Open File Envelope No. 5944

EL 1249

COTTAGE BORE

PROGRESS AND FINAL REPORTS FOR THE PERIOD 24/9/84 TO 23/6/86

Submitted by

CRA Exploration Pty Ltd
1986

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PRIMARY INDUSTRIES AND RESOURCES SA

CONTENTS ENVELOPE 5944

Transparencies in Cylinder 5944/1.

ENV 5944
6504 ✓

EL 1249 and EL 1311

A located data tape of the aerial magnetic/radiometric survey flown by Geometrics in December 1984 is to be provided by CRA.

In due course the tape should be available from Geophysics Section, SADME.

9 September 1986

ENVELOPE NO. 5944
6504

CONTENTS - TRANSPARENCY CYLINDER NO. TC 5944 / 1

TITLE - EL 1311 E.L.1249 LEVI RANGE COTTAGE BORE	SCALE	PLAN NO.
AERIAL MAGNETIC SURVEY FLOWN BY GEOMETRICS - DECEMBER, 1984		
- TMI CONTOURS (2 copies)	1:50 000	SAa 3457
- MAGNETIC STACKED PROFILES		
~ Sheet 1 of 4	1:50 000	SAa 3615
~ Sheet 2 of 4	"	" 3616
~ Sheet 3 of 4	"	" 3617
~ Sheet 4 of 4	"	" 3618
- FLIGHT PATH RECOVERY		
~ Sheet 1 of 4	1:50 000	SAa 3619
~ Sheet 2 of 4	"	" 3620
~ Sheet 3 of 4	"	" 3621
~ Sheet 4 of 4	"	" 3622

2E

Env. 5944, 6504

EL 1249/1311

1984 AERIAL MAGNETIC/RADIOMETRIC SURVEY - GEOMETRICS

- Located (2) and gridded (2) data tapes together with a format listing from the aerial magnetic/radiometric survey conducted by Geometrics for CRA in September, 1984 are held by Geophysics Section, SADME. (Tape No. 84 SA 11).

- Transparencies of magnetic contours, stacked magnetic profiles and flight path at 1:100 000 scale are held in transparency cylinder TC 5944/1 and possibly in TC 6504/1.

CRA EXPLORATION PTY. LIMITED

FIRST QUARTERLY REPORT ON

COTTAGE BORE E.L. 1249, SOUTH AUSTRALIA

FOR THE PERIOD ENDING 24TH DECEMBER, 1984

AUTHOR: J.P. HOWARD

COPIES TO: CIS CANBERRA
SADME

DATE: 19TH FEBRUARY, 1985

SUBMITTED BY: J.P. Howard

ACCEPTED BY:

130490

CONTENTS

1. SUMMARY

Several unexplained indicator and microdiamond occurrences, discovered by Stockdale Pty. Ltd. during the tenure of SML 706 are within E.L. 1249.

Gravel sampling in the first quarter by CRAE found a likely source, Mackys Dam, for the picroilmenites from the Nackara microdiamond occurrence. The diamonds, however, remain unexplained.

Petrological work was carried out on several other possible sources, with negative results.

An aeromagnetic survey was flown over the eastern portion of the E.L. Results are awaited.

2. INTRODUCTION

Exploration Licence 1249 was granted to CRA Exploration Pty. Limited on the 24th day of September 1984 for a period of 12 months. A schedule of the area is attached as Appendix I and is plotted on plan no. SAa 2686.

The area was applied for when a reconnaissance sample (917763) returned picroilmenites in an area from which Stockdale reported 32 microdiamonds (SADME Env. 2046). Large numbers of other indicators and several diamond occurrences remain unexplained.

This report summarises the work completed during the first quarterly period.

3. CONCLUSIONS

1. Picroilmenites at the Nackara microdiamond occurrence probably derived from Mackys Dam.
2. The Nackara microdiamonds are unexplained.
3. BHP magnetic anomlies 29, 30 and 33 are not kimberlitic.
4. BHP magnetic anomaly 30 may be associated with a diatreme.

4. RECOMMENDATIONS

Ground magnetic recovery of all interesting anomalies should be carried out when results of the aeromagnetic survey are to hand.

5. SAMPLING (Plan SAa 3147)

A single reconnaissance gravel sample (917763) was taken in the vicinity of Stockdale's indicator and microdiamond anomaly, Nackara, on the Manunda Creek. The sample contained 22 picroilmenites and suggested a southerly or southwesterly source. Stockdale's sampling revealed a possible source at Mackys Dam, 30km away. Initially this anomaly was thought to be too far away to give the 22 picroilmenites in a poor trap site. However, when Mackys Dam was resampled 905 very fresh to fresh picroilmenites, 32 fresh chromites and a pyrope garnet were present. Thus the picroilmenites from 917763 are likely to derive from Mackys Dam. However, the source of the Nackara microdiamonds has not been traced, since none were found at Mackys Dam.

6. PETROLOGY

Rock samples were taken from the following BHP drill holes (plan SAa 3148) to assess whether they could be contributing to the microdiamond, pyrope, picroilmenite anomaly at Nackara:

Magnetic anomaly 29 DH.B182
Magnetic anomaly 30 DH.B194, 197
Magnetic anomaly 32 DH.B191
Magnetic anomaly 33 DH.B187

The petrologist C. Smith concludes that anomalies 29, 32 and 33 are unlikely to have contributed to the Nackara anomaly. However anomaly 30 samples may be from a xenolith within a kimberlitic diatreme (Appendix I).

7. GEOPHYSICS

A detailed aeromagnetic survey has been flown over the eastern portion of the Licence (plan SAa 3148).

Results are awaited.

J.P. HOWARD

JPH/dp

EXPENDITURE

Expenditure for the period ending 31st December 1984, the nearest accounting period was $47,643.00, as listed below.

Payroll	$ 3,212
Supplies	368
Vehicle	273
Travel	121
Property	1,582
Tenements	1,551
Contractors	39,135
Overheads	1,401
Total	$ 47,643

LOCATION

Orroroo	SI 54-1	1:250 000 sheet S.A.
Olary	SI 54-2	1:250 000 sheet S.A.
Burra	SI 54-5	1:250 000 sheet S.A.
Chowilla	SI 54-6	1:250 000 sheet S.A.

KEYWORDS

Airborne geophys-rad-mag. gradiometer, HM study, petrology.

LIST OF PLANS

Plan No.	Title	Scale
SAa 2686	Location Plan E.L. 1249	1:250 000
SAa 3147	Gravel Sample Locations and Results	1:100 000
SAa 3148	Location of Aeromagnetic Surveys and Anomalies	1:100 000

APPENDICES

Appendix I Schedule for E.L. 1249.
Appendix II Petrology of drill hole samples from BHP Anomalies 29, 30, 32 and 33.

APPENDIX I

Schedule for E.L. 1249

E.L. Application Cottage Bore

Commencing at the intersection of latitude 32°50'S, longitude 139°26'E, thence due East to longitude 139°31'E, thence due South to latitude 33°02'S, thence due West to longitude 139°30'E, thence due South to latitude 33°04'S, thence due East to 139°31'E, thence due South to latitude 33°15'S, thence due West to longitude 139°19E, thence due North to latitude 33°07'S, thence due West to longitude 139°16'E, thence due North to latitude 32°55'S, thence due East to longitude 139°26'E, thence due North to Point of Commencement.

Approximate Area 850 km^2

APPENDIX II

Petrology of Drill Hole Samples From BHP Anomalies 29, 30, 32 and 33

CRA EXPLORATION PTY. LIMITED
(Incorporated in New South Wales)
(A SUBSIDIARY OF CRA LIMITED)
21 WYNYARD STREET, BELMONT
WESTERN AUSTRALIA 6104

P.O. BOX 175 BELMONT
WESTERN AUSTRALIA 6104
TELEPHONE (09) 277 8833
TELEGRAMS "EXPLORECO"
TELEX AA92578

013

4 May, 1984

MEMORANDUM TO : J. P. Howard

COPY TO : A. E. Hall/H. Lucas
Manager - Infor Services

FROM : C. B. Smith

917426 : B182 BHP Anomaly 29

The rock has a holocrystalline, igneous texture and essentially consists of plagioclase (54%) amphibole (36%) and magnetite (10%). The feldspar occurs as 0.6mm laths, is albite in composition, but is extensively altered to epidote, suggesting it probably once had a more lime-rich composition. The amphibole (tremolite, Mg/Mg + Fe 0.81) forms pale green to purplish grey ragged prisms to 4mm and shows minor alteration to green chlorite. Magnetite is partly oxidised and occurs as equant crystals of 0.5 to 2mm size.

Partial rock silicate analysis using the SEM gave the following result:

P_2O_5	SiO_2	TiO_2	Al_2O_3	FeO	MgO	CaO	K_2O	Na_2O	Total
0.11	48.44	2.71	14.93	11.11	5.11	6.68	0.36	5.07	94.52

This analysis, and the mineral components and compositions present, suggest the assemblage is the product of metamorphism of a basic igneous rock. Current composition is shoshonitic, i.e. trachybasalt or trachyandesite or their intrusive equivalents.

917427 : B194 BHP Anomaly 30

This rock is very similar to 917426 and is not separately described. The only observable difference is that it contains minor green mica.

917429 : B187 BHP Anomaly 33

This is also similar to 917427 but is genera-ly finer grained. Magnetite grains are about 0.1mm, feldspar and amphibole less than 0.5mm. There is a little more plagioclase than in 917426. Green mica occurs as a trace.

917427 : B197 BHP Anomaly 30

This samples consits of granular dolomite.

917427 : B194, B197 BHP Anomaly 30

The rock is extensively carbonated but shows strongly cleaved and kinked-textured areas suggestive of former mica. Ragged granules of magnetite are common.

.../3

If the samples 917427, B197 and B194 are from the same source, their markedly different compositions could suggest the possibility of their being xenoliths in a diatreme (??).

917428, sample 1 B191 BHP Anomaly 32

The sample consists of 0.05mm plates of brown phlogopite forming a fairly even-grained disorientated aggregate It is associated with fine granules of magnetite.

The phlogopite has about 1% TiO_2, 15% Al_2O_3 and Mg/Mg+Fe = 0.72. This composition is fairly close to many kimberlitic micas, but is a little low in Mg. The composition does not match that of lamproite mica.

917428, sample 2 B191 BHP Anomaly 32

The rock consists of brown mica (66%) and patches of carbonate plus minor pale green chlorite. The mica forms disoriented aggregates of plates to 1.5mm which are often kinked. One finer grained portion of the rock is similar to 917428 but contains some carbonate plus green chlorite.

The resemblance between 917428 and the micaceous xenolith in B79 is noted.

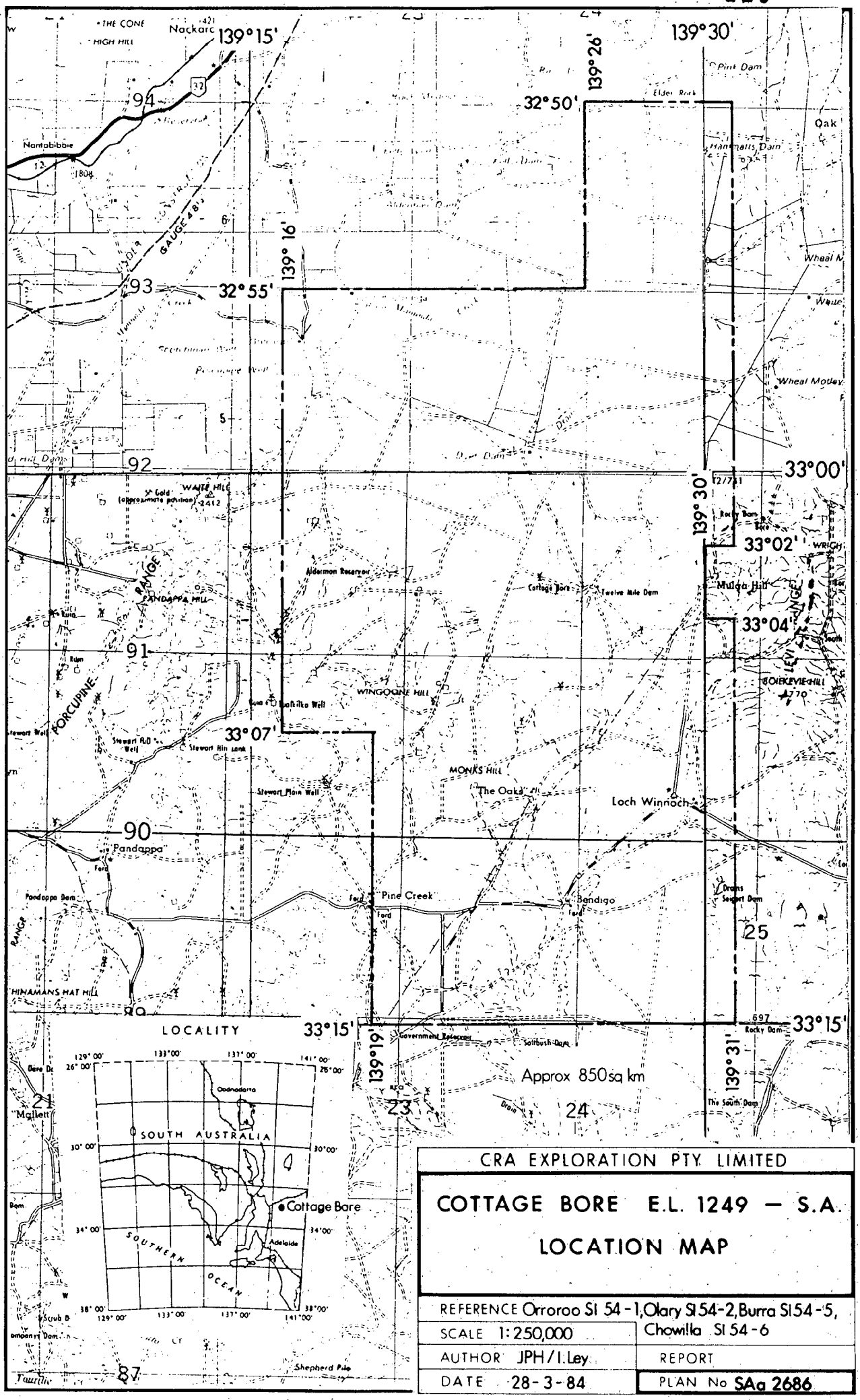
Conclusions

It is concluded that 917431 represents a kimberlitic rock but has probably not been the source of the pyrope and ilmenite in gravel sample 917763 because of the absence of chromite in the latter (whereas chromite is abundant in 917431).

The other samples examined are not kimberlites and should not have contributed pyrope and ilmenite to the gravel sample. The field evidence need checking to consider the possibility of some of these other samples being xenoliths in a kimberlitic diatreme. A variety of rock types are present, some contain phlogopite, and a xenolith is present in 917431 which resembles 917428.

C. B. Smith

CBS/sy



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COTTAGE BORE E.L. 1249 — S.A.

LOCATION MAP

REFERENCE Orroroo SI 54-1, Olary SI 54-2, Burra SI 54-5, Chowilla SI 54-6	
SCALE 1:250,000	
AUTHOR JPH/I.Ley	REPORT
DATE 28-3-84	PLAN No SAa 2686

CRA EXPLORATION PTY. LIMITED

SECOND QUARTERLY REPORT ON COTTAGE BORE E.L. 1249, SOUTH AUSTRALIA FOR THE PERIOD ENDING 24TH MARCH, 1985

AUTHOR: J.P. HOWARD

COPIES TO: CIS CANBERRA
SADME

DATE: 16TH APRIL, 1985

SUBMITTED BY: R.J.L. Howard

ACCEPTED BY:

CONTENTS

1. SUMMARY

Aeromagnetic and radiometric data has been received from Geometrics. Interpretation is in progress.

2. INTRODUCTION

Exploration Licence 1249 was granted to CRA Exploration Pty. Limited on the 24th day of September 1984 for a period of 12 months.

The area was applied for when a reconnaissance sample (917763) returned picroilmenites in an area from which Stockdale reported 32 microdiamonds (SADME Env. 2046). Large numbers of other indicators and several diamond occurrences remain unexplained.

CRAE has carried out petrological and heavy mineral observation work on possible source rocks without indicating a source for the microdiamonds. An aeromagnetic and radiometric survey has been flown over the eastern portion of the licence.

3. CONCLUSIONS AND RECOMMENDATIONS

Ground recovery of anomalies should be carried out when interpretation of the airborne geophysical survey is complete.

4. GEOPHYSICS

Final aeromagnetic and radiometric data have been received from Geometrics. The specifications for the survey are as follows:

Flight Line Spacing;	
Traverse Line:	250 Metres
Tie Line:	4,000 Metres
Flight Line Direction:	East - West
Tie Line Direction:	North - South
Sample Interval:	35 Metres
Flight Path Record:	Hitachi Colour Video Camera
Digital Acquisition System:	Geometrics G-714
Survey Altitude:	80 Metres MTC
Navigation:	Singer Doppler Navigation System
AMG Grid Coordinates:	Australian Map Grid Zone 54
Flown:	September 1984
Projection:	Australian National Spheroid
Flight Line Recovery:	Visually to 1:25000 Photo Enlargements
Magnetometers:	Geometrics G-813 Proton Precession
Sensitivity:	0.2 nT
Area Covered:	650 Square Kilometres
Line Kilometres:	2770 Kilometres

Geophysical interpretation is in progress. Location of the survey is shown on plan SAa 3148.

R.J. Lhane
for
J.P. HOWARD

JPH/dp

EXPENDITURE

Expenditure for the period ending 31st March, 1985, the nearest accounting period was $13,332.00, as listed below.

Payroll	$ 8,029
Supplies	584
Vehicle	138
Travel	95
Property	817
Tenements	18
Overheads	3,651
Total	$ 13,332

LOCATION

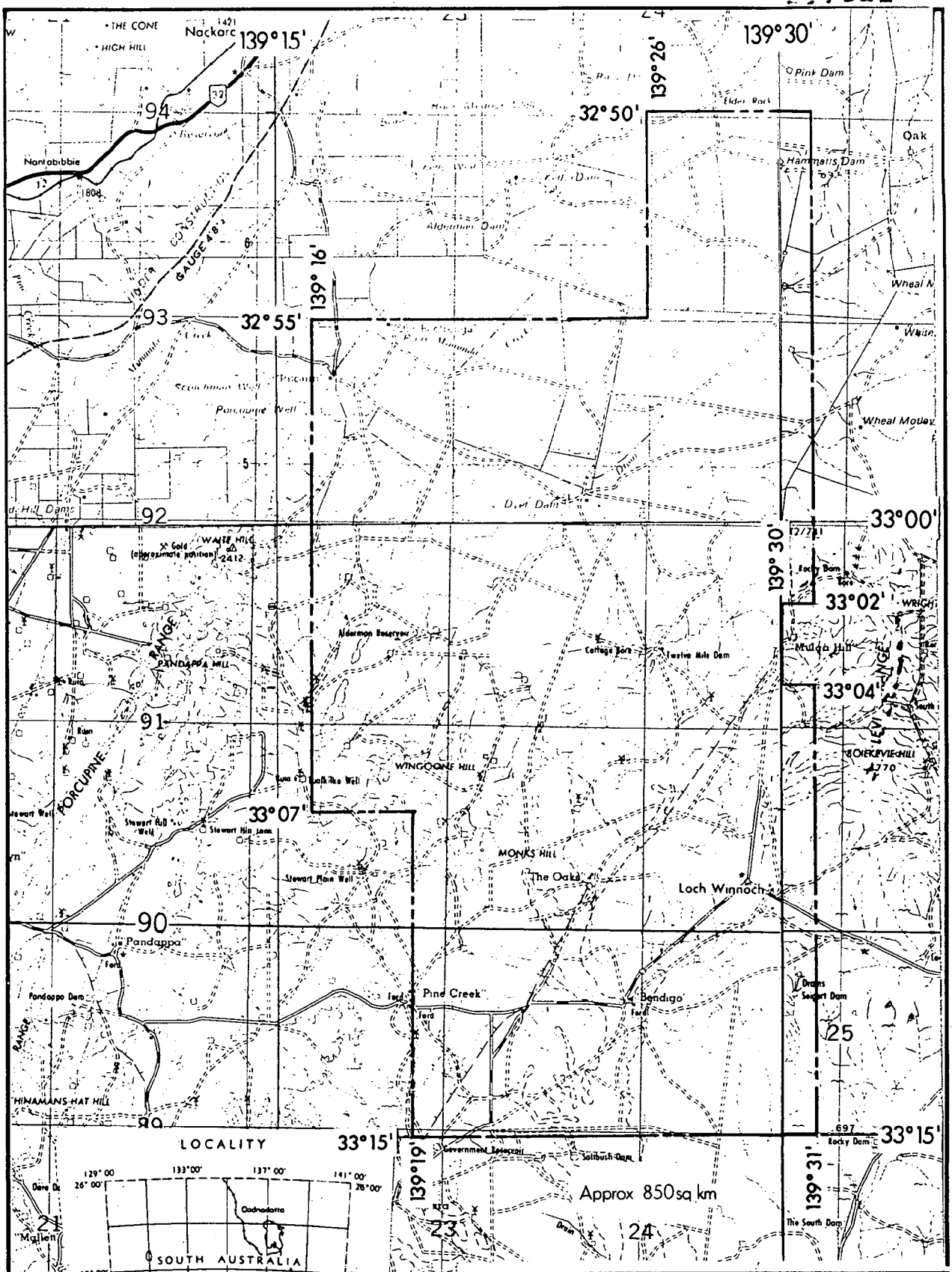
Orroroo	SI 54-1	1:250 000 sheet S.A.
Olary	SI 54-2	1:250 000 sheet S.A.
Burra	SI 54-5	1:250 000 sheet S.A.
Chowilla	SI 54-6	1:250 000 sheet S.A.

KEYWORDS

Airborne geophys-rad-mag. gradiometer.

LIST OF PLANS

Plan No.	Title	Scale
SAa 2686	Location Plan E.L. 1249	1:250 000
SAa 3148	Location of Aeromagnetic Surveys and Anomalies	1:100 000



CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L. 1249 — S.A.

LOCATION MAP

REFERENCE Orroroo SI 54-1, Olary SI 54-2, Burra SI 54-5, Chowilla SI 54-6	
SCALE 1:250,000	
AUTHOR JPH	REPORT 130496
DATE March '85	PLAN No SAg 2686

CRA EXPLORATION PTY. LIMITED

THIRD QUARTERLY REPORT ON

COTTAGE BORE E.L. 1249, SOUTH AUSTRALIA,

FOR THE PERIOD ENDING 24TH JUNE, 1985

AUTHOR: R.J.L. LANE

COPIES TO: CIS CANBERRA
SADME

DATE: 9TH AUGUST, 1985

SUBMITTED BY: R.J.L. Lane

ACCEPTED BY:

CONTENTS

1. SUMMARY

Magnetic anomalies have been selected from the 1984 Cottage Bore (CRAE) and 1979 Peterborough (BHP) Aeromagnetic Surveys for ground recovery and sampling as kimberlite targets.

2. INTRODUCTION

Exploration Licence No. 1249 was granted to CRA Exploration Pty. Limited on the 24th day of September, 1984 for a period of 12 months.

The area was applied for when a reconnaissance sample (917763) returned picroilmenites in an area from which Stockdale reported 32 microdiamonds (SADME Env. 2046). Large numbers of other indicators and several diamond occurrences remain unexplained.

CRAE has carried out petrological and heavy mineral observation work on possible source rocks without indicating a source for the microdiamonds. An aeromagnetic and radiometric survey has been flown over the eastern portion of the licence.

3. CONCLUSIONS AND RECOMMENDATIONS

Ground recovery of the selected anomalies should be carried out during the next quarter.

4. GEOPHYSICS

The 1984 Cottage Bore Survey was flown over the eastern half of the licence to help locate the source of indicators and diamonds obtained from samples within the licence area. The western half of the licence is covered by an aeromagnetic survey flown by Geoex for BHP in 1979.

Discrete magnetic anomalies were selected for ground recovery and sampling as kimberlite targets (plans SAa 0000 and SAa 0000).

R.J.L. LANE

RJLL/pw

EXPENDITURE

Expenditure for the period ending 30th June, 1985, the nearest accounting period was $9363.00, as listed below.

	$
Payroll	4 313
Supplies	402
Vehicle	237
Rent	524
Contractors	1 965
Laboratory	208
Overheads	1 714
Total	$9 363

LOCATION

Orroroo	SI 54-1	1:250 000 sheet, S.A.
Olary	SI 54-2	1:250 000 sheet, S.A.
Burra	SI 54-5	1:250 000 sheet, S.A.
Chowilla	SI 54-6	1:250 000 sheet, S.A.

KEYWORDS

Airborne geophys-rad-mag. gradiometer.

LIST OF PLANS

Plan No.	Title	Scale
SAa 2686	Location Plan E.L. 1249 Cottage Bore	1:250 000
SAa 3531	Cottage Bore E.L. 1249, S.A. - TMI Contours and Anomalies (BHP Survey)	1:100 000
SAa 3532	Cottage Bore E.L. 1249, S.A. - TMI Contours and Anomalies (CRAE Survey)	1:100 000

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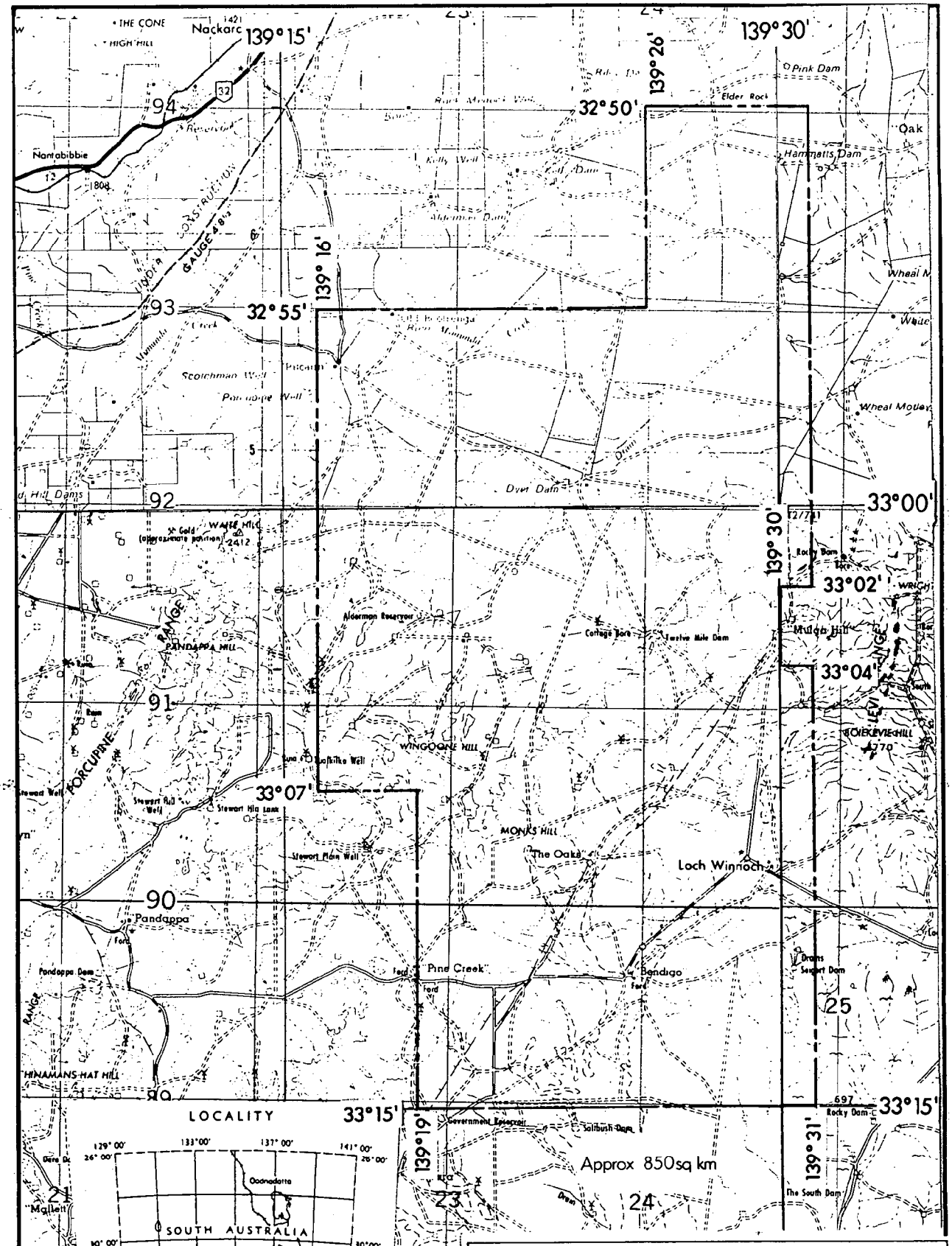


CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L. 1249 — S.A.

LOCATION MAP

REFERENCE Orroroo SI 54-1, Olary SI 54-2, Burra SI 54-5, Chowilla SI 54-6	
SCALE 1:250,000	REPORT 130567
AUTHOR JPH	PLAN No SAg 2686
DATE June '85	

CRA EXPLORATION PTY. LIMITED

FOURTH QUARTERLY REPORT ON COTTAGE BORE E.L. 1249, SOUTH AUSTRALIA, FOR THE PERIOD ENDING 24TH SEPTEMBER, 1985

AUTHOR: J.P. HOWARD

COPIES TO: CIS CANBERRA
SADME

DATE: 15TH OCTOBER, 1985

SUBMITTED BY: J.P. Howard

ACCEPTED BY:

130585

CONTENTS

1. SUMMARY

During ground checking of 16 aeromagnetic and 13 photo geological anomalies, a variety of metasomatically altered basic to ultrabasic rocks were found.

Results of ground magnetometer traversing, heavy mineral sampling, petrology and rock geochemistry are presented here and summarised in Table 1.

Potential exists for the discovery of diamondiferous kimberlite at eight magnetic and two photo geological anomalies.

2. INTRODUCTION

Exploration Licence No. 1249 was granted to CRA Exploration Pty. Limited on the 24th day of September, 1984 for a period of 12 months.

The area was applied for when a reconnaissance sample (917763) returned picroilmenites in an area from which Stockdale reported 32 microdiamonds (Nackara) (SADME Env. 2046). Large numbers of other indicators and several diamond occurrences also remain unexplained.

CRAE has carried out petrological and heavy mineral observation work on possible source rocks without as yet indicating a source for the microdiamonds. An aeromagnetic and radiometric survey has been flown over the eastern portion of the licence.

Magnetic anomalies were selected from the 1984 Cottage Bore (CRAE) and 1979 Peterborough (BHP) Aeromagnetic Surveys. These anomalies are thought to be potential sources for the microdiamonds mentioned above.

This report describes the results of ground magnetic recovery and sampling of these features, together with ground checking and sampling of selected aerial photograph anomalies.

3. CONCLUSIONS

Any one of the magnetic and photo-geological anomalies in the Dyer Dam drainage could be caused by the kimberlite body which has shed the microdiamonds found at Nackara and, perhaps, the larger diamonds at Macky's Dam and The Oaks.

4. RECOMMENDATIONS

Reverse circulation drilling should be carried out at the following magnetic and photo-geological anomalies, at the grid locations shown on Table 1:- CB6, 7, 8, 15, 16, 17, 23 and 26 and CBP1 and 13.

5. GEOPHYSICS

Ground recovery of 16 aeromagnetic anomalies has been completed. A report by R.J.L. Lane, attached as Appendix I, gives details of each anomaly. Total magnetic intensity profiles are referred to under the List of Plans at the back of this report and a summary of each anomaly is given on Table 1.

Outcropping basic rocks at CB18, 19, 20 and 27, and thin sources at CB11 and 24 downgraded these anomalies for further work. Anomaly CB9 (BHP An. 27) is thought to be caused by magnetic material in a palaeochannel. A contouring idiosyncracy is probably responsible for anomaly CB10.

The remainder of the anomalies are thought to be potential sources for the Nackara microdiamonds.

6. AERIAL PHOTOGRAPHY

Good quality colour photography was flown for BHP in 1979 with the following specifications:- Flown by Stereometric Services Airphoto; Scale: 1:250 000; Height: 500m. The survey (Nr. 243483) was acquired by CRAE through the SADME and thirteen anomalies were selected and subsequently ground checked. Results are presented on Plan SAa 3129 and on Table 1.

Outcropping Adelaidean sediments explain five of the features (CBP6, 8, 9, 10 and 12) and negative indicator results downgrade CBP7 and 11. Two of the remainder are potential kimberlites having significant kimberlitic indicator mineral anomalies (CBP7 and 13), whilst results are awaited for CBP2, 3 and 4.

7. PETROLOGY

Rock samples submitted for petrological description from magnetic and photo-geological anomalies are summarised below. Full descriptions are presented in Appendix II.

Anomaly CB18

S.No. 1158373: uralitised and saussuritised gabbro with leucoxenised titanium magnetite.

Anomaly CB19

S.No. 1158374: porphyritic metabasalt with metasomatic epidote and hornblende.

S.No. 1158375: metamorphosed, porphyritic and vesicular basalt. Vesicles contain epidote, chlorite, phlogopite, hornblende and magnetite.

S.No. 1158376: meta-peridotite consisting of massive chlorite-tremolite with fine magnetite and minor leucoxene.

Anomaly CBP13

S.No. 1158392: metasomatic quartz breccia.

S.No. 1158396: massive albite-phlogopite metsomatically altered ?basalt.

A kimberlite could be the cause of anomaly CBP13, whcih is an area completely devoid of vegetation, approximately 200m in diameter. The presence of phlogopite and kimberlitic indicator minerals upgrades this prospect.

8. GEOCHEMISTRY

Two samples were analysed by AMDEL for the following range of elements: K, Na, Mg, Fe, Mn, Ba, Nb, Sr, Ni, Cr, Ca, Ce, La, Cu Zn. Results, attached as Appendix III, are as expected for the gabbro and peridotite analysed.

9. SAMPLING FOR INDICATOR MINERALS

9.1 Magnetic and Photo Features

Approximately 100kg of loam sample was collected from each of the magnetic and photo anomalies (locations are shown on plans SAa 3148 and 3129 respectively). Results to date are presented on Plan SAa 3147.

9.2 Macky's Dam Indicator Anomaly

Loam samples were collected at approximately 250m centres over a rise adjacent to positive gravel sample no. 917460. Although a thin layer of reworked gravels are present throughout the grid, it is thought that kimberlitic indicators from the underlying rocks will be reflected in the loam samples.

Sample locations and results are presented on plan SAa 3565.

9.3 Double Dam Indicator Anomaly

Sampling of palaeogravels in the vicinity of a positive sample taken by Stockdale Pty. Ltd. at Double Dam has returned chrome diopsides together with pyrope, chromite and picroilmenite. Similar indicators were found at magnetic anomaly CB9, suggesting a westerly source for the indicators.

J.P. Howard.

J.P. HOWARD

JPH/dp

EXPENDITURE

Expenditure for the period ending 30th September, 1985, the nearest accounting period was $33,694.00, as listed below.

	$
Payroll	13 369
Supplies	1 571
Vehicle	2 129
Travel	351
Rent	1 127
Tenement	446
Contractors	594
Laboratory	7 197
Overheads	6 910
Total	$ 33 694

LOCATION

Orroroo	SI 54-1	1:250 000 sheet, S.A.
Olary	SI 54-2	1:250 000 sheet, S.A.
Burra	SI 54-5	1:250 000 sheet, S.A.
Chowilla	SI 54-6	1:250 000 sheet, S.A.

KEYWORDS

Airborne geophys-rad-mag. gradiometer.

