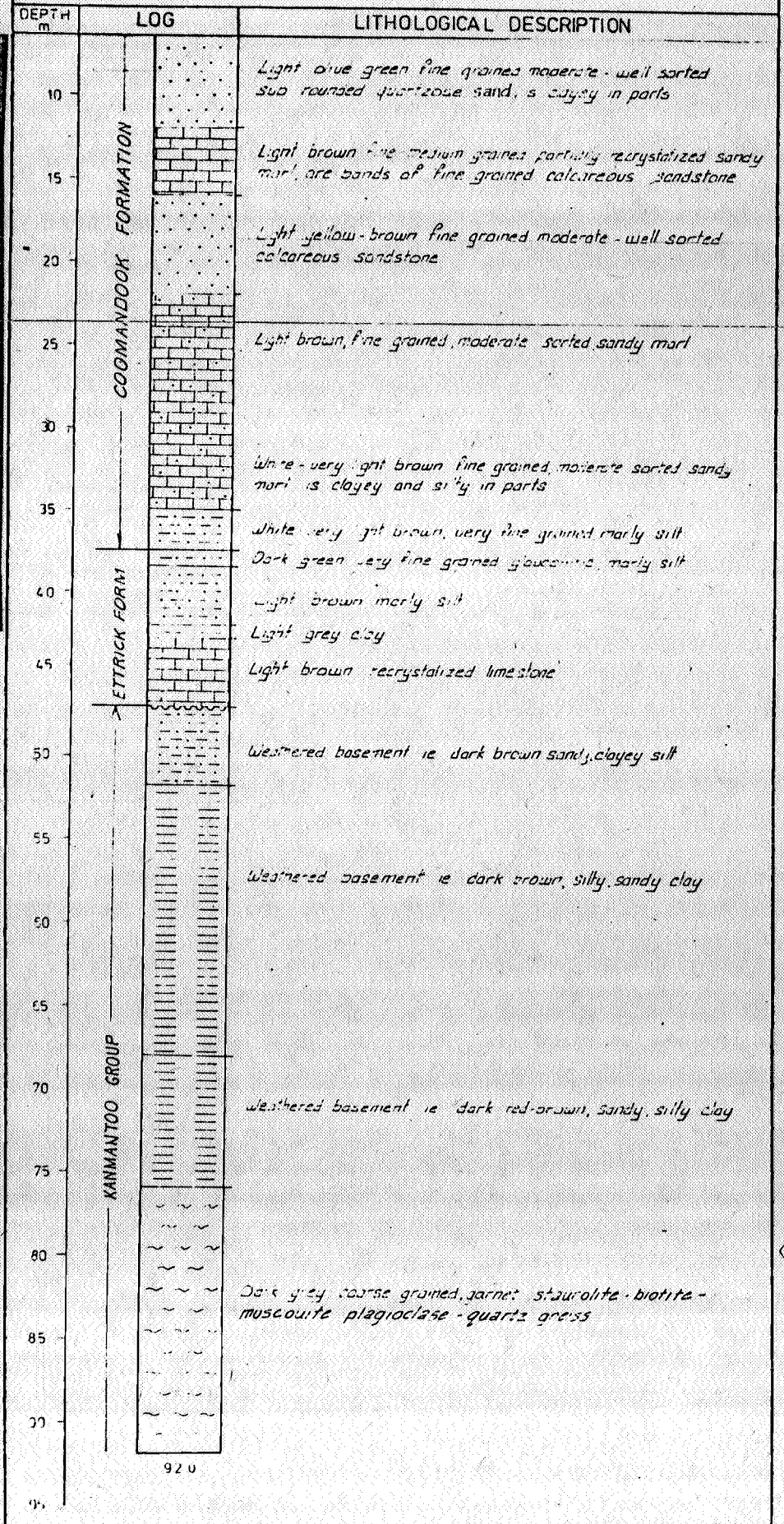
064

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Brown fine grained moderately sorted sub angular sand
5		Light yellow brown fine grained moderately - well sorted clayey sand
10		Light grey - green medium grained, poorly moderately sorted well rounded quartzose sand, is clayey in parts
15	COOMANDOOK FORMATION	
20		Yellow - brown, fine grained moderately - well sorted calcareous sandstone
25		Grey clay
30		Yellow - brown fine grained moderately well sorted calcareous sandstone, grades into sandy limestone with depth
35		Light brown, very fine grained, marly clay
40		Dark green highly glauconitic, marly clayey silt
45	ETTRICK FORMATION	Light yellow brown fine grained, marl with coarse quartz and shell fragments
50		Dark brown - black highly carbonaceous clay
55		Pink recrystallized limestone
60		Brown, coarse grained, sub angular - rounded sand
65		Weathered basement ie dark green and brown sericitic, silty clay
70		
75	KANMANTOO GROUP	Brown, fine grained, quartz feldspar - biotite schist
80		
..		

850

SCALE 1:250	THIESS BROS PTY LIMITED MINING DIVISION
DRAWN	PH 13

CO-ORDINATES	361 900E 6059 500N	HOLE TYPE	[illegible]
CO-ORD SYSTEM	AMG	DEPTH	92.0 m
REDUCED LEVEL	80 m	COMMENCED	20 3 80
INCLINATION	Vertical	FINISHED	2 3 80
MAP REFERENCE	Barker SF 54-3	WATER LEVEL	40 m



CO-ORDINATES
CO ORD SYSTEM
REDUCED LEVEL
INCLINATION
MAP REFERENCE

HOLE TYPE Percussion
DEPTH 80·0 m
COMMENCED 28·2·81
FINISHED 2·3·81
WATER LEVEL

066

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Sand, buff cream, loose fine and well rounded.
5		Sand, fine, loose buff yellow with minor clay casts
		Sand, medium grained, light buff-yellow, loose.
10		Sandy limestone, light buff-yellow, iron stained hard limestone nodules
15		Calcarenite, light buff-brown, with well rounded quartz pebbles
20		Aeolianite, light-cream-white, soft and brittle, composed of fine shell fragments.
25		
30		Glauconitic marl with sandy intervals, light green-grey, moderate and brittle, with glauconitic fecal pellets at 30-40m
35		
40		Calcareous mud, light buff grey, soft and friable, abundant very fine calcareous fossil fragments
45		Limestone, cream-pink, hard and tough, sandy in places
50		Quartz-calc silicate gniess, banded, dark grey-black, white and minor brown bands, rare bands of coarse granular quartz, very dense.
55		
60		Calc silicate-quartz gniess, black with brown, green, white - pink bands, translucent.
65		
70		
75		
80	TD 80·0 m	
85		
90		

PH15

CO-ORDINATES
CO ORD SYSTEM
REDUCED LEVEL
INCLINATION
MAP REFERENCE

HOLE TYPE Percussion
DEPTH 96·0m
COMMENCED 25·2·81
FINISHED 26·2·81
WATER LEVEL 48·0 m

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
10		Calcarenite, light cream - buff, hard and brittle with yellow oxidised bands.
15		Gravel, well rounded milky and yellow quartz pebbles.
20		Calcarenite? coarse finely broken shell fragments, uniform sorting, cream - white colour, soft and friable.
25		
30		Calcarenite, glauconitic in parts, buff - green colours, chert bands at base.
35		
40		Limestone, light cream - buff, hard and tough.
45		Limestone, light pink red, hard and tough.
50		Gravel, quartz dominated composition of basement and typical quartz and minor ironstone pebbles.
55		Calc - silicate - quartz gneiss, green - black with minor quartz banding very hard and tough, waxy lustre. Clay bands, dark grey at 52·53m and 52·54m.
60		Calc - silicate - quartz gneiss, green - black with minor quartz banding, waxy lustre.
65		Calc - silicate - quartz gneiss, green - black with minor quartz banding, dense with a waxy lustre. Minor veins of milky quartz.
70		
75		Brown dense metaquartzite or intermediate intrusive associated with green black gneiss.
80		Calc - silicate, quartz gneiss with minor brown meta - quartzite minor pyrite and very rare chalcopyrite, also very minor purple mineral and rare garnet.
85		Calc - silicate gneiss with rare quartz, banded hard, [illegible] fine crystalline.
90		
95		
	TD 96·0m	

PH16

COORDINATES
GRID SYSTEM
PROJECTED LEVEL
ELEVATION
MAP REFERENCE

HOLE TYPE Percussion
DEPTH 109 m
COMMENCED 24.7.81
FINISHED 25.7.81
WATER LEVEL 460 m

068

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
25		Lt. green - buff, soft - friable, with minor glauconite
30		
35		Calcareous silt, dark grey, soft friable with minor hard limestone
40		Limestone, dark brown hard and tough.
		Glauconitic sand, dark brown, fine and loose.
		Limestone, pink, hard tough with probably quartz bands.
45		Limestone, pink - red, hard - tough, becoming softer toward base.
50		Slightly weathered biotite quartz schist, buff-yellow, with quartz (milky pink coloured) veins
55		
60		Slightly weathered biotite, quartz, muscovite, feldspar, migmatite buff - cream colour, moderately hard.
		Biotite, quartz, muscovite, feldspar, migmatite, mottled buff-grey white with minor actinolite associated with quartz minor pyrite and calcite, hydrothermal alteration?
65		Quartz, biotite, amphibolite gneiss, dark grey, black with white bands of quartz and calcite, pyrite mineralisation
70		
75		Quartz, biotite amphibolite gneiss, dark grey - black, hard and tough, with pyrite, sphalerite ? actinolite galena ?
80		Biotite, amphibolite, gneiss with lesser quartz, dark grey - black, fine banding, white pyrite.
85		
90		Quartz (>50%), biotite, amphibolite gneiss, dark grey - black with white bands with abundant pyrite ? chalcopyrite ? galena ?
95		
100		Quartz (>80%), biotite, amphibolite gneiss, dark grey black with white bands with abundant pyrite ? chalcopyrite ? galena ?
105		
		Dark grey - black amphibolite with quartz bands & pyrite

TD 109 m

PH17

CO-ORDINATES
CO ORD SYSTEM
REDUCED LEVEL
INCLINATION
MAP REFERENCE

HOLE TYPE Percussion
DEPTH 120·0 m
COMMENCED 4.3.81
FINISHED 5.3.81
WATER LEVEL 4·30 m

069

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
35		Limestone, mottled pink-red colour, clean fossiliferous limestone
40		
45		Weathered gniess dark grey-black moderately hard and friable
50		Garnet, muscovite biotite, sericite gniess banded with light grey-black, brown-white tree quartz bands abundant Fe_2O_3 staining and magnetite, rare K-feldspar
55		Garnet quartz biotite schist, dark grey black with quartz bands, fine grained.
60		Quartz biotite schist, banded black and white, with rare pyrite Altered dyke ?
65		Quartz biotite muscovite sericite schist to gniess, hard and tough with rare pyrite.
70		Quartz biotite schist to gniess with Fe stained oxidised faces perpendicular to strike and very rare garnet.
75		Biotite quartz muscovite gniess banded black and white less than 25% fine quartz, hard and tough.
80		Garnet, quartz, biotite, pyrite, schist to gniess hard and tough, dark grey to black with white bands, white to green, quartzose bands with pyrite. Rare pyrite in the mafics.
85		
90		Garnet, biotite, quartz, amphibolite gniess. Dark grey-black with white bands, pyrite associated with the quartz bands and rarely associated on cleavage plane Hard and tough Greater 15% quartz less than 30%.
95		
100		Biotite, garnet, quartz schist, dark green black Quartz decreasing towards base green white vuggy quartz with pyrite rare chalcopyrite Au ? Red garnets (fine) on strike planes
105		
110		Biotite, garnet, quartz, schist as above but without chalcopyrite.
115		
120	TD 120 m	

PH 18

070

CO-ORDINATES
CO ORD SYSTEM
REDUCED LEVEL
INCLINATION
MAP REFERENCE

HOLE TYPE Percussion
DEPTH 104·0 m
COMMENCED 5·3·81
FINISHED 6·3·81
WATER LEVEL

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
25		
30		Limestone, buff-cream, moderately hard and brittle.
35		Calcareous siltstone, buff-cream, with minor limestone and calcarenite bands
40		Glauconitic silt and sand, fine and light green-grey, with red oxidised ferruginous grains
45		Dark brown clay with minor lignite and root traces ? soft and plastic with minor limestone, weathered, buff with lesser calcarenite (fossiliferous).
50		Limestone, moderately weathered, red-pink, soft & friable.
55		Gravel - coarse - very coarse, black and grey and white composed of quartz, weathered basement and fossiliferous limestone.
60		Clay (weathered basement) blue-steel grey with trace muscovite, biotite, with green and blue clay blebs
65		
70		Clay, as above, also with minor quartz (crystalline) generally less weathered.
75		
80		
85		
90		Garnet, muscovite, biotite, quartz-slate-phyllitic schist, black, very fine grained, perfectly fissile, 2 schistosity types at 90° to each other and a lineation defined by the pink-red garnets
95		
100		
105		
110		

PH19

CO-ORDINATES
CO ORD SYSTEM
REDUCED LEVEL
INCLINATION
MAP REFERENCE

HOLE TYPE Percussion
DEPTH 96.0 m
COMMENCED 2-3-81
FINISHED 3-3-81
WATER LEVEL 4.50 m

071

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
10		Calcarenite, buff-cream moderately hard and brittle fossiliferous and minor glauconite
15		
20		
25		Calcarenite, buff-cream soft and brittle glauconitic bands and minor pink-buff limestone bands
30		
35		Glauconitic marl, green-buff, fossiliferous soft and friable.
40		
45		Limestone, pink-red, hard and tough, fossiliferous.
50		Quartz biotite gneiss hard and tough, dark grey-black, slightly weathered Calc-silicate-quartz gneiss, dark green-black with alteration with pyrite, calcite, quartz and unknown green mineral → garnet or amphibolite?
55		
60		Calc-silicate-quartz gniess, dark green-black containing milky, pink and grey quartz. Minor pyrite, abundant ilmenite.
65		
70		
75		Calc-silicate-quartz gniess dark green black with quartz banding containing brown translucent bands of metaquartzite.
80		
85		Quartz biotite calc-silicate gniess hard and tough waxy lustre fine to medium grainsize. Almandine amphibolite gniess - dark brown-black very fine grained and dense. Minor quartz
90		Amphibolite gniess dark green-black with calcite, and yellow green mineral.
95		TD 96.0 m

PH20

REFERENCE

E.L. boundary
Percussion drill hole
Diamond drill hole
Theiss geophysical line
SADME geophysical line

CSR LIMITED-MD

E.L. 705 MENINGIE S.A.

LOCATION MAP
GEOPHYSICAL TRAVERSES &
DRILL HOLES

SCALE : 1:100,000	DRG.No.	
DRAWN :	I 5413-1	
DATE :		
REVISED :		

3962(I)-12

I

CSR 072

Minerals Division

CSR LIMITED
MINERALS DIVISION
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SYDNEY AUSTRALIA
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SYDNEY AUSTRALIA 2001
TELEPHONE (02) 237 5111
TELEX AA20285
CABLE 'CSRMINDIV' SYDNEY

Ref : DJC/sgl/415

June 21, 1982

The Director-General,
Department of Mines & Energy,
P.O. Box 151,
EASTWOOD S.A. 5063

Dear Sir,

E.L. 705 MENINGIE

SEVENTH QUARTERLY REPORT ON EXPLORATION

PERIOD ENDING 27TH MAY, 1982

A review and evaluation was made of exploration during the current tenancy of the lease area. The resulting assessment report, EMR 64/82, is submitted with this report.

It was concluded that exploration to date has not adequately tested the original concepts that base metal concentrations might be associated with: (1) coincident magnetic and gravity anomalies, or (2) pyritic strata of the Kanmantoo Group sediments.

Difficulty in meeting expenditure commitments for the YE 27.8.82 is anticipated. This stems from transfer of the title from the previous holder, amendments to the Mining Act and winter weather unfavourable to exploration.

Although transfer of title to CSR was dated 1.4.82?, legal delays prevented actual transfer until October, 1981. Related uncertainties delayed transfer of data and records of exploration by the previous title holder.

Partly as a consequence of the November 1981 amendments to the Mining Act as related to exempt lands and entry upon land, CSR felt it was necessary to search land ownership titles and served appropriate notices and obtain Waivers of Exemption. This is well in hand.

Wet ground in the Meningie district during the winter months will prevent (in many cases at landowners' insistance) exploration drilling and hence limit expenditure during the remaining tenure of E.L. 705.

CSR intends to apply for renewal of the licence in August 1982 and has budgetted $50,000 for the year ending March 1983.

Proposals for future work recommend identification of zones of structural disturbance, followed by ground geophysical surveys and, where warranted, drilling.

There has been no change in the prospectiveness of the lease.

A statement of expenditure for the three month period ending 27th May, 1982 is attached.

Yours faithfully,

Dr. J.H. Rattigan,
Exploration Manager

Encl.

SEVENTH QUARTERLY REPORT
ON EXPLORATION - EL 705 MENINGIE
(EXPENDITURE THREE MONTHS TO 31ST MAY 1982)

The quarterly expenditure was incurred as follows :-

Geological and Geophysical			$ 383
Logistics			
.. freight	$ 26		
.. camp services	$ 592		
.. vehicle operations	$ 23		
.. camp provisions	$ 6		
.. salaries	$2,812	$3,459	
Administration		$ 13	$3,472
TOTAL			$3,855

I

075

CSR

Minerals Division

CSR LIMITED
MINERALS DIVISION
1 O'CONNELL STREET
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BOX 483 GPO
SYDNEY AUSTRALIA 2001
TELEPHONE (02) 237 5111
TELEX AA20285
CABLE 'CSRMINDIV' SYDNEY

Ref: DGT/lmc/415

30th September, 1982.

The Director-General,
Department of Mines and Energy,
P.O. Box 151.
EASTWOOD. S.A. 5063

Dear Sir,

EL 705 MENINGIE

EIGHTH QUARTERLY REPORT ON EXPLORATION

PERIOD ENDING 27TH AUGUST, 1982.

Maloney Field Services made title searches of all major properties within the EL, excluding small (irrigation) holdings. Maps were marked up showing 117 individual ownerships. These were served with Notices of Entry and Waivers of Exemption were sought, mostly successfully.

A literature study revealed the presence of basic volcanic rocks in apparent association with Kanmantoo Group metasediments, beneath thin cover of Murray Basin sediments. It was concluded that unrecognised acidic volcanics might also be present and that the potential for volcanogenic base metal sulphide deposits should be investigated.

An application for renewal of the licence over the area covered by EL 705 was lodged and the granting of a new Exploration Licence to CSR Limited was recommended by the Director-General.

There was no change in the prospectiveness of the lease.

A Statement of Expenditure of the three month period ending 27th August, 1982, is attached. Total expenditure for the period was $12,416.

Yours faithfully,

P. G. Miller
Manager-Australian Operations

Enc.

EIGHTH QUARTERLY REPORT
ON EXPLORATION - EL 705 MENINGIE
(EXPENDITURE THREE MONTHS TO 31ST AUGUST 1982)

The quarterly expenditure was incurred as follows:-

Geological and Geophysical			$ 7,537
Logistics			
.. freight	$ 14		
.. camp services	$ 49		
.. vehicle operations	$ 226		
.. travel	$ 848		
.. salaries	$2,433	$3,570	
Administration		$1,309	$ 4,879
		TOTAL	$12,416

I

Prospect 415

077

CSR LIMITED - MINERALS DIVISION
EXPLORATION GROUP

FIRST QUARTERLY REPORT ON
EXPLORATION LICENCE 1056
MENINGIE AREA, SOUTH AUSTRALIA
FOR PERIOD ENDING 18TH JANUARY 1983

EMR 37/83

ADELAIDE
March 1983

D.G. TONKIN

COPY NO. 1

076

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KEYWORDS

SOUTH AUSTRALIA
E L 1056
MENINGIE
EXPLORATION
AEROMAGNETICS
GRANITE
BARKER
PINNAROO
STRUCTURE

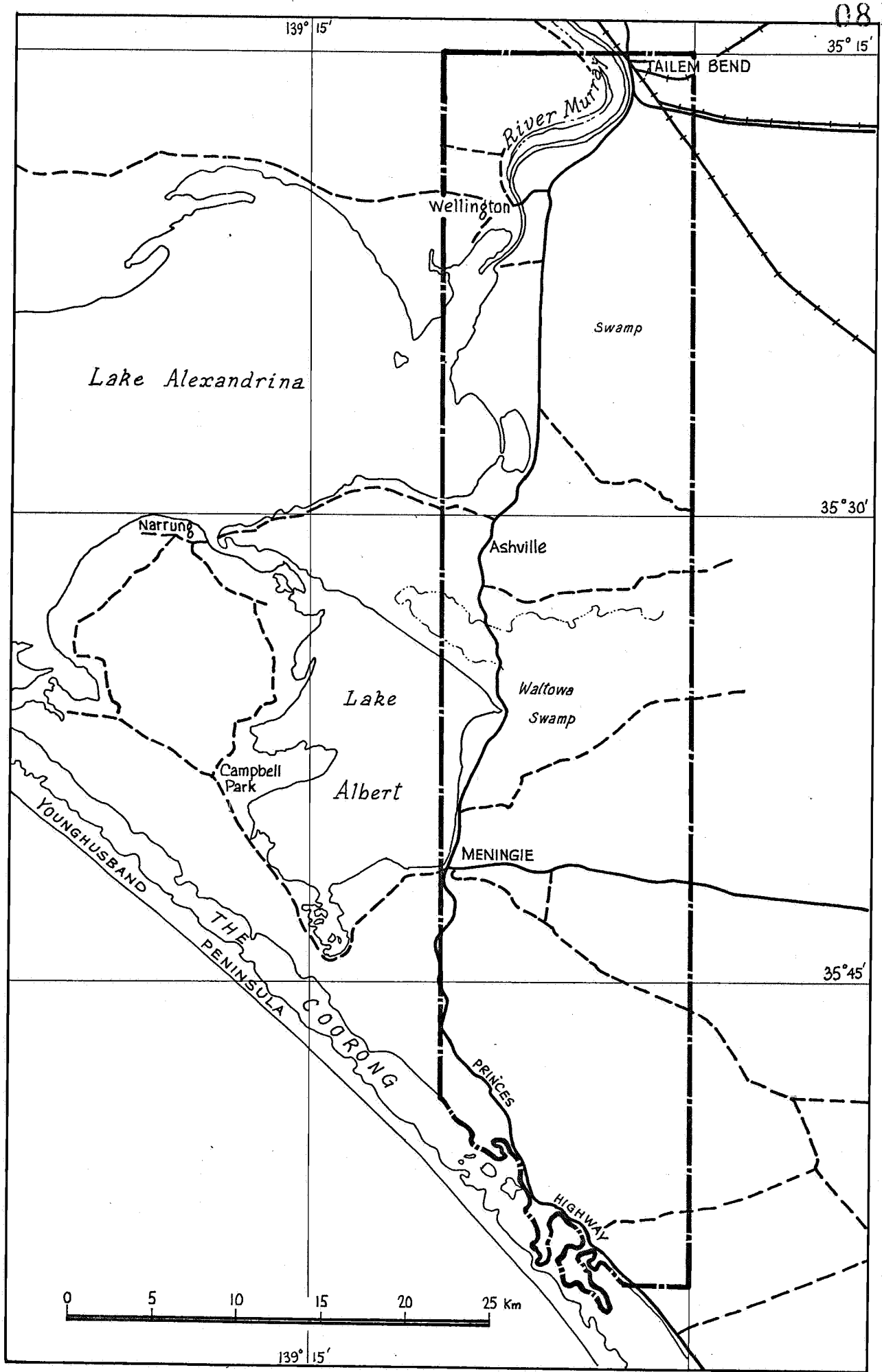

FIG. 1 E.L. 1056 MENINGIE, SOUTH AUSTRALIA

1. INTRODUCTION

This is the first quarterly report to the South Australian Department of Mines and Energy for Exploration Licence 1056. This report covers exploration during the period ending 19th January 1983.

E.L. 1056 replaces E.L. 705, the term of which expired on 27th August, 1982.

2. SUMMARY

Exploration during the quarterly period ending 19th January 1983, consisted of :-

(a) Reprocessing of BMR aeromagnetic data over an area of about 15,400 square kilometres, including E.L. 1056.

(b) Commencement of a geophysical interpretation utilising reprocessed aeromagnetic data, open file records of the SADME and company exploration files.

(c) Preparation of a depth to pre-Tertiary basement contour plan, utilising available information.

