Open File Envelope No. 8560

EL 1567, EL 1568 AND EL 1727

CARPIE PUNTHA AND PETERLUMBO

JOINT SECOND PARTIAL SURRENDER REPORT FOR THE PERIOD 14/2/89 TO 13/2/92

PLUS:

CARPIE PUNTHA AND WADDIKEE

JOINT FINAL REPORT TO LICENCES SURRENDER FOR THE PERIOD 14/2/89 TO 24/6/92

Submitted by
Aberfoyle Resources Ltd
1993

Enquiries: Customer Services
Ground Floor
101 Grenfell Street, Adelaide 5000

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

PRIMARY INDUSTRIES AND RESOURCES SA

Open File Envelope

NUMBER 8560

EL 1567 CARPIE PUNTHA
EL 1568 PETERLUMBO

TECHNICAL AND FINAL REPORTS FOR THE AREA RELINQUISHED ON 13/2/92

Submitted by

Aberfoyle Resources Ltd
1992

MINES AND ENERGY
SOUTH AUSTRALIA

Enquiries: Records Management
Mines and Energy South Australia
191 Greenhill Road, Parkside 5063
Telephone: (08) 274 7687
Facsimile: (08) 272 7597

ENVELOPE 8560

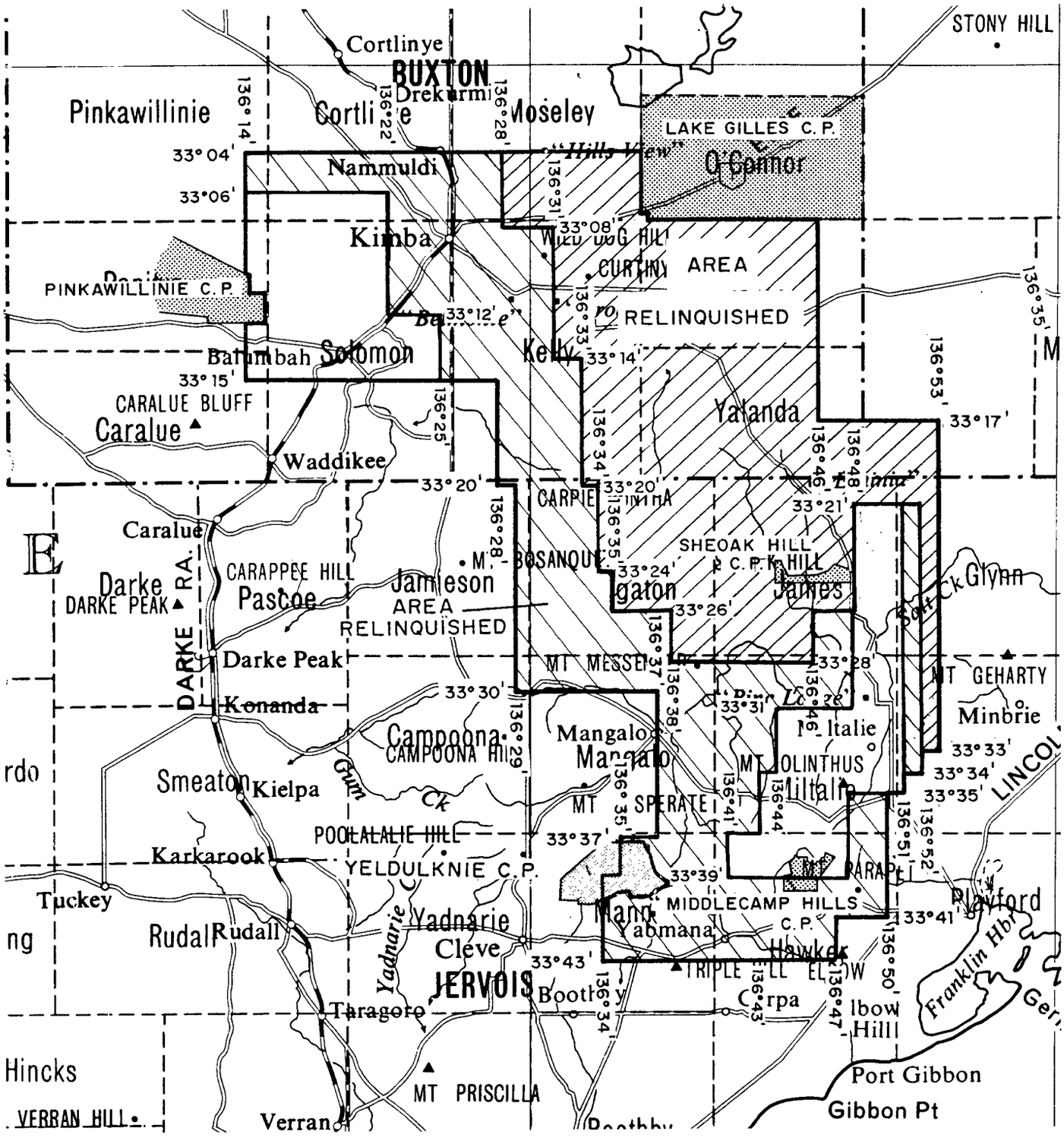
TENEMENT: EL 1567, Carpie Puntha; EL 1568, Peterlumbo

TENEMENT HOLDER: Aberfoyle Resources Ltd

CONTENTS

END OF CONTENTS

SCHEDULE A



EXPIRED

SCALE 1:500,000

KILOMETRES 10 0 10 20 30 40 50 KILOMETRES

APPLICANT: ABERFOYLE RESOURCES LIMITED

DM: 335/88

AREA: ~~2458~~ ~~1472~~ 455 square kilometres (approx.)

1:250000 PLANS: KIMBA, WHYALLA

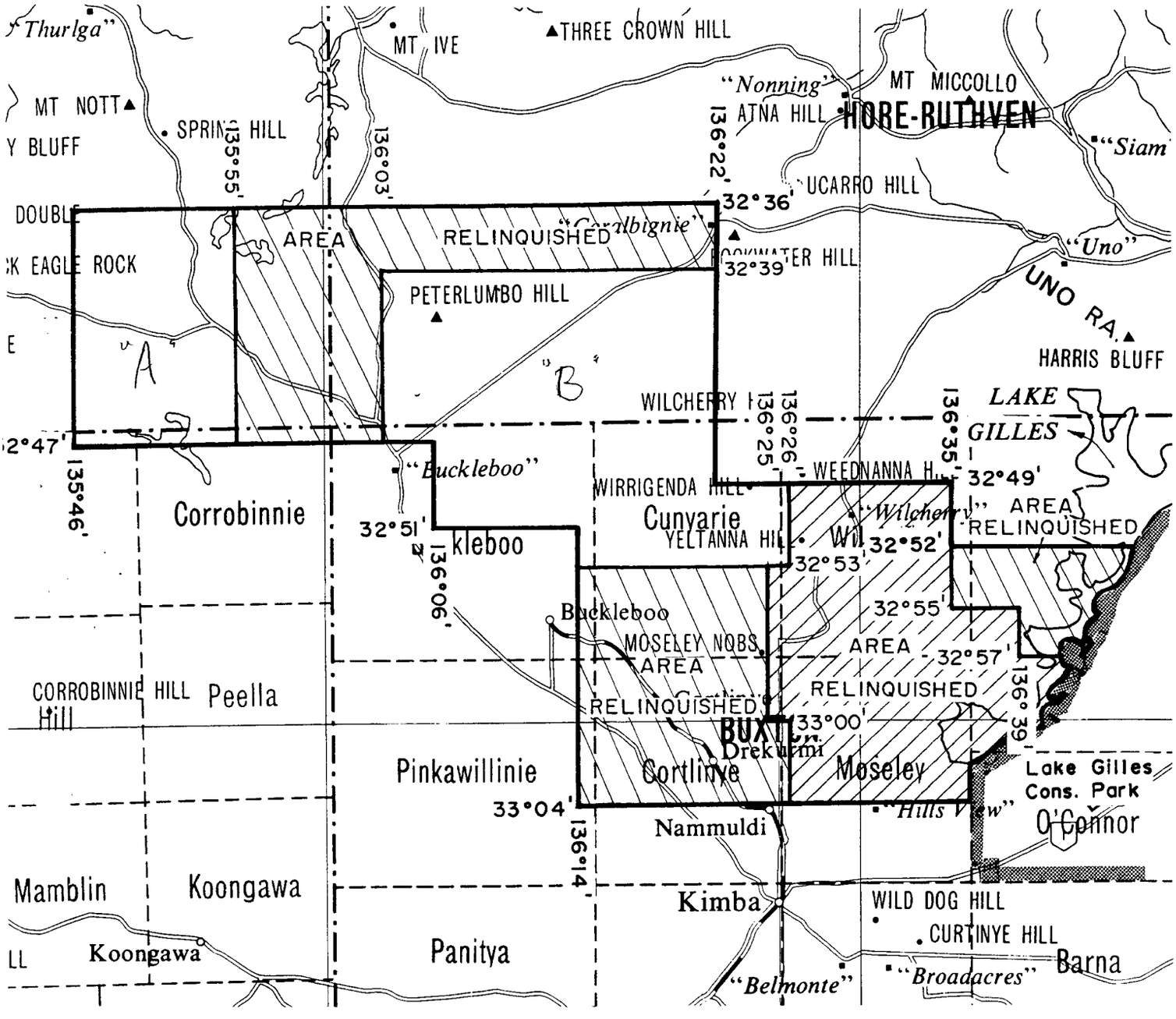
LOCALITY: "CARPIE PUNTHA" AREA - Approx. 90 km SOUTHEAST of WHYALLA

DATE GRANTED: 14-2-89

DATE EXPIRED: 13-2-~~89~~ 91 ~~91~~ 93

EL No: EL 1567

SCHEDULE A



EXPIRED

SCALE 1:500,000

KILOMETRES 10 0 10 20 30 40 50 KILOMETRES

APPLICANT: ABERFOYLE RESOURCES LIMITED

DM: 336/88

AREA: ~~1857~~ 1001 ~~2386~~ square kilometres (approx.)

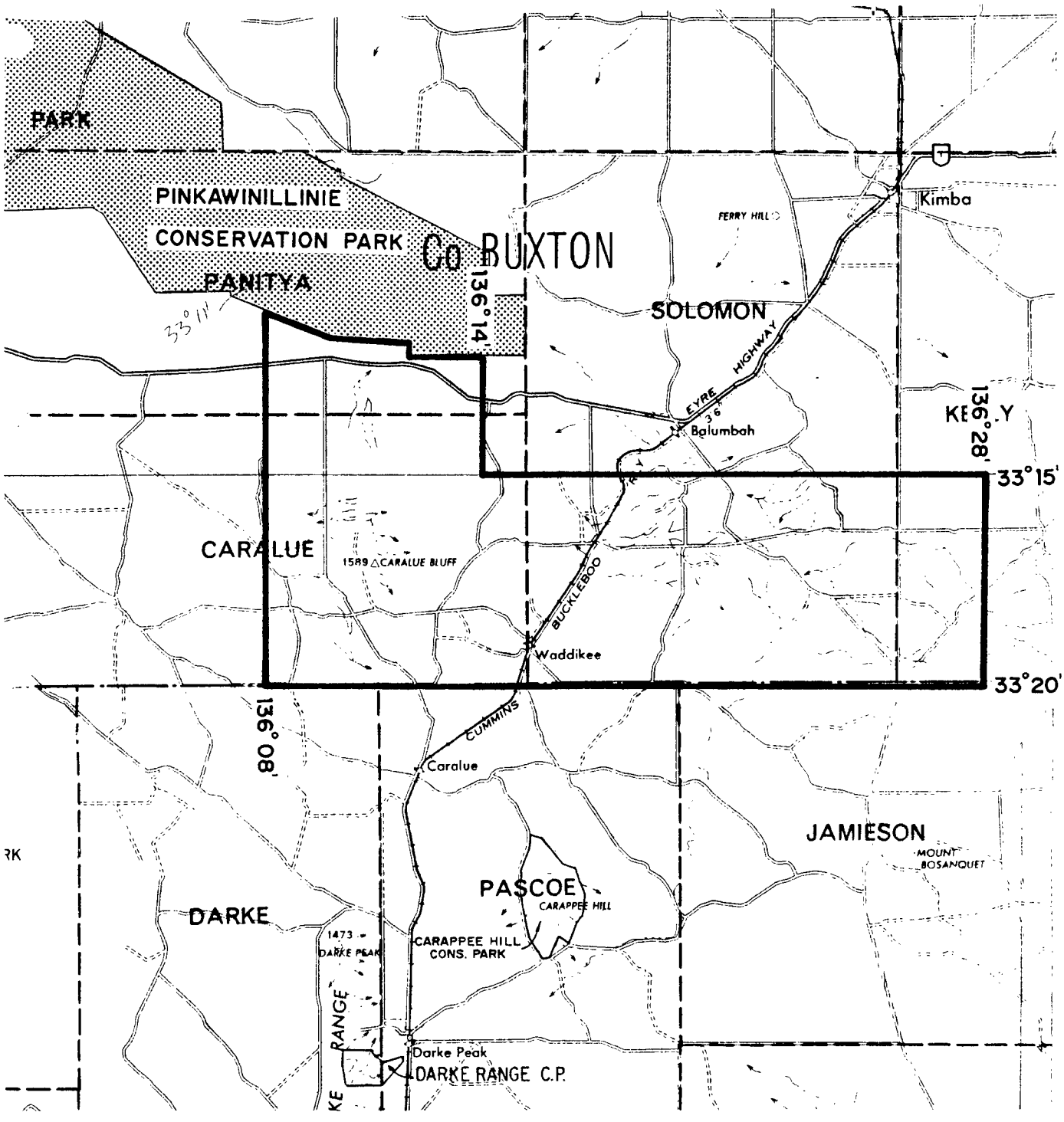
1:250000 PLANS: YARDEA, PORT AUGUSTA, KIMBA, WHYALLA

LOCALITY: PETERLUMBO AREA - approximately 90 km west of Whyalla

DATE GRANTED: 14.2.89

DATE EXPIRED: 13.2.~~90~~ ~~91~~ ~~92~~ ~~93~~ EL No: 1568

SCHEDULE A



EXPIRED

SCALE 1:250,000

KILOMETRES 5 0 5 10 15 20 25 KILOMETRES

APPLICANT: ABERFOYLE RESOURCES LIMITED

DME 64/90 AREA: 341 square kilometres (approx.)

1:250000 PLANS: KIMBA

LOCALITY: WADDIKEE AREA : Approximately 25 kilometres southwest of Kimba

DATE GRANTED: 25·6·91 DATE EXPIRED: 24·6·92 EL No: 1727

Aberfoyle Resources Limited
A.C.N. 004 664 108

Exploration Division

91 Beulah Road
Norwood
South Australia 5067
Australia

Telephone (08) 363 1636
Facsimile (08) 363 1409

00003

A B E R F O Y L E

EXPLORATION LICENCE 1567 "CARPIE PUNTHA" & 1568 "PETERLUMBO"

EYRE PENINSULA, SOUTH AUSTRALIA

TECHNICAL REPORT FOR AREAS RELINQUISHED on 13th February 1992

Distribution:

SADME	(1)
ARL Hawthorn	(1)
ARL Adelaide	(1)

Prepared By:

B P COUTTS
Geologist

Issued By:

J A ANDERSON
Regional Manager

February 1992
ARL Report No. CP5

CONTENTS

TABLES

APPENDICES

FIGURES

1. INTRODUCTION:

This report details and discusses all exploration activities undertaken by Aberfoyle Resources Limited (ARL) on recently relinquished areas within EL's 1567 "Carpie Puntha" and 1568 "Peterlumbo".

1a. Location and Tenure

EL's 1567 and 1568 are centered on the township of Kimba, located within central Eyre Peninsula, 300km northwest of Adelaide (Figure 1). Both EL's were granted to ARL on 14th February 1989, and on 13th February 1992 were renewed with areal relinquishments of 75% and 50% for EL's 1567 & 1568 respectively (Figure 2).

1b. Exploration Approach

Modern exploration of EL's 1567 & 1568 under past licences has been fully collated and assessed (Table 1 - Painter 1989; Toteff 1990; Anderson 1991). The model used for selecting and ranking potential target areas combined existing exploration data, proven exploration vectors such as aeromagnetics (Figure 3) and empirical indicators such as Landsat TM anomalies (Figure 4). Exploration indicators were objectively weighted, allowing the relative prospectivity of areas within the EL's to be assessed.

1c. Tenure Reduction

The relinquished areas shown on Figure 2 are those the above procedure indicated to be of minimal prospectivity. No field prospecting was undertaken over the relinquished portion of EL 1567, while two areas were prospected and sampled over EL 1568. Technical details from these areas is presented below.

2. THURLGA RAMP AREA:

The Thurlga Ramp area is located 65 to 70km NW of Kimba (Figure 5). Outcrop within the area is minimal, being dominated by NW trending ridges of Warrow Quartzite. Quaternary cover, silcrete, calcrete, and salt lakes between these ridges obscure Proterozoic basement. Prior exploration comprised limited rock chip sampling and RAB drilling of 5 ground magnetic traverses (Figure 6). Geochemical assays and intersected lithologies were non-prospective.

Seventeen rock chip samples were collected during 4 days surface prospecting by ARL in mid December 1991. Activity focused on magnetic structures (Figure 3) and in areas identified as being under explored. Lithologies sampled were dominated by massive Warrow Quartzite, however limonitised cavernous quartz (704017, 704018) represents carbonate veining within Warrow Quartzite (Appendix 2). Sample 704024, a magnetite bearing metaquartzite, presumably represents the style of unit responsible for the magnetic signature attributable to the Warrow Quartzite. Geochemical analyses were non-anomalous, reflecting the nature of the sample suite (Appendix 1A).

The lack of prospective outcrop and discouraging geochemistry have resulted in the relinquishment of the Thurlga Ramp area. Further, the presence of saline groundwater and the proximity of high relief GRV indicate that neither EM techniques or soil geochemistry would be applicable over the area.

3. JUNGLE DAM AREA:

The Jungle Dam area lies 35km NE of Kimba (Figure 2). Outcrop within the area is poor. Quaternary cover, silcrete and calcrete obscure the Proterozoic basement away from the Warrow Quartzite formed Botenella Hills. Prior exploration consisted of limited rock chip sampling and RAB drilling of 1 ground magnetic traverse.

Four days surface prospecting by ARL during early December 1991 collected 23 rock chip samples (Figure 8). Activity focused on sampling across magnetic trends, heavy mallee restricting movement to tracks and fence lines. Lithologies sampled were either calcrete, laterite or massive Warrow Quartzite, and geochemical analyses were non-anomalous.

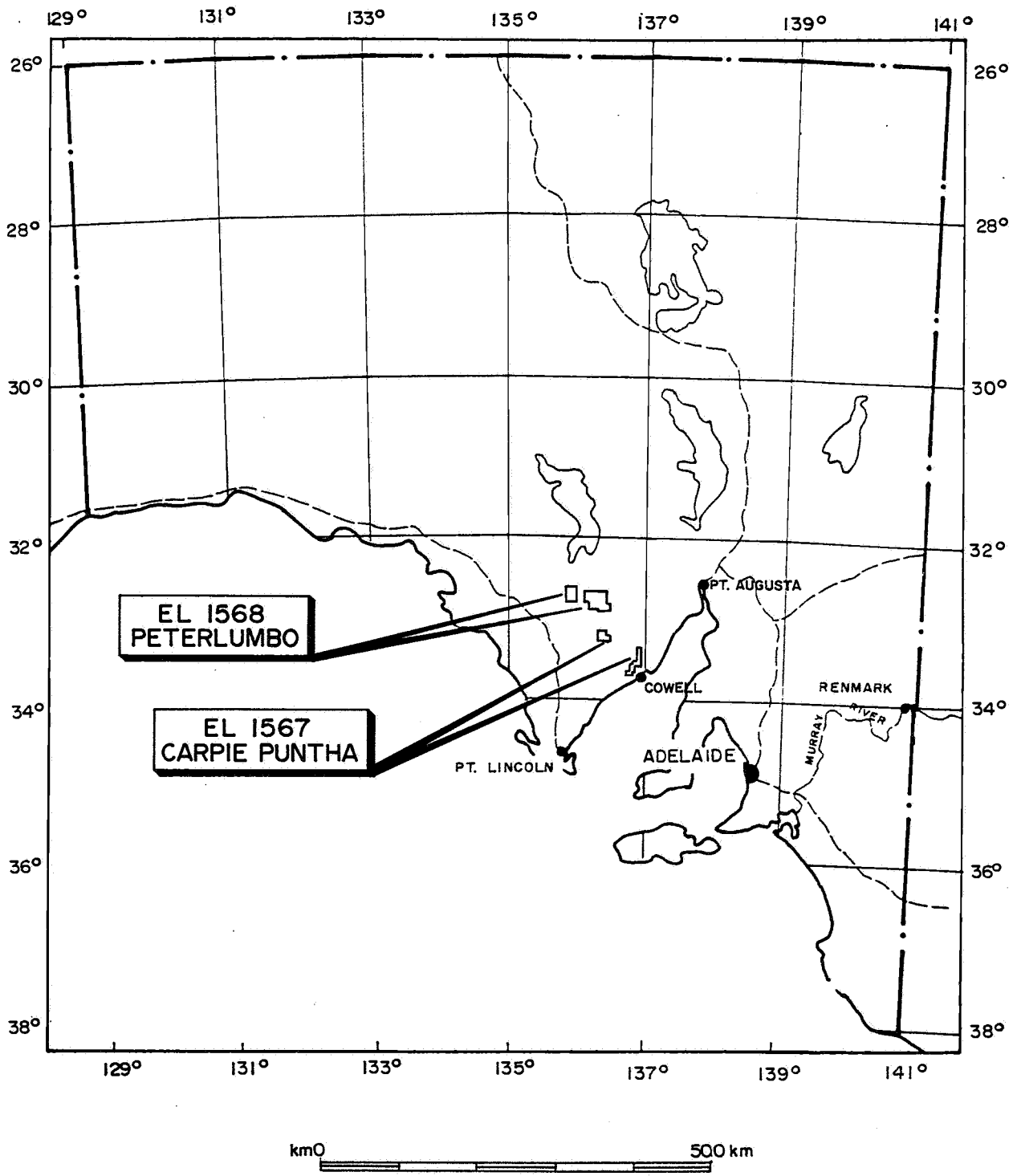
Difficulty of access to the area, lack of prospective outctop and discouraging geochemistry indicate that Jungle Dam is of minimal prospectivity. Thick accumulations of transported Warrow Quartzite and Quaternary cover render assessing the Proterozoic basement prohibitive.

4. REFERENCES:

Anderson, J.A., (1991) EL's 1567 & 1568, Report on Exploration for the Period ending 14th August 1991. ARL Report No. CP3

Painter, J.A.C., (1989) EL's 1567 & 1568, Report on Exploration for the Quarter ending 13th May 1989. ARL Report No. CP1

Toteff, S., (1990), EL's 1567 & 1568, Report on Exploration for the Period ending 14th November 1990. ARL Report No. CP2.



Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 1

REVISIONS			
Init.	Date	Init.	Date
JAAnb	9/91		
RJE	14·2·92		

SOUTH AUSTRALIA

EL 1567 CARPIE PUNTHA, EL 1568 PETERLUMBO
LOCALITY PLAN

Compiled : JACP
Drawn :
Traced : EAC
Checked :

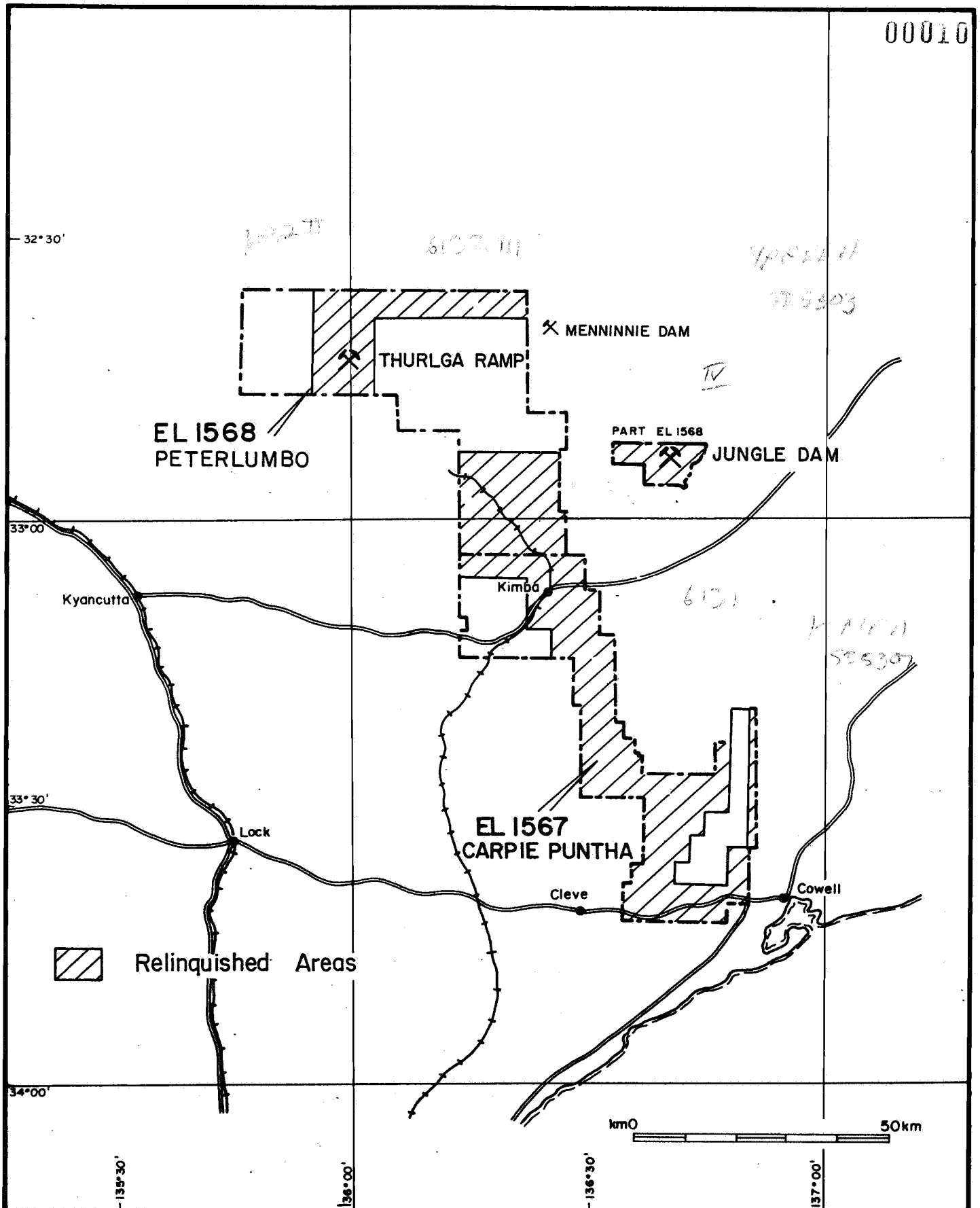
Location Code :

Scale : AS SHOWN

Date : JUNE 1989

Plate No. : EP-2

00010



Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 2

REVISIONS			
Init.	Date	Init.	Date
RJE	7·1·92		
JAA	8·1·92		

SOUTH AUSTRALIA

EL 1567 CARPIE PUNTHA & EL 1568 PETERLUMBO

RELINQUISHED AREAS, LOCATION PLAN

Compiled : BPC

Drawn :

Traced : RJE

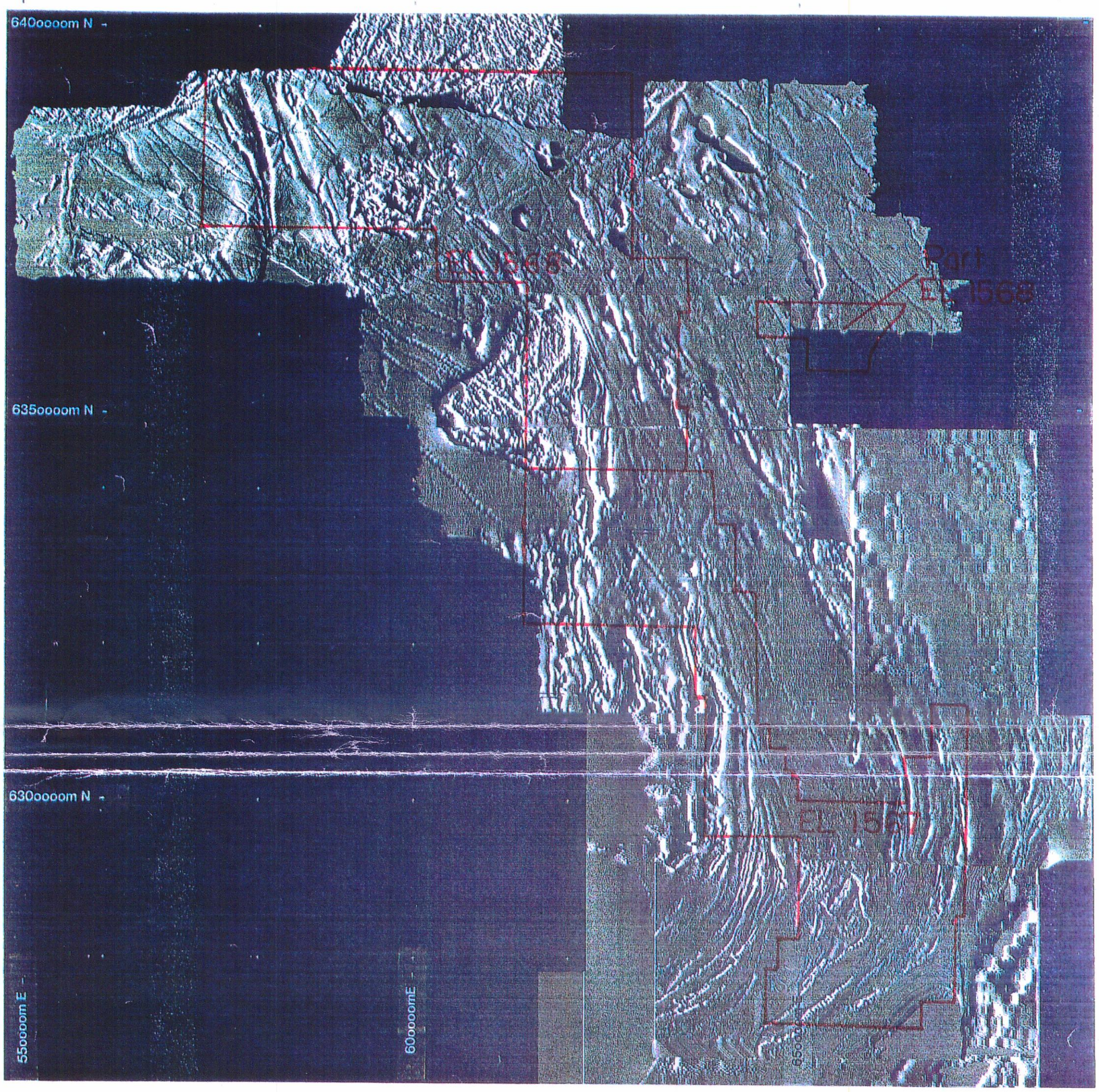
Checked :

Location Code :

Scale : AS SHOWN

Date : February, 1992

Plate No. : EPN-44



20 km

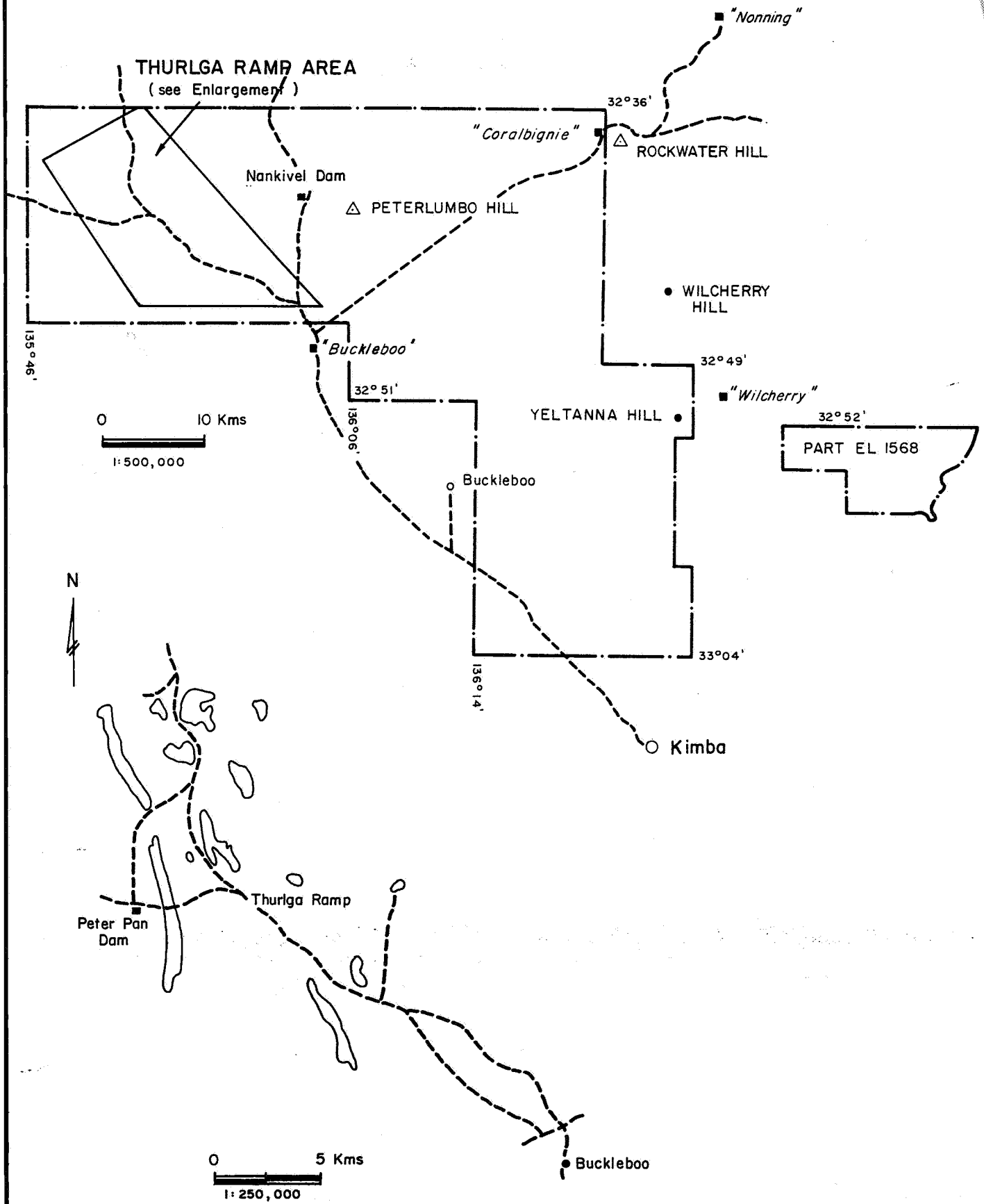
CENTRAL EYRE PENINSULA AEROMAGNETIC MOSAIC

Edge Enhancement

Computer Effects and Images Pty Ltd
Aberfoyle Resources

1990

FIGURE 3



Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 5

REVISIONS			
Init.	Date	Init.	Date
BPC rje	5·12·91		

Location Code :

SOUTH AUSTRALIA

PETERLUMBO E.L. 1568

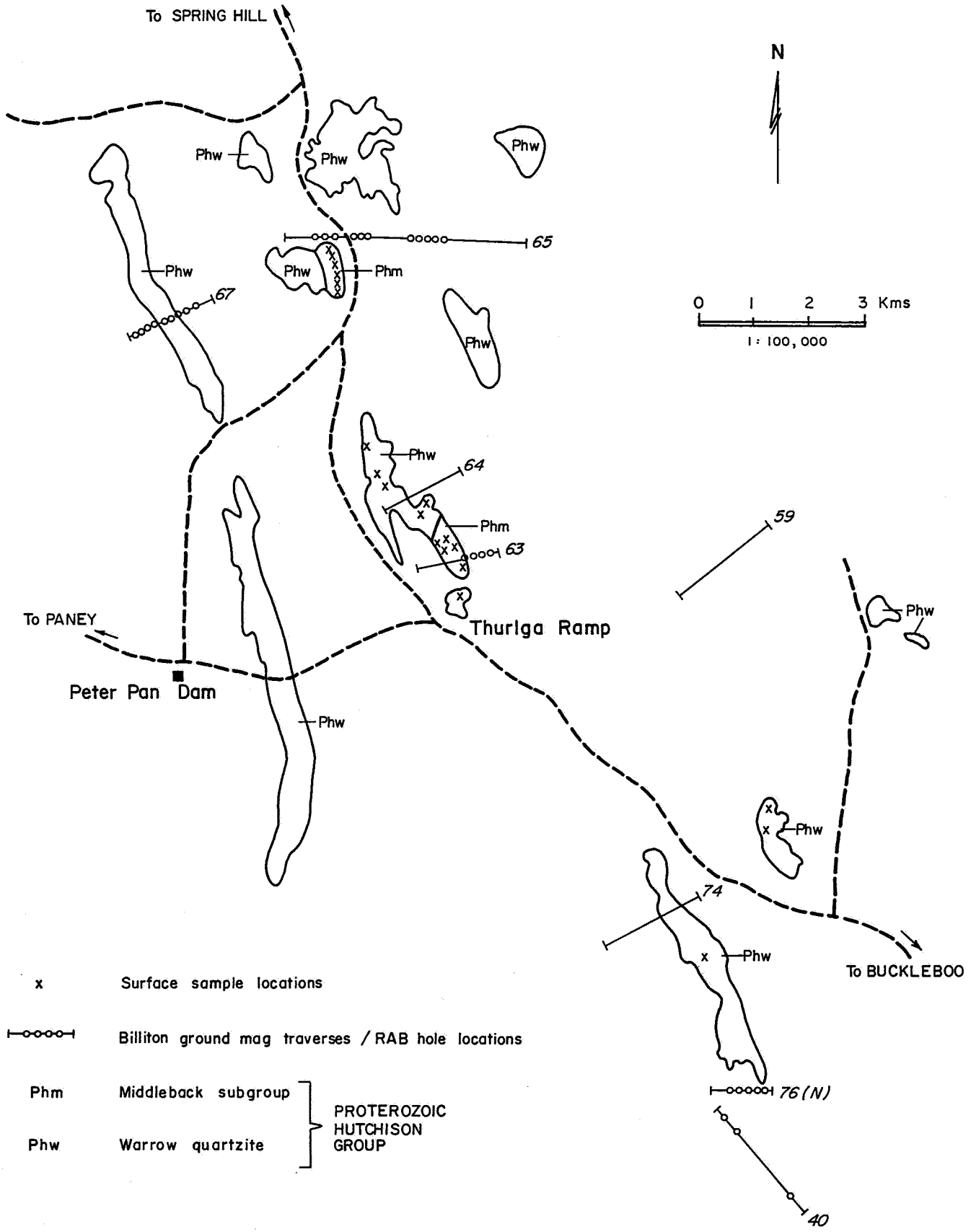
THURLGA RAMP AREA

LOCALITY PLAN

Scale : As shown

Date : December, 1991

Compiled :	BPC
Drawn :	BPC
Traced :	RJE
Checked :	BPC
Plate No. :	PET 31



Aberfoyle Resources Limited

FIGURE 6

EXPLORATION DIVISION

REVISIONS			
Init.	Date	Init.	Date

SOUTH AUSTRALIA

PETERLUMBO E.L. 1568

THURLGA RAMP AREA

PAST EXPLORATION & GEOLOGY

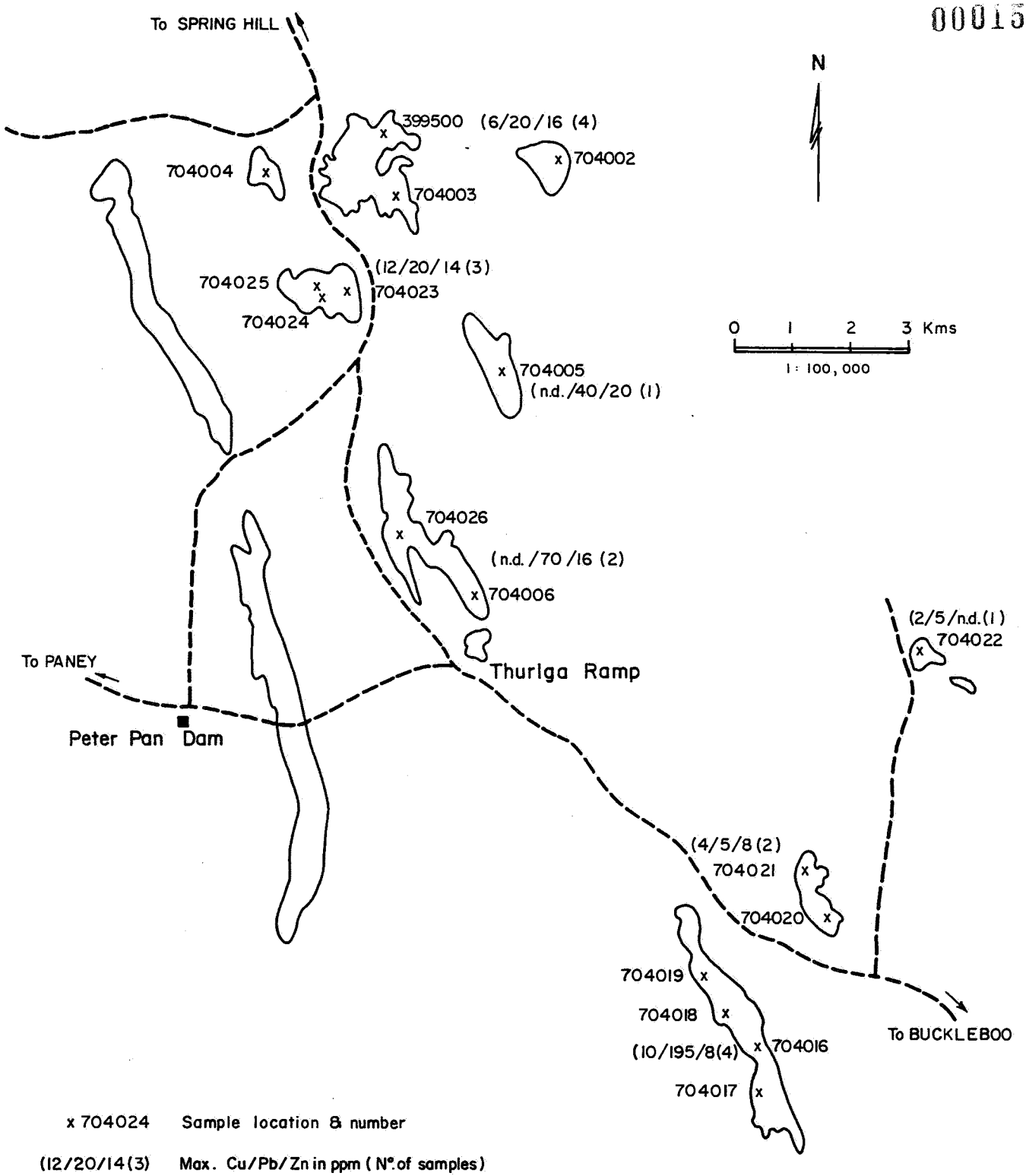
Compiled :	BPC
Drawn :	BPC
Traced :	RJE
Checked :	BPC

Location Code :

Scale : 1:100, 000

Date : December, 1991

Plate No. : PET 33

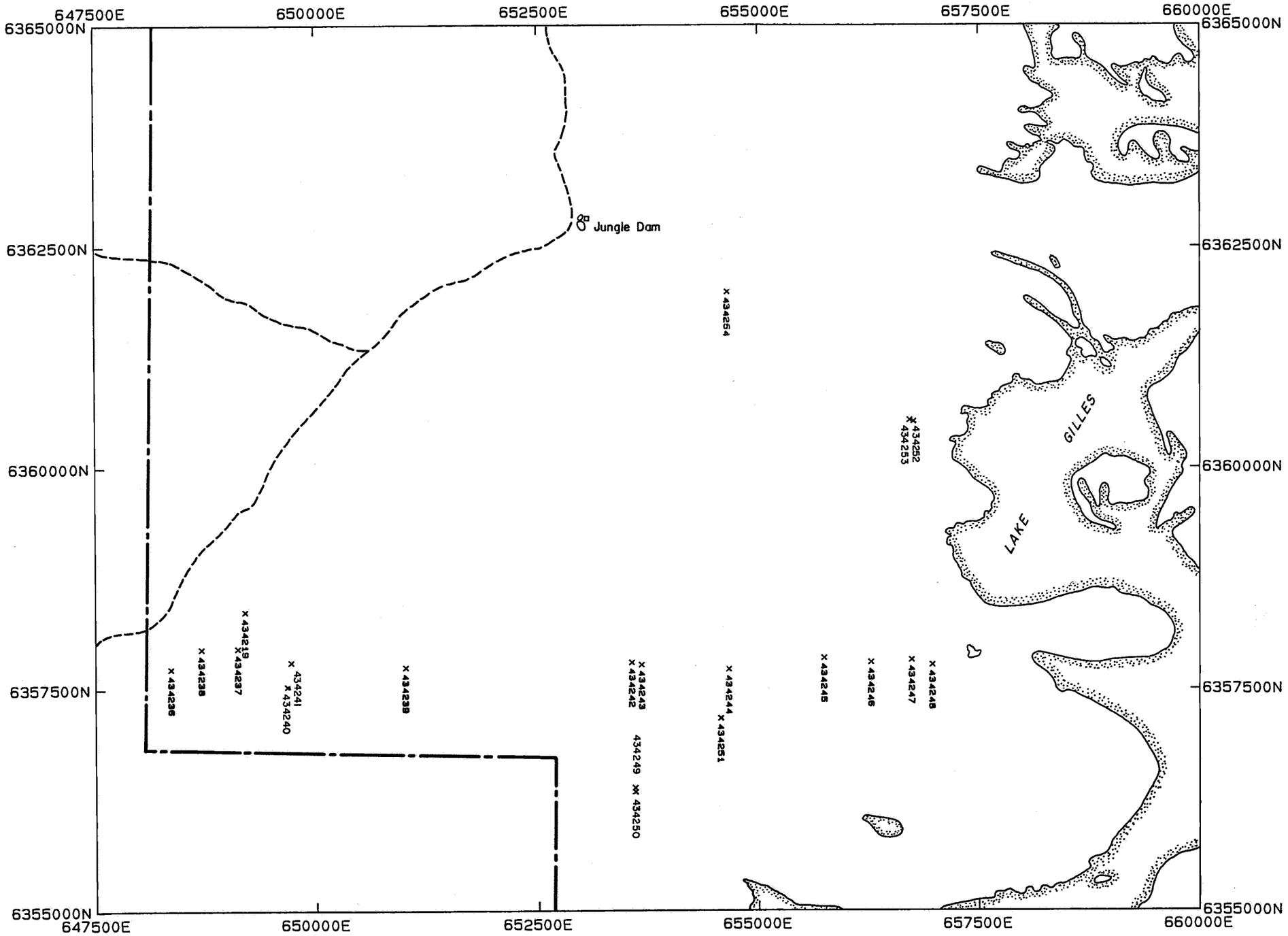


Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 7

REVISIONS				SOUTH AUSTRALIA	Compiled : BPC
Init.	Date	Init.	Date	PETERLUMBO E.L. 1568	Drawn : BPC
				THURLGA RAMP AREA	Traced : RJE
				1991 SAMPLE LOCATIONS & ASSAY RESULTS	Checked : BPC
Location Code :				Scale : 1:100, 000 / Date : December, 1991	Plate No. : PET 34



	Aberfoyle Resources Limited EXPLORATION DIVISION	FIGURE 8
REVISIONS Init. | Date | Init. | Date	SOUTH AUSTRALIA E.L. 1568 "Peterlumbo" Jungle Dam Rock Chip Sample Locations	Compiled: Drawn: Traced: Checked:
Location Code:	Scale: 1 : 50000 Date: 17/02/92	Plate No.: EPN 45

SUMMARY OF 1980-1988 EXPLORATION OF TENEMENTS PRIOR TO ELs 1567 & 1568

Central Eyre Peninsula

		Drilling				Geophysics				
		RAB		Percussion		Magnetics			Electrical	
Company	Tenement (EL/SADME Envelope No's.)	No.	Metres	No.	Metres	Airborne	No. Prospect Grids	Regional Lines No.	Sirotem (km)	No. Prospect Grids
Billiton/ WMC	Mt. Nott/Mt. Ive (1) (1158 + 1159/4267)	365	9,500	4	370	D	2	75	24	2
Billiton	Mt. Olinthus (1079/3338)					D	3	61	1	
Billiton	Sheoak Hill (1117/5075 + 5545)	63	1,400			R		51		
Billiton	Buckleboo (1115/5074)	87	2,500	1	196	D		20		
WMC	Caralue (1181/3583)	547	9,000	81	5,400	D		15	350+	11(2)
	Totals	1,062	22,400	86	5,966		5	207	375+	13
	Average Depth		21.1		69.4					

NOTE: D - Detailed low level survey flown by tenement holder.
R - Reprocessed BMR data.
(1) - Excludes work outside area of current Aberfoyle ELs 1567 and 1568
(2) - Plus trial Input and 27 line km of trial gravity.

TABLE 1

APPENDIX 1

GEOCHEMICAL ANALYSES RESULTS

1A

Thurlga Ramp Area

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.

ADELAIDE

00019

Phone (08)3365097

16 Sunbeam Road, Glynde, S.A. 5070

Fax (08) 3365564

ANALYTICAL REPORT No. 100580.35.07207

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

INVOICE TO: Mr B Coutts
Aberfoyle Resources Limited
91 Beulah Road

Norwood SA 5067

ORDER No.	PROJECT
12041	

DATE RECEIVED	RESULTS REQUIRED
27/11/91	ASAP

No. OF PAGES OF RESULTS	DATE REPORTED	No. OF COPIES	TOTAL No. OF SAMPLES
2	*03/12/91	1	32

SAMPLE NUMBERS	SAMPLE DESCRIPTION	ELEMENT/METHOD
399496/500 & others	RO Prep : OP021	Au/GG329,!Au/CHK,As/GA115,!As/CHK
399496/500 & others	RO Prep :	Cu,Pb,Zn,Ag,Cd,Mn,Fe/GA140

RESULTS TO

Mr B Coutts
Aberfoyle Resources Limited
91 Beulah Road

Norwood SA 5067

REMARKS

RESULTS TO

RESULTS TO

AUTHORISED OFFICER

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	100580.35.07207	03/12/91	12041	1 OF 2

TUBE No.	SAMPLE No.	Au	Ag	Cu	Pb	Zn	Ag	Cd	Mn	Fe
1	[redacted]									
2	[redacted]									
3	[redacted]									
4	[redacted]									
5	397500	<0.02	20	<2	5	8	<1.0	<1	15	1.75
6	704002	<0.02	40	6	20	16	<1.0	<1	30	10.94
7	704003	<0.02	10	<2	5	8	<1.0	<1	15	0.52
8	704004	<0.02	<10	4	<5	4	<1.0	<1	70	0.84
9	704005	<0.02	10	<2	40	20	<1.0	<1	55	0.72
10	704006	<0.02	20	<2	70	16	<1.0	<1	60	0.62
11	[redacted]									
12	[redacted]									
13	[redacted]									
14	[redacted]									
15	[redacted]									
16	[redacted]									
17	[redacted]									
18	[redacted]									
19	[redacted]									
20	704016	<0.02	20	8	35	6	<1.0	<1	145	0.96
21	704017	<0.02	<10	2	5	8	<1.0	<1	65	0.83
22	704018	0.02	<10	4	15	4	<1.0	<1	230	1.85
23	704019	0.02	10	10	195	6	<1.0	<1	65	0.70
24	704020	<0.02	<10	2	<5	4	<1.0	<1	60	1.44
25	704021	0.02	10	4	5	8	<1.0	<1	60	1.61

Results in ppm unless otherwise specified
T = element present, but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER D. K. Rowley

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	OLIENT ORDER No.	PAGE
	100580.35.07207	03/12/91	12041	2 OF 2

SAMPLE No.	Au	As	Cu	Pb	Zn	Ag	Cd	Mn	Fe
704022	<0.02	<10	2	5	<2	<1.0	<1	45	0.62
704023	0.02	<10	12	5	10	<1.0	<1	80	6.03
704024	<0.02	30	4	20	14	<1.0	<1	65	15.70
704025	0.02	<10	<2	15	6	<1.0	<1	45	16.20
704026	<0.02	<10	2	<5	<2	<1.0	<1	105	0.77
IC399500	0.02	<10	<2	5	6	<1.0	<1	10	1.70
IC704020	0.02	<10	4	5	2	<1.0	<1	55	1.48
ETECTION	0.02	10	2	5	2	1.0	1	5	0.01
UNITS	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	%
METHOD	66329	GA115	GA140	GA140	GA140	GA140	GA140	GA140	GA140

Results in ppm unless otherwise specified
T = element present, but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER D.K. Rowley

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.