LIST OF PLANS

Plan No.	Title	Scale
SAa 2686	Location Plan E.L. 1249 Cottage Bore	1:250 000
SAa 3129	Geology & Photo Anomalies	1:100 000
SAa 3147	Gravel & Loam Sample Locations & Results	1:100 000
SAa 3148	Location of Aeromagnetic Surveys & Anomalies	
SAa 3565	Macky's Dam Loam Sample Grid	1: 10 000
SAa 3547	Ground Magnetic Profiles Anomaly CB6	1: 10 000
SAa 3548	Ground Magnetic Profiles Anomaly CB7&8	1: 10 000
SAa 3534	Ground Magnetic Profiles Anomaly CB9	1: 10 000
SAa 3535	Ground Magnetic Profiles Anomaly CB10	1: 10 000
SAa 3553	Ground Magnetic Profiles Anomaly CB11	1: 10 000
SAa 3537	Ground Magnetic Profiles Anomaly CB15	1: 10 000
SAa 3538	Ground Magnetic Profiles Anomaly CB16	1: 10 000
SAa 3539	Ground Magnetic Profiles Anomaly CB17, 18 and 26	1: 10 000
SAa 3540	Ground Magnetic Profiles Anomaly CB19&20	1: 10 000
SAa 3543	Ground Magnetic Profiles Anomaly CB23	1: 10 000
SAa 3098	Ground Magnetic Profiles Anomaly CB24	1: 10 000
SAa 3556	Ground Magnetic Profiles Anomaly CB27	1: 10 000

LIST OF APPENDICES

Appendix I	Report by R.J.L. Lane on "Recovery of magnetic anomalies from the 1984 CRAE Cottage Bore Survey and the 1979 BHP Peterborough Survey".
Appendix II	Petrology
Appendix III	Geochemistry

APPENDIX I

Report by R.J.L. Lane on

"Recovery of Magnetic Anomalies from the 1984 CRAE Cottage Bore Survey and the 1979 BHP Peterborough Survey

RECOVERY OF MAGNETIC ANOMALIES FROM THE 1984 CRAE COTTAGE BORE SURVEY AND THE 1979 BHP PETERBOROUGH SURVEY

Anomalies CB 1 to 10 come from the BHP survey, while anomalies CB 11 to 26 come from the CRAE survey. Anomalies were selected using stacked profiles, contour plans and image processed data presented on slides.

The known kimberlite at Pine Creek displays a simple discrete 40 nT magnetic anomaly on the BHP survey. Three other discrete anomalies 3,5 kilometers to the north were drilled by BHP and found to be kimberlites (AN58, AN64, AN68). Other discrete anomalies further to the north were drilled by BHP and found to be caused by 'mafic' rocks and basalts. The work so far on Cottage Bore EL 1245 and Levi Range ELA suggests a continuation of the province to the east.

Ground conditions for magnetics were found to be quite noisy, with a 20 nT noise envelope being common despite using a 2,5 m staff with the sensor. In some cases where mafic bodies were found to outcrop or subcrop, material with significant susceptibility was close to the surface, resulting in "noisy" profiles. In other areas, large amplitude variations due to shallow sources were more noticeable on broad, low ridges and within creek channels.

CB 4 AND 5

These anomalies were selected from the contoured data, but the image processed data suggests that they are part of linear or arcuate stratigraphic magnetic trends. No further work is planned for these features.

CB 6

This anomaly falls within the grid used to investigate the Mackays Dam indicator occurrence. A number of N/S stratigraphic trends are obvious on the western side of the ground magnetic data. This strike direction is consistent with outcrops of shale and mudstone within the eroded creek at this locality. The anomaly within the centre of the grid is of more doubtful origin. A 150 nT anomaly is seen on the middle three lines with lesser anomalies on the northern and southern lines.

Drilling around 4750 mE 9800 mN would determine the source of the anomaly, but it is recommended that the results of the loam grid be obtained before any further action is taken.

CB 7 AND 8

These features are weak (20nT) anomalies on the airborne data. Ground recovery proved difficult due to the level of near surface noise (+/- 100 nT spikes).

CB 8 is a poorly defined 100 nT anomaly on the ground data centred at 5000 mE 10000 mN, on the eastern side of a dam. Gravel in the watercourse 250 m to the NNE was sampled (893116).

CB 7 is a much clearer anomaly, with an amplitude of 100 nT and much less near surface noise. There was no obvious source of the anomaly. The anomaly occurs on the eastern flank of a N/S ridge with outcropping quartzite or silcrete on it. The outcrop is located at approximately 4700 mE 9350 mN. Sample 893115 was taken at the centre of the anomaly (4900 mE 9550 mN).

Modelling of CB7 was carried out assuming that there was a single source for the anomaly. Straight-slope and half-width methods gave depth estimates between 160 and 180 m. MAGMOD modelling for line 9550 N using a prism model fixed at 200 m width N/S gave depth-to-top values of 140 to 200 m, and E/W widths of 300 m. The body was centred at 4850 E, 9550 N. Attempts to fix the depth at shallower values produced visually poorer fits.

The poor definition of anomaly CB8 precluded any sophisticated modelling, but the half-width method suggests a depth to top of 140 m for a body centred at 5000 E, 10050 N.

CB 9

On the BHP survey, CB 9 is a 10 nT dipolar feature lying within the present day catchment area of the Double Dam indicator anomaly. BHP reported drilling the anomaly, but only intersected Adelaidean shales and quartzites. Two ground magnetic lines were run over the anomaly, centred on the BHP drillhole to determine whether the correct feature was drilled. These magnetic profiles show that the source of the aeromag anomaly is a patch of near surface noise.

Sample 893101 included material from the surrounding area as well as drill cuttings. The indicators obtained in this sample may be from the drill cuttings or from material lying on the surface around the hole, or from both.

Inspection of the image processed aeromagnetic data showed several subtle magnetic trends which may result from an accumulation of magnetic material in paleodrainage channels passing close to the drillhole.

CB 10

This 10 nT low on the BHP survey occurs within the present day catchment of the Double Dam indicator anomaly. Two lines of ground magnetics failed to locate the anomaly. This may be due to the +/- 20 nT noise, but when the BHP data is closely inspected, it is found that the low occurs between two flight lines. It may well be that this feature is simply an artifact of the contouring.

CB 11

This anomaly lies just within the Cottage Bore EL, adjacent to a cluster of discrete magnetic features investigated by BHP and found to be "mafics".

The ground magnetic profiles for CB11 show two N/S trending high amplitude (>100 nT) features. Dark green altered basalt(?) float was abundant over both magnetic anomalies. Micaceous material, similar to the sample from CB12 described as "potassically altered basalt", was found near the contact of the basic with the host Adelaidean dolomite.

The magnetic profiles would indicate a depth to magnetic source of 20 to 30 m despite the presence of abundant material with significant susceptibility (>0.002 SI) at the surface.

Loam sample 1237756 adequately sampled the source of the anomaly.

CB 15

CB 15 occurs near the centre of a broad river channel. A pervasive cover of silt prevented a loam sample from being taken.

Half-width estimation techniques gave a depth to top value of 45 m. MAGMOD modelling of the anomaly suggested a high susceptibility central part of the magnetic body accounting for the major peak on line 10000 N, with lower susceptibility material over the surrounding 100 + m. The central part of the body has an E/W width of 80 m, a N/S width of 40 m and a depth to top of 50 m.

Drilling of the central part of the magnetic body at 4990 E, 9960 N would be recommended to determine the nature of the source.

CB 16

On ground magnetic profiles, CB 16 is a well defined 130 nT anomaly immediately to the SW of a NNW trending linear feature. The usual float of angular to rounded quartzite pebbles, calcrete and ironstone occurred around the centre of the anomaly but there was no obvious magnetic source.

The magnetic profile for line 10000 N is not a result of a simple prismatic body of constant magnetization, hence modelling using MAGMOD would be of little value. Half-width and straight-slope estimation methods give depth to top values of 50 to 80 m. Drilling at 5000 E, 9970 N would be recommended to test the magnetic source.

CB 17, 18 AND 26

A cluster of anomalies were identified from the stacked profiles, with three being selected for ground recovery. Well defined 200 to 400 nT anomalies were located, with widespread outcrops of a medium grained feldspar-amphibole rock occurring at CB 18. Petrological work has identified this rock as an altered gabbro. The loam sample at this site should adequately test the magnetic anomaly. CB 17 and CB 26 occur on the edge of an alluvial plain, but close to float of similar material to CB 18. Considering the close spatial relationship of mafic intrusives and kimberlites in the Pine Creek area and the nature of the indicators from the loam samples above CB17 and CB26, drill testing of these two unexplained magnetic anomalies should be carried out.

The outcropping gabbro at CB18 has an interesting magnetic signature for such a shallow depth to top! The short wavelenth "noise" spikes may in fact relate to shallow bedrock magnetic sources rather than maghaemite in the overburden, but the general features of the mangetic profile suggest a depth to top of between 50 and 150 m. This experience should be carried through to other anomalies which give similar depth to top values, giving some justification for drill testing to say 50 m in these cases and expecting to intersect either non-magnetic or weathered rock associated with the magnetic body.

Straight-slope estimation methods suggest depth to top values of 50 to 75 m for both CB17 and CB26. Drilling at 4500 E, 10550 N would test the magnetic source at CB17. 4450 E, 9950 N would be the drillhole location for CB26.

CB 19 AND 20

A cluster of three 600 to 700 nT anomalies were found within an 800 m area around CB 19 and 20. Two discrete lows are also evident on line 5000 E, some 700 m to the south of CB19. Outcrops of a dark green, fine grained igneous rock with magnetite phenocrysts were found at the centre of CB 19. Float of the same material was present at CB 20. Petrological work revealed that the float was composed of altered basalt and meta-peridotite.

These anomalies should be adequately tested by the loam samples taken over both of them. Again, despite the presence of subcropping magnetic material, the depth to top values obtained using various estimation methods and MAGMOD modelling remain at 40 to 60 m.

CB 23

CB 23 was a promising discrete feature on the image processed data immediately to the NW of a major NE trending fault. Ground conditions were found to be very noisy, with near surface anomalies up to several thousand nT. The anomaly is a broad 100 nT feature in the centre of a patch of noise. Ironstone float was abundant on the slight rise in this central region. Some large massive hematite cobbles were found.

The width of the anomaly suggests a depth to top of several hundred metres. Alternately, some of the "noise" in the data may be due to shallow bedrock magnetic sources having a somewhat patchy distribution. Concidering the proximity of this anomaly to the diamond ocurrence at 352150 mE 6334150 mN, and the reasonable lateral extent of the feature, some shallow drilling may be warranted. The centre of the anomaly is at 4850 mE 9950 mN.

CB 24

This was the Hammatts Dam anomaly recovered earlier in the year. On the ground, the feature is a well defined 450 nT anomaly. Details of the interpretation are given in a memorandum from RJLL to JPH (18th February, 1985). The magnetic source was modelled as a thin tabular body 400 m in length, striking 010 degrees magnetic. The depth to top was 170 to 180 m, making this anomaly unattractive unless signs of a nonmagnetic kimberlite can be discovered above the magnetic body.

CB 27

A 0,6 to 0,8 mm diamond was reported by Stockdale in a loam(?) sample from 343100 mE 6347400 mN. Further sampling failed to locate the source of the diamond but produced one pyrope. Cuttings from two drillholes located in the region of a magnetic cluster at 346650 mE 6342700 mN were found and sampled (893117). The rock type was a fine grained, dark green mafic igneous rock (altered basalt?) with traces of mica and magnetite. Epidote was commonly covering the chips. Similar rocks occur as float around the gate at 346100 mE 6342600 mN.

A ground magnetic survey was carried out to investigate the magnetic complex identified from the BHP aeromagnetic survey in far greater detail than was done by BHP. The two previous drillholes tested a broad N/S trending dyke with a 200 nT magnetic response. A similar high amplitude anomaly occurs on the western margin of the grid on lines 10000 N and 9800 N. This feature is explained by abundant float of altered basalt similar to that found at CB19 and CB20.

Although the topography is not such that the source of the macro diamond would necessarily be within the catchment of the sample, three anomalies within this grid deserve testing by shallow drillholes. The locations of these holes are ; (5200 E, 10200 N), (5650 E, 10000 N) and (5575 E, 9400 N). All three features are less manetic than the basalt tested by BHP, but should be found at similar shallow depths.

APPENDIX II

Petrology

COTTAGE BORE

CB18 355700mE/6354200mN

1158373 : uralitised and saussuritised gabbro (or very coarse dolerite), with leucoxenised, skeletal Ti-oxides.

This sample was originally a gabbro with a grainsize of 1 - 4 mm and slightly more pyroxene (55%) than plagioclase (40%). It also contained titanomagnetite as characteristic skeletal grains about 0.5 - 1 mm in size (5%), randomly disposed throughout.

Some albitised plagioclase is present, but most of the original felspar is replaced by very fine granular epidote.

The pyroxene is totally replaced by zoned pale to dark green hornblende. Small interstitial areas are replaced by fine secondary uralitic hornblende and albite, (not derived from plagioclase).

The titanomagnetite is mostly leucoxenised and some grains of secondary magnetite are present.

See sample no. 1157596 for geochemistry.

COTTAGE BORE
CB 14 357900mE/6356300mN

1158374 : porphyritic metabasalt, (or andesitic basalt) with a large domain of amphibole-epidote "metasomatic" alteration.

Plagioclase phenocrysts about 2 mm long make-up about 15% of this rock and are mostly albitised, with a little epidote in some of the grains. Ferromagnesian phenocrysts were much less abundant (5%) and are completely replaced by fine hornblende and epidote. The groundmass is a fine grained weakly schistose amphibolite, i.e. composed of albite and actinolitic hornblende, with sparse extremely fine epidote.

A zone at one end of the thin section has irregular domains of epidote and hornblende with very finely dispersed leucoxene (? or sphene).

A relict porphyritic texture is visible in these domains, in the form of epidotised felspar laths and there is a trace of secondary magnetite, which suggests an original (andesitic) basalt, the same as the rest of the rock pervasively (metasomatically) replaced by the epidote and hornblende.

COTTAGE BORE
CB 19 337900E/6356300N

1158375 : metamorphosed, weakly porphyritic and vesicular basalt.

The 7 - 10% plagioclase phenocrysts in this sample are 0.5 - 2 mm long and are albitised with minor epidote and/or hornblende, and rare chlorite. Very minor rectillinear patches of epidote, probably after clinopyroxene, are present; and accessory fine magnetite grains occur at one end of the section.

The groundmass is mostly very fine grained hornblende with minor epidote and sphene. Small patches of clear-epidote appear to be filling small vesicles.

Vesicles to 3 mm in diameter are filled variously by epidote, chlorite, phlogopite, hornblende and magnetite. Irregular patches of epidote and chlorite occur along one end of the thin section.

COTTAGE BOAT

CB 19 357900 mE/6356300m N

1158376 : massive chlorite-tremolite rock, with fine magnetite and minor leucoxene; a meta-peridotite

This rock contains two dominant textural elements in subequal abundance:

(1) areas of extremely fine compact chlorite with minor tremolite and veinlets of secondary magnetite, forming vague networks,

(2) patches of quite coarse tremolite, partly after interstitial (post cumulus) clinopyroxene grains about 5 mm in size, with some overgrowths into areas previously not occupied by pyroxene.

The chloritic areas appear to be derived from olivine grains of cumulus origin 1 - 2 mm in size, with the aluminium needed to form the chlorite possibly derived from the pyroxene, or from minor felspar.

Accessory opaque oxides (magnetite or chrome-magnetite) and small patches of rutile are scattered. A single cube of limonite after pyrite occurs in the section.

The original rock appears to have been an olivine-cumulate, with post cumulus clinopyroxene.

See Sample no. 1157597 for geochemistry.

COTTAGE BORE

CBP 13 357000mE/6320200mN

1158392 : unsorted, very fine to coarse, loose aggregate of mostly angular, single-crystal quartz grains (?breccia); cement-matrix of ultrafine rutile and K-spar (?metasome)

About 65% of this rock consists of a very loose-packed aggregate of angular to subrounded, single crystal quartz grains, unsorted with a size range of 0.02 mm to 1.8 mm, maximum dimension.

These grains have no diagnostic genetic characteristics, and although vague embayments in some suggest a possible volcanic derivation, most probably have a plutonic source.

The cement/matrix between all of these grains consists of minute (1 to 5 micron) crystals of rutile; crowded within diffuse cryptocrystalline K-spar (which is impossible to identify by optics along, but is indicated by ubiquitous yellow stain on the offcut, treated with HF and sodium-cobaltinitrite). This matrix shows incipient resorption of the quartz-grain boundaries.

Rare crystals of zircon also occur in the cement/matrix.

The origin of the rutile- K-spar matrix is uncertain, except to say that it is probably "metasomatic" or "hydrothermal". Likewise the genesis of the quartz grain aggregate is not apparent, objectively from the thin section examination. It may be a breccia with less resistant, more reactive phases (?? clays), removed and replaced by the Ti-K "metasome". It may be a residual "sandstone".

COTTAGE BORE
Anomaly CBP 13
357000mE/6320200mN.

1158396 : massive, mostly extremely fine compact albite-phlogopite rock; relict textures suggest an original basalt, completely metasomatically altered

About 65% of this rock consists of a diffuse, microcrystalline mass of albite, crowded with decussate extremely fine phlogopite and lesser chlorite, with dispersed titaniferous dust, and relatively more discrete but extremely small crystals of oxidised magnetite. A very vague relict "basaltic" texture is locally evident in the albite mosaic, partly outlined by the titaniferous dust.

The remaining 35% consists of "inclusions" 0.3 to 1 mm in size, and apparently representing completely altered phenocrysts, altered vesicle fillings, and possibly small xenoliths. Most of these components consist of decussate phlogopite ± rare extremely fine quartz and generally stained by leucoxene and/or limonite.

The rock is interpreted therefore, as a basalt which has been pervasively metasomatically altered to mainly albite and phlogopite.

This rock compared with 1157593 described for R. Lane, Pontifex Report no. 4613 dated 6/9/85.

APPENDIX III

Geochemistry

C.R.A. EXPLORATION PTY. LTD. - ROCK SAMPLE FIELD DATA SHEET.

PAGE N°

Area: Cottage Bore Collected: A.L.L. Analysed by: Amdel Lab. report no: 558/86.
Map ref: Orbost Olary Date collected: 7-8/85 Date anal. rec: 22 & 30/8/85
Photo name: Date to lab: 8/8/85 Plan no: SA 3129
Run No: D.P.O. No: B0949 C.R.A. report no: 130496

Less than detection limit [-]

Sample type: 1. Chip. 2. Float 3. Channel. 4. Panel.
Test: 1. Chemistry 2. Duplicate 3. Thin section 4. Polished section.

ANALYSIS METHOD	AAS4	A1/1	X1	X1	X1	A1/1	A1/1	A1/1	X1	X1	A1/1	A1/1										
DETECTION LIMIT (ppm)	5	5	10	4	2	5	10	5	20	20	2	2										

Sample Number	COORDINATES AM.G/~~Long~~/~~Lat~~/~~Local~~ EAST	NORTH	SAMPLE TYPE	Mag. Anom		No. CHIPS	TEST	Petrology.	AAS (HF+10%) 10ppm K%	Na%	Mg%	Fe%	Metal Content (ppm) Mn	Ba	Nb	Sr	Ni	Cr	Co	Ce	La	Cu	Zn
1157596	355700	6354200	2	08	18	1	1	Uralitized gabbro.	0·28	1·90	3·80	10·1	395	350	6	190	20	–	26	25	20	140	12
1157597	357900	6356300	2	08	19	1	1	Meta-peridotite.	0·05	0·08	14·5	7·8	200	–	6	5	700	440	100	–	25	8	14

Note: All samples negative for U, Th & Pb.

053

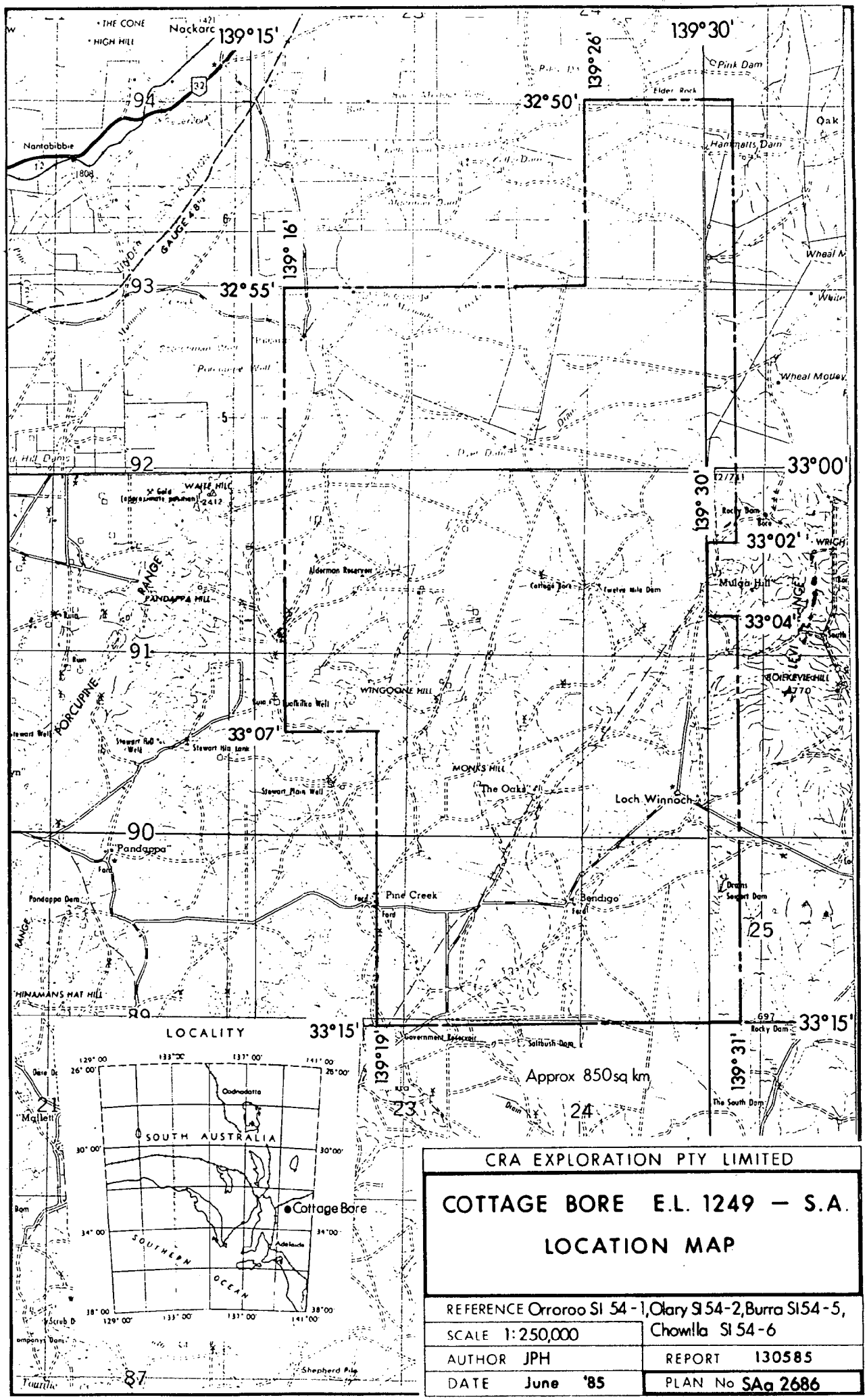
N.B. CB = magnetic anomaly
CBP = photo anomaly

TABLE 1

SUMMARY OF AEROMAGNETIC & PHOTO ANOMALIES

COTTAGE BORE E.L. 1249

PLAN SAa	ANOMALY NO.	LOCATION (AMG) mE	LOCATION (AMG) mN	DESCRIPTION	PROPOSED DRILL HOLE COLLARS (LOCAL GRID)	SAMPLE NO.	INDICATOR RESULTS	FURTHER WORK
3547	CB6	344000	6343550	150nT on 3 lines	4750E/9800N	123240-250; 258-267; 271; 280-283	See SAa 3565	Drilling
3548	CB7	347300	6344150	100nT; Depth 140m, diamond nearby, well defined	4950E/9550N	893115	Awaited	Drilling
3548	CB8	347400	6344600	100nT; diamond nearby, poorly defined	5000E/10050N	893116	Awaited	Drilling
3534	CB9	341700	6351300	Patch of surface noise. ?palaeochannel		893101	5 pyrope, 2 chromite, 125 picroilmenites, 1 chrome diopside	Sampling westward
3535	CB10	344000	6354500	Not found. Probable contouring error.		Not Sampled		
3553	CB11	354200	6365600	Thin basalt		Not Sampled		
3537	CB15	356100	6362300	Suggestion of magmatic core (high sus.) & tuff rim. Depth 50m	5000E/99600N; 4840E/10000N	Not Sampled		Drilling
3538	CB16	359350	6353500	130nT; in creek system with 30m.d. Depth 50m	5000E/9950N	893111	Awaited	Drilling
3539	CB17	355150	6354600	200-400nT anomaly cluster up creek system from 30m.d. Fresh indicators nearby. Depth 50m	4400E/10500N	893104	4 pyropes & 1 chromite	Drilling
3539	CB18	355650	6354100	Outcropping gabbro. Depth to top 100-150m!		893102	24 picroilmenites (Surface contamination)	None
3540	CB19	357950	6356300	Porphyritic vesicular basalt & peridotite in outcrop		893105	Negative	None
	CB20	358500	6356300			893106	1 picroilmenite	None
3543	CB23	352400	6333300	Comtal anomaly. 100nT very broad & noisy ≈2mm diamond nearby	4900E/10000N	893112	Awaited	Drilling
3098/9	CB24	361000	6364900	450nT, N/S, 400x20m, Depth 170m		1234273	2 picroilmenite	No further work
3539	CB26	355150	6354100	300nT; fresh indicators nearby. Depth 50m	4450E/900N	893103	2 pyrope, 2 picrolmenites	Drilling
3556	CB27	346150	6342600	Complex magnetic relief		1234312	Awaited.	
3147& 3129	CBP1	351150	6355250	Silcrete & sand rise	As for AMG Co-ord	1234270	1 pyrope, 54 picroilmenites	Drilling
	CBP2	356100	6352650	Vegetation anomaly		1234278	Awaited	
	CBP3	354750	6351400	Slight rise		1234279	Awaited	
	CBP4	351000	6341350	Slight rise		1234269	Awaited	
	CBP5	355000	634600	2km diameter vegetation anomaly		1234284	1 picroilmenite	None
	CBP6	348000	6344500	Slight rise, with siltstone		Not Sampled		None
	CBP7	351200	6337550	Vegetation anomaly		1234285	Negative	None
	CBP8	356500	6338800	Slight rise, siltstone & quartzite		Not Sampled		None
	CBP9	359000	6343800	Slight rise, Mudstone		Not Sampled		None
	CBP10	359700	6342600	Rise of Quartzite		Not Sampled		None
	CBP11	353300	6332700	Vegetation anomaly		1234286	Negative	None
	CBP12	350100	6324800	Vegetation anomaly on Stockdale's loam grid		Not Sampled		None
	CBP13	357000	6320200	Rabbit warren. Vegetation anomaly	As for AMG Co-ord	1234314	12 pyrope, 4 chromite, 45 picroilmenites	Drilling

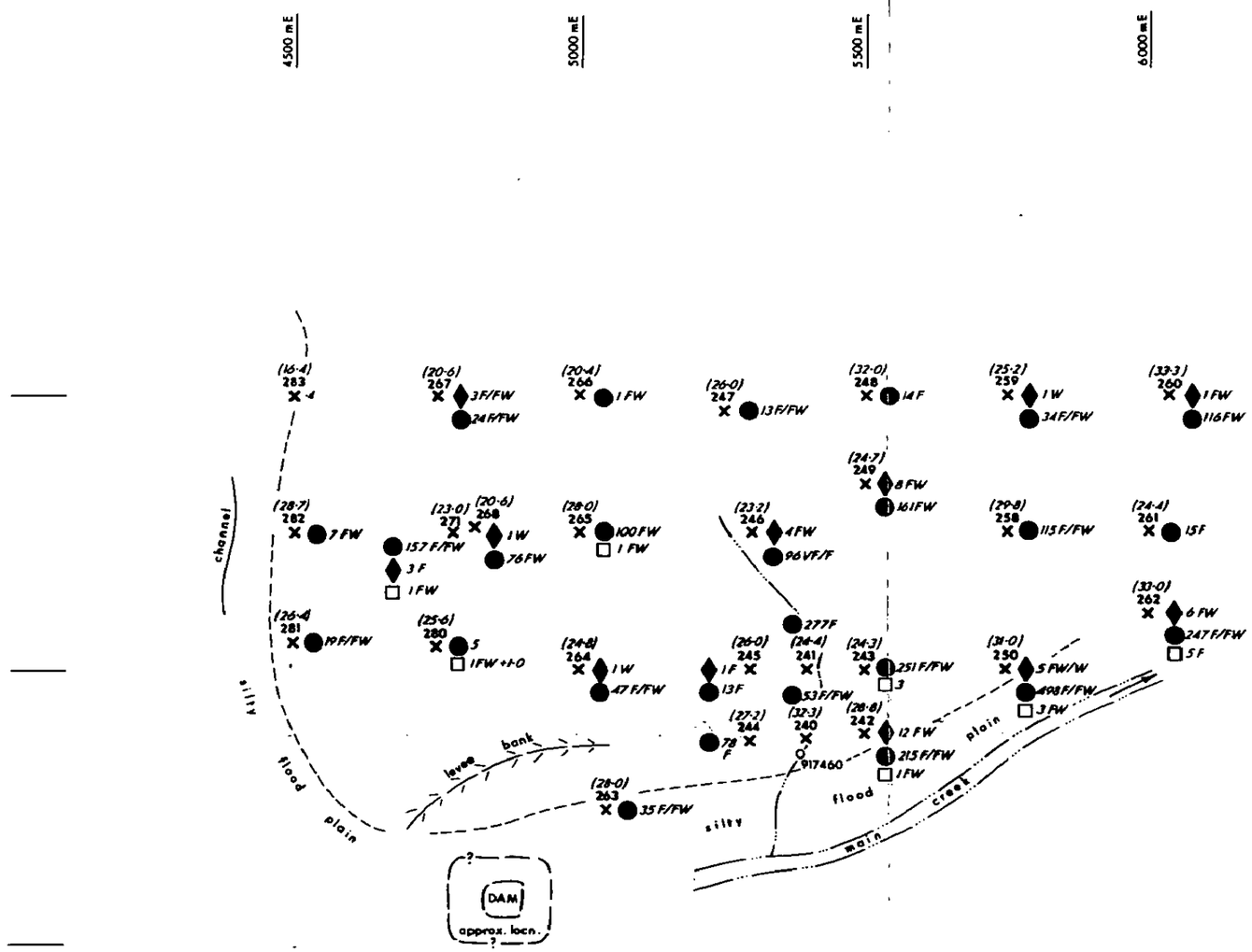


CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L. 1249 — S.A.

LOCATION MAP

REFERENCE Orroroo SI 54-1, Olary SI 54-2, Burra SI 54-5, Chowilla SI 54-6	
SCALE 1:250,000	
AUTHOR JPH	REPORT 130585
DATE June '85	PLAN No SAa 2686



250 × Sample location and number (numbers prefixed by 1234)

(31·0) Sample weight in kilograms

917460 Gravel sample (CRAE Plan SAa 3147)

● Picroilmenite

♦ Chromite

□ Zircon

VF Very Fresh
F Fresh
FW Fresh Worn
W Worn

5000mE/10000mN = AMG 344000mE/6343550mN
(CAROONA – 6731 1:100000 sheet.)

0 100 200 300 400 500 600 700 800 900 1000 m

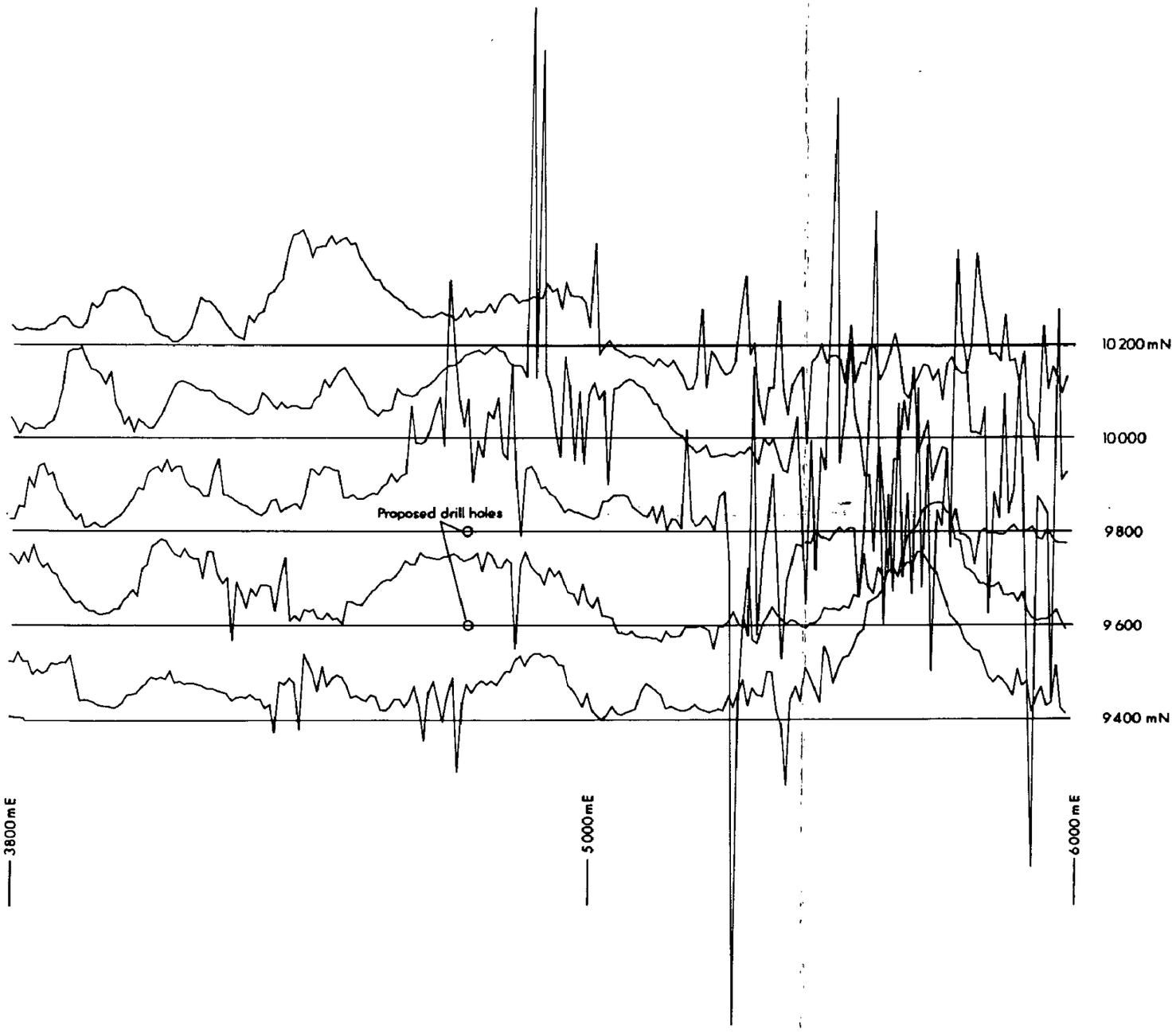
MN

050

CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 — S.A.
MACKY'S DAM LOAM GRID
(MAGNETIC ANOMALY CB6)

REF.	BURRA SI 54–5		
SCALE	1 : 10000		
AUTHOR	J.P.H.	REPORT	130585
DATE	Oct. '85	PLAN No	SAa 3565



MN

Base level 58580 nT

1 cm = 100 nT

Station interval 10m

5000mE, 10000mN = AMG 344000mE, 6343550mN

057

CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 — S.A.
GROUND MAGNETIC PROFILES
ANOMALY CB 6

REF.	BURRA SI 54-5		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130585
DATE	Aug. '85	PLAN No	SAa 3547

B'

A'

10000mN

X 893116 (CB 8)

9550mN

893115 (CB 7)

Proposed drill holes

Proposed drill holes

B'