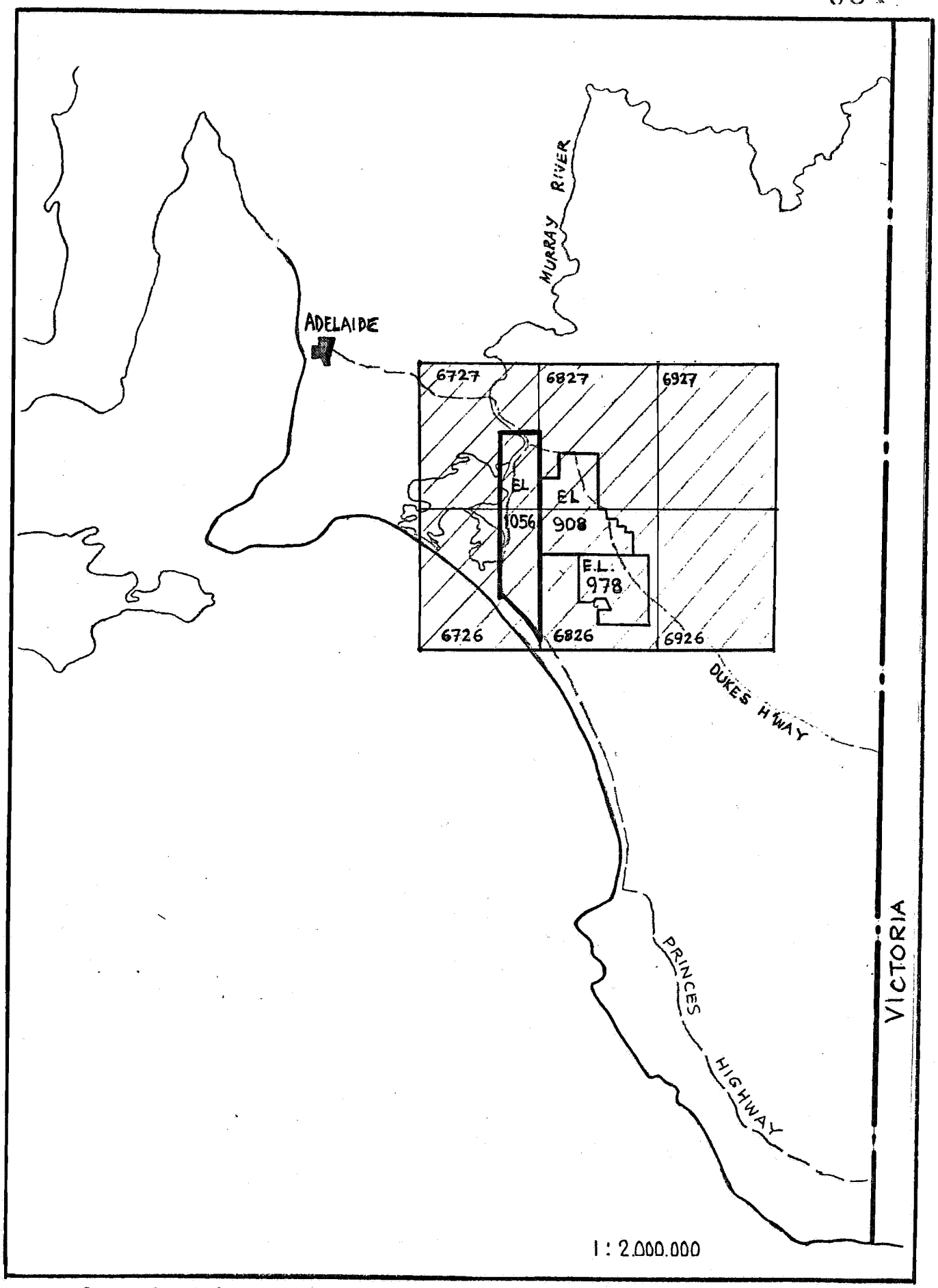

FIG. 2 AREA COVERED BY REPROCESSED AEROMAGNETIC DATA

3. GEOPHYSICS

Data tapes of aeromagnetics flown for the BMR over the Barker and Pinnaroo 1:250,000 sheets were given to Pitt Research Pty. Ltd. for reprocessing and contouring. The area that was covered is shown in Figure 2. A portion of the reprocessed contouring is shown in Figure 3.

Mr. P.R. Gidley, CSR geophysicist, is presently interpreting the high quality, reprocessed data received from Pitt and his interpretation is expected to be available during the next quarterly period.

Preliminary interpretation suggests the presence of two inferred granites in the northern part of the licence area, in addition to granites in the area already known from outcrop or drill information.

Structural dislocation of a banded amphibolite gneiss unit, which stikes northerly through the licence, is seen as producing fractured zones that could provide concentration sites for mineralisation. A major west-northwest trending magnetic lineament that crosses the central part of the licence is of particular interest (Figure 3).

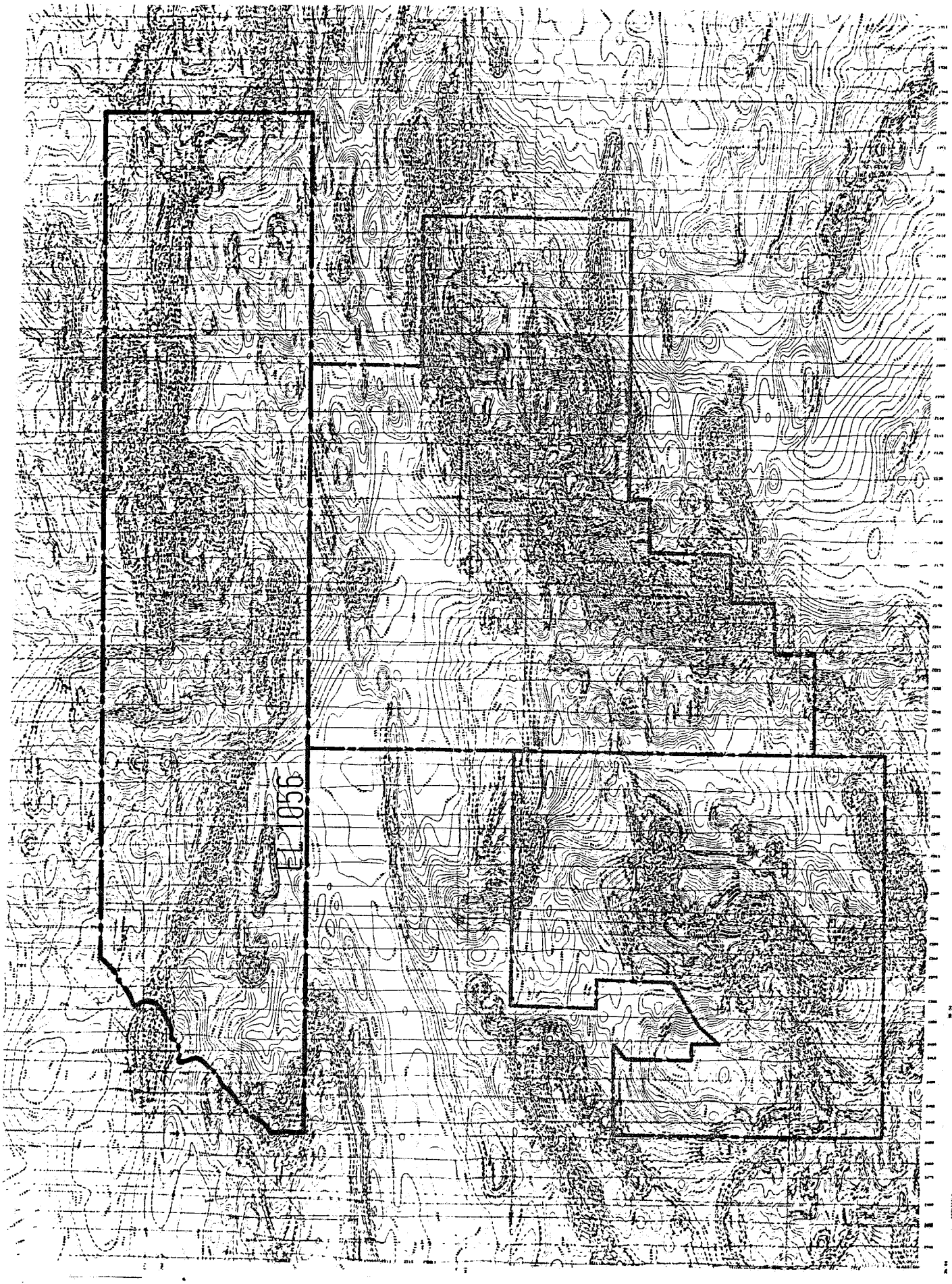

FIG. 3 TOTAL MAGNETIC INTENSITY – MT BARKER / PINNAROO AREA S.A.

4. EXPLORATION PHILOSOPHY

Because of the paucity of geological knowledge of the rocks beneath the Tertiary cover sequence, the potential of the area is hard to evaluate objectively. Specific targets, as opposed to conceptual targets, are not immediately apparent. Thus a regional approach to early exploration is indicated. CSR Limited currently hold three contiguous exploration licences in the region (Meningie E.L. 1056, Coonalpyn E.L. 978 and Yumali E.L. 908, Figure 2) and, as far as metallic mineral exploration is concerned, prefers to treat these as a block at this stage.

Data from drill holes and from interpretation of aeromagnetic results indicate that depths to the pre-Tertiary basement are less than 50 m throughout the greater proportion of the Licence (Figure 4) and hence not as difficult to prospect as might have been the case a decade ago.

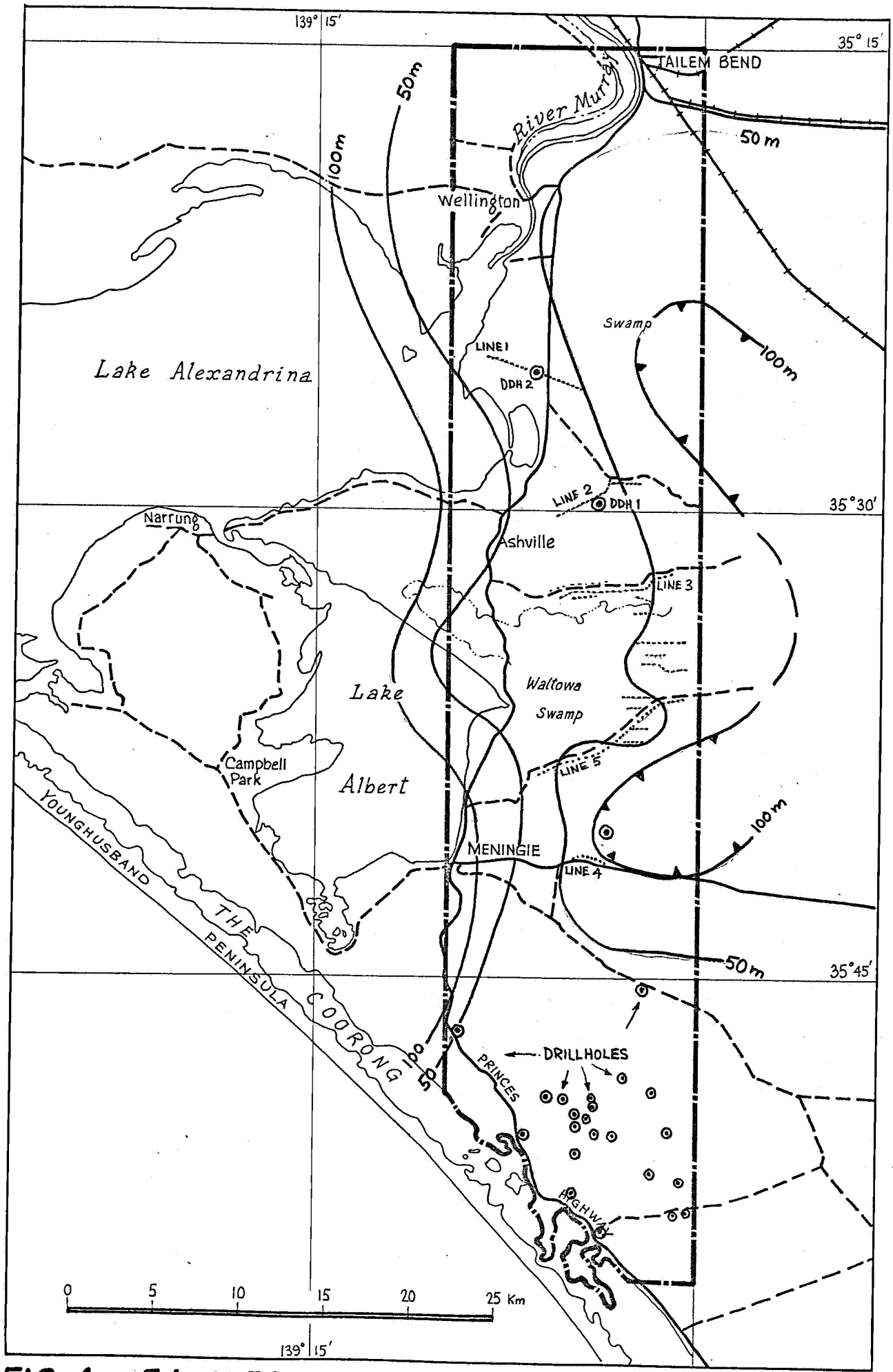

FIG. 4 E.L. 1056 MENINGIE, SOUTH AUSTRALIA
DEPTH TO BASEMENT FROM DRILL HOLE AND
MAGNETIC DATA

5. FUTURE WORK

It is proposed that a drilling programme be implemented in order to check and, if necessary, amend the aeromagnetic interpretation. This would involve a number of holes drilled on the different interpreted lithologies, particularly in areas with interpreted shallow basement.

In view of possible structural controls on any mineralisation, it is envisaged that a photogeological study, in a regional as well as local context, be undertaken in order to identify and discriminate major structural features.

Prospects 415/416

1056 908 978 ELs

Yumali (Coal Division)

090

CSR LIMITED - MINERALS DIVISION

EXPLORATION GROUP

A REVIEW WITH INTERPRETATION AND GEOLOGICAL ASSESSMENT OF THE BARKER-PINNAROO AREAS OF SOUTH AUSTRALIA

EMR 5/83

P.R. GIDLEY

SYDNEY

JANUARY 1983

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G. STOKOE	

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I5413-3	TOTAL MAGNETIC INTENSITY OF COONALPYN (6826) (REPROCESSED B.M.R. DATA)	1:100,000
I5413-4	TOTAL MAGNETIC INTENSITY OF MOBILONG (6727) (REPROCESSED B.M.R. DATA)	1:100,000
I5413-5	TOTAL MAGNETIC INTENSITY OF MOORLANDS (6827) (REPROCESSED B.M.R. DATA)	1:100,000
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I5413-9	DRILLHOLE LOCATIONS, OUTCROP AND DEPTHS TO MAGNETIC BASEMENT IN MENINGIE-YUMALI-COONALPYN AREAS	1:100,000
I5413-10	TOTAL MAGNETIC INTENSITY MAP OF AREA SURROUNDING AND INCLUDING MENINGIE-YUMALI-COONALPYN AREAS	1:250,000

KEYWORDS

SOUTH AUSTRALIA
COONALPYN
MENINGIE
YUMALI
MANNUM
BARKER
PINNAROO
SADME
GEOLOGY
GEOPHYSICS
SI54-14
SI54-13
AEROMAGNETIC
INTERPRETATION
BMR
KANMANTOO

1. INTRODUCTION

This report is written to serve as a review of available data pertaining to the 1:250,000 scale areas of Barker and Pinnaroo in the south-eastern portion of South Australia. Contained within these sheet areas are the Exploration Licences of Meningie (E.L. 1056), Coonalpyn (E.L. 978) and Yumali (E.L. 908) which are currently all held by CSR Limited.

Water bore and company drillhole data was reviewed and is described. This information plus the reprocessing of Bureau of Mineral Resources aeromagnetic data enabled a reasonable depth to basement map and interpretation of subsurface geology to be presented. Recommendations for further exploration are given.

1.1 Tenement Details

This report deals only with E.L. 1056 (Meningie), E.L. 908 (Yumali) and E.L. 978 (Coonalpyn).

E.L. 1056 Meningie

This tenement was granted as E.L. 401 in the Meningie area to Thiess Bros. Pty. Ltd. for a period of 12 months commencing 7 June, 1978. A 12 month extension was granted in June, 1979 with the licence being renewed as E.L. 705 in August, 1980 and again extended in August, 1981.

The area was transferred in title to CSR Limited, Minerals Division which became effective in April, 1981. The area was again renewed for 12 months in August, 1982 under E.L. 1056. The Meningie area covers 1,303 km^2 of ground and is located 120 kilometres south-east of Adelaide (see Figure 1).

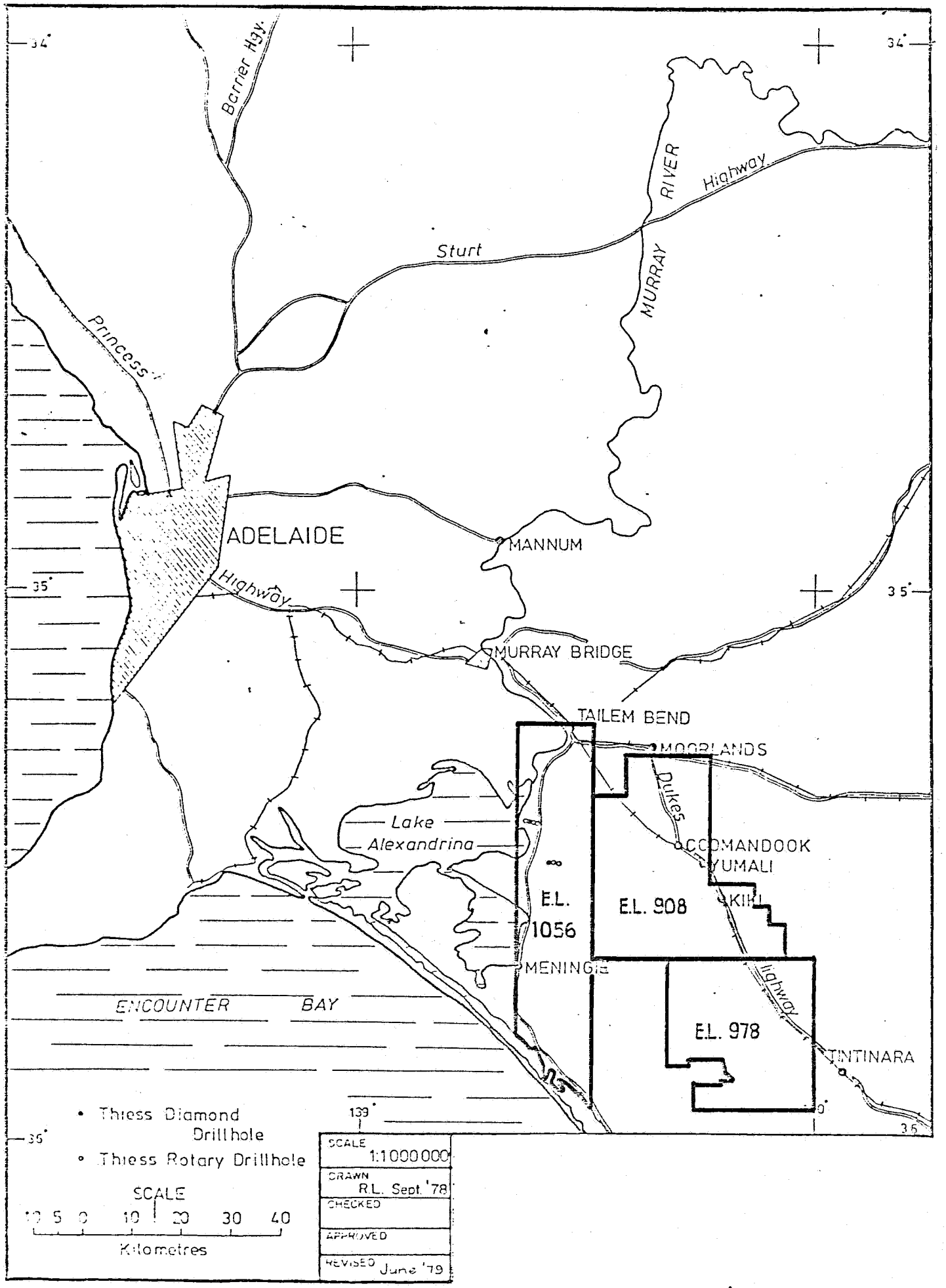

FIG. 1 LOCALITY MAP E.L's. 1056 MENINGIE, 908 YUMALI AND 978 COONALPYN SOUTH AUSTRALIA

E.L. 978 Coonalpyn

This area was applied for by CSR Limited, Minerals Division on 14 January, 1982 and was finally granted for 12 months on 29 March, 1982. The tenement covers an area of 647 km^2 and was originally granted for commodities of molybdenum/wolfram. The tenement is located east of the Meningie tenement and is shown in Figure 1.

E.L. 908 Yumali

This area was originally granted to Thiess Bros. Pty. Limited as E.L. 403 on 7 June, 1978 for a 12 month period. The tenement covers an area of 598 km^2. E.L. 403 was extended until 20 June, 1980 and renewed again as E.L. 707 for a term of one year for the period ending 26 August, 1981.

An area of 372 km^2 to the west adjoining E.L. 707 was relinquished by CRA Exploration on 6 July, 1981. CSR Limited, Energy Division applied for the relinquished area to be combined with E.L. 707. The combined licences were granted to CSR Limited (Coal Division) as E.L. 908 Yumali on 19 October, 1981 with a total area of 970 km^2. The tenement is approximately 130 km southeast of Adelaide in the Moorlands-Yumali-Coonalpyn area and is shown in Figure 1.

2. SUMMARY

A review of company and publically available data relating to the Barker-Pinnaroo 1:250,000 sheet areas and tenements of Meningie (E.L. 1056), Yumali (E.L. 908) and Coonalpyn (E.L. 978) are presented in this report. Also presented is 1:250,000 and 1:100,000 scale maps of reprocessed Bureau of Mineral Resources aeromagnetic data.

The reprocessed geophysical data plus drillhole and outcrop information have been employed in the presentation of a depth to magnetic basement and interpretive map which describes the prominent geological features of the area.

A number of areas of Lower Cambrian metasediments have been intruded by Ordovician Delamerian Orogeny granites. Also evident are areas of diorites, amphibolites, basic extrusives and andesites of presumed Ordovician age. Some evidence presented suggests some volcanic basic rocks in the area equate with the Truro Volcanics to the north. It is therefore possible Proterozoic rock units exist at relatively shallow depths (less than 200 m) in the vicinity of these rock equivalents.

Some anomalous intersections of copper, pyrite and pyrrhotite occur at the contact between amphibolite and gneiss units and within a hornblende gneiss. Structural effects are observable within the aeromagnetics affecting an amphibolite/gneiss unit and this may present an added control on concentrations of mineralisation.

The tenement areas have potential for base metal mineralisation in the following environments:-

- the magnetite rich banded amphibolite/gneiss unit where structural control has occurred.

- some intermediate to basic volcanogenic rocks.

- some areas of calc-silicate rocks in the vicinity of intruded granites offering skarn-type mineralisation potential.

- shallow Proterozoic rock units flanking the Murray Basin.

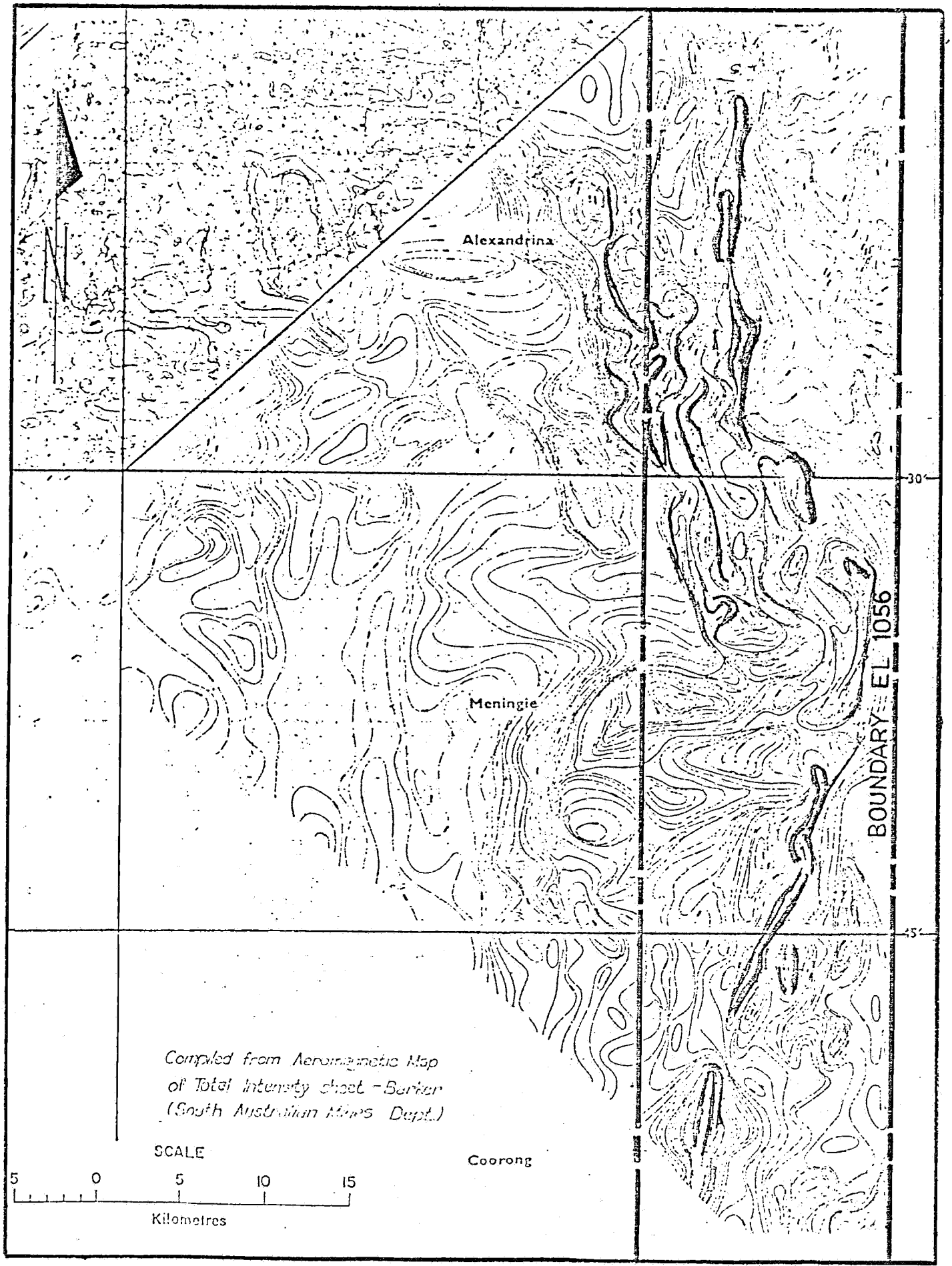

FIG. 2 BARKER AEROMAGNETIC MAP OF PART E.L. 1056 MENINGIE S.AUST.

3. EXPLORATION PHILOSOPHY

3.1 E.L. 1056 Meningie

This area was originally acquired to investigate a number of regional aeromagnetic anomalies (see Figure 2) with coincident gravity highs occurring within the Kanmantoo Group metasediments for associated base metal mineralisation. It was suggested that the high magnetic responses observed in the 1957 BMR Barker 1:250,000 aeromagnetic data may have a source containing the Nairne Pyrite Member (Dredge, 1978). This unit contains the recently working mines of Kanmantoo Copper Mine and Nairne Pyrite Mine to the north. Minor intersections of sulphides were also observed within water bores in the Meningie area which intersected metasediment rocks.

