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EL 447

APPILA

FIRST AND FINAL REPORT TO LICENCE SURRENDER FOR THE PERIOD 7/2/79 TO 6/5/79

Submitted by
CRA Exploration Pty Ltd
1979

Enquiries: Customer Services
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101 Grenfell Street, Adelaide 5000

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PRIMARY INDUSTRIES AND RESOURCES SA

CONTENTS ENVELOPE 3486

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TENEMENT: EXPLORATION LICENCE No. 447

TENEMENT HOLDER: C.R.A. EXPLORATION PTY. .LTD

REPORTS:

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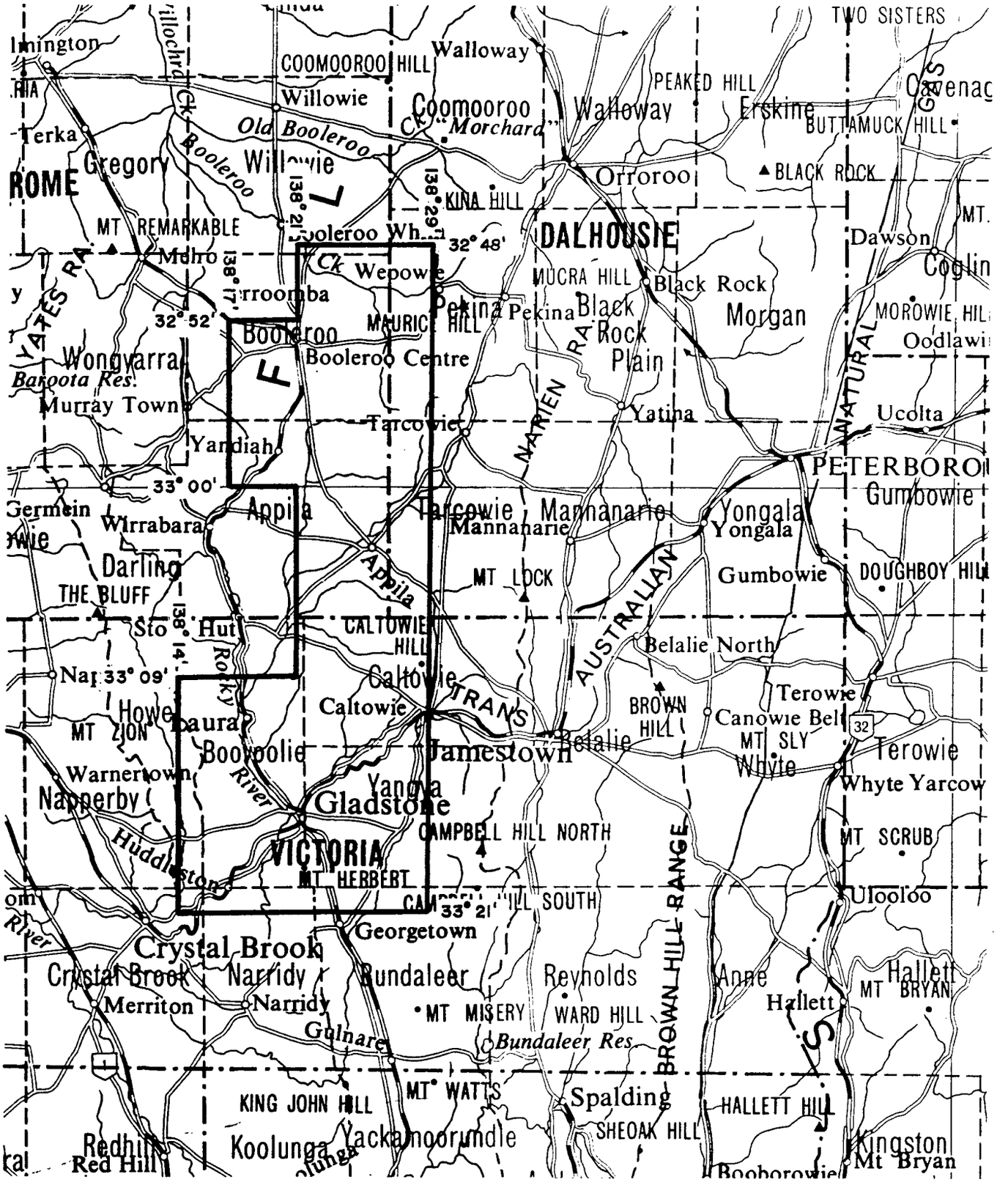
SCHEDULE A



SURRENDERED

SCALE 1:500,000

KILOMETRES 10 0 10 20 30 40 50 KILOMETRES

APPLICANT: C.R.A. EXPLORATION PTY. LTD.