Phone (08)3365099 | 16 Sunbeam Road, Glynde, S.A. 5070 | Fax (08) 3368864

Jungle Dam

ANALYTICAL REPORT No. 100380.35.07111

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

INVOICE TO:
Mr B Rava
Aberfoyle Resources Limited
91 Beulah Road

Norwood SA 5067

ORDER No.	PROJECT
12004	

DATE RECEIVED	RESULTS REQUIRED
07/11/91	ASAP

No. OF PAGES OF RESULTS	DATE REPORTED	No. OF COPIES
3	19/11/91	1

TOTAL No. OF SAMPLES: 33

SAMPLE NUMBERS	SAMPLE DESCRIPTION	ELEMENT/METHOD
434201/21,0C434220	ro Prep : 0P021,S9900	Cu,Pb,Zn,Ag,Mn/GA140
<695 & others	ro Prep :	Pb/GI223

RECEIVED
20 NOV 1991

REMARKS

RESULTS TO
Mr B Rava
Aberfoyle Resources Limited
91 Beulah Road

Norwood SA 5067

RESULTS TO

RESULTS TO

AUTHORISED OFFICER

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	100580.35.07111	19/11/91	12004	1 OF 1

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Ag	Mn				
1	[redacted]									
2	[redacted]									
3	[redacted]									
4	[redacted]									
5	[redacted]									
6	[redacted]									
7	[redacted]									
8	[redacted]									
9	[redacted]									
10	[redacted]									
11	434211	8	5	18	<1.0	160				
12	434212	250	45	554	<1.0	3850				
13	[redacted]									
14	[redacted]									
15	[redacted]									
16	[redacted]									
17	[redacted]									
18	[redacted]									
19	434219	14	25	86	<1.0	645				
20	[redacted]									
21	[redacted]									
22	QC434220	4	20	4	<1.0	120				
23	DETECTION	2	5	2	1.0	5				
24	UNITS	PPM	PPM	PPM	PPM	PPM				
25	METHOD	GA140	GA140	GA140	GA140	GA140				

Results in ppm unless otherwise specified
T = element present, but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER A. J. Branson

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.

[redacted] + JUNGLE
ROCK CHIP
Jungle Dan

Phone (08) 3365099 | 16 Sunbeam Road, Glynde, S.A. 5070 | Fax (08) 3365864

ANALYTICAL REPORT No. 100580.35.07146

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

INVOICE TO: Mr B Rava
Aberfoyle Resources Limited
91 Beulah Road
Norwood SA 5067

ORDER No.	PROJECT
13027	

DATE RECEIVED	RESULTS REQUIRED
15/11/91	ASAP

No. OF PAGES OF RESULTS	DATE REPORTED	No. OF COPIES	TOTAL No. OF SAMPLES
2	21/11/91	1	32

SAMPLE NUMBERS	SAMPLE DESCRIPTION	ELEMENT/METHOD
434224/54,OG434240	ro Prep : OP021,S9900	Cu,Pb,Zn,Ag,Mn/GA140

RESULTS TO: Mr B Rava
Aberfoyle Resources Limited
91 Beulah Road
Norwood SA 5067

RESULTS TO:

RESULTS TO:

REMARKS

RECEIVED
22 NOV 1991

AUTHORISED OFFICER

DOENELLA + JUNXLE
ROCK CHIP

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	100280.35.07166	21/11/92	12027	1 OF 1

TUBE No.	SAMPLE No.	Mn	Cu	Zn	Ag	Pb				
1	[redacted]									
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13	434236	170	6	8	<1.0	35				
14	434237	370	34	80	<1.0	110				
15	434238	65	4	8	<1.0	10				
16	434239	205	6	10	<1.0	60				
17	434240	30	4	8	<1.0	25				
18	434241	75	16	16	<1.0	65				
19	434242	150	100	170	<1.0	60				
20	434243	70	14	20	<1.0	20				
21	434244	90	6	2	<1.0	5				
22	434245	305	18	18	<1.0	70				
23	434246	60	4	4	<1.0	5				
24	434247	115	4	22	<1.0	<5				
25	434248	325	2	30	<1.0	<5				

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER A.J. Bronson

00027

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

LUTENELLA + JUNGLE ROCK CHIP

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	100560.35.07166	21/11/91	12027	2 OF 2

TUBE No.	SAMPLE No.	Mn	Cu	Zn	Ag	Pb				
1	434249	695	12	26	<1.0	20				
2	434250	75	6	6	<1.0	25				
3	434251	70	4	20	<1.0	5				
4	434252	175	122	102	<1.0	45				
5	434253	55	36	18	<1.0	10				
6	434254	1870	22	72	1.0	135				
7	QC434240	40	4	6	<1.0	30				
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	5	2	2	1.0	5				
24	UNITS	PPM	PPM	PPM	PPM	PPM				
25	METHOD	GA140	GA140	GA140	GA140	GA140				

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER A.J. Branson

APPENDIX 2

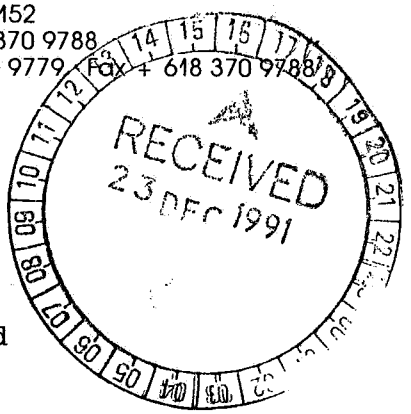
PETROLOGY REPORT, THURLGA RAMP AREA

Peterlumbo / Nankivel - Thurlga

00029

Central Mineralogical Services

8 Bradshaw Avenue, Crafers, S.A. 5152
Telephone (08) 370 9779 Fax (08) 370 9788
International: Telephone + 618 370 9779 Fax + 618 370 9788



Mr. B.P. Coutts
Aberfoyle Resources Limited
91 Beulah Road
NORWOOD SA 5067

19th December, 1991

REPORT CMS 91/11/15

YOUR REFERENCE:	Order No.12042
DATE RECEIVED:	26th November, 1991
SAMPLE NOS:	As listed in Report
SUBMITTED BY:	Mr. B.P. Coutts
WORK REQUESTED:	Petrographic Examination

H.W. Fander, M.Sc.

Sisters Dam

SAMPLE NO.: 704017

CLASSIFICATION: Cavernous Vein Quartz.

COMPOSITION: Coarse interlocking plates, and random prismatic crystals of quartz with many small fluid inclusions. Zones of weakly limonite-lined voids.

FABRIC: Typical vein quartz material. Shapes of voids suggest a leached carbonate, perhaps ankerite.

MINOR MINERALS:

None detected.

INTERPRETATION/ COMMENTS: Quartz-carbonate (?ankerite) vein material. No evidence of sulphides.

SAMPLE NO.: 70418

Sisters Dam

CLASSIFICATION: Cavernous Vein Quartz.

COMPOSITION: Coarse platy and prismatic quartz patches, and areas of finer matted quartz crystals.

FABRIC: Characteristic vein quartz fabric. Areas of voids with cellular textures derived from leaching/silicification of a carbonate.

MINOR MINERALS: Thin limonitic coatings in voids.

INTERPRETATION/ COMMENTS: Very similar to 70417. No evidence of sulphides. Represents leach quartz-carbonate vein material.

Thurlga Ramp.

SAMPLE NO.: 704024

CLASSIFICATION: Magnetite-Hematite Metaquartzite.

COMPOSITION: Coarse interlocking quartz plates, generally elongate with crude parallel orientation. Bands of coarsely-crystalline euhedral martitised magnetite and platy hematite.

FABRIC: No relict textures. Present coarse fabric has rough but definite preferred orientation and compositional banding.

MINOR MINERALS: Isolated grains of detrital heavy minerals (zircon, tourmaline). Crosscutting carbonate veinlets. Trace muscovite.

INTERPRETATION/
COMMENTS: Featureless rock of simple composition. Detrital heavies suggest a clastic rather than chemical origin. Fe oxides were probably primary.

SAMPLE NO.:

CLASSIFICATION:

COMPOSITION:

FABRIC:

MINOR MINERALS:

INTERPRETATION/
COMMENTS:

Aberfoyle Resources Limited
A.C.N. 004 664 108

Exploration Division

91 Beulah Road
Norwood
South Australia 5067
Australia

Telephone (08) 363 1636
Facsimile (08) 363 1409

A B E R F O Y L E

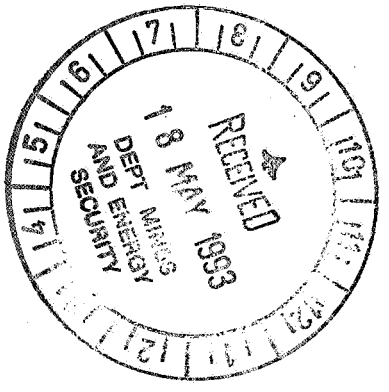
EXPLORATION LICENCES 1567 "CARPIE PUNTHA" & 1727 "WADDIKEE"

EYRE PENINSULA, SOUTH AUSTRALIA

FINAL REPORT FOLLOWING RELINQUISHMENTS on 13th February 1993 & 25th June 1992

Distribution:

SADME	(2)
ARL Hawthorn	(1)
ARL Adelaide	(1)



Prepared By:

J A ANDERSON
Regional Exploration Manager

May 1993

ARL Report No. CP 7

CONTENTS

TABLES

FIGURES
(in text)

PLATES
(in sleeves)

APPENDICES

1. SUMMARY

Aberfoyle Resources Limited sought stratiform zinc-lead targets in the Carpie Puntha and Waddikee areas during 1989 to 1992.

After compilation and interpretation of aeromagnetic, Landsat and past exploration data, the areas worthy of attention were reduced to the Mount Olinthus-Miltalie North trend NE of Cleve, the Bunora magnetic trend SW of Kimba and a secondary graphite target in the Balumbah area also SW of Kimba.

Reconnaissance prospecting failed to gain geochemical encouragement in the Bunora and Miltalie North areas. Lead isotopes characterised the scattered Pb (+/- Cu U) sulphide mineralisation in the Mt Olinthus area as unlikely to be stratiform nor prospective. Blanket airborne EM coverage or RAB drilling of the covered extensions to these marginally prospective areas was rejected as unlikely to be cost effective in comparison with more successful projects elsewhere on Eyre Peninsula.

Although a large zone of graphite mineralisation was tentatively identified at Balumbah, further evaluation was considered commercially inappropriate.

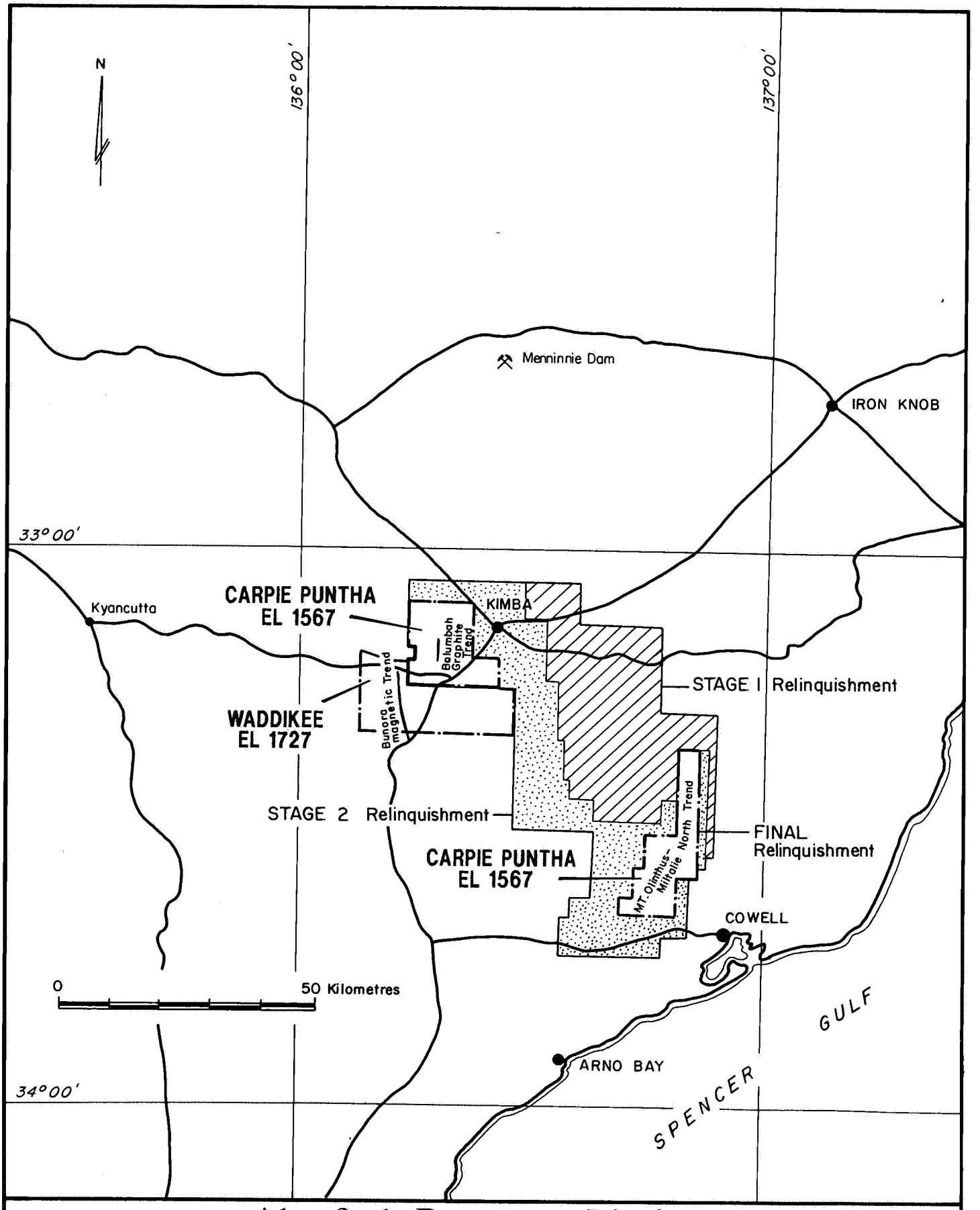
The relevant Exploration Licences 1567 and 1727 were relinquished in 1992-3.

2. INTRODUCTION

This final report completes description of regional exploration for stratiform zinc-lead deposits under Exploration Licences 1567 "Carpie Puntha" and 1727 "Waddikee". It supplements and is to be read in conjunction with ARL Report No. CP3 dated 13th September 1991.

EL 1567 was granted on 14th February 1989 for an area of 2458 sq.km (Figure 1). The area was reduced to 1585 sq.km on 20th April 1991 then to 455 sq.km on 13th February 1992. The licence expired on 13th February 1993. Total expenditure under the licence for the four years of tenure was $169,044.76. Expenditure for the last six months of tenure was - $148.11 due to accounting adjustments as shown on the attached expenditure statement (Table 1).

EL 1727 was granted on 25th June 1991 for an area of 341 sq.km. The licence expired on 24th June 1992. Total expenditure was $5,104.11 during the one year of tenure of which $2,194.69 was spent during the last six months (Table 2).



Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 1

REVISIONS			
Init.	Date	Init.	Date

Location Code :

SOUTH AUSTRALIA

EYRE PENINSULA

CARPIE PUNTHA EL1567-WADDIKEE EL1727

LOCALITY PLAN

Scale : 1:1,000,000

Date : March, 1993

Compiled : RJE

Drawn :

Traced : RJE

Checked :

Plate No. : **EPN 62**

TABLE 1

EXPLORATION LICENCE 1567 "CARPIE PUNTHA"

SUMMARY OF EXPENDITURE
FOR THE SIX MONTHS
ended 13th February 1993

GEOLOGY	<$1,057.59>
GEOCHEMISTRY	< 53.73>
TENURE	735.54
OTHER SERVICES	67.50
INDIRECT COSTS	60.17
TOTAL COSTS	<$ 144.11>

T A B L E 2

EXPLORATION LICENCE 1727 "WADDIKEE"

SUMMARY OF EXPENDITURE
FOR THE SIX MONTHS
ended 25th June 1992

GEOLOGY	$1,576.53
OTHER SERVICES	391.12
INDIRECT COSTS	227.04
TOTAL COSTS	$2,194.69

3. REGIONAL GEOLOGY (Summarised from Parker et al., 1988)

The Eyre Peninsula forms the southern part of the Gawler Craton which is composed of Late Archaean to Early Proterozoic gneisses, granites and metasediments, and a variety of Middle Proterozoic sediments, volcanics and granites (Plate 1). The block was cratonised at about 1450 m.y.

The Late Archaean - Early Proterozoic basement Sleaford Complex is typified in the southern peninsula, however scattered inliers also occur across the central region.

In the Cowell district a variably migmatised granodioritic suite defined as the Miltalie Gneiss, pre-dates the Hutchison Group, but is considered to be somewhat younger than the Sleaford Complex.

The Hutchison Group is the dominant and most widespread element of the Early Proterozoic. It is a mixed clastic and chemical metasedimentary sequence. The base Warrow Quartzite is succeeded by interbedded carbonates, iron formations and clastics making up the Middleback Subgroup, and an upper psammopelitic formation named the Yadnarie Schist.

Acid volcanics are not known in the central and southern parts of Eyre Peninsula, however sequences of rhyolites and rhyodacites (Myola Volcanics) associated with amphibolites and metasediments (Broadview Schist) represents the later Early Proterozoic to the east of the Middleback Ranges.

Somewhat younger acid volcanics and basaltic lavas (McGregor Volcanics) and coarse clastics (Moonabie Formation) occur to the south of these.

Middle Proterozoic rocks are most extensive at the north of the Peninsula where a great expanse of the Gawler Range Volcanics overlaps scattered outcrop areas of Hutchison Group and various granitoids, and locally interfingers with the Corunna Conglomerate.

South of the Gawler Range Volcanics, some 50% or more of Eyre Peninsula is blanketed with Quaternary cover.

The Late Archaean-Early Proterozoic rocks of Eyre Peninsula are multiply deformed and the structure is complex. They have suffered two major periods of deformation, metamorphism and plutonism. The later Kimban Orogeny which affected the Hutchison Group is dated at around 1850 - 1700 m.y.

Three main events are defined in the central region:

- an early high grade metamorphic event
- a high grade deformational/metamorphic event with tight isoclinal folding and possible thrusting
- a lower grade open fold event with associated major mylonite zones.

There is evidence for still later tectonism in the form of cross-folding, fracturing and the development of major lineaments and shear zones.

A complex plutonic history has long been recognised on Eyre Peninsula, and is most diverse and discriminated in the south. In the north-eastern and central parts, five main suites of granites and granitic gneisses have been defined:

- an ancient gneissic suite
- three syn-tectonic suites related to the Kimban Orogeny
- a post-tectonic suite considered part of the Hiltaba Suite of the Gawler Ranges.

4. BASE METALS MINERALISATION AND POTENTIAL

Numerous small base metal deposits were discovered on Eyre Peninsula in the period 1870-1920 and were mined in shallow workings on high-grade secondary copper or silver-lead (-zinc) ore.

Virtually all of the lead and zinc mineralisation is hosted in Hutchison Group rocks, in the Early Proterozoic fold belt of the north-eastern to southern sectors of the Peninsula. The majority of mines are located in or close to calc-silicates or serpentine marbles, the former being a basal unit of the Hutchison Group notably in the Mount Olinthus district, and the latter, part of the Katunga Dolomite equivalent at the base of the Middleback Subgroup.

There are stratigraphic, structural and metamorphic analogies with the Willyama Supergroup which hosts the Broken Hill lead-zinc-silver deposits (Glenn et al., 1977), but the abundance of known economic mineralisation is much less on Eyre Peninsula. There is also a significant age difference, that of Hutchison sedimentation being 1950 - 1850 m.y., while 1670 m.y. is widely accepted for the Willyama Supergroup.

Billiton's discovery of stratiform Zn-Pb Ag deposits at Menninnie Dam (Higgins et al. 1990) greatly improved the perceived potential for stratiform ore on Eyre Peninsula. The host rocks include marbles, calc-silicates and amphibolitic or oxide iron formations which were metamorphosed to upper amphibolite grade during the Kimban Orogeny.

Elsewhere on Eyre Peninsula, evidence of stratiform lead-zinc mineralisation is sparse, the more likely signs being in stratabound and veined occurrences in the Mount Olinthus area north-west of Cowell. The reasonably good rock exposure there contrasts with the widely scattered outcrop on central and northern Eyre Peninsula where an overburden thickness of 20 to 100 metres is usual.

The South Australian Department of Mines & Energy drilled three holes in 1990 at the Miltalie mine (located within Aberfoyle's former EL 1567) in which some disseminated zinc, lead and iron sulphides in carbonate-rich metasediments were reported (Cowley and Parker, 1991).

Regional exploration potential was recognised in these widely mineralised, conceptually attractive, and generally, under-explored rocks.

The target stratigraphy is the Middleback Subgroup, representing the chemical sediment-dominated pivotal phase of the intracratonic Hutchison Group rift sequence.

5. ABERFOYLE'S EXPLORATION APPROACH

Aberfoyle's presence on the Eyre Peninsula is bound to the search for and discovery of a large tonneage stratiform or stratabound Zn-Pb-Ag deposit.

The opportunity was seen in the regional potential for the lower Proterozoic meta-sedimentary pile to host these ore bodies, with geological analogies to other Early-Mid Proterozoic meta sedimentary belts. The Menninnie Dam discovery has been an encouraging exploration development in the past decade.

Eyre Peninsula is considered to be under-explored for this type of deposit. Much of the past effort has relied on surface geochemistry and scout drilling aimed at the higher amplitude segments of magnetic Middleback Subgroup. Moving-loop Sirotem has been used frequently as a targeting technique, but often in areas of deep leaching where its effectiveness can be dubious.

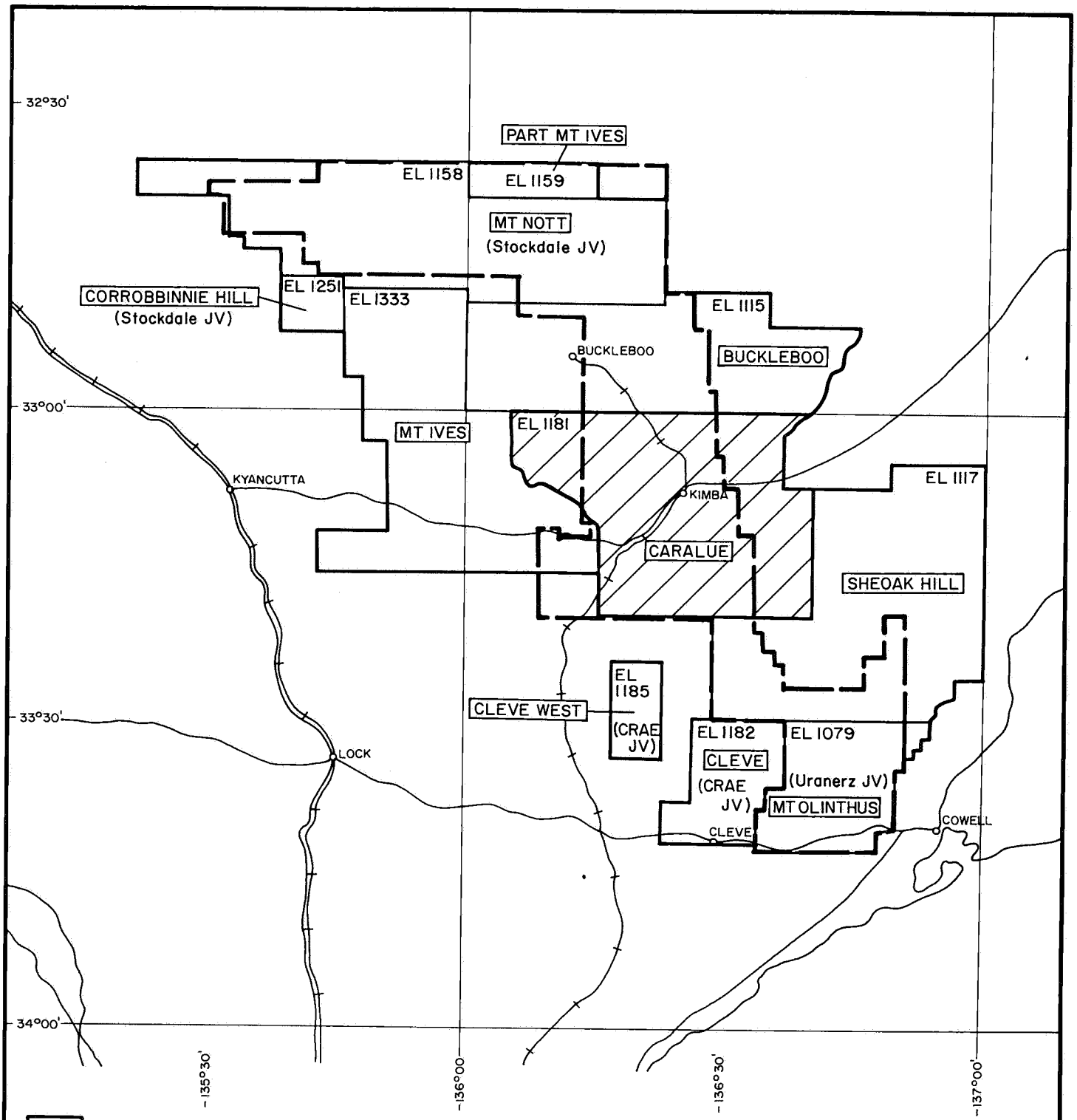
Modern exploration under past licences (Figure 2) was collated then assessed during the first year of tenure and is summarised on Table 3. It was evident in places that this reconnaissance-style approach had not tested the regional potential.