11000 m N

9000mN

A

4000mE

4900 mE

A

5000 mE

B

5500mE

6000mE

9000 mN

B

MN

Base level 58500 nT

1 cm = 50nT

Station interval 10m

X Loam sample

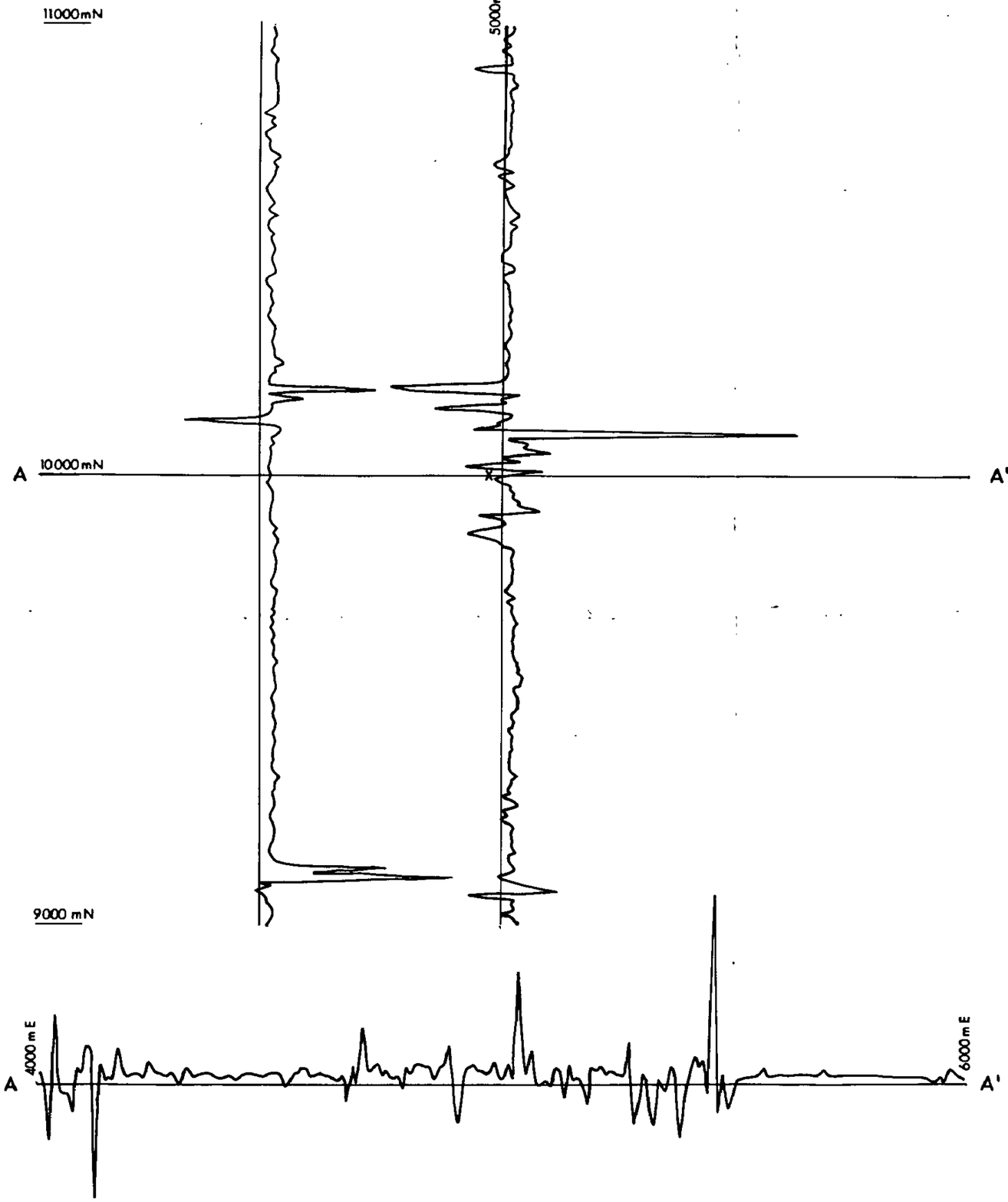
5000mE, 10000mN = AMG 347400mE, 6344600mN

CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 – S.A.
GROUND MAGNETIC PROFILES
ANOMALIES CB 7 & 8

REF.	BURRA SI 54-5		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130585
DATE	Aug. '85	PLAN No	SAa 3548

058



MN

Base level 58700 nT

1 cm = 250 nT

Station interval 10 m

X Loam sample No. 893101

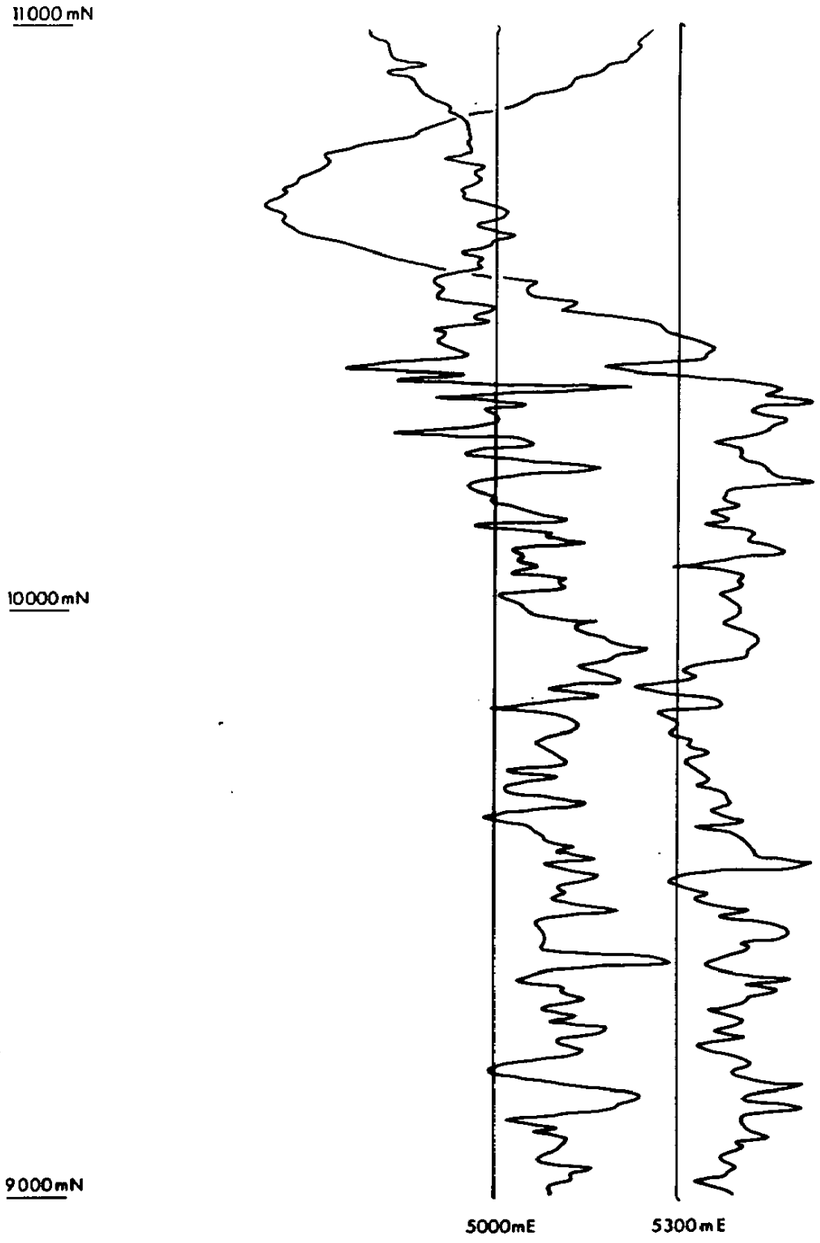
5000E, 10000N = AMG 341700mE, 6351300mN

059

CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 – S.A. GROUND MAGNETIC PROFILES ANOMALY CB9

REF.	ORROROO SI 54-1		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130585
DATE	Aug. '85	PLAN No	SAa 3534



MN

Base level 58500nT

1 cm = 40 nT

Station interval 10m

No loam sample taken

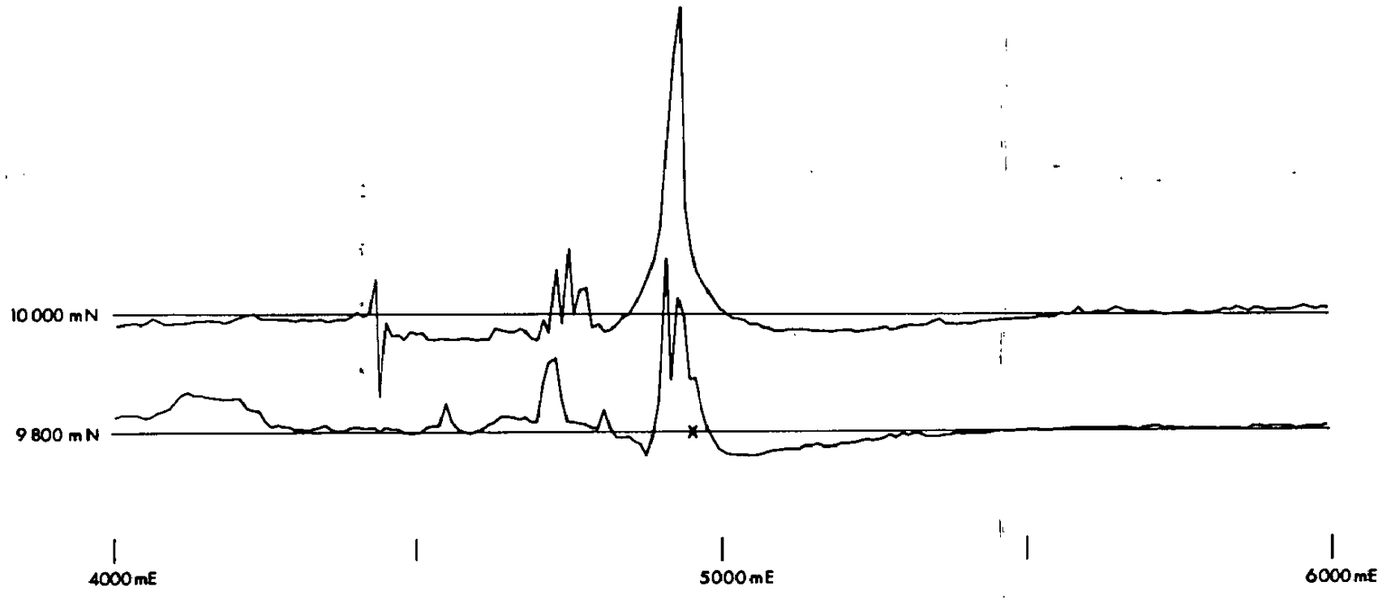
5000E, 10000N = AMG 344150mE, 6354500mN

090

CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L. 1249 – S.A.
GROUND MAGNETIC PROFILES
ANOMALY CB10

REF.	ORROROO SI 54-1		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130585
DATE	Aug. '85	PLAN No	SAa 3535



MN

Base level 58600 nT

1 cm = 200 nT

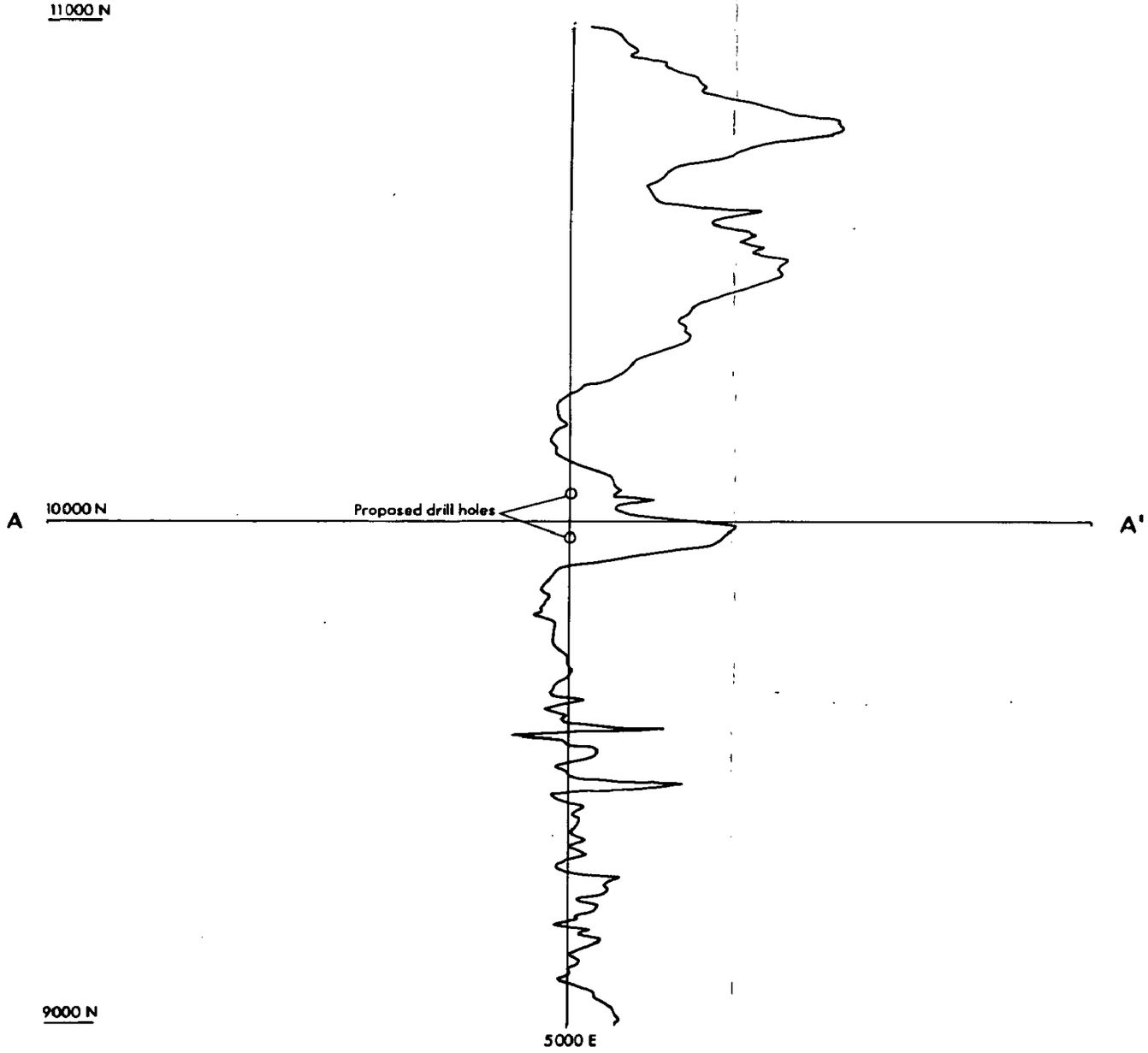
Station interval 10 m

X Loam sample 1237756

4950 mE, 9800 mN = AMG 353800 mE, 6365200 mN

061

CRA EXPLORATION PTY LIMITED			
COTTAGE BORE E.L.1249 – S.A. GROUND MAGNETIC PROFILES ANOMALY CB 11			
REF.	ORROROO SI 54-1		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130585
DATE	Sept.'85	PLAN No	SAa 3553



Base level 58650 nT

1 cm = 50 nT

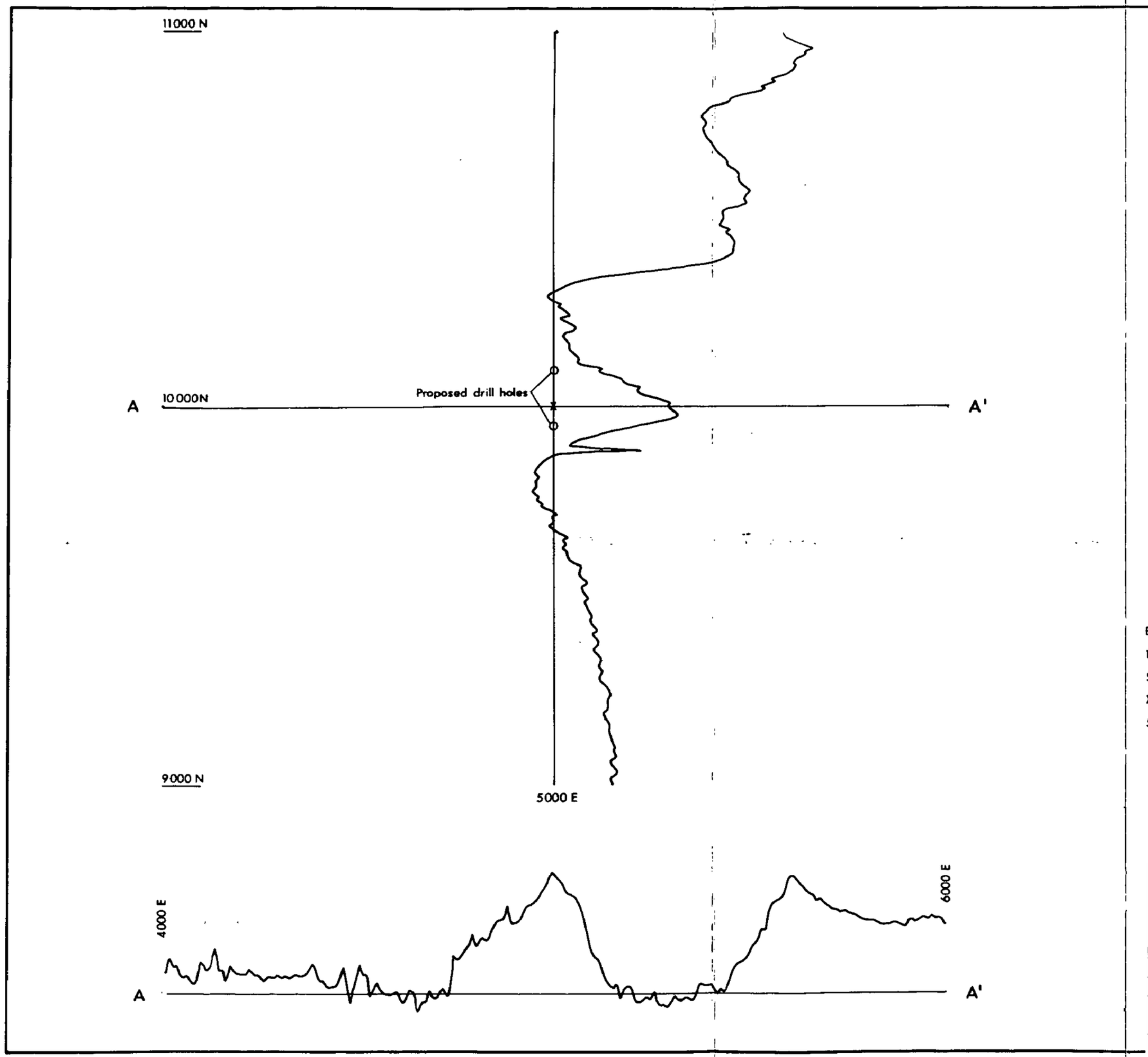
Station interval 10 m

No loam sample

5000E, 10000N = AMG 356100 mE, 6362300 mN

062

CRA EXPLORATION PTY LIMITED			
COTTAGE BORE E.L. 1249 – S.A. GROUND MAGNETIC PROFILES ANOMALY CB15			
REF.	ORRORO0 SI 54-1		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130585
DATE	Aug. '85	PLAN No	SAa 3537



MN

Base level 58700 nT

1 cm = 50 nT

Station interval 10 m

X Loam sample 893111

5000 E, 10000N = AMG 359350mE, 6353500mN

063

CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L. 1249 — S.A. GROUND MAGNETIC PROFILES ANOMALY CB16

REF.	ORROROO SI 54-1		
SCALE	1 : 10000		
AUTHOR	R. J. L. L.	REPORT	130585
DATE	Aug. '85	PLAN No	SAa 3538

A'

A'

B'

11000mN

10 600mN

X 893104 (CB 17)

10 500mN

Proposed drill holes

1157596

10000mN

9900mN

893103 (CB 26)

Proposed drill holes

893102 (CB 18)

B'

MN

Base level 58650 nT

1 cm = 100 nT

Station interval 10m

X Loam sample

• Rock sample

5000mE, 10000mN = AMG 355700mE, 6354100mN

064

9000mN

4000mE

4450mE

5000mE

6000mE

A

A

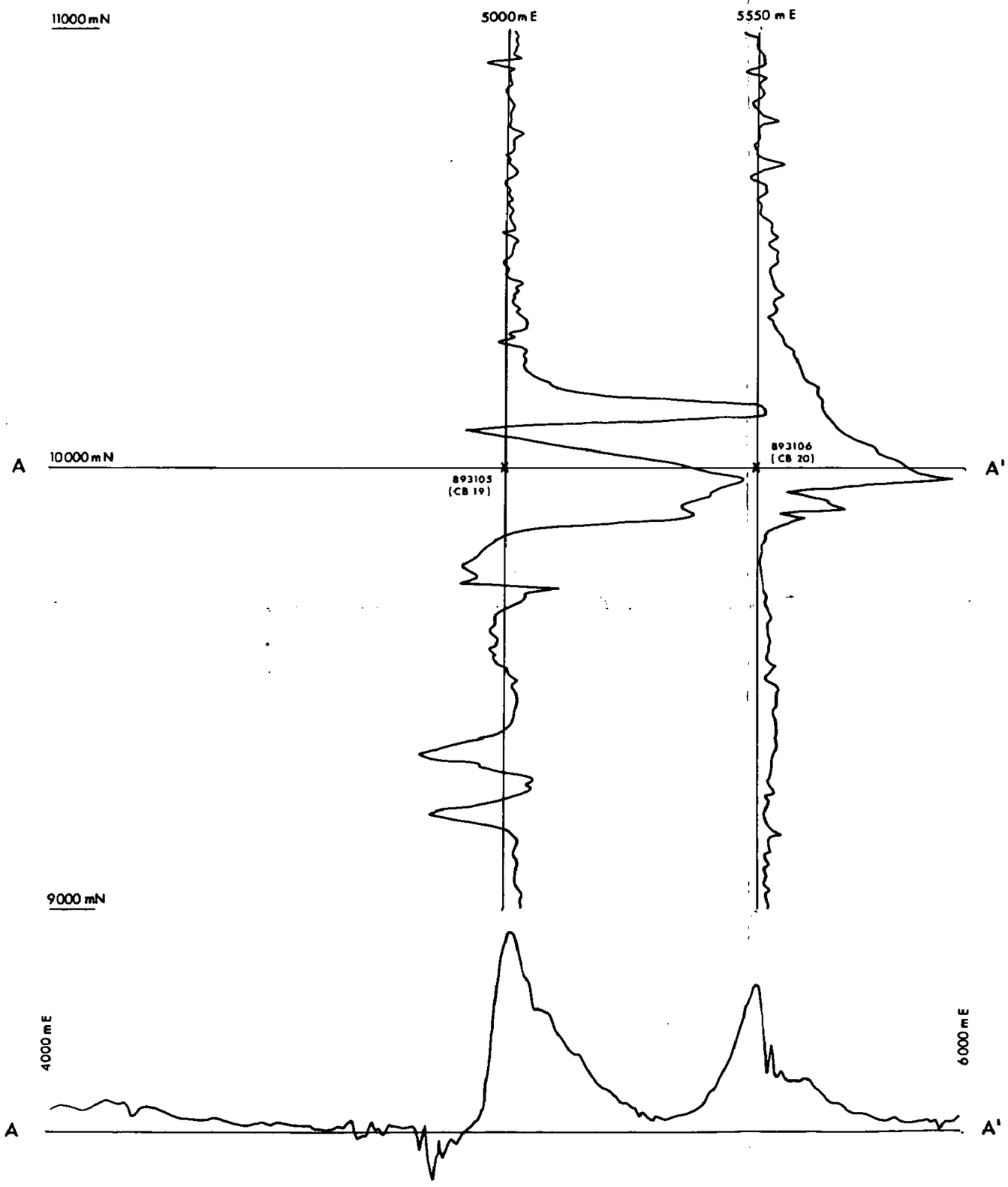
B

B

CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 — S.A. GROUND MAGNETIC PROFILES ANOMALIES CB 17, 18 & 26

REF.	ORROROO SI 54 - 1		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130585
DATE	Aug. '85	PLAN No	SAa 3539



Base level 58700 nT

1 cm = 150 nT

Station interval 10m

X Loam sample

5000mE, 10000mN= AMG 357950mE, 6356300mN

065

CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L. 1249 — S.A.
GROUND MAGNETIC PROFILES
ANOMALY CB 19 & 20

REF.	ORROROO SI 54-1		
SCALE	1:10000		
AUTHOR	R.J.L.L	REPORT	130585
DATE	Aug. '85	PLAN No	SAa 3540

11000 mN

4800 mE

5000 mE

B'

B'

A

10 000 mN

A'

MN

Base level 58650 nT

1 cm = 50 nT

Station interval 10 m

X Loam sample 893112

5000mE, 10000mN = AMG
352400mE, 6333300mN

990

9000 mN

B

B

4000 mE

6000 mE

A

A'

Proposed drill holes

CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 – S.A.
GROUND MAGNETIC PROFILES
ANOMALY CB 23

REF.	OLARY SI 54-2		
SCALE	1: 10000		
AUTHOR	R.J.L.L.	REPORT	130585
DATE	Aug. '85	PLAN No	SAa 3543

3500 N

4000 N

4500 N

5000 N

5500 N

6000 N

4250 E

4600 E

5000 E

5400 E

5750 E

Line 5000N

Profiles plotted with a base level of 58640 nT
Vertical scale 1cm = 100 nT
Station interval 10m

7°
GN
MN

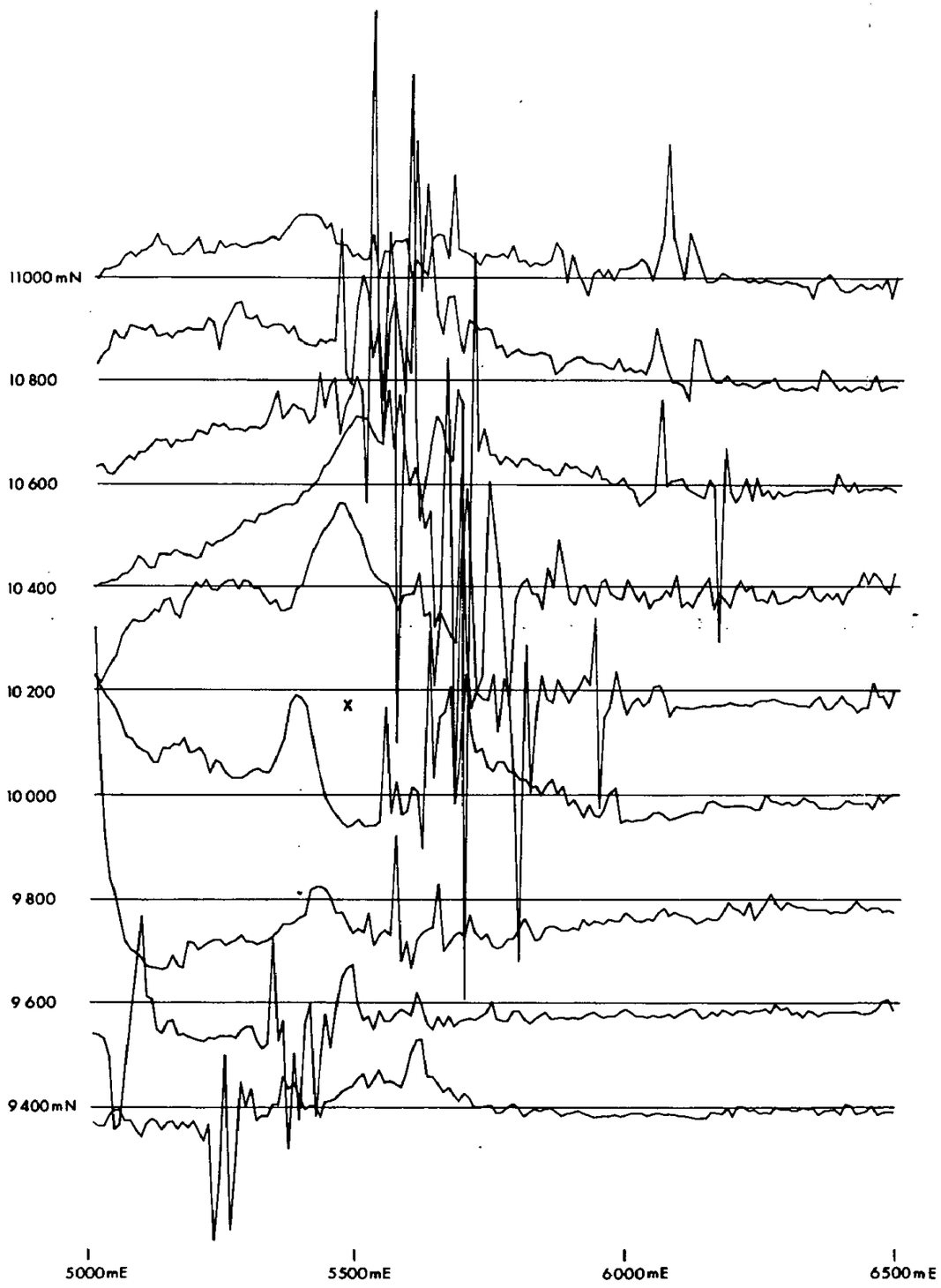
0 200 400 600 800 1000 metres

067

CRA EXPLORATION PTY LIMITED

COTTAGE BORE EL1249 - S.A.
HAMMATTS DAM
GROUND MAGNETIC PROFILES
ANOMALY CB 24

REF.	OLARY SI54-2		
SCALE	1:10000		
AUTHOR	R J L L	REPORT	130585
DATE	JAN '85	PLAN No	SAg 3098



MN

Base level 58500 nT

1cm = 75nT

Station interval 10m

X Loam sample 893117

5000mE, 10000mN = AMG 346150mE, 6342600mN

890

CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 — S.A. GROUND MAGNETIC PROFILES ANOMALY CB 27

REF.	BURRA SI 54-5		
SCALE	1:10000		
AUTHOR	R. J. L. L.	REPORT	130585
DATE	Sept. '85	PLAN No	SAa 3556

069

CRA EXPLORATION PTY. LIMITED

FIFTH QUARTERLY REPORT ON COTTAGE BORE E.L. 1249, SOUTH AUSTRALIA, FOR THE PERIOD ENDING 24TH DECEMBER, 1985

AUTHOR: J.P. HOWARD

COPIES TO: CIS CANBERRA
SADME

DATE: 31ST JANUARY, 1986

SUBMITTED BY: Lucille de Mesquier for John Howard.

ACCEPTED BY:

130634

CONTENTS

1. SUMMARY

A total of 21 reverse circulation/percussion boreholes, aggregating 392.5m, were drilled during November 1985. The holes were targeted on magnetic and photographic anomalies which had potential as the source of microdiamonds and indicators at the "Nackara occurrence".

A cover sequence of ?Recent and Tertiary sands, clay and conglomerate were drilled varying from 0.2 to 21m overlaying ?Adelaidean sediments of low metamorphic grade. One drill hole, 85CBR16, intersected dolerite. No kimberlitic rocks were discovered but heavy mineral analysis results.

Analysis of samples from the Macky's Dam loam grid revealed one diamond measuring 0.65 x 0.30mm. Some follow-up ground magnetic surveying is recommended.

2. INTRODUCTION

Exploration Licence No. 1249 was granted to CRA Exploration Pty. Limited on the 24th day of September, 1984 for a period of 12 months.

The area was applied for when a reconnaissance sample (917763) returned picroilmenites in an area from which Stockdale reported 32 microdiamonds (Nackara) (SADME Env. 2046). Large numbers of other indicators and several diamond occurrences also remain unexplained.

CRAE has carried out petrological and heavy mineral observation work on possible source rocks without indicating a source for the microdiamonds. An aeromagnetic and radiometric survey has been flown over the eastern portion of the licence.

Magnetic anomalies were selected from the 1984 Cottage Bore (CRAE) and 1979 Peterborough (BHP) Aeromagnetic Surveys. These anomalies were thought to be potential sources for the microdiamonds mentioned above, and were consequently recovered with ground magnetometry and sampled preparatory to drilling.

This report describes the results of a reverse circulation drilling program carried out during the quarter and also the results of diamond analyses of samples from Macky's Dam.

3. CONCLUSIONS

A diamond discovered with pyrope, picroilmenite, chromite and zircon at Macky's Dam suggests that the source of the Nackara microdiamonds and indicators could be a local source at this Prospect. Alternatively the source could be near Double Dam - BHP Anomaly 27 where diamond occurs with pyrope, chromite, picroilmenite and chrome diopside. Drainage from these two Prospects converge at the Nackara occurrence.

Drilling of magnetic and photo anomalies failed to disclose any other source for this diamond occurrence.

4. SAMPLING FOR INDICATOR MINERALS

4.1 Magnetic and Photo Features

Sample results for the quarter are presented on updated plan SAs 3147.

4.2 Macky's Dam Indicator Anomaly

Samples from this grid have now been assayed for microdiamonds. Results are presented on plan SAa 3565. One diamond measuring 0.65 x 0.30mm was recovered.

5. DRILLING

A drill hole location and lithological summary map is presented herewith as plan SAa 3558. Appendix I contains detailed geological logs, whilst petrological descriptions have been included as Appendix II.

Samples were taken for geochemistry from the "basement" lithologies of each drill hole. Two sets of assays were performed: Comlabs assayed for Cu, Pb, Zn, Ni, Co, Fe, Mn, Cr, Mg (AAS) and Ba, Nb, Sr (XRF) (see Drill Logs); Analabs assayed the following elements by ICP - Li, Be, B, Na_2O, MgO, Al_2O_3, SiO_2, P, K_2O, CaO, Sc, TiO_2, V, Cr, Mn, Fe_2O_3, LOI, Co, Ni, Sr, Y, Zr, Nb, Mo, Ag, Sn, Ba, La, Hf, Ta, W, RE, Pb, Zn, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Th, U (Appendix III).

Bulk samples were collected from each drill hole for the purpose of analysis for heavy minerals, the results of which are awaited.

A summary of each prospect is given below in the order in which they were drilled.

5.1 Photo Anomaly CBP13

This vegetation and indicator (pyrope, chromite, picroilmenite - Table 1) anomaly consists of a circular patch of soft soil 200m in diameter devoid of the usual blue bush. Drill hole 85CBRC1 intersected gypsiferous sandy clay, indicating the anomaly to be caused by the formation of a lake. A summary log follows.

85CBRC1

0 - 3m clay, sandy & gypsiferous ?Recent
3 - 6m sandy clay
6 - 10.5m sandstone, clayey (?metasomatic matrix)
(E.O.H.)

Max. susceptibility 80 x 10^{-5} SIU

5.2 Magnetic Anomaly CB23

Stockdale reported a 0.075 carat diamond near this very broad 100nT, noisy magnetic anomaly (Plan SAa 3543). A loam sample reported picroilmenites. Thinly laminated mudstone dipping at 45° was intersected in 85CBRC2B. Fine grained iron oxide may represent oxidised magnetite at depth which is the likely cause of the magnetic anomaly. Assays of the mudstone show only background geochemical values. A summary log follows.

85CBRC2A

0 - 6m surface scree, ironstone, quartzite, silcrete (?Recent)
6 - 21m sand, clay, pebble conglomerate (?Tertiary)
B.O.H.

Max. susc. of last metre 100 x 10^{-5} SIU

85CBRC2B

0 - 5m	scree quartzite angular fragments. Note: ironstone confined to top metre (?Recent)
5 - 21m	sand, clay, pebble conglomerate (?Tertiary)
21 - 26m	clay, green-brown, soft (weathered mudstone)
26 - 28m	mudstone (cored), green-grey. Thinly laminated beds at 45° LCA. Minor leucocratic layers. Very fine iron flecks.
B.O.H.	
	Max. susc. 20 x 10^{-5} SIU

5.3 Magnetic Anomaly CB6 (Macky's Dam)

This 150nT magnetic anomaly (plan SAa 3547) is on the Macky's Dam loam sampling grid and was thought to be a possible source for the picroilmenite, pyrope, chromite, zircon and diamond described from these samples (plan SAa 3565). However, 85CBRC3 drilled only weathered mudstone and the source of the magnetic anomaly is now thought to be very deep. The relatively shallow depth of surficial material in this hole confirmed the likelihood that the fresh indicators from the Macky's Dam samples are very locally derived rather than transported. Thus three further drill holes (85CBRC4, 5 and 6) were completed over a slight depression on the grid coincident with the picroilmenite anomaly (plan SAa 3593). No kimberlite was intersected. Geochemical values were low.

The source of the diamond and indicators at this prospect is probably a narrow east-west dyke. Summary logs are as follows.

85CBRC3

0 - 3.5m	surface scree, sand and clay (?Recent)
4 - 20m	clay, fawn and orange, soft. Weathered mudstone ?Adelaidean
20 - 23m	mudstone (cored), green, brown, laminated beds at
B.O.H.	70°/CA. Minor chlorite and magnanese. Max. susc. 25 x 10^{-5} SIU (?Adelaidean). Source of magnetic anomaly probably very deep.

85CBRC5

0 - 0.2m	clay and surface scree, including indicators (?Recent)
0.2 - 6m	clay, light grey-green, soft. ?Weathered Adelaidean
B.O.H.	mudstone

85CBRC6

0 - 0.2m	surface scree, including indicators
0.2 - 8m	clay, brown, soft, sandy. ?Weathered Adelaidean
B.O.H.	sandy mudstone

5.4 Magnetic Anomaly CB7

A diamond (0.005 carats - Stockdale) nearby upgraded this 20nT aeromagnetic anomaly for drilling (plan SAa 3548). Although the ground magnetic data suggested a deep source, experience on the licence allowed that a near-outcropping kimberlite was possible. A loam sample returned large numbers of picroilmenites.