DM: 531/78 AREA: 1093 square kilometres

1:250000 PLANS: ORRORO
BURRA

LOCALITY: APPILA AREA — Approx. 15 km West of Jamestown

DATE GRANTED: 7-2-79 DATE EXPIRED: 6-2-80 EL No: 447

C.R.A. EXPLORATION PTY. LIMITED

FINAL REPORT ON APPILA EL 447 SOUTH AUSTRALIA.

Author: A.G. Connor

Submitted to: D.R. Kennedy

Copy to: S.A. Department of Mines

Date: May, 1979.

CONTENTS

C.R.A. EXPLORATION PTY. LIMITED
(INC IN N.S.W.)

28th FLOOR, 55 COLLINS STREET, MELBOURNE,
AUSTRALIA 3001

G.P.O. BOX 384D
MELBOURNE, AUSTRALIA 3001
TELEGRAMS: "CONRIO"
TELEX: AA30108
TELEPHONE: (AREA CODE 03)
SWITCHBOARD: 658 3333
DIRECT LINE: 658
IN REPLY PLEASE QUOTE

28 June 1979

The Director of Mines
PO Box 151
EASTWOOD SA 5063

Dear Sir,

EL 447 - Appila, South Australia
Final Report

Please find enclosed a report by A G Connor entitled "Final Report on Appila, EL 447. South Australia", dated May 1979.

Final expenditure on Exploration Licence 447 amounted to $11 959 comprising:

Salaries and wages	$3 855
General Supplies	1 406
Vehicles	434
Travel & accommodation	364
Contractors	35
Assaying	2 800
General Overheads	3 065
	$11 959

Yours faithfully,

for J Collier
General Manager

Enc

1. SUMMARY

C.R.A. Exploration was granted Appila EL 447 on 7th February 1979. The exploration targets were basemetal and diamond mineralisation associated with sixteen spot aeromagnetic anomalies located by past explorers and by the B.M.R. Where possible, rock chip samples were collected and assayed for basemetals.

Stream sediment and loam samples were collected around the anomalies and the heavy mineral concentrates were observed for kimberlite indicator minerals. No significant geochemical anomalies or kimberlitic indicator minerals were found. It is recommended that the area be relinquished.

2. CONCLUSIONS & RECOMMENDATIONS

The stream sediment, loam and rock chip sampling program did not detect any exposed basemetal mineralisation or kimberlite. The aeromagnetic anomalies may be due to kimberlitic intrusions at depth.

Continued exploration of the anomalies involves a commitment to a major drilling program. On the basis of known kimberlite occurrences in the Peterborough-Terowie area and the intensity of past diamond exploration, the possibility of finding an economic diamond pipe on Appila E.L. is remote.

Further exploration cannot be justified and the E.L. should be relinquished.

3. INTRODUCTION

C.R.A. Exploration applied for an exploration licence centred on Appila in the South Flinders Ranges for the purpose of testing sixteen spot aeromagnetic anomalies located by previous explorers. Appila E.L. 447 of 1093 sq. km. was granted on 7th February 1979 for one year with an expenditure commitment of $45,000. E.L. 447 adjoins C.R.A. Exploration's Wirrabara E.L. 417 and the exploration program for Appila overlaps E.L. 417. Most of the E.L. is on cultivated land and exploration activity is restricted by the agricultural seasons.

This report describes work carried out on Appila E.L. 447 from 7th February 1979 to 6th May 1979.

07

4. PREVIOUS EXPLORATION

The area was flown by the B.M.R. in 1963 as part of a regional aeromagnetic survey. The survey located fourteen spot aeromagnetic highs using a flight line spacing of 1600 m and height of 152 m A.G.L. Part of the area (north of L 33°15'S) was reflown in January 1971 by McPhar on behalf of Systems Exploration (SML 426). This survey was flown with M.T.C. of 130 m and a line spacing of 400 m.

In total, sixteen aeromagnetic anomalies have been found. Each anomaly has been given a number as shown on the accompanying plans, and its characteristics are listed below.