The challenge was to select and reduce favourable target areas to manageable sizes enabling detailed target definition initially by outcrop and float prospecting and lead isotope discrimination. These were to determine if follow-up was warranted and whether surface geochemistry or EM can be preferably and more cheaply used with the required effectiveness.

The criteria for selecting and ranking potential target areas was as follows:-

- delineate the probable subcropping extent of the prospective Middleback Subgroup
- locate all geochemical anomalies over the Middleback Subgroup from past exploration work
- characterise as many geochemical anomalies and galena occurrences with field observations and lead isotopic analyses as possible
- seek regional facies changes indicative of chemical or exhalative sub-basins
- establish a pre-orogenic tectonic-basin model to nominate permissive lineaments ("growth faults") as loci for sulphide basin development
- seek more emphirical indicators such as Landsat TM anomalies and magnetic "breaks" (ie. changes in magnetic intensity along magnetic stratigraphic trends)
- combine and weigh all the resulting ingredients to rank the potential target areas, selecting the best for evaluation of past exploration coverage, field prospecting and infill surface geochemistry with further characterisation by lead isotopes.

This was completed over 2 1/2 years with the results described in the following sections. There were substantial delays in acquiring data, especially data tapes of appropriate quality and format for reprocessing the required images.



Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 2

REVISIONS			
Init.	Date	Init.	Date

Location Code : SI53

SOUTH AUSTRALIA

EYRE PENINSULA

EXPIRED BILLITON & WMC TENURE

Scale : 1:1000 000

Date : 1st MARCH 1991

Compiled : JAA

Drawn : EAC

Traced : EAA

Checked :

Plate No. : EPN-36

1511

SUMMARY OF 1980-1988 EXPLORATION OF TENEMENTS PRIOR TO ELs 1567 & 1568

Central Eyre Peninsula

		Drilling				Geophysics				
		RAB		Percussion		Magnetics			Electrical	
Company	Tenement (EL/SADME Envelope No's.)	No.	Metres	No.	Metres	Airborne	No. Prospect Grids	Regional Lines No.	Sirotem (km)	No. Prospect Grids
Billiton/ WMC	Mt. Nott/Mt. Ive (1) (1158 + 1159/4267)	365	9,500	4	370	D	2	75	24	2
Billiton	Mt. Olinthus (1079/3338)					D	3	61	1	
Billiton	Sheoak Hill (1117/5075 + 5545)	63	1,400			R		51		
Billiton	Buckleboo (1115/5074)	87	2,500	1	196	D		20		
WMC	Caralue (1181/3583)	547	9,000	81	5,400	D		15	350+	11(2)
	Totals	1,062	22,400	86	5,966		5	207	375+	13
	Average Depth		21.1		69.4					

NOTE:
D - Detailed low level survey flown by tenement holder.
R - Reprocessed BMR data.
(1) - Excludes work outside area of current Aberfoyle ELs 1567 and 1568
(2) - Plus trial Input and 27 line km of trial gravity.

TABLE 3

6.2 Past Rock Chip and Drill Geochemistry

All rock chip and RAB drill traverses and resulting anomalous geochemistry were plotted on Plate 2.

The compilation highlights broadly anomalous areas indicative of stratigraphic anomalism. Even low order anomalies need to be considered in view of the frequent shallow depth of sampling within the leached saprolith. For example, the Erainia (Miltalie North) area 16km north of Miltalie is weakly but consistently zinc anomalous.

The past geochemical work sterilises large areas such as the magnetic trends underlain by granitised sediments 20-40km north of Mt Olinthus.

6.3 Lead Isotopes

Lead isotope analyses were the key method of characterising geochemical lead anomalies, gossans and galena occurrences. The signatures sought are the target ratios for Proterozoic stratiform mineralisation of 206/204 Pb = 16.0, 207/204 Pb = 15.3 and 208/204 Pb = 36.0.

The data available for the licence areas, at the time of the regional assessment, totalled 53 determinations which are listed in report ARL CP 3. An additional 22 analyses subsequently made by Aberfoyle are listed in Appendix 3. All lead isotope analyses are summarised on Plate 3. Very accurate CSIRO (Sirotope) analyses by HBr extraction and mass spectrometer measurement were initially done on all samples. Less accurate ICP-mass spectrometer analyses by Analabs enabled rapid and cheaper determinations on more samples prior to accurate verification of significant results by Sirotope. The reliability of the Analabs method was tested against Sirotope results. Measurements of the most important 206/204 ratio are consistently 0.1-0.5 greater than Sirotope readings. This is acceptable as a coarse regional filter of signatures >17.0 and well out of the target range. The Analabs 207/204 and 208/204 ratios are not useful, being erratic and more than one unit greater than accepted real values on check samples.

The investigation can be geographically divided into three areas. At the north end of the belt, Billiton obtained 11 Sirotope analyses on anomalous RAB drill material from their Mt Nott and Buckleboo areas. In the central Kimba area, Aberfoyle gained 7 Sirotope and 18 Analabs analyses from anomalous WMC RAB and percussion drill cuttings stored in the SADME core library at Moonta. Initial determinations in the areas of ELs 1567 and 1727 were from around Mt Olinthus and concentrated on gossans and galena from the Miltalie deposit including 4 samples from the recent SADME drilling. The only other measurements for the area were two dump samples from the Calcookra and Yalpoudnie Cu U deposits.

Follow-up lead isotope analyses in the Mt Olinthus area are described below.

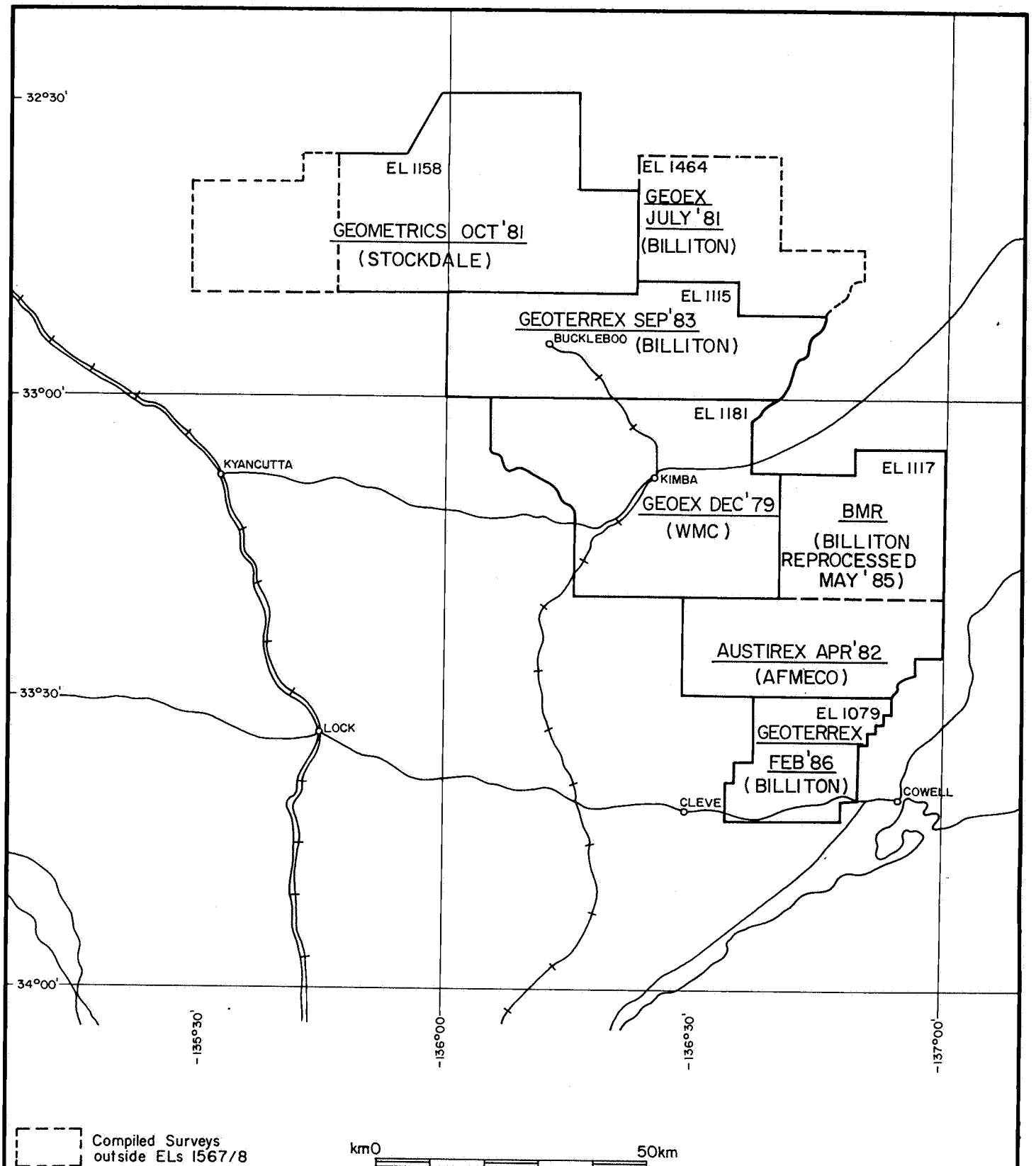
All the initial regional results were radiogenic, 206/204 ranging from 17.6 in the north to 21.4 in the south (Plate 3), thus falling outside the target limits. The regional trend as summarised on Plate 7 may reflect the increasing overprint of radiogenic lead derived from the epigenetic Cu U mineralisation event in the southern area. Extremely radiogenic 206/204 values were obtained from the Calcookra deposit. The radiogenic ratios of the stratabound Miltalie mineralisation indicate epigenetic precipitation. The suggestion that the abundant lead occurrences in the Mt Olinthus area resulted from remobilisation of stratiform lead and reprecipitation with uranium which then swamped the target signature with radiogenic lead is not envisaged by Sirotope personnel (Appendix 3).

6.4 Landsat and Aeromagnetic Reprocessing

The images processed and used in this study are presented in report CP 3. Stratigraphic and structural discussed below were interpreted from the 1:250,000 scale prints of the images.

The Landsat TM was an inverted 7 4 1 image which is routinely used in geological exploration to give balanced enhancement of outcrop, soil and vegetation features.

The aeromagnetic mosaic image was a simple merging of edge enhanced images of various past surveys (Figure 3) without levelling between the various surveys used.



Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 3

REVISIONS			
Init.	Date	Init.	Date
JAA, nb	1/3/91		
JAA nb	9/91		

Location Code :

SOUTH AUSTRALIA

EL 1567 CARPIE PUNTHA & EL 1568 PETERLUMBO

PREVIOUS AEROMAGNETIC SURVEYS

Scale : 1:1000 000

Date : JUNE 1989

Compiled : JACP

Drawn :

Traced : EAC

Checked :

Plate No. : EPN - 4

1511

6.5 Interpretation of Permissive Stratigraphy and Structures

The concept that growth faults localise metal exhalation and control basin geometry and hence facies, including sulphides, offered an attractive if difficult approach for selecting sectors of the palaeo-basin with higher potential for stratiform zinc-lead targets. The controlling structures were expected to be deep and persistent with time such that they will remain evident geophysically and as reactivated faults. The prospective rock package of the related sub-basin will remain proximal to the root and reactivated fault zones despite subsequent deformation, the geometry of which will also be influenced by the same deep structural regime.

Consequently all apparent faults and lineaments can be examined for possible candidates as mineralisation-localising features by their relative paragenesis, spatial associations with low clastic, slope, chemical or exhalative facies and regional attitude to the fold belt. If such structures are nominated, priority can be given to targets in the vicinity of the structures.

Several studies nominated permissive regional structures which were detailed in report CP 3. Initial studies combined structures seen on the Landsat TM and Aeromagnetic images. Structures were also selected from faults and lithological changes on the published 1:250,000 geological plans. Both these studies emphasised structures parallel to the arcuate fold trends.

6.6 Empirical Indicators

Three types of regional anomaly were also sought as indicators of large stratiform sulphide systems ie.

- Landsat features indicative of geochemical halos
- Breaks in magnetic trends indicative of sulphide facies.
- Large 5-10 milligal gravity highs indicative of dense mineralogical envelopes.

The selected features were also described in ARL Report CP 3.

6.7 Selection of Target Areas

Nineteen potential target areas were selected and ranked according to the presence and quality of key indicators in the central Eyre Peninsula region (Table 4). Arbitrary point scores were given with increasing weight for more favourable indicators. Negative weighting was given to non-target lead isotopic ratios. The total point scores ascertained each area's ranking of exploration potential against all Aberfoyle prospects in the region.

Only two areas were selected from within the Carpie Puntha-Waddikee licence areas. The Mt Olinthus and Miltalie North (Erainia) areas in the SE part of the Carpie Puntha licence area were rated highly because of the abundance of mineralisation, development of carbonates, regional facies changes and paucity of drill testing. The Bunora-Balumbah area which had the lowest ranking of the selected areas was chosen because of the strength and coherence of the Bunora magnetic anomaly which was not tested by past exploration.

CARPIE PUNTHA EL1567/PETERLUMBO EL1568

TARGET AREA RANKINGS

REGIONAL RANK	TARGET	PERMISSIVE FAULTS 1(2)	PERMISSIVE FAULTS 2(4)	PERMISSIVE FAULTS 3(6)	FACIES CHANGE(a) FAR(3)	FACIES CHANGE(a) NEAR(6)	MAG BREAK(b) STRUCT.(2)	MAG BREAK(b) STRAT.(4)	LANDSAT ANOMALY(c) NON-COIN.(3)	LANDSAT ANOMALY(c) COINC.(6)	PATH FINDER GEOCHEM. Ag(3)	PATH FINDER GEOCHEM. Mn(3)	PATH FINDER GEOCHEM. Ba(3)	TARGET GEOCHEM.(d) L(2)	TARGET GEOCHEM.(d) M(4)	TARGET GEOCHEM.(d) H(6)	SULPHIDES GEOMETRY(e) V(2)	SULPHIDES GEOMETRY(e) S?(4)	SULPHIDES GEOMETRY(e) S(6)	Pb ISOTOPES (f) NON(-3)	Pb ISOTOPES (f) NEAR(3)	Pb ISOTOPES (f) T(6)	SYSTEM SIZE(g) W>100(3)	SYSTEM SIZE(g) L>500(3)	MASSIVE STRATA-BOUND SULPHIDES (6)	TOTAL (56)
13	Peter Pan D.	2			3					6				2			2							3		18
32	Poodina D.	2			3				3																	8
17	Thurgla Ramp					6		4		6																16
10	Back Bore		4			6	2			6					4											22
28	One Mile D.		4			6			3											-3						10
29	Ajax Dam			6			2		3					2						-3						10
18	Wodalla D.		4					4							4						3					15
12	Bittali D.			6	3					6					4											19
21	Cortilyne			6				4			3				4					-3						14
22	Pilepudla Well	2					2		3		3				4											14
14	Jungle D.	2			3			4		6				2												17
15	Balumbah		4				2		3		3				4					-3				3		16
19	Rowanglen						2			6	3				4											15
37	Seymour	2						4			3									-3						6
20	Irkanda		4			6			3					2												15
24	Pootitnie Hill	2			3			4	3																	12
16	Cock Hill		4			6		4									2									16
7	Mt Olinthus			6		6	2		3		3				4			4		-3						25
6	Erainia		4			6		4		6		3		2										3		28

NOTES: (a) Perceived facies changes within Middleback Subgroup located far from or near to permissive (potential growth)faults.
(b) Magnetic break in magnetic stratigraphic trend appears to be fault induced or a facies variation.
(c) Landsat anomaly non-coincident or coincident with a magnetic break.
(d) Pb and/or Zn anomalies are low level (200-500ppm), medium level (500-5,000ppm) or high level (>5,000ppm).
(e) Sulphides are observed with either a vein, possible stratabound tabular or definite stratabound tabular geometry.
(f) Lead isotope ratios are non-, near- or true target signature.
(g) Anomalous stratigraphic package is >100m wide with/without >500m strike length evident.

TABLE 4

7. RECONNAISSANCE EXPLORATION OF TARGET AREAS

7.1 Bunora Magnetic Trend

EL 1727 covered the central segment of a 25km long, first order aeromagnetic trend west of Bunora Siding (Figure 4).

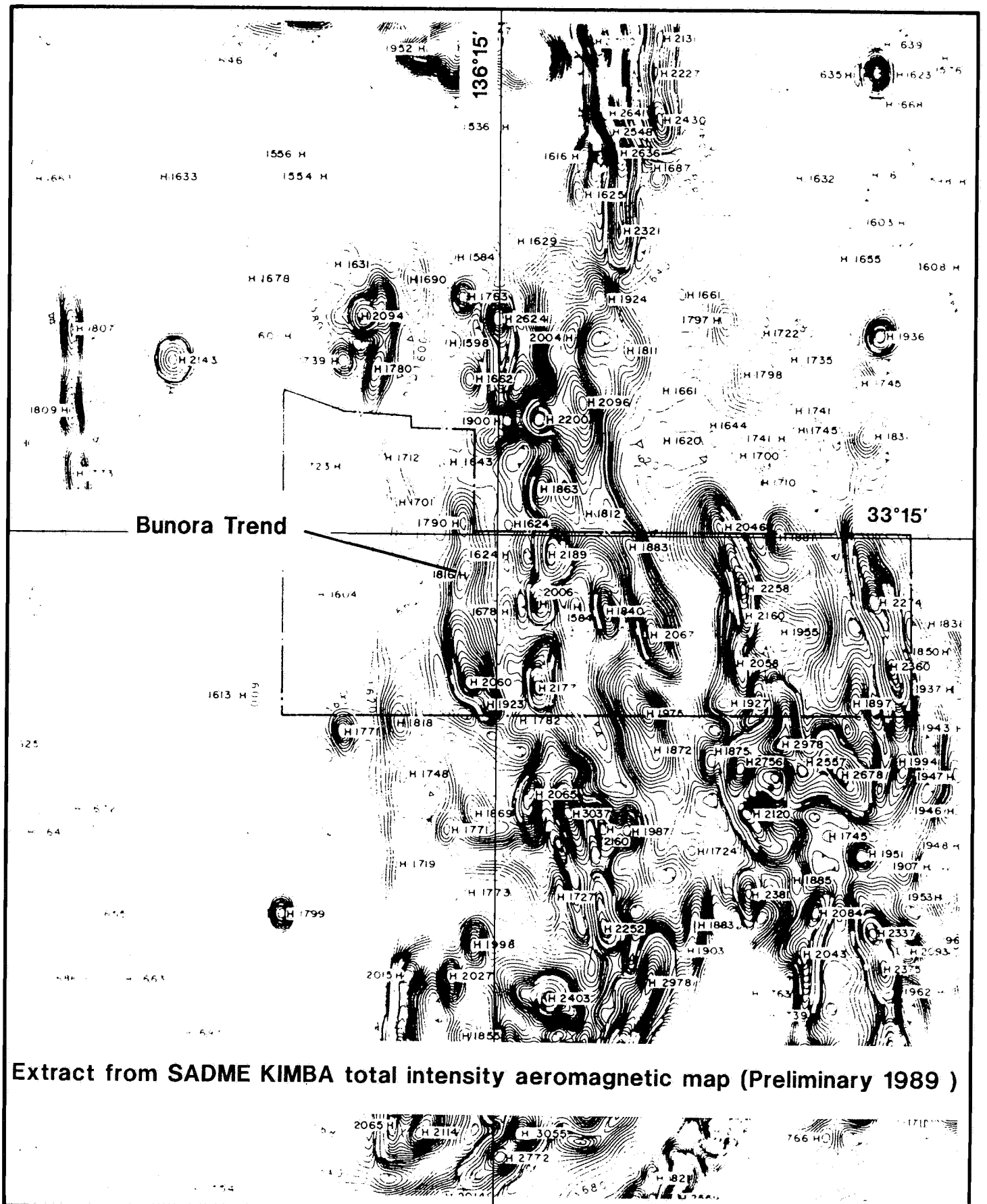
Well-developed ironstones, graphitic schists or rhyolitic volcanics had been mapped at either end of this anomaly.

The Bunora trend represents an essentially unexplored portion of the prospective Upper Middleback Jaspilite. However rock chip sampling of ironstones at the exposed ends of the trend (largely within EL 1567) failed to gain geochemical encouragement (Figure 5; Appendix 1). The predominant rock type located and sampled was lateritised, massive to banded cherts.

7.2 Balumbah Graphite Trend

The Balumbah graphite prospect lies within EL 1567 "Carpie Puntha" and is located 10km SW of Kimba, immediately to the north of the Balumbah railway siding (Figure 6). Land within the prospect is cultivated, wheat cropping and low intensity grazing being the main land use.

Reconnaissance prospecting in the area during late 1991 disclosed a road exposure of Lincoln Complex gneiss at the Kimbolton cross roads (Site 16 on Figure 5) found to contain 6% graphite of a potentially exploitable grainsize of around 150 um. Graphite was reported as occurring at Rowanglen and Balumbah 15km SE along the same structural trend.



Extract from SADME KIMBA total intensity aeromagnetic map (Preliminary 1989)

Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 4

REVISIONS			
Init.	Date	Init.	Date

SOUTH AUSTRALIA

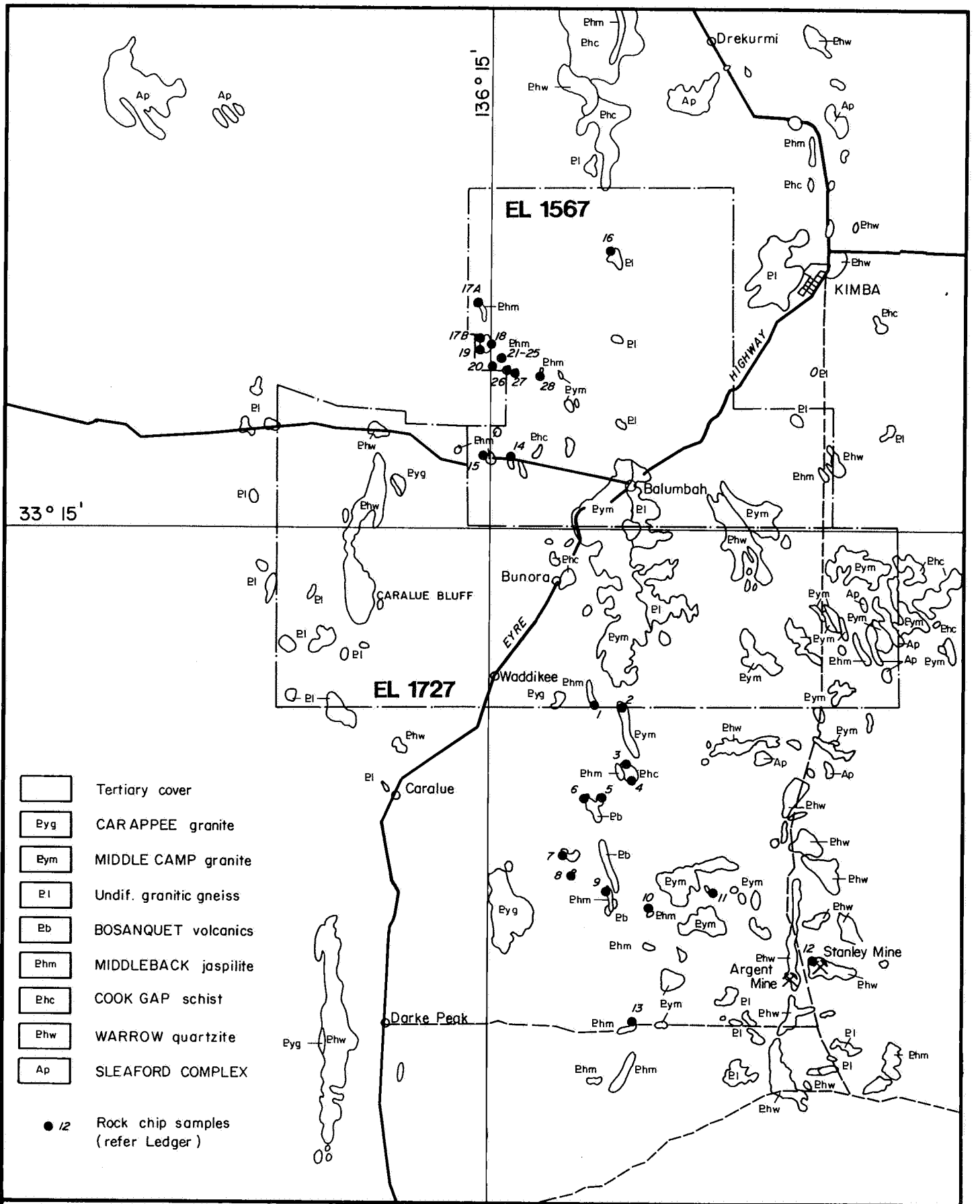
EL1727 WADDIKEE
BUNORA TREND
AEROMAGNETIC PLAN

Compiled :	SADME
Drawn :	SADME
Traced :	RJE
Checked :	IBF
Plate No. :	EPN 50

Location Code :