However drill hole 85CBRC7 intersected carbonaceous mudstone with background geochemistry. Following is a summary log.

85CBRC7

0 - 2m	surface scree of black ?gabbro and clay (?Recent)
2 - 10m	clay fawn at top to green-blue, soft (?Weathered Adelaidean)
10 - 11m	mudstone, grey-blue, very thinly laminated. Ferruginous spots to 4mm. Bedding at 50°/CA
B.O.H.	(?Adelaidean)

Max. susc. 400 x 10^{-5} SIU

5.5 Magnetic Anomaly CB8

This anomaly is near CB7 and is poorly defined on ground magnetics (plan SAa 3548). The loam sample contained pyrope and picroilmenite. Drill hole 85CBRC8 intersected dolomite with elevated MgO but otherwise background geochemistry. The lithlogies are summarised below.

85CBRC8

0 - 2m	calcrete, pink, clayey (?Recent)
2 - 15m	dolomite grey-brown and clay, fawn (?Adelaidean)
B.O.H.	

Max. susc. 90 x 10^{-5} SIU

5.6 Magnetic Anomaly CB27

A shallow sourced weak anomaly within an area of complex magnetic relief was chosen for drilling (see plan SAa 3557) because of its proximity to the diamond mentioned under CB7 and the presence of indicators.

Drillhole 85CBRC9 intersected quartzite, mudstone and talc displaying folding and brecciation and some chlorite flakes. The slightly high Mg of 5.9% probably results from the chlorite, other elements show background values only.

Below is a summary log.

85CBRC9

0 - 2m	calcrete and clay (?Recent)
2 -12m	quartzite, fine grained, white, bedding at 45°/CA. Clay cream (?Adelaidean)
12 -22.9m	mudstone green-grey, folded, jumbled, 5% dark green chlorite to 2mm. Bedding varies 0.45°/CA (?Adelaidean)
22.9 - 23.0m	talc, light grey as bed (?Adelaidean)
B.O.H.	

Max. susc. 40 x 10^{-5} SIU

5.7 Palaeochannel West from Double Dam

A sample taken from the collar of the drill hole at BHP Anomaly 27 - 893101 (CRA's magnetic anomaly CB9) contained pyrope, chromite, picroilmenite and chrome diopside. BHP's detailed aeromagnetic survey shows three linear features trending west and northwest, which are interpreted as palaeochannels. Two drill holes were targeted on these channels to obtain gravel samples for heavy mineral analysis. Results are awaited.

Summary logs are as follows.

85CBRC10

0 - 0.5m	clay and heavy minerals (?Recent)
0.5 - 6.5m	clay and scree of quartzite and mudstone (?Recent)
6.5 - 7m	siltstone (core) brown, bedding at 50°/CA
B.O.H.	(?Adelaidean)

85CBRC11

0 - 0.5m	clay, heavy minerals and quartz scree (?Recent)
0.5 - 2m	clay and scree of quartzite and silstone (?Recent)
2 - 6m	siltstone (core) brown, bedding at 50°/CA
B.O.H.	(?Adelaidean)

5.8 Photo-Anomaly CBP4

A loam sample from this low rise with patches of pisolitic iron, contained pyrope, chromite and picroilmenite. Drill hole 85CBRC12 intersected weathered mudstone with carbonate; the carbonate is reflected in a high CaO value of 19.7%. Below is a summary log.

85CBRC12

0 - 4m	scree of siltstone, quartzite and ironstone (?Recent)
4 - 8m	clay and sand (?Tertiary)
8 - 10m	clay and mudstone, green, bedded at 45°/CA
B.O.H.	?Adelaidean

The indicators derive from transported scree.

5.9 Photo-Anomaly CBP1

This anomlay is a prominent "mesa" with a steep north-west slope showing scattered outcrops of silcrete. Indicator minerals from a loam sample at the top included pyrope and picroilmenite. Stiff grey clay was intersected at the bottom of drill hole 85CBRC13 a sample of which gave no anomalous geochemical assays. The summary log is as follows.

85CBRC13

0 - 6m	scree, sand and clay (?Recent)
6 - 14m	sand and clay (?Tertiary)
14 - 26m	clay, dark grey, stiff (Weathered ?Adelaidean)
26 - 30m	claystone (core) (Weathered ?Adelaidean)
B.O.H.	The indicators derive from transported scree.

5.10 Magnetic Anomaly CB17

CB17 is within a cluster of magnetic anomalies including CB18 and 26 (plan SAa 3539), the former of which is a suboutcropping gabbro. Indicator minerals in loam samples from this anomaly include pyrope and chrome and there is a micro-diamond reported by Stockdale nearby.

Weathered feldspathic mudstone was intersected in drill hole 85CBRC14. A trace of tourmaline is reflected in a boron analysis of 334 ppm and the niobium value of 24 ppm is slightly anomalous for no obvious reason. A lithlogical summary is as follows.

85CBRC14

0 - 4m	calcrete and clay (?Recent)
4 -11.5m	sand and clay (?Tertiary)
11.5-21m	feldspathic mudstone (?Adelaidean, ?Jurassic)
B.O.H.	
	Max. susc. 150 x 10^{-5} SIU

Weathered limestone in a second hole, 85CBRC15, was not anomalous in any of the elements assayed. Below is a drill hole summary.

85CBRC15

0 - 2m	clacrete and clay (?Recent)
2 - 13m	sand, clay and pebble conglomerate (?Tertiary)
13 - 17m	weathered limestone with fine grained biotite.
B.O.H.	
	Max. susc. 200 x 10^{-5} SIU (?Adelaidean)

5.11 Magnetic Anomaly CB26

This anomaly is part of the cluster of magnetic anomalies including CB17 and 18 (plan SAa 3539). A loam sample over CB26 contained pyrope and picroilmenite.

Limestone and dolerite was intersected in drill hole 85CBRC16, the dolerite having elevated magnetic susceptibilities, but lacking any anomalous geochemistry. A summary log follows.

85CBRC16

0 - 1m	sand and scree (?Recent)
1 - 26m	limestone, clacite and dolomite (?Adelaidean)
26 - 27m	green dolerite
B.O.H.	

Max. susc. 6500 x 10^{-5} SIU

5.12 Photo-Anomaly CBP3

A loam sample from this low rise contained pyrope and picroilmenite.

Soft yellow-white clay was intersected at the bottom of 85CBRC17. Anomalous boron assays of 1160 ppm probably indicate the presence of very fine grained tourmaline, although borate is also a possibility. Below is a summary log.

85CBRC17

0 - 12m	calcrete, sand, clay and pebble conglomerate (?Recent)
12 - 14m	claystone (core), yellow-white (Weathered ?Adelaidean)
B.O.H.	

The indicators appear to derive from transported scree.

5.13 Magnetic Anomaly CB16

On ground magnetic profiles, CB16 is a well defined 130nT anomaly adjacent to a NNW trending linear feature (plan SAa 3538).

Lithologies intersected in drill hole 85CBRC18 are summarised below. Apart from slightly elevated geochemical values of Pb and Zn of 185 ppm and 160 ppm respectively, the remaining elements analysed were at background levels only.

85CBRC18

0 - 1.5m	clay and scree (?Recent)
1.5 - 20m	clay, rust coloured (?Tertiary)
20 - 50m	weathered dolomite (?Adelaidean)
B.O.H.	

Max. susc. 1200 x 10^{-5} SIU

Although scattered high susceptibility values occur in the dolomite the drill hole has failed to explain the magnetic anomaly, the source of which must be at greater depth.

5.14 Magnetic Anomaly CB15

CB15 occurs near the centre of a broad river channel. A loam sample was not taken. The anomlay is discrete, with a central peak, surrounded by a fringe of lesser magnetic intensity (plan SAa 3537).

A hole was drilled into each feature. Sericitic siltstone with disseminated oxidised pyrite was encountered in both drill holes. No anomalous geochemistry was present in bottom of hole samples.

A lithlogical summary of the drill holes follows.

85CBRC21

0 - 1m	clay (?Recent)
1 - 9m	siltstone, grey-green, slaty (?Adelaidean)
B.O.H.	
	Max. susc. - background (650 x 10^{-5} SIU)

85CBRC/P22

0 - 1m	clay (?Recent)
1 - 50m	siltstone with minor carbonate and very fine grained
B.O.H.	magnetite (?Adelaidean)
	Max. susc. increasing at B.O.H. to 200 x 10^{-5} SIU

J.P. HOWARD

JPH/dp

EXPENDITURE

Expenditure for the period ending 31st December, 1985, the nearest accounting period was $46,299.00, as listed below.

		$
Drilling		12 022
Payroll		9 528
Supplies		81
Vehicle		755
Travel		298
Rent		80
Tenement		1 596
Laboratory		19 353
Overheads		2 586
	Total	$ 46 299

LOCATION

Orroroo	SI 54-1	1:250 000 sheet, S.A.
Olary	SI 54-2	1:250 000 sheet, S.A.
Burra	SI 54-5	1:250 000 sheet, S.A.
Chowilla	SI 54-6	1:250 000 sheet, S.A.

KEYWORDS

Drill reverse circ., H.M. study

LIST OF PLANS

Plan No.	Title	Scale
SAa 2686	Location Plan E.L. 1249 Cottage Bore	1:250 000
SAa 3147	Gravel & Loam Sample Locations & Results	1:100 000
SAa 3565	Macky's Dam Loam Sample Grid	1: 10 000
SAa 3547	Ground Magnetic Profiles Anomaly CB6	1: 10 000
SAa 3548	Ground Magnetic Profiles Anomaly CB7&8	1: 10 000
SAa 3537	Ground Magnetic Profiles Anomaly CB15	1: 10 000
SAa 3538	Ground Magnetic Profiles Anomaly CB16	1: 10 000
SAa 3539	Ground Magnetic Profiles Anomaly CB17, 18 and 26	1: 10 000
SAa 3543	Ground Magnetic Profiles Anomaly CB23	1: 10 000
SAa 3557	Ground Magnetic Profiles Anomaly CB27	1: 10 000
SAa 3592	Drill Hole Location & Geology	1:100 000
SAa 3593	Macky's Dam Loam Sample Grid - Contours of Numbers of Picroilmenite Grains	1: 10 000

LIST OF APPENDICES

Appendix I	Detailed Geological Drill Hole Logs
Appendix II	Petrology Descriptions
Appendix III	Table of Drill Hole ICP Analyses by Analabs

APPENDIX I

Detailed Geological Drill Hole Logs

ANOMALY CB 15

C.R.A. EXPLORATION PTY. LIMITED

PROJECT COTTAGE BORE EL 1249.

REVERSE CIRCULATION DRILL CORE LOG

CO-ORDINATES 9960N/5000E AZIMUTH ____ DRILLERS Northbridge COMMENCED 22/11/85 DEPTH 50m HOLE No. 85CBRC/P22

RL COLLAR ____ INCLINATION Vertical DRILL TYPE ____ COMPLETED 22/11/85 CASING LEFT ____ DPO No(s) ____

DEPTH FROM(M)	DEPTH TO(M)	CORE REC. (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	Scint CPS	Sus $\times 10^{-3}$ SI U	ASSAY VALUES
0	4				? RECENT CLAY & SILT		BG.			18	500	
					Silt, very fine grained, light grey fawn			0	2	16	200	
					Clay, medium orange brown.							
4	50				? ADELAIDEAN SILTSTONE	4-6m Petrology 1159857			4	18	650	
	EOH				4-6 Grey green slaty siltstone containing 10% very fine grained black + hematite.	Chlorite-Sericite-quartz shale with disseminated oxidised pyrite			6	16	85	
					Bedding at 10°/ca.				8	16	200	
					Cleavage at 45°/ca.							
					Cleavage High point is 20° clockwise from high point on bedding.	6-50m Heavy minerals 1234393			10	16	150	
					6-8m as above with ferruginous stains & some voids filled with white or orange carbonate. Minor light cream siltstone				12	18	200	
					18-20m 10% brown limonite stains - minor faulting				14	18	95	
									16	18	45	
					Magnetite - very fine grained or pencil magnet throughout.				18	18	40	
					Minor flakes from outside of drill rod				20	18	45	
									22	16	55	
									24	16	40	
									26	14	25	
									28	16	60	
									30	18	80	
									32	16	90	
									34	18	65	
					34-36m 10% limonite stained. Water present				36	14	95	
									38	18	55	
					Note: drillers say HB = 51m 14-16m is possibly 14-18m.				40	18	150	
									42	18	70	
									44	18	200	
									46	18	150	
									48	18	200	
									50	18	200	
						48-50m 1159839 Geochem	Cu	Pb	Zn	Ni	Co	Fe%	Mn	Cr	Ba	Nb	Sr	Mg%
							20	6	18	50	30	4.15	590	20	440	16	60	1.49

SUMMARY AND SPECIAL COMMENTS

LOGGED BY J.P. Howard DATE ____

SHEET 1 OF 1

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ANOMALY CB 15

C.R.A. EXPLORATION PTY. LIMITED

REVERSE CIRCULATION DRILL CORE LOG

PROJECT COTTAGE BORE EL 1249

CO-ORDINATES 5000E/10,000N AZIMUTH ____ DRILLERS Northbridge COMMENCED 22/11/85 DEPTH 9m HOLE No. B5CBRC 21

RL COLLAR ____ INCLINATION Vertical DRILL TYPE ____ COMPLETED 22/11/85 CASING LEFT ____ DPO No(s) ____

DEPTH FROM(M)	DEPTH TO(M)	CORE REC. (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	SCINT (CPS)	SUS $\times 10^3$ SIU	ASSAY VALUES
0	1				?RECENT CLAY Clay, red brown, silty			0	2	8	650	
									4	8	650	
1	9				?ADELAIDEAN SILTSTONE Siltstone, grey-green, slaty containing very fine grained black metallic ?hematite with 6				6	8	650	
	EOH								8	8	650	
									9	8	650	
					10% orange-brown limonite after pyrite	Heavy min's	1234392		BG.	8	650	
					Bedding at < 10° ica.							
					Clay, light fawn							

SAMPLE No.	Cu	Pb	Zn	Ni	Co	Fe%	Mn	Cr	Ba	Nb	Sr	Mg%
8-9m 1159838 Geochemistry	6	<4	10	42	12	5.40	60	30	370	16	70	1.02

Petrology 1159856
Chlorite-sericite-quartz shale, with fine disseminated oxidised pyrite.

CRAE 117
PLAN No B 4166

SUMMARY AND SPECIAL COMMENTS ____

LOGGED BY J.A. Howard DATE ____

SHEET 1 OF 1

780

ANOMALY CB16

C.R.A. EXPLORATION PTY. LIMITED

PROJECT COTTAGE BORE EL 1249

REVERSE CIRCULATION DRILL CORE LOG

CO-ORDINATES 9950N/5000E. AZIMUTH ____ DRILLERS Northbridge COMMENCED 12/11/85 DEPTH 50m HOLE No. 85CBRC18

RL COLLAR ____ INCLINATION Vertical DRILL TYPE ____ COMPLETED 12/11/85 CASING LEFT ____ DPO No(s) ____

DEPTH FROM(M)	DEPTH TO(M)	CORE REC. (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	SCINT (CPS)	SUS. XIO^{-3} SIU	ASSAY VALUES
					?RECENT SCREE & CLAY		B.G.			14	900	
0	1.8				Scree, quartzite & silcrete.			0	2	16	200	
					Clay, light brown, stiff.							
1.8	20				? TERTIARY CLAY & SAND				4	18	70	
					1.8-4.5m Clay, light brown & grey, stiff.							
					4.5-6m Clay, dark rusty brown, sandy, soft				6	28	30	
					6-18m Clay 95, dark rusty brown, soft.							
					Sand 5, angular, poorly sorted, ferruginous.				8	20	40	
			10						10	18	35	
									12	24	30	
									14	20	20	
					16-20m Clay, light grey-brown.				16	24	40	
									18	22	40	
			20						20	20	35	
20	50		RC		WEATHERED ? ADELAIDEAN DOLOSILTITE							
	EOH				20-26m Clay 99, light rust, soft.				22	16	60	
					Rock fragments 1, Dolomite with 10% small clay pseudomorphs after calcite in very fine grained grey-green matrix. Vague horizontal layering.				24	18	150	
					3mm flat plates of limonite on one broken surface.				26	16	80	
					26-28m Clay 75, light yellow-brown, soft.				28	16	35	
			30		Rock frags 25, Dolomite, light yellow-brown, very fine to 1cm grain size. Surfaces are limonite coated.				30	16	20	
					28-30m Clay 50,				32	18	20	
					Rock frags 50, Dolomite, dark grey & yellow-brown & limonitic				34	16	250	
					30-32m Rock frags 60, Dolomite as above				36	16	200	
					Powdered rock frags 40, with very fine Mn spots							
					32-34m RF 60, Dolomite, dark rusty brown.				38	16	55	
					PRF 40 as above. " " "							
			40		34-36m RF 30, Dolomite, very fine grained, dark grey				40	18	40	
					PRF 70, as above.							
					36-38m RF 40, Dolomite RF Quartz, 3cms, grey, angular				42	18	45	
					PRF 60, grey.							
					38-40m RF 40, Dolomite, light-medium grey & brown, limonitic				44	16	45	
					RF 1, Hematite, red-brown, angular.							
					PRF 60 as above.				46	16	350	
										max	1200	

SUMMARY AND SPECIAL COMMENTS ____

LOGGED BY J.P. Howard DATE ____

SHEET 1 OF 2

CRAE 117 PLAN No. 8-000

085

C.R.A. EXPLORATION PTY LIMITED

PROJECT _____

DRILL CORE LOG

CO-ORDINATES _____ AZIMUTH _____ DRILLERS _____ COMMENCED _____ DEPTH _____ HOLE No. 85CBRC18

RL COLLAR _____ INCLINATION _____ DRILL TYPE _____ COMPLETED _____ CASING LEFT _____ DPO No(s) _____

DEPTH FROM(M)	DEPTH TO(M)	CORE REC (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	SCINT (CPS)	SUS x10⁻³ SIU	ASSAY VALUES
					40-42m RF 30, light to medium grey & yellow brown dolomite			46	48	18	30	
					PRF 70, as above.							
			50		42-44m RF 60, Dolomite, very light grey-white, yellow grey			48	50	16	93	
					Hematite, black, spots & streaks.		Cu	Pb	Zn	Ni	Co	Fe%
					PRF 40	44-46m 1159836 Geochemistry	9	185	160	26	14	3.05
					44-50m RF 50, Dolomite, yellow brown, white &	28-50m 1234390 Heavy min's.						
					medium green.							
					PRF 50, 10% is red-brown, ferruginous.							

Mn	Cr	Ba	Nb	Sr	Mg%
870	26	–	6	110	4.30

FRAE 117
PLAN No M414

SUMMARY AND SPECIAL COMMENTS _____

LOGGED BY _____ DATE _____

SHEET 2 OF 2

080

ANOMALY CBP3

C.R.A. EXPLORATION PTY. LIMITED

PROJECT COTTAGE BORE E/W 1249

REVERSE CIRC. DRILL CORE LOG

CO-ORDINATES 354700mE / 6351350mN (AMG) AZIMUTH ____ DRILLERS Northbridge COMMENCED 12/11/85 DEPTH 14 m HOLE No. 85CBRC17

RL COLLAR ____ INCLINATION Vertical DRILL TYPE ____ COMPLETED 12/11/85 CASING LEFT ____ DPO No(s) ____

DEPTH FROM (M)	DEPTH TO (M)	CORE REC. (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	Scint CPS	SUS $\times 10^{-3}$ SI	ASSAY VALUES
							BG.			20	750	
0	12				? TERTIARY CALCRETE, CLAY, SAND & CONGLOMERATE			0	2	20	65	
					0-2m Calcrete 40, fragments to 2cm.							
					Clay 60, brown, soft.				4	20	40	
					2-4m Pebble conglomerate 20, subrounded, well sorted.							
					Clay 80, white, soft.				6	20	50	
					4-6m Pebble conglomerate 20,							
					Sandstone 30, silicified aggregates of medium				8	20	15	
					grained sand & quartz crystals.							
			10		Clay 50, white, soft				10	20	35	
					6-8m Clay 95, white, hard with very fine grained							
			u/c		hematite spots				12	20	50	
					Sand 5.							
		10-20%			8-12m Clay 80%, grey-white, hard & soft.				14	25	60	
					Sand 20%, medium to very course grained &		Cu	Pb	Zn	Ni	Co	Fe% Mn Cr Ba Nb Sr Mg%
					pebbly, subangular, poorly sorted.	1159835 Geochemistry	32	4	12	8	4	0.22 10 22 20 22 16 0.57
						1234384 Heavy min's.						
12	14				CLAYSTONE, WEATHERED ? ADELAIDEAN							
	EOH				Yellowish-white, soft.							

CRAE 117
PLAN No. 8-0-0

SUMMARY AND SPECIAL COMMENTS ____

LOGGED BY JPHoward DATE ____

SHEET 1 OF 1

087

ANOMALY cb826

C.R.A. EXPLORATION PTY. LIMITED

PROJECT COTTAGE BORE EL 1249

(CB18 GRID) REVERSE CIRCULATION DRILL CORE LOG

CO-ORDINATES 9900mN/4450E AZIMUTH _____ DRILLERS Northbridge COMMENCED 11/11/85 DEPTH 27m HOLE No. 85CBRC16

RL COLLAR _____ INCLINATION Vertical DRILL TYPE _____ COMPLETED 11/11/85 CASING LEFT _____ DPO No(s) _____

DEPTH FROM(M)	DEPTH TO(M)	CORE REC (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	SCINT. (CPS)	SCINT. (CPS)	ASSAY VALUES
0	1		dc?		? RECENT SAND & SCREE		BG					
					Sand 80, red-brown, medium to coarse grained poorly sorted			0	2	1200 1800	20	
					Rock fragments 20, quartzose scree.				4	65	18	
					Heavy minerals 1%, black.							
1	20				? ADELAIDEAN LIMESTONE, CALCITE & CLAY				6	35	20	
					1-2m Clay 100, green & brown, stiff & sandy & minor black chert.							
					2-4m Limestone 50, white				8	45	16	
			10		Clay 50, as above.							
					4-6m Clay 100, fawn-brown, soft, Micaceous, 0.5mm flake				10	45	16	
					6-8m Clay 80, grey-green, soft, micaceous.				12	40	18	
					Calcite 20							
					8-14m Clay 100, dark green-grey, soft, micaceous (?chlorite)				14	35	18	
					14-20m Clay 88, yellow-white							
					Rock fragments 10-50 limestone, grey with very fine grained silica Calcite, euhedral, white 4c 1cm.				16	55	18	
20	27				DOLERITE				18	50	16	
	EOH				20-22 Rock frags 80% dolerite, green-grey, fine grained				20	70	16	
			20		Clay 20, soft							
				V V	22-24 Rock frags 25, dolerite, dark green 80, chlorite 20				22	55	18	
				V V	Clay 75, soft.							
				V V	24-27m Dolerite, very fine grained, dark green,				24	80	20	
				V V	with laths of feldspar & ?magnetite.							
				V V					26	200	20	
				V V								
				V V					27	2000 4500	16	
								Cu	Pb	Zn	Ni	Co	Fe%	Mn	Cr	Ba	Nb	Sr	Mg%
			30			26-27m 1159834 Geochemistry	1159834	16	-	14	55	40	3.75	110	36	25	14	75	2.70
						8-27m 1234388 Heavy min's	1234388												
						26-27m 1159854 Petrology	1159854												
						Massive medium grained dolerite; magnetite-rich; pyroxene uralitised to actinolitic hornblende, plagioclase is albitised.													

SUMMARY AND SPECIAL COMMENTS _____

LOGGED BY J.P. Howard DATE _____

SHEET 1 OF 1

CRAE 117
PLAN No M 416

088

ANOMALY CB17

C.R.A. EXPLORATION PTY. LIMITED

PROJECT COTTAGE BORE EL 1249

REVERSE CIRCULATION DRILL CORE LOG

CO-ORDINATES 4500 mE/10500mN (Local) AZIMUTH _____ DRILLERS Northbridge

RL COLLAR _____ INCLINATION Vertical DRILL TYPE _____

COMMENCED 11/11/85 DEPTH 17 m HOLE No. 85CBRC15

COMPLETED 11/11/85 CASING LEFT _____ DPO No(s) _____

DEPTH FROM(M)	DEPTH TO(M)	CORE REC. (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	Scint (CPS)	ASSAY VALUES: SUS x10⁻³ SI/U
							B.G.			18	900
0	2			C C C	? TERTIARY CALCRETE. Calcrete 60, pink, hard Clay 40, brown, soft, 1% heavy minerals			0	2	18	400
2	13				? TERTIARY SAND, CLAY & CONGLOMERATE				4	18	30
					2-6.5m Clay, grey, white & hard				6	16	20
					6.5-10m Sand 70, very fine grained "egg-timer sand", subrounded, well sorted. Clay 30, light grey, soft.				8	18	50
			10		10-13m Sand 60 very fine to very coarse grained, bimodal, rounded, well sorted Clay 30 grey, soft. Pebble conglomerate 10, quartz to 5mm, rounded, 2% dark black chert, 1% secondary silica & silicified sandstone with mm Fe spots				10	14	60
									12	16	100
			u/c						14	18	50
13	17m E.O.H.				WEATHERED ? ADELAIDEAN LIMESTONE				16	16	200
					13-14m Clay light yellow-green.				17	16	100
					14-16m Clay medium green.						
					16-17m Rock fragments and "coins" of core of sandy limestone, fine grained, subangular, well sorted containing 10% very fine grained biotite.						

SAMPLE No.	Cu	Pb	Zn	Ni	Co	Fe%	Mn	Cr	Ba	Nb	Sr	Mg%
42	6	10	24	6	1.65	990	16	45	8	120	0.91	

1159833 Geochemistry
1234387 Heavy mnls.
1159853 Petrology
laminated silty to fine sandy (q,fz-fdd) limestone; minor biotite

SUMMARY AND SPECIAL COMMENTS _____

LOGGED BY JRKennard DATE _____

SHEET 1 OF 1

CRAE 117
PLAN No M 414

089

ANOMALY CB17

C.R.A. EXPLORATION PTY. LIMITED — PROJECT COTTAGE BORE EL 1249

REVERSE CIRCULATION DRILL CORE LOG

CO-ORDINATES 4400E/10500N — AZIMUTH — DRILLERS Northbridge — COMMENCED 11/11/85 — DEPTH 21m — HOLE No. 85CBRCH4

RL COLLAR — INCLINATION Vertical — DRILL TYPE — COMPLETED 11/11/85 — CASING LEFT — DPO No(s)

DEPTH FROM(M)	DEPTH TO(M)	CORE REC (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	SCINT (CPS)	ASSAY VALUES: SUS (x10⁻³ SI)
0	4				? RECENT CALCRETE & CLAY		Bg			18	500
					0-2m Calcrete 70, pink.			0	2	20	200
					Clay 25, brown				4	20	60
					Heavy minerals <5 to 2mm ø.						
					2-4m Calcrete 70, white, fragments				6	18	30
					Clay 30, light green-brown						
4	11.5				? TERTIARY SAND & CLAY				8	16	85
					4-6m Clay 100, soft, light grey, sandy.						
					6-8m Sand 80, very fine grained, subrounded "egg timer"				10	18	200
			10		Clay 20, coating sand, light grey.						
					8-11.5 Sand 70, fine to very coarse grained, poorly				12	18	45
					sorted, subrounded						
					Clay 20, light grey.				14	20	55
					Pebble conglomerate 10, angular quartzite						
					to 3cm. <1% HM.				16	18	35
11.5	21m				WEATHERED FELDSPATHIC MUDSTONE						
	EOH				11.5-12m Clay, bright yellow-green & brown.				18	18	40
					12-14m Clay 90, dark green						
					Rock fragments 10, to 3cm. Very dark green ?chlorite				20	20	45
			20		14-18m Clay 80, dark green.				21	20	150
					Rock fragments 20% to 15mm. Very fine grained						
					mica & chlorite to 1mm.						
					18-21m Very fine grained feldspar, biotite						
					layered mudstone. Thin "feldspar" skins" on						
					very fine grained dark green core. Very hard						

SAMPLE No.	Cu	Pb	Zn	Ni	Co	Fe%	Mn	Cr	Ba	Nb	Sr	Mg%
1159832 Geochem.	22	—	18	36	6	5.30	26	46	15	24	38	.52
Heavy mins	1234386											
Petrology	1159852											

Mixed pelitic & quartz-plagioclase sandstone, with biotite & trace of tourmaline.

SUMMARY AND SPECIAL COMMENTS

LOGGED BY — DATE

SHEET — OF

CRAE 117
PLAN No M 414

090

ANOMALY CBP 1

C.R.A. EXPLORATION PTY. LIMITED

PROJECT COTTAGE BORE EL 1249

REVERSE CIRCULATION DRILL CORE LOG

CO-ORDINATES 351150mE/6355250mN (AMG) AZIMUTH — DRILLERS Northbridge — COMMENCED 10/11/85 — DEPTH 30m — HOLE No. BSCBRC13

RL COLLAR — INCLINATION Vertical — DRILL TYPE — COMPLETED 10/11/85 — CASING LEFT — DPO No(s)

DEPTH FROM(M)	DEPTH TO(M)	CORE REC. (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	Scint (CPS)	Sus x10⁻³SU	ASSAY VALUES
0	6				? RECENT SCREE Siltstone, quartzite, calcrete, angular. Sand, white & orange, medium grained, well sorted rounded			0	2	18	3000	
								2	4	20	1000	
								4	6	20	500	
								6	8	20	30	
								8	10	22	35	
								10	12	20	50	
6	14				? TERTIARY SAND, CLAY & CONGLOMERATE			12	14	20	40	
					6-8m Sand 90, grey-brown Clay 10, gray, with clots of sand			14	16	22	25	
								16	18	24	16	
					8-10m Consolidated clayey sand. Sand 70, medium grained, well sorted, rounded Clay 30, as matrix.			18	20	26	20	
								20	22	23	90	
								22	24	20	90	
					10-12m Sand 30, medium grained, well sorted, rounded Clay 70, soft cream.			24	26	22	50	—
								26	28	22	50	
					12-14m Pebble Conglomerate 20, 3cm angular translucent quartz fragments.			28	30	24	65	
					DEEPLY WEATHERED ? ADELAIDEAN? MUDSTONE		Bg			18	1000	
14	30m EOH				Clay, very stiff, grey-fawn.							
					20-22m Bedding at 20° to lca. on core pieces.							
					22-26m Whisps & flecks of white clay at 70° lca.							
					26-28m CLAYSTONE grey & white bands to 1cm wide at 20° lca. Probably deeply kaolinised Adelaidean mudstone.							
					28-30m As above with ferruginous mudstone at the bottom.							

SAMPLE No.	FROM (M)	TO (M)	Cu	Pb	Zn	Ni	Co	Fe%	Mn	Cr	Ba	Nb	Sr	Mgl
28-30m 1159831 Geochemistry														
			Cu	Pb	Zn	Ni	Co	Fe%	Mn	Cr	Ba	Nb	Sr	Mgl
	-	14	48	-	14	55	16	4·75	70	32	80	20	36	2·80
Heavy mins 1234385	14	30												

SUMMARY AND SPECIAL COMMENTS

LOGGED BY — DATE

SHEET — OF

CRAE 117
PLAN No M 616

091

ANOMALY CBP4

C.R.A. EXPLORATION PTY. LIMITED

REVERSE CIRCULATION. DRILL CORE LOG

PROJECT COTTAGE BORE EL 1249

CO-ORDINATES 35/000mE/63/41350mN (AMG) AZIMUTH ____ DRILLERS Northbridge COMMENCED 10/11/85 DEPTH 10 m HOLE No. 85CBRC 12

RL COLLAR ____ INCLINATION Vertical DRILL TYPE ____ COMPLETED 10/11/85 CASING LEFT ____ DPO No(s) ____

DEPTH FROM(M)	DEPTH TO(M)	CORE REC (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	SCUM cps	ASSAY VALUES
0	4				?RECENT SCREE		B 6			1.5	545 370
					Quartzite, medium brown			0	2	20	500
					Siltstone - fragments to 4cm						
					Ironstone			2	4	20	1500
					Quartz - fragments to 3cm, opaque, white.						
4	8				?TERTIARY CLAY, SAND & ROCK FRAGMENTS			4	6	20	250
					4-6m Clay 85, rust coloured, soft.						
			vlc		Rock fragments 15, quartzite, siltstone.			6	8	20	60
					6-8m Clay 85, rust, soft.						
					Sand 15, coarse to very coarse grained, ~10% Fe			8	10	20	250
8	10				?ADELAIDEAN WEATHERED MUDSTONE		Cu	Pb	Zn	Ni	Co	Fe%	Mn	Cr	Ba	Nb	Sr	Mg%
	EOH				Clay 60, green, soft.	1159830 Geochemistry	42	18	48	40	12	4.5	150	43	230	10	135	0.88
					Rock fragments a core 40, thinly laminated green mudstone, bedded at 45°ca, minor carbonate.	1234384 Heavy mins.												

CRAE 117
PLAN No M 414

SUMMARY AND SPECIAL COMMENTS ____

LOGGED BY ____ DATE ____

SHEET ____ OF ____

092

ANOMALY Palaeochannel.

C.R.A. EXPLORATION PTY. LIMITED

PROJECT COTTAGE BORE EL 1249

REVERSE CIRCULATION DRILL CORE LOG

85CBRC 11
85CBRC 10

CO-ORDINATES 340300mE/6352300mN AZIMUTH ____ DRILLERS Northbridge COMMENCED 9/11/85 DEPTH 7m/6m HOLE No.