ANOMALY	DIMENSIONS (m)	NO. OF FLIGHT	AMPLITUDE (γ) ABOVE LOCAL BKGD.
1	1860 x 1200	4	360
2	1760 x 1090	4	300
3	2450 x 1010	6	140
4	1550 x 640	3	60
5	2290 x 800	5	160
6	3360 x 1360	8	340
7	4080 x 960	9	240
8	530 x 690	1	120
9	2320 x 1280	5	1500
10	800 x 1060	3	100
11	partial coverage	>2	>500
12	3200 x 1600	3	50-100
13	1800 x 500	1	50
14	2200 x 850	2	50
15	440 x 1300	1	100
16	1300 x 960	1	50

McPhar Anomalies 1 to 11
B.M.R. Anomalies 12 to 16

Westchester regarded the magnetic anomalies as indicators of intrusive activity into the cores of concealed diapiric structures. There is no record of ground inspection or testing by Westchester. The S.M.L. was relinquished because of problems with "source definition" of the anomalies and the "limited potential" of the area.

All the anomalies were inspected in the field by Geomanagement Pty. Ltd. during 1973-74 on behalf of Cultus Pacific N.L. who held E.L. 49. No attempt was made to explain the anomalies, and no geophysical or subsurface testing was done.

D.H. Tucker carried out a magnetic and gravity interpretation of the northern portion of E.L. 447 in 1972.

Tucker interpreted the source of some of the anomalies as concentrations of magnetic minerals within Quaternary sediments of the Willochra Plain.

The McPhar aeromagnetic and V.L.F. - E.M. data was reviewed by M. Locke in his B.Sc (Hons) thesis (1976). Reconnaissance ground I.P. and magnetic surveys were carried out over Anomaly 2.

Locke estimated the depth to the top of the magnetic body at Anomaly 2 as 250 m from airborne data, and 120-200 m from ground magnetic data, but he says that "detailed magnetic interpretation is required before any conclusions can be made". Anomaly 2 has an associated I.P. anomaly with an estimated depth of 120 m to the top of the conductor (Locke, 1976).

Locke suggested that the anomalies might be due to basic or ultrabasic intrusive bodies associated with diapirism and faulting.

5. WORK CARRIED OUT

5.1 GEOLOGY

All the anomalies except numbers 12 and 14 have been inspected on the ground. Most are located on cultivated land where the only exposure consists of rubbly ferruginous sandstone and amorphous ironstone cobbles. The cobbles are remnants of a ? Tertiary Laterite surface and may not be in situ because of natural and artificial spreading. Representative samples of each lithology were collected and assayed by the Zinc Corporation for Pb, Zn, Cu, Ni, Mn and Ag.

The anomalies were located in the field using McPhar and B.M.R. aeromagnetic contour plans and the following notes were made at each location.

Anomaly 1

There is no outcrop at this anomaly. Subrounded cobbles of ferruginous sandstone occur as float in the vicinity of the anomaly which coincides with a slight depression.

Anomaly 2

Subcrop of white kaolinitic sandstone with some ferruginous sandstone and porcellainite were found in cultivated fields at the anomaly. A deeply incised creek cuts through the anomaly exposing a well bedded sequence of shale, quartzite and siltstone. Some ironstone cobbles were found in the creek gravels.

Anomaly 3

This anomaly is located over a low lying swampy area. No outcrop was found, but the streams contain highly ferruginous gravel.

Anomaly 4

Rubble (? subcrop) of lateritic ironstone with some clean white sandstone.

Anomaly 5

There is no outcrop at the centre of the anomaly. Mature quartz sandstone with some interbedded pale grey siltstone crops out in a deeply eroded creek bed approximately 400 m north-west of the anomaly's centre.

Anomaly 6

No outcrop. The anomaly is along strike from Anomaly 5.

Anomaly 7

The anomaly occurs along the flank of a slight ridge. There is no outcrop, but large floaters (to 25 cm diameter) indicate a fairly shallow depth to bedrock. Lithologies represented in the floaters are earthy iron concretion, ferruginous sandstone with voids containing ? boxwork, and massive specular hematite.

Anomaly 8

The anomaly occurs on a ridge along strike from Anomaly 7. There is no outcrop.

Anomaly 9

The anomaly coincides with a low rubbly outcrop of lateritic concretionary ironstone.

Anomaly 10

There is no outcrop at the centre of the anomaly, but an old iron flux quarry occurs 400 m along strike to the north. Massive structureless hematite and chlorite-specularite rock crop out in the quarry. The ironstone occurs within a sequence of steeply dipping laminated siltstone and sandstone. The contact between the ironstone and its enclosing sediments is obscured by talus and soil, but the general shape of the quarry suggests a conformable relationship. A small outcrop of lateritic ironstone is situated a further 500 m along strike north of the quarry (Sample 615962 and 3). There are some poor exposures in a deeply incised creek bed which crosses the anomaly. Resistant bands of clean sandstone with interbedded siltstone and minor shale crop out on the north-eastern margin of the anomaly. Highly weathered fine grained dark green (?) chlorite-specularite rock crops out towards the centre of the anomaly, but no massive ironstone is exposed in the creek.