Scale : 1:250,000

Date : February, 1992



Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 5

REVISIONS			
Init.	Date	Init.	Date

SOUTH AUSTRALIA

EL1727 WADDIKEE - EL1567 CARPIE PUNTHA

GEOLOGY PLAN & ROCK CHIP LOCATIONS

Compiled : JAA , SADME

Drawn : SADME

Traced : RJE

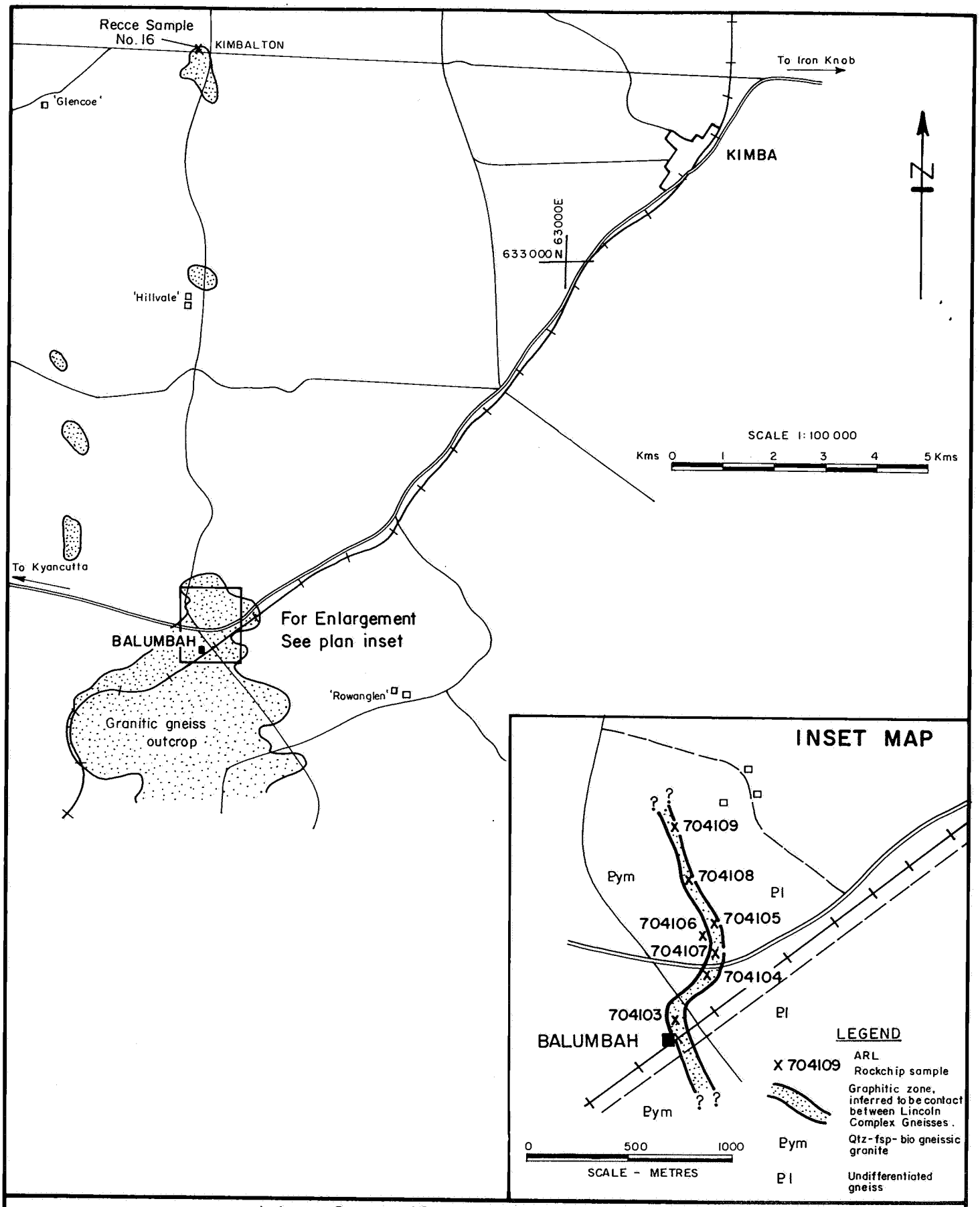
Checked :

Location Code :

Scale : 1:250,000

Date : March , 1993

Plate No. : EPN 64



Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 6

REVISIONS			
Init.	Date	Init.	Date
JAA rje	1-4-93		

SOUTH AUSTRALIA

EL 1567 - CARPIE PUNTHA

BALUMBAH GRAPHITE PROSPECT

PROSPECT LOCATION AND GEOLOGY

Compiled :

Drawn : BPC

Traced : NB

Checked :

Location Code : SI 53-7

Scale : AS SHOWN

Date : JANUARY 1992

Plate No. : CPN-7

Fourteen samples were collected during further prospecting along this trend during January 1992. Proterozoic outcrop within the area is limited, Quaternary cover obscuring much of the target zone. Highly graphitic gneiss exposed in railway embankments at Balumbah lead to the recognition of the Balumbah graphite prospect.

Between 5 to 7 graphitic beds form a zone approximately 60m wide and of 1.3km surfical strike extent, with trends 165 degrees and dips steeply east. Bed width is between 0.5 to 3m, the thicker beds appearing to be continuous and containing 8 to 12% coarsely crystalline graphite (Assay report and Petrologist report - Appendix 2). The zone occurs proximal to a granitic gneiss - undifferentiated gneiss contact, which is suggested to be locally graphite prospective stratigraphic horizon. The graphite is inferred to represent the remobilisation and concentration of original sedimentary organics due to the multiple influences of granitic intrusion, upper amphibolite facies metamorphism and multiple deformation.

Prior exploration within the area by WMC involved the drill testing of multiple SIROTEM anomalies, many of which proved to be graphitic lithologies. The utilisation of this existing data base, and the recognition of the locally prospective stratigraphic horizon could aid further exploration.

However commercial analysis did not warrant Aberfoyle pursuing this target and exploration ceased.

7.3 Mount Olinthus-Miltalie North Trend

Base metals mineralisation and rock geochemical anomalies are recorded along some 35 kilometres of strike trend of chemical metasediments of the Lower Middleback Subgroup and basal Warrow Quartzite in the far south-east corner of EL 1567 (Plate 5).

Mixed copper, zinc, silver, lead and uranium, mostly shear-related, are concentrated in the Miltalie-Mount Miller area.

Northward of Miltalie North is a 10 kilometre long manganese oxide-rich unit of the Lower Middleback amphibolitic iron formation. The manganese content of outcrop samples sometimes exceeds 30% Mn and commonly has a low level of associated Cu, Zn and Pb (see Appendix 3).

Some work has been carried out towards assessing these Hutchison Group rocks for stratiform Pb-Zn ore possibilities. The old mines and prospects were located in the field and sampled. Geochemical analyses are included in Appendix 3.

The Geological Survey published 1:50,000 COWELL and MANGALO geology maps, and the preliminary 1:100,000 BARNA map, provided geological background for these investigations.

Two lines of approach were made:-

1. Where there are appropriate levels of lead present, Pb-isotope determinations have been carried out for evidence of the presence of Lower Proterozoic massive sulphides.

2. With a more conceptual approach to stratiform Pb-Zn exploration in these highly deformed and metamorphosed rocks, interpretive work using aeromagnetics and aerial photographs was used to integrate structural and stratigraphic data, which might show up more permissive ore settings. Figure 5 displays some of the broader elements defined in this study, however this approach was not pursued.

Lead Isotopes

Ten rock samples with anomalous Pb levels, from mines including Mount Millar, Calcookara, Yalpoudnie and Davey East were analysed by Analabs in Perth. Isotope ratios and corresponding Pb, U, and Th assays are listed as Appendix 3. The Pb 206/204 ratios fall in the range 21.55 to 23.26, well above the Lower Proterozoic target ratio of near 16.1. These leads are highly radiogenic.

In addition, galena crystals from Mount Millar mine and two massive gossan samples from the Davey West pit were analysed at Sirotope in Sydney. The galena data equate closely with those above.

The Davey gossan samples have a very low Pb content (<10ppm) and there is a substantial radiogenic Pb component derived from in situ decay of U and Th. The Pb 206/204 ratios are 44.16 and 39.50 respectively. Although this data is minimal, isotope plots for these two gossans project to a Lower Proterozoic isochron "age", which suggests that they could represent weathered stratiform sulphides (comm. J. Dean, Sirotope).

The gossan exposure at Davey West is adjacent to a ridge of Katunga Dolomite and therefore it may be equatable with the massive iron sulphides found in drill-holes in the Katunga Hill type area near Iron Knob.

The Hutchison Group rocks in this area of EL 1567 are highly deformed and have been widely affected by granite intrusion. Uranium is a significant constituent metal in about half of the known deposits. The available evidence points to an epigenetic style of base metal sulphides.

8. CONCLUSIONS

No immediate targets were delineated from exposures of mineralisation in the two Pb-Zn target areas. As the lead isotope indicators are not encouraging, the areas are considered less prospective than several key prospects on which Aberfoyle's exploration remains focussed.

The use of advanced airborne EM technology was proposed as the only effective technique warranted in these lowly ranked areas, however the technology needed to penetrate the weathered mantle was still in development and not available to meet that objective within the timing of tenure commitments.

Without a cheap and effective blanket technique to delineate targets in covered areas, the marginal target areas at Bunora-Mt Olinthus-Miltalie North do not warrant intensive RAB drilling that would be required at the present time.

Accordingly, Exploration Licences 1567 "Carpie Puntha" and 1727 "Waddikee" were relinquished.

9. REFERENCES

Aberfoyle Report CP 3 - ELs 1567 & 1568 - Report on Exploration for the Quarters ending 14th May & 14th August 1991.

Aberfoyle Report CP 5 - ELs 1567 & 1568 - Technical Report for Areas Relinquished on 13th February 1992.

Blissett, A.H., Parker, A.J., Crooks, A.F., 1988. YARDEA map sheet, 1:250,000 Geol. Series, S. Aust. Dept. Mines and Energy.

Cowley, W.M. and Parker, A.J., 1991. Eyre Peninsula Pb-Zn Data Package. South Aust. Dept. Mines and Energy.

Dalgarno, C.R. et al., 1968. PORT AUGUSTA map sheet, 1:250,000 Geol. Series. S. Aust. Dept. Mines and Energy.

Flint, R.B. and Rankin, L.R., 1991. KIMBA 1:250,000 Geol. Series - Explanatory Notes, S. Aust. Dept. Mines and Energy.

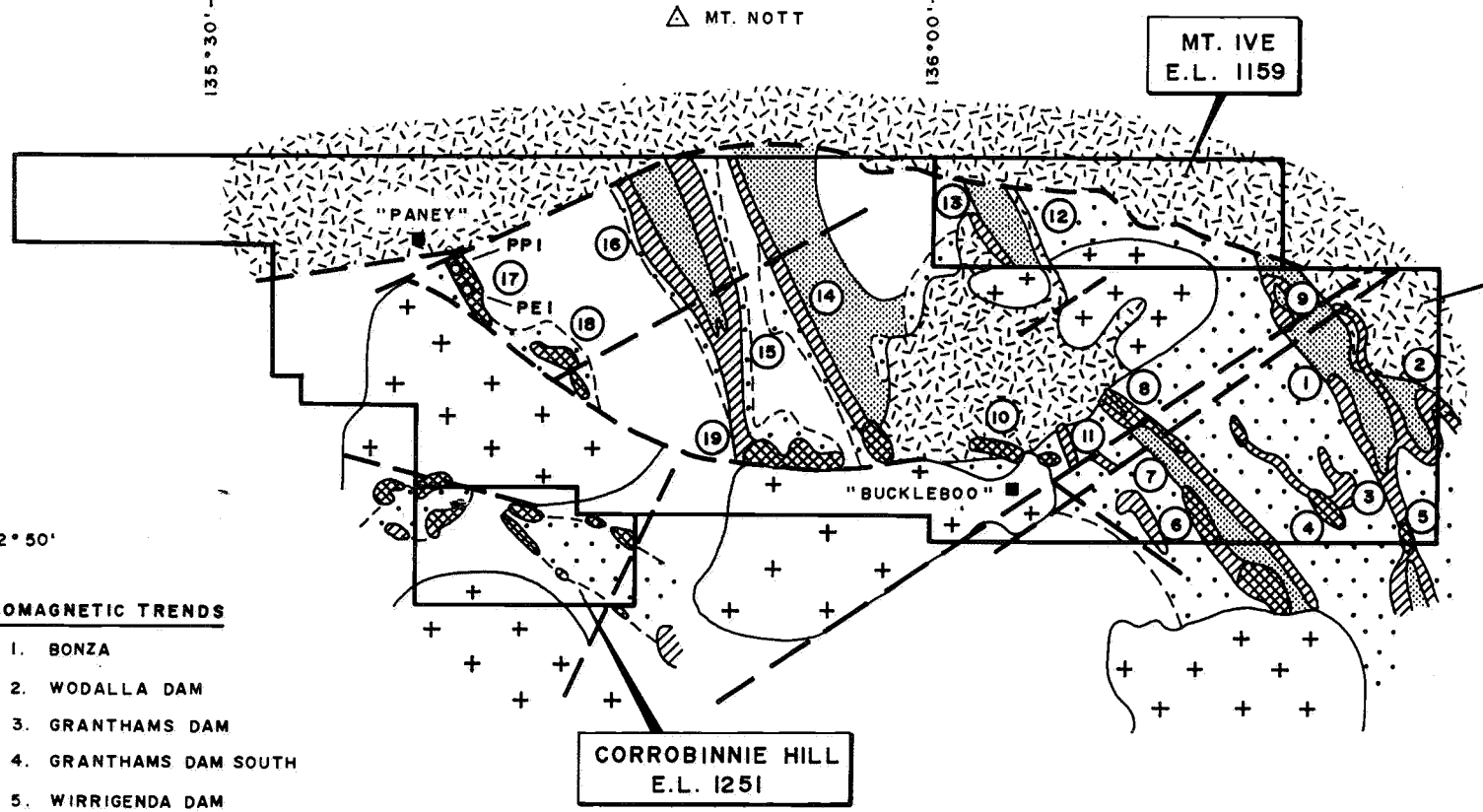
Higgins, M.L. et al., 1990. Menninnie Dam Lead-Zinc-Silver Prospect, Eyre Peninsula in Geology of the Mineral Deposits of Australia and Papua New Guinea (Ed. F.E. Hughes) pp. 1055-1058. AIMM.

Parker, A.J., 1983. WHYALLA map sheet, Geol. Atlas of South Aust. 1:250,000 Series. Geol. Surv. S. Aust.

Parker, A.J., 1990. Gawler Craton and Sturt Shelf - regional geology and mineralisation, in Geology of the Mineral Deposits of Australia and Papua New Guinea (Ed. F.E. Hughes), pp. 999-1008 (AIMM).

Parker, A.J. and Lemon, N.M., 1982. Reconstruction of the Early Proterozoic stratigraphy of the Gawler Craton, South Australia. J. Geol. Soc. Aust. 29:221-238.

Townsend, I.J., 1988. Review of Lead Zinc Mineralisation in South Australia - Gawler Craton. Rept. Bk. No. 88/61. S. Aust. Dept. Mines and Energy.



AEROMAGNETIC TRENDS

1. BONZA
2. WODALLA DAM
3. GRANTHAMS DAM
4. GRANTHAMS DAM SOUTH
5. WIRRIGENDA DAM
6. AJAX DAM
7. SPOONER DAM
8. OXY'S DAM
9. SWAMP DAM
10. SIX MILE DAM
11. CHANNELS
12. LAKE FLORA DAM
13. NANKIVEL DAM
14. THURLGA RAMP
15. SALT LAKES
16. PETER PAN
17. PANEY
18. TIN HUT WELL
19. BACK PENNAS DAM

Gawler Range Volcanics

Granite

HUTCHISON GROUP

Cook Gap Schists

Middleback Jaspilite

Warrow Quartzite

Basement Gneiss
(Lower Prot - Archaean)

0 10 20 KM

Billiton Australia
The Metals Division of The Shell Companies of Australia Limited

Project: MT. NOTT J.V.

Title: Interpreted Geology

Author R.C.B.	Date SEP86	Scale 1:500 000	
Drawn B.J.O.	Office ADEL	Revised	Date
Drawing No. A/FK 12/347		Fig No. 1	

560000mE

600000mE

640000mE

680000mE

6420000mN

6380000mN

6340000mN

6300000mN

6260000mN

MENNINNIE DAM PROSPECT

Nonning H.S.

Peterlumbo Hill

EL 1568 - 'PETERLUMBO'

PT EL 1568

GILLES LAKE

EYRE HIGHWAY

IRON KNOB

IRON BARON

IRON DUKE

KYANCUTTA

KIMBA

EL 1567 - 'CARPIE PUNTHA'

Carpie Puntha Hill

CLEVE

COWELL

LITHOLOGIES

JURASSIC -TERTIARY — SEDIMENTS (including POLDA TROUGH)

MID – PROTEROZOIC

(1590 Ma) — GAWLER RANGE VOLCANICS

(1590 Ma) — HILTABA SUITE GRANITES { MAGNETIC / NON-MAGNETIC

(1650 Ma) — COVER SEDIMENTS { BLUE RANGE BEDS / CORUNNA CONGLOMERATE / MOONABIE FORMATION

(1690 Ma) — LINCOLN COMPLEX - INCLUDING GRANITIZED HUTCHISON GROUP

EARLY PROTEROZOIC (1850 Ma) — PROSPECTIVE HUTCHISON GROUP (including possible subcrop)

ARCHAEAN — SLEAFORD COMPLEX

- BOSANQUET VOLCANICS
- IRON FORMATION OUTCROP
- MAGNETIC UNITS
- CARBONATES

SCALE 1:250000

Kms 5 0 5 10 15 20 25 Kms

Aberfoyle Resources Limited
EXPLORATION DIVISION

PLATE 1

REVISIONS

Init | Date | Init | Date

Location Code: SI53-3, 8

SOUTH AUSTRALIA
Central Eyre Peninsula

GEOLOGICAL SUMMARY PLAN
WITH EL 1567 – CARPIE PUNTHA
& EL 1568 – PETERLUMBO TENURE

Scale — Date 8 JUNE 1990

Compiled JAA after 1:250 000 Geol Surv Plans
Drawn JAA
Traced EAA, NB
Checked JAA
Plate No EPN-37A

560 000 E
580 000 E
600 000 E
620 000 E
640 000 E
660 000 E
680 000 E
400 000 N
380 000 N
360 000 N
340 000 N
320 000 N
300 000 N
280 000 N
PETER PAN DAM
LAKE FLORA DAM
PETERLUMBO HILL
NINE MILE DAM
OXYS DAM
BUCKLEBOO
AJAX DAM
ARGENT
STANLEY
CAMPOONA HILL
MT OLINTHUS
MILTALIE Pb, Ag, Cu
SOUTH MOROWIE Cu, Zn
ATKINSON
CALOOKARA Cu, U
MT MILLAR Pb
DAVEY Pb, Ag
YALPOUDNIE Cu, U, Pb
FERNS QUARRY
BOARDS Cu
EMU PLAIN Cu, U
SIMMS & BRADLEY Cu
YADNARIE Pb, Zn
Cu
SILVER MONARCH
POONANA Cu, Pb, U
ELSON Pb
OLD CLEVE Ag
WINDITTIE Cu
ARNO BAY Cu
COWELL
Mn

DRILLHOLES

(in ppm)

Pb	Zn	Ag
100 - 499	200 - 999	3 - 9
500 - 4999	1000 - 9999	≥ 10
≥ 5000	≥ 10000	

ROCK CHIP SAMPLES

(in ppm)

Pb	Zn	Ag
o 100 - 499	• 100 - 999	□ 3 - 9
O 500 - 4999	● 1000 - 9999	☐ ≥ 10
○ ≥ 5000	● ≥ 10000	

—— RAB traverses

◦ Drillholes

⬭ Grouped Traverses

· Rock Chip Sample Sites

⬭ Grouped Sample Sites

– Channel Sample Traverses

N

10 5 0 10 20
KILOMETRES

Aberfoyle Resources Limited
EXPLORATION DIVISION

PLATE 2

REVISIONS			
Init.	Date	Init.	Date

SOUTH AUSTRALIA
Central Eyre Peninsula

GEOCHEMISTRY SUMMARY PLAN

Location Code : SI53 | Scale : 1:250 000 | Date : JUNE 1990

Compiled : ST
Drawn : EAC
Traced : EAC
Checked :
Plate No : EPN - 12A

560 000E

580 000E

600 000E

620 000E

640 000E

660 000E

680 000E

400 000N

380 000N

360 000N

340 000N

320 000N

300 000N

280 000N

MENNINNIE DAM ■

LAKE FLORA DAM ■

△ PETERLUMBO HILL

PETER PAN DAM ■

RAM 125
7GRV
20 26/40 28

■ NINE MILE DAM

OXYS DAM ■

BUCKLEBOO ■

RAM 52
19 677/40 234

■ AJAX DAM

RAM 136
17 69/36 675 O

RAM 139
18 254/37 656

RAM 86
17 789/37 679

RAM 265
18 621/37 601

RAM 267
19 06/37 304

RAM 268
18 447/37 018

RBB 26
53 474/43 791

RBR 16
18 104/40 519

RBR 39
24 109/40 266

CP 250
O 18 18/39 29 (A)

CP 247
O 22 47/37 93 (A)

CP 208
O 19 34/38 26 (A)

CP 32
O 21 46/39 68 (A)

CP 203
22 08/57 62 (A)

CP 2
21 19/41 00 (A)

CP 233
O 27 62/37 51 (A)

CP 84
20 70/41 64 (A)

CP 565
20 736 - 21 848 /40 203

CP 566
19 986/39 301
20 49/40 35 (A)

CP 338
O 19 19/39 58 (A)

CP 492
O 19 42/40 56 (A)

CP 601
O 21 32/42 05 (A)

CP 548
O 21 28/41 28 (A)

CP 616
21 227/40 852
21 32/41 88 (A)

O 20 37/40 81 (A)
O 20 66/41 20 (A)
CP 618

CP 615
20 581/40 195

CP 619
O 20 794/40 670
O 20 75/41 58 (A)

ARGENT ⚒ STANLEY

DDH SC 2A
19 848/31 587
19 859 · 39 620

△ CAMPOONA HILL

Mo

18.58 - 21.41 / 39.13 - 42.18 (A)
2128 - 2132 / 41.64 - 41.83 (A)
MILTALIE O 19 288 - 21 067/38 001 - 41 388
Pb, Ag, Cu 19 094 - 20 936/38 185 - 40 760

△ MT OLINTHUS

SOUTH MOROWIE
Cu, Zn

EMU PLAIN
Cu, U

ATKINSON
Ag

DAVEY
Pb, Ag

588.24 / 4124 (A) CALOOKARA
Cu, U

MT MILLAR
Pb

YALPOUDNIE 21.74 / 41.52 (A)
Cu, U, Pb

FERNS QUARRY
BOARDS
Cu

SIMMS & BRADLEY
Cu

YADNARIE
Pb, Zn
Cu

SILVER MONARCH

POONANA
Cu, Pb, U

ELSON Pb

OLD CLEVE Ag

WINDITTIE
Cu

ARNO BAY
Cu

◇ COWELL

LEGEND

DDH PP1 / CP 616 — Drillhole, sample site

○ Pb < 500 ppm

○ Pb = 500 ppm

○ Pb >> 500 ppm

× > 30 ppm Th

\+ > 30 ppm U

— No U, Th assays

Blank — Low U, Th

Pb 206/204 (206 over 204) Pb 208/204 (208 over 204) Pb isotope ratio — Underlining shows Pb from fresh rock (fresh galena), otherwise weathered

(A) shows Analabs determined Pb Isotopic Ratio by ICP-MS, all others are Sirotope results

N

10 5 0 10 20
KILOMETRES

Aberfoyle Resources Limited
EXPLORATION DIVISION

PLATE 3

REVISIONS			
Init	Date	Init	Date
BFR eqa	9/91		

SOUTH AUSTRALIA
Central Eyre Peninsula

Pb ISOTOPES SUMMARY PLAN

Compiled : ST
Drawn :
Traced : NB
Checked :

Location Code S153
Scale : 1:250 000
Date : NOVEMBER 1990
Plate No : EPN - 21A

560000mE
600000mE
640000mE
680000mE
6420000mN
6390000mN
6340000mN
6300000mN
6260000mN

15·98-17·41(6)
16·06-17·71(5)
20·26(1)
19·68(1)
17·69-18·25
18·45-19·06(3)
33·47(1)
16·30-16·41(3)
18·10(1)
24·11 (1)
18·18-27·68(5A)
20·70-21·46 (3A)
19·99(1), 20·49(1A)
21·32(1A)
21·28(1A)
19·19-19·42(2A)
20·58-21·23(3)
20·37-21·32(5A)
19·85-19·86
18.29-21.07(17)
18.59-21.41(6A)
588.24(1A)
21.74(1A)

EMPIRICAL INDICATORS

- Pb, Zn or Ag mineralization
- Pb, Zn Geochemical anomaly
- 17·69-21·25 (3) Lead isotope 206/204 ratio (n=nº of CSIRO analyses; nA=nº of Analabs analyses)
- Landsat anomaly
- Magnetic break
- Gravity high

SCALE 1:250 000

Kms 5 0 5 10 15 20 25 Kms

Aberfoyle Resources Limited
EXPLORATION DIVISION

PLATE 4

REVISIONS

Init	Date	Init	Date
JAA	9/91		

SOUTH AUSTRALIA
Central Eyre Peninsula

EMPIRICAL TARGET INDICATORS PLAN

Location Code SI53

Scale 1:250 000

Date 6 JUNE 1991

Compiled JAA
Drawn JAA
Traced EAA, NB
Checked JAA
Plate No EPN-39A

LEGEND

Selected lithostratigraphic ingredients (outcrop)

PB	AMPHIBOLITE
Phm	IRON FORMATION
Phk	DOLOMITE
Phd	CALC-SILICATE
Di	DIOPSIDE ROCK
Py.Pya	GRANITE WITHOUT STRONG FOLIATION