Recent (1978 to 1981) Thiess Bros. Pty. Ltd. drilling has evidenced intense metamorphism among some units over which high magnetic responses are observed. This unit was found to be a banded amphibolite/gneiss and some anomalous copper was observed within some parts of the unit. It was suggested that structural control applied to the amphibolite may provide suitable loci for massive sulphide mineralisation (Stokoe, 1982). Additionally acid intrusives near a structurally controlled area of amphibolite would enhance prospectivity.

3.2 E.L. 908 Yumali

Two intense coincident aeromagnetic and gravity anomalies occur in the Ki Ki and Coomandook areas which form part of a major band which extends north around the western margin of the Murray Basin (see Figures 3 and 4). A report by Dredge (1979c) suggests the

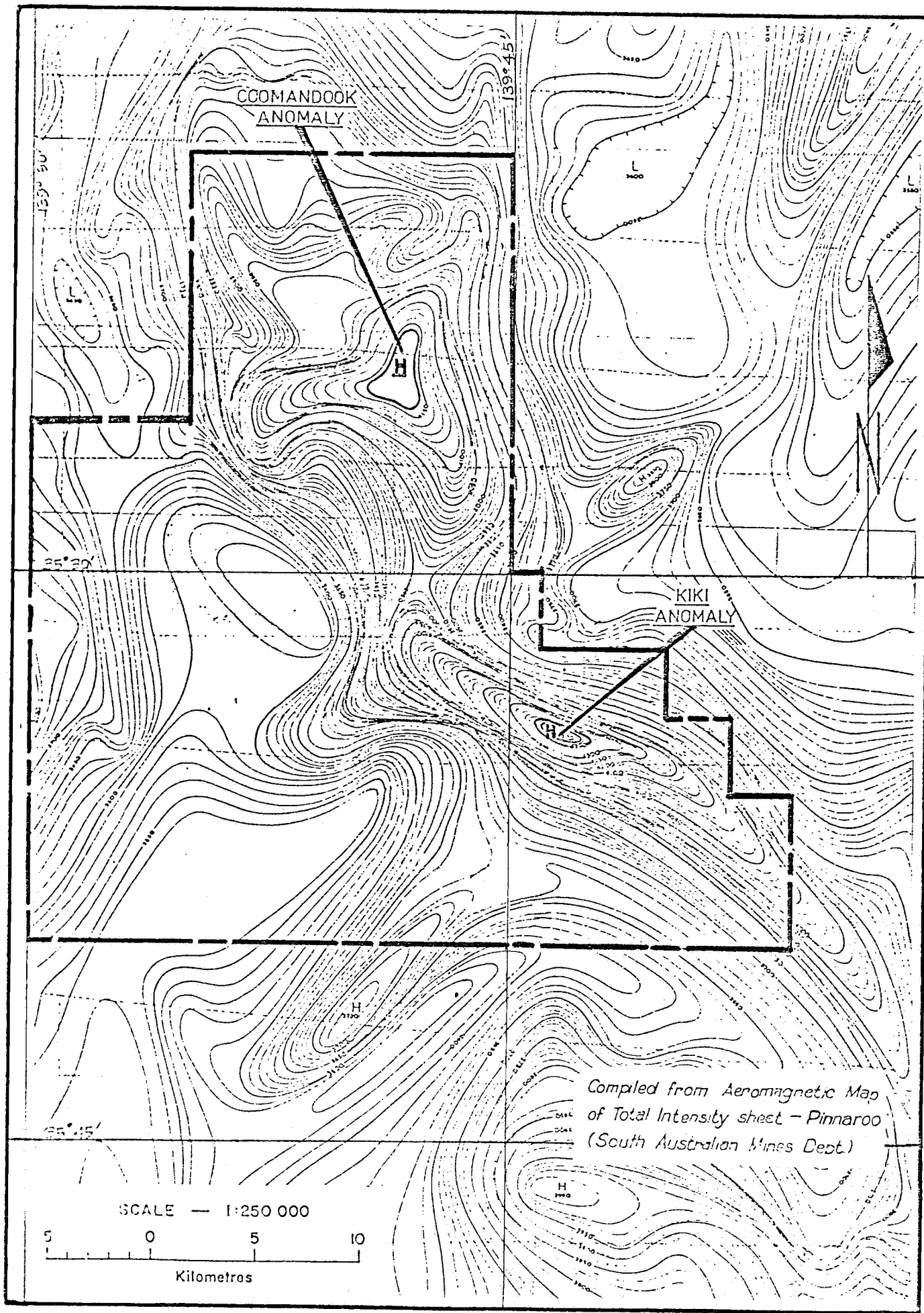

FIG. 3 PINNAROO AEROMAGNETIC MAP - E.L. 908 TUMALI, S.AUST.

coincident magnetic and gravity anomalies may be due to the following sources:-

(a) A geological unit similar to that containing the Nairne Pyrite Member.

(b) Mineralisation in the Kanmantoo Group metasediments.

(c) Basic dykes or sills within or intruding the Kanmantoo Group metasediments.

(d) Mineralised dykes in the Kanmantoo Group metasediments.

(e) The Coomandook anomaly could reflect a large basic intrusive.

Exploration to 1980 confirmed that the intense coincident anomalies reflect a suite of rocks ranging from extrusive basalts to basaltic andesites and andesitic tuffs to diorite/gabbros containing trace amounts of pyrite and magnetite.

Drilling undertaken during February, 1981 in the northern part of the E.L. outlined prospective areas for brown coal exploration. Based on the results of this exploration, a programme of rotary and chip holes was undertaken in June, 1981 and the Yarrawonga Prospect was outlined.

3.3 E.L. 978 Coonalpyn

This area lies on the south-western margin of the Murray Basin around which such granite intrusions as Anabama Hill and Tintinara (Padthaway Ridge) contain molybdenite/wolframite mineralisation. The area

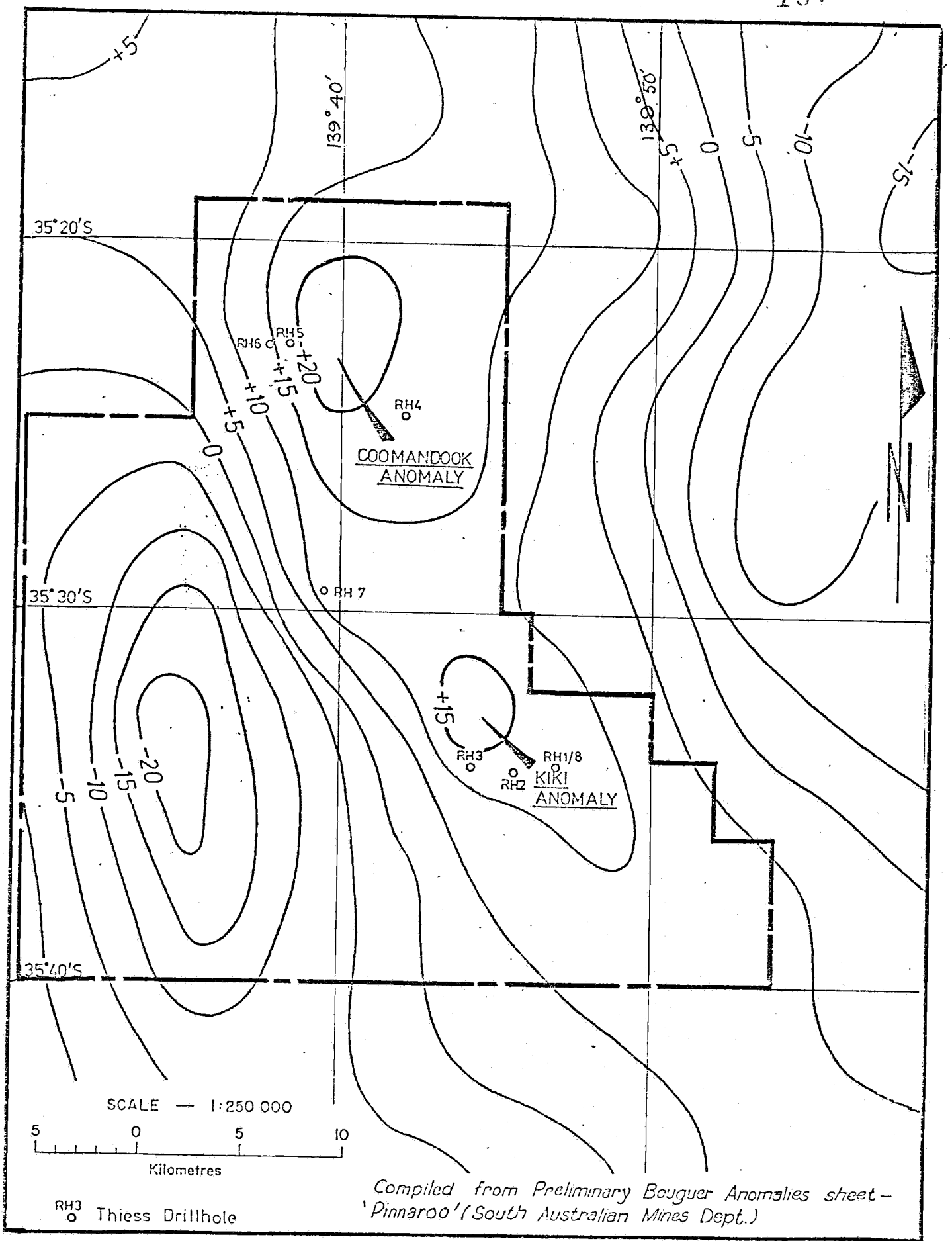

FIG. 4 BOUGUER GRAVITY MAP E.L. 908 YUMALI, S.A

contains both outcrop and geophysical aeromagnetic evidence as to the presence of intrusives adjacent to metasediments of suspected Kanmantoo Group equivalent rocks. The potential for porphyry molybdenum/bismuth within these known high fluorine intrusives is regarded as high.

4. REGIONAL GEOLOGY AND STRATIGRAPHY

4.1 General Comments

The surface and subsurface geology of the Meningie, Coonalpyn and Yumali areas have been interpreteted on a regional scale using aeromagnetic data, gravity, water bore, company drilling and mapped outcrop information. A list of available water bore and company drill information is attached in Appendix 1. In most cases, only water bores which intersect interpreted basement have been listed. In some instances basement interpretation are suspect due to the variable nature of driller's expertise in adequately describing lithologies.

A map of drill hole locations and available geological data including summary logs is presented as Drawing No. I5413-9. The lithologies, thicknesses and stratigraphic relationships of the various rock units are summarised in Tables 1 and 2.

4.2 Cambrian

The oldest evident rocks in the region are those of the Kanmantoo Group. These rocks were deposited in the Middle Cambrian in and along a sea floor depression known as the Kanmantoo Trough which rapidly filled with a thick sequence of greywacke-type clastics. Following metamorphism of the rocks during the Ordovician Delamerian Orogeny the main lithologies recorded are of low to medium grade metasediments consisting dominantly of quartz-feldspar-mica, and hornblende schists, meta-siltstones, quartzites and muscovite, biotite and chlorite slates. Gneiss, carbonates and some basic igneous rocks have also been recorded in drillholes. Also contained within these rocks are amphibolites as

TABLE 1

SUMMARY OF PALAEOZOIC STRATIGRAPHY (MENINGIE-YUMALI-COONALPYN AREAS)

AGE	STRATIGRAPHIC UNIT	LITHOLOGY	REMARKS
EARLY PALAEOZOIC	Cambrian Kanmantoo Group	Low grade metasediments consisting dominantly of quartz-feldspar biotite schists, sericite schists, slate, meta siltstones and quartzite, minor gneiss and carbonate.	Forms metamorphic basement of major part of south-west Murray Basin.
	Ordovician Murray Bridge Granite Suite, Victor Harbour and Cape Willoughby Granites and asociated diorite - basic plutonic rocks, amphibolite/gneiss units and basic-intermediate volcanics.	Includes granites, diorites - basic plutonic rocks. Amphibolite/gneiss units and basalts, basaltic andesites and andesitic tuffs.	Intruded into Kanmantoo Group during Delamerian Orogeny.
		UNCONFORMITY	
LATE PALAEOZOIC	Early Permian un-named unit	Blue-grey and greenish-grey clay fragments of slate and granite.	Occur along western edge of the Padthaway Ridge. Inferred to fill glacial depressions incised into Victor Harbour and Cape Willoughby Granites.

evidenced near Tailem Bend (Nichol, 1977) and in recent company drilling. The amphibolites in part have high (10-20%) magnetite concentrations and as such produce very high magnetic responses as observed in the Meningie tenement area.

It should be noted that within the areas under discussion the oldest rocks evidenced are those of the Middle Cambrian Kanmantoo Group. However, to the north, in the Adelaide 1:250,000 sheet area the Kanmantoo Group rocks are known (Thompson, 1969) to be contained east and west by Lower Cambrian rocks outcropping near Truro (the Truro Volcanics) and the Heatherdale Shale equivalent bounded to the east by the Palmer Fault Zone. This closure of Kanmantoo Group rocks infers the likelihood of Lower Cambrian and Proterozoic rocks to be present within the Yumali/ Coonalpyn tenement areas if the Kanmantoo Trough continued south and southeast as is evidenced by bore and drillhole information.

4.3 Ordovician

The Late Cambrian onset of the Delamerian Orogeny ceased deposition of the Kanmantoo Group rocks and resulted in folding, faulting and metamorphism of the Kanmantoo sediments. The orogeny ended in Early Ordovician time with some local acid volcanic extrusion and granitic intrusion along a belt from Mannum to Padthaway - termed the Padthaway Ridge (Rochow, 1971).

The intruded granites are generally biotite-poor, fluorite-bearing leucogranite or biotite-hornblende granite. Some evidence of contact metamorphism between these granites and the metasediments is seen in bore holes (Rogers, 1979).

Near Tailem Bend township, outcropping and geophysically inferred granites are considered to belong to the Murray Bridge Granite Suite which extends from north of Mannum to Tintinara in the south-east. These granites have moderate magnetic responses although some differentiates with lower magnetic susceptibility are also present.

Southwest from the Murray Bridge Granite Suite occur the Victor Harbour and Cape Willoughby Granites. These intrusives are mainly porphyritic and coarse grained adamellites. It has been suggested (Dredge, 1980a) that these intrusives extend west forming sub-surface basement below Lakes Alexandrina and Albert. Recent BMR aeromagnetic data does not wholly support this idea but rather evidences a number of intrusives north of Meningie and without surface exposure.

4.4 Permian

Suspected tillites of Permian age have been intersected in various water and exploratory bores and have been correlated with the Early Permian Cape Jervis Beds (Ludbrook, 1961) of the Fleurieu Peninsula. Some oil exploration drilling has also intersected thick (>550 m) sequences of Permian rocks identified by foraminifera (Ludbrook, 1965). It is suspected (Rogers, 1979, Dredge, 1979c) that the Permian deposits fill glacial depressions incised into the Victor Harbour and Cape Willoughby Granite basement. The glaciers believed to have created the valleys are thought to have moved in a northwesterly direction, from the presence of porphyritic rhyolite erratics in Permian deposits near Kangarilla and Finniss River areas.

TABLE 2 - SUMMARY OF TERTIARY STRATIGRAPHY (MENINGIE-YUMALI-COONALPYN AREAS)

AGE	STRATIGRAPHIC UNIT AND SYMBOL	LITHOLOGY	THICKNESS (m)	REMARKS
Late Pliocene	Norwest Bend Formation (Tpn)	Fossiliferous calcareous quartz sandstones and sandy limestones.	<3	Estuarine equivalent of Parilla Sand. Limited outcrops in Elwomple area.
	Parilla Sand (Tpp)	Pale yellow-brown fine to medium quartz sands.	>16 (Parilla silo bore)	Standard subsurface section in Parilla silo bore (7027-511) (Firman, 1963).
Early Pliocene	Loxton Sands (Tpl)	Fluvial facies. Yellow-brown and red-brown fine to very coarse micaceous quartz sands and gravels.	10-65	Fluvial facies seen in quarries north of Karoonda.
		Coastal facies. Purplish brown medium to coarse calcareous shelly quartz sandstones.	35-40?	Coastal facies exposed on Marmon Jabuk Range and ridges in Karoonda area.
Early Pliocene to ?late Miocene	Bookpurnong Beds (Tpb)	Dark green-grey fossiliferous glauconitic sandy clays, black silty clays; pale grey fine quartz sands.	2-18	
		DISCONFORMITY		
Early to Middle Miocene	Pata Limestone and Morgan Limestone (Tmm). Mannum Formation (Tmu).	White to grey bryozoal limestone, clayey or sandy in places.	25-140	Generally absent south of the Mormon Jabuk Scarp.
Latest Eocene to Middle Miocene	Gambier Limestone equivalents (Tmg)	White bryozoal limestones; yellow-brown shelly algal limestones with granitic fragments.		Overlies granite near 'Cold and Wet' HS.
	Ettrick Formation (Toe).	Grey-green glauconitic and carbonaceous calcareous clays; grey limonitic fossiliferous sandy clays.	10-55	Standard subsurface section in Launer's No. 2 bore (6827-1457) (Ludbrook, 1961).
	Compton Conglomerate equivalents (Toc)	Yellow-grey sandy calcareous clay; greenish grey fossiliferous calcareous sandstones.		
		DISCONFORMITY		
Late Eocene to ?Middle Oligocene	Buccleuch Beds (Teb)	Grey-brown carbonaceous clays; carbonaceous sands with thin limestone beds; bryozoal limestones pasing down to glauconitic calcareous clays.	20-80	Standard subsurface section in Coonalpyn township bore (Ludbrook, 1957).
Middle Paleocene to ?Late Eocene	Renmark Beds (Tp-er)	Grey carbonaceous pyritic medium to coarse loose sands with layers of carbonaceous clay and sandy clay.	30-150	Moorlands Lignite Member developed in upper part of Renmark Beds near Moorlands.

AFTER ROGERS (1970)

4.5 Tertiary

The Tertiary sequence in the Barker/Pinnaroo areas of the western Murray Basin consist of marine and freshwater sediments lying above concealed basement.

Over most of Pinnaroo, the Paleocene-Eocene Renmark Beds were deposited in a fluviatile-lacustrine environment, except over the Padthaway Ridge. Within this unit the Moorlands Lignite Member was developed in the north of Yumali.

Overlying the Renmark Beds are the marine Buccleuch Beds which appear to interbed in part. Disconformably overlying the Buccleuch Beds are the Oligocene marine Ettrick Formation rocks and its equivalents. The marine transgression which resulted in this formation was widespread and extended over much of the Padthaway Ridge.

Marine deposition continued into Early and Middle Miocene time with the formation of the bryozoal limestones of the Pata Limestone, Morgan Limestone and Mannum Formation (Ludbrook, 1957). These units have been completely removed south of the Marmon Jabuk Scarp by Pleistocene marine erosion (O'Driscoll, 1960).

4.6 Quaternary

The Meningie-Yumali-Coonalpyn areas are largely covered with a thin veneer of Quaternary material including palaeosols and aeolian dune deposits. Over much of Yumali and Coonalpyn E.L. areas occurs a composite concrete profile of "Bakara Calcrete". This material consists of a pinkish-brown fine to coarse shelly quartz calcarenite of stranded coastal dune and beach deposits. In some areas the hard sheet calcrete

contains clasts of older carbonates, overlain by and reworked into weaker, blocky and nodular "Balkara Calcrete".

A more detailed account of stratigraphy of the Meningie, Yumali and Coonalpyn areas may be found in Ludbrook (1957, 1961), Rogers (1979), O'Driscoll (1960) and Dredge (1979c).

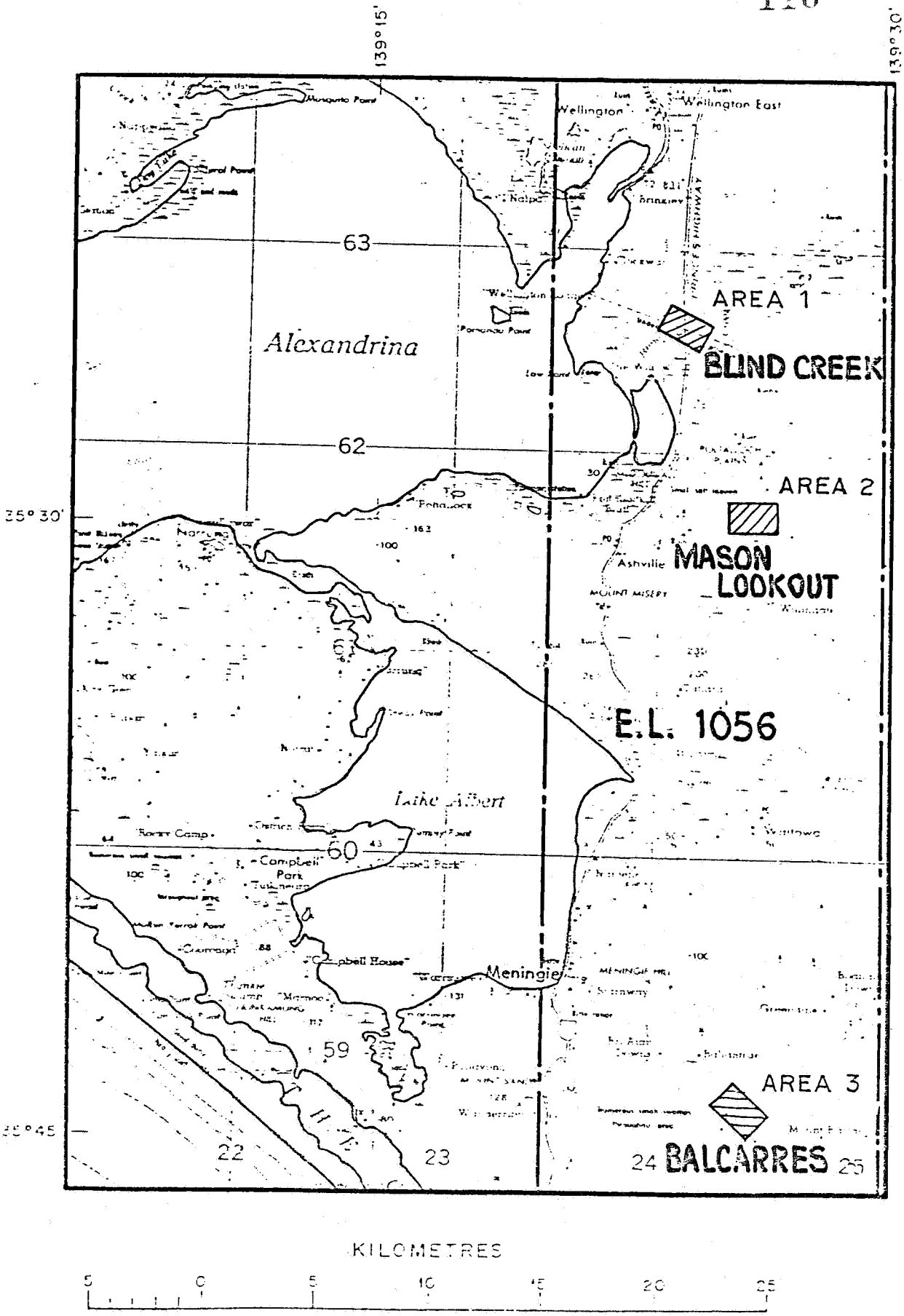

FIG. 5 LOCATION MAP- AREAS 1, 2 and 3
E.L. 1056 MENINGIE SOUTH AUST.

5. WORK UNDERTAKEN AND RESULTS

5.1 General Comments

Within the Meningie, Yumali and Coonalpyn areas considerable exploratory and investigative work has been undertaken by public (water drilling), private and government agencies. Within the Reference Section (8) are listed reports and reference material describing work in the tenements and surrounding areas.

Specific exploration within the tenement areas to date is summarised below.

5.2 E.L. 1056 Meningie

Meningie E.L. exploration was directed initially at three aeromagnetic anomalies defined by Bureau of Mineral Resources and South Australian Department of Mines and Energy (SADME) surveys undertaken over the Barker and Pinnaroo 1:250,000 sheets in 1957. During 1977/78 investigations by B. Taylor of SADME (Taylor, 1978) using ground magnetics, gravity and induced polarisation techniques designated three prospect areas. These areas called Blind Creek, Mason Lookout and Balcarres Prospect are shown in Figure 5.