Anomaly 11

Rubble of highly weathered yellow limonitic friable siltstone and minor maroon laminated micaceous siltstone.

Anomaly 13

No outcrop.

Anomaly 15

No outcrop.

Anomaly 16

No outcrop.

Anomalies 12 & 14

Not inspected.

The copper occurrence shown on the Burra 1:250000 sheet 5.5 km NW of Caltowie could not be located in the field. The iron occurrence shown on the Orroroo 1:250000 sheet 13 km SE of Booleroo Centre is associated with highly ferruginous (lateritised?) shale. No massive ironstone outcrops were found.

5.2 GEOCHEMISTRY

Rock chip samples were collected where possible, from the magnetic anomalies. The samples were sent to the Zinc Corporation Ltd. for Pb, Zn, Cu, Ni, Mn and Ag analysis by A.A.S. The assay results are attached to this report.

Concentrations ranged from 8-800 ppm Pb, 20-660 ppm Zn, 15-850 ppm Cu, 6-96 ppm Ni, <10-5200 ppm Mn and <1-4 ppm Ag. Nine samples from Anomaly 10 were assayed for gold by fire assay. All samples were below the detection limit.

5.3 STREAM SEDIMENT & LOAM SAMPLING

Three loam and twenty-seven-4 mm stream sediment samples were collected around the magnetic anomalies. The heavy mineral concentrates from these samples were observed to -28 mesh for kimberlitic indicator minerals in our Perth laboratory. No indicators were detected.

6. INTERPRETATION

There are three possible interpretations of the source of aeromagnetic anomalies in Appila E.L. 447.

1. Conformable sedimentary iron deposits within the Burra Group.

2. Recent deposits of magnetic gravels in shallow depressions.

3. Intrusive basic or ultrabasic bodies.

6.1 CONFORMABLE IRON DEPOSITS

At 1:250000 scale, there is a confusion of stratigraphic nomenclature across the Burra-Orroroo sheet boundary. However, Anomalies 1,4,5,6,7,8,10 and possibly 14 can be interpreted as belonging to a narrow stratigraphic interval near the top of the Burra Group. (see attached plan) On the Orroroo sheet, the aeromagnetic anomalies occur in the Cradock Quartzite which is probably equivalent to the Watervale Sandstone Member of the Auburn Dolomite on the Burra 1:250000 sheet. The top of the Burra Group is defined differently on each sheet. For the purposes of this report, it has been arbitrarily taken as the base of the Belair Subgroup on Orroroo, and the base of the Leasingham Quartzite on the Burra 1:250000 sheet.

The occurrence of ? conformable ironstone (Anomaly 10), the ellipsoidal shape of the anomalies parallel to strike, the reported iron occurrence on the same horizon south-east of Booleroo Centre and the low nickel values from the samples all support a sedimentary rather than igneous origin. The exposed sediments are economically uninteresting, but an estimated 70% of the area is concealed by alluvium, with only the more resistant sandstone and glacial sediments cropping out. Because of this, it is difficult to gauge the potential of the geological environment for basemetal mineralisation.

However, there are no large basemetal deposits known in this stratigraphic position elsewhere in the Adelaide Geosyncline. In view of the low geochemical values obtained from rock chip samples, the potential for basemetal mineralisation appears to be low.

6.2 RECENT DEPOSITS

As suggested by D.H. Tucker (1972), some of the anomalies which occur over swampy depressions may be caused by recent deposits of magnetic gravels. Anomalies 3, and 15 fit into this category.

6.3 BASIC AND ULTRABASIC INTRUSIVES

Most previous explorers have attributed the cause of the aeromagnetic anomalies to basic or ultrabasic intrusions associated with diapirism and/or faulting for the following reasons:

- the circular or ellipsoidal shape of the anomalies,
- the known occurrences of magnetic basic rocks intruded into the cores of "diapirs",
- the known occurrences of kimberlite in the Peterborough, Carrieton and Wirrabara areas,
- the presence of basic volcanics within the Burra Group south of Olary. (Boucaut Volcanics). This interpretation of the origin of the magnetic anomalies has been generally accepted and consequently, has not been tested by drilling. (The data for E.L. 359 which was held by Australia - Cities Service Inc. covering the aeromagnetic anomalies south of lat 33°05'S has not been placedon open file at this date).

Anomalies 1,2,9 and 11 may be caused by concealed basic or ultrabasic intrusives. However, no kimberlitic indicator minerals or anomalous nickel concentrations were found at the surface, which suggests that the intrusions are either barren or deep-seated. (Locke interpreted the depth of Anomaly 2 as 120 m from magnetic and I.P. data).