Generalized geology

- LINCOLN COMPLEX
- COOK GAP SCHIST
- WARROW QUARTZITE (includes some larger covered areas)
- MILTALIE GNEISS (basement)

Structural lines

- AEROMAGNETIC DISCONTINUITY
- MAGNETIC ANOMALY TREND (1 : 50.000 Residual aeromagnetics)
- GEOMORPHIC LINEAR (airphoto.topography)

Mineralization

MINE. OLD PROSPECT

- ○ SHEAR RELATED
- ◇ ? STRATABOUND
- X ROCK GEOCHEMICAL ANOMALY (reported)

MOSS VALE
YALPOUDNIE LINEAMENT

E. L. 1567

Mangalo · Merrivale · Pootitnie Hill · Mt Olinthus · Coolgnie · Pine Lodge · Hill View · Yalpoudnie

Miltalie North Zn, Mn · Miltalie Pb, Zn, Ag · Wilklow Hut Mn, Zn · Mt Olinthus Prospect U, Mn · Morowie Cu · South Morowie Cu, Zn · Davey West Mn, Zn · Davey East Pb, Zn, Ag · Atkinsons Ag, Pb · Calcookara U, Pb, Cu · Mt Millar Pb, Ag · Boards Cu, Zn, Ag · Yalpoudnie Cu, Pb, Ag, U · Arno Bay Cu

Previous E.L. Boundary

To Cowell 6Km

LINCOLN HIGHWAY

ABERFOYLE ROCK SAMPLE LOCALITIES

1	681205 - 06	MT MILLAR MINE	
2	681207 - 09	Cu PIT	
3	681210 - 11	GARNET PIT	
4	681212 - 13, 20	ATKINSONS NORTH	
5	681215 - 19	ATKINSONS	
6	681221 - 22	MOROWIE SOUTH	
7	681223	ULGERA (filled in mine)	
8	681224 - 30	MOROWIE	
9	681231	MOROWIE RIDGE	
10	681232, 34-39	CALCOOKARA	
11	681233	PIT	
12	681240 - 41	BOARDS	
13	681242 - 48	YALPOUDNIE	
14	681249 - 51	DAVEY EAST	
15	681252 - 55, 83	DAVEY WEST	
16	681256 - 60	WILKLOW HUT	
17	681261 - 66	Mn IRON FORMATION	
18	681267 - 72	" " "	
19	681273 - 75	" " "	
20	681276 - 78	" " "	
21	681279 - 82		

Notes

Outcrop geology taken from COWELL and MANGALO published 1:50,000 geology maps, and BARNA 1:100,000 preliminary geology map, SADME.
Magnetic data interpreted from contour maps of residual TMI, from surveys by Afmeco (1982) and Billiton (1986)

EL 1567 (part)
MAP AREA
EL1567 (part)
Previous E.L. Boundary

136°40' 136°45' 136°50'
33°20' 33°25' 33°30' 33°35' 33°40'
6310000mN 6300000mN 6290000mN 6280000mN 6270000mN
650000mE 660000mE 670000mE

Aberfoyle Resources Limited
EXPLORATION DIVISION

PLATE 5

REVISIONS			
Init.	Date	Init.	Date
RJE	12 2 92		

Location Code :

EYRE PENINSULA, SOUTH AUSTRALIA
CARPIE PUNTHA E.L. 1567
MOUNT OLINTHUS - MILTALIE N. TREND
SELECTED INGREDIENTS

Scale : 1:50,000 | Date : December, 1991

Compiled : IBF
Drawn : IBF, RJE
Traced : RJE
Checked : IBF
Plate No : CP 6

APPENDIX 1

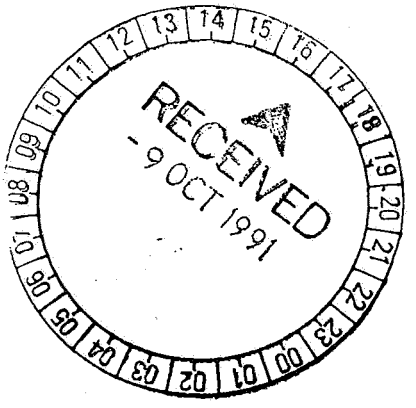
BUNORA TREND

ROCK CHIP LEDGERS AND ASSAYS

Wadelike Rock Chips (Anne Reed Sept 1991) Master File - Geochem

CLASSIC LABORATORIES LTD
Incorporated in WA; a wholly owned subsidiary of Amdel Ltd
ACN 009-076-555
Osman Place, Thebarton, South Australia 5031
Telephone: (08) 43 5722 Facsimile: (08) 234 0321

Please note our new Phone Number is (08) 416 5300



Mr John Anderson
Aberfoyle Exploration Pty Ltd
91 Beulah Road
NORWOOD
SA 5067

F I N A L A N A L Y S I S R E P O R T

Your Order No: 13338 Our Job Number : 1AD2932

Samples received : 24-SEP-1991 Results reported : 07-OCT-1991
No. of samples : 12
Report comprises a cover sheet and pages 1 to 3

This report relates specifically to the samples tested in so far as that the samples as supplied are truly representative of the sample source.

Note:
If you have any enquiries please contact Miss Anne Reed quoting the above job number.

Approved Signatory:

Allan H Jorgensen
fr

John Waters
Laboratory Manager - Adelaide

MM Mr John Anderson SA

Report Codes:
N.A. - Not Analysed.
L.N.R. - Listed But Not Received.
I.S. - Insufficent Sample.

Distribution Codes:
CC - Carbon Copy
EM - Electronic Media
MM - Magnetic Media

"RELIABLE ANALYSES AT COMPETITIVE COST"

CLASSIC LABORATORIES LTD

ANALYTICAL REPORT

Job: 1AD2932
O/N: 13338

Sample	Ag	As	Bi	Cd	Co	Cr	Cu
402455	<1	4	<10	<3	<2	94	11
402456	2	18	<10	<3	22	110	200
402457	<1	<3	<10	<3	3	11	8
402458	<1	7	<10	<3	4	20	7
402459	3	38	85	4	165	84	64
402460	<1	4	<10	<3	5	16	6
402461	<1	<3	<10	<3	3	28	22
402462	1	42	<10	<3	6	1080	88
402463	3	24	15	<3	28	32	14
402464	1	55	<10	<3	6	130	210
402465	<1	8	<10	<3	12	8	18
402466	<1	<3	<10	<3	3	32	56
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
DL	1	3	10	3	2	2	2
Scheme	IC2A	IC2A	IC2A	IC2A	IC2A	IC2A	IC2A

ANALYTICAL REPORT

Job: 1AD2932
O/N: 13338

Sample	Fe	Mn	Mo	Ni	Pb	P	Sb
402455	0.82	1380	<3	11	20	15	<10
402456	43.6	74	<3	80	50	2050	10
402457	1.43	125	<3	3	25	175	<10
402458	16.6	670	<3	3	5	270	<10
402459	9.65	21.3%	7	110	50	1050	<10
402460	4.02	8500	<3	5	10	35	<10
402461	5.70	880	<3	6	20	60	<10
402462	22.2	280	<3	78	25	75	15
402463	44.5	3300	3	92	50	190	15
402464	27.2	190	<3	20	40	460	<10
402465	13.3	800	<3	12	30	510	<10
402466	3.12	58	<3	15	15	15	<10
Units	%	ppm	ppm	ppm	ppm	ppm	ppm
DL	0.01	2	3	2	5	10	10
Scheme	IC2A	IC2A	IC2A	IC2A	IC2A	IC2A	IC2A
Upper Scheme	IC2A	IC2A					

CLASSIC LABORATORIES LTD

Job: 1AD2932
O/N: 13338

ANALYTICAL REPORT

Sample	V	Zn
402455	14	6
402456	96	260
402457	20	18
402458	30	12
402459	40	85
402460	8	11
402461	44	12
402462	350	32
402463	34	1200
402464	270	95
402465	6	48
402466	4	76
Units	ppm	ppm
DL	2	2
Scheme	IC2A	IC2A

Aberfoyle Resources Limited

EXPLORATION DIVISION

BUNORA TREND

GEOLOGICAL SAMPLE SHEET

Sheet 1 Of 1

PROJECT CARPIE DUNTHA EL1567 SAMPLED BY JAA LABORATORY ANALABS

SAMPLE TYPE RECCE ROCK GRAB DATE October 1991 LAB. JOB NO. 07031

ARL. ORDER NO. 13389

SAMPLE NO.	See EPN 64 LOCATION (Fig. 4) ✓	Location	ANALYSES (In ppm unless otherwise stated) AND TECHNIQUES Cu	Pb	Zn	Ag	Mn	Au	Fe			COMMENTS
402467		16	See attached laboratory report									Medium grained graphitic gneiss/mylonite
68		17A										Grey bedded cherty shale/siltstone
69		17B										Light brown - tan bedded calcareous shale
70		18A										Dark grey laminated siltstone
71		18B										Yellow brown lateritized schist
72		19										Green-brown schist embedded in calcrete
73		20										Dark brown ferruginous cherty shale
74		21										Purple brown bedded schist
75		22										Brown bedded limonite/recrystallised chert
76		23										Grey bedded graphitic shale
77		24										Brown weakly manganiferous ironstone
78		25										Grey brown bedded lateritized siltstone
79		26										Brown smooth float of ferruginous chert
80		28										White laminated micaceous quartzite

CARPIE PUNTHA
SA MONITOR

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.

Phone (08)3365099 | 16 Sunbeam Road, Glynde, S.A. 5070 | Fax (08) 3365564

ANALYTICAL REPORT No. 100580.35.07031

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

INVOICE TO:
Mr J Anderson
Aberfoyle Resources Limited
91 Beulah Road

Norwood SA 5067

ORDER No.	PROJECT
13389	

DATE RECEIVED	RESULTS REQUIRED
21/10/91	ASAP

No. OF PAGES OF RESULTS	DATE REPORTED	No. OF COPIES
3	12/11/91	1

TOTAL No. OF SAMPLES: 15

SAMPLE NUMBERS	SAMPLE DESCRIPTION	ELEMENT/METHOD
587617	pu Prep :	Pb,U,Th/GI222,Pb/GI223
402467/402480	ro Prep : OP021,S9900	Au/GG329
402467/402480	ro Prep :	Cu,Pb,Zn,Ag,Mn/GA140

RESULTS TO
Mr J Anderson
Aberfoyle Resources Limited
91 Beulah Road

Norwood SA 5067

RESULTS TO

RESULTS TO

REMARKS

RECEIVED
13 NOV 1991

AUTHORISED OFFICER

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	100580.35.07031	12/11/91	13389	1 OF 3

TUBE No.	SAMPLE No.	Au	Cu	Pb	Zn	Ag	Mn	Pb	U	Th
1	402467	<0.02	6	15	4	<1.0	40	–	–	–
2	402468	<0.02	10	10	6	<1.0	70	–	–	–
3	402469	<0.02	10	15	8	<1.0	455	–	–	–
4	402470	0.02	6	10	<2	<1.0	110	–	–	–
5	402471	<0.02	6	56	20	<1.0	835	–	–	–
6	402472	<0.02	20	20	12	<1.0	585	–	–	–
	402473	<0.02	8	30	14	<1.0	340	–	–	–
8	402474	<0.02	10	70	20	<1.0	560	–	–	–
9	402475	<0.02	4	35	18	<1.0	255	–	–	–
10	402476	0.02	2	20	8	<1.0	50	–	–	–
11	402477	0.03	2	40	24	<1.0	520	–	–	–
12	402478	<0.02	2	30	20	<1.0	210	–	–	–
13	402479	<0.02	8	45	18	<1.0	525	–	–	–
14	402480	<0.02	6	5	<2	<1.0	45	–	–	–
15	687617	–	–	–	–	–	–	3.39	1.05	3.17
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	0.02	2	5	2	1.0	5	1.00	0.05	0.05
24	UNITS	PPM	PPM	PPM	PPM	PPM	PPM	ppm	ppm	ppm
25	METHOD	GG329	GA140	GA140	GA140	GA140	GA140	GI222	GI222	GI222

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER A.J. Branson

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	100580.35.07031	12/11/91	13389	2 OF 3

TUBE No.	SAMPLE No.	Pb4:6	Pb7:6	Pb8:6	Pb6:4	Pb7:4	Pb8:4	Pb4:7	Pb6:7	Pb8:7
1	687617	0.0518	0.8120	2.0950	19.31	15.68	40.44	0.0638	1.232	2.580
2										
3										
4										
5										
6										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	0.0000	0.0000	0.0000	0.00	0.00	0.00	0.0000	0.000	0.000
24	UNITS	–	–	–	–	–	–	–	–	–
25	METHOD	GI223	GI223	GI223	GI223	GI223	GI223	GI223	GI223	GI223

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER A.J.Branson

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	100580.35.07031	12/11/91	13389	3 OF 3

TUBE No.	SAMPLE No.	Pb4:8	Pb6:8	Pb7:8						
1	687617	0.0247	0.4773	0.3876						
2										
3										
4										
5										
6										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	0.0000	0.0000	0.0000						
24	UNITS	—	—	—						
25	METHOD	GI223	GI223	GI223						

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER A.J. Branson

APPENDIX 2

BALUMBAH GRAPHITE PROSPECT

MEMO, PETROLOGY AND ASSAYS

EL 1567 CARPIET 14

Pontifex & Associates Pty. Ltd.

TEL. (08) 332 6744
A.H. (08) 31 3816
FAX (08) 332 5062

26 KENSINGTON ROAD, ROSE PARK
SOUTH AUSTRALIA

P.O. BOX 91, NORWOOD
SOUTH AUSTRALIA 5067

MINERALOGICAL REPORT NO. 5970

November 5th, 1991

TO: Mr John Anderson
Aberfoyle Resources Ltd
91 Beulah Rd
NORWOOD SA 5067

YOUR REFERENCE: Order No. 13393

MATERIAL: Rock sample BALUMBAH NORTH XROADS

IDENTIFICATION: No. 402467 6333900N, 622900E
SUBMITTED FOR GRAPHITE POTENTIAL

WORK REQUESTED: Thin or polished thin section and description.

SAMPLES & SECTIONS: Returned to you with this report.

PONTIFEX & ASSOCIATES PTY. LTD.

402467

Disrupted layers or layer-veins of metamorphic and/or vein quartz, in an extensive matrix of randomly oriented coarse muscovite, lesser graphite, and an interstitial ?clay, cement. Possibly a disrupted (?and muscovite-altered) gneiss.

About 20% of this rock consists of quartz mostly as stressed quite coarse polycrystalline grains, individually about 1mm size, and most arranged in irregular, more or less continuous layers (or disrupted layer-veins) up to 5mm thick. These occur at irregular intervals from 5mm to 20mm spacing. The quartz is dusted with minute fluid inclusions, and some incorporate minor fine muscovite.

There is also at least one discontinuous (disrupted) vein, of essentially the same quartz, cutting across the layering.

These various forms of quartz, occur within a whole rock matrix of abundant chaotically arranged and commonly quite coarse flakes (or 'micro-books') of muscovite, all cemented by very fine, clouded clay-sericite (of uncertain exact composition). Other components scattered through this cement material, between, and rarely interlocking with the muscovite, are fine (<0.3mm) irregular quartz grains (7-20%) and flakes of graphite (7-10%), some quite coarse (1-2mm) and bent.

Numerous irregular voids up to 2mm are filled by and/or lined by, indefinite compact apparent 'clay'; rarely by microcrystalline carbonate. Accessory small grains of rutile are scattered throughout.

The genesis of this rock is obscure. The micro-texture of the quartz, and its distribution suggests a pre-existing gneiss, albeit disrupted. The micas do not now have a gneissic (oriented) disposition, (nor do they appear to represent an altered ex-gneissic component, such as felspar); but they, and the graphite, may have developed their existing form during disruption of an original gneissic fabric.

The 'clay' cement and mud 'clay' void fillings, also the carbonate are probably supergene.

ABERFOYLE MEMORANDUM

Date	13th February 1992	Ref	BPC:CAC
To	J A Anderson	From	B P Coutts
At	Adelaide	At	Adealide
Copies to		Keep	CPuntha 14

Subject

BALUMBAH GRAPHITE PROSPECT

SUMMARY

Substantial outcrops of Proterozoic graphitic gneiss occuring at Balumbah, Central Eyre Peninsula, form a potentially exploitable resource warranting further exploration. It is suggested that a Joint Venture proposal be made to the operators of the Uley graphite mine, Pt Lincoln, to fund such work. Thus, should a resource be proven, the beneficiation technologies and markets will be instantaneously available.

BALUMBAH

The Balumbah graphite prospect lies within EL 1567 "Carpie Puntha", and is located 10km SW of Kimba, immediately to the north of the Balumbah railway siding (Figure 1). Land within the prospect is cultivated, wheat cropping and low intensity grazing being the main land uses.

Reconnaissance prospecting in the area during late 1991 disclosed a road exposure of Lincoln Complex gneiss at the Kimbolton cross roads (Figure 1), found to contain 6% graphite of a potentially exploitable grainsize of around 150um. Graphite was reported as also occurring at Rowanglen and Balumbah, 15km SE along the same structural trend.

Further prospecting along this trend was undertaken during January 1992, 14 samples being collected during 4 days fieldwork. Proterozoic outcrop within the area is limited, Quaternary cover obscuring much of the target stratigraphy. Highly graphitic gneiss exposed in railway embankments at Balumbah lead to the recognition of the Balumbah graphite prospect (Figure 1).

Between 5 to 7 graphite layers form a zone approximately 60m wide and of 1.3km surficial strike extent which trends 165 and dips steeply east. Layer width is between 0.5 to 3m, the thicker layers appearing to be continuous and containing 8 to 12% coarse crystalline graphite (Attachments 1 & 2). The zone occurs proximal to a granitic gneiss-undifferentated gneiss contact, which is suggested to be a locally graphite prospective stratigraphic horizon. The graphite is inferred to represent the remobilisation and concentration of original sedimentary organics, due to the multiple influences of granitic intrusion, upper amphibolite facies metamorphism and multiple deformation (Taylor & Berry, 1990).

Prior exploration by WMC involved the drill testing of multiple SIROTEM anomalies, many of which proved due to graphitic schist (WMC, 1986). The utilisation of this existing data base and the recognition of the locally prospective stratigraphic horizon will aid further exploration. Prospect landowners are positive towards company activities.

Complicating any development of the Balumbah graphite prospect is the proximity of both Highway 1 and a local railway line to Pt Lincoln (Figure 1). These overlie the southern 100m of the exposed graphitic zone and whilst providing logistical advantages, preclude open-pit development of that area. The proposed positioning of a DRT crusher immediately beyond the northern exposure of the prospect and subsequent road metal extraction may provide further extensions to the prospect. Further, the provision of these facilities conceivably could allow the rapid acquirement of a bulk testing sample.

ULEY

The Uley graphite deposit located 23km SW of Pt Lincoln is hosted within Hutchison Group metasediments and is open-pit mined from multiple workings over 70 Ha of leases. High quality crystaline 95+% purity graphite flake is produced with a forecast minimal annual production of 11,000 tonnes, of $14M value at current prices. Uley was worked until 1951, and was reactivated by Solution Mining Pty Ltd (83% owned by Tarcoola Gold Pty Ltd) in 1988. Solutions Mining's lack of necessary capital to achieve economy of scale in the operation lead to the involvement of the US based Pittston Company. Pittston undertook a feasibility study and subsequently entered into a $7.5M plant and development investment in the Uley graphite mine to earn 75% interest. Uley is the only graphite mining operation in Australia, with a drill indicated resource of 390 Mt at 6.6% graphite.

RECOMMENDATION

Whilst graphite is not on ARL target commodity, its economics are attractive (Attachment 3, S. Toteff, 1990 internal). The investment of $7.5M in the Uley mine by Pittstons suggests that economic viability and marketability exists for an Eyre Peninsula graphite product. Given that it is the companies intention to seek JV partners for EL 1567, it is proposed that an approach to the Uley mine operators be made to fund further exploration of the Balumbah graphite prospect.

REFERENCES

S. Toteff, 1990, Internal ARL memo Graphite.

Taylor, W.R. & Berry, R.F., Origin at the Proterozoic Graphite Deposits of the Southern Eyre Peninsula. Preceedings of the 10th AGC, Hobart, 1990, 230-231.

SADME Mineral Industry Quarterly, No's 62 (June 1991), 58 (June 1990), 57 (March 1990) & 53 (March 1989).

WMC, 1986, Final Report for EL 1181 (Caralue), S.A.

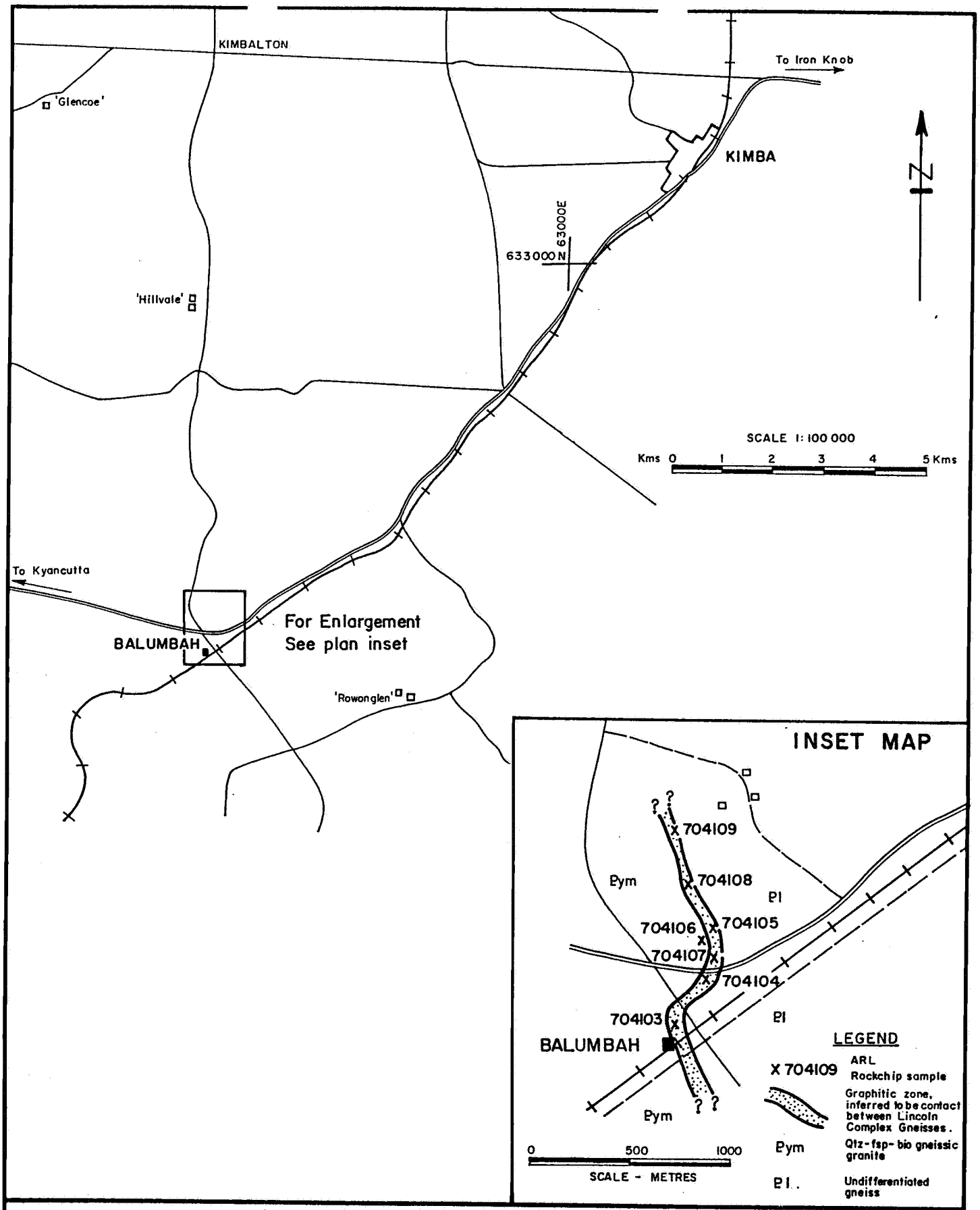
ATTACHMENTS

Figure 1 - Prospect Location & Detail

Attachment 1 - Total Carbon as Graphite, Balumbah

Attachment 2 - Petrology Report, Balumbah

Attachment 3 - November 1991 Industrial Mineral Prices



Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 6

REVISIONS			
Init.	Date	Init.	Date

SOUTH AUSTRALIA

EL 1567 - CARPIE PUNTHA

BALUMBAH GRAPHITE PROSPECT

PROSPECT LOCATION AND GEOLOGY

Compiled :	
Drawn : BPC	
Traced : NB	
Checked :	
Location Code : SI 53-7	Scale : AS SHOWN
Date : JANUARY 1992	Plate No. : CPN-7

Page G1

Report 2AD0212

Sample ID Code Results in	TGC GRAV 4D %
704102	0.01
704103	6.38
704104	6.10
704105	1.65
704106	5.39
704107	11.9
704108	8.15
704109	8.09

Prices

Prices obtained often vary widely acxcording to type, source, quality, quantity purchased and application. Hence the following quotations can only serve as a guide to the prices obtained by producers and dealers. The unit of weight is the metric tonne, unless otherwise stated, and CIF prices are normally CIF main European port. To accord with trade practices, certain prices are quoted in US$ (sterling now floating at around $1.60-1.80 = £1).