RL COLLAR ____ INCLINATION Vertical DRILL TYPE Investigator Mk III COMPLETED 9/11/85 CASING LEFT ____ DPO No(s) ____

DEPTH FROM(M)	DEPTH TO(M)	CORE REC (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	SCINT REC (M) CPS	ASSAY VALUES SUS $\times 10^{-3}$
					85CBRC 10						
0	2				? RECENT CLAY & ROCK FRAGMENTS		1234375	0	0.5		
					0-0.5m Heavy minerals, black,		1234376	0.5	2.0		
					Clay, , brown.						
					0.5-2m Clay 85%, light fawn		1234377	2	4		
			5		Rock fragments 15%, quartzite & mudstone						
							1234378	4	6		
2	7				? ADELAIDEAN CLAY & SILTSTONE						
	EOH				2-6m Clay, brown, Mn stains		1234379	6	7		
		1m			6-7m Siltstone, light brown, bedding at 50°/ca						
			10								
			GL								
					85CBRC 11 340300mE/6352000mN			0	2	20	200
0	2				? RECENT CLAY & ROCK FRAGMENTS						
					0-2m Quartz scree, quartzite & shale			2	4	15	0
					Clay, brown						
			5		Heavy minerals, black			4	6	10	20
2	6				? ADELAIDEAN SILTSTONE & WEATHERED CLAY						
	EOH.				2-4m Clay, brown.		1234380	0	0.5		
					4-6m Siltstone core, light fawn, bedding 50°/ca.		381	0.5	2		
					Clay, brown.		382	2	4		
							383	4	6		

CRAE 117
PLAN No M 414

SUMMARY AND SPECIAL COMMENTS

LOGGED BY ____ DATE ____

SHEET ____ OF ____

093

Anomaly C827

C.R.A. EXPLORATION PTY. LIMITED

PROJECT COTTAGE BORE EL 1249

REVERSE CIRCULATION DRILL CORE LOG

CO-ORDINATES 10200N/5200E AZIMUTH _____ DRILLERS Normbridge COMMENCED 9/11/85 DEPTH 23m HOLE No. 85CBRC9

RL COLLAR _____ INCLINATION Vertical DRILL TYPE Investi. Rig COMPLETED 9/11/85 CASING LEFT _____ DPO No(s) _____

DEPTH FROM(M)	DEPTH TO(M)	CORE REC. (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	SCINT EPS	ASSAY VALUES SUS. X10⁻³
0	2				?RECENT CALCRETE & CLAY			0	2	20	350
					Clay & medium brown.						
2	14				?ADELAIDEAN QUARTZITE & CLAY				4	18	15
					2-6m Clay 75%, cream to light brown.						
			5		Quartzite 25%, white, very fine grained.				6	18	15
					6-12m Clay 70%, cream & 5% green.						
					Quartzite 25%, chips. Bedding at 045°/ca.				8	18	25
					Clay 5%, sericitic, brown.						
					12-14m Clay 80% ravin				10	20	20
			10		Quartzite core 20%, Bedding at 045°/ca.						
14	22.9								12	18	5
									14	22	25
					?ADELAIDEAN MUDSTONE						
			15		14-16m Mudstone, green-grey with strong limonite stains – jumbled-looking.				16	20	40
		10%			16-18m Mudstone with soft, millimetric bedding at 0°/ca				18	20	5
					18-20m as above - folding; dark green chlorite to 2mm				20	18	40
			20		20-22.9m as above - bedding 0-30°/ca.				22	20	25
									23		15
22.9	23.0				?ADELAIDEAN TALC						
					Talc, light grey.		Bg			18	600

	Cu	Pb	Zn	Ni	Co	Fe%	Mn	Cr	Ba	Nb	Sr	Mg%
Geochemistry 1159829	16	4	14	65	26	3.60	75	20	20	20	70	0.9

CRAE 117
PLAN No M414

SUMMARY AND SPECIAL COMMENTS _____

LOGGED BY _____ DATE _____

SHEET _____ OF _____

094

Anomaly C88

C.R.A. EXPLORATION PTY. LIMITED

PROJECT COTTAGE BORE EL 1249

REVERSE CIRCULATION DRILL CORE LOG

CO-ORDINATES 4900E/9600N AZIMUTH ______ DRILLERS Northbridge COMMENCED 8/11/85 DEPTH 15m HOLE No. 85C8RC8

RL COLLAR ______ INCLINATION Vertical DRILL TYPE Investigator Mk III COMPLETED 8/11/85 CASING LEFT ______ DPO No(s) ______

DEPTH FROM (M)	DEPTH TO (M)	CORE REC. (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	SCINT CPS	SUS x10⁻⁵	ASSAY VALUES						
0	0.2				?RECENT SURFACE LAG of IRONSTONE			0	2	20	450							
0.2	4				?ADELAIDEAN LIMESTONE & CLAY				4	20	35							
					Limestone 50%, pink-brown, crystalline				6	20	30							
					Clay 50%, brown, soft				8	18	30							
4	15		5		?ADELAIDEAN DOLOMITE				10	20	65							
					Dolomite 50% - grey brown crystals to 1.5cm D.				12	20	40							
					Clay - grey-brown.				14	18	55							
					Becoming grey & very fine grained at the bottom.			14	15	20	90							
							Cu	Pb	Zn	Ni	Co	Fe%	Mn	Cr	Ba	Nb	Sr	Mg%
			10			Geochemistry												
						1159668	10	–	–	43	9	2.67	810	520	48	–	98	12.6
						(ICP)												
			15															

CRAE 117 PLAN No. M414

SUMMARY AND SPECIAL COMMENTS ______

LOGGED BY J.P. Howard DATE ______

SHEET 1 OF 1

095

Anomaly C87 -

C.R.A. EXPLORATION PTY. LIMITED

PROJECT COTTAGE BORE EL 1249

REVERSE CIRCULATION DRILL CORE LOG

CO-ORDINATES 5000E/10150N AZIMUTH ____ DRILLERS Northbridge COMMENCED 8/11/85 DEPTH 11m HOLE No. 85CBRC7

RL COLLAR ____ INCLINATION ____ DRILL TYPE ____ COMPLETED 8/11/85 CASING LEFT ____ DPO No(s) ____

DEPTH FROM(M)	DEPTH TO(M)	CORE REC. (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	SCINT REC (M)	SUS. x10⁻³ SI	ASSAY VALUES
0	2				? RECENT SCREE of black ?dolerite & red-brown clay.		0	2		20	950	
2	10				CLAY after ? ADELAIDEAN MUDSTONE			4		20	650	
			5		2-4m Clay, fawn, soft.			6		20	30	
					4-8m Clay, green-blue, angular chips ? mudstone.			8		20	90	
					8-10m Clay, blue.			10		20	100	
			10					11		20	400	
10	11m				? ADELAIDEAN CARBONACEOUS MUDSTONE							
	EOH				Very fine grained, dark grey, thinly laminated, very hard mudstone with ferruginous spots to 6mm		Bg			16	400	
					Bedding at 060°/ca.		Cu	Pb	Zn	Ni	Co	Fe% Mn Cr Ba Nb Sr Mg%
						Geochem. 1159828	18	10	34	38	14	1.95 460 16 350 14 48 2.80
						Heavy mins. 1234373						
						Petrology 1159851 laminated, low-grade metamorphosed pelitic silt with minor carbonate & graphite.						

CRAE H7
PLAN No. 8 696

SUMMARY AND SPECIAL COMMENTS ____

LOGGED BY J.P. Howard DATE ____

SHEET 1 OF 1

Anomaly CBG.

C.R.A. EXPLORATION PTY. LIMITED

PROJECT COTTAGE BORE EL 1249

Macky's Dam Grid. REVERSE CIRCULATION DRILL CORE LOG

85 C B RC 5

CO-ORDINATES 9800N/5100E RC4 AZIMUTH _____ DRILLERS Northbridge COMMENCED 8/11/85 DEPTH 6 m HOLE No. 85CBRC 4

RL COLLAR 9760N/5100E RC5 INCLINATION _____ DRILL TYPE _____ COMPLETED 8/11/85 CASING LEFT _____ DPO No(s) 85CBRC 6

9760N/5100E RC6

DEPTH FROM (m)	DEPTH TO (m)	CORE REC (m)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	SCINT REC (m)	SUS 10⁻³ SI	ASSAY VALUES
0	0.2				?RECENT SCREE & CLAY			0	2	20	600	
0.2	6				WEATHERED ?ADELAIDEAN MUDSTONE				4	20	20	
	EOH				2-4m CLAY, white, 5cm core of ?mudstone				6	20	20	
			5		4-6m CLAY similar to 85CBRC 3/interpreted as weathered mudstone ? steep bedding.			Bg		20		
											%	%
							Cu	Pb	Zn	Ni	Co	Fe	Mn	Cr	Ba	Nb	Sr	Mg
						4-6m 1159825	5	14	10	6	4	0.26	6	4	570	18	22	0.66
			0		85 CBRC 5													
0	0.2				?RECENT SCREE & CLAY													
0.2	6 m				?ADELAIDEAN (MUDSTONE) CLAY													
					2-4m Clay, light green-grey, dry - minor core of mudstone.													
												%						%
			5		4-6m Clay, orange-brown, soft, ferruginous, quartz		Cu	Pb	Zn	Ni	Co	Fe	Mn	Cr	Ba	Nb	Sr	Mg
	EOH				vein material, angular fragments	4-6m 1159826	50	20	35	75	18	5.15	80	12	590	18	28	0.78
			0		85CBRC 6													
0	6				?ADELAIDEAN CLAY & SAND			0	2	20	200							
					0-2 m Clay 95, brown-grey, ferruginous, soft. Sand 5 medium to very coarse grained,				4	20	35							
									6	20	25							
					angular, equant. Aggregates of very coarse grained				8	20	40							
			5		2-4 Clay 90, fawn brown													
					Sand 10, as above.			Bg		10								
					4-6 Clay 90 grey-brown. Sand 10 as above							%						%
					6-8 Clay 90, light fawn-brown		Cu	Pb	Zn	Ni	Co	Fe	Mn	Cr	Ba	Nb	Sr	Mg
					Sand 10, as above.	1159827	10	4	24	26	12	1.94	32	20	195	10	60	4.50

CORE H7
PLAN No 8646

SUMMARY AND SPECIAL COMMENTS _____

LOGGED BY J.P. Heward DATE _____

SHEET 1 OF 1

097

C.R.A. EXPLORATION PTY. LIMITED

REVERSE CIRCULATION DRILL CORE LOG

PROJECT: COTTAGEBORE EL An CB 6

CO-ORDINATES: 9750N/4750E — AZIMUTH: — DRILLERS: Northbridge — COMMENCED: 8/11/86 — DEPTH: 23m — HOLE No.: 85CBRC 3

RL COLLAR: — INCLINATION: Vertical — DRILL TYPE: — COMPLETED: — CASING LEFT: — DPO No(s):

DEPTH FROM (M)	DEPTH TO (M)	CORE REC. (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES (WEATH., ALTERATION, FRACTURING, VEINING, MINERALIZATION)	SAMPLE No.	FROM (M)	TO (M)	SCINT. CPS
0	4				RECENT(?) SCREE, SAND & CLAY					
					Scree, medium brown, quartz, iron & indicators.					
					Clay 80, off white to light fawn.					
					Sand 5, coarse to very coarse grained, angular quartz					
4	23				(?)ADELAIDEAN MUDSTONE & CLAY.					
	EOH.				4-8.5 Clay, light fawn to orange brown					
		.25			8.5-10 Mudstone core, finely laminated, grey-orange,					
					steeply dipping. Angular fragments of quartz vein.					
		0			10-19m a's above. Minor ferruginous nodules					
		.07	10		20-22m mudstone.					
		.04			22-23m mudstone, green-brown, finely laminated					
					bedding at 70° lca. ?chlorite ? manganese					
			20							
			EOH			22-23m 1159824				

ASSAY VALUES (sample 1159824, 22-23m):

Cu	Pb	Zn	Ni	Co	Fe	Mn	Cr	Ba	Nb	Sr	Mg
28	6	20	60	28	6.20	145	12	420	18	70	0.96

SUMMARY AND SPECIAL COMMENTS:

LOGGED BY: J.R. Howard — DATE: — SHEET 1 OF 1

CRAE 117 PLAN No. M414

C.R.A. EXPLORATION PTY. LIMITED

PROJECT COTTAGE BORE EL Am.CB 23

REVERSE CIRCULATION DRILL CORE LOG

CO-ORDINATES 5000N/10000E AZIMUTH — DRILLERS Northbridge COMMENCED 7/11/85 DEPTH 13.0m HOLE No. 85CBRC 2A/2B

RL COLLAR — INCLINATION Vertical DRILL TYPE — COMPLETED 7/11/85 CASING LEFT — DPO No(s)

DEPTH FROM(M)	DEPTH TO(M)	CORE REC (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	Scint CPS	Scint $\frac{S10}{S10^2}$	ASSAY VALUES Cu	Pb	Zn	Ni	Co	Fe	Mn
					85CBRC 2A													
0	2				Surface scree of ironstone, quartzite, silcrete & quartz			0	2	30	450							
					becoming more clayey			2	4	22	350							
2	4				SILTSTONE & CLAY			4	6	28	250							
					Siltstone angular fragments			6	8	24	40							
					Clay 70%, mottled grey, stiff.			8	10	22	150							
4	9				CLAY & SAND			10	12	24	100							
					Clay 90%, fawn, stiff			12	13									
					Sand 10%, very fine grained, angular, poorly sorted.													
9	13				SAND & PEBBLE CONGLOMERATE													
	EOH		10"		Sand 70% very fine grained "egg timer"													
					Pebbles 30%, white, angular, quartz, subangular, grey													
					quartzite with holes after ? pyrite. Minor jasper													
					NB Abandoned - bit refusal. No good for percussion													
			8"		85CBRC 2B													
0	21				5000E/9800N RECENT & TERTIARY Conglom Sand Clay.													
0	4				Surface scree of ironstone, feldspathic quartzite			0	2	22	250							
					& 20% medium brown clay. NB. Ironstone confined			2	4	22	400							
					to top 1m or less.			4	6	22	200							
4	8				PEBBLE CONGLOMERATE & CLAY			6	8	22	15							
					Pebbles 80% quartz to 1cm, subrounded, large (3cm)			8	10	22	30							
					fragments			10	12	22	20							
					Clay 50% medium brown & white			12	14	24	10							
8	13	10%			PEBBLE CONGLOMERATE & CLAY			14	16	24	15							
			10"		Pebbles 30% quartz to 3cm, subrounded.			16	18	24	15							
					Clay 65% white			18	20	24	40							
					Sand 5% very fine grained			20	22	24	10							
13	15				CLAY & SAND			22	24	24	20							
					Clay 70%, cream			24	26	24	20							
					Sand 30%, very coarse grained			26	28	26	5							
15	16				SAND, "egg timer"													
					Sand, very fine grained, grey, subangular, bimodal													
					to 1mm													
16	21				CONGLOMERATE & SAND													
			20		Pebbles 30% g-ey & white quartz, to 3cm, angular													
			14"		Sand "egg timer", grey, very fine grained A few													
					pebbles at base show rounding.													
21	28				ADELAIDEAN MUDSTONE													
	EOH				21-26 Clay, yellow brown & medium green, soft.													
		10%			26-28 Clay & mudstone													
					Clay 90% medium green, soft													
					Mudstone 10% Thinly laminated beds at 45° Ca													
					Minor leucocratic layers. Very fine iron oxides flecks													
					Limonite stained													

SAMPLE No.	Cu	Pb	Zn	Ni	Co	Fe	Mn	Cr	Ba	Nb	Sr	Mg
Geodrum 1159823	22	4	14	50	24	3.65	170	50	330	16	32	1.36

SUMMARY AND SPECIAL COMMENTS

LOGGED BY JHoward DATE

SHEET 1 OF 1

CRAE 117 PLAN No M 416

099

C.R.A. EXPLORATION PTY. LIMITED

REVERSE CIRC. DRILL CORE LOG

PROJECT COTTAGE BORE EL ANOMALY CBP13

CO-ORDINATES Centre of claypan AZIMUTH _____ DRILLERS Northbridge COMMENCED 6/11/85 DEPTH 10.5m HOLE No. 85CBRC1

RL COLLAR _____ INCLINATION Vertical DRILL TYPE RC 4½" COMPLETED 6/11/85 CASING LEFT _____ DPO No(s) _____

DEPTH FROM(M)	DEPTH TO(M)	CORE REC (M)	CORE SIZE	GRAPHIC LOG	CORE DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	SCINT CPS	ASSAY VALUES GU3 Xe⁸
0	3				CLAY SANDY & GYPSIFEROUS Clay 60% stiff, medium brown & fawn brown Sand 20% medium grained, well rounded, quartzose Gypsum 20% crystals to 2cm di			BG		40	1900
								0	2	40	200
									4	40	55
3	6				SANDY CLAY Clay 50% red-brown, stiff. Sand 50% medium grained quartz, well rounded				6	40	50
									8	40	80
6	10.5	5%	10		SANDSTONE, CLAYEY				10	40	80
	EOH				SAND 70, fine grained, angular, well sorted, glassy, single crystals Clay 30, mottled grey NB Very hard bottom	Heavy mins - Surface float	1234366 1158392				
						Petrology " "	1158396				
						1158392 Unsorted very fine grained angular, single crystal quartz in ultrafine rutile & Kspar ? metasome matrix.					
						1158396 albite-phlogopite after ? basalt metasome					

SUMMARY AND SPECIAL COMMENTS _____

LOGGED BY _____ DATE _____

SHEET 1 OF 1

CRAE 117
PLAN No M 414

100

APPENDIX II

Petrology Descriptions

Pontifex & Associates Pty. Ltd.

TEL. 332 6744
A.H. 31 3816

26 KENSINGTON ROAD, ROSE PARK
SOUTH AUSTRALIA

P.O. BOX 91, NORWOOD
SOUTH AUSTRALIA 5067

MINERALOGICAL REPORT NO. 4686

8th January, 1986

TO: Mr. John Howard,
CRA Exploration Pty. Ltd.,
P.O. Box 254,
NORWOOD, S.A. 5067

COPY TO: Manager Information Services,
CRA Exploration Pty. Ltd.,
P.O. Box 656,
FYSHWICK, A.C.T. 2069

The Administration Officer,
CRA Exploration Pty. Ltd.,
P.O. Box 254,
NORWOOD, S.A. 5067

YOUR REFERENCE: Order No. B1031

MATERIAL: Drill Core samples

IDENTIFICATION: 1159851 to 860
1159862, 63

WORK REQUESTED: Thin section preparation
and description

SAMPLES & SECTIONS: Returned to you
with this report

PONTIFEX & ASSOCIATES PTY. LTD.

85CBRC 7 (10-11m)

1159851 : laminated, low-grade metamorphosed (but not schistose) pelitic silty facies; composed of quartz, felspar, clay-sericite and biotite; very minor carbonate sparser possible graphitic material

This rock is a fairly low-grade metamorphosed laminated sequence of pelitic and silty sediment in overall subequal abundance.

The pelitic material consists of very fine biotite (approx. 25% of the whole rock) mixed with turbid very poorly defined clay-sericite (25 - 30% of the whole rock). The clouding appears to be due to extremely finely dispersed leucoxene, and probably some carbonaceous (graphitic) material.

These phyllosilicates may form their own laminations, or be mixed with silt in vaguely graded sequences of laminations. They are not schistose, and the random distribution particularly of the biotite suggests possible very low-grade metasomatism or contact metamorphism, rather than regional.

The silt (50% of the whole rock) consists mostly of quartz grains but with minor probable felspar trains, and may form variably 20% to 85% of a given lamination.

Minor carbonate grains (3 - 5%) probably dolomite, are disseminated, mainly through the silt layers.

Accessory detrital grains of tourmaline, rutile, and muscovite flakes, are scattered.

85CBRC 14 (20-21m)

1159852 mixed pelitic, and fine to medium quartz-plagioclase sandstone facies; apparent low-grade metamorphism to produce interstitial extremely fine silicification, scattered patchy biotite and trace tourmaline

This is a more massive, unordered mixed sediment than 115953, i.e. not laminated or bedded (also not schistose), and generally coarser grained, i.e. 0.1 to 0.25 mm, which is fine to medium sand size.

It consists of very irregular lenticular domains about 10 mm across, gradational into one another, and each composed of variable amounts of :-

greenish-khaki biotite
detrital quartz grains
detrital plagioclase grains

In addition to these essential components which have an overall subequal abundance, minor diffuse cryptocrystalline quartz is more or less intergranular throughout as an apparent 'silificiation' of low-grade metasomatic type.

The random patchy distribution of the biotite, which may have derived partly from a pelitic component, also suggests a low-grade metasomatic aspect to its genesis, and rare small greenish crystals of (non-detrital) tourmaline, (difficult to distinguish from biotite) also support this idea.

Rare (detrital) grains of zircon, and rare crystals of rutile are scattered.

85CBRC15 (16-17m)

1159853 : laminated, silty to fine sandy (quartz-felspar), limestone; minor scattered biotite

At least 60% of this rock consists of fine crystalline carbonate, the staining of which indicates calcite. A fine layering (bedding) is partly manifest as variations in grain size from 0.1 mm to 0.3 mm in different layers.

Also the layering reflects different abundances of the minor non-carbonate phases which includes mostly quartz and plagioclase grains, originally detrital and with a size range of silt to fine sand. These silicate grains dominate rare layers.

The other rock-forming mineral is pale yellowish, brown biotite, which forms about 20% of the whole sample. It occurs as random flakes, in the carbonate aggregate, in variable abundance, with a size compatible with the size of the enclosing carbonate aggregate.

85CBRC 16 (26-27m)

1159854 : massive, medium grained dolerite; magnetite-rich; pyroxenes uralitised to actinolitic-hornblende, plagioclase is albitised

This is a massive, homogeneous, holocrystalline rock, and at least 50% of it consists of randomly interlocking laths of plagioclase, average size about 0.5 x 2 mm, which appear to have an albite composition (albitised).

The other 50% of the rock consists of mafic minerals, evenly disposed through the aggregate of interlocking plagioclase, with subophitic fabric. Most of these are crystgals of pyroxene which have retrograded to actinolitic-hornblende (by uralitic style alteration). Minor slightly bluish-mid-green hornblende is commonly intergrown with the fibre-clusters of actinolitic-hornblende.

Magnetite (7 - 10%) average size about 0.2 mm, is scattered with the same mode of occurrence (and somewhat unusual abundance). Accessory oxidised pyrite, extremely fine grains of epidote, rarer apatite, rutile, and flakes of chlorite are scattered, intergranular, and as inclusions in (albitised) plagioclase.

85CBRC 21 (8-9m)

1159856 : chlorite-sericite-quartz shale, with minor disseminated very fine oxidised pyrite; (very low-grade metamorphosed, silty mudstone)

This is a massive homogeneous, extremely fine low-grade metamorphosed sediment, characterised by the presence of abundance chlorite and disseminated pyrite (without biotite).

At least 50% of the rock consists of a diffuse metamorphically microcrystalline aggregate, grain size about 0.02 mm, of quartz (silt). Equally fine single flakes of sericite (25%) and of chlorite (15 - 20%) are dispersed throughout. The sericite and some chlorite has a weakly schistose arrangement, but some chlorite is at random more or less substituting for biotite in other samples described. Minute (10 micron size) crystals of rutile are dispersed.

Euhedral cubes of oxidised pyrite (5 - 7%), average size 0.1 mm, are randomly dispersed throughout. Rare, smaller crystals of authigenic tourmaline are also scattered.

85CBRC/P/22 (4-6m)

1159857 : chlorite-sericite-quartz shale, minor disseminated, oxidised pyrite; (essentially the same as 1159856)

This rock has essentially the same composition and structure as 1159856, but with some thin beds notably richer in extremely fine sericite, with negligible sericite, and some thin beds notably richer in quartz silt, with negligible sericite.

The beds are thin and lenticular, and consist of variable proportions of diffuse micromosaic of quartz silt, with variably minor to abundance sericite, similarly oriented; also minor chlorite (10 - 15%) which is weakly schistose to random as in 1159856.

Euhedral cuibes of oxidised pyrite (5 - 7%), (and some voids after leached-out pyrite) average size about 0.15 mm, are randomly disposed. Rare very small crystals of authigenic tourmaline are scattered.

APPENDIX III

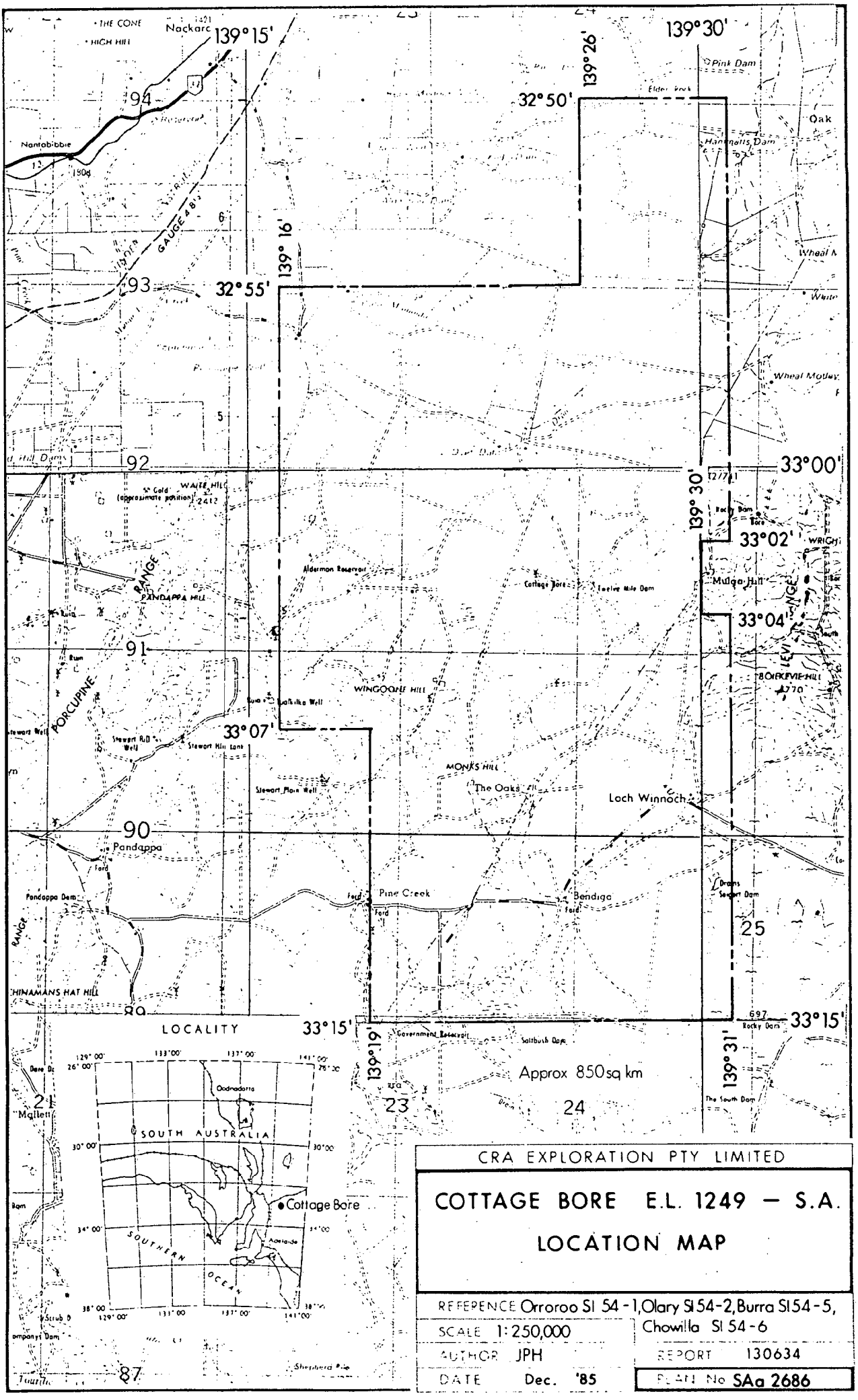
Table of Drill Hole ICP Analyses by Analabs

COTTAGE BORE TABLE OF DRILL HOLE SAMPLE ICP ANALYSES

DRILL HOLE	SAMPLE	LI	BE	B	NA2O	MGO%	AL2O3%	SIO2%	P	K2O%	CAO	SC	TIO2	V	CR	MN	FE2O3%	LOI%	CO	NI
CBRC 8	1159668	13	2	48	1.11%	12.6	3.44	39.4	232	0.610	15.4%	6	1990	84	520	610	2.67	24.6	9	43
CBRC 20	1159669	18	2	69	3.64%	7.53	9.82	44.5	920	1.73	9.44%	15	1.23%	128	377	1220	6.53	14.7	18	56
RC 28	1159823	10	3	54	8980	2.54	9.14	67.4	730	2.07	4.35%	10	9470	76	148	188	6.19	6.07	23	50
RC 3	1159824	15	4	83	1.44%	1.67	15.3	61.4	195	3.30	1690	17	1.05%	152	130	223	11.1	4.50	26	63
RC 4	1159825	24	3	161	2070	0.982	16.0	70.9	119	3.59	-700	13	8660	119	77	30	2.50	4.18	-5	21
RC 5	1159826	22	6	188	4380	1.30	14.6	61.9	467	3.90	770	21	8000	153	133	117	12.3	4.41	16	101
RC 6	1159827	12	2	863	7620	7.94	10.9	67.7	248	2.97	940	14	5670	155	103	44	4.88	4.06	12	39
RC 7	1159828	18	3	118	1.63%	5.19	12.0	61.2	800	2.59	3.82%	12	8700	121	87	477	4.86	7.75	11	38
RC 9	1159829	39	3	37	1.33%	11.3	11.1	63.0	461	0.738	5820	12	6360	100	100	85	5.60	5.50	25	65
RC 12	1159830	16	2	80	4100	1.52	8.54	41.7	315	1.59	19.7%	10	5840	97	129	168	6.82	19.2	9	33
RC 13	1159831	42	3	167	7.21%	5.17	17.5	56.7	274	3.49	3610	17	9840	164	118	82	7.01	0.97	12	50
RC 14	1159832	11	2	334	7190	0.805	26.5	43.0	100	4.97	1550	11	1.25%	127	199	88	12.0	10.7	-5	98
RC 15	1159833	14	1	76	3.07%	1.77	7.10	27.6	320	0.101	31.5%	8	3700	73	-50	920	2.42	25.4	6	21
RC 16	1159834	23	2	11	5.73%	4.86	13.0	49.6	940	1.23	4.98%	28	3.05%	381	201	493	16.0	1.45	50	89
RC 17	1159835	9	1	1160	5360	0.794	24.8	62.3	-100	0.334	1140	5	9320	113	171	18	0.864	9.32	-5	15
RC 18	1159836	3	2	65	2.75%	7.73	5.39	26.3	438	-0.060	23.9%	12	4590	195	94	870	5.38	28.0	15	31
RC 19	1159837	13	4	560	4.58%	3.93	15.6	65.7	590	0.156	2650	16	1.09%	97	118	74	6.03	1.92	17	68
RC 21	1159838	18	4	100	1.43%	1.76	16.7	62.1	465	3.22	2140	19	1.05%	132	142	104	10.1	2.85	-5	42
RC 22	1159839	22	3	82	1.38%	2.47	16.7	60.4	660	4.28	4820	19	1.08%	126	113	680	8.49	4.19	26	58

DRILL HOLE	SAMPLE	SR	Y	ZR	NB	MO	AG	SN	SAMPLE	BA	LA	HF	TA	W	RE	PB	CU	ZN
RC 8	1159668	98	11	38	-20	23	-5	-100	1159668	48	9	-10	-10	-20	-10	-200	10	-5
RC 20	1159669	172	17	233	-20	37	-5	-100	1159669	165	30	-10	-10	-20	-10	-200	54	150
RC 28	1159823	39	24	152	-20	-20	-5	-100	1159823	412	46	-10	-10	-20	-10	-200	22	14
RC 3	1159824	73	16	562	20	-20	-5	-100	1159824	505	35	-10	-10	-20	-10	-200	26	30
RC 4	1159825	19	14	290	-20	-20	-5	-100	1159825	860	23	-10	-10	-20	-10	-200	17	32
RC 5	1159826	31	45	392	-20	-20	-5	-100	1159826	720	33	-10	-10	-20	-10	-200	65	105
RC 6	1159827	63	38	95	-20	-20	-5	-100	1159827	288	60	11	-10	-20	-10	-200	9	28
RC 7	1159828	54	21	201	-20	-20	-5	-100	1159828	469	40	10	-10	-20	-10	-200	18	35
RC 9	1159829	81	24	133	-20	-20	-5	-100	1159829	40	71	12	-10	-20	-10	-200	15	9
RC 12	1159830	168	23	106	-20	-20	-5	-100	1159830	244	23	-10	-10	-20	-10	-200	49	50
RC 13	1159831	37	18	349	-20	-20	-5	-100	1159831	108	21	-10	-10	-20	-10	-200	51	11
RC 14	1159832	36	17	236	23	-20	-5	-100	1159832	34	43	-10	-10	-20	-10	-200	25	28
RC 15	1159833	129	15	50	-20	-20	-5	-100	1159833	63	-5	-10	-10	-20	-10	-200	44	89
RC 16	1159834	79	26	210	22	-20	-5	-100	1159834	46	24	-10	-10	-20	-10	-200	5	19
RC 17	1159835	13	5	158	21	-20	-5	-100	1159835	28	23	-10	-10	-20	-10	-200	46	20
RC 18	1159836	118	24	64	-20	-20	-5	-100	1159836	17	-5	-10	-10	-20	-10	-200	6	174
RC 19	1159837	19	18	195	-20	-20	-5	-100	1159837	199	51	-10	-10	-20	-10	-200	23	12
RC 21	1159838	75	14	373	22	-20	-5	-100	1159838	756	35	-10	-10	-20	-10	-200	-5	19
RC 22	1159839	65	16	240	-20	-20	-5	-100	1159839	572	47	-10	-10	-20	-10	-200	17	28

DRILL HOLE	SAMPLE	CE	PR	ND	SM	EU	GD	TB	SAMPLE	DY	HO	ER	TM	YB	TH	U
CBRC 8	1159668	16	-20	-20	-5	1	-10	-5	1159668	-5	-20	-2	-2	-2	-10	-200
RC 20	1159669	46	-20	27	6	1	-10	-5	1159669	-5	-20	2	-2	2	11	-200
RC 28	1159823	64	-20	35	7	1	-10	-5	1159823	-5	-20	2	-2	3	17	-200
RC 3	1159824	61	-20	35	7	2	-10	-5	1159824	-5	-20	2	-2	2	15	-200
RC 4	1159825	98	-20	28	6	1	-10	-5	1159825	-5	-20	-2	-2	2	10	-200
RC 5	1159826	67	-20	37	9	2	-10	-5	1159826	6	-20	4	-2	5	17	-200
RC 6	1159827	96	-20	72	14	3	11	-5	1159827	7	-20	3	-2	3	11	-200
RC 7	1159828	64	-20	35	8	1	-10	-5	1159828	-5	-20	2	-2	3	17	-200
RC 9	1159829	114	-20	56	9	1	-10	-5	1159829	-5	-20	2	-2	3	12	-200
RC 12	1159830	54	-20	29	6	1	-10	-5	1159830	-5	-20	2	-2	2	-10	-200
RC 13	1159831	34	-20	20	5	1	-10	-5	1159831	-5	-20	2	-2	2	-10	-200
RC 14	1159832	80	-20	38	7	2	-10	-5	1159832	-5	-20	2	-2	2	29	-200
RC 15	1159833	22	-20	-20	-5	-1	-10	-5	1159833	-5	-20	-2	-2	2	-10	-200
RC 16	1159834	46	-20	36	10	3	-10	-5	1159834	5	-20	3	-2	3	-10	-200
RC 17	1159835	41	-20	-20	-5	-1	-10	-5	1159835	-5	-20	-2	-2	-2	-10	-200
RC 18	1159836	21	-20	-20	-5	1	-10	-5	1159836	5	-20	2	-2	2	-10	-200
RC 19	1159837	82	-20	44	8	2	-10	-5	1159837	-5	-20	2	-2	2	15	-200
RC 21	1159838	63	-20	33	6	2	-10	-5	1159838	-5	-20	-2	-2	2	15	-200
RC 22	1159839	81	-20	43	9	2	-10	-5	1159839	-5	-20	2	-2	2	17	-200



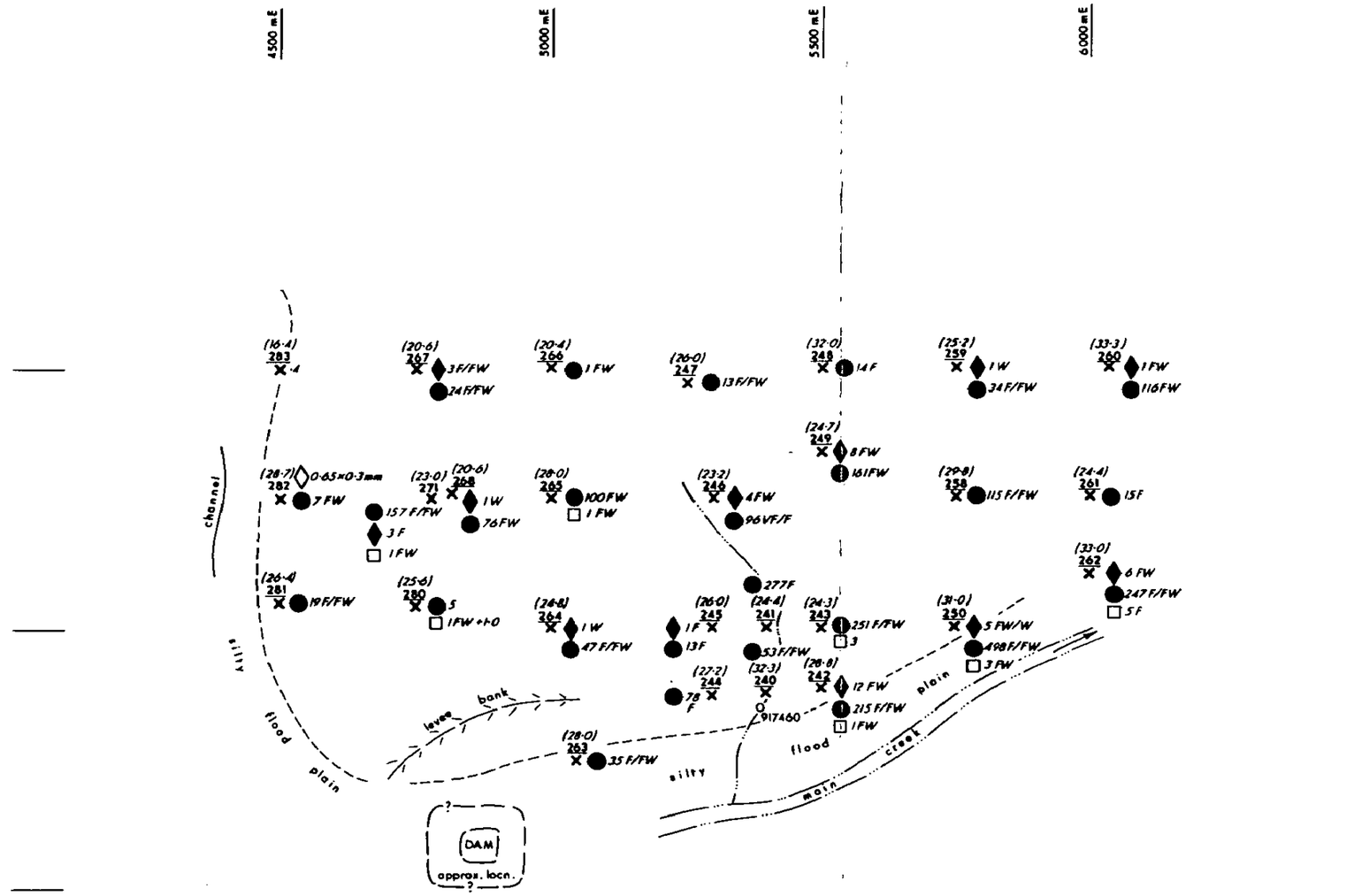
CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L. 1249 — S.A.