Five percussion holes and two diamond drillholes were drilled on the Blind Creek and Mason lookout Prospects in early 1979 (Dredge, 1979d). In all holes metasediments were intersected beneath the Oligocene Ettrick Formation, however, the diamond drillholes cored into thick sequences of banded amphibolites and leucocratic gneisses. Importantly, the petrology on the recovered core samples (Pontifex, 1979 in Dredge, 1979b) indicate the amphibolites and gneisses are metamorphosed primary differentiates of either a

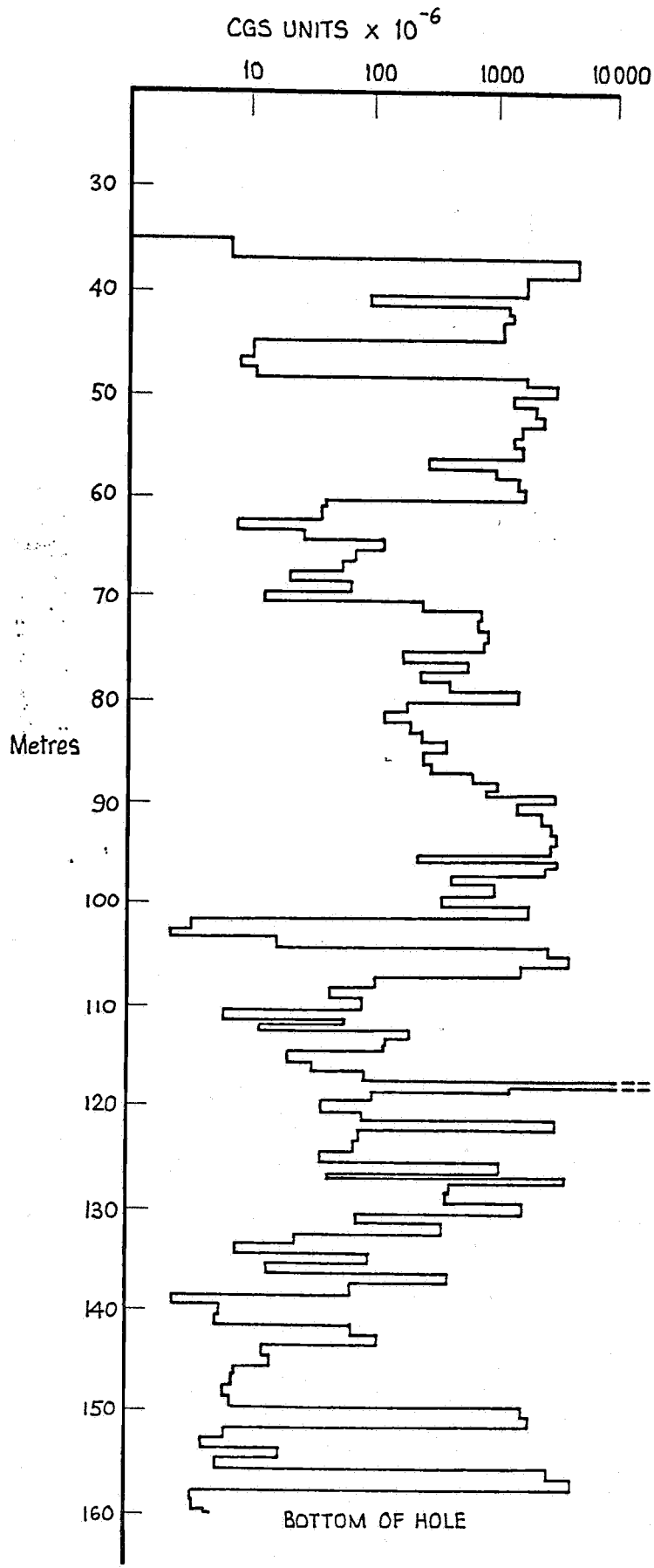

FIG. 6 MAGNETIC SUSCEPTIBILITY LOG DDH-1
E.L. 1056 MENINGIE S.AUST.

quartz-dolerite to mafic diorite magma or a basic magma with quartz and soda introduced during metamorphism.

Within the intersected amphibolites, pyrite, pyrrhotite, chalcopyrite and up to 20% magnetite were detected. In consequence, magnetic susceptibilities of the amphibolites and in part, the gneisses are moderate to high as shown on the magnetic susceptibility log (see Figure 6).

Geochemical assaying of DDH1 at one to two metre intervals for Cu, Pb and Zn was made (Dredge, 1979b). Average values for Cu and Zn were substantially higher in the amphibolites (68 ppm Cu, 45 ppm Zn) than in the gneisses (14 ppm Cu, 18 ppm Zn). The best copper intersections, however, (2.4 m @ 0.078%, 1 m @ 0.082%) were in the gneisses. Lead values were uniformly low.

Some scapolite-bearing rocks were located in PH12 which are associated with sulphide-rick rocks and are considered as a correlative of the Nairne Pyrite/ Talisker calc-silicate horizon. The dominant sulphide is up to 50-60% pyrite in company with sphalerite and pyrrhotite.

Between September and October 1979 a resistivity and a ground magnetics survey were undertaken at five locations between Blind Creek and Balcarres by Murdoch Geophysics Pty. Ltd. (Dredge, 1979d). The electrical techniques employed were not successful in locating loci of mineralisation. The saline nature of the Quaternary and Cainozoic cover rocks is such as to make electrical techniques inconclusive in their results due to current channelling in the highly conductive near surface layers.

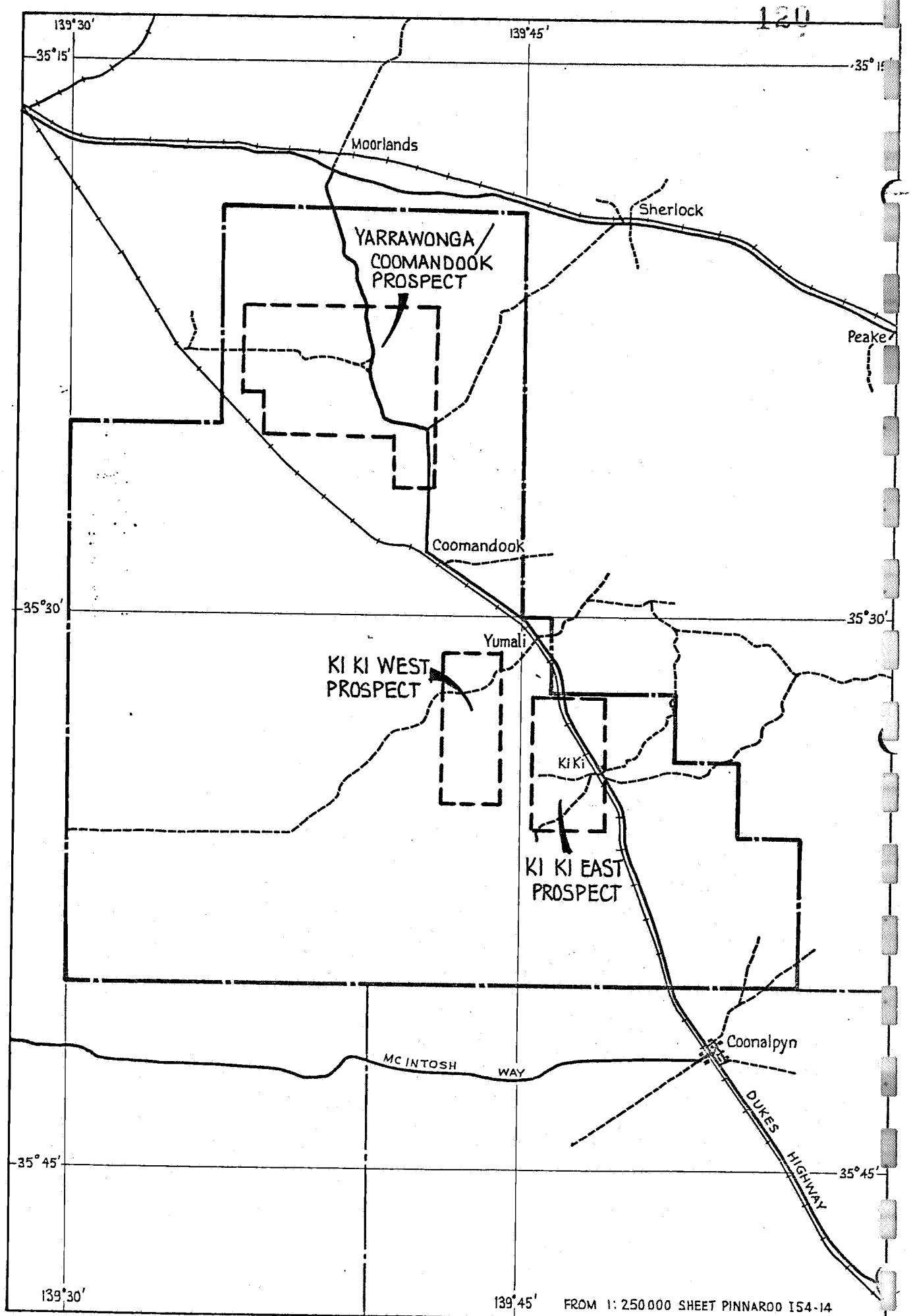

FIG. 7 E.L. 908 YUMALI SOUTH AUSTRALIA
SHOWING KI KI & YARRAWONGA/COOMANDOOK PROSPECTS

Eleven ground magnetic traverses were carried out in October 1980 to trace the interpreted correlative of the Nairne Pyrite/Talisker calc-silicate horizon intersected in PH12. Following this work six rotary percussion holes were drilled with PH15, PH16 and PH20 intersecting the interpreted calc-silicate horizon. PH17 intersected a pyritiferous amphibolite gneiss with hydrothermal (?) actinolite, calcite and pyrite in the uphole Kanmantoo Group schists (Stokoe, 1982). PH18 intersected a banded sequence of garnet schists with minor amphibolite and garnet schists.

Anomalous values of Cu and Zn were recorded in garnet schists in PH18, the best Cu intersections being 14 m @ 0.04% (90 m to 104 m), including 2 m @ 0.07% (100 to 102 m). High copper values were also observed in PH17 amphibolite.

5.3 E.L. 908 Yumali

Early exploration was directed at defining the coincident gravity and magnetic anomalies associated with the basement rocks within the area and to do this approximately 70 line kilometres of ground magnetic and gravity survey work was carried out in August-September, 1978. Interpretation of these results suggested magnetic banded rocks at a source depth of less than 200 metres. Follow-up magnetics and resistivity survey work was undertaken by Murdoch Geophysics Pty. Ltd. in January, 1980 and from this data eight rotary percussion holes were drilled.

The drilling was undertaken at two prospects, Ki Ki and Coomandook as shown on Figure 7. Results from drilling at Ki Ki within hole RH2 located a magnetite rich (5%) quartz-microdiorite at 185.0 m while RH3 intersected a porphyritic basalt with minor magnetite

HOLE	AMG EASTING	AMG NORTHING	TOTAL DEPTH (m)	REMARKS
805x	406350E	6036150N	Cullurra	Lignite @ 83.0 m.
817x	395800E	6034750N	Cullurra	Lignite @ 82.7 m.

TABLE 3 - EXPLORATION LICENCE 908 - YUMALI - BEDROCK GEOCHEMISTRY

Hole No.	Sample Interval (metres)	Cu (2)	Pb (2)	Zn (2)	Ni (5)	Cr (10)	Ba (200)	Co (5)	Mn (10)	Ni (5)	V (10)	Cr (20)	Mo (3)	W (50)	La (50)	Y (10)	Ag (0.1)	As (50)	Bi (1)	Sb (30)	Cd (3)	Rock Type
RH2	182-184	60	25	110	20	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Quartz microdiorite
	184-186	75	20	100	30	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" "
	186-188	35	15	65	20	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" "
	188-189	30	10	75	15	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" "
RH3	178-180	40	15	65	240	160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Weakly porphyritic basalt
	180-181	65	20	65	210	185	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" " "
	181-182	60	15	60	210	175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" " "
	182-183	40	15	55	190	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" " "
	183-184	70	10	45	95	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" " "
RH4	80-81	35	10	80	130	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Tuff
	81-82	35	10	90	150	110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	"
	124-125	10	10	60	35	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Basaltic andesite-tuff
	125-126	20	10	60	40	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" " "
	126-127	60	10	50	35	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" " "
	127-128	20	10	65	40	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" " "
	128-129	30	10	90	55	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" " "
	129-130	65	15	90	60	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" " "
RH5	61-62	10	10	50	165	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Hornblende Diorite
	64-66	60	10	135	70	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" "
	70-72	70	25	95	45	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" "
	86-87	25	15	60	50	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Hornblende-diorite/gabbro
	87-88	30	10	75	60	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" "
	88-89	30	10	60	50	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" "
	89-90	60	10	75	60	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" "
	90-91	35	15	75	45	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	" "
RH7	138-143	35	<5	75	-	-	200	50	1000	30	200	30	x	x	50	50	0.3	x	x	x	x	Basic volcanic and/or gabbro
RH8	176-181	35	<5	50	-	-	600	80	500	150	250	30	x	x	x	50	0.3	x	x	x	x	Basalt

Method of Analysis, A.A.S.

Method of Analysis, Emmission Spectrography

Results in ppm

Detection limits in brackets

x not detected

- Analysis not undertaken

after Dredge (1979c)

and pyrite. The diorite is considered to intrude the volcanics (of RH3 and RH4) and the hornblende diorite gabbro (of RH5) is thought (Dredge, 1979c) to be a hybrid or reaction gabbro, formed by an introduced diorite and contaminated with a more basic gabbro or basaltic rock.

Holes RH4, 5, 6 and 7 were drilled at Coomandook and intersected a hornblende diorite (RH5 @ 61.0 m) and a hornblende diorite/gabbro (RH5 @ 76.0 m). Hole RH7 intersected a highly altered porphyritic basic volcanic and/or gabbro at 137.0 m depth.

Petrological examination of basement chip rocks from holes RH2, RH3, RH4, RH5, RH7 and RH8 indicate that drilling intersected rocks ranging in composition from basalt-basaltic andesite and andesite type to hornblende diorite/gabbro. Importantly, Dredge (1979c) suggests the volcanics may be equated to the (Adelaide 1:250,000 sheet) Truro volcanics based on petrological assessment by Pontifex (in Dredge, 1979b).

No anomalous geochemical assays were received from any of the submitted samples from the drillholes. In general the basalts contained higher nickel (>200 ppm) and chromium (>160 ppm) than the diorite/gabbros (nickel <70 ppm, chronium <70 ppm). Results of the analyses and corresponding bedrock type are shown in Table 3.

Further drilling during February, 1981 in the northern portion of the Yumali tenement outlined prospective areas for brown coal exploration. Within the Yarrawonga Prospect lignite was defined by chip sampling within two rotary holes. The drillholes were all geophysically logged for gamma, resistivity, neutron, long spaced and short spaced density and caliper.

5.4 E.L. 978 Coonalpyn

A review of geology and geophysical work based on available data for Meningie and Yumali areas was completed by Dredge in 1979(c). Interpretations within this work are relevant to the Coonalpyn tenement area and are described in part by Stokoe (1982).

Additionally, during 1978 the BMR surveyed the Pinnaroo (and Barker) 1:250,000 sheet areas for aeromagnetics and radiometrics. These sheets which cover all the described tenement areas were flown to replace the previously uncorrected analog data of the earlier (1957) survey (as shown in Figures 2 and 3). The reflying used digital acquisition and a line separation of 1.5 and 3.0 km. The data was collected with a data interval of 55 metres along track and at an above ground clearance of 150 metres. The collected aeromagnetic data was reprocessed in December, 1982 on behalf of CSR Limited, Minerals Division by Pitt Research Pty. Ltd. and recontoured using a 250 m x 250 m grid and a 10 Nannotesla contour interval. This data is presented at 1:100,000 scale in Drawing Nos. I5413-2 through 7 and at 1:250,000 scale in Drawing No. I5413-10.

6. REGIONAL INTERPRETATION

6.1 General Comments

An interpretation on a regional scale of the Meningie/Yumali/Coonalpyn tenement areas plus the surrounding region was undertaken using the reprocessed BMR aeromagnetic data, outcrop, water bore and company drilling information. The stratigraphic and lithologic relationships accord with those described in Section 4 and summarised in Tables 1 and 2. The interpretation is provided in Drawing No. I5413-8 and outlines the major features regionally present in the data.

6.2 Granites

A number of Ordovician granites have been outlined and inferred which occur in the region.

No distinction is provided between the granitic intrusives observed other than their general locality hence enabling definition as Murray Bridge or Victor Harbour-Cape Willoughby Suite equivalents. Radiometric dating on granites in the Mannum-Tintinara region (Murray Bridge Suite) gives an early Ordovician age of intrusion of 471 $\pm$ 12 m.y. (Webb, 1976). An earlier emplacement of the Victor Harbour-Cape Willoughby Granite Suite was radiometrically dated as 515 $\pm$ 6 m.y. (Milnes, et al., 1977).

Generally the granites observed in the Coonalpyn and southern Yumali tenements as well as those extending into the northern Meningie tenement are Murray Bridge Granite Suite rocks. Western and central Meningie E.L. granites are of the older Victor Harbour-Cape Willoughby Suite.

In the central Coonalpyn tenement it is probable a number of phases of granitic intrusion have occurred. The area shown in Drawing No. I5413-8 as G1 has a pronounced granitic aureole and is consequently distinct from areas of outcropping and intersected (water bores 322, 578) granite to the northwest (G2-G4). It is probable that relatively low magnetic susceptibility granites underly much of this region which were substantially incised by Permian or pre-Permian glacial or fluviatile erosion. The gneiss and schists intersected in water bores 222 and 230 are likely to be underlain by Ordovician granites, at least in part, and these may have been the source of the evident metamorphism.

A similar situation appears to exist to the northwest (in the northern Meningie tenement area) where granitic outcrop and bore intersections are numerous. Granite area, G3, is likely to extend under the metamorphic schists and gneisses to the east and may account for the high magnetic signature of this area. An area, G4, south of G3 is probably the result of a separate intrusive phase during Ordovician time in which a granitic aureole is again observed, similar to that of G1.

All the granites, G1-G4, constitute Murray Bridge granitic suite plutons. They appear variable in magnetic susceptibility (for example, comparing G2 and G1) and it is likely they have been intruded in a number of various phases. These granites are manifest in the observed gravity of the area producing Bouguer anomaly lows (see Figure 4).

The outcropping granites and their inferred extent to the west and southwest of the central Meningie tenement area are of the older Victor Harbour-Cape Willoughby Granitic Suite. The intrusive area, G5, is

surrounded by a small granitic aureole and is likely to extend northwards under the metasediments of M1. The granite intrusives may possibly extend over a substantial area to the south (G6) being outlined by a marked gradient along T1 in the west and a banded amphibolite unit in the east (A1). To the west of T1 a generally low magnetic signature is due to thicknesses of Permian glacial fill, however, it is probable granitic basement underlies these sediments.

6.3 Amphibolite/Gneiss Unit

Numerous drillholes (especially Thiess Bros. Pty. Ltd. holes of DDH1 and DDH2) intersect a belt of highly magnetic banded amphibolites and gneisses occurring within the Meningie tenement area. The belt trends north-south and is marked as A1, A2, A3 and A4 on Drawing No. I5413-8.

Petrological evidence shows this unit to be an intruded and dynamically metamorphosed igneous suite which was primarily differentiated (Dredge, 1979c) from a diorite-dolerite magma. The rocks are generally magnetite-rich with some assays having up to 20% content by volume.

Structural control upon the amphibolite unit is obviously of importance as is observed by the offsetting of A2 to A3 and A4 and the manner of interpreted faults in this area. The amphibolite appears to have been emplaced along north-south trending fractures and it is possible that such cross-cutting features would provide possible sites for mineralisation. It is also important to note the lineament, L1, which passes through the offsetting area of A3 and A4 and which may have significance for the structural deformation and emplacement control of the amphibolite/gneiss unit or associated mineralisation.

The northern extent of the amphibolite (A4) extends toward Mannum before intersecting a sequence of metasediments of high magnetic response which mask the amphibolite magnetic signature further to the north. Importantly, east of A4 an inferred granite (G7) may occur which would have had control on the emplacement of the amphibolite. This granite is evidenced in Thiess Bros. Pty. Ltd. rotary percussion holes R308, R310, R322, R323, R324, R325 and R326 to the east as well as the generally low magnetic signature observed in this western portion of the Yumali tenement. Granite G7 is likely to have been incised by glacial or fluviatile erosion prior infilling by Permian sedimentation (glacial) and consequently this area may represent potential for coal exploration further south than that defined at the Yarrawonga Prospect.

6.4 Metasediments

The oldest rocks recognised within the region are the metasediments equated with the Cambrian Kanmantoo Group. These rocks outcrop north and to the northeast of E.L. 1056 Meningie (M3) and north of E.L. 908 Yumali (M4). The Kanmantoo Group rocks, as known from outcrop and coincident aeromagnetic response have been cited (Dredge, 1979c) to contain zones of weak to high aeromagnetic and gravity responses. Typically the units have prominent north-south magnetic trends upon which three broad divisions depending on associated magnetic susceptibility have been made. These range from weak, through moderate to strong, and have been presented in Dredge's report (1979c).

Here seven main zones of metasediment areas are defined (M1-M7). These are:

M1 - This area lies immediately north of granite, G5 and is flanked to the east by amphibolite units, A2

and A3. The area has medium metamorphic grades as observed in Thiess Bros. Pty. Ltd. percussion holes PH4, PH6, PH7 and PH8 containing quartz-feldspar-mica schists and leucoxene gneiss. Petrological examination of cored samples (Pontifex in Dredge, 1979b) infers the sulphide, magnetite and ilmenite content of these rocks to be indigenous to the host rock. Consequently the concentrations of pyrite ± pyrrhotite and/or magnetite, plus the associated chalcopyrite, are interpreted to have formed during metamorphism.

Area M1 appears offset by a disconformity or fault to zone M2, lying immediately north. This contact is pronounced geophysically and implies some structural influence.

M2 - Area M2 appears of similar magnetic signature to that of M1 which grades into lower magnetic amplitudes in the north, possibly due to the influence of intrusive G4. The area transects lineament L1 with no apparent effect, however, the amphibolite, A4 appears to be offset by local faulting in the east of the area.

M3 - Area M3 extends M2 north of the inferred granitoids G3 and G4 and appears to contain rocks of medium to low magnetic susceptibility. These rocks outcrop in part and in general are not greater than 50 m below surface.

M4 - This area lies east of the Murray Bridge outcropping granite of G3 and is suspected to be largely underlain by it. Numerous water bore and Thiess Bros. drill holes intersect granite in this area and consequently the metasediments found in this region are thin and near surface.

M5/M6 - These two zones are separated by a fault on the southern flank of M5. Area M6 is one of

variable magnetic response and is likely to contain, in addition to the metasediments, sequences of basaltic and andesitic tuffs. Thiess percussion holes RH3, RH2 and RH8 contain respectively basalt, micro-diorite and andesite tuffs suggesting the variable rock content within this area.

Further to the north in percussion hole R1004 and hole RH7, basalts and andesites were also intersected suggesting significant and widespread volcanic activity in this area. It is likely the volcanic rocks within M5/M6 are of Truro Volcanic age as suggested previously (Dredge, 1979d). If this were the case it is implied the Kanmantoo Group metasediments to the west are equivalents to those contained in the Kanmantoo Trough to the northwest. It therefore is possible the metasediments, within the Meningie-Yumali-Coonalpyn areas are equivalents of the deposition within the Trough itself which may have extended into this region at the time (Lower to Middle Cambrian). In consequence, the areas of M5 and M6 are likely to have at relatively shallow depths, rocks of Proterozoic age which extend east forming basement to the Murray Basin. To test this hypothesis it is suggested age dating of the volcanic rocks recovered from this area be undertaken. Although this dating process is difficult due to low Sr content of basic rocks and Ar release by metamorphism, an attempt is warranted.

M7 - The metasediment zone in the central Coonalpyn tenement is noted by high magnetic signature and frequent shallow (40-60 m) intersections in local water bores. The Ordovician granites to the west have been incised by glaciation followed by Permian in-filling and a proportion of the metasediments is likely to have been eroded during this period.

To the east of the M7 area a series of carbonates, quartzites and some limestones have been intersected. Areas such as M7a therefore may be prospective for skarn deposits.

6.5 Basic Intrusives

A number of near surface and deeper basic intrusive units are evident both within the aeromagnetic and drillhole data. In general the basic intrusives are strongly magnetic having high amplitudes and being confined along a trend or zone of weakness into which they have intruded.

For instance, the strongly anomalous aeromagnetic belt, B1, intersected by numerous Thiess Bros. drillholes outline a shallow, broad belt of extrusive basalts and basaltic andesites within the central Yumali tenement. Petrological evidence suggest that this group of rocks is strongly (auto)metasomatised and contain magnetite and ilmenite (Dredge, 1979c).

To the north, northeast and east (areas B1, B2, B3, B4, B5, B6 and B7) some drillhole information and moderate to strong aeromagnetics infers the likely presence of basaltic intrusives. Such areas as B3 are likely to be relatively deep (140-200 m) beneath Murray Basin sediments but suggest zones of weakness around the basin perimeter. Area, B3, for example, appears to be a northerly extension of area B2 along trend T2. This trend may be regionally significant as it appears to continue south to align with the eastern flank of granite G2.

Other likely sites for basic intrusive activity evidenced in the aeromagnetic data lie along trends T3, T4 and T5.

In addition to the intrusives described, two anomalous aeromagnetic features, B8 and B9 are likely to be due to basic intrusive plugs having been intruded at a time resulting in reversed polarisation. This indicates the basic intrusions within the area have occurred in at least two separate events or phases.

6.6 Lineaments

The main significant lineament evident from the aeromagnetic data is that marked by L1. The feature is most evident on the 1:250,000 scale presentation of the data but is marked on Drawing No. I5413-8. Considerable structural activity is evident along this lineation (for instance the extensive faulting and offsetting of A4, A3 and trend T3). Some left lateral disposition may be present between zones M1 and M2 and this is also suggested by trends T3 and T5. It is suggested a photogeological and/or Landsat imagery analysis be undertaken to establish the significance of this lineament.

7. CONCLUSIONS

Derived from the analysis of original and reprocessed aeromagnetic data, gravity, company and SADME listed water bore information plus published mapping a number of conclusions and recommendations for further exploration in the Meningie-Yumali-Coonalpyn areas can be made.

- The area has a general history of Lower to Middle Cambrian, Kanmantoo Group equivalent metasediments into which Ordovician granites have intruded. Later erosion by glacial or fluviatile activity has incised much of these areas to be later infilled by Permian tillites and sediments. The resultant metasediment distribution as suggested by the aeromagnetics and drillhole information is due to the Ordovician granitic emplacement and subsequent erosion. In most areas the depths to these metasediments is relatively shallow (<80 m) with a decrease in depth along the southeast/northwest trending Padthaway Ridge. In the north and northwest much of the metasediments outcrop.

- A number of basic intrusives occur ubiquitously throughout the region but in general confined to supposed zones of weakness flanking the margins of the Murray Basin.

- The area in the east edge of M6 is known to contain basaltic andesites of possible Truro Volcanic age. In consequence this area may mark the eastern boundary of Kanmantoo Trough rocks and so suggest the presence of Proterozoic age rocks relatively near-surface. Age dating, if possible, to test this hypothesis is suggested.

- The banded amphibolite/gneiss (A1-4) should be considered prospective, especially where structural

control is suspected. The primary zone for attention is likely to be in the vicinity of intersection with lineation L1.

- The intrusive relationship between the amphibolite/gneiss unit and the adjoining granites of G3, G4, G5, G6 and G7 is at present unknown. This relationship is likely to have influence on the potential for massive sulphide mineralisation associated with the amphibolite/gneiss unit.