A.G. CONNOR

REFERENCES

Westchester Mining	1972	Quarterly Reports SML 426 Open File Envelope's 1384, 1567.
Cultus Pacific N.L.	1974	Quarterly Reports E.L. 49 Open File Envelope 1392
Locke M.S.	1976	Analysis of F-400 Airborne E.M. Data and Ground Investigations in the Booleroo - Laura District of South Australia. B.SC (Hons) thesis, Adelaide University. (unpublished)
Tucker D.H.	1972	Magnetic and Gravity Interpretation of an Area of Precambrian Sediments in Australia. (unpublished Ph.D thesis (1972) Adelaide University.

LOCATION

Orroroo SI 54 - 1
Burra 54 - 5

KEYWORDS

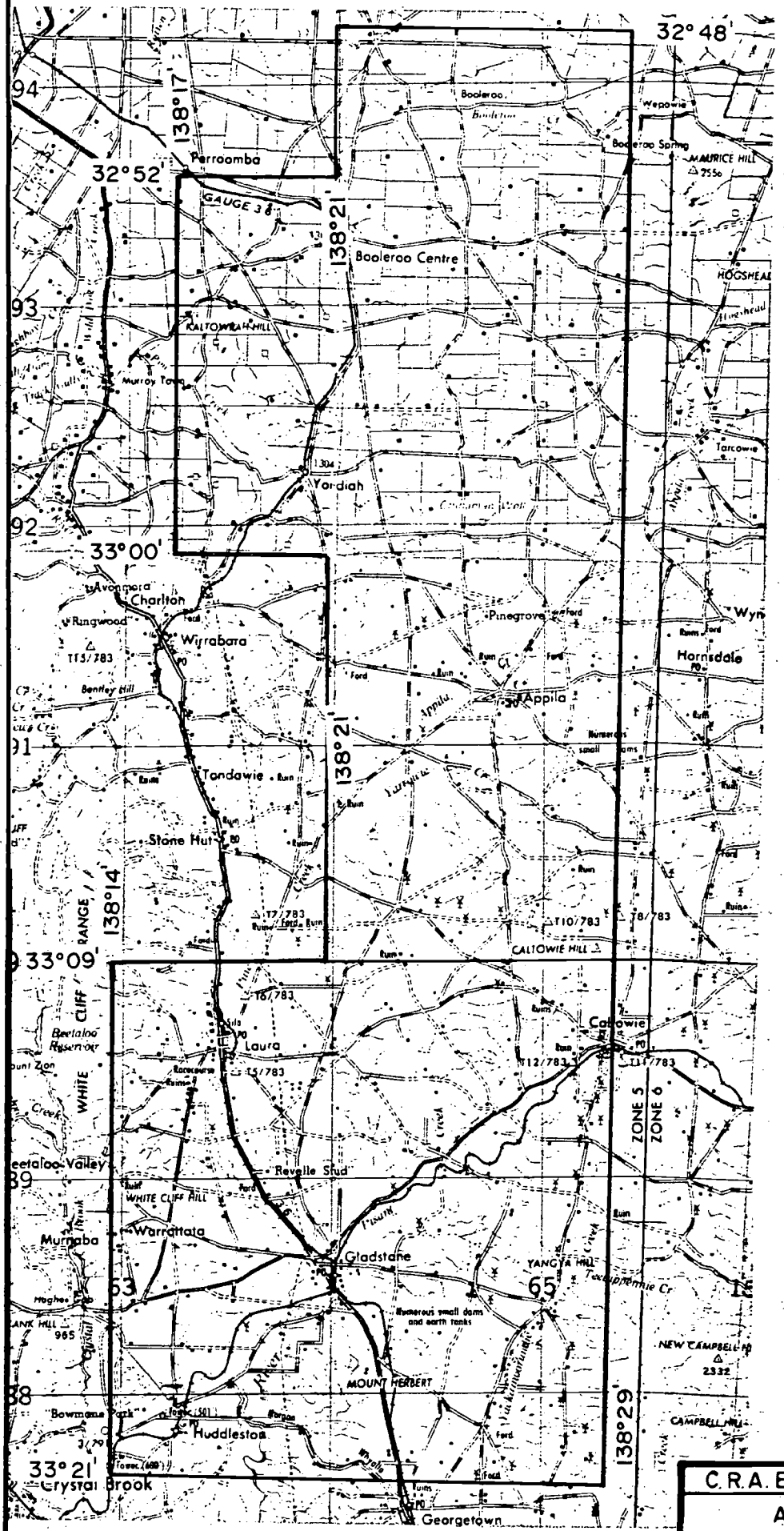
Proterozoic-Up, geochem-rock, geophys-mag