LOCATION MAP

REFERENCE Orroroo SI 54-1, Olary SI 54-2, Burra SI 54-5, Chowilla SI 54-6

SCALE 1:250,000	REPORT 130634
AUTHOR JPH	PLAN No SAa 2686
DATE Dec. '85	



Microdiamonds negative – $\frac{250}{X}$ Sample location and number (numbers prefixed by 1234)

(31·0) Sample weight in kilograms

$\frac{O}{917460}$ Gravel sample (CRAE Plan SAa 3147)

● Picroilmenite
♦ Chromite
□ Zircon

VF Very Fresh
F Fresh
FW Fresh Worn
W Worn

5000mE/10000mN = AMG 344000 mE/6343550 mN
(CAROONA – 6731 1:100000 sheet.)

0 100 200 300 400 500 600 700 800 900 1000 m

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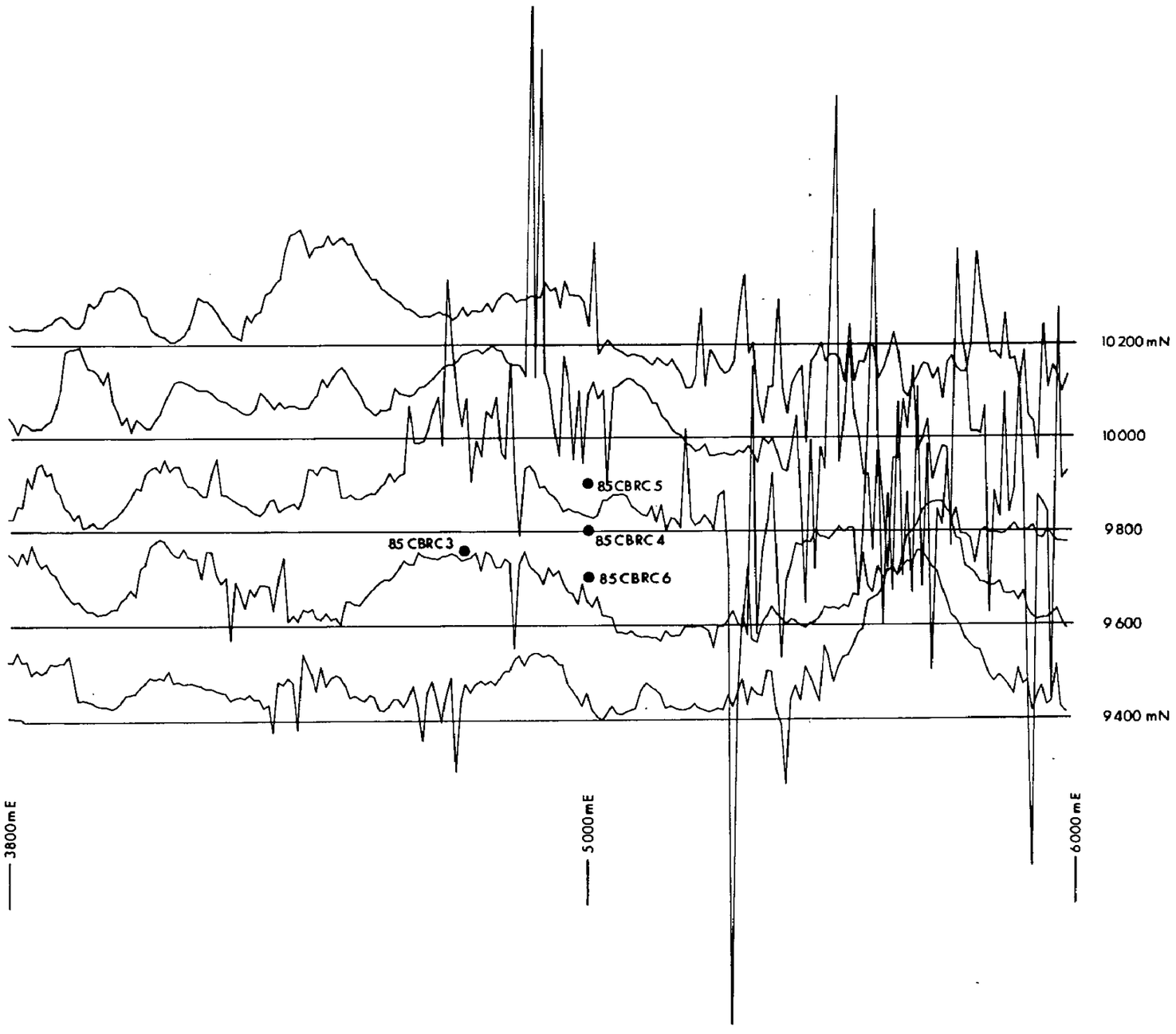
CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 — S.A.
MACKY'S DAM LOAM GRID
(MAGNETIC ANOMALY CB 6)
DIAMOND EXPLORATION

REF.	BURRA SI 54–5		
SCALE	1 : 10 000		
AUTHOR	J.P.H.	REPORT	130634
DATE	Dec. '85	PLAN No	SAa 3565



MN

Base level 58580 nT

1 cm = 100 nT

Station interval 10m

5000mE, 10000mN = AMG 344000mE, 6343550mN

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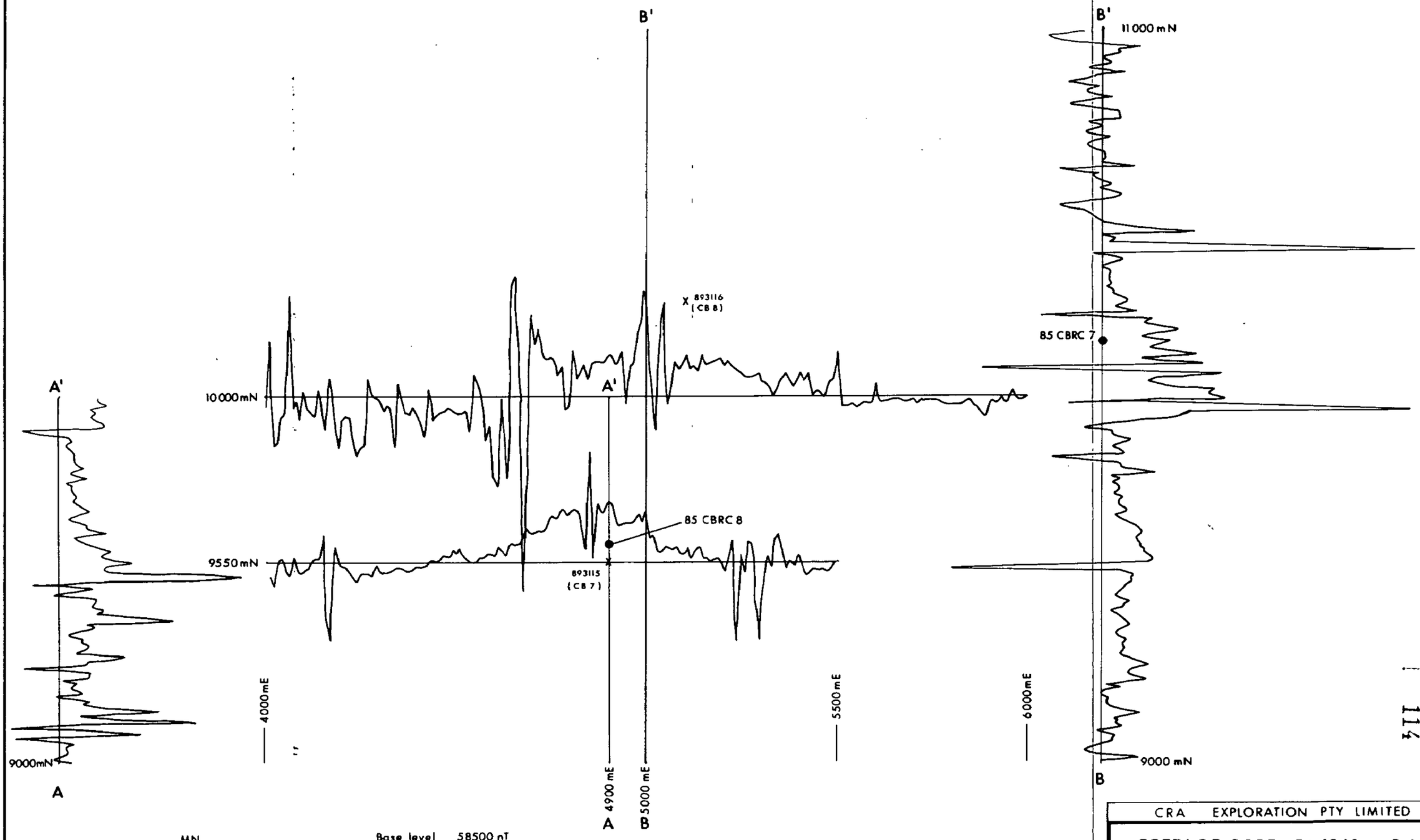
CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 – S.A. GROUND MAGNETIC PROFILES ANOMALY CB 6

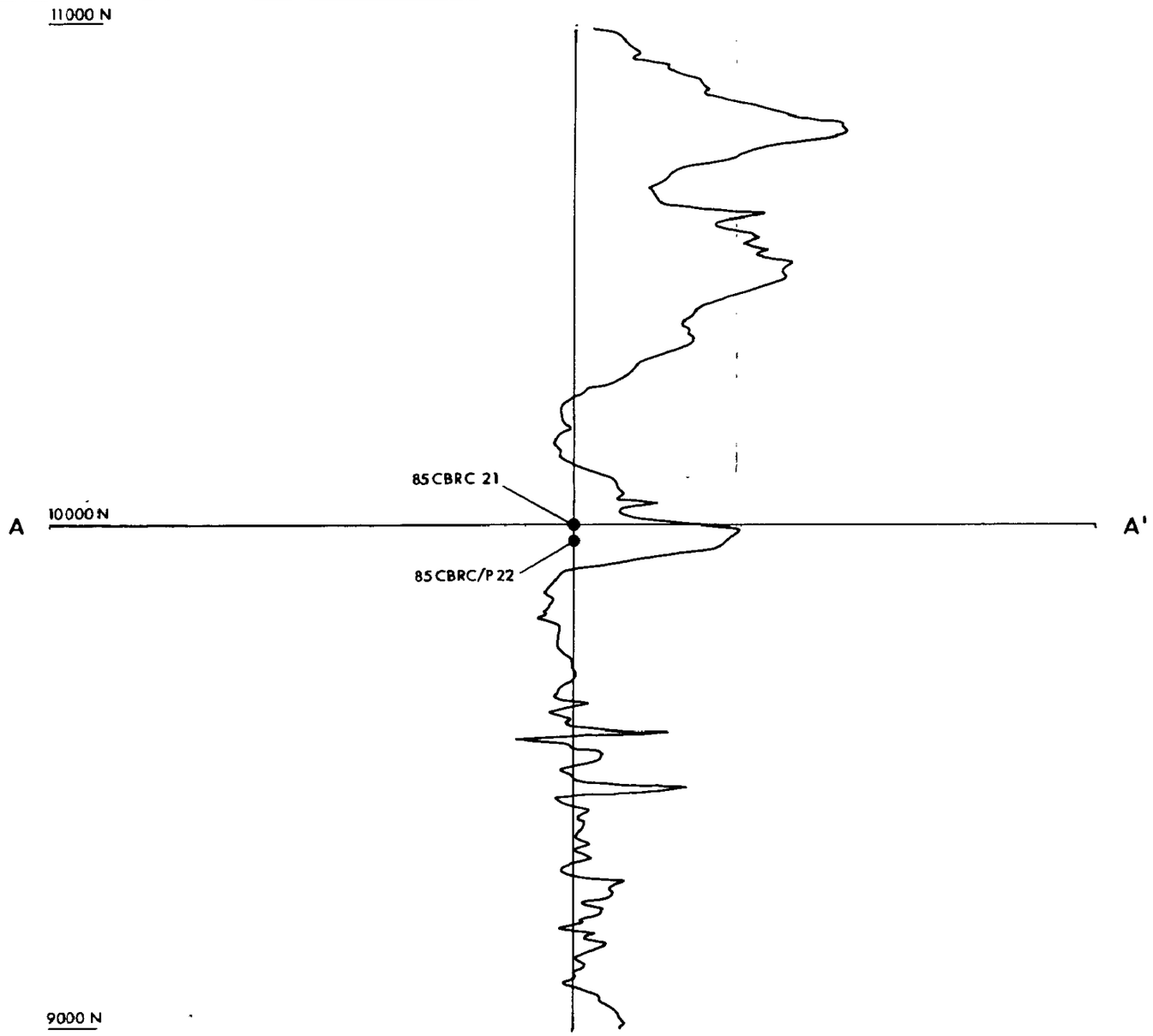
REF.	BURRA SI 54-5		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130634
DATE	Dec. '85	PLAN No	SAa 3547

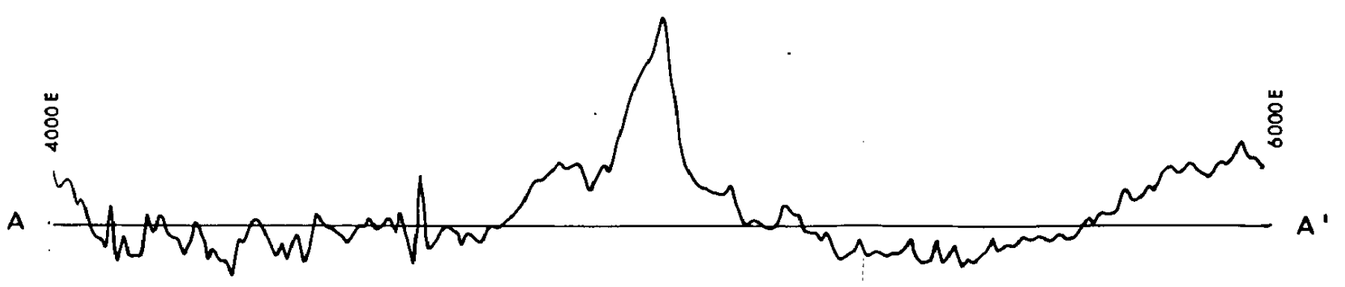


CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 – S.A. GROUND MAGNETIC PROFILES ANOMALIES CB 7 & 8

REF.	BURRA SI 54-5		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130634
DATE	Dec. '85	PLAN No	SAa 3548





Base level 58650 nT

1 cm = 50 nT

Station interval 10 m

No loam sample

5000 E, 10000 N = AMG 356100 mE, 6362300 mN

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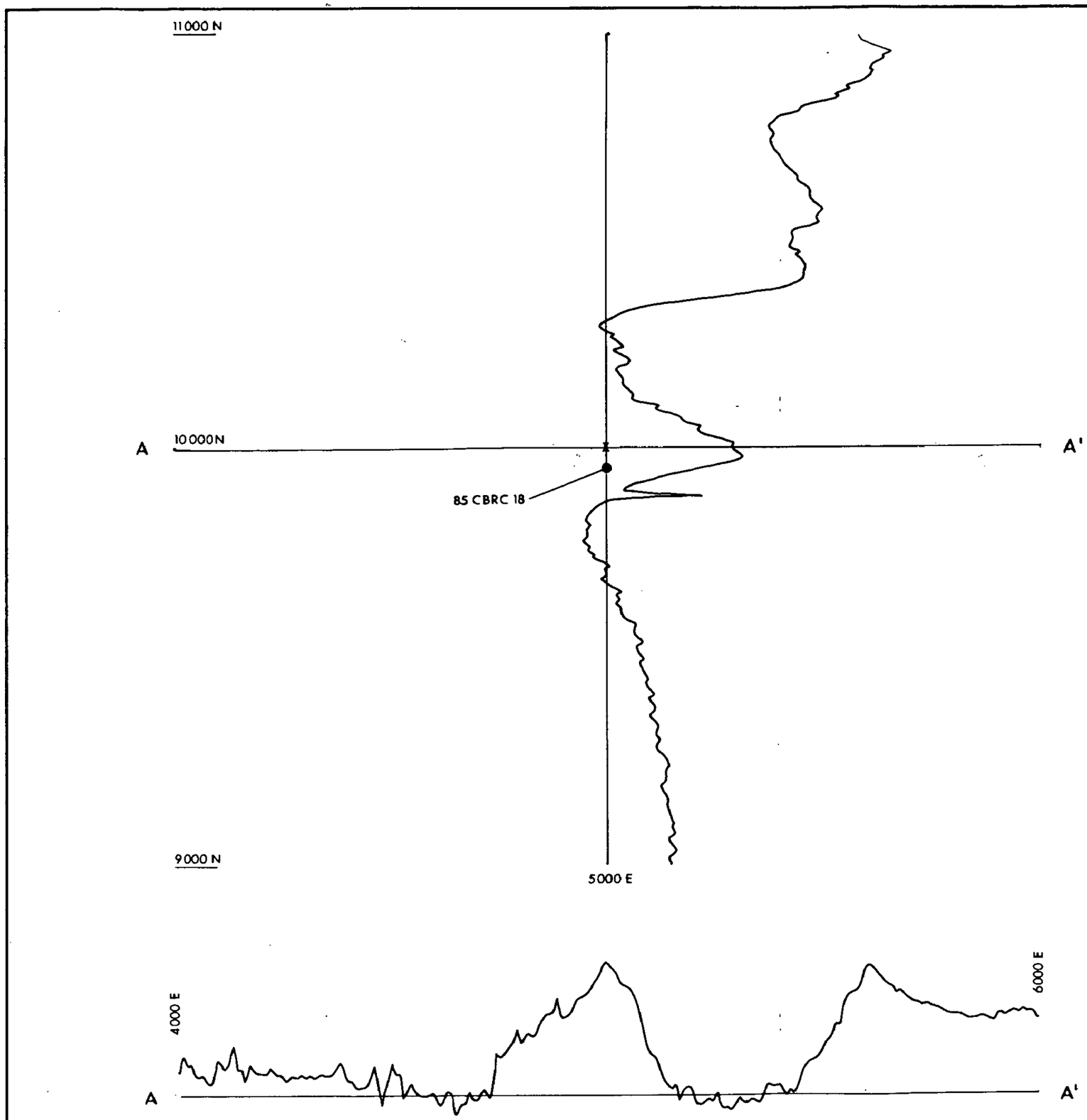
CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 – S.A.
GROUND MAGNETIC PROFILES
ANOMALY CB15

REF.	ORROROO SI 54-1		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130634
DATE	Dec. '85	PLAN No	SAa 3537



Base level 58700 nT

1 cm = 50 nT

Station interval 10 m

X Loam sample 893111

5000 E, 10000N = AMG 359350mE, 6353500 mN

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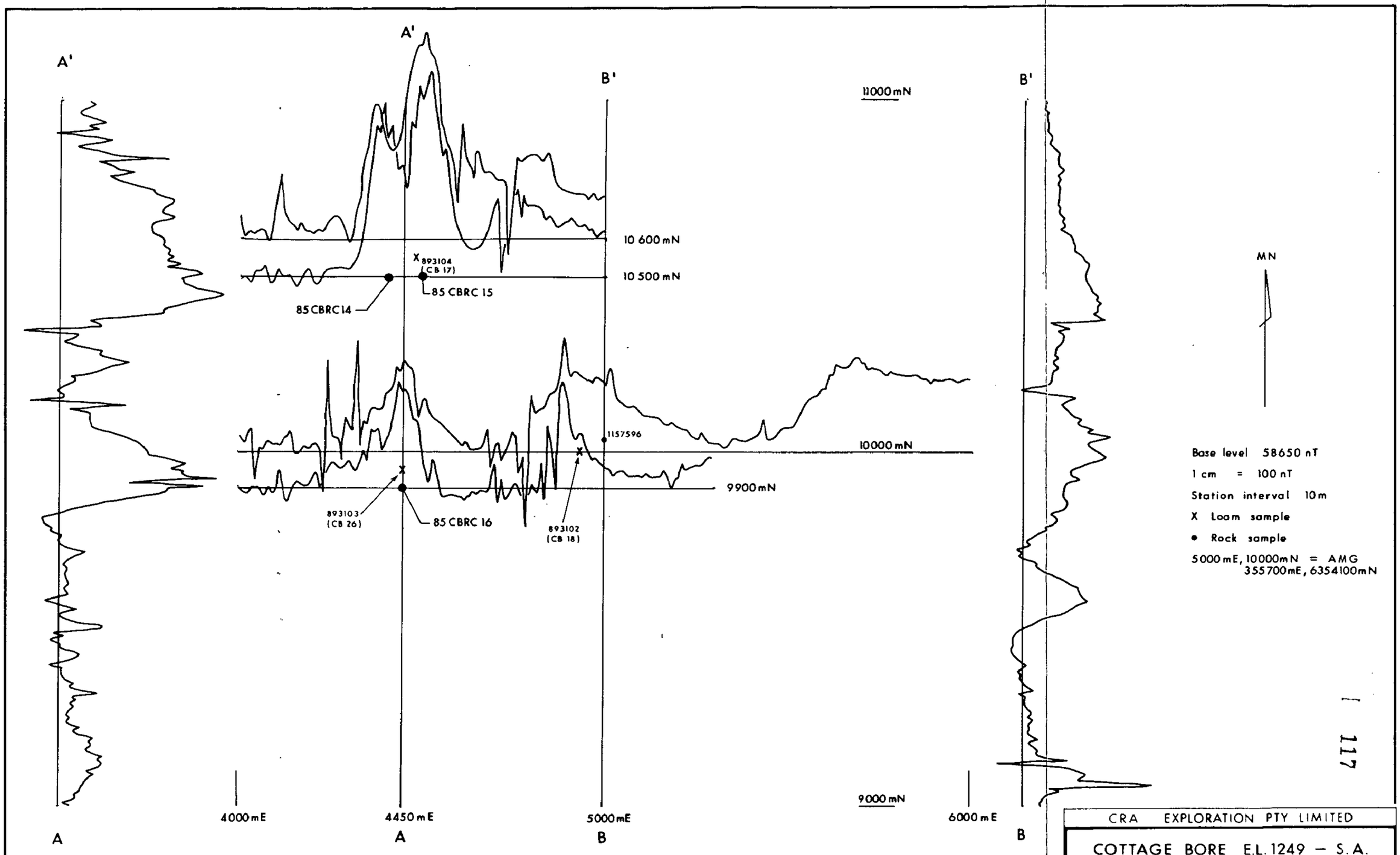
CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L. 1249 — S.A.
GROUND MAGNETIC PROFILES
ANOMALY CB 16

REF	ORROROO SI 54-1		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130634
DATE	Dec. '85	PLAN No	SAa 3538



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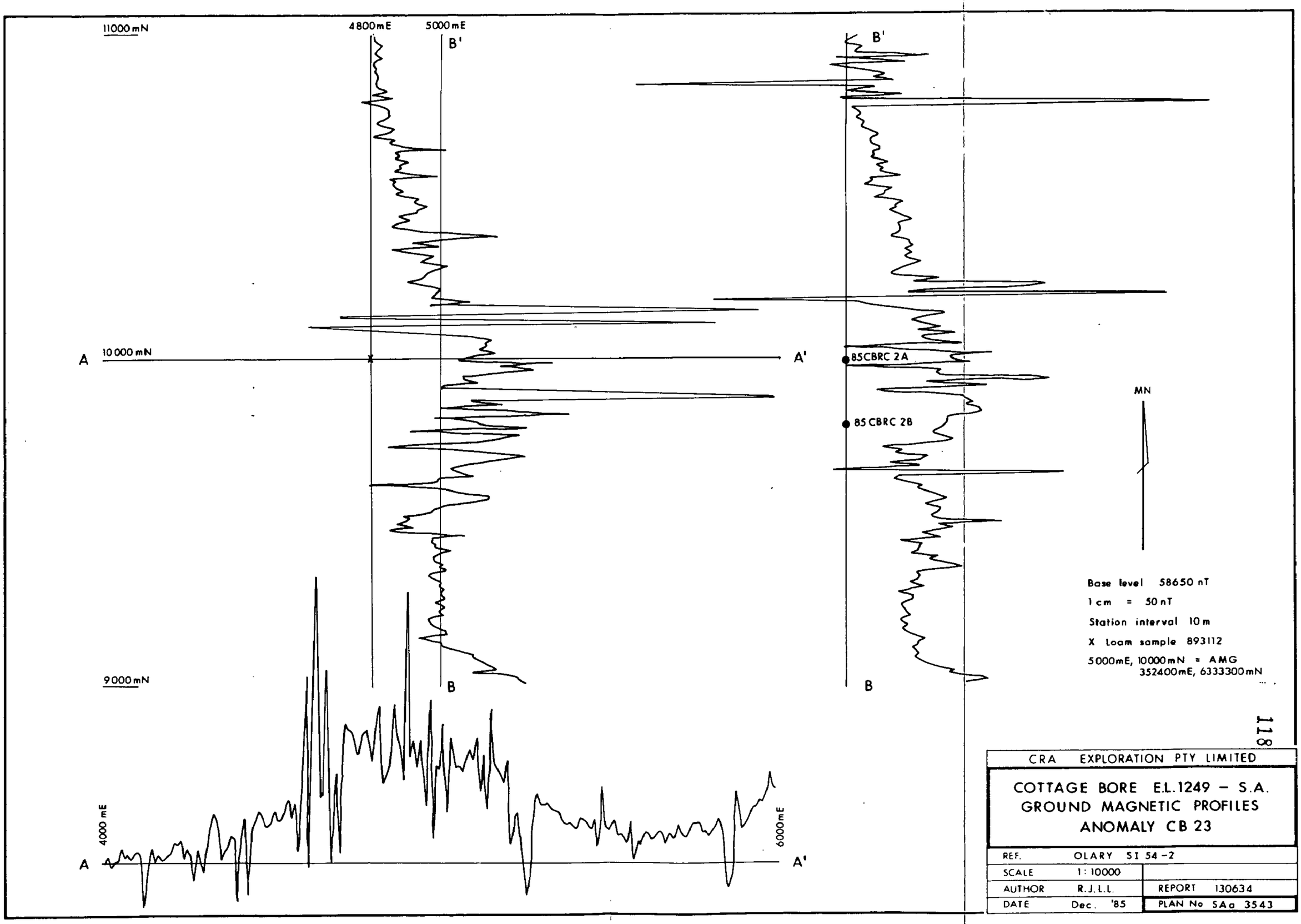
CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 – S.A. GROUND MAGNETIC PROFILES ANOMALIES CB 17, 18 & 26

REF.	ORROROO SI 54 - 1		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130634
DATE	Dec. '85	PLAN No	SAa 3539



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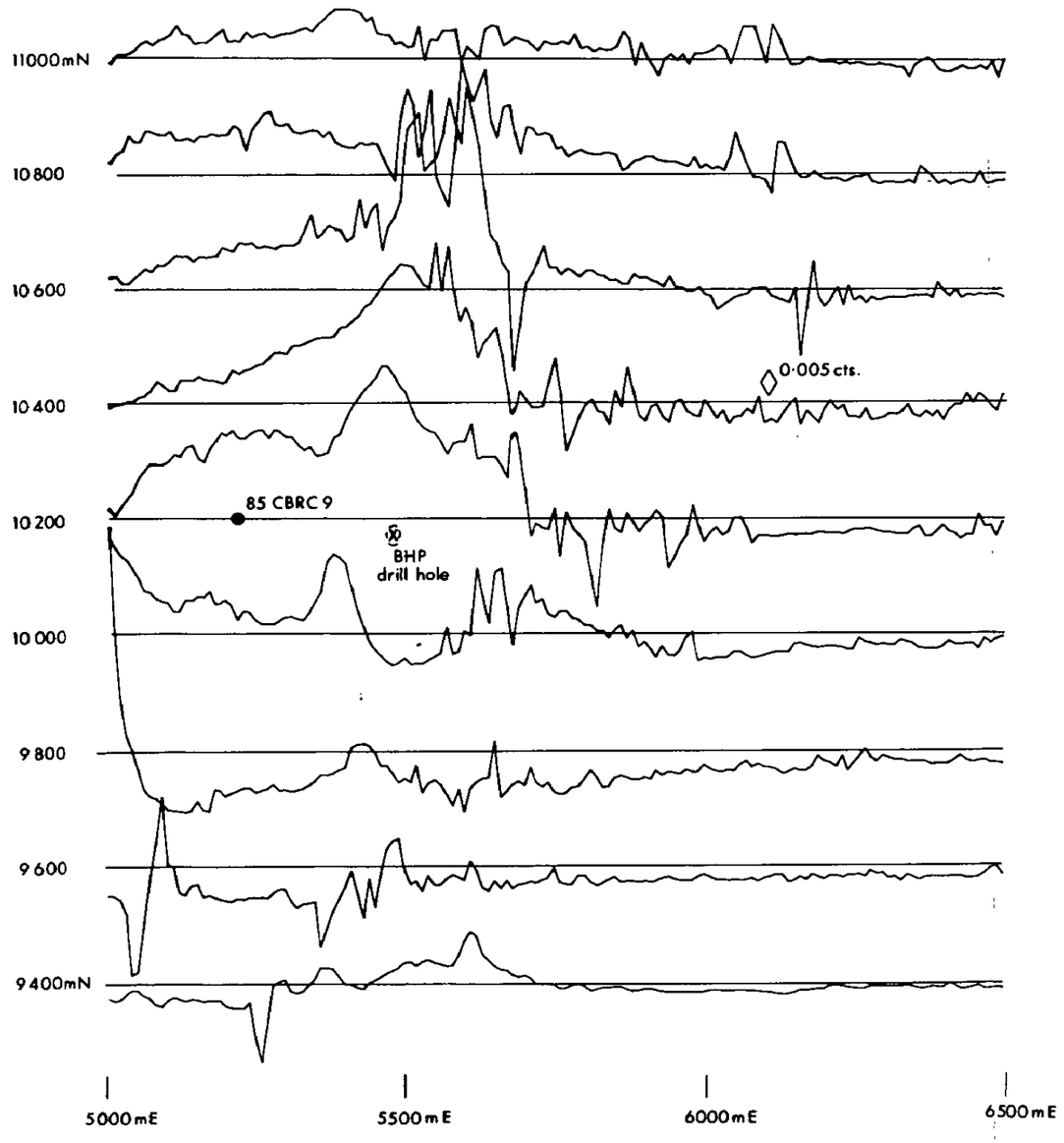
CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 – S.A.
GROUND MAGNETIC PROFILES
ANOMALY CB 23

REF.	OLARY SI 54-2		
SCALE	1:10000		
AUTHOR	R.J.L.L.	REPORT	130634
DATE	Dec. '85	PLAN No	SAa 3543



MN

Base level 58500nT

1cm = 100nT

Station interval 10m

X Loam sample 893117

5000mE, 10000mN = AMG 346150mE, 6342600mN

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CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 – S.A.
FILTERED GROUND MAGNETIC PROFILES
ANOMALY CB 27

REF.	BURRA SI 54–5		
SCALE	1 : 10000		
AUTHOR	R.J.L.L.	REPORT	130634
DATE	Dec. '85	PLAN No	SAa 3557

4500 mE

5000 mE

5500 mE

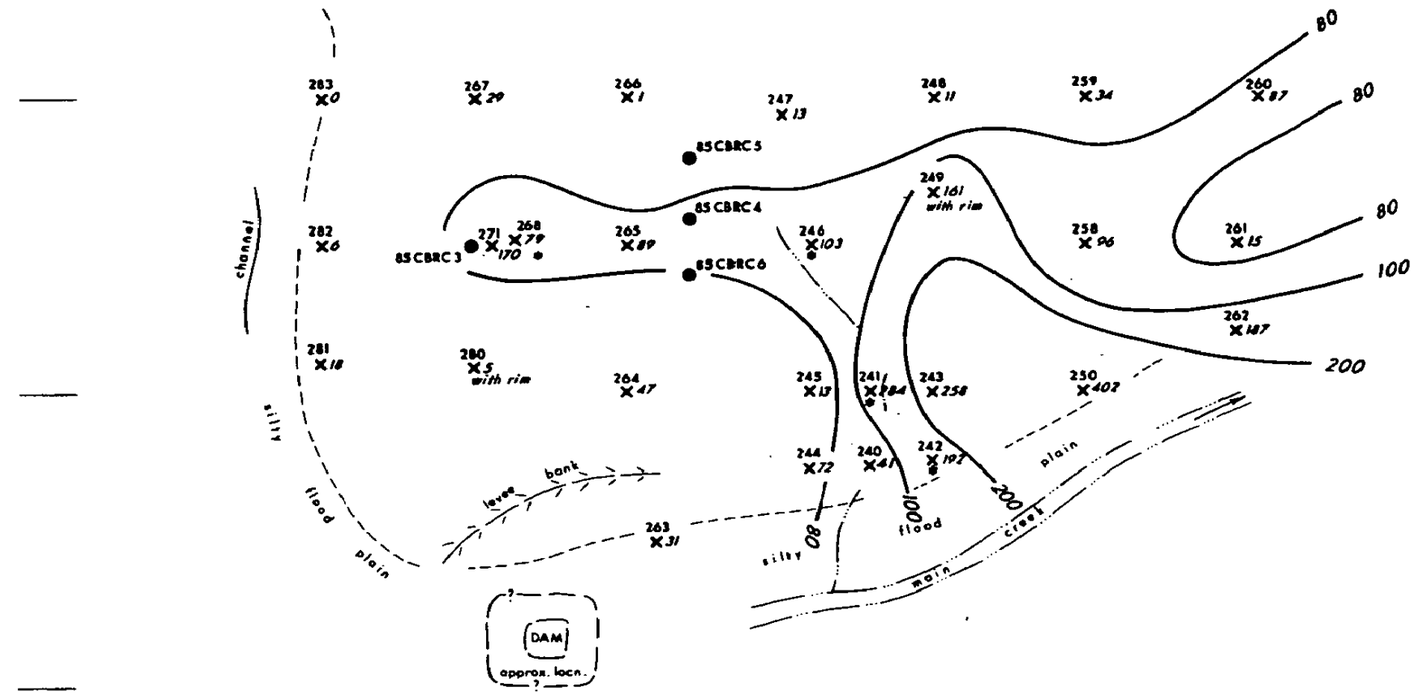
6000 mE

10000 mN

9500 mN

9000 mN

MN



250 X Sample location and number (numbers prefixed by 1234)

● Drill hole location and number

* Leucoxene alteration present.

X34 / 80 Number of Picroilmenite normalised to 25 kg. of sample weight.

5000mE/10000mN = AMG 344000 mE/6343550 mN
(CAROONA - 6731 1:100000 sheet)

0 100 200 300 400 500 600 700 800 900 1000 m

120

CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 — S.A.
DIAMOND EXPLORATION
MACKY'S DAM LOAM GRID
CONTOURS OF PICROILMENITE GRAINS

REF	BURRA SI 54-5		
SCALE	1 : 10000		
AUTHOR	J.P.H.	REPORT	130634
DATE	Dec. '85	PLAN No	SAa 3593

CRA EXPLORATION PTY. LIMITED

SIXTH QUARTERLY REPORT ON COTTAGE BORE E.L. 1249, SOUTH AUSTRALIA, FOR THE PERIOD ENDING 23RD MARCH, 1986

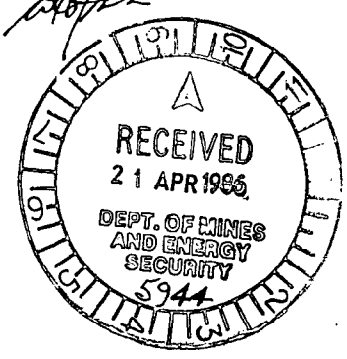
AUTHOR: L.A. LE MESSURIER
AND G.P. JENKE

DATE: 9TH APRIL, 1986

COPIES TO: CIS CANBERRA
SADME

SUBMITTED BY: G.P. Jenke

ACCEPTED BY:



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LIST OF PLANS

Plan No.	Title	Scale
SAa 2686	Cottage Bore E.L. 1249 Location Plan	1:250 000
SAa 3592	Cottage Bore E.L. 1249 Drill Hole Location and Geology	1:100 000
SAa 3129	Cottage Bore E.L. 1249 Geology	1:100 000
SAa 3565	Cottage Bore E.L. 1249 Macky's Dam Loam Grid	1: 10 000
SAa 3761	Cottage Bore E.L. 1249 Macky's Dam Grid. Ground Magnetic Profiles N-S.	1: 2 500
SAa 3547	Cottage Bore E.L. 1249 - S.A. Ground Magnetic Profiles E-W. Anomaly CB6.	1: 10 000

LIST OF FIGURES

Figure 1	Cottage Bore E.L. 1249, S.A. Total Magnetic Intensity Contour Map. (BHP Survey).	1:100 000

1. SUMMARY

Cottage Bore E.L. 1249 is dominantly covered by Quaternary Alluvium and low angle slope deposits. Topographic highs are composed of Proterozoic Adelaidean Sediments and high level silcreted gravels of Tertiary age in the north east of the licence area..