- The inferred granites of G4 and G7 have been interpreted from the aeromagnetics and limited borehole intersections. The presence of the granites, however, may increase the potential for mineralisation in the north of the Meningie tenement area.

- Within the Coonalpyn tenement the presence of carbonate and limestone sequences in the proximity of intruded granites increases the prospectivity for skarn-type mineralisation. Resolution of such targets would best be investigated by some follow-up magnetics of aeromagnetic features.

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APPENDIX 1

WATER BORE AND COMPANY DRILLHOLE DATA

AMG HOLE	AMG EASTING	TOTAL NORTHING	DEPTH (m)	REMARKS
PH 1			31.0	Blind Creek Prospect 000N/425W @ 27 m intersected coarse amphibolite.
PH 2			52.0	Blind Creek Prospect 000N/650W @ 40 m intersected feldspar-qtz-hornblende gneiss.
PH 3			44.0	Blind Creek Prospect 000N/225W @ 32 m intersected feldspar-qtz-hornblende gneiss.
PH 4			21.0	Mason Lookout 750N/200E @ 18 m intersected coarse grained amphibolite.
PH 5			28.0	Mason Lookout 750N/400E @ 27 m intersected coarse amphibolite.
PH 6	355650E	6040400N	48.0	Meningie E.L. @ 32 m intersected mica-qtz schist.
PH 7	356480E	6071020N	48.0	Meningie E.L. 2 27 m intersected weathered mica-qtz schist. @ 38 m fresh schist.
PH 8	358180E	6072310N	44.0	Meningie E.L. @ 31 m qtz-biotite schist.
PH 9	359950E	6072480N	70.0	Meningie E.L. @ 35 m weathered sericitic basement. @ 60 m feldspar-mica-qtz schist.
PH10	353250E	6079400N	40.0	Meningie E.L. @ 26 m feldspar-mica-qtz schist.
PH11	355825E	6055550N	68.0	Meningie E.L. @ 68 m leucocratic granite.
PH12	360250E	6058360N	87.0	Meningie E.L. @ 87 m hornblende-qtz scapolite.
PH13	360800E	6058850N	85.0	Meningie E.L. @ 53 m weathered basement @ 70 m qtz-feldspar-mica schist.

HOLE	AMG EASTING	AMG NORTHING	TOTAL DEPTH (m)	REMARKS
PH14	361950E	6059500N	92.0	Meningie E.L. @ 47 m weathered basement. @ 76 m mica-plagioclase-qtz gneiss.
PH15			80.0	Meningie E.L. @ 48 m calc-silicate-qtz gneiss.
PH16			96.0	Meningie E.L. @ 50 m calc-silicate-qtz gneiss.
PH17			108.0	Meningie E.L. @ 48 m interbedded qtz-mica schists, gneisses and amphibolite.
PH18			120.0	Meningie E.L. @ 48 m interbedded mica gneiss, mica schists and some amphibolites. Some mineralisation.
PH19			104.0	Meningie E.L. @ 56 m weathered basement. @ 74 m mica-qtz phylitic schist.
PH20			96.0	Meningie E.L. @ 45 m qtz-mica gneiss grading to amphibolitic gneiss.
DDH1	357570E	6071000N	159.95	Meningie E.L. (Mason Lookout) @ 27 m intersected hornblende-feldspar-qtz gneiss. Some interbedded amphibolite with massive pyrite/pyrrhotite.
DDH2	354030E	6079170N	240.0	Meningie E.L. (Blind Creek) @ 41 m intersected amphibolite. Continued with interbedded qtz-feldspar-mica gneiss and amphibolite. Some high (>20%) magnetite.
RH1	389400E	6062725N	25.0	Yumali E.L. (Ki Ki Prospect)

HOLE	AMG EASTING	AMG NORTHING	TOTAL DEPTH (m)	REMARKS
RH2	387300E	6062700N	189.0	Yumali E.L. (Ki Ki Prospect) intersected @ 182 m Qtz microdiorite.
RH3	385300E	6063075N	184.0	Yumali E.L. (Ki Ki Prospect) intersected @ 178 m weakly porphyritic basalt.
RH4	381500E	6080100N	130.0	Yumali E.L. (Coomandook Prospect) intersected @ 12m basaltic andesitic tuff.
RH5	376000E	6083600N	91.0	Yumali E.L. (Coomandook Prospect) intersected @ 61m hornblende diorite.
RH6	375250E	6083500N	63.0	Yumali E.L. (Coomandook Prospect)
RH7	378150E	6071500N	143.0	Yumali E.L. (Coomandook Prospect) intersected @ 138 m basic volcanics and gabbros.
RH8	389400E	6062725N	181.0	Yumali E.L. (Ki Ki Prospect) intersected @ 176 m basalt.
R304	374090E	6089060N	43.0	Yumali E.L. (Yarrawonga Area) intersected basement @ 37 m.
R305	378570E	6084290N	47.0	Yumali E.L. Did not intersect basement.
R306	377555E	6088570N	96.0	Yumali E.L. (Yarrawonga Area) intersected basement @ 91.6 m.
R307	377290E	6083510N	64	Yumali E.L. Did not intersect basement.
R308	373740E	6083910N	74	Yumali E.L. Basement metasediment @ 66 m.
R309	373440E	6086155N	62	Yumali E.L. Basement @ 54.1 m.

HOLE	AMG EASTING	AMG NORTHING	TOTAL DEPTH (m)	REMARKS
R311	374820E	6083100N	64	Yumali E.L. Basement @ 59.7 m.
R312	375925E	6080675N	87	Yumali E.L. Basement granite suspected @ 72.6 m from high geophysical gamma count logs.
R313	375750E	6085400N	53	Yumali E.L. Basement @ 47.4 m.
R314	375410E	608655N	54	Yumali E.L. Basement @ 46.2 m.
R316	374480E	6088500N	47	Yumali E.L. Basement @ 31.0 m.
R317	373460E	6087800N	46	Yumali E.L. Basement @ 38.9 m.
R318	373590E	6083870N	66	Yumali E.L. Basement @ 63.1 m.
R319	373380E	6085320N	56	Yumali E.L. Basement @ 54.1 m.
R320	374990E	6084090N	63	Yumali E.L. Basement @ 55.3 m.
R321	375020E	6085020N	51	Yumali E.L. Basement @ 46.2 m.
R322	374560E	6081040N	77	Yumali E.L. Granitic Basement @ 75.3 m.
R323	374500E	6079980N	65	Yumali E.L. Granitic Basement @ 62.0 m.
R324	375910E	6079080N	81	Yumali E.L. Granitic Basement @ 77.0 m.
R325	373725E	6079630N	69.0	Yumali E.L. Granitic Basement @ 67.5 m.
R326	373480E	6080760N	64.0	Yumali E.L. Granitic Basement @ 62.8 m.
R327	372760E	6084360N	43	Yumali E.L. Metasediment Basement @ 41.7 m.
R328	371560E	6084140N	31	Yumali E.L. Metasediment Basement @ 28.5 m.

HOLE	AMG EASTING	AMG NORTHING	TOTAL DEPTH (m)	REMARKS	
R329	371340E	6085710N	32	Yumali E.L.	Metasediment Basement @ 28.5 m.
R330	372500E	6085380N	37	Yumali E.L.	Metasediment Basement @ 33.6 m.
R331	373375E	6082825N	61	Yumali E.L.	Basement @ 58.0 m.
R332	372820E	6081840N	66	Yumali E.L.	Metasediment Basement @ 63.6 m.
R333	375950E	6082750N	73	Yumali E.L.	Metasediment Basement @ 70.7 m.
R334	377230E	6082350N	77	Yumali E.L.	Metasediment Basement @ 75.8 m.
R335	378410E	6084990N	93	Yumali E.L.	Basement @ 91.0 m.
R336	378075E	6086475N	83	Yumali E.L.	Basement @ 79.5 m.
3	354100E	6032200N		Water Bore (SADME)	Metasediment Basement @ 1.2m.
5	355450E	6034650N		Water Bore (SADME)	Metasediment @ 6.0 m.
6	356600E	6034550N		Water Bore (SADME)	Metasediment @ 6.2 m.
7	357900E	6033650N		Water Bore (SADME)	Granite @ 1.6 m.
9	358150E	6034400N		Water Bore (SADME)	Granite @ 5.7 m.
11	357350E	6033800N		Water Bore (SADME)	Metasediment @ 5.5 m.
12	358250E	6032850N		Water Bore (SADME)	Granite @ 1.3 m.
13	357950E	6034750N		Water Bore (SADME)	Granite @ 2.0 m.
14	357250E	6033200N		Water Bore (SADME)	Granite @ 2.2 m.

HOLE	AMG EASTING	AMG NORTHING	TOTAL DEPTH (m)	REMARKS	
15	357300E	6031550N		Water Bore (SADME)	Granite @ 5.8 m.
17	400750E	6043900		Water Bore (SADME) (Coonalpyn)	Lignite @ 76.9 m.
19	399700E	6045000N		SADME Water Bore	Metasediment @ 99.7 m.
21	359400E	6032550N		SADME Water Bore	Granite @ 3.5 m.
25	362500E	6032900N		SADME Water Bore	Metasediment @ 12.6 m.
26	361450E	6035100N		SADME Water Bore	Metasediment @ 15.2 m.
27	361500E	6030600N		SADME Water Bore	Metasediment @ 27.4 m.
28	363100E	6028150N		SADME Water Bore	Metasediment @ 18.7 m.
31	363700E	6028250N		Magrath Flat	Metasediment @ 14.0 m.
32	363300E	6030000N		Magrath Flat	Metasediment @ 24.0 m.
36	403950E	6047800N		Coonalpyn	Lignite @ 127.6 m.
38	401100E	6045200N		Coonalpyn	Lignite @ 71.7 m.
41	357050E	6029050N		Magrath Flat	Metasediment @ 2.9 m.
49	358550E	6026950N		Magrath Flat	Metasediment @ 3.0 m.
50	397850E	6048600N		Coonalpyn	Lignite @ 66.9 m.
64	400100E	6053750N		Coonalpyn	Lignite @ 130.4 m.

HOLE	AMG EASTING	AMG NORTHING	TOTAL DEPTH (m)		REMARKS
72	349800E	6038500N		Magrath Flat	Granite @ 4.6 m.
76	397200E	6051400N		Coonalpyn	Lignite @ 11.5 m.
93	393500E	6052400N		Coonalpyn	Lignite @ 66.9 m.
95	390650E	6052750N		Coonalpyn	Lignite @ 88.1 m.
96	391300E	6053750N		Coonalpyn	Lignite @ 130.7 m.
97	394000E	6053000N		Coonalpyn	Lignite @ 113.1 m.
113	393650E	6057400N		Coonalpyn	Lignite @ 71.1 m.
163	361000E	6042150N		Magrath Flat	Metasediment @ 14 m.
171	359850E	6035850N		Magrath Flat	Metasediment @ 118 m.
172	390600E	6063000N		Coonalpyn	Metasediment @ 203.0 m.
188	387500E	6068200N		Coonalpyn	Lignite @ 125.2 m.
220	388700E	6048200N		Coonalpyn	Metasediment @ 61.0 m.
221	389450E	6044650N		Coonalpyn	Lignite Metasediment @ 61.0 m.
222	388150E	6044950N		Coonalpyn	Granite @ 15.2 m.
223	389000E	6046400N		Coonalpyn	Metasediment @ 76.8 m.
225	387700E	6044650N		Coonalpyn	Granite @ 28.0 m.
228	388000E	6044400N		Coonalpyn	Granite @ 16.5 m.

HOLE	AMG EASTING	AMG NORTHING	TOTAL DEPTH (m)		REMARKS
263	361050E	6052200N		Meningie	Lignite @ 86.3 m.
265	358650E	6050800N		Meningie	Granite @ 108.2 m.
387	384400E	6044600N		Binnie	Granite @ 27.4 m.
388	385200E	6044700N		Binnie	Granite @ 1.8 m.
392	381000E	6048650N		Binnie	Granite @ 27.4 m.
394	380550E	6048200N		Binnie	Granite @ 1.5 m.
456	375350E	6083550N		Moorlands	Volcanics @ 68.3 m.
502	380650E	6081550N		Moorlands	Lignite @ 91.2 m.
518	382400E	6034250N		Woods Well	Granite @ 119.5 m.
683	385050E	6090750N		Moorlands	Lignite @ 69.9 m.
783	396100E	6040400N		Culburra	Lignite @ 89.7 m.
792	398700E	6038150N		Culburra	Lignite @ 93.6 m.
795	397450E	6037700N		Culburra	Lignite @ 106.1 m.
801	397450E	6037700N		Culburra	Lignite @ 76.0 m.
803	402500E	6037750N		Culburra	Lignite @ 79.3 m.
804	404000E	6039750N		Culburra	Lignite @ 72.9 m.

HOLE	AMG EASTING	AMG NORTHING	TOTAL DEPTH (m)		REMARKS
805	406350E	6036150N		Culburra	Lignite @ 83.0 m.
817	395800E	6034750N		Culburra	Lignite @ 82.7 m.

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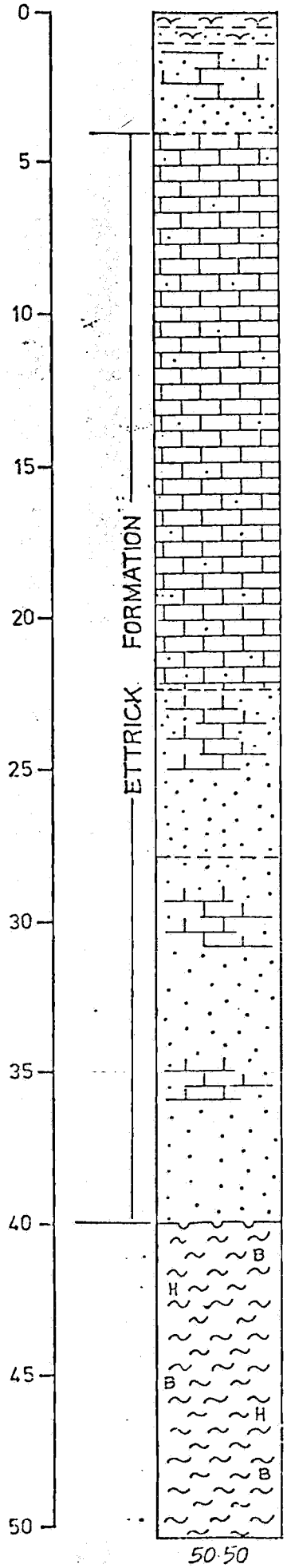
CO-ORDINATES	000 N 425 W	HOLE TYPE	Percussion
CO-ORD. SYSTEM	SADM Geoph. Survey	DEPTH	31·0 m
REDUCED LEVEL	5·0 m.	COMMENCED	12-1-79
INCLINATION	Vertical	FINISHED	13-1-79
MAP REFERENCE	Barker 1:250 000 5154-13	WATER LEVEL	3·0 m

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Black soil
		Light brown, sandy soil with secondary calcification
5		Light brown, sandy clayey marl with kunkar bands
	ETTRICK FORMATION	Pale green to light olive green, glauconitic marl. Shell fragments increasing in size with depth. Generally unconsolidated. Numerous consolidated bands up to 0·5 m. thick. Minor fine grained quartz
10		
15		
20		Light brown, medium grained, well sorted, well rounded unconsolidated sand, with 20% shell fragments. (Possible contamination from above). Increase in shell fragments with depth.
25		20-26 m. very poor sample return.
		Light grey-green, coarse grained amphibolite with minor magnetite and pyrite.
30		
	31·0	
35		

SCALE 1:200	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN IW Mar '79	EL 401 MENINGIE BLIND CREEK PROSPECT DRILLHOLE LITHOLOGICAL LOG PH 1	FIGURE
CHECKED		REVISION
APPROVED		
REVISED		DRAWING NO Q/6202-10

CO-ORDS.. _ 0CON , 650 W	INCLINATION Vertical	COMMENCED _ _ _ _ 13-1-79
CO-ORD. SYSTEM _ SADM	HOLE TYPE _ Percussion	FINISHED _ _ _ _ _ _ 13-1-79
REDUCED LEVEL _ 5·0 m.	DEPTH _ _ _ _ _ 50·50 m.	WATER LEVEL _ _ _ 2·0 m.



Black soil

Light brown, sandy soil with secondary calcification.

Light brown, sandy clayey marl with kunkar bands 150

Pale green to light olive green, glauconitic marl with minor fine grained quartz.

Light brown, fine grained, well sorted, well rounded unconsolidated sand with 40% shell fragments. (Possible contamination from above)

30-40 m. V. poor sample return.

Light brown medium grained, moderate sorted, well rounded unconsolidated sand. 40% shell fragments (Possible contamination from above)

Light grey-green, coarse grained, subidioblastic, feldspar-quartz-hornblende - biotite gneiss with minor chlorite. No magnetite present.

SCALE 1:200	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN IW. Mar '79	EL 401 MENINGIE	FIGURE
CHECKED	BLIND CREEK PROSPECT	REVISION
APPROVED	DRILLHOLE LITHOLOGICAL LOG	DRAWING NO
REVISED	PH 2	Q/GEOP-11

CO-ORDINATES . . . . 000 N, 225 W
CO-ORD. SYSTEM . . . . SADM Geoph. Survey
REDUCED LEVEL . . . 5·0 m.
INCLINATION . . . . . Vertical
MAP REFERENCE . . Barker 1:250 000 SI54-13

HOLE TYPE . . . . . Percussion
DEPTH . . . . . 44·0 m.
COMMENCED 14-1-79
FINISHED 14-1-79
WATER LEVEL . . . . 2·5 m.

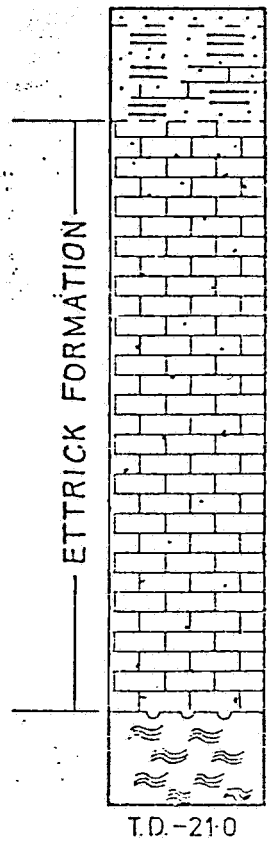
15.

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Black soil
		Light brown, sandy soil with secondary calcification & kunkar bands.
	ETTRICK FORMATION	Light brown, sandy, clayey marl
5		
10		Pale green to light olive green, glauconitic marl with minor fine grained quartz.
15		
20		
25		Light brown, medium grained, well sorted, well rounded, unconsolidated sand with 40% shell fragments (possible contamination from above)
30		
	B	Light grey-green, coarse grained feldspar-quartz-biotite-hornblende gneiss. Minor magnetite & minor garnets from 37-44 m.
35	H	
	B	
40	H	
45	44·0	

SCALE 1:200	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN IM Mar '79	EL 401 MENINGIE	FIGURE
CHECKED	BLIND CREEK PROSPECT	REVISION
APPROVED	DRILLHOLE LITHOLOGICAL LOG	DRAWING NO Q/6202-12
REVISED	PH 3	

15c

CO-ORDINATES	750 N 200 E	HOLE TYPE	Percussion
CO-ORD. SYSTEM	SADM Geoph. Survey	DEPTH	21·0m.
REDUCED LEVEL	9·5 m.	COMMENCED	14-1-79
INCLINATION	Vertical	FINISHED	14-1-79
MAP REFERENCE	Barker 1:250000 S154-13	WATER LEVEL	3·0 m.

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Light yellow-brown, fine-medium grained, moderately sorted, sub-angular-rounded sand. White.-light brown, sandy clay with kunkar bands & minor shell fragments.
5		
10		Pale green-light olive green glauconitic marl with minor fine grain sand.
15		
20		Coarse grained amphibolite. (foliated hornblende gneiss). 60-70% hornblende, 20% feldspar & minor quartz & fine grained magnetite.
25		

SCALE 1:200	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN J.M. Mar'79	EL 401 MENINGIE MASON LOOKOUT DRILLHOLE LITHOLOGICAL LOG PH 4	FIGURE
CHECKED		REVISION
APPROVED		DRAWING NO. Q/6202-13
REVISED		

CO-ORDINATES ____ 750 N, 400 E
COORD SYSTEM ____ SADM Geoph. Survey
REDUCED LEVEL ____ 9.0 m.
INCLINATION ____ Vertical
MAP REFERENCE ____ Barker 1:250 000

HOLE TYPE ____ Percussion
DEPTH ____ 28.0 m.
COMMENCED ____ 15-1-79
FINISHED ____ 15-1-79
WATER LEVEL ____ 3.0 m.

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Brown, fine-medium grained, sub-angular sand.
		Brown-light yellow-brown, sandy clay with kunkar bands and minor shell fragments.
5		
10		Pale green to light olive green, glauconitic marl with minor fine grained quartz.
15		
20		Quartz content increasing to 15-20 %
25		Quartz medium grained, moderate sorted, well rounded, increasing to 20-30 %.
		Light grey-green, coarse grained, well rounded amphibolite.
30		

ETTRICK FORMATION

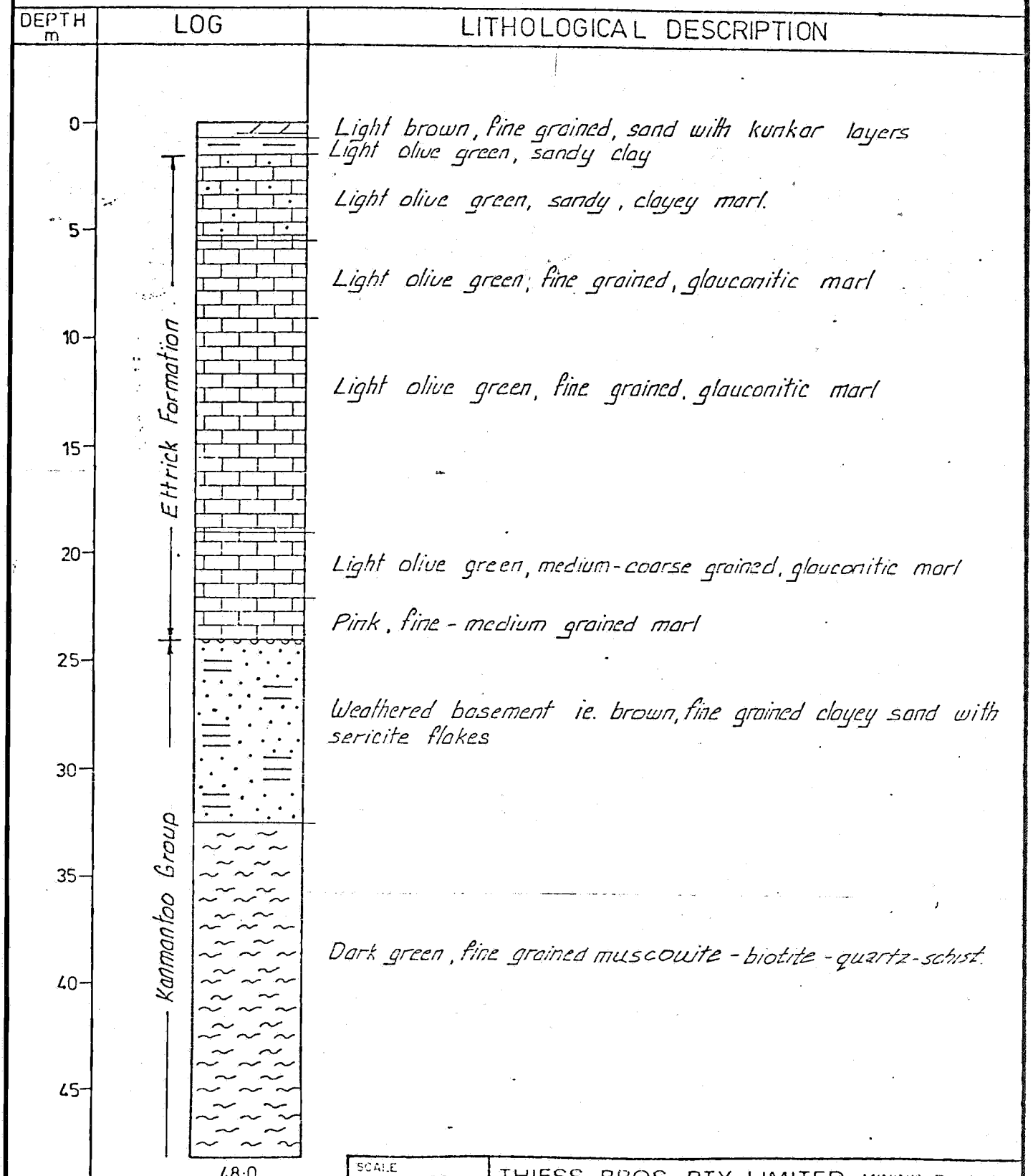
28.0

SCALE 1:200	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN IW. Mar '79	EL 401 MENINGIE	FIGURE
CHECKED	BLIND CREEK PROSPECT	REVISION
APPROVED	DRILLHOLE LITHOLOGICAL LOG	DRAWING No
REVISED	PH 5	Q/G202-14

CO-ORDINATES ..... 355 650 E 6040 400 N
CO-ORD. SYSTEM AMG
REDUCED LEVEL ..... 3·0 m
INCLINATION ..... Vertical
MAP REFERENCE ..... Barker SI. 54-13

HOLE TYPE ..... Rotary / Percussion
DEPTH ..... 48·0 m
COMMENCED 10-3-80
FINISHED 10-3-80
WATER LEVEL ..... 1·25 m.

154



SCALE 1:250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN	EL 401 MENINGIE DRILLHOLE LITHOLOGICAL LOG PH 6	FIGURE
CHECKED		REVISION
APPROVED		DRAWING No. SA/6202-23
REVISED		

CO-ORDINATES 356 480E 6071 020N
CO-ORD. SYSTEM AMG
REDUCED LEVEL 3.0m
INCLINATION ..... Vertical
MAP REFERENCE .... Barker S.I. 54-13

HOLE TYPE ..... Rotary / Percussion
DEPTH ..... 48.0 m
COMMENCED 10.3.80
FINISHED 11.3.80
WATER LEVEL ..... 1.0 m.