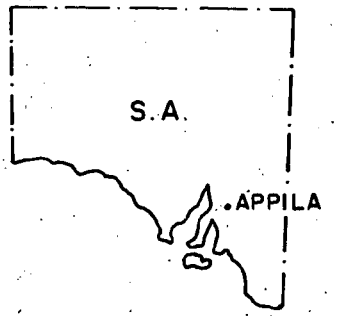
LIST OF PLANS

Plan No.	Title	Scale
SAa 218	Location Map Appila E.L. 447	1:250000
SAa 275	Geological Interpretation	1:250000
SAa 276	Aeromagnetic Anomalies and Sample Locations	1:50000

ATTACHMENTS

Geochemical Rock Chip Sample Ledgers.





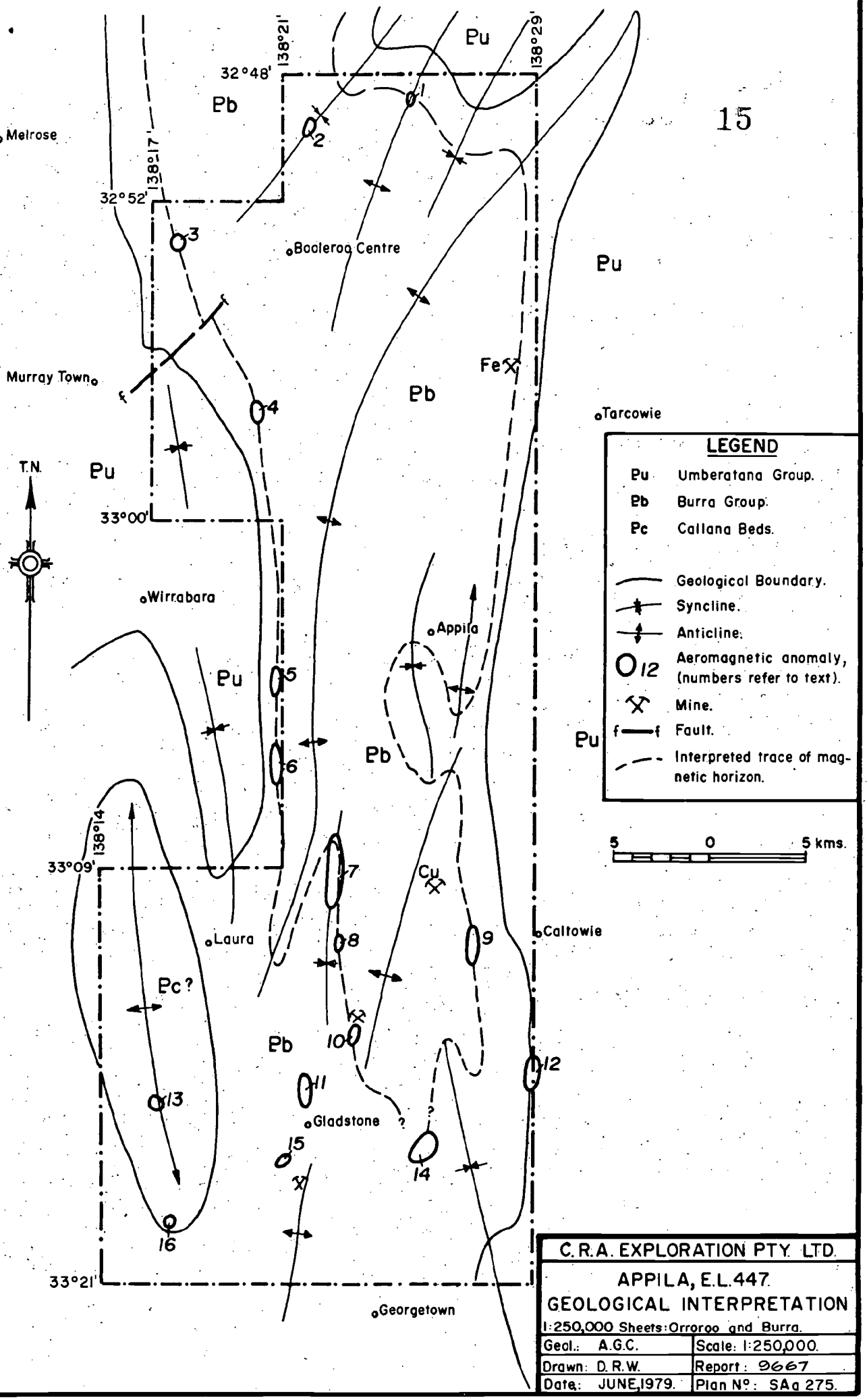
C.R.A. EXPLORATION PTY. LTD.