Abrasives

Emery, coarse grain CIF	£145-180
medium and fine grain, CIF	£150-210
Garnet (Idaho) 8-250mesh, 20 ton lots, FOB mine	$160-220
Fused alumina, 8-230 mesh, CIF	
Brown, min 94% Al_2O_3	£380-450
White, min 99.5% Al_2O_3	£530-600
Silicon carbide, 8-220 mesh, CIF	
Black, about 99% SiC Grade 1	£700-750
Grade 2	£600-700
Green, over 99.5% SiC	£850-950

Alumina & Bauxite

Alumina, calcined 98¼-99¼% Al_2O_3 bags included 20-ton lots, del UK	£250-310
Alumina, calcined, medium-soda content, 50-ton lots	£285-335
Bauxite, abrasive grade, min 86% Al_2O_3, CIF	$95-108
Bauxite, refractory grade, min 86% Al_2O_3, CIF	$200-210
Chinese Grade I typical 85% Al_2O_3, CIF	£60
Grade II typical 80% Al_2O_3, CIF	£53
Guyana bauxite, refractory grade, FOB rail car - Baltimore or barge - Gulf Coast	$175

Antimony

Lump sulphide ore, 60% Sb CIF	$25.00-26.75
Antimony oxide typ 99.5% Sb_2O_3 FOB Antwerp, (5t lots)	£2, 700

Aplite

Glass grade, bulk 100% +200 mesh FOB Montpelier VA	£25.75

Asbestos

Canadian chrysotile, FOB mine Quebec car load lots:	
Group No 3	C$1,550-2,500
Group No 4	C$1,080-1,500
Group No 5	C$710-840
Group No 6	C$520
Group No 7	C$160-310

Attapulgite

Bagged, min 1 tonne lots, ex-works UK	£90

Ball Clay

Air-dried, shredded, bulk, FOB	£15-45
Refined, noodled, bulk, FOB	£40-60
Pulverised, air floated, bagged, FOB	£70-110

Barytes

Ground, white, paint grade, 96-98% $BaSO_4$, 99% 350 mesh, 1-5 tons, del UK	£150-190
Micronised, min 99% <20 microns del UK	£140-150
Unground, OCMA bulk, FOB Morocco SG 4.25:	$40
SG 4.10:	$34
Ground OCMA bulk, del Aberdeen	£45-52
del Gt Yarmouth	£55-68
API, ground, FOB Gulf Coast:	
wholesale	$70-75
retail	$85

Bentonite

Wyoming, foundry grade, 85% <200 mesh, bagged, 10-ton lots del UK	£120-130
FOB plants, Wyoming rail hopper cars, bulk sh ton	$18.00-35.00
FOB plants, Wyoming, bagged rail cars, sh ton	$33.00-45.00
Fullers' Earth, soda ash-treated, del, UK foundry grade, bagged	£85-95
Civil engineering grade, bulk	£60-70
OCMA, bulk del UK	£65-70
API, FOB plant, Wyoming, rail cars, bagged, sh ton	$34.50

Boron minerals

Turkish lump colemanite, 40-42% B_2O_3, FOB	$300-365

Borates

Paper bags, del UK (2-24 tonne lots)	
Anhydrous borax	£802-746
British refined	
Decahydrate borax, gran, tech	£456-400
Pentahydrate, borax, gran refined	£410-354
Boric acid, gran, tech	£658-602

Bromine

Bulk purified (99.95% Br) ex-works per lb	$0.57-0.58

Calcium Carbonate

Uncoated, ex-works UK	£26-40
Coated, ex-works UK	£58-73

Chromite

Transvaal, chemical grade, 44/45% Cr_2O_3, FOB	$70-75
Transvaal, foundry grade, 45% Cr_2O_3, FOB	$74-78
Transvaal, refractory grade, 46% Cr_2O_3, FOB	$85-95
Philippine, refractory grade, concentrates, FOB	$100-120
Sand, moulding grade, 98% <30 mesh, del UK	£120-150

Diatomite

US calcined filter-aids, del UK	£315-330
US flux-calcined filter-aids, del UK	£330-360

Feldspar

Ceramic grade, powder, 300 mesh, bagged, ex-store UK	£140
Sand, 28 mesh, glass grade, ex-store UK	£65
Ceramic grade, bulk, sh ton	
FOB Spruce Pine, NC, 170-250 mesh	$50.00
FOB Monticello, Ga, 200 mesh high potash	$82.50
FOB Middleton, Con, <200 mesh	$67.50
Glass grade, bulk, sh ton	
FOB Spruce Pine, NC, 97.8% >200 mesh	$83.50
FOB Monticello, Ga, 92% >200 mesh, high potash	$64.75
FOB Middleton, Con, 96% >200 mesh	$45.50

Flint Clay

Calcined, CIF	£58-63

Fluorspar

Metallurgical, min 70% CaF_2, ex-UK mine	£85-90
Acidspar, dry basis 97% CaF_2 bagged ex-works	£140-150
Acidspar, dry, bulk ex-works tankers	£125-135
Acidspar Chinese dry bulk, CIF Rotterdam	$106-110
Mexican, FOB Tampico, Acidspar filtercake	$122-127
Metallurgical	£90-95
South African acidspar dry basis, FOB Durban	$120-125
USA, Illinois district, bulk, sh tons acidspar	$190-195

Garnet

Idaho almandine, 8-250 mesh, 20 sh ton lots, FOB Seattle, Washington	$195-255

Graphite

CIF UK port	
Crystalline lump, 92-95% C	$750-1,500
Crystalline large flake, 85/90% C	$650-1,200
Crystalline medium flake, 85/90% C	$450-1,000
Crystalline small flake, 80/95% C	$400-600
Powder (200 mesh), 80/85% C	$826-860
90/92%	$520-600
95/97%	$770-1,000
97/99%	$1,000-1,300
Amorphous powder, 80/85% C	$220-440

Gypsum

Crude, ex-mine or CIF UK	£6-7

Ilmenite

Bulk concentrates, Australian, min 54% TiO_2, FOB	A$90-100
Indian, 'Q' grade, 58/60% TiO_2 FOB Neendakara	nom
US concentrate, bulk, FOB E. Coast sh ton	nom

Iodine

Crude iodine crystal, 50 kg drums 99.5% min, per kg del UK	$15-16

Iron Oxide pigments

Spanish ochre	
Standard (53 microns), FOB Spain	$115 min
Micronised, FOB Spanish port	$200 min
Ochre, FOB Carterville, CL/TL, sh ton, cents per lb	
Light (No 404)	$0.17
Medium (No 548)	$0.12
Dark (No 808)	$0.0925

Kaolin

Refined, principal grades, bulk FOB:	
Coating clays	£75-120
Filler clays	£45-65
Pottery clays	£30-90

amdel

Amdel Limited
(Incorporated in S.A.)
31 Flemington Street,
Frewville, S.A. 5063

A.C.N. 008 127 802

P.O. Box 114,
Eastwood, S.A. 5063

Telephone: (08) 372 2700

Telex: AA82520
Facsimile: (08) 79 6623

6 December 1991

Aberfoyle Resources Limited
91 Beulah Road
NORWOOD SA 5067

Attention: Mr C G Drown

REPORT G 6398/92

YOUR REFERENCE:	Order No. 12016 dated 11/11/91
IDENTIFICATION:	402467 ~~and DA composites 1-3~~ not included; outside Carpie Puntha
MATERIAL:	~~Drill~~ chip samples
DATE RECEIVED:	12 November 1991
WORK REQUIRED:	X-ray diffraction analysis, petrography and mineragraphy
Investigation and Report by:	Frank Radke and Michael Till

Keith Henley

Dr Keith J Henley
Manager, Geological Services

hk

The individual petrographic and mineragraphic descriptions of each sample follows. All of the samples contain a weakly birefringent clay mineral which has been termed clay in the list of minerals but by X-ray diffraction analysis is shown to be kaolinite. It is possible that minor smectite is present in at least some samples and has not been detected by X-ray diffraction analysis. All of the samples also contain a titanium mineral which was identified as anatase by X-ray diffraction analysis.

Sample: 402467 : TSC56339

Rock Name:
Graphitic Schist

Hand Specimen:
This sample consists of chips up to ~1 cm in size which are generally have a medium grey colour. Some milky white quartz chips are present and a few chips exhibit localised reddish-brown iron staining.

Thin Section:
An optical estimate of the constituents gives the following :

	%
Quartz	40
Muscovite	35
Clay (kaolinite)	15
Graphite	6
Anatase	3
Goethite	1

This sample consists mainly of a deformed, granoblastic quartz intergrown with well developed muscovite flakes which generally exhibit a preferred orientation defining a lepidoblastic foliation. The quartz typically exhibits sutured grain margins and undulose, strained extinction and tends to be concentrated in slightly elongate, lenticular bodies. The muscovite flakes are generally below 0.5 mm in size and at least some have contorted, deformed characters.

The sample also contains moderate amounts of a pale brown weakly birefringent clay believed to be kaolinite. The clay forms irregular patches up to about 1 mm in size and interstitial intergrowths between granoblastic quartz. Although most of the clay has a pale brown, weakly pleochroic colour a small amount of colourless clay is also present. The pale brown colour of the clay is most likely due to finely intergrown iron or titanium oxides.

Graphite forms well developed flakes which are typically between 20 and 500 μm in length. These flakes have a average length of 150 μm and most are between 50 and 200 μm long. Some graphite aggregates up to 1 mm in length are also present but these are quite rare. Most of the graphite is intergrown with clay located interstitially between quartz grains (Plate 2).

A titanium mineral which is most likely anatase forms disseminated grains up to 0.5 mm in size. It is considered possible that the turbid, brown colour of much of the clay is also due to anatase rather than goethite since in general the sample does not have an iron stained character. Minor goethite is present locally as interstitial intergrowths between quartz grains and fine intergrowths with the clay and muscovite/sericite.

This is a metamorphic rock comprised largely of quartz and muscovite with smaller amounts of graphite and anatase. The sample shows some retrograde alteration to kaolinite possibly under weathering conditions. Locally minor goethite is also present and is also very likely a weathering product. This sample has the coarsest graphite of the four samples examined. Photomicrographs of this sample are given in Plates 1 and 2.

TABLE 1: MINERALOGY BY X-RAY DIFFRACTION

402467		DA Composite #1		DA Composite #2		DA Composite #3	
Quartz	CD	Quartz	CD	Quartz	CD	Quartz	D
Muscovite	CD	Kaolinite	CD	Kaolinite	CD	Goethite	SD
Kaolinite	A	Muscovite	A	Calcite	A	Kaolinite	A
Graphite	Tr	Graphite	Tr	Ankerite/dolomite	A	Muscovite	A
Anatase	Tr			Muscovite	A	Graphite	Tr
				Graphite	Tr	Anatase	Tr
				Anatase	Tr	Calcite	Tr

Semiquantitative Abbreviations:

D = Dominant. Used for the component apparently most abundant, regardless of its probable percentage level.

CD = Co-dominant. Used for two (or more) predominating components, both or all of which are judged to be present in roughly equal amounts.

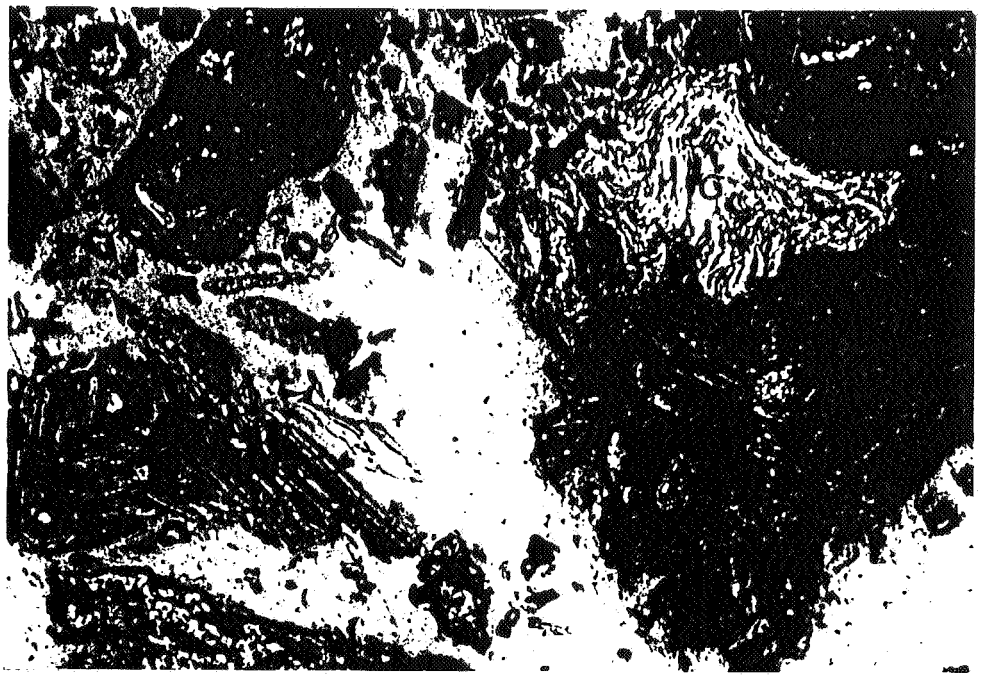
SD = Sub-dominant. The next most abundant component(s) providing its percentage level is judged above about 20.

A = Accessory. Components judged to be present between the levels of roughly 5 and 20%.

Tr = Trace. Components judged to be below about 5%.

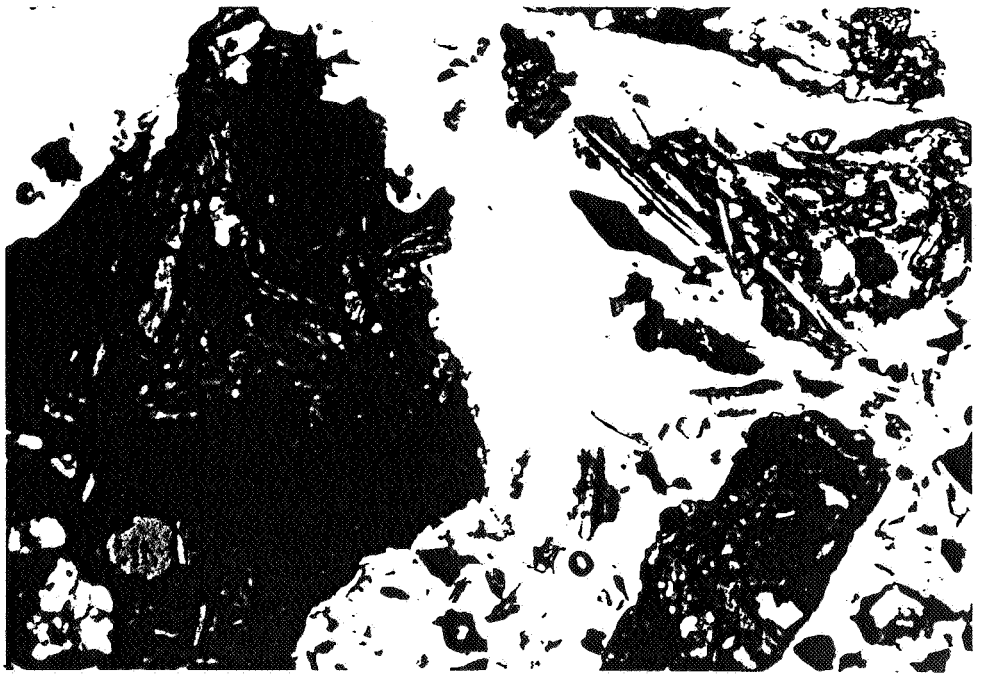
PLATE 1

Sample: 40267 : TSC56339



500 μm

a) Reflected light (1,5)



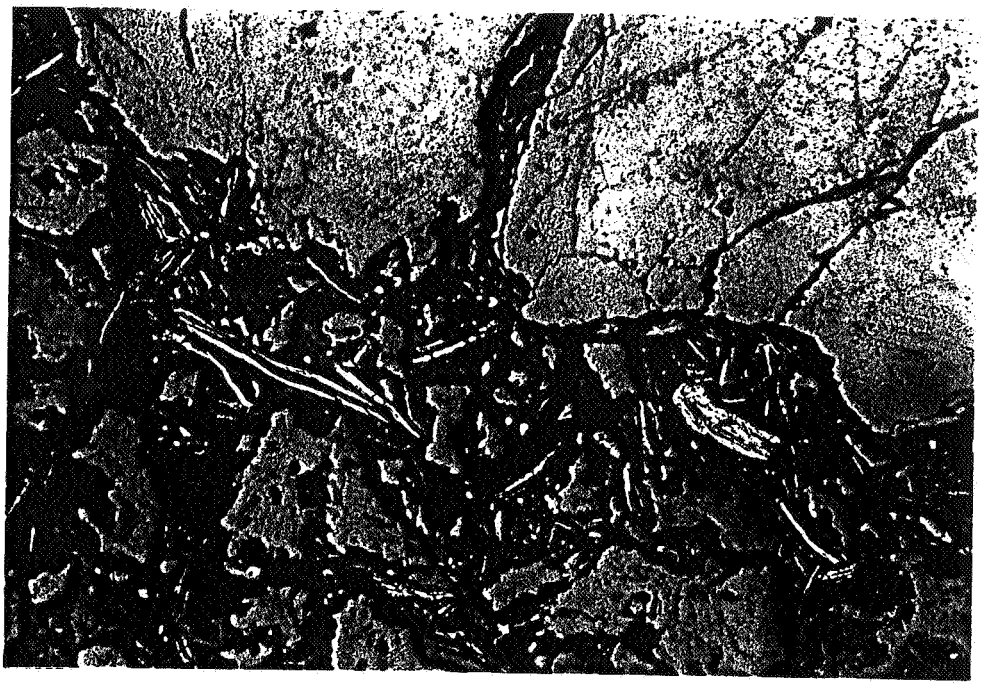
500 μm

b) Transmitted light (2,5)

The field contains contorted aggregate of graphite flakes (pale grey in reflected light; G) and a liberated graphite flake.

PLATE 2

Sample: 42067 : TSC56339



500 μm

a) Reflected light (3,5)

500 μm

b) Transmitted light (4,5)

The graphite flakes are intergrown with interstitial clay between the large quartz grains.

Carpie Puntha 2614

Pontifex & Associates Pty. Ltd.

TEL. (08) 332 6744
A.H. (08) 31 3816
FAX (08) 332 5062

26 KENSINGTON ROAD, ROSE PARK
SOUTH AUSTRALIA

P.O. BOX 91, NORWOOD
SOUTH AUSTRALIA 5067
A.C.N. 007 521 054

MINERALOGICAL REPORT NO. 6049

by A.C. Purvis, PhD

February 3rd, 1992

TO: Mr Ben Coutts
Aberfoyle Resources Limited
92 Beulah Rd
NORWOOD SA 5067

YOUR REFERENCE: Order No. 12410

MATERIAL: 8 Rock samples

IDENTIFICATION: 704104 to 704114

WORK REQUESTED: Thin and polished thin sections and description, with comments as specified.

SAMPLES & SECTIONS: Returned to you with this report.

PONTIFEX & ASSOCIATES PTY LTD

SUMMARY COMMENTS

The eight rock samples discussed in this report were described from polished thin section (five samples) and normal thin sections (one sample). For one of the samples (704110) the thin section was supplemented by polishing the offcut as the sample was mostly opaque in thin section due to abundant manganese oxides.

The polished thin sections represent weathered graphitic metasediments, from quartz-rich to kaolin-rich, locally with abundant limonite. Limonite coating in 704109 has apparently preserved the graphite from shredding during weathering, as graphite in the other samples has been shredded - i.e. occurs as flakes split along the basal cleavage, infilled by clay lenses.

The characteristic of the graphite-bearing rocks are summarised on the accompanying table (Table 1).

Examples of the textural types of graphite are illustrated in Figure 1 attached.

The samples examined in this section (704112, 704114) are weathered felspathic to micaceous (704112) to cherty (704114) metasediments. No. 704112 is strongly layered with some graphite in apparently micaceous layers. No. 704114 was probably a BIF-related chert with quartz veins.

Sample 704110 consists of micro vermiform clays and minor quartz, extensively permeated and veined by manganese oxides. The clays are visible only on the polished surface and may have replaced felspar and mica. Boxworks after possibly manganese-rich garnet are present.

FIGURE 1 : TEXTURAL VARIATION SEEN IN GRAPHITE FLAKES IN SAMPLES DESCRIBED FOR PONTIFEX REPORT NO. 6049

A) Neither kinked nor shredded, but enclosed in limonite (spotted) (e.g. 704109)

B) Kinked, but not shredded

C) Shredded, but not kinked (e.g. 704105)

D) Kinked and shredded (e.g. 704104; 106)

TABLE 1 : CHARACTERISTICS OF GRAPHITE-BEARING SAMPLES, PONTIFEX REPORT NO. 6049

Sample No.	Lithology	Estimated Vol. % Graphite	Length of Graphite Flakes (mm)	Thickness of Graphite Flakes (microns)	Textures
704104	Kaolinised felspar-rich gneiss, minor quartz and mica	7-10%	0.2 - 0.5	5-40	Kinked and shredded
704105	Layered gneiss with quartz and kaolin, and boxworks after garnet. Limonite-rich	1-2%	0.1-0.6	5-100	Planar to shredded
704106	Quartzite	7-10%	0.2-1.5	10-100	Kinked and shredded
704108	Felspar-rich gneiss, kaolinised with quartz. Some kaolin after mica(s)	10%	0.2-1.5	10-100	Shredded and weakly kinked
704109	Quartzite, limonite-rich	10-15%	0.2-4	10-100	Enclosed in limonite. No kinking or shredding
704112	Layered schist	<1%	not measured		Not recorded

INDIVIDUAL DESCRIPTIONS

704104 — Weathered gneiss with graphite-rich alternating with graphite-poor layers. Typically quartz-poor but with some quartz-rich layers, and kaolin-rich.

The host rock in this sample is relatively quartz-poor, with layers rich in quartz to 2mm thick, and disseminated fine granular quartz. An overall quartz content of 7-10% is indicated.

The graphite occurs in layers separated by a graphite-poor layer 5-10mm thick. The matrix varies from quartz-rich to layers, as described above, to fine grained massive to vermiform kaolin after felspar. No indication of the grain size or type of felspar is evident.

Graphite varies from 3 to 15% of the various layers, as curved folded and kinked thin flakes 0.2 to 2mm long, averaging about 1mm and 5 to 40 microns thick. Bundles of parallel (shredded) flakes separated by quartz and/or kaolin are common and small massive clots to 1mm in size are rare.

704105 Weathered layered garnetiferous gneiss, with very minor graphite.

Boudinaged conformable quartz veins occur in this weathered gneiss, in which layers are variably quartz-limonite-rich, and kaolin-sericite-rich. Limonitic clay boxworks after garnet crystals to 6mm diameter are scattered. There is only very minor graphite in this sample, as thin flakes about 0.2 - 0.6mm long, largely unkinked but commonly shredded. The graphite content is 0-5% in various layers, averaging 1-2% throughout the whole rock.

704106 Quartzite with graphite and limonite.

The host rock in this sample is essentially a quartzite with lenses of decussate sericite to 5mm long, and minor disseminated sericite. About 7-10% of graphite is present, partly in lenses parallel to a spaced gneissic foliation, partly as poorly oriented to crenulated flakes between the foliated zones. Individual flakes are 0.2 to 1.5mm long and 10 to 100 microns thick, with lenses to 7mm long. Kinking and shredding are common. Narrow quartz veins are present.

704108 Quartz-kaolin-graphite rock, deeply weathered quartz-felspar graphite gneiss.

Kaolin in this sample has replaced layers, augen and possible metacrysts of felspar, separated by narrow quartz-rich laminae, to 3mm thick. Kaolinised mica flakes occur sporadically or in small lenses, mostly in and adjacent to the quartz laminae.

Most of the graphite is in or adjacent to the quartz-rich laminae, with small amounts in seams apparently separating former felspar augen to 5mm long, now altered to homogeneous kaolin.

The graphite occurs as single flakes or in bundles of flakes, 0.2 to 1.5mm long, and 2-100 microns wide. Shredding and some kinking are visible.

704109 Quartz-graphite schist with minor limonite.

Apart from leached limonite-lined cavities about 0.2 to 0.5mm in size, rarely filled by opal, this sample is composed of quartz, graphite and limonite. The graphite occurs in a folded foliation and is commonly embedded in limonite. There appears to be 10-15% graphite as flakes 0.2 - 4mm long, and 10 to 100 microns thick. Shredding and kinking are absent from the graphite in this rock.

704110 Manganese oxides with clays.

Manganese oxides dominate this rock with granular metamorphic quartz disseminated or in lenses and diffuse layers to 2mm wide. Vermiform clays are ubiquitous, with some more lamellar clays possibly after mica, all extensively permeated along contacts and internal cleavages by extremely fine manganese oxides. Managnese oxide boxworks possibly replacing small garnet crystals are scattered to form about 10% of the sample.

Veins of relatively more concentrated and massive manganese oxide, as elongate crystals, are common, roughly parallel in layering.

The original rock may have been felspathic with micas, garnet and quartz, but has been flooded by manganese oxide.

704112 Clay-altered layered metasediment with graphite in schistose layers.

Sericitic clays (illite $\pm$ kaolin) dominate this rock with layers 0.5 to 3mm thick, alternately columnar to decussate, and schistose. Minor graphite appears to be present in the schistose layers, and limonite in the others. A layered micaceous metasediment is the most probable genesis.

704114

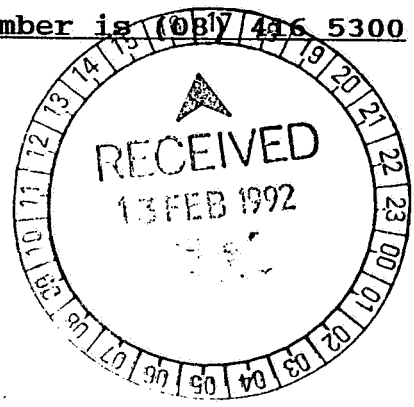
Quartz-limonite-clay rock with quartz veins. Weathered metamorphosed iron-rich chert, which originally contained amphibole.

This is essentially a laminated quartzite with limonite ± clays in laminae apparently after amphibole rosettes. Lenses of dense limonite and clays may also be after amphibole and are up to 15 x 5mm. Quartz veins are common to 10mm wide, locally enclosing dense limonite-clay lenses. The original rock was probably an iron-rich chert.