150

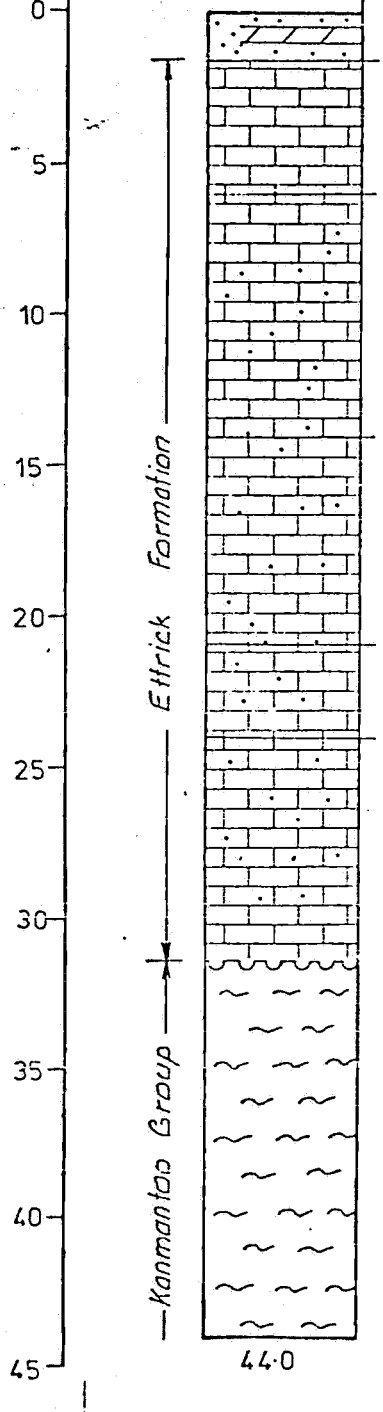
DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Dark brown, fine grained sand
		Light brown clay with thin kunkar layers
5		Light brown clayey, sandy marl, grades into below
10	Ethrick Formation	Light olive green, fine grained glauconitic, sandy marl. Marl becomes coarser grained with depth
15		
20		
25		Light olive green-yellow, medium coarse grained glauconitic, sandy marl.
30		
35	Kanmantoo Group	Dark green, fine grained albite-muscovite-chlorite-quartz schist, slightly weathered.
40		Dark green, fine grained albite-muscovite-chlorite-quartz schist.
45		
50	48.0	

SCALE 1:250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN	EL 401 MENINGIE DRILLHOLE LITHOLOGICAL LOG PH 7	FIGURE
CHECKED		REVISION
APPROVED		DRAWING NO SA/5202-24
REVISED		

CO-ORDINATES ..... 358 180 E 60 72 310 N
CO-ORD SYSTEM AMG
REDUCED LEVEL ..... 8·0 m
INCLINATION ..... Vertical
MAP REFERENCE ..... Barker SI. 54-13

HOLE TYPE ..... Rotary / Percussion
DEPTH ..... 44·0 m
COMMENCED ..... 11·3·80
FINISHED ..... 11·3·80
WATER LEVEL ..... 2·5 m

15b



LITHOLOGICAL DESCRIPTION

Dark brown, silty, fine grained sand, are numerous thin kunkar layers

Light yellow-brown, fine grained clayey marl, clay content decreases with depth.

Light, olive green, fine grained, sandy glauconitic marl

Light, olive green, fine-medium grained, sandy glauconitic marl

Light brown, fine-medium grained, sandy marl

Light brown, medium grained, sandy marl, are coarse-very coarse shell fragments

Grey, fine grained (? graphitic) quartz-biotite schist.

SCALE 1:250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN	EL 401 MENINGIE	FIGURE
CHECKED	DRILLHOLE LITHOLOGICAL LOG	REVISION
APPROVED	PH 8	DRAWING No SA / 6202-25
REVISED		

SECTION 8. PROGRAM DAFORM

DESCRIPTION

This program formats direct access files using the nominated file specification for the specified number of blocks.

FILE USAGE

Input File:

SYSIN - input data set.

Output Files:

SYSPRINT - message data set.

filespec - specified direct access file.

INPUT

Input to this program consists of a CONTROL statement detailing the file specification and the number of blocks to format.

"CONTROL" Statement

This statement defines the file specification and the number of blocks required to be formatted for the nominated direct access file.

```
CONTROL  FILESPEC = filespec,'BLOCKS = nblk
```

filespec

This parameter describes the file specifier and has the following format:-

CO-ORDINATES	359 950E 607[illegible]	HOLE TYPE	Rotary	157
CO-ORD SYSTEM	AMG	DEPTH	70.0m	
REDUCED LEVEL	9.0m	COMMENCED	1.3.80	
INCLINATION	Vertical	FINISHED	2.3.80	
MAP REFERENCE	Bunker Bay 6[illegible]-3	WATER LEVEL	2.0m	

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0	Yallingup Formation / Kammantoo Group	Light brown fine grained sand with numerous humus layers
5		Light yellow brown fine grained sand
10		Light olive green fairly consolidated clay
15		Light olive green fine grained glauconitic marl
20		Light olive green marl with minor glauconite
25		Light green-brown medium grained marl
30		Light yellow-brown medium grained marl
35		
40		
45		Weathered basement ie dark grey sandy, silty clay with minor gravel
50		
55		
60		
65		Dark grey, chlorite - feldspar - quartz schist
70		

	THIESS BROS PTY LIMITED	
	EL 40 PENINSULA DRILLHOLE LITHOLOGICAL LOG PH 9	
		A1-5202-25

dev: is the physical or logical device unit on which the direct access file is to be stored. The device unit is expressed as a 2-character alphabetic ASCII device name and an optional 1- or 2- digit octal unit number, followed by a colon.

e.g., DKØ: DKØ1:

If not given, the device defaults to the device unit on which the system volume is mounted.

[g,m] Is the User Identification Code (UIC) that specifies the User File Directory (UFD) in which the direct access file is listed. g and m are octal numbers from Ø to 377 that represent the owner's group and member number, respectively. The brackets are a mandatory part of the UIC. If not given, the UIC default to the current UIC specified for the requesting terminal.

filename Is the name of the file consisting of an alphanumeric string from 1 to 9 characters in length. A dot always separates the filename from the file type.

type Is a 3 letter mnemonic that identifies the nature of the files contents. A semi-colon (;) always separates the file type from the version number.

version Is an octal number from 1 to 77777 that differentiates among various versions of a file. The numbers -1 and Ø have special significance:-

-1 implies the lowest existing version of a file.
Ø implies the highest existing version of a file.

nblk

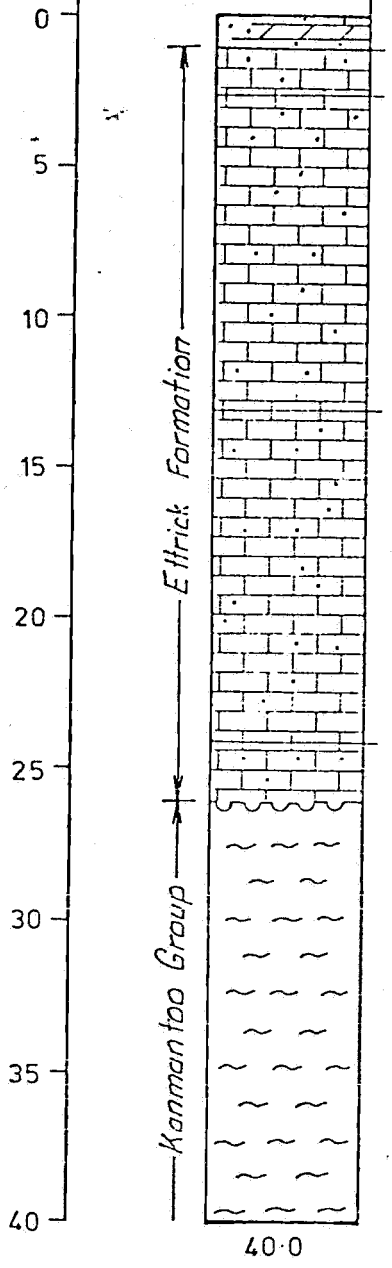
This parameter describes the number of blocks (1Ø24 characters per block) required to be formatted.

ERROR MESSAGE

CO-ORDINATES.....353 250E 6079 400N
CO-ORD. SYSTEM AMG
REDUCED LEVEL.....50 m.
INCLINATION..... Vertical
MAP REFERENCE.....Barker SI. 54-13

HOLE TYPE.....Rotary / Percussion
DEPTH.....40·0 m.
COMMENCED.....12·3·80
FINISHED.....12·3·80
WATER LEVEL....2·0 m.

156



LITHOLOGICAL DESCRIPTION

Light brown, fine grained sand with numerous kunkar layers

Light yellow brown, fine grained marl

Light olive green, fine grained glauconitic sandy marl

Light brown, fine grained sandy marl, are numerous bands of glauconitic marl. Increase in quartz content with depth

Light brown, fine - medium grained sandy marl up to 30% sand and coarse to very coarse shell fragments

Dark grey - green, fine grained muscovite - biotite - feldspar - quartz schist

SCALE 1:250	THIESS BROS. PTY. LIMITED MINING DIVISION	
DRAWN	EL 401 MENINGIE DRILLHOLE LITHOLOGICAL LOG PH 10	FIGURE
CHECKED		REVISION
APPROVED		DRAWING No SA/6202-27
REVISED		

dev: is the physical or logical device unit on which the direct access file is to be stored. The device unit is expressed as a 2-character alphabetic ASCII device name and an optional 1- or 2- digit octal unit number, followed by a colon.

e.g., DKØ: DKØ1:

If not given, the device defaults to the device unit on which the system volume is mounted.

[g,m] Is the User Identification Code (UIC) that specifies the User File Directory (UFD) in which the direct access file is listed. g and m are octal numbers from Ø to 377 that represent the owner's group and member number, respectively. The brackets are a mandatory part of the UIC. If not given, the UIC default to the current UIC specified for the requesting terminal.

filename Is the name of the file consisting of an alphanumeric string from 1 to 9 characters in length. A dot always separates the filename from the file type.

type Is a 3 letter mnemonic that identifies the nature of the files contents. A semi-colon (;) always separates the file type from the version number.

version Is an octal number from 1 to 77777 that differentiates among various versions of a file. The numbers -1 and Ø have special significance:-

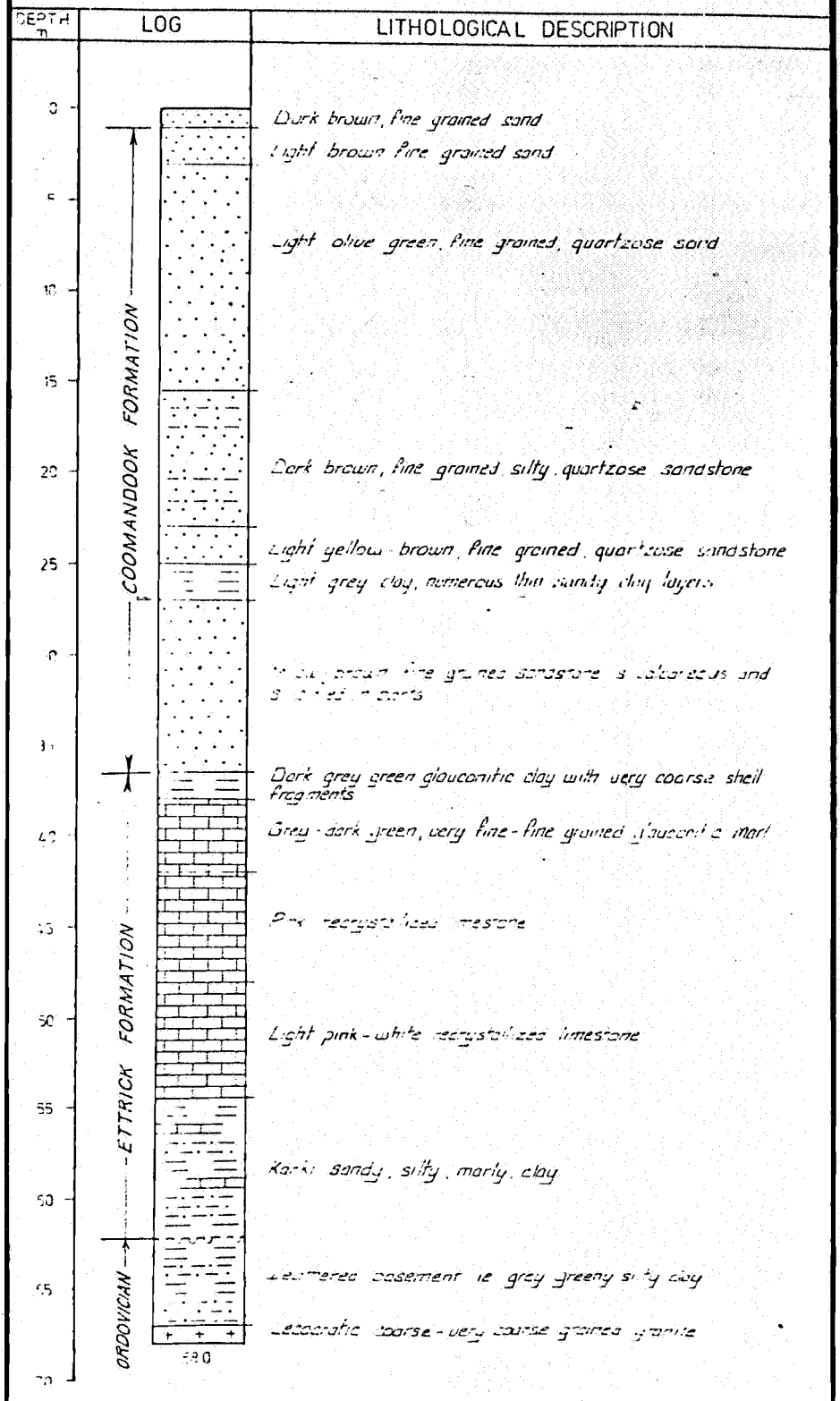
-1 implies the lowest existing version of a file.
Ø implies the highest existing version of a file.

nblk

This parameter describes the number of blocks (1Ø24 characters per block) required to be formatted.

ERROR MESSAGE

CO-ORDINATES	355 325 E 8055 550 N	HOLE TYPE	Rotary
CO-ORD SYSTEM	A.M.G	DEPTH	68.0 m
REDUCED LEVEL	5.0 m	COMMENCED	13.3.80
INCLINATION	Vertical	FINISHED	13.3.80
MAP REFERENCE	Burner SI 54-3	WATER LEVEL	1.5 m



SCALE 1:250	THIESS BROS PTY LIMITED	FIGURE
DRAWN	EL 401 MENINGIE	
	DRILL HOLE LITHOLOGICAL LOG	
	DH 11	DRAWING No. GA/5202-28

SECTION 8. PROGRAM DAFORM

DESCRIPTION

This program formats direct access files using the nominated file specification for the specified number of blocks.

FILE USAGE

Input File:

SYSIN - input data set.

Output Files:

SYSPRINT - message data set.

filespec - specified direct access file.

INPUT

Input to this program consists of a CONTROL statement detailing the file specification and the number of blocks to format.

"CONTROL" Statement

This statement defines the file specification and the number of blocks required to be formatted for the nominated direct access file.

```
CONTROL  FILESPEC = filespec,'BLOCKS = nblk
```

filespec

This parameter describes the file specifier and has the following format:-

BOARD SYSTEM
REDUCED LEVEL
INCLINATION Vertical
MAP REFERENCE Barker S.I. 54-13

DEPTH
COMMENCED
FINISHED
WATER LEVEL ?

162

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Brown, fine grained sand
5		Light yellow brown, fine grained, clayey sand
10		Green-blue, fine grained sand, is clayey in parts
15		Yellow brown, fine grained, quartzose sand
20		Yellow brown, fine grained, calcareous sandstone
25		Grey clay
30		Yellow brown, fine grained, calcareous sandstone, up to 50% calcareous matter
40		Dark yellow green highly glauconitic, very fine grained marl
45		Yellow brown very fine grained marl
50		Dark brown, highly carbonaceous, clay
55		Pink, recrystallized limestone
60		Dark sandy, silty, marly clay
65		Weathered basement ie blue grey silty clay
95		Dark green porphyroxene, hornblende - quartz - plagioclase gneiss.

COOMANDOOK FORMATION

ETTRICK FORMATION

KANMANTOO GROUP

BTD

PH-12

SECTION 9. GEOCOR - Interprets Base Level Adjustments to Multi-Channel Profile Plots for EM Input Data.

DESCRIPTION

This program is designed to run interactively and interpret manual adjustments made to the base levels of individual channels of multi-channel profile plots. The output of this program is input for AGP18Ø.

FILE USAGE

Input File:

SYSIN - input data set - base level changes from plots.

Output Files:

SYSPRINT - output data set - new base levels in relation to time.

SYSOUT - correction file. Input to AGP18Ø.

INPUT DATA

This is information manually coded from multi-channel profile plots concerning adjustment of base levels of individual channels. Coding should be carried out according to the specifications shown below:-

Columns	Data
1-8	Job Number
9-16	Flight no
17-24	Time
25-32	Channel P1 base level adjustment

CO-ORDINATES		HOLE SIZE	
RECORD SYSTEM		DEPTH	
REDUCED LEVEL		COMMENCED	
INCLINATION	Vertical	FINISHED	
MAP REFERENCE	Barker SI 54-13	WATER LEVEL	?

164

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Brown fine grained moderately sorted sub angular sand
		Light yellow brown fine grained moderately-well sorted clayey sand
5		
10		Light grey-green medium grained poorly moderately sorted well rounded quartzose sand is clayey in parts
15		
		Yellow-brown, fine grained moderately well sorted calcareous sandstone
20		
25		Grey clay
30		Yellow brown fine grained moderately well sorted calcareous sandstone, grades into sandy limestone with depth
35		
		Light brown very fine grained, marly clay
40		Dark green highly glauconitic marly clayey silt
		Light yellow brown fine grained marl with coarse quartz and shell fragments
45		Dark brown-black highly carbonaceous clay
		Pink recrystallized limestone
50		Brown, coarse grained, sub angular-rounded sand
55		
		Weathered basement: dark green and brown sericitic, clayey schist
60		
65		
70		
75		Brown fine grained, quartz-feldspar-biotite schist
80		
85		

COOMANDOOK FORMATION

ETTRICK FORMATION

KANMANTOO GROUP

850

SCALE 1:250	THIESS BROS PTY LIMITED MINING DIVISION	
DRAWN		PH 13

SECTION 9. GEOCOR - Interprets Base Level Adjustments to Multi-Channel Profile Plots for EM Input Data.

DESCRIPTION

This program is designed to run interactively and interpret manual adjustments made to the base levels of individual channels of multi-channel profile plots. The output of this program is input for AGP180.

FILE USAGE

Input File:

SYSIN	- input data set - base level changes from plots.

Output Files:

SYSPRINT	- output data set - new base levels in relation to time.
SYSOUT	- correction file. Input to AGP180.

INPUT DATA

This is information manually coded from multi-channel profile plots concerning adjustment of base levels of individual channels. Coding should be carried out according to the specifications shown below:-

Columns	Data
1-8	Job Number
9-16	Flight no
17-24	Time
25-32	Channel P1 base level adjustment

COORDINATES	[illegible]	HOLE TYPE	[illegible]
COORD SYSTEM	AMG	DEPTH	[illegible]
REDUCED LEVEL	[illegible]	COMMENCED	[illegible]
INCLINATION	Vertical	FINISHED	[illegible]
MAP REFERENCE	Sheet SE 54-8	WATER LEVEL	4.0m

166

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
10	COOMANDOOK FORMATION	Light olive green fine grained moderate - well sorted sub rounded quartzose sand, is clayey in parts
15		Light brown fine medium grained partly recrystalized sandy marl, are bands of fine grained calcareous sandstone
20		Light yellow-brown fine grained moderate - well sorted calcareous sandstone
25		Light brown, fine grained, moderate sorted sandy marl
30		White - very light brown fine grained, moderate sorted sandy marl is clayey and silty in parts
35		White very light brown, very fine grained marly silt
40	ETTRICK FORM	Dark green very fine grained glauconitic marly silt
45		Light brown marly silt
50		Light grey clay
55		Light brown recrystalized limestone
60		Weathered basement ie dark brown sandy, clayey silt
65		Weathered basement ie dark brown, silty, sandy clay
70	KANMANTOO GROUP	Weathered basement ie dark red-brown, sandy, silty clay
75		
80		Dark grey coarse grained, garnet staurolite - biotite - muscovite plagioclase - quartz gneiss
85		
90		
92.0		

PH-14

CO-ORDINATES
CO ORD SYSTEM
REDUCED LEVEL
INCLINATION
MAP REFERENCE

HOLE TYPE PERCUSSION
DEPTH 80.0 m
COMMENCED 28-2-81
FINISHED 2-3-81
WATER LEVEL

167

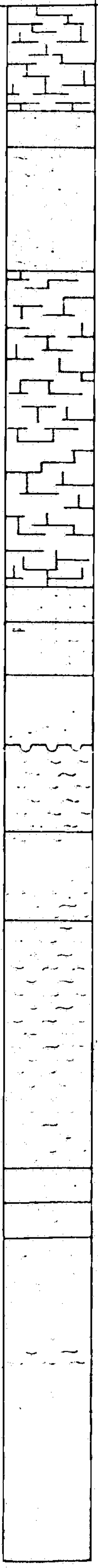
DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
0		Sand, buff cream, loose fine and well rounded.
5		Sand, fine, loose buff yellow with minor clay casts
		Sand, medium grained, light buff-yellow, loose.
10		Sandy limestone, light buff yellow, iron stained hard limestone nodules
15		Calcarenite, light buff-brown, with well rounded quartz pebbles
20		Aeolianite, light-cream-white, soft and brittle, composed of fine shell fragments.
25		
30		Glauconitic marl with sandy intervals, light green-grey, moderate and brittle, with glauconitic fecal pellets at 30-40m
35		
40		Calcareous mud, light buff grey, soft and friable, abundant very fine calcareous fossil fragments.
45		Limestone, cream-pink, hard and tough, sandy in places
50		Quartz-calc silicate gneiss, banded, dark grey-black, white and minor brown bands, rare bands of coarse granular quartz, very dense.
55		
60		Calc silicate-quartz gneiss, black with brown, green, white - pink bands, translucent.
65		
70		
75		
80	TD 80.0 m	
85		
90		

PH-15

COORDINATES
GRID SYSTEM
REDUCED LEVEL
INCLINATION
MAP REFERENCE

HOLE TYPE [illegible]
DEPTH 96.0 m
COMMENCED 25.2.81
FINISHED 26.2.81
WATER LEVEL 48.0 m

168

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
10		Calcarenite, light cream-buff, hard and brittle with yellow oxidised bands.
15		Gravel, well rounded milky and yellow quartz pebbles.
20		Aeolianite [illegible] of finely broken shell fragments, [illegible], cream-white colour, [illegible] and friable.
25		
30		Calcarenite, glauconitic [illegible], buff-green colours, chert bands at base.
35		
40		Limestone, light cream-buff, hard and tough.
45		Limestone, light [illegible], hard and tough.
		Gravel, [illegible] of basement [illegible] quartz and minor ironstone pebbles.
50		Calc-silicate-quartz gneiss, green-black with minor quartz banding, very hard and tough, waxy lustre. [illegible] dark [illegible] at 52 [illegible] m and 54.5 m.
55		Calc-silicate-quartz gneiss, green-black with minor quartz banding, waxy lustre.
60		
65		Calc-silicate-quartz gneiss, green-black with minor quartz banding, dense with a waxy lustre. Minor veins of milky quartz.
70		
75		Brown dense metaquartzite or intermediate intrusive associated with green black gneiss.
		Calc-silicate quartz gneiss with minor brown meta-quartzite, minor pyrite and very rare chalcopyrite, also very minor purple mineral and rare garnet.
80		
85		Calc-silicate gneiss with rare quartz, [illegible] and hard, [illegible], finely [illegible].
90		
95		
	TD 96.0 m	

PH-16

DATE
SYSTEM
SEA LEVEL
ELEVATION
MAP REFERENCE

HOLE TYPE Percussion
DEPTH 100 m
COMMENCED [illegible]
FINISHED [illegible]
WATER LEVEL 460 m

169

DEPTH	LOG	LITHOLOGICAL DESCRIPTION
25		Silt, green-buff, soft-friable with minor glauconite
30		
45		Calcareous silt, dark grey, soft-friable with minor hard limestone
50		Limestone, dark brown hard and tough.
		Glauconitic sand, dark brown, fine and loose.
		Limestone, pink, hard tough with patchy quartz bands.
60		Limestone, pink-red, hard-tough, becoming softer toward base.
65		Slightly weathered biotite quartz schist, buff-yellow, with quartz milky pink coloured veins
50		Slightly weathered biotite quartz, muscovite, feldspar, migmatite buff-cream colour, moderately hard
		Biotite quartz muscovite feldspar migmatite, mottled buff-grey with minor dolomite dissolution with quartz vein pyrite and calcite (hydrothermal alteration?)
65		Biotite, quartz, amphibolite gneiss, dark grey-black with white bands of quartz and calcite, banding more distinct
70		
75		Biotite biotite amphibolite gneiss, dark grey-black, hard and tough, with pyrite, sphalerite? actinolite galena?
80		Biotite, amphibolite gneiss with lesser quartz, dark grey-black, fine banding, white pyrite
85		
90		Quartz (>50%), biotite, amphibolite gneiss, dark grey-black with white bands with abundant pyrite? chalcopyrite? galena?
95		
100		Quartz (>50%), biotite, amphibolite gneiss, dark grey-black with white bands with abundant pyrite? chalcopyrite? galena?
105		
		Dark grey-black biotite amphibolite gneiss with quartz veins & pyrite