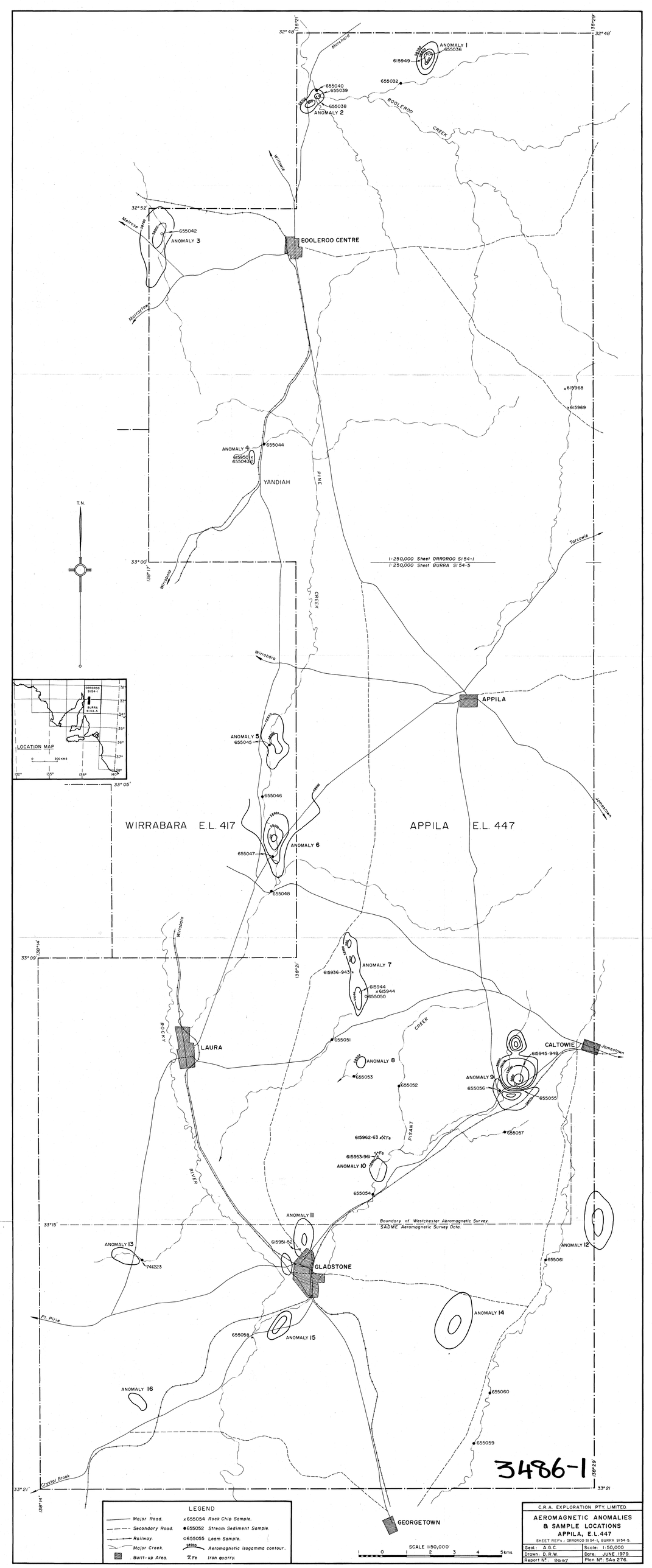
APPILA, E.L.447.

LOCATION MAP

1:250,000 Sheets: Orroroo and Burra.

Geol.: A.G.C.	Scale: 1:250,000.
Drawn: D.R.W.	Report: 9667
Date.: JUNE, 1979.	Plan No: SAa 218


Melrose
Booleroo Centre
Murray Town
Tarcowie
Wirrabara
Appila
Laura
Caltowie
Gladstone
Georgetown
32°48'
32°52'
33°00'
33°09'
33°21'
138°17'
138°21'
138°29'
138°14'
T.N.
Pu
Pb
Pc?
Pc
Fe
Cu
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
LEGEND
Pu Umberatana Group.
Pb Burra Group.
Pc Callana Beds.
Geological Boundary.
Syncline.
Anticline.
12 Aeromagnetic anomaly, (numbers refer to text).
Mine.
f—f Fault.
Interpreted trace of magnetic horizon.
5 0 5 kms.
C.R.A. EXPLORATION PTY. LTD.
APPILA, E.L.447
GEOLOGICAL INTERPRETATION
1:250,000 Sheets: Orroroo and Burra.
Geol.: A.G.C.
Scale: 1:250,000.
Drawn: D.R.W.
Report: 9667
Date: JUNE, 1979.
Plan No: SAa 275.