During the last three month period ground magnetics were conducted over the Mackys Dam loam grid at aeromagnetic anomaly CB6. There were no responses which would represent significant widths of kimberlitic dyke or small pipes.

Microdiamond results from the reverse circulation drilling programme were all negative. Further results are awaited.

2. INTRODUCTION

This is the sixth statutory report for E.L. 1249 which was granted to CRA Exploratin on the 24th September, 1984 and renewed in September, 1985 for a further twelve month period. The licence was applied for to locate the source of indicators and microdiamonds found by Stockdale with the E.L.

3. GEOLOGY

Approximately fifty percent of the Cottage Bore E.L. is covered by Quaternary alluvium of drainage channels and flood plains. The geology on the remainder of the licence area is Proterozoic Adelaidean Sediments of the the Burra, Umberatana and Wilpena Groups. The sediments are generally siltstones, sandstones and tillites with a north south strike and variable dips both to the east and west. High level silcreted gravels of Tertiary age have formed to the north east of the licence area. Quaternary low angle slope deposits presumably dominantly of Adelaidean Sediments flank the topographic highs. Refer plan SAa 3129 for geology as interpreted by S.A.D.M.E.

4. PREVIOUS WORK BY CRA EXPLORATION

1. Reconnaissance sampling, with s. 917763 having pircomenites observed.

2. Aeromagnetic and radiometric survey was flown over the eastern portion of the E.L.

3. Rock samples were taken from BHP drill holes over aeromagnetic anomalies 29, 30 and 33. Petrology on these samples concluded that anomalies 29, 30 and 33 were not kimberlitic, however 33 may be associated with a diatreme.

4. Aeromagnetic features highlighted by the CRAE survey, and photofeatures were followed up with rock sampling and ground magnetic traverses.

Results are: CB18 - saussuritized gabbro
CB19 - porphyritic metabasalt and vesicular basalt
CBP13 - metasomatic quartz breccia

5. Reverse circulation drilling of twelve magnetic and photo anomalies (twenty-one holes totalling 392.5m).

5. CURRENT DIAMOND EXPLORATION

5.1 Ground Magnetics - Mackys Dam (CB6)

As a follow up measure ground magnetics were used over aeromagnetic anomaly CB6 (Mackys Dam) in an attempt to locate the source of indicator minerals observed in loam samples over the grid (refer plan SAa 3565 for results). Fourteen north south lines using an MP3 magnetometer at 50 x 5m spacing were completed over the central section of the grid to cover the area where the three reverse circulation drill holes had been drilled and where the indicator minerals were most prevalent.

The earlier ground magnetic survey profiles are shown on plan SAa 3547. As for the aeromagnetic survey data (fig. 1), they clearly show the general NNE trend of the geology of the area. However, the airborne data suggests that structural complications are present in the area of the prospect.

The ground magnetic data is dominated by high amplitude, short wavelength responses typical of near surface, highly magnetic material. Although the responses occur in clusters, there are no consistently coincident long wavelength responses which would reflect sizable volumes of magnetic material beneath these clusters. There appears to be no relationship to the topography, and the source is probably laterite.

Away from these clusters, readings are generally variable within an envelope +/- 10nT from station to station, reflecting the presence of minor amounts of magnetic material at or very close to the surface almost everywhere.

The long wavelength, low amplitude responses generally less than 200nT probably reflect the underlying geology. Drill hole 85CBRC3 indicated that although the cover is thin, the general depths of weathering may be substantial (>20m). Therefore depths to magnetic sources may be similar to the depth of weathering.

The presence of thin kimberlite dykes or small pipes within the clusters is not precluded as the wavelengths and amplitudes of any responses produced by them would be masked readily. If weathered to depth, the responses of any dykes would be broader and less intense, making them even more difficult to recognise.

There are no responses which would represent significant thicknesses of kimberlite dyke recognisable outside of the clusters.

If the magnetic survey technique is to be used further in exploration on this prospect, it is recommended that a helicopter borne magnetometer be used to attenuate the response of the near surface sources relative to any kimberlite and bedrock sources which might be present.

Consideration should be given to other survey techniques which may uniquely respond to kimberlite dykes and pipes. VLF-EM is suggested as a simple, cost effective technique, provided background resistivities are high and cover is thin.

5.2 Microdiamond Results

Over the last three months a number of microdiamond results have been received. They are tabulated on Table 1 and sample locations are plotted on SAa 3592. All samples returned negative results.

Further results are awaited.

TABLE 1

Cottage Bore E.L. 1249 - Microdiamond Results

23rd December 1985 - 23rd March 1986

SAMPLE NUMBER	MICRODIAMOND RESULTS
1234389	Negative
1234371	Negative
1234377	Negative
1234379	Negative
1234381	Negative
1234383	Negative
1234368	Negative
1234380	Negative
1234392	Negative
1234378	Negative
1234387	Negative
1234375	Negative
1234370	Negative
1234376	Negative
1234382	Negative
1234369	Negative
1234385	Negative

L.A. LEMESSURIER

LAL/dp

EXPENDITURE

Expenditure for the period ending 31st March, 1986, the nearest accounting period was $13,085.00, as listed below.

	$
Payroll	4,898
Supplies	746
Vehicle	808
Travel	147
Rent	29
Tenement	620
Laboratory	4,372
Overheads	1,465
Total	$ 13,085

LOCATION

Orroroo	SI 54-1	1:250 000 sheet, S.A.
Olary	SI 54-2	1:250 000 sheet, S.A.
Burra	SI 54-5	1:250 000 sheet, S.A.
Chowilla	SI 54-6	1:250 000 sheet, S.A.

KEYWORDS

Ground Mags, Drill Reverse Circ., Diamonds, Indicator Minerals

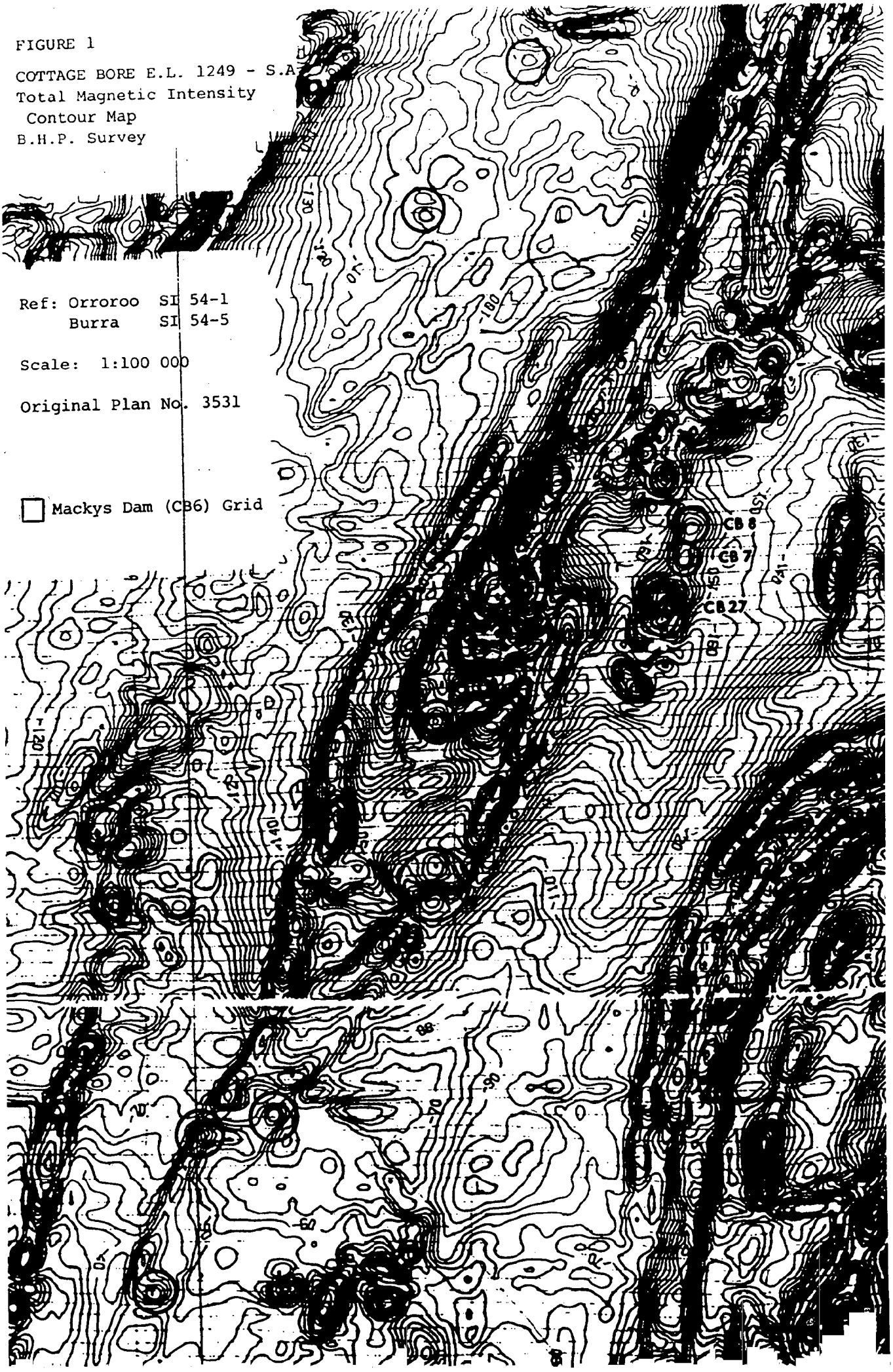
FIGURE 1

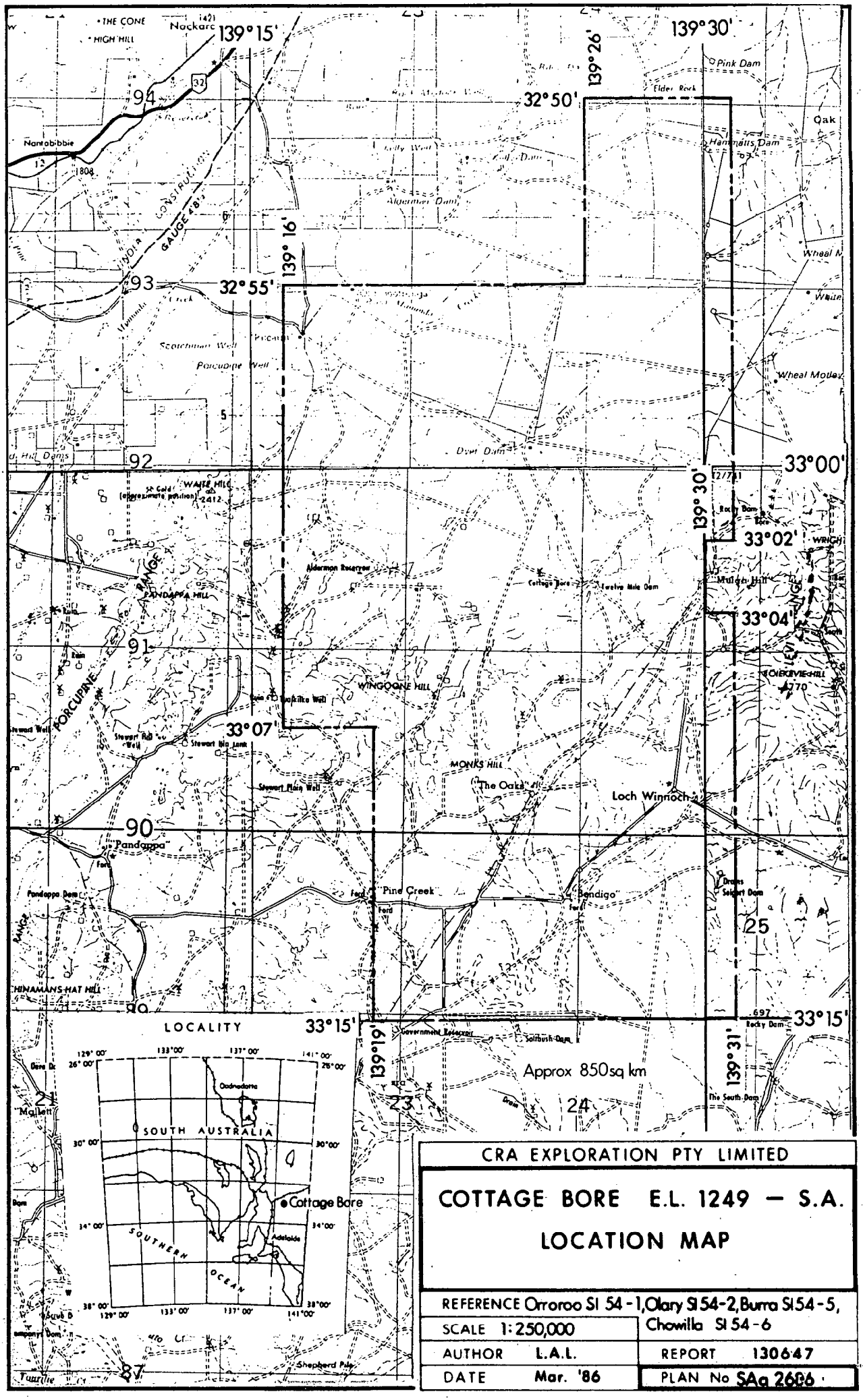
COTTAGE BORE E.L. 1249 - S.A.
Total Magnetic Intensity
Contour Map
B.H.P. Survey

Ref: Orroroo SI 54-1
Burra SI 54-5

Scale: 1:100 000

Original Plan No. 3531



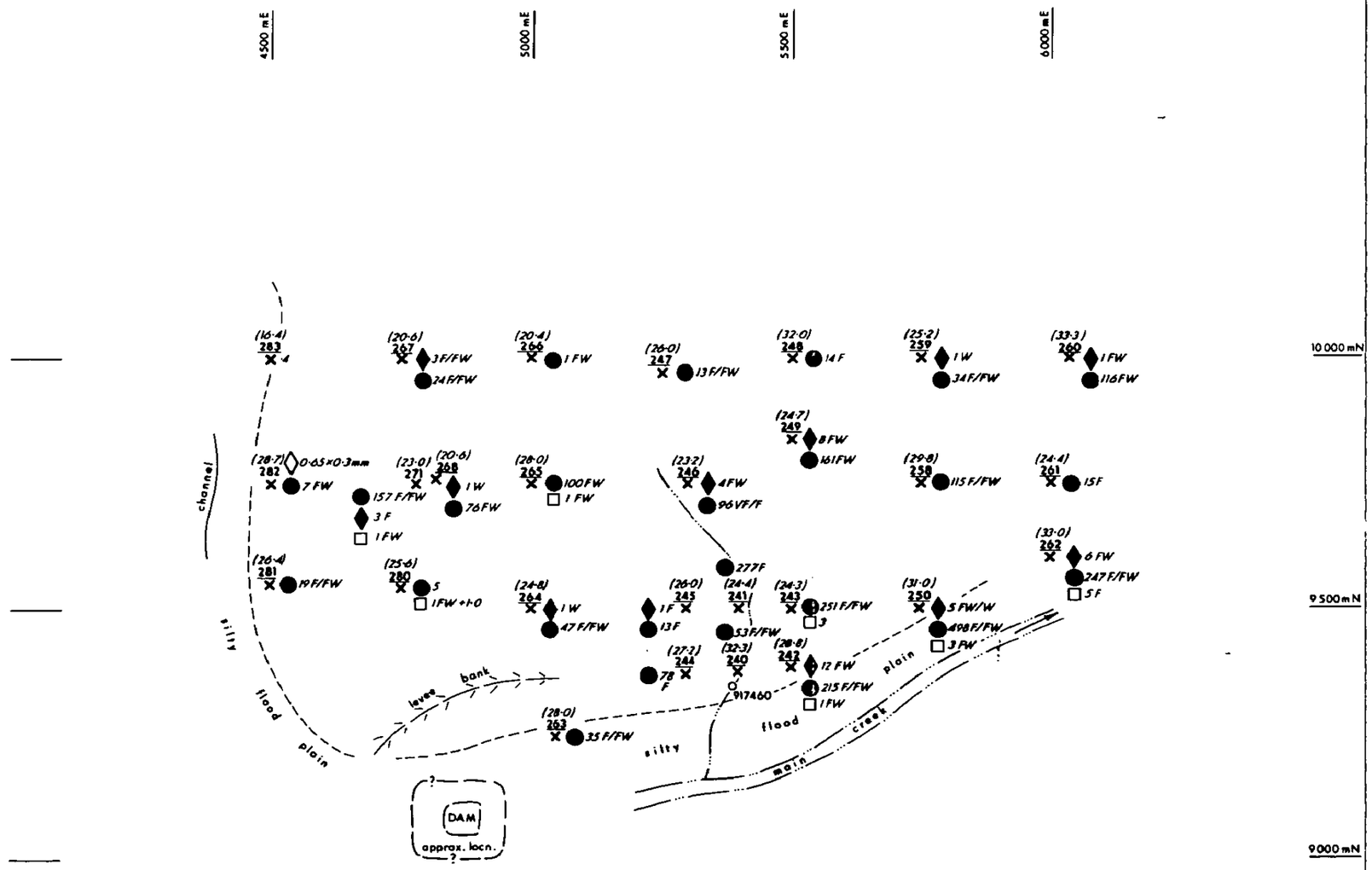


CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L. 1249 — S.A.

LOCATION MAP

REFERENCE Orroroo SI 54-1, Olary SI 54-2, Burra SI 54-5, Chowilla SI 54-6	
SCALE 1:250,000	
AUTHOR L.A.L.	REPORT 13064/7
DATE Mar. '86	PLAN No SAa 2606



Microdiamonds negative – 250 X Sample location and number (numbers prefixed by 1234)

(31·0) Sample weight in kilograms

917460 Gravel sample (CRAE Plan SAa 3147)

● Picroilmenite

♦ Chromite

□ Zircon

VF Very Fresh
F Fresh
FW Fresh Worn
W Worn

5000mE/10000mN = AMG 344000mE/6343550mN
(CAROONA – 6731 1:100000 sheet.)

0 100 200 300 400 500 600 700 800 900 1000 m

MN

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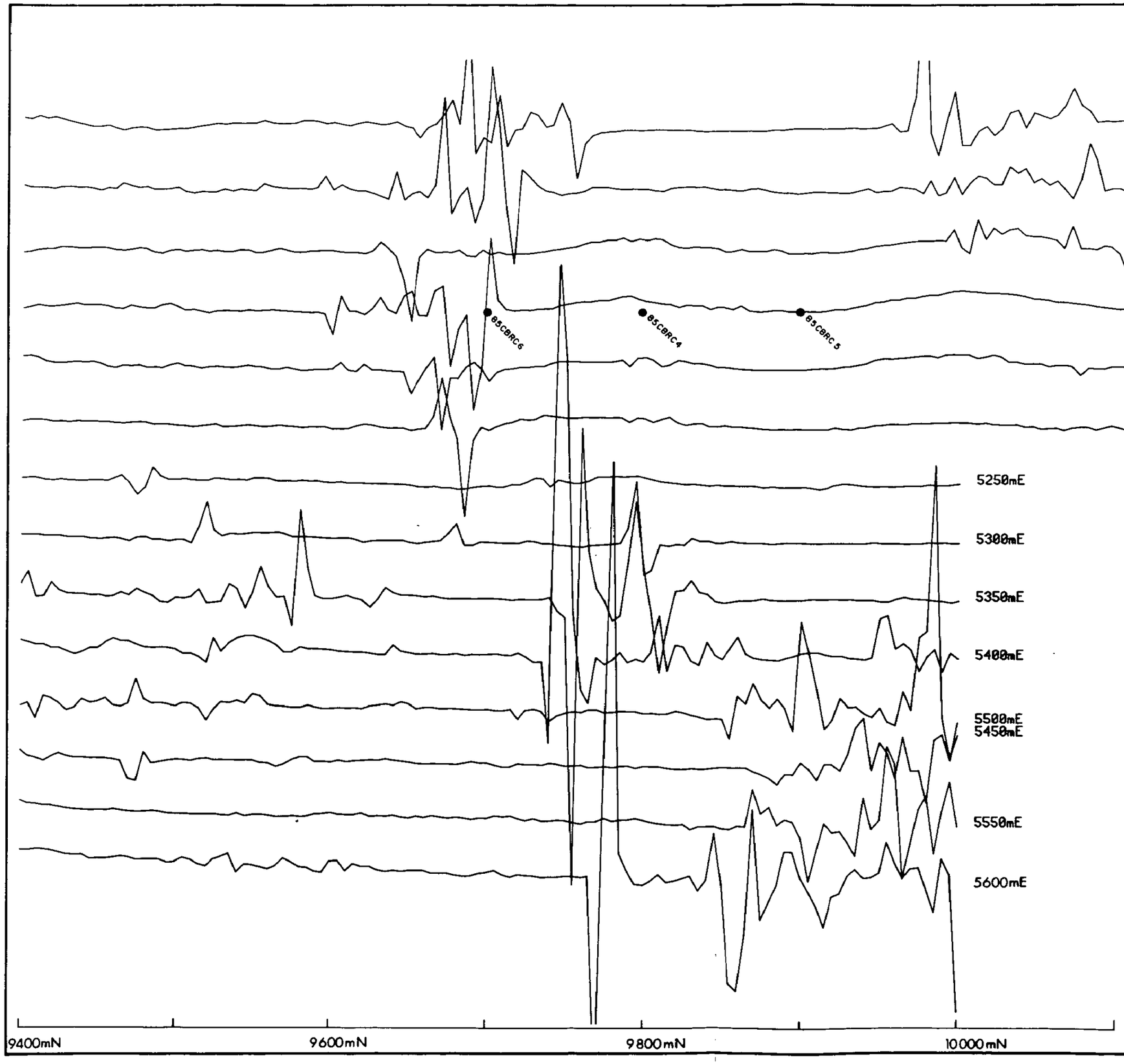
CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 — S.A.
MACKY'S DAM LOAM GRID
(MAGNETIC ANOMALY CB 6)
DIAMOND EXPLORATION

REF.	BURRA SI 54–5		
SCALE	1 : 10000		
AUTHOR	J.P.H.	REPORT	130647
DATE	Mar.'86	PLAN No	SAa 3565



Magnetometer : MP3
Sensitivity : +/-0.2 nT
Sensor height : 2 metres
Diurnal correction applied
Base station mag: MP3

Grid north : MAGNETIC
Station spacing : 5 metres
Survey date : 23.3.86
Operator : L.LEMESSURIER

Scale-horizontal: 1:2500
-vertical : 250 nT/CM

: 100000 Sheet — CAROONA 6731

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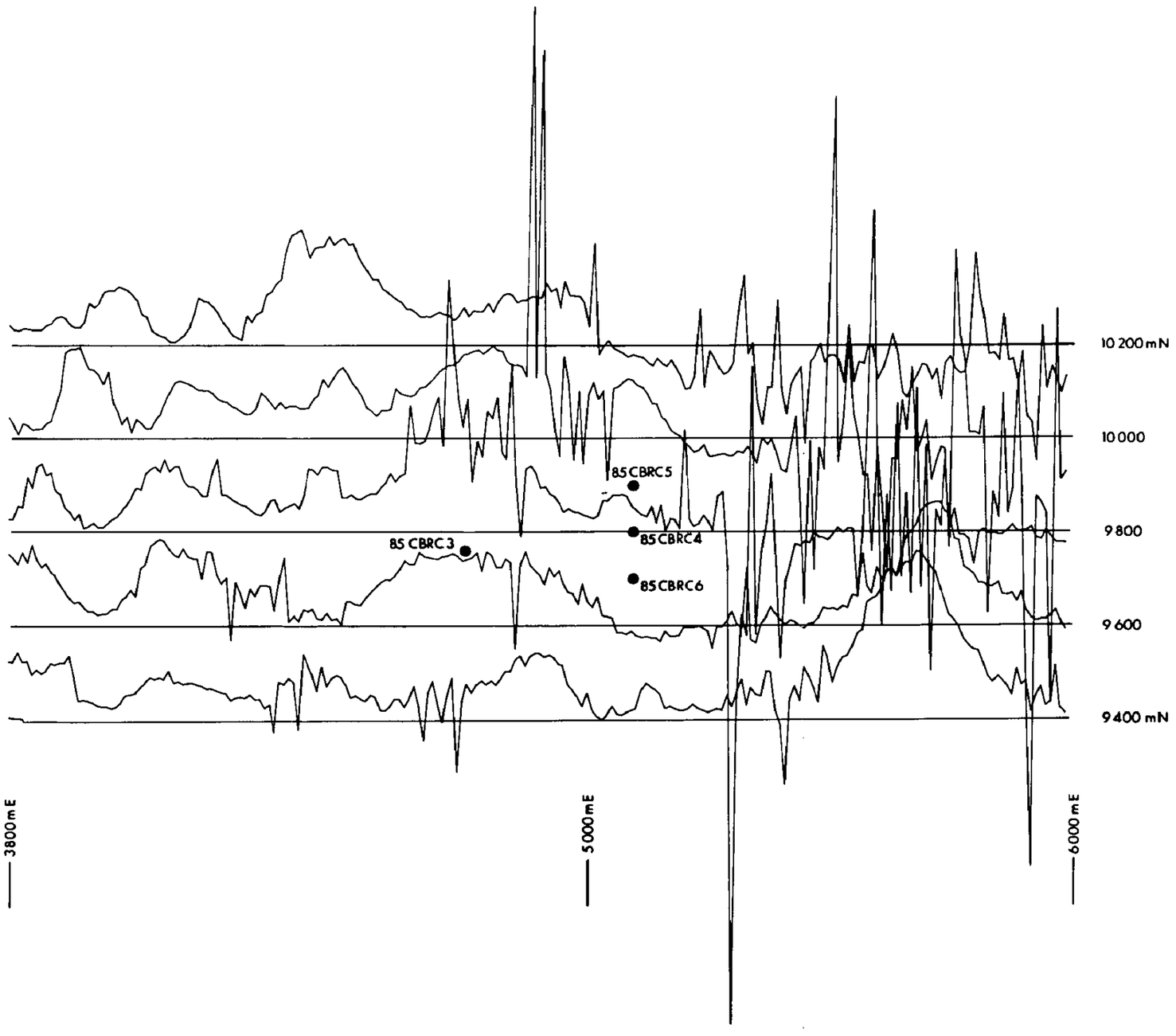
CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 — S.A.
MACKYS DAM GRID (CB6)
GROUND MAGNETIC PROFILES

REF	BURRA SI 54-5		
SCALE	1 : 2500		
AUTHOR	L.A.L.	REPORT	130647
DATE	March '86	PLAN No	SAa 3761



Base level 58580 nT

1 cm = 100 nT

Station interval 10m

5000mE, 10000mN = AMG 344000mE, 6343550mN

134

CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L.1249 – S.A. GROUND MAGNETIC PROFILES ANOMALY CB 6

REF.	BURRA SI 54-5		
SCALE	1 : 10 000		
AUTHOR	R.J.L.L.	REPORT	130647
DATE	Mar. '86	PLAN No	SAa 3547

CRA EXPLORATION PTY. LIMITED

SEVENTH QUARTERLY AND RELINQUISHMENT REPORT ON COTTAGE BORE E.L. 1249, SOUTH AUSTRALIA, FOR THE PERIOD ENDING 23RD JUNE, 1986

AUTHOR: L.A. LE MESSURIER

DATE: 3RD JUNE, 1986

COPIES TO: CIS CANBERRA
SADME

SUBMITTED BY: Lucille Le Messurier

ACCEPTED BY:

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SAa 3531	Cottage Bore E.L. 1249, S.A. TMI Contours & Anomalies (BHP Survey)	1:100 000
SAa 3532	Cottage Bore E.L. 1249, S.A. TMI Contours & Anomalies (CRAE Survey)	1:100 000

1. SUMMARY

Cottage Bore E.L. 1249 is dominantly covered by Quaternary Alluvium and low angle slope deposits. Topographic highs are composed of Proterozoic Adelaidean Sediments and high level silcreted gravels of Tertiary age.

CRA Exploration have been exploring for diamonds in the area for the past eighteen months. Work has involved a regional gravel sampling programme, aeromagnetic survey, ground magnetic follow up and the reverse circulation drilling of any potential aeromagnetic anomalies or photo features.

All microdiamond results from the regional gravel sampling programme and all indicator mineral and microdiamond results from the reverse circulation drilling programme were negative. Thus the possibility of an economic diamond bearing pipe within the area is remote.

It is therefore recommended that Exploration Licence 1249, Cottage Bore, be relinquished.

2. INTRODUCTION

This is the seventh and final relinquishment report for Exploration Licence 1249, Cottage Bore, which was granted to CRA Exploration on the 24th September, 1984 and renewed in September, 1985 for a further twelve month period. The licence was applied for to locate the source of indicator minerals and microdiamonds found by Stockdale within the area.

Work to date has involved an aeromagnetic survey over the eastern portion of the licence area, a regional gravel sampling programme, follow up ground magnetics and the drilling of any potentially interesting photo features or magnetic anomalies.

3. CONCLUSIONS AND RECOMMENDATIONS

Cottage Bore, E.L. 1249, has been explored for diamonds using a regional gravel sampling programme, aeromagnetics, ground magnetics and a reverse circulation drilling programme.

The Nackara Diamond Occurrence which was located in the north east of the licence area by Stockdale was resampled during the present exploration period. CRAE samples had a number of indicator minerals, however all microdiamond results were negative. The presence of Quaternary drainage channels, flood plains and low angle slope deposits in the area where the diamonds were observed, combined with the unrepeatable nature of the results makes it likely that the minerals observed are being remobilised from a secondary depositional surface. It is also probable that this is the source for the indicator minerals observed in samples collected during the regional sampling programme.

If any of the indicator minerals observed are reflecting a primary source, the presence of negative microdiamond results indicate that it is unlikely to be economic. All potential magnetic anomalies and photo features have been drilled. There were no rocks of kimberlitic affinity intersected and indicator mineral and microdiamond results were negative.

It is recommended that Exploration Licence 1249, Cottage Bore, be relinquished.

4. GEOLOGY

Approximately fifty percent of the Cottage Bore E.L. is covered by Quaternary alluvium of drainage channels and flood plains. The geology on the remainder of the licence area is Proterozoic Adelaidean Sediments of the the Burra, Umberatana and Wilpena Groups. The sediments are generally siltstones, sandstones and tillites with a north south strike and variable dips both to the east and west. High level silcreted gravels of Tertiary age have formed to the north east of the licence area. Quaternary low angle slope deposits presumably dominantly of Adelaidean Sediments flank the topographic highs. Refer plan SAa 3129 for geology as interpreted by S.A.D.M.E.

5. PREVIOUS WORK BY CRA EXPLORATION

1. (a) The licence was applied for when a reconnaissance sample s. 917763 returned picroilmenites in an area from which Stockdale reported 32 diamonds (Nackara Diamond Occurrence).

   (b) Repeat gravel samples by CRAE resulted in a number of indicator minerals being observed, however all microdiamond results were negative.

2. (a) B.H.P. drill holes over magnetic anomalies were resampled and petrologically assessed. The sample from Anomaly 30 was described as possibly being a xenolith from within a kimberlitic diatreme.

(b) The creeks draining Anomaly 30 were bulk sampled by B.H.P. with negative results.

3. Regional gravel sampling outlined the Macky's Dam Indicator Anomaly and The Double Dam Indicator Anomaly.

(a) Macky's Dam Indicator Anomaly is also an aeromagnetic anomaly CB6. It has been loam sampled on 250m centres, had three drill holes all of which intersected mudstone and had been ground magnetically recovered using north-south traverses on 50m spacings. The ground magnetics revealed that there were no consistently coincident long wavelength responses which would reflect a sizable kimberlitic pipe. A thin layer of reworked gravels throughout the grid is thought to be producing both the magnetic response and the indicator minerals.

(b) Palaeogravels sampled in the vicinity of the Double Dam Indicator Anomaly had positive indicator mineral results.

4. (a) A detailed aeromagnetic survey was flown over the eastern portion of the licence area.

(b) Magnetic anomalies were selected from the 1984 CRAE and the 1979 B.H.P. aeromagnetic surveys (refer plans SAa 3531 and SAa 3532).

5. Sixteen aeromagnetic anomalies were ground recovered. Anomalies CB18, CB19, CB27, CB11 and CB24 were downgraded because of the presence of outcropping basic rocks and Anomaly CB9 was a palaeochannel.

6. Thirteen photo anomalies were ground recovered. The following anomalies were downgraded because of the presence of outcropping Adelaidean Sediments at CBP6, CBP8, CBP9, CBP10 and CBP12 and negative indicator mineral results at CBP11.

7. Prospective photo and aeromagnetic anomalies were drilled using a reverse circulation rig. Results were as follows:-

Aeromagnetic Anomalies

Anomaly	Hole No.	T.D.(m)	Lithology
CB6 (Macky's Dam)	85CBRC3	23	Mudstone
	85CBRC5	6	Mudstone
	85CBRC6	8	Mudstone
CB7	85CBRC7	11	Mudstone
CB8	85CBRC8	15	Dolomite
CB9 (Double Dam)	85CBRC10	7	Siltstone
	85CBRC11	6	Siltstone
CB15	85CBRC21	9	Siltstone
CB16	85CBRC18	50	Dolomite
	85CBRC/P22	50	Siltstone
CB17	85CBRC14	21	Mudstone
	85CBRC15	17	Limestone
CB23	85CBRC2A	21	Pebble Conglomerate
	85CBRC2B	28	Mudstone
CB26	85CBRC16	27	Dolerite
CB27	85CBRC9	23	Talc

Photo Anomalies

CBP1	85CBRC13	30	Claystone
CBP3	85CBRC17	14	Claystone
CBP4	85CBRC12	10	Mudstone
CBP13	85CBRC1	10.5	Sandstone

6. CURRENT DIAMOND EXPLORATION

During the last quarter the remainder of the microdiamond results from the reverse circulation drilling programme were received. The results are tabulated on Table 1 and their locations are plotted on SAa 3592. All results were negative.

Lalle Le Messurier.

L.A. LEMESSURIER

LAL/dp

TABLE 1

Cottage Bore E.L. 1249 - Microdiamond Results

23rd March 1986 - 23rd June 1986

SAMPLE NUMBER	MICRODIAMOND RESULTS
1234373	Negative
1234386	Negative
1234374	Negative
1234393	Negative
1234390	Negative
1234372	Negative
1234384	Negative
1234388	Negative

EXPENDITURE

Expenditure for the period ending 30th June, 1986, the nearest accounting period was $12,858.00, as listed below.