T.D. 100 m

PH-17

COORDINATES
GRID SYSTEM
REDUCED LEVEL
INCLINATION
MAP REFERENCE

HOLE TYPE
DEPTH 120.0 m
COMMENCED 4.3.81
FINISHED 5.3.81
WATER LEVEL 30.0 m

170

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
35		Limestone, mottled pink-red colour, clean fossiliferous limestone
40		
45		Weathered gniess dark grey-black moderately hard and friable
50		Garnet muscovite biotite sericite gniess banded with light grey-black brown-white fine quartz bands abundant Fe_2O_3 staining and magnetite, rare K-feldspar
55		Garnet quartz biotite schist, dark grey black with quartz bands, fine grained.
60		Quartz biotite schist, banded black and white, with rare pyrite Altered dyke
65		Quartz biotite muscovite sericite schist to gniess, hard and tough with rare pyrite.
70		Quartz biotite schist to gniess with Fe stained oxidised faces perpendicular to strike and very rare garnet.
75		Biotite quartz muscovite gniess, banded black and white less than 25% Fe quartz, hard and tough
80		Garnet, quartz, biotite, pyrite, schist to gniess hard and tough, dark grey to black with white bands, white to green quartzose bands with pyrite. Rare pyrite in the mafics.
85		
90		Garnet, biotite, quartz, amphibolite gniess Dark grey-black with white bands, pyrite associated with the quartz bands and rarely associated on cleavage plane Hard and tough Greater 15% quartz less than 30%.
95		
100		Biotite, garnet, quartz schist dark green black Quartz decreasing towards base green, white vuggy quartz with pyrite rare chalcopyrite Au ? Red garnets (fine) On strike planes
105		
110		Biotite, garnet, quartz, schist as above but without quartz veins
115		
120		

TD 120 m

THESS BROS PTY LIMITED

PH-18

CO-ORDINATES
CO ORD SYSTEM
REDUCED LEVEL
INCLINATION
MAP REFERENCE

HOLE TYPE Percussion
DEPTH 104.0 m
COMMENCED 5-3-81
FINISHED 6-3-81
WATER LEVEL

171

DEPTH m	LOG	LITHOLOGICAL DESCRIPTION
25		Limestone, buff-cream, moderately hard and brittle.
30		
35		Calcareous siltstone, buff-cream, with minor limestone and calcarenite bands
40		Glauconitic silt and sand, fine and light green-grey, with red oxidised ferruginous grains
45		Dark brown clay with minor lignite and root traces / soft and plastic with minor limestone weathered, buff with lesser calcarenite (fossiliferous).
50		Limestone, moderately weathered, red-pink, soft & friable.
55		Gravel - coarse - very coarse, black and grey and white composed of quartz, weathered basement and fossiliferous limestone.
60		
65		Clay (weathered basement) blue-steel grey with trace muscovite, biotite with green and blue clay blebs
70		
75		Clay as above, also with minor quartz (crystalline) generally less weathered.
80		
85		
90		Garnet, muscovite, biotite, quartz - slate - phyllitic schist black very fine grained, perfectly fissile, 2 schistosity types at 90° to each other and a lineation defined by the pink - red garnets
95		
100		
105		
110		

PH-19

COORDINATES
CO ORD SYSTEM
REDUCED LEVEL
INCLINATION
MAP REFERENCE

HOLE TYPE Percussion
DEPTH 96.0 m
COMMENCED 2.3.81
FINISHED 3-3-81
WATER LEVEL 45.0 m

172

DEPTH	LOG	LITHOLOGICAL DESCRIPTION
10		Calcarenite, buff-cream moderately hard and brittle fossiliferous and minor glauconite
15		
20		
25		Calcarenite, buff-cream soft and brittle glauconitic bands and minor pink-buff limestone bands
30		
35		Glauconitic marl, green buff, fossiliferous soft and friable.
40		
45		Limestone, pink-red, hard and tough, fossiliferous.
50		Quartz biotite gneiss hard and tough, dark grey black, slightly weathered Calc-silicate-quartz gneiss, dark green black with alteration with pyrite, calcite, quartz and unknown green mineral → garnet or amphibolite?
55		
60		Calc-silicate-quartz gneiss, dark green black containing milky, pink and grey quartz. Minor pyrite, abundant ilmenite.
65		
70		
75		Calc-silicate-quartz gneiss dark green black with quartz banding containing brown translucent bands of metaquartzite.
80		
85		Quartz biotite calc-silicate gneiss hard and tough waxy lustre fine to medium grained. Almandine amphibolite gneiss dark brown-black very fine grained and dense. Minor quartz
90		Amphibolite gneiss dark green-black with calcite, and yellow green mineral.
95		
	TD 96.0m	

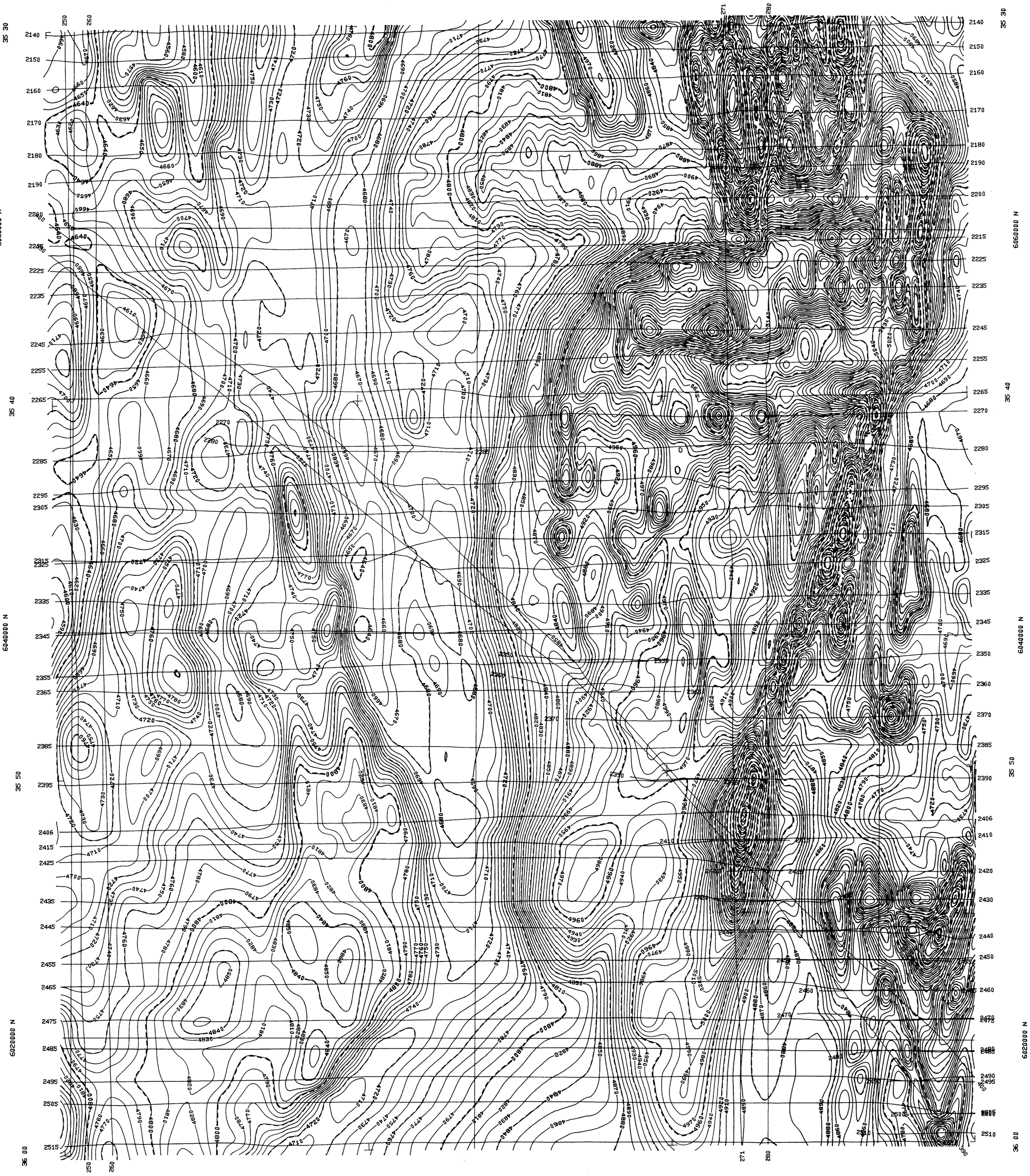
PH-20

THORNTON, R.C.N., 1974. Hydrocarbon Potential of Western Murray Basin and Infrabasins. Rep. Invest. Geol. Surv. S. Aust. 41.

WATERHOUSE, J.D. and COBB, M.A., 1979. The Geology and Hydrogeology of the South-east Province, South Australia - A Bibliography. Note, Geol. Surv. S. Aust.

WEBB, A.W., 1976. Geochronology of the Granitic Rocks of South-eastern South Australia. AMDEL Report No. 1138 (unpublished).

320000 E
139 00
340000 E
139 10
360000 E
139 20
139 30
35 30
35 40
35 50
36 00
6060000 N
6040000 N
6020000 N



Data for this map was acquired by the BMR in 1978 using a Fluxgate magnetometer. Data was acquired approximately 150 metres above G.L. with a sampling interval of 55 metres and a planned traverse spacing of approximately 1.5 km.

In 1982, this data was reprocessed by Pitt Research Pty Limited. IGRF removed data was interpolated to a grid cell size of 250m by 250m. Contours were then regenerated from this gridded data.

Contours are shown at intervals of 10 nano-Teslas.

3962 (II) - 1

CSR LIMITED - MINERALS DIVISION

MENINGEE - 6726

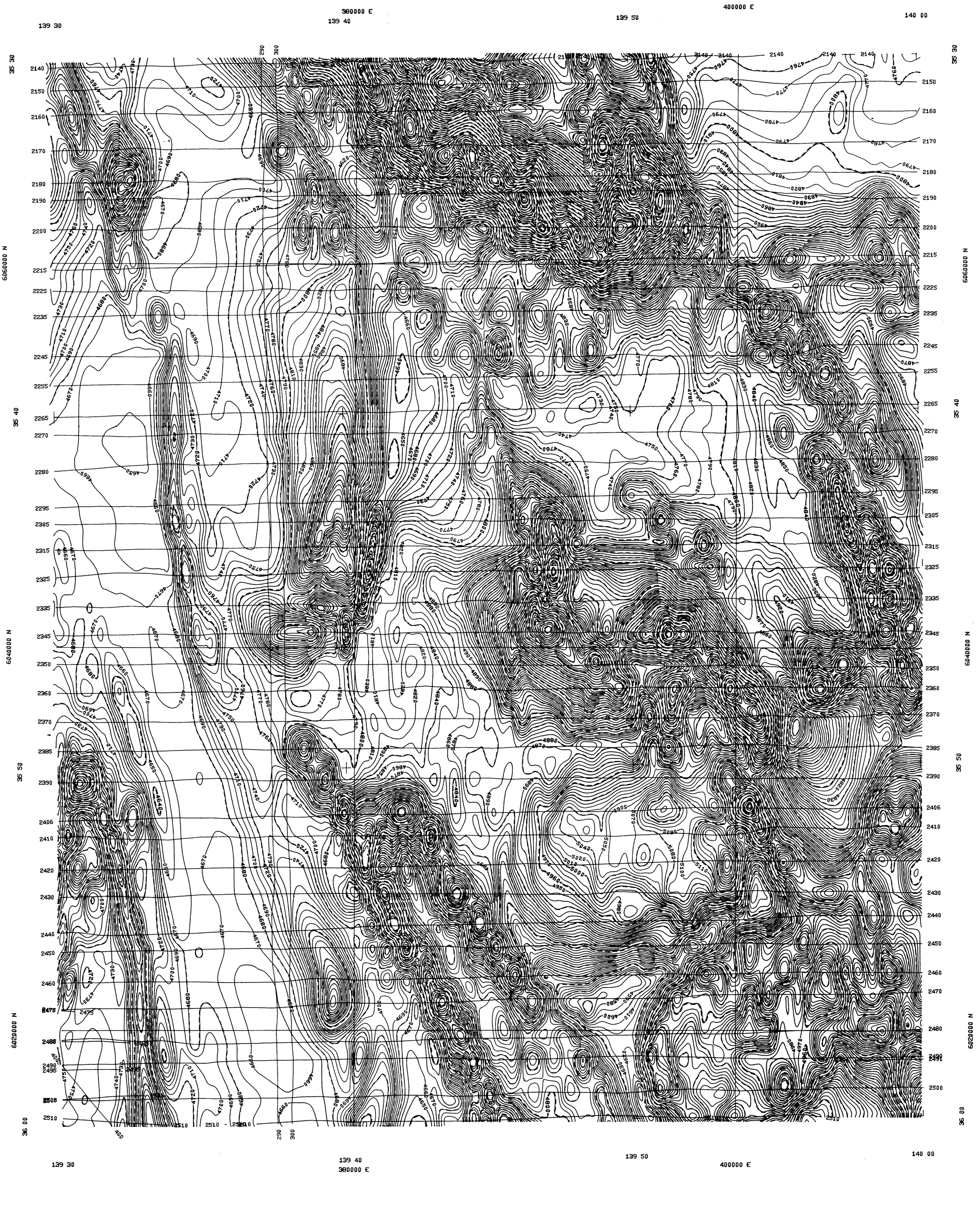
RESIDUAL MAGNETIC INTENSITY

SCALE: 1 : 100 000	
DRN:	
CKD:	
APPD:	
ISSUED:	
DATE: 9th December 1982	SHEET:

High precision geophysical mapping by
PITT RESEARCH PTY LIMITED

E.L.s 1056 & 978 S.A.

DRG. No 15413-2



Data for this map was acquired by the BMR in 1978 using a Fluxgate magnetometer. Data was acquired approximately 150 metres above G.L. with a sampling interval of 55 metres and a planned traverse spacing of approximately 1.5 km.

In 1982, this data was reprocessed by Pitt Research Pty Limited. IGRF removed data was interpolated to a grid cell size of 250m by 250m. Contours were then regenerated from this gridded data.

Contours are shown at intervals of 10 nano-Teslas.

3962(II)-2

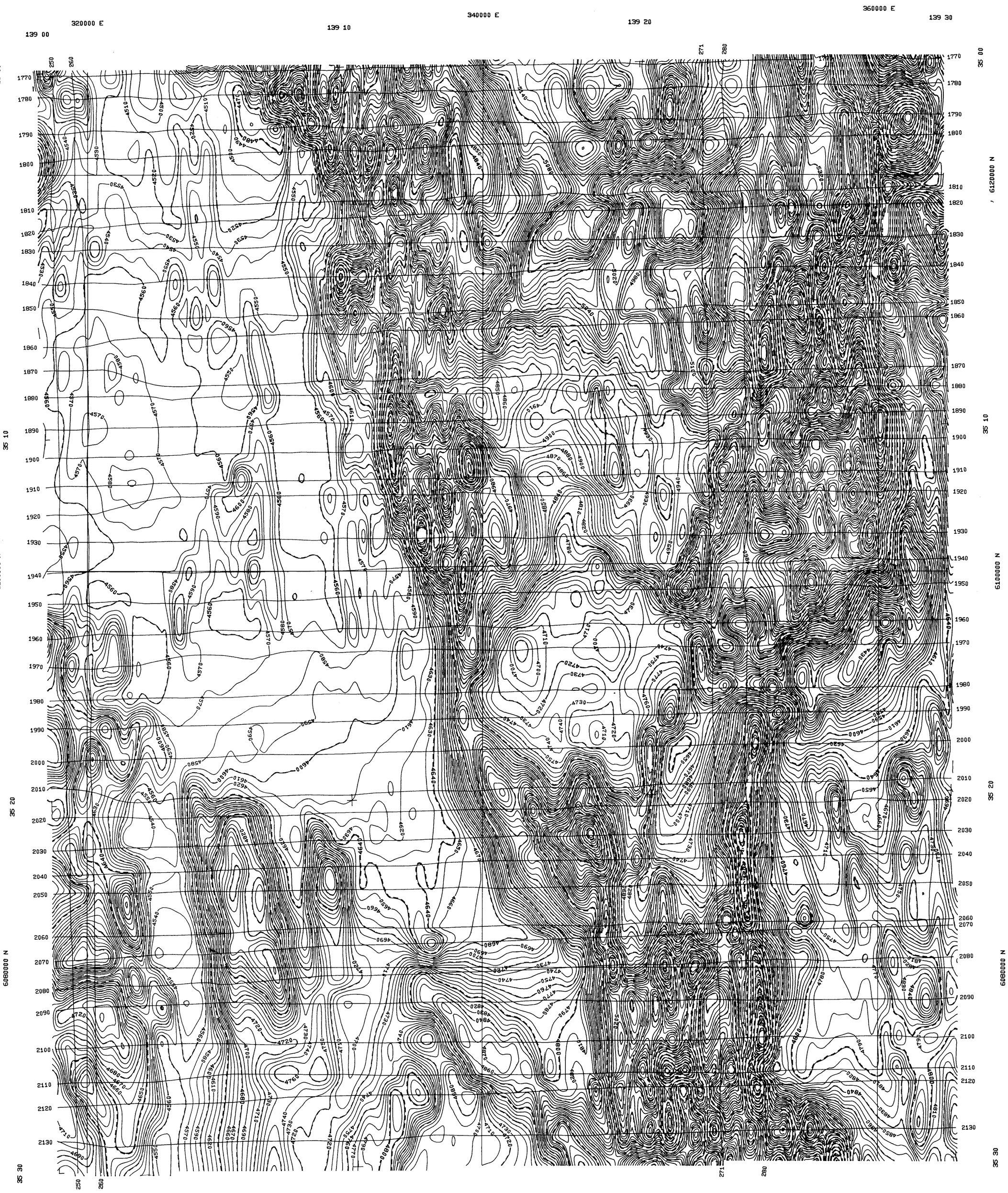
CSR LIMITED - MINERALS DIVISION

COONALPYN - 6826
RESIDUAL MAGNETIC INTENSITY

SCALE: 1 : 100 000	
DRN:	
CKD:	
APPD:	
ISSUED:	
DATE: 9th December 1982	SHEET:

High precision geophysical mapping by
PITT RESEARCH PTY LIMITED

E.L.s 1056 & 978 S.A. DRG.No. I5413-3



Data for this map was acquired by the BMR in 1978 using a Fluxgate magnetometer. Data was acquired approximately 150 metres above G.L. with a sampling interval of 55 metres and a planned traverse spacing of approximately 1.5 km.

In 1982, this data was reprocessed by Pitt Research Pty Limited. IGRF removed data was interpolated to a grid cell size of 250m by 250m. Contours were then regenerated from this gridded data.

Contours are shown at intervals of 10 nano-Teslas.

3962(II)-3

CSR LIMITED - MINERALS DIVISION

MOBILONG - 6727

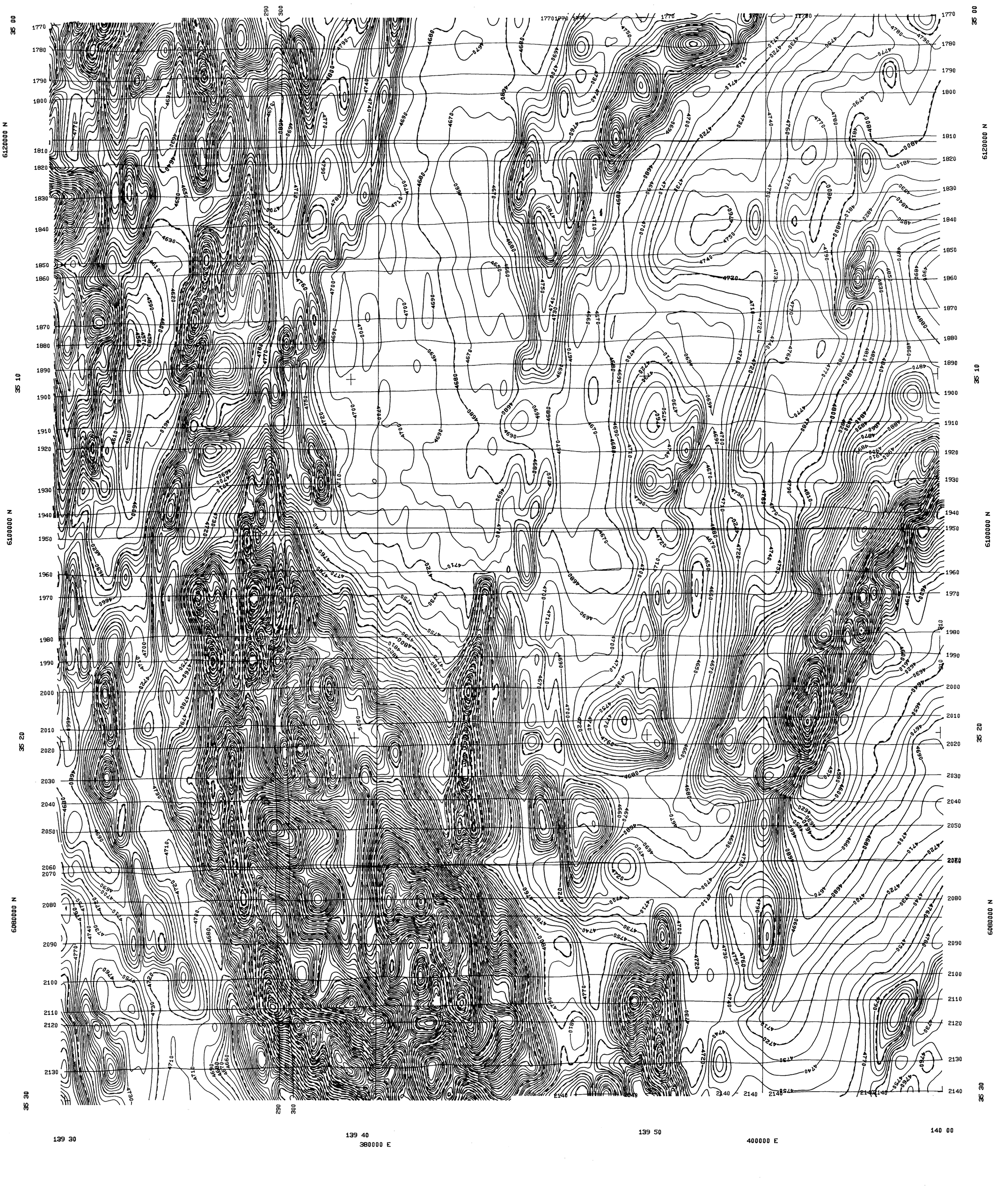
RESIDUAL MAGNETIC INTENSITY

SCALE: 1 : 100 000	
DRN:	
CKD:	
APPD:	
ISSUED:	
DATE: 9th December 1982	SHEET:

High precision geophysical mapping by PITT RESEARCH PTY LIMITED

E.L.s 1056 & 978 S.A.

DRG.No. I5413-4



Data for this map was acquired by the BMR in 1978 using a Fluxgate magnetometer. Data was acquired approximately 150 metres above G.L. with a sampling interval of 55 metres and a planned traverse spacing of approximately 1.5 km.

In 1982, this data was reprocessed by Pitt Research Pty Limited. IGRF removed data was interpolated to a grid cell size of 250m by 250m. Contours were then regenerated from this gridded data.

Contours are shown at intervals of 10 nano-Teslas.

3962 (II)-4

CSR LIMITED - MINERALS DIVISION

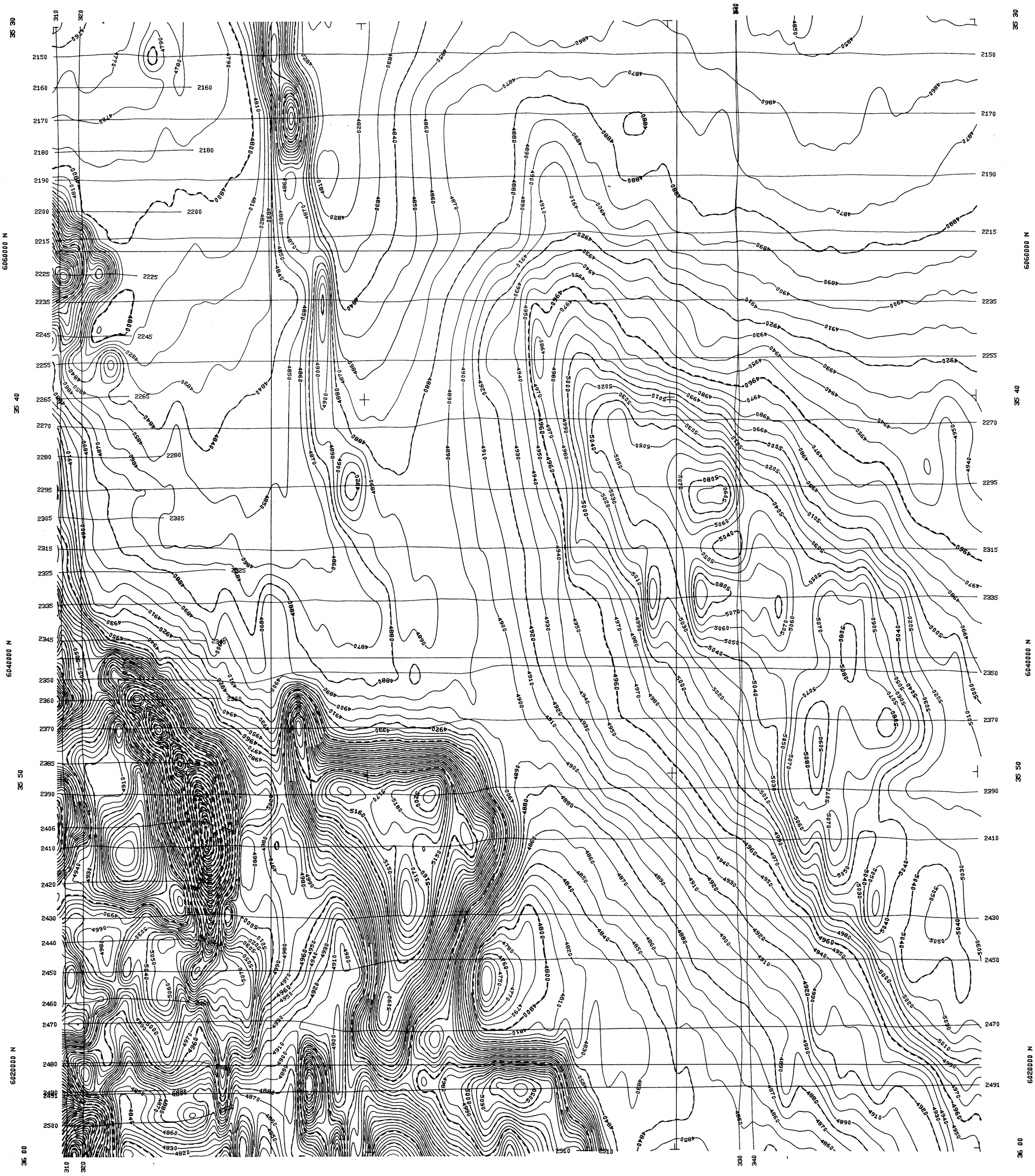
MOORLANDS - 6827

RESIDUAL MAGNETIC INTENSITY

SCALE: 1 : 100 000	
DRN:	
CKD:	
APPD:	
ISSUED:	
DATE: 9th December 1982	SHEET:

High precision geophysical mapping by
PITT RESEARCH PTY LIMITED

E.L.s 1056 & 978 S.A. DRG.No. 15413-5



Data for this map was acquired by the BMR in 1978 using a Fluxgate magnetometer. Data was acquired approximately 150 metres above G.L. with a sampling interval of 55 metres and a planned traverse spacing of approximately 1.5 km.