LEGEND

- Major Road.
- Secondary Road.
- Railway.
- Major Creek.
- Built-up Area.
- x655054 Rock Chip Sample.
- ●655052 Stream Sediment Sample.
- ○655055 Loam Sample.
- 18900 Aeromagnetic isogamma contour.
- ⚒ Fe Iron quarry.

C.R.A. EXPLORATION PTY. LIMITED

AEROMAGNETIC ANOMALIES & SAMPLE LOCATIONS APPILA, E.L. 447

SHEET REFs. ORROROO SI 54-1, BURRA SI 54-5.

Geol.: A.G.C.	Scale: 1:50,000
Drawn: D.R.W.	Date: JUNE 1979
Report N°: 96-67	Plan N°: SAo 276.

GEOCHEMICAL ROCK CHIP SAMPLING

Area / Prospect APPILA EL 447 Sample Nos.: 615936-948 Analysed by: Z.C.

Plan Reference BURRA/CRR-Rec D.P.O. No. ~~21007~~ 21010 Collected by: A.G.C. Date May 78

	Sample No	Pb	Zn	Cu	Ni	Mn	Ag			Flag ✓	Remarks
		Metal Content in p.p.m									
Anom 3	615936	300	590	500	35	5200	2			✓	Fe sil qtz c qz voids
Anom 3	615937	150	660	390	35	2600	3			✓	Fe sil qtz c voids + bxwk?
Anom 3	938	200	69	24	10	190	2			✓	Massive hem.
Anom 3	939	220	590	730	96	800	2			✓	Sil lim hem - lat?
Anom 3	940	89	115	630	74	840	2			✓	As above - c goss? voids
Anom 3	941	72	330	390	15	740	1			✓	Y-or porous earthy Fest.
Anom 3	942	81	60	200	37	300	2			✓	Massive br lim c min qz
Anom 3	943	70	72	630	51	200	2			✓	Lam Fe sil qtz c voids.
near Anom 3	944	89	82	24	33	380	1				Fg Fe slts c goss voids.
Anom 4	945	110	42	84	10	100	2				Mass red br hem - lat.
Anom 4	946	34	39	57	23	4500	1				Fe Δ - voids (lat?)
Anom 4	947	61	85	120	9	100	1				Massive - red br hem
Anom 4	948	56	410	75	23	3600	1				" metallic hem.

GEOCHEMICAL ROCK CHIP SAMPLING

17 Page No.

Area / Prospect: APPILA EL447 Sample Nos.: 615949-963 Analysed by: Z.C.

Plan Reference: BURRA/ORROROO D.P.O. No 21011 Collected by: AGC Date May 78

	Sample No	Pb	Zn	Cu	Ni	Mn	Ag	Au	Cr	Check	Remarks
		Metal Content in ppm									
Anom 7	615949	58	88	15	9	20	<1			✓	Mass red br Fe sst c̄ voids
Anom 10	950	16	31	33	13	80	2			✓	Y br earthy friable Fe st.
Anom 12	951	9	31	15	6	<10	<1			✓	Massive lam. mica slts
	952	8	20	16	11	80	<1			✓	Lam? y. br Fe st.
Anom 13	953	18	33	140	66	250	2	<.04			Lam? spec, lim rk c̄ some caliche
	954	110	260	100	72	130	3	<.04			Mass wt hem rk c̄ boxwork voids & lim.
	955	13	29	210	77	430	2	<.04			d br cellular spec, chl, lim rk
	956	21	82	200	95	90	2	<.04			cellular wt hem c̄ boxworks? rich min
	957	56	440	850	75	310	3	<.04			mass gg hem c̄ lim on jts.
	958	21	43	43	70	310	2	<.04			mass metallic wt hem c̄ voids.
	959	19	22	230	47	250	4	<.04			qz chl spec rk.
	615960	12	43	28	61	400	2	<.04			k-br cellular hem goss?
	961	13	41	210	64	130	2	<.04			as above c̄ qz + spec.
near Anom 6	962	54	94	410	57	830	2				goet, lim qz Δ - lat?
	963	19	70	300	40	650	2				lam? Fe poorly sort sst - lat?
	615968	48	191	61	47	230	4		250		Laminated alt. slts. high Si
	969	25	19	28	10	60	<1		30		friable slts c̄ voids ex py? Fe