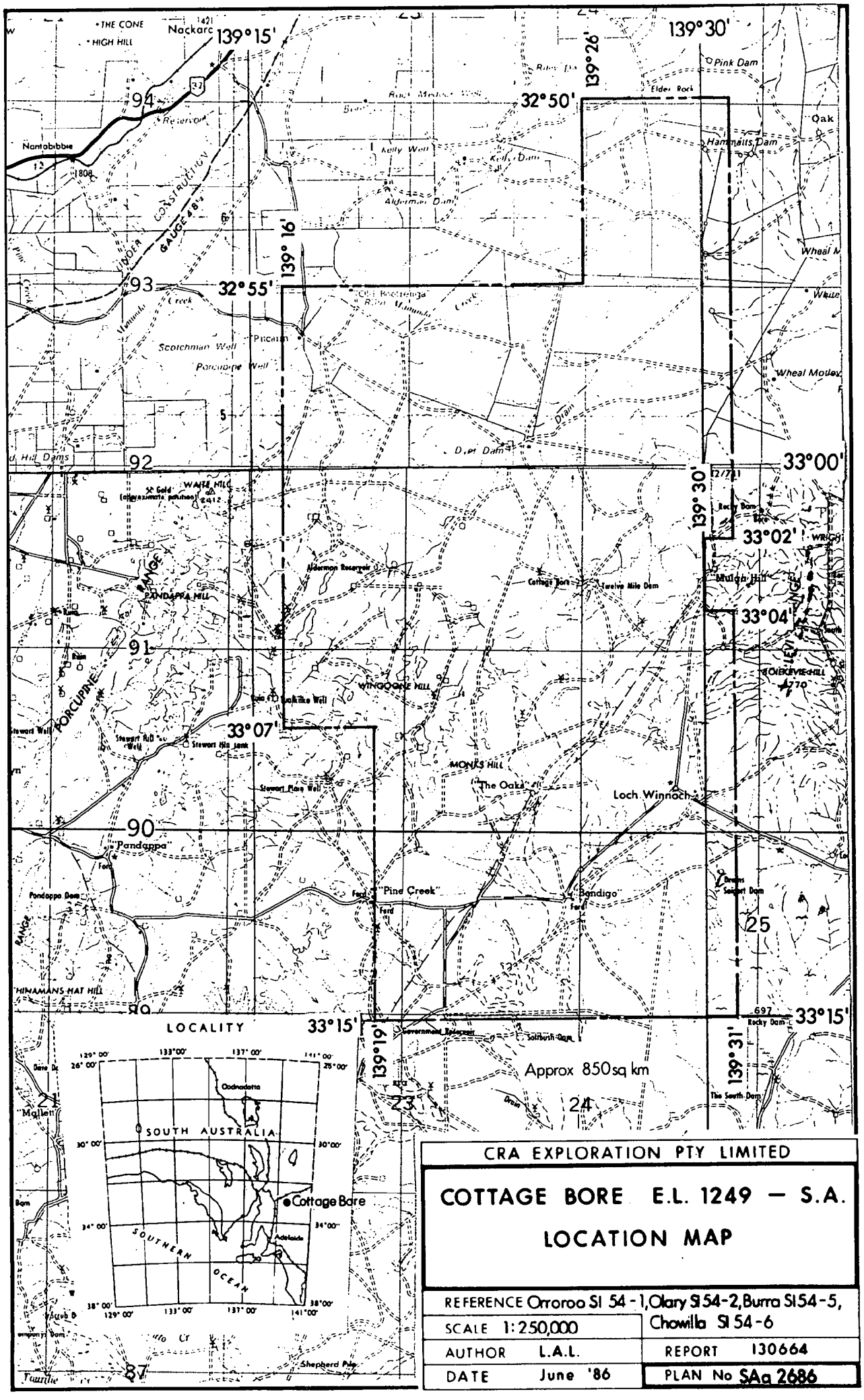
	$
Payroll	1 525
Supplies	1 220
Vehicle	465
Travel	7
Rent	759
Contractors	336
Laboratory	7 772
Overheads	774
Total	$ 12 858

LOCATION

Orroroo	SI 54-1	1:250 000 sheet, S.A.
Olary	SI 54-2	1:250 000 sheet, S.A.
Burra	SI 54-5	1:250 000 sheet, S.A.
Chowilla	SI 54-6	1:250 000 sheet, S.A.

KEYWORDS

Diamonds, Indicator Minerals, Drill Reverse Circ.



CRA EXPLORATION PTY LIMITED

COTTAGE BORE E.L. 1249 — S.A.

LOCATION MAP

REFERENCE Orroroo SI 54-1, Olary SI 54-2, Burra SI 54-5, Chowilla SI 54-6	
SCALE 1:250,000	
AUTHOR L.A.L.	REPORT 130664
DATE June '86	PLAN No SAa 2686

139°15' 340000mE 139°20' 350000mE 135°25' 139°30' 360000mE

32°50'

"Bulyninnie" H.S.

"Hill Grange" H.S.

Landing Ground

Pink Dam

Hammatt Dam

6360000mN

Creek

Manunda

"Pitcairn" H.S.

917763
Gp 9 ○ 5+·5 4+·4 FW
● 4+8 16+5 2+4 FW

6350000mN

Dyer Dam

Mafeking O.S.

Bulk Samples

33°00'

917460
Gp 1 ○ 1+·4 FW
◆ 1+8 18+5 13+4F
● 300+8 520+5 103+4 VF/F/FW -

917461(rock)

Macky's Dams

Cottage Bore

Twelve Mile Dam

"Mulga Hill" H.S.

6340000mN

Tualkilka Well

Wingoone Hill

◊ 1 NE

Monks Hill

The Oaks

Loch Winnoch

6330000mN

BHP AN65 BHP AN58 BHP AN68

Pine Creek

Pine Ck

Bendigo

Seigert Dam

Ucocola Well

6320000mN

The Mill Dam

Saltbush Dam

139°15' 139°20' 139°25' 139°30'

Trap site rating

⊙ GOOD

⊖ MODERATE TO GOOD

Ⓘ MODERATE

⊕ POOR TO MODERATE

⊗ POOR

X LOAM

Anomaly investigations

917638 / RC84RH004 — GRAVEL SAMPLE No. 917638 / DRILL HOLE No. RC84RH004; LOAM SAMPLE No. 917342 / ANOMALY No. 071 (prefixed by 1:100000 sheet no.)

073 MAGNETIC ANOMALY NOT GROUND RECOVERED

074 INPUT ANOMALY NOT GROUND RECOVERED

INPUT ANOMALY GROUND RECOVERED WITH MAGNETICS

Indicator mineral results

·4 NIL TO +·4mm INDICATORS

·5 NIL TO +·5mm INDICATORS

MICRODIAMOND NEGATIVE

DIAMOND

Gp3 PYROPE (Group 3 of Dawson and Stevens)

CHROMITE

PROBED: Priority of follow up H = high M = medium L = low N = no work

PICROILMENITE

PROBED: K = kimberlitic NK = non kimberlitic

CHROME DIOPSIDE

ORTHOPYROXENE

KIMBERLITIC ZIRCON

KIMBERLITE

Wear

VF VERY FRESH

F FRESH

FW FRESH WORN

W WORN

STOCKDALE RESULTS

◊ DIAMOND

● PICROILMENITE

○ PYROPE

Δ CHROME DIOPSIDE

Refer : SADME ENV. No. 1164 & 2046

0 1 2 3 4 5 6 7 8 9 10 Km.

5944-1

CRA EXPLORATION PTY. LIMITED.

COTTAGE BORE E.L. 1249 — S.A.

GRAVEL SAMPLE LOCATIONS AND RESULTS

Ref. :	ORRORO SI 54-1, OLARY SI 54-2, BURRA SI 54-5, CHOWILLA SI 54-6		
Scale.	1 : 100000		
Author.	J.P.H.	Report No.	130490
Date.	March '85	Plan No.	SAa 3147

139°15' 340000mE 139°20' 350000mE 135°25' 139°30' 360000mE

32°50' 32°50'

Pink Dam

Hammatt Dam

BHP 62-64 48
BHP 54-57 49
BHP 58-60 60
BHP 211, 212 23
BHP 206-210 24
"Bulyninnie" H.S.
BHP 31-40 50
BHP 46-49 57
BHP 61
"Hill Grange" H.S.
Landing Ground
BHP 41-45 62
BHP 50-53 52
BHP 203

6360000mN

BHP 204, 205 25

Creek

Manunda

"Pitcairn" H.S.

BHP 199-201 27

6350000mN

Dyer Dam
Mafeking O.S.

33°00' 33°00'

6732 6832
6731 6831
(1:100000 Map Series)

BHP 183-186 29
BHP 195-198 30
BHP 189-193 32
BHP 187, 188 33

Mocky's Dams

"Mulga Hill" H.S.

BHP 164-171 35/36

Cottage Bore
Twelve Mile Dam

6340000mN

Tualkilka Well
Wingoone Hill
Monks Hill
The Oaks
Loch Winnoch

6330000mN

BHP 65
BHP 58
BHP 68
BHP 41
BHP 63
BHP 40
BHP 42
BHP 43
BHP 44

Pine Creek

Pine Ck

Bendigo

Seagert Dam

BHP 46
BHP 238, 239 47
BHP 127-132 39
BHP 142, 143 45
BHP 10 53
BHP 11 54
BHP 7-9 55
BHP 12-14 56
BHP 20-23 57

Ucocola Well

6320000mN

The Mill Dam
Saltbush Dam

33°10' 33°10'

139°15' 139°20' 139°25' 139°30'

204, 205 25 B.H.P. Ground recovered aeromagnetic anomaly
Drill Hole No. Anomaly No.
SADME Env. 3548 & 3591

CRAE Airborne survey 1984

B.H.P. Airborne survey 1979

0 1 2 3 4 5 6 7 8 9 10 Km.

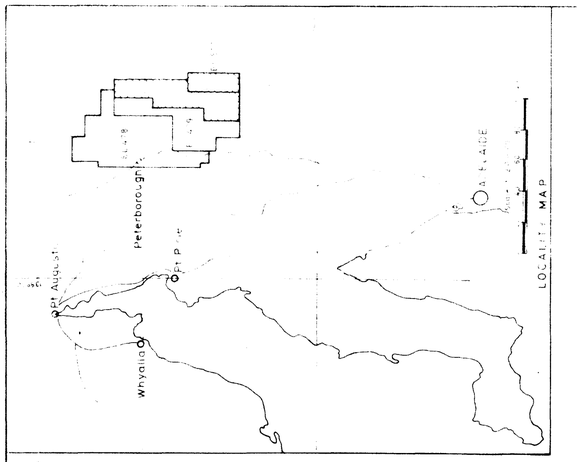
5944-2

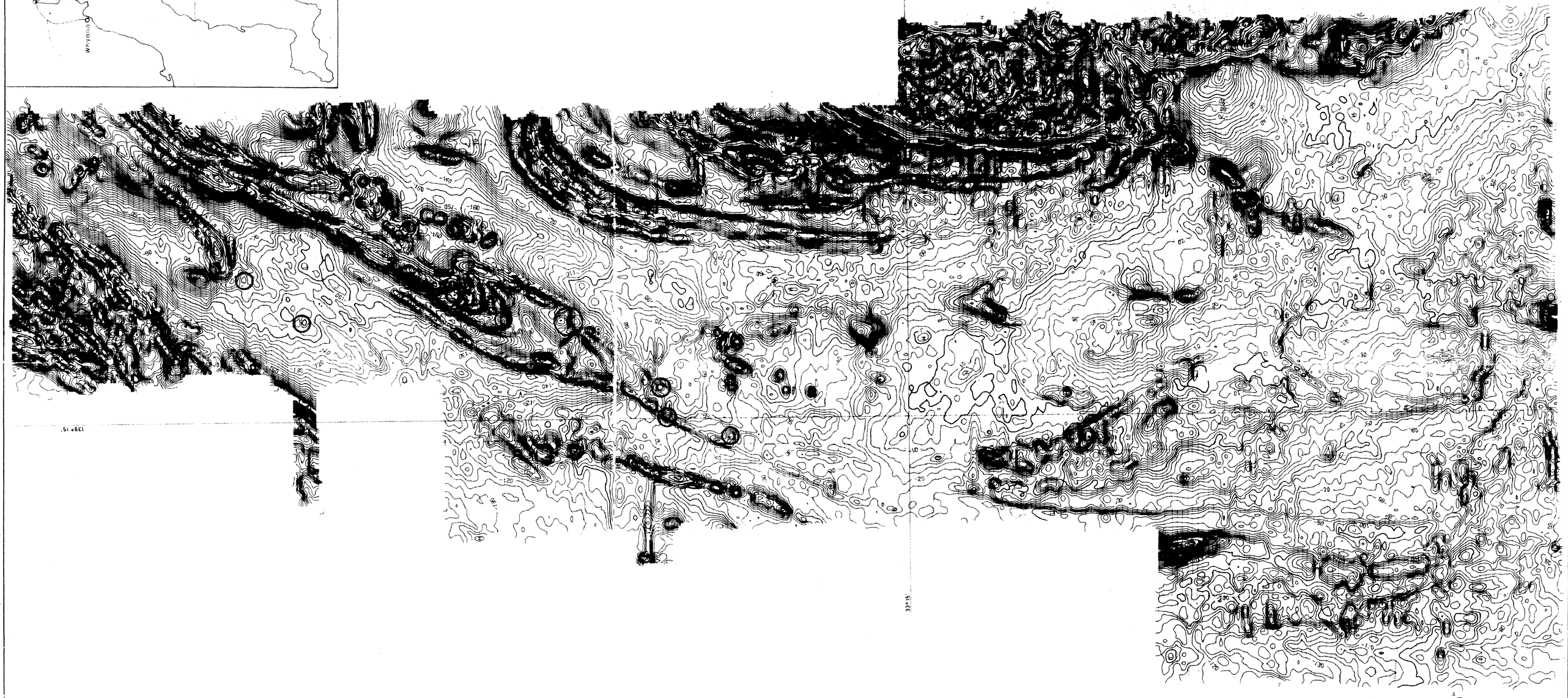
CRA EXPLORATION PTY. LIMITED.

COTTAGE BORE E.L. 1249 — S.A.

LOCATION OF AEROMAGNETIC SURVEYS AND ANOMALIES

Ref. :	ORROROO SI 54-1, OLARY SI 54-2, BURRA SI 54-5, CHOWILLA SI 54-6		
Scale .	1 : 100000		
Author .	J.P.H.	Report No.	130490
Date .	March '85	Plan No.	SAa 3148





SURVEY CONDUCTED BY GEOEX PTY LTD
DATE AUGUST 1979
LINE SPACING 250 METRES
SURVEY HEIGHT 80 METRES M.T.C
MAGNETOMETER USED
SAMPLING INTERVAL 0.8 SEC APPROX 60 METRE

SURVEY PROCESSED BY B.H.P. EXPLORATION
CONTOUR INTERVAL 5 nT
IGRF REMOVED
INTERPOLATED CONTOUR GRID 150 x 150 METRES

Scale 1:100,000

N

5944-3

CRA EXPLORATION PTY. LIMITED

COTTAGE BORE E.L. 1249 – S.A.

TMI CONTOURS
& ANOMALIES (BHP Survey)

Ref.: ORROROO SI 54-1, BURRA SI 54-5
Scale. 1 : 100000
Author. R.J.L.L. Report No. 130567
Date. Aug. '85 Plan No. SAa 3531

THE BROKEN HILL PROPRIETARY CO. LTD
EXPLORATION DEPARTMENT

E.L 479 BURRA (CHINAMAN HAT HILL) &
E.L 517 KIAORA S.A.
TOTAL MAGNETIC INTENSITY
CONTOUR MAP

Revisions	Drawn	Date	Centre
	Traced	Project No. 6-D210-32	Drawing No. A1-47
	Checked		

350000mE 139° 25' 360000mE 139°30' 139°35' 370000mN

0 1 2 3 4 5 6 7 8 9 10 Km.

6370000 mN

32°50'

6360000 mN

32°55'

6350000 mN

33°00'

6340000 mN

33°05'

6330000 mN

33°10'

6320000 mN

33°15'

5944-4

CRA EXPLORATION PTY. LIMITED.

COTTAGE BORE E.L. 1249 – S.A.

TMI CONTOURS & ANOMALIES (CRAE Survey)

Ref. :	ORROROO SI 54-1 , OLARY SI 54-2, BURRA SI 54-5 , CHOWILLA SI 54-6		
Scale .	1 : 100000		
Author .	R.J.L.L.	Report No.	130567
Date .	Aug. '85	Plan No.	SAo 3532

PROTEROZOIC ADELAIDE SYSTEM

T — Tertiary

WILPENA GROUP

Pwu — ULUPA SILTSTONE Red-brown weathering, grey-green siltstone & minor sandstone. Thin bands white sandstone near top

Pep — PEPUARTA TILLITE Grey-green massive siltstone, local occurrences of boulder tillite

UMBERATANA GROUP

Put — TAPLEY HILL FORMATION Flaggy, well laminated, blue-grey siltstone Calcareous and sandy in part

Pye — BRAEMAR IRON FORMATION Hematitic siltstone and ferruginous shale

Puw — WILYERPA QUARTZITE Pale grey, feldspathic sandstones with interbeds of grey siltstone and thin tillite bands

Pyp — PUALCO/APPILA TILLITE Massive boulder tillite with interbedded siltstones and sandstones

BURRA GROUP

Pb — BURRA GROUP Undifferentiated

Pl — BELAIR SUB-GROUP Grey, green-grey siltstone and quartzite

Pbn — NACKARA DOLOMITE Dark grey laminated dolomite, grey siltstone. Minor quartzite

Dolomitic

Crush zone

Trend of bedding

Bedding - inclined

Faults

Mine

BHP drill hole location & geology

Kimberlite

1234270 Recovered photo anomaly and sample no.

340000mE 350000mE 360000mE

139°20' 139°30'

32°50' 33°00' 33°10'

6350000mN 6340000mN 6330000mN 6220000mN

Photo run 7

Pink Dam

Hammatt Dam

"Hill Grange" H.S.

Landing Ground

"Bulyninnie"

quartzite/mafic

mafic/gabbro

mafic

quartzite/phyllite

quartzite

Creek

Manunda

"Pitcairn" H.S.

Phyllite Argillite

Dyer Dam

Mafeking O.S.

TS 1158374,5,6. porphyritic & vesicular basalt & meta-peridotite

TS1158373 uralitised gabbro

1234270 CBP1

1234278 CBP2

1234269 CBP4

1234279 CBP3

1234284 CBP5

1234285 CBP7

1234286 CBP11

1234314 CBP13

Trachy basalt

TS 917427

Trachy basalt dolomite mica

TS 917428

Trachy basalt + phlogopite

TS 917429 Trachy basalt

Siltstone CBP6

Mafics, carbonate schists, quartzite

Macky's Dams

Cottage Bore

Twelve Mile Dam

mudstone CBP9

quartzite CBP10 "Mulga Hill" H.S.

siltstone, quartzite CBP8

Tualkilka Well

Wingoona Hill

Monks Hill

BHP AN63

BHP AN58

BHP AN68

quartzite

siltstone volc ?

Pine Creek

carbonate

mafic

phyllite

Ucocola Well

Pine Ck

dolerite CBP12

alluvium

The Oaks

Loch Winnoch

Basic to intermediate intrusive

Bendigo

Seigert Dam

The Mill Dam

Saltbush Dam

TS 1158396 phlogopite basalt/K metasome.
TS 1158392 sandstone with K metasome.

0 1 2 3 4 5 6 7 8 9 10 Km.

This map was compiled from SADME Geological maps BURRA, ORROROO, OLARY and CHOWILLA 1:250,000

5944-5

CRA EXPLORATION PTY. LIMITED.

COTTAGE BORE E.L.1249 — S.A.
GEOLOGY
AND PHOTO ANOMALIES

Ref. :	ORROROO SI 54-1, OLARY SI 54-2, BURRA SI 54-5, CHOWILLA SI 54-6		
Scale.	1 : 100000		
Author.	JPH	Report No.	130585
Date.	MARCH 1985	Plan No.	SAa 3129

139°15' 340000mE 139°20' 350000mE 139°25' 360000mE 139°30'

32°50'

Pink Dam

"Bulyninnie" H.S.

"Hill Grange" H.S.

Landing Ground

Hammott Dam

6360000mN

1234273 X
2+·5 W

9+8
40+5
22+·4 F/FW
1234277 X ◊1

1234274 X ◊6
1234275 X ◊16
Nackara Occurrence
◊6 X 1234276

Creek

Manunda

"Pitcairn" H.S.

1234270 X
1+·4 FW
6+8
28+5
20+·4 F/FW

Gp 9 ○ 2+·5
2+·4F
1+·4 F
m.d. neg.
893104
1234272 X

893105 X ·4

X 893106
1+·4 FW
not all obs
m.d. neg.

917763
Gp 9 ○ 5+·5
4+·4 FW
4+8
16+5
2+·4 FW
K X 893111

893103
Gp 11 ○ 2+·5 FW
1+8
1+5 FW
8% MgO
m.d. neg.

893102
3+8
21+5 FW
8-13% MgO
variable Cr_2O_3
not all obs.

X 1234278

1234196 gravel, 1234195 palaeogravel
Gp 3,9 ○ 4+·5
1+·4F
2+·5
2+·4F
6+·5
5+·4F
1+·5
2+·4F
1+·5
1+·4 F/FW
12+·8
19+·5
24+·4 F/FW

0·0008 ct
Double Dam

1234269 X
X 1234279

893101
Gp 1,3,9 ○ 2+·5
3+·4F
2+·4F
6+1·0
11+·8
50+·5
58+·4 FW-F
△ 1+·5
m.d. neg.

6350000mN

Dyer Dam
Mafeking O.S.

33°00'

Bulk Samples

1234284 X
1+·4 W

917460
Gp 1 ○ 1+·4 FW
1+·8
K 18+·5
13+·4 F
300+·8
520+·5
103+·4 VF/F/FW

1234240-230
258-267, 271
280-283
25 samples

X 893116
X 893115

1234312
1×0·6-0·8mm (0·005 cts)
1+·6
1+·6

917461 (rock)
Macky's Dams

Cottage Bore
Twelve Mile Dam

Mulga Hill" H.S.

6340000mN

+1·0

1234313
7+·4F
1+·8
1+·4F
11+1·0
25+·8
312+·5
120+·4 VF

1234285 X

Tualkilka Well
Wingoone Hill

1×1·7-2·4mm (0·075 cts)
1+·6
X 893112

Monks Hill

X 1234286

The Oaks

Loch Winnoch

6330000mN

33°10'

BHP AN65
BHP AN58
BHP AN68

1234194
Gp 9 ○ 3+1·0
12+·8
39+·4F
1+1·0
6+·8
6+·5
5+·4F-FW
21+1·0
24+·8
283+·5
87+·4 VF-F
△ 8+·4 VF-F

Pine Creek
Pine Ck
Creek

1234193
Gp 1,3,9,11 ○ 1+·8
10+·5
29+·4 FW-W
7+·8
83+·5
98+·4 FW-W
4+·8
54+·5
23+·4 FW
Ucocola Well

1234192
Gp 9,11 ○ 4+·8
28+·5
15+·4 W
2+·8
6+·5 W
1+·5
1+·4 W
10% MgO

Bendigo
Seigert Dam

6320000mN

X 1234314
○ 1+·8
7+·5
4+·4 FW
3+·5
1+·4 FW
4+·8
24+·5
17+·4 FW

The Mill Dam
Saltbush Dam

139°15' 139°20' 139°25' 139°30'

Trap site rating

⊙ GOOD
⊖ MODERATE TO GOOD
⊕ MODERATE
⊕ POOR TO MODERATE
⊗ POOR
X LOAM

Anomaly investigations

917638 / RC84RH004 — GRAVEL SAMPLE No. 917638 / DRILL HOLE No. RC84RH004 — LOAM SAMPLE No. 917342 / ANOMALY No. 071 (prefixed by 1:100000 sheet no.)

MAGNETIC ANOMALY NOT GROUND RECOVERED

INPUT ANOMALY NOT GROUND RECOVERED

INPUT ANOMALY GROUND RECOVERED WITH MAGNETICS

Indicator mineral results

·4 NIL TO +·4mm INDICATORS
·5 NIL TO +·5mm INDICATORS
MICRODIAMOND NEGATIVE
DIAMOND
Gp3 PYROPE (Group 3 of Dawson and Stevens)
CHROMITE
PROBED: Priority of follow up H = high M = medium L = low N = no work
PICROILMENITE
PROBED: K = kimberlitic NK = non kimberlitic
CHROME DIOPSIDE
ORTHOPYROXENE
KIMBERLITIC ZIRCON
KIMBERLITE

Wear

VF VERY FRESH
F FRESH
FW FRESH WORN
W WORN

STOCKDALE RESULTS

◊ DIAMOND
● PICROILMENITE
○ PYROPE
△ CHROME DIOPSIDE

Refer : SADME ENV. No. 1164 & 2046

0 1 2 3 4 5 6 7 8 9 10 Km.

5944-6

CRA EXPLORATION PTY. LIMITED.

COTTAGE BORE E.L. 1249 — S.A.
DIAMOND EXPLORATION
GRAVEL SAMPLE LOCATIONS AND RESULTS

Ref. :	ORRORoo SI 54-1, OLARY SI 54-2, BURRA SI 54-5, CHOWILLA SI 54-6		
Scale .	1 : 100000		
Author .	J.P.H.	Report No.	130585
Date .	March '85	Plan No.	SAa 3147

139°15' 340000mE 139°20' 350000mE 135°25' 139°30' 360000mE

32°50'

Pink Dam

BHP 62-64 48
BHP 54-57 49
BHP 58-60 60
011
1234273 024
BHP 211, 212 23
BHP 206-210 24
"Bulyninnie
BHP 50
BHP 31-40 51
BHP 46-49 61
Hammatt Dam
"Hill Grange" H.S.
Landing Ground
BHP 41-45 62
BHP 50-53 52
015
BHP 203 ?
6360000mN
BHP 204,205 25
Creek
893105 019
893106 020
893104 017
893103 026
893102 018
893111 016
Manunda
010
"Pitcairn" H.S.
893101 008
BHP 199-201 27
6350000mN
Dyer Dam
Mafeking O.S.
33°00'
6732 6832
6731 6831
(1:100000 Map Series)
BHP 183-186 29
BHP 195-198 30
BHP 189-193 32
BHP 187,188 33
893116
893115 008
1234240-250
258-267, 271
280-283
006
1234312 027
Macky's Dams
Mulga Hill" H.S.
BHP 164-171 35/36
Cottage Bore
Twelve Mile Dam
6340000mN
Tualkilla Well
Wingoone Hill
893112 023
Monks Hill
The Oaks
Loch Winnoch
6330000mN
Pine Creek
33°10'
BHP 65
BHP 58
BHP 68
BHP 41
BHP 63
BHP 40
BHP 42
BHP 43
Pine Ck
Bendigo
Seigert Dam
BHP 46
BHP 44
BHP 127-132 39
BHP 238, 239 47
Ucocola Well
BHP 142,143 45
BHP 10 53
BHP 11 54
BHP 7-9 55
BHP 12-14 56
BHP 20-23 57
6320000mN
The Mill Dam
Saltbush Dam
139°15' 139°20' 139°25' 139°30'

Anomaly investigations

917638 / RC84RH004 — GRAVEL SAMPLE No. 917638 / DRILL HOLE No. RC84RH004
917342 / 071 — LOAM SAMPLE No. 917342 / ANOMALY No.(prefixed by C.B. 071

CRAE Airborne survey 1984

B.H.P. Airborne survey 1979

073 — MAGNETIC ANOMALY NOT GROUND RECOVERED

074 — INPUT ANOMALY NOT GROUND RECOVERED

INPUT ANOMALY GROUND RECOVERED WITH MAGNETICS

5944-7

0 1 2 3 4 5 6 7 8 9 10 Km.

CRA EXPLORATION PTY. LIMITED.

COTTAGE BORE E.L. 1249 — S.A.

LOCATION OF AEROMAGNETIC SURVEYS AND ANOMALIES

Ref. :	ORRORoo SI 54-1, OLARY SI 54-2, BURRA SI 54-5, CHOWILLA SI 54-6		
Scale .	1 : 100000		
Author .	J.P.H.	Report No.	130585
Date .	March '85	Plan No.	SAa 3148

139°15' 340000mE 139°20' 350000mE 139°25' 360000mE 139°30'

32°50'

Pink Dam

"Bulyninnie" H.S.

"Hill Grange" H.S.

Landing Ground

Hammatt Dam

6360000mN

Nackara Occurrence

Creek

Manunda

"Pitcairn" H.S.

Double Dam

6350000mN

Dyer Dam

Mafeking O.S.

33°00'

Bulk Samples

SEE SAa 3565
1234240 - 250
258 267,271
280 - 283
25 samples

Macky's Dams

893117 (DH)
4
m.d.neg

Cottage Bore

Twelve Mile Dam

Mulga Hill" H.S.

6340000mN

Tualkilka Well

Wingoone Hill

Monks Hill

The Oaks

Loch Winnoch

6330000mN

BHP AN65 BHP AN58 BHP AN68

Pine Creek

Pine Ck

Bendigo

Seigert Dam

Ucocola Well

6320000mN

The Mill Dam

Saltbush Dam

139°15' 139°20' 139°25' 139°30'

Trap site rating

- ⊙ GOOD
- ⊖ MODERATE TO GOOD
- ⊕ MODERATE
- ⊕ POOR TO MODERATE
- ⊗ POOR
- X LOAM

Anomaly investigations

917638 / RC84RH004 — GRAVEL SAMPLE No. 917638 / DRILL HOLE No. RC84RH004; LOAM SAMPLE No. 917342 / ANOMALY No. 071 (prefixed by 1:100000 sheet no.)

- MAGNETIC ANOMALY NOT GROUND RECOVERED
- INPUT ANOMALY NOT GROUND RECOVERED
- INPUT ANOMALY GROUND RECOVERED WITH MAGNETICS

Indicator mineral results

- ·4 NIL TO +·4mm INDICATORS
- ·5 NIL TO +·5mm INDICATORS
- MICRODIAMOND NEGATIVE
- DIAMOND
- Gp3 PYROPE (Group 3 of Dawson and Stevens)
- CHROMITE
- PROBED: Priority of follow up H = high M = medium L = low N = no work
- PICROILMENITE
- PROBED: K = kimberlitic NK = non kimberlitic
- CHROME DIOPSIDE
- ORTHOPYROXENE
- KIMBERLITIC ZIRCON
- KIMBERLITE

Wear

- VF VERY FRESH
- F FRESH
- FW FRESH WORN
- W WORN

STOCKDALE RESULTS

- DIAMOND
- PICROILMENITE
- PYROPE
- CHROME DIOPSIDE

Refer : SADME ENV. No. 1164 & 2046

0 1 2 3 4 5 6 7 8 9 10 Km.

5944-8

CRA EXPLORATION PTY. LIMITED.

COTTAGE BORE E.L. 1249 — S.A.
DIAMOND EXPLORATION
GRAVEL SAMPLE LOCATIONS AND RESULTS

Ref. :	ORROROO SI 54-1, OLARY SI 54-2, BURRA SI 54-5, CHOWILLA SI 54-6		
Scale .	1 : 100000		
Author .	J.P.H.	Report No.	130634
Date .	Dec. '85	Plan No.	SAa 3147

139°15' 340000mE 139°20' 350000mE 135°25' 139°30' 360000mE

32°50'

"Bulyninnie" H.S.

"Hill Grange" H.S.

Landing Ground

Pink Dam

Hammatt Dam

85 CBRC 21 CB 15 1234392 R 1 / P slst. 8

85 CBRC 22 1234393 R 1 / P slst. 49

6360000mN

Creek

Manunda

"Pitcairn" H.S.

85 CBRC 13 CBP1 1234385 R 6 / T 8 / P cst. 16

CBRC 14 1234386

85 CBRC 15 CB 17 1234387 R 2 / T 11 / P lst. 4

R 4 / T 7·5 / P mst 9·5

85 CBRC 16 CB 26 1234388 R 1 / P lst. 25 / J dolerite 1

85 CBRC 18 CB 16 R 1·5 / T 18·5 / P dol. 30

R 6 / P mst 1

85 CBRC 10 1234375-379

85 CBRC 11 1234380, 381 R 2 / P mst 4

85 CBRC 12 CBP 4 1234384 R 3·5 / T 4·5 / P mst 7

85 CBRC 17 CBP 3 1234389 R 12 / P cst 2

6350000mN

Dyer Dam

Mafeking O.S.

33°00'

R 2 / P mst 9

85 CBRC 7 CB 7 1234373

85 CBRC 8 CB 8 R 2 / P dol 9

R·2 / P mst 6

85 CBRC 5 1234371

85 CBRC 4 1237370 R 2 / P mst 6

85 CBRC 6 1234372 R·2 / P mud 8

R 3·5 / P mst 19·5

85 CBRC 3 CB 6 1234369

Macky's Dams

85 CBRC 9 CB 27 1234374 R 2 / P qtz 10 / P mst 10·9 / P talc 0·1

Cottage Bore

Twelve Mile Dam

"Mulga Hill" H.S.

6340000mN

Tualkilka Well

Wingoone Hill

Monks Hill

R 6 / T 15

85 CBRC 2A CB 23

85 CBRC 2B 1234368 R 5 / T 16 / P mst 7

The Oaks

Loch Winnoch

6330000mN

33°10'

Pine Ck

Bendigo

Seigert Dam

Ucocola Well

R 6 / P sst 4·5

85 CBRC 1 CBP 13

6320000mN

The Mill Dam

Saltbush Dam

139°15' 139°20' 139°25' 139°30'

⊙ 85 CBRC 21 / CB 15 / 1234392 — Drill hole location and number. Magnetic anomaly number. (CBP 13 Photo anomaly number.) Drill hole sample number.

R 2 / T 4 / P mst 5 — 2m of Recent sand, clay, conglomerate. 4m of Tertiary sand, clay, conglomerate. 5m of Adelaidean mudstone

slst siltstone
mst mudstone
sst sandstone
lst limestone
dol dolomite
cst claystone
qtz quartzite

0 1 2 3 4 5 6 7 8 9 10 Km.

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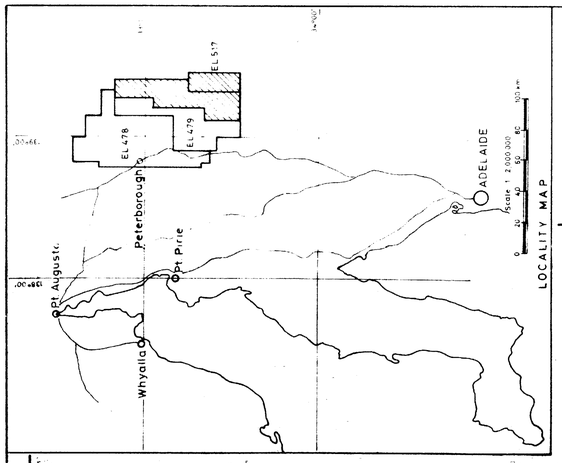
CRA EXPLORATION PTY. LIMITED.

COTTAGE BORE E.L. 1249 — S.A.

DRILL HOLE LOCATIONS AND GEOLOGY

Ref. :	ORROROO SI 54-1, OLARY SI 54-2, BURRA SI 54-5, CHOWILLA SI 54-6		
Scale.	1 : 100000		
Author.	J. P. H.	Report No.	130634
Date.	Dec. '85	Plan No.	SAa 3592



COTTAGE BORE EL 1249

33°15'

139° 15'

SURVEY CONDUCTED BY GEOEX PTY LTD
DATE AUGUST 1979
LINE SPACING 250 METRES
SURVEY HEIGHT 80 METRES M.T.C.
MAGNETOMETER USED
SAMPLING INTERVAL .8 SEC. APPROX. 60 METRE

SURVEY PROCESSED BY B.H.P EXPLORATION
CONTOUR INTERVAL 5 nT
IGRF REMOVED
INTERPOLATED CONTOUR GRID 150 x 150 METRES

N

Scale 1:100,000
0 2 4 6 8 10 Km

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C.R.A. EXPLORATION PTY. LIMITED.

COTTAGE BORE E.L. 1249 — S.A.

TMI CONTOURS
& ANOMALIES (BHP Survey)

Ref.: ORROROO SI 54-1, BURRA SI 54-5
Scale. 1 : 100000
Author. R.J.L.L. Report No. 130664
Date. June '86 Plan No. SAa 3531

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

E.L 479 BURRA (CHINAMAN HAT HILL) &
E.L. 517 KIAORA S.A.
TOTAL MAGNETIC INTENSITY
CONTOUR MAP

Revisions	Drawn:	Date:	Centre:
	Traced:	Project No 6-D210-32	Drawing No: A1-47
	Checked:		

6370000 mN

350000 mE

139° 25'

139° 30'

360000 mE

139°35'

370000 mN

0 1 2 3 4 5 6 7 8 9 10 Km.

32°50'

6360000 mN

32°55'

6350000 mN

33°00'

6340000 mN

33°05'

6330000 mN

33°10'

6320000 mN

33°15'

5944-11

CRA EXPLORATION PTY. LIMITED.

COTTAGE BORE E.L.1249 – S.A.

TMI CONTOURS & ANOMALIES (CRAE Survey)

Ref. :	ORROROO SI 54-1 ; BURRA SI 54-5 ;	OLARY SI 54-2, CHOWILLA SI 54-6	
Scale.	1 : 100000		
Author.	R.J.L.L.	Report No.	130664
Date.	June '86	Plan No.	SAa 3532