In 1982, this data was reprocessed by Pitt Research Pty Limited. IGRF removed data was interpolated to a grid cell size of 250m by 250m. Contours were then regenerated from this gridded data.

Contours are shown at intervals of 10 nano-Teslas.

3962(II)-5

CSR LIMITED - MINERALS DIVISION

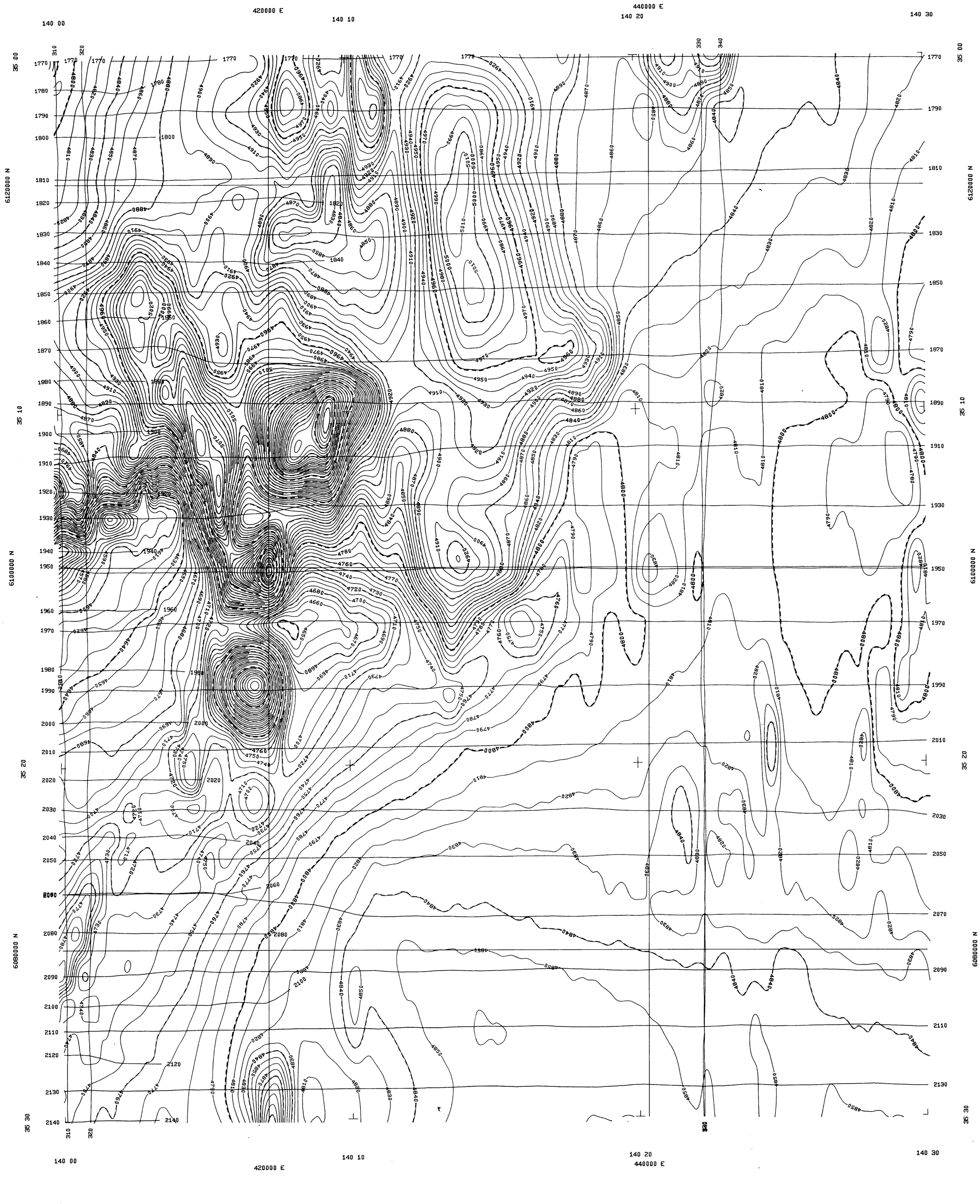
TINTINARA - 6926
RESIDUAL MAGNETIC INTENSITY

SCALE: 1 : 100 000	
DRN:	
CKD:	
APPD:	
ISSUED:	
DATE: 9th December 1982	SHEET:

High precision geophysical mapping by
PITT RESEARCH PTY LIMITED

E.L.s: 1056 & 978 S.A.

DRG. No 15413-6



Data for this map was acquired by the BMR in 1978 using a Fluxgate magnetometer. Data was acquired approximately 150 metres above G.L. with a sampling interval of 55 metres and a planned traverse spacing of approximately 1.5 km.

In 1982, this data was reprocessed by Pitt Research Pty Limited. IGRF removed data was interpolated to a grid cell size of 250m by 250m. Contours were then regenerated from this gridded data.

Contours are shown at intervals of 10 nano-Teslas.

3962(II)-6

CSR LIMITED - MINERALS DIVISION

PARRAKIE - 6927

RESIDUAL MAGNETIC INTENSITY

SCALE: 1 : 100 000	
DRN:	
CKD:	
APPD:	
ISSUED:	
DATE: 9th December 1982	SHEET:

High precision geophysical mapping by
PITT RESEARCH PTY LIMITED

E.L.s 1056 & 978 S.A.

DRG. No 15413-7

EL 1056 MENINGIE

EL 908 YUMALI
(Coal Division CSR)

EL 978 COONALPYN

G3
Odgm

G4
Odgm

G5
Odgc

G6

G7

G1
Odgm

M1

M2

M3

M4

M5

M6

M7

M7a

B1

B2

B3

B4

B5

B6

B7

B8

B9

A1

A2

A3

A4

T1

T2

T3

T4

T5

L1

F

T

340 000 m E

360 000 m E

380 000 m E

400 000 m E

6 120 000 m N

6 100 000 m N

6 080 000 m N

6 060 000 m N

6 040 000 m N

6 020 000 m N

139° 10'

139° 20'

139° 30'

139° 40'

139° 50'

35° 10'

35° 20'

35° 30'

35° 40'

35° 50'

REFERENCE

- GRANITE PLUTONS
- ? ? POSSIBLE GRANITE BASEMENT
- M AREAS OF METASEDIMENTS
- BANDED AMPHIBOLITE GNEISS
- L MAJOR LINEAMENT
- F FAULT INFERRED
- T TREND LINE
- BASIC INTRUSIVES - NORMALLY MAGNETISED
- BASIC INTRUSIVES - REVERSE MAGNETISED
- PERMIAN GLACIAL TILLS & SEDIMENTS
- E.L. BOUNDARY

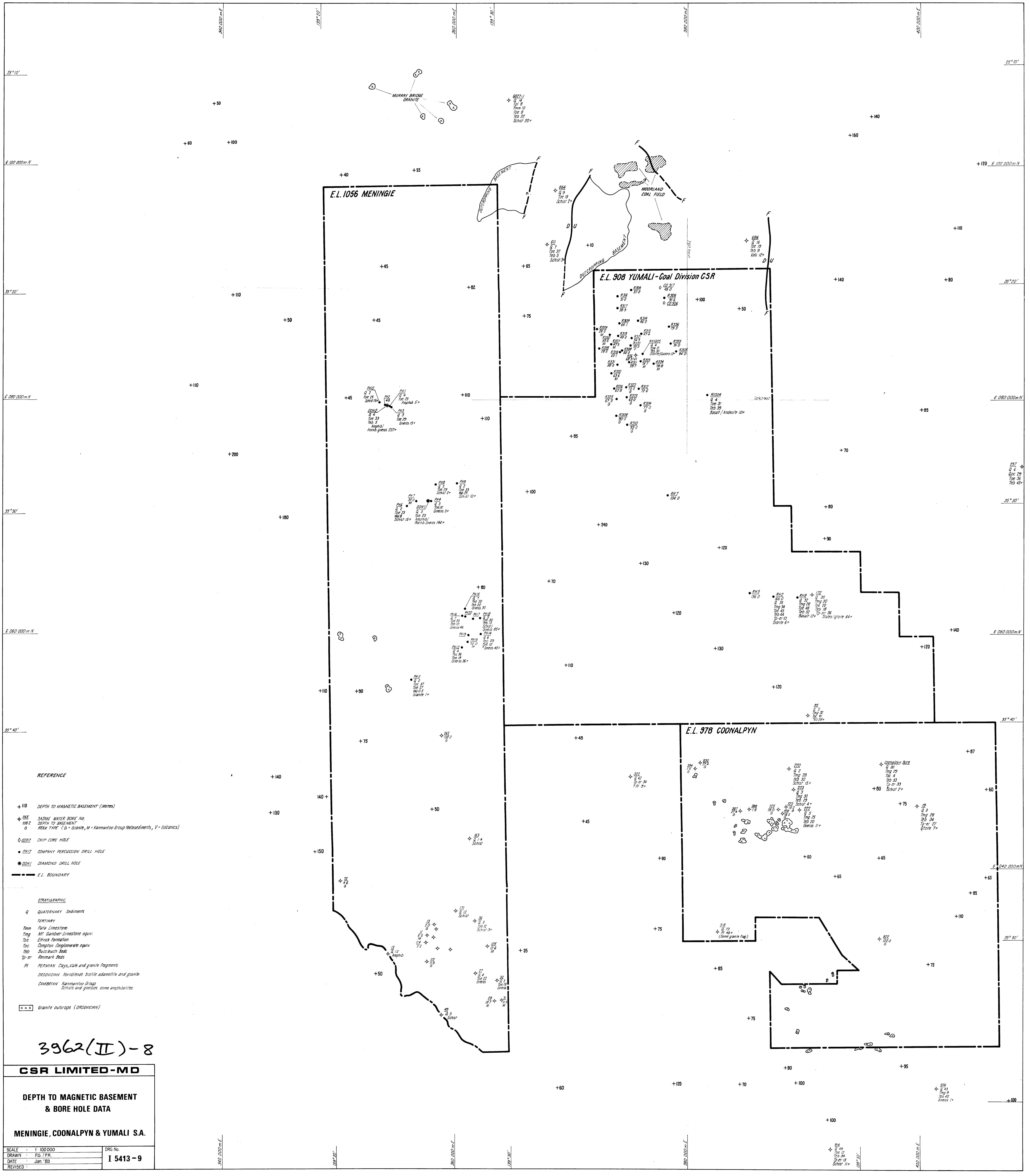
3962 (II)-7

CSR LIMITED-MD

INTERPRETED REGIONAL GEOLOGY FROM AEROMAGNETIC & DRILL HOLE DATA

BARKER - PINNAROO AREA S.A.

SCALE : 1: 100000	DRG No
DRAWN : P.G. / P.R.	I 5413 - 8
DATE : Jan. '83	
REVISED :	


E.L. 1056 MENINGIE
E.L. 908 YUMALI-Coal Division CSR
E.L. 978 COONALPYN
MURRAY BRIDGE GRANITE
MOORLAND COAL FIELD
OUTCROPPING BASEMENT
340 000 m E
360 000 m E
380 000 m E
400 000 m E
139°20'
139°30'
139°50'
6 100 000 m N
6 080 000 m N
6 060 000 m N
6 040 000 m N
35°20'
35°30'
35°40'
35°50'
6827-1 Q 14 Tpl 8 Tmm 10 Toe 8 Teb 22 Schist 20+
664 Q 9 Toe 18 Schist 2+
611 Q 7 Toe 37 Teb 5 Schist 3+
684 Q 16 Toe 19 Teb 9 Volc 12+
R1004 Q 4 Toe 31 Teb 39 Basalt / Andesite 10+
RH1005 Q 4 Toe 21 Teb 35 Diorite/Gabbro 12+
PH10 Q 2 Toe 25 Schist 15+
PH1 Q 4 Toe 23 Amphib 5+
DDH2 Q 4 Toe 33 Teb 5 Amphib/ Hornb.gneiss 237+
PH3 Q 3 Toe 29 Gneiss 15+
DDH1 Q 3 Toe 23 Amphib/ Hornb.Gneiss 144+
RH2 166·0 Q 35 Tmg 34 Toe 45 Teb 44 Tp-er 10 Diorite 6+
RH8 Q 32 Tmg 28 Toe 48 Teb 52 Basalt 12+
172 Q 35 Tmg 30 Toe 20 Teb 18 Tp-er 36 Slates/qtzite 64+
257 Q 6 Qpc 29 Toe 36 Teb 43+
95 Q 5 Tmg 32 Toc 41 Teb 28+
Coonalpyn Bore Q 30 Tmg 29 Toc 4 Teb 53 Tp-er 33 Schist 2+
220 Q 2 Tmg 28 Teb 32 Schist 15+
223 Q 3 Tmg 30 Teb 29 Schist 4+
222 Q 5 Tmg 25 Teb 20 Gneiss 11+
19 Q 3 Tmg 28 Teb 34 Tp-er 27 Qtzite 7+
322 Q 42 Tp-er 34 ?Pl 9+
518 Q 73 Pl 46+ (Some granite frag.)
822 102·0 G
974 Q 43 Tmg 9 Teb 45 Gneiss 1+
914 Q 49 Toe 12 Teb 34 Tp-er 13 Schist 11+

REFERENCE

+110 DEPTH TO MAGNETIC BASEMENT (Metres)

265 / 108·2 / G — SADME WATER BORE No. / DEPTH TO BASEMENT / ROCK TYPE (G = Granite, M = Kanmantoo Group Metasediments, V = Volcanics)

◇ CO317 CHIP CORE HOLE

• PH17 COMPANY PERCUSSION DRILL HOLE

◉ DDH1 DIAMOND DRILL HOLE

— · — E.L. BOUNDARY

STRATIGRAPHIC

Q	QUATERNARY Sediments
	TERTIARY
Tmm	Pata Limestone
Tmg	Mt. Gambier Limestone equiv.
Toe	Ettrick Formation
Toc	Compton Conglomerate equiv.
Teb	Buccleuch Beds
Tp-er	Renmark Beds
Pl	PERMIAN Clays, slate and granite fragments
	ORDOVICIAN Hornblende biotite adamellite and granite
	CAMBRIAN Kanmantoo Group Schists and gneisses some amphibolites

x x x Granite outcrops (ORDOVICIAN)

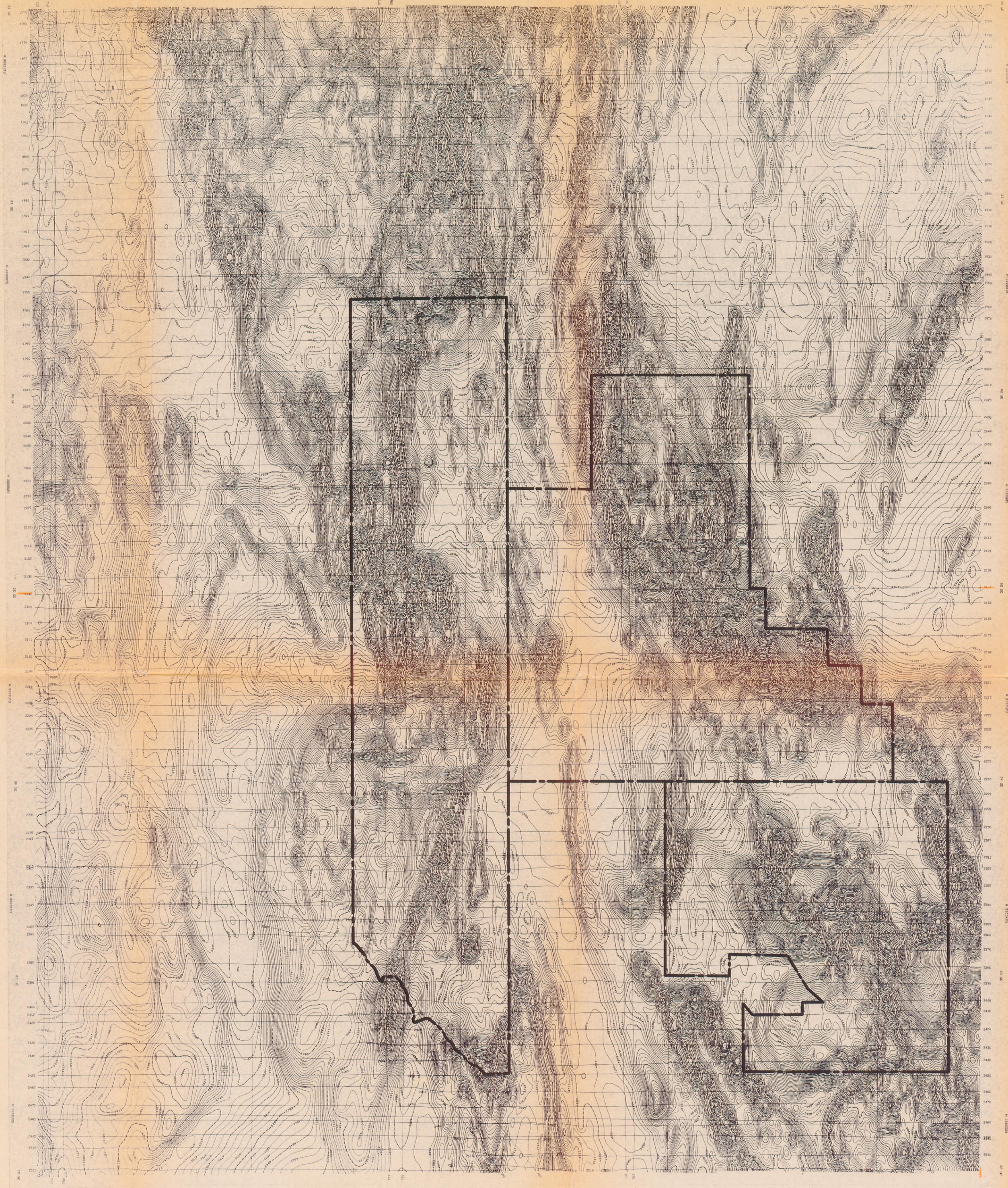
3962(II)-8

CSR LIMITED-MD

DEPTH TO MAGNETIC BASEMENT & BORE HOLE DATA

MENINGIE, COONALPYN & YUMALI S.A.

SCALE : 1:100 000	DRG.No. I 5413-9
DRAWN : P.G./P.R.	
DATE : Jan.'83	
REVISED :	



TOTAL MAGNETIC INTENSITY – MT. BARKER / PINNAROO AREA S.A.

SCALE 1 : 250 000
DATE JANUARY 1983

DRG. No.
I 5413-10

3962(II)-9

II

174

Aluminium, Minerals And Chemicals Division

ALUMINIUM, MINERALS AND CHEMICALS DIVISION
CSR LIMITED
1 O'CONNELL STREET
SYDNEY AUSTRALIA
GPO BOX 483
SYDNEY 2001 AUSTRALIA
TELEPHONE (02) 235 8333
TELEX AA20285
CABLE 'CSRMINDIV' SYDNEY

Ref: GKA/mag/415

8th August 1983

The Director-General
Department of Mines & Energy
P.O. Box 151
EASTWOOD SA 5063

Dear Sir,

RE: E.L. 1056 - MENINGIE; THIRD QUARTERLY REPORT ON EXPLORATION, PERIOD ENDING 18TH JULY 1983

Work was confined to geological analysis of data to select target areas for further exploration.

A statement of expenditure for the three months to 30th June 1983 is attached. Total expenditure for the period was $1,334.00.

Yours faithfully,

G.K. ALEXANDER
Titles Officer

encl.

THIRD QUARTERLY REPORT

ON EXPLORATION - E.L. 1056 MENINGIE

EXPENDITURE FOR THREE MONTHS TO 30TH JUNE, 1983

The quarterly expenditure was incurred as follows:-

GEOLOGICAL AND GEOPHYSICAL		$ 740
LOGISTICS		
Camp Services	$ 162	
Salaries	$ 216	
		$ 378
ADMINISTRATION		$ 216
TOTAL:		$ 1,334

II

FOURTH QUARTERLY REPORT

ON EXPLORATION - E.L. 1056 MENINGIE

EXPENDITURE FOR THREE MONTHS TO 30TH SEPTEMBER, 1983

The quarterly expenditure was incurred as follows:

GEOLOGICAL AND GEOPHYSICAL		$2,008
LOGISTICS		
Vehicles	$ 92	
Salaries	$1,611	$3,711
ADMINISTRATION		$ 322
TOTAL		$4,033

II

177

CSR

Aluminium, Minerals And Chemicals Division

ALUMINIUM, MINERALS AND CHEMICALS DIVISION
CSR LIMITED
1 O'CONNELL STREET
SYDNEY AUSTRALIA
GPO BOX 483
SYDNEY 2001 AUSTRALIA
TELEPHONE (02) 235 8333
TELEX AA20285
CABLE 'CSRMINDIV' SYDNEY

P.O. BOX 259,
GLENSIDE S.A. 5065

16 November, 1983

Ref: DGT/SR/415

The Director-General,
Department of Mines & Energy,
P.O. Box 151,
Eastwood S.A. 5063

Dear Sir,

RE: E.L. 1056 - MENINGIE FOURTH QUARTERLY REPORT ON EXPLORATION PERIOD ENDING 18TH OCTOBER 1983

During the period a photogeological study of the combined area covered by EL 978 (Coonalpyn), EL 1056 (Meningie) and EL 908 (Yumali) was made by CSR photogeologist M. I'ons. These 3 contiguous tenements are being investigated as a block at this very early, grass roots stage of exploration.

Data obtained from geophysical, geological and photogeological compilations to date will be used to select sites for exploratory drill holes to obtain information on the pre Tertiary basement terrain in the region.

A statement of expenditure for the three months to 30th September 1983 is attached. Total expenditure for the period was $4,033.

Yours faithfully,

David Brunt
Regional Manager
Central Region

c.c. D.G. Tonkin/file
G.K. Alexander
D.J. Clappison

II

CSR 176

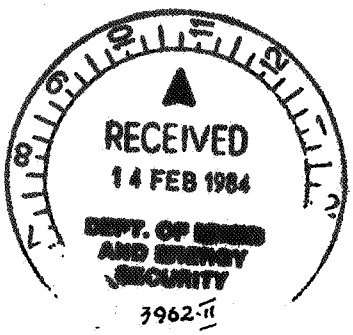
Aluminium, Minerals And Chemicals Division

ALUMINIUM, MINERALS AND CHEMICALS DIVISION
CSR LIMITED
1 O'CONNELL STREET
SYDNEY AUSTRALIA
GPO BOX 483
SYDNEY 2001 AUSTRALIA
TELEPHONE (02) 235 8333
TELEX AA20285
CABLE 'CSRMINDIV' SYDNEY
P.O. Box 259,
GLENSIDE, SA 5065

Ref: GKA/SS/415

8th February 1984

The Director-General,
Department of Mines and Energy,
P.O. Box 151,
EASTWOOD, S.A. 5063



3962 II

Dear Sir,

EXPLORATION LICENCE 1056, MENINGIE
FIFTH QUARTERLY REPORT
PERIOD ENDED 18TH JANUARY 1984

A photogeological study of the combined area covered by the above Licence, and by E.L.'s 978 (Coonalpyn) and 908 (Yumali) was evaluated along with other drill target selection techniques, including depth to basement isopach data and aeromagnetic data.

The photogeological study of E.L. 1056 indicated that the majority of the area has deep Tertiary sedimentary cover with extensive agricultural disturbance of the natural landscape. Hence very little structural information was gained by the study. Scattered outcrops of Ordovician granite were located as were numerous road gravel quarries possibly exposing Cambrian bedrock.

An isopach map of depth to basement has been compiled from water bore data, Coal Division drilling logs and interpreted depth to magnetic basement and was utilised in selection of areas of thin Tertiary and Quaternary cover within which to undertake stratigraphic drilling to basement.

Interpretation of reprocessed regional BMR aeromagnetic data outlined several inferred granites in the north of the tenement. However, further assessment of these and other data has led to the conclusion that there is little potential for discovery of the target mineralisation types within E.L. 1056 and that further exploration might not be warranted.

/....

A statement of expenditure for the three months to 31st December, 1983 is attached. Total expenditure for the period was $2,236.

Yours faithfully,

G.K. ALEXANDER
Titles Officer

E.L. 1056, MENINGIE
FIFTH QUARTERLY REPORT ON EXPLORATION
PERIOD ENDING 31ST DECEMBER, 1983

The quarterly expenditure was incurred as follows :-

GEOLOGICAL AND GEOPHYSICAL		$ 27
LOGISTICS		
Field Camp	$ 732	
Vehicle Operations	$ 77	
Salaries	$ 936	
Freight	$ -	
Travel	$ 46	$1,791
ADMINISTRATION		$ 418
	TOTAL	$2,236

8/2/84