Carpie Puntha 26

CLASSIC LABORATORIES LTD
Incorporated in WA; a wholly owned subsidiary of Amdel Ltd
Osman Place, Thebarton, South Australia 5031
Telephone: (08) 43 5722 Facsimile: (08) 234 0321

Please note our new Phone Number is (08) 416 5300



Mr Ben Coutts
Aberfoyle Exploration Pty Ltd
91 Beulah Road
NORWOOD
SA 5067

F I N A L A N A L Y S I S R E P O R T

Your Order No: 12409 Our Job Number : 2AD0212

Samples received : 24-JAN-1992 Results reported : 11-FEB-1992
No. of samples : 22
Report comprises a cover sheet and pages 1 to 4

This report relates specifically to the samples tested in so far as that the samples as supplied are truly representative of the sample source.

Please note code GRAV4D reported as 'TGC' is an abbreviation for 'Total Graphitic Carbon'.

Note:
If you have any enquiries please contact Miss Anne Reed quoting the above job number.

Approved Signatory:

John Waters
Laboratory Manager - Adelaide

MM Mr Ben Coutts SA

Report Codes:
N.A. - Not Analysed.
L.N.R. - Listed But Not Received.
I.S. - Insufficent Sample.

Distribution Codes:
CC - Carbon Copy
EM - Electronic Media
MM - Magnetic Media

"RELIABLE ANALYSES AT COMPETITIVE COST"

CLASSIC LABORATORIES

ANALYTICAL REPORT

Job: 2AD0212
O/N: 12409

Sample	Ag	As	Bi	Cd	Co	Cr	Cu
704101	<1	<3	<10	<3	2	120	13
704102	<1	<3	<10	<3	2	90	7
704103	<1	5	<10	<3	<2	110	32
704104	<1	<3	<10	<3	<2	35	5
704105	<1	<3	<10	<3	2	110	48
704106	<1	4	<10	<3	<2	82	12
704107	<1	<3	<10	<3	<2	38	5
704108	<1	24	<10	<3	7	80	900
704109	<1	40	<10	<3	8	175	230
704110	<1	14	60	<3	165	50	26
704111	<1	82	20	<3	200	32	24
704112	<1	62	<10	<3	8	10	14
704113	<1	50	60	4	58	82	70
704114	<1	50	<10	<3	4	52	5
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
DL	1	3	10	3	2	2	2
Scheme	IC2A	IC2A	IC2A	IC2A	IC2A	IC2A	IC2A

CLASSIC LABORATORIES

ANALYTICAL REPORT

Job: 2AD0212
O/N: 12409

	Sample	Fe	Mn	Mo	Ni	Pb	P	Sb
	704101	1.34	55	9	10	10	100	<10
	704102	2.92	120	6	7	15	120	<10
	704103	2.18	45	10	8	5	30	<10
	704104	0.33	25	<3	3	80	60	<10
	704105	3.18	190	7	11	210	105	<10
	704106	1.01	135	6	5	55	45	<10
	704107	0.62	45	<3	3	10	20	<10
	704108	18.3	155	8	25	110	220	<10
	704109	27.6	180	10	16	85	80	<10
	704110	3.46	27.5%	5	125	75	830	<10
	704111	8.40	13.2%	<3	46	90	650	<10
	704112	34.6	980	<3	13	5	1300	<10
	704113	4.08	30.9%	12	320	50	790	<10
	704114	15.0	1950	<3	13	<5	700	<10
	Units	%	ppm	ppm	ppm	ppm	ppm	ppm
	DL	0.01	10	3	2	5	10	10
	Scheme	IC2A	IC2A	IC2A	IC2A	IC2A	IC2A	IC2A
Upper	Scheme	IC2A	IC2A					

CLASSIC LABORATORIES

ANALYTICAL REPORT

Job: 2AD0212
O/N: 12409

Sample	V	Zn
704101	13	34
704102	14	56
704103	100	11
704104	46	5
704105	50	36
704106	66	7
704107	46	5
704108	510	120
704109	410	72
704110	54	30
704111	98	34
704112	32	42
704113	70	420
704114	11	44
Units	ppm	ppm
DL	2	2
Scheme	IC2A	IC2A

CLASSIC LABORATORIES

ANALYTICAL REPORT

Job: 2AD0212
O/N: 12409

Sample	TGC
704102	<0.01
704103	6.38
704104	6.10
704105	1.65
704106	5.39
704107	11.90
704108	8.15
704109	8.09
Units	%
DL	0.05
Scheme	GRAV4D

APPENDIX 3

MT OLINTHUS - MILTALIE NORTH TREND

ROCK CHIP ASSAYS AND LEAD ISOTOPE REPORTS

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.

~~Cordony~~ Carpie Pun 2L

Phone (08)3365099

16 Sunbeam Road, Glynde, S.A. 5070

Fax (08) 3365564

ANALYTICAL REPORT No. 100580.35.06859

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

INVOICE TO: Mr I Freytag
Aberfoyle Resources Limited
91 Beulah Road

Norwood SA 5067

ORDER No.	PROJECT
13306	

DATE RECEIVED	RESULTS REQUIRED
06/09/91	ASAP

No. OF PAGES OF RESULTS	DATE REPORTED	No. OF COPIES
4	13/09/91	1

TOTAL No. OF SAMPLES: 81

SAMPLE NUMBERS	SAMPLE DESCRIPTION	ELEMENT/METHOD
681206/240 & others	ro Prep : OP021,59900	Cu,Pb,Zn,Ag,Co,Cd,Mn/GA140

RESULTS TO: Mr I Freytag
Aberfoyle Resources Limited
91 Beulah Road

Norwood SA 5067

RESULTS TO:

RESULTS TO:

REMARKS

AUTHORISED OFFICER

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	100580.35.06859	13/09/91	13306	1 OF 4

TUBE No.	SAMPLE No.	Mn	Co	Cu	Zn	Ag	Cd	Pb		
1	681206	65	5	70	360	<1.0	3	405		
2	681207	60	270	49600	5486	20.0	4	15		
3	681208	50	30	7848	1710	2.0	<1	40		
4	681209	40	120	11200	7990	1.0	5	85		
5	681210	2900	5	684	200	1.0	<1	35		
6	681211	4370	15	6854	402	2.0	<1	325		
7	681212	45	<5	42	22	<1.0	<1	<5		
8	681213	75	<5	120	80	<1.0	<1	35		
9	681214	35	<5	18	32	<1.0	<1	10		
10	681215	11900	5	146	66	<1.0	<1	10		
11	681216	50	<5	38	22	<1.0	<1	<5		
12	681217	6495	<5	750	24	<1.0	<1	5		
13	681218	80	<5	506	50	<1.0	<1	15		
14	681219	970	15	144	10	<1.0	<1	30		
15	681220	340	15	48	100	<1.0	<1	10		
3	681221	115	160	42700	374	1.0	<1	25		
17	681222	125	630	92800	2020	3.0	<1	50		
18	681223	59900	20	164	386	<1.0	2	10		
19	681224	250	10	1640	28	<1.0	<1	5		
20	681225	2420	10	121400	40	<1.0	<1	5		
21	681226	40	5	1205	4	<1.0	<1	5		
22	681227	400	10	2742	76	<1.0	<1	<5		
23	681228	60	<5	4714	14	<1.0	<1	10		
24	681229	380	15	610	66	<1.0	<1	10		
25	681230	290	25	27100	360	<1.0	<1	10		

Results in ppm unless otherwise specified
T = element present, but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER D.K.Rowley

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	100580.35.06859	13/09/91	13306	2 OF 4

TUBE No.	SAMPLE No.	Mn	Co	Cu	Zn	Ag	Cd	Pb		
1	681231	150	5	1160	144	<1.0	<1	35		
2	681232	375	5	196	20	<1.0	<1	<5		
3	681233	510	5	12	46	<1.0	<1	30		
4	681234	10200	5	24	26	1.0	<1	<5		
5	681235	26600	55	40	80	1.0	<1	15		
6	681236	2600	15	290	20	<1.0	<1	20		
7	681237	1555	5	9840	64	1.0	<1	15		
8	681238	4230	15	29800	86	2.0	3	20		
9	681239	26800	25	20000	76	25.0	<1	935		
10	681240	305	75	21900	888	24.0	<1	20		
11	681242	6875	5	452	196	<1.0	<1	35		
12	681243	80	5	1234	114	1.0	1	975		
13	681244	410	35	8290	54	<1.0	<1	10		
14	681245	40	5	832	122	4.0	<1	500		
15	681246	55	10	2242	142	29.0	2	12100		
	681247	605	1010	6622	5138	175.0	13	14700		
17	681248	60	5	468	70	3.0	<1	430		
18	681249	705	35	180	282	3.0	<1	330		
19	681250	190	10	26	120	<1.0	<1	25		
20	681251	280	5	30	44	<1.0	<1	30		
21	681252	320	10	8	286	<1.0	<1	<5		
22	681253	28400	210	16	336	<1.0	<1	10		
23	681254	45000	275	12	370	<1.0	<1	10		
24	681255	3900	140	40	1046	<1.0	<1	25		
25	681256	73200	115	20	796	<1.0	2	15		

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER D.K. Rowley

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	100580.35.06859	13/09/91	13306	4 OF 4

TUBE No.	SAMPLE No.	Mn	Co	Cu	Zn	Ag	Cd	Pb		
1	681282	39100	10	136	20	<1.0	<1	5		
2	681283	10800	70	12	144	1.0	<1	<5		
3	QC681220	350	15	54	90	<1.0	<1	5		
4	QC681240	310	75	21100	856	23.0	<1	15		
5	QC681260	32900	60	26	680	<1.0	1	15		
6	QC681280	6960	100	630	288	<1.0	<1	20		
7										
8										
9										
10										
11										
12										
13										
14										
15										
17										
18										
19										
20										
21										
22										
23	DETECTION	5	5	2	2	1.0	1	5		
24	UNITS	PPM	PPM	PPM	PPM	PPM	PPM	PPM		
25	METHOD	GA140	GA140	GA140	GA140	GA140	GA140	GA140		

Results in ppm unless otherwise specified
T = element present, but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER D.K.Rowley

Copies to 26

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.

Phone (08)3365099 | 16 Sunbeam Road, Glynde, S.A. 5070 | Fax (08) 3365564

ANALYTICAL REPORT No. 100580.35.06896

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

INVOICE TO:
Mr I Freytag
Aberfoyle Resources Limited
91 Beulah Road

Norwood SA 5067

ORDER No.	PROJECT
13320	

DATE RECEIVED	RESULTS REQUIRED
16/09/91	ASAP

No. OF PAGES OF RESULTS	DATE REPORTED	No. OF COPIES
2	04/10/91	1

TOTAL No. OF SAMPLES: 10

SAMPLE NUMBERS	SAMPLE DESCRIPTION	ELEMENT/METHOD
<681,205/6,211,239,243,245/49	ro Prep :	U,Th,Pb/GI222,Pb/GI223

RESULTS TO
Mr I Freytag
Aberfoyle Resources Limited
91 Beulah Road

Norwood SA 5067

RESULTS TO

RESULTS TO

REMARKS

AUTHORISED OFFICER

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	100580.35.06896	04/10/91	13320	1 OF 2

TUBE No.	SAMPLE No.	U	Th	Pb	Pb	Pb4:6	Pb7:6	Pb8:6	Pb6:4	Pb7:4
1	681205	21.70	3.02	~~DTF~~	85	0.0450	0.7291	1.8950	22.22	16.20
2	681206	5.72	7.67	394.00	-	0.0464	0.7450	1.8900	21.55	16.06
3	681211	3.53	10.70	289.00	-	0.0464	0.7475	1.8800	21.55	16.11
4	681239	732.00	1.57	925.00	-	0.0006	0.0833	0.0247	1666.7	138.83
5	681243	8.93	0.38	946.00	-	0.0443	0.7272	1.8370	22.57	16.42
6	681245	5.82	<0.05	481.00	-	0.0454	0.7364	1.8430	22.03	16.22
7	681246	12.00	0.61	13200	-	0.0454	0.7398	1.8830	22.03	16.30
8	681247	89.80	0.50	15000	-	0.0447	0.7311	1.8390	22.37	16.36
9	681248	0.91	0.22	424.00	-	0.0430	0.7045	1.7480	23.26	16.38
10	681249	31.80	6.84	312.00	-	0.0446	0.7305	1.8090	22.42	16.38
11										
12										
13										
14										
15										
17										
18										
19										
20	PLEASE NOTE: YOUR SAMPLE 681239 HAS SHOWN TO BE DOMINANT IN Pb204									
21	CAUSED BY HIGHISH URANIUM. CONSEQUENTLY THE LEAD ISOTOPE RATIO									
22	ANALYSIS ON THIS SAMPLE MAY BE BIASED DUE TO ROUNDING OF DECIMALS.									
23	DETECTION	0.05	0.05	1.00	1	0.0000	0.0000	0.0000	0.00	0.00
24	UNITS	ppm	ppm	ppm	%	-	-	-	-	-
25	METHOD	GI222	GI222	GI222	OA601	GI223	GI223	GI223	GI223	GI223

Results in ppm unless otherwise specified
T = element present, but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER D.K.Rowley

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	100580.35.06896	04/10/91	13320	2 OF 2

TUBE No.	SAMPLE No.	Pb8:4	Pb4:7	Pb6:7	Pb8:7	Pb4:8	Pb6:8	Pb7:8		
1	681205	42.11	0.0617	1.372	2.599	0.0237	0.5277	0.3847		
2	681206	40.73	0.0623	1.342	2.537	0.0246	0.5291	0.3942		
3	681211	40.52	0.0621	1.338	2.515	0.0247	0.5319	0.3976		
4	681239	41.17	0.0072	12.005	0.297	0.0243	40.486	3.3725		
5	681243	41.47	0.0609	1.375	2.526	0.0241	0.5444	0.3959		
6	681245	40.59	0.0617	1.358	2.503	0.0246	0.5426	0.3996		
7	681246	41.48	0.0614	1.352	2.545	0.0241	0.5311	0.3929		
8	681247	41.14	0.0611	1.368	2.515	0.0243	0.5438	0.3976		
9	681248	40.65	0.0610	1.419	2.481	0.0246	0.5721	0.4030		
10	681249	40.56	0.0611	1.369	2.476	0.0247	0.5528	0.4038		
11										
12										
13										
14										
15										
16										
17										
18										
19										
20	PLEASE NOTE: YOUR SAMPLE 681239 HAS SHOWN TO BE DOMINANT IN Pb206									
21	CAUSED BY HIGHISH URANIUM. CONSEQUENTLY THE LEAD ISOTOPE RATIO									
22	ANALYSIS ON THIS SAMPLE MAY BE BIASED DUE TO ROUNDING OF DECIMALS.									
23	DETECTION	0.00	0.0000	0.000	0.000	0.0000	0.0000	0.0000		
24	UNITS	–	–	–	–	–	–	–		
25	METHOD	GI223	GI223	GI223	GI223	GI223	GI223	GI223		

Results in ppm unless otherwise specified
T = element present, but concentration too low to measure
X = element concentration is below detection limit
– = element not determined

AUTHORISED OFFICER D.K. Rowley

Sirotope

CSIRO
AUSTRALIA

File
Carpie Puntha 26

Division of Exploration Geoscience
Institute of Minerals, Energy and Construction
51 Delhi Road, North Ryde. NSW. Postal Address: PO Box 136, North Ryde, NSW 2113
Telephone: (02) 887 8666. Telex: AA2S817. Fax: (02) 887 8909

Chief: Dr. B.J.J. Embleton

REPORT TO ABERFOYLE RESOURCES LTD

ON THE Pb ISOTOPIC COMPOSITIONS OF SAMPLES

FROM THE MT MILLAR PROSPECT,

EYRE PENINSULA, SOUTH AUSTRALIA

= Mount Millar mine (1 sample)

= Davey West (2 samples)

SIROTOPE REPORT SR 193

JUDITH A. DEAN

23/10/91

Floreat Park
Location: Underwood Avenue, Floreat Park
Postal Address: CSIRO Private Bag, PO Wembley WA 6014
Telephone: (09) 387 0200
Telex: AA92178
Fax: (09) 387 8642

Lindfield
Location: Bradfield Road, Lindfield
Postal Address: PO Box 218, Lindfield NSW 2070
Telephone: (02) 413 7733, 413 7211
Telex: AA26296
Fax: (02) 416 7902

1. INTRODUCTION AND AIMS OF STUDY

The aim of this study has been to carry out a Pb isotopic assessment of Pb-Zn mineralization and gossanous samples from the Mt Millar prospect, central Eyre Peninsula.

2. SAMPLES AND METHODS

Three samples were submitted by Ian Freytag. Sample descriptions, as provided, are given below.

681205 containing coarse galena, probably forming veinlets in a quartz-feldspar-biotite gneiss at the Mt Millar prospect.

681253 and 254 are from a layered gossan in the same area with good boxworks but Pb contents < 10 ppm.

A representative portion of each gossan was crushed in Mn steel. Galena was handpicked from **681205**, dissolved in concentrated nitric acid and Pb purified by micro-electrodeposition techniques. A small amount of each powdered gossan was weighed into a teflon beaker along with a known amount of ^{202}Pb spike in order that Pb contents could be determined simultaneously with isotope ratios. These were digested in a hot 1:1 mix of 7N HCl and 7N HNO_3 acids. Lead was extracted by anion exchange in dilute HBr acid solutions and purified as for the galena. The originally reported mass spectrometer run of **681254** (fax of 3/10/91) was very unstable. Due to its very low Pb content lead a repeat analysis was undertaken using a double anion excange column method only to extract and purify Pb. Lead contents are precise to within about ± 5% for low Pb levels.

Lead isotope ratios were determined on a VG ISOMASS 54E thermal ionization mass spectrometer run in fully automated mode. Results have been normalised to the accepted values of international standard SRM 981 by applying a correction factor of +0.08% per atomic mass unit. Precision estimates, based on over 1300 analyses of international standards and natural samples, are shown as error bars in the upper left hand corner of the accompanying figures. Also shown are 95% confidence ellipses based on these standard data.

3. TARGET Pb ISOTOPE SIGNATURES AND PREVIOUS WORK IN THE REGION

The target Pb isotope signature is that for Proterozoic massive sulfide mineralization of the Menninnie Dam style in the Hutchison Group. This signature has recently been slightly revised (Dean and Carr, 1991 in prep.) and is shown as a 95% confidence ellipse in the Figures.

Previous analyses have been obtained from galenas from the Miltalie Mine and other prospects in the central part of the Cleve Subdomain (Gulson, 1983; Carr, 1984; Carr and Dean, 1989; Dean and Carr, 1990; Dean and Carr, 1991). These have variable and highly radiogenic, anomalous Pb isotopic compositions giving "model" ages which are in the future. They also plot above average crustal Pb

evolution curves which lends further evidence to derivation of their Pb from a high U/Pb, or high μ ($^{238}U/^{204}Pb$) source terrane (Doe and Zartman, 1979).

4. RESULTS

Lead isotope ratios and Pb contents are given in Table 1 and plotted in Figure 1 with reference to the average crustal Pb evolution curve, or growth curve, of Cumming and Richards (1975) and the revised Menninnie Dam target ellipses.

Galena 681205 This result is considered to represent initial Pb isotope ratios at the time of formation of the mineralization i.e. they have not changed by *in situ* radioactive decay of U and Th to Pb. This galena has considerably more radiogenic Pb than the target for Proterozoic massive sulfide mineralization in the Hutchison Group and is similar to other data from the central Eyre Peninsula.

Gossans 681253 and 254 These gossans have very low Pb contents (6.1 and 2.4 ppm respectively) and very radiogenic $^{206}Pb/^{204}Pb$ ratios (44.16 and 39.50 respectively). There is undoubtably a very significant component of radiogenic Pb in these samples.

5. DISCUSSION

Galena 681205 The significant difference between the isotopic composition of galena from ***681205*** and the values of the target argue against its representing Proterozoic massive sulfide mineralization of the Menninnie Dam style. It has a highly "anomalous" $^{206}Pb/^{204}Pb$ ratio thus giving a "model age" in the future. Such ratios are not uncommon in the central Eyre Peninsula and indicate a much higher U/Pb ratio for the source rocks of this Pb. If the mineralization is epigenetic, then carbonate-rich rocks which are enriched in U with respect to Pb compared to average crustal rocks, are a possible source of high U/Pb. These are extensive in the Hutchison Group. Alternatively, the radiogenic values of this galena, and indeed all of the radiogenic mineralization in Cowell region, could have been derived from the Archean basement which unconformably underlies the Warrow Quartzite, the basal unit of the Hutchison Group and the host of the Miltalie deposit (Parker, 1990). The presence of U mineralization in the Gawler Craton is further evidence for a high U/Pb source.

In Table 2 and Figure 2, all of the available data for samples from the Cleve exploration areas are shown. These include data from Miltalie (Aberfoyle - Carr and Dean, 1990, Dean and Carr, 1991; Billiton - Gulson, 1983), Goongoona and Cleve (Dean and Carr, 1990), and Cleve West and Cleve Central (Gulson, 1983; Carr, 1984). Most of the data from this region are galenas and high-Pb samples and are thus considered to represent initial ratios. However, especially for the Cleve West samples, there is probably a radiogenic component.

Two broadly linear trends are indicated on the uranogenic Pb diagram. One of these, with lower $^{206}Pb/^{204}Pb$ and higher $^{207}Pb/^{204}Pb$ ratios includes three of the four Miltalie samples from Dean and Carr (1991). The other trend is comprised of all the rest of the central Eyre Peninsula data. The

two trends indicate that these epigenetic occurrences were derived from source rocks with significantly different U/Pb ratios. However, in both cases the U/Pb ratios were larger than "average crustal rocks" indicated by the growth curve. Such high U/Pb (μ) source rocks are likely to be "old" continental crust (Doe and Zartman, 1979).

Gossans 681253 and 54 The low Pb contents of the two gossans has resulted in a substantial radiogenic Pb component derived by the *in situ* radioactive decay of U and Th. It is not possible to determine the initial ratios of these samples. However, a few observations can be made, although it must be emphasised that these are based on a very small dataset.

On the $^{207}Pb/^{204}Pb$ vs $^{206}Pb/^{204}Pb$ diagram, the gossan data lie on a trend which projects back close to the Menninnie Dam ellipse. This "two point line" has a slope of 0.107 ± 0.0024 and gives an isochron "age" of about 1650 - 1850 Ma. The galena plots off this trend and, on the $^{208}Pb/^{204}Pb$ vs $^{206}Pb/^{204}Pb$ diagram, the gossans and galena have significantly different $^{208}Pb/^{204}Pb$ ratios. The gossans must have had initial $^{208}Pb/^{204}Pb$ ratios of < 37.5 and are thus not related to the galena, nor any of the epigenetic style mineralization from the central Eyre Peninsula (Fig. 2). The gossan data are therefore consistent with an initial ratio similar to the Proterozoic Menninnie Dam signature, although the exact ratios cannot be determined.

It has been noted that massive pyrrhotite bodies occur in the region (I.B. Freytag, pers. comm.) and sulfide facies iron formations, consisting of pyrite and pyrrhotite, occur locally throughout the Lower Middleback Subgroup of the Hutchison Group (Parker, 1990). The low-Pb nature of the gossans, their probable Middle Proterozoic isochron age, and the different $^{208}Pb/^{204}Pb$ ratios compared to probable epigenetic mineralization indicate that they were probably derived from such massive Fe-rich bodies.

6. CONCLUSIONS

The Pb isotope ratios of galena from sample ***681205*** are inconsistent with Proterozoic massive sulfide mineralization of the Menninnie Dam style. An enriched U/Pb source is indicated by the high $^{206}Pb/^{204}Pb$ and $^{207}Pb/^{204}Pb$ ratios of this sample and all the central Eyre Peninsula data.

The gossans ***681253 and 254*** are low in Pb and hence have highly radiogenic ratios. Their initial Pb isotope ratios cannot be estimated, however derivation from a different, more "Menninnie Dam" like mineralizing system than the galena is indicated because of differing Pb isotope systematics. A low precision Middle Proterozoic isochron age is indicated by the gossan data, consistent with the age of the Hutchison Group. Thus, it is possible that these gossans have developed from iron sulfide bodies such as exist in sediments Lower Middleback Subgroup.

7. REFERENCES

Carr, G.R. (1984). Evaluation of lead isotopes in exploration: further samples from the Gawler Craton for Shell (IV). Sept. 1984, 5p.

Carr, G.R. and Dean, J.A. (1989). Assessment of the metallogenic association of galenas from the central Eyre Peninsula, South Australia for Aberfoyle Resources Limited. ***SIROTOPE Report SR 086***, 19/07/89, 5p.

Cumming, G.L. and Richards, J.R. (1975). Ore lead isotope ratios in a continuously changing Earth. *Earth Planet. Sci. Letts, 28,* pp. 155-171.

Dean, J.A. and Carr, G.R. (1990). Report to Aberfoyle Resources Limited on a Pb isotope study of exploration samples from the Eyre Peninsula, South Australia. ***SIROTOPE Report SR 114***, 10/05/90, 32p.

Dean, J.A. and Carr, G.R. (1991). The metallogenic association of exploration samples from the Eyre Peninsula, South Australia - a report to Aberfoyle Resources Ltd. ***SIROTOPE Report SR 142***, 31/05/91, 14p.

Dean, J.A. and Carr, G.R. (1991). Report to Aberfoyle Resources Ltd on the Pb isotopic compositions of galenas from the Hutchison Group and the Gawler Range Volcanics, in the region of Menninnie Dam, South Australia. ***SIROTOPE Report SR 171***, in prep.

Doe, B.R. and Zartman, R.E. (1979). Plumbotectonic, the Phanerozoic. In H.L. Barnes (Ed.). Geochemistry of Hyrdothermal Ore Deposits. 2nd ed., John Wiley & Sons, New York, pp. 22-70.

Gulson, B.L. (1983). Evaluation of lead isotopes in exploration: Attempt to establish target signatures and drilling sites in the Gawler Craton for Shell. *Collaborative Lead Isotope Research Report No. 35,* 7p.

Parker, A.J. (1990). Gawler Craton and Stuart Shelf - regional geology and mineralization. In: F.E. Hughes (Ed.), Geology of the Mineral Deposits of Australia and Papua New Guinea. *The Aust. Inst. Min. & Metall., Monograph No. 14,* Melbourne, pp. 999-1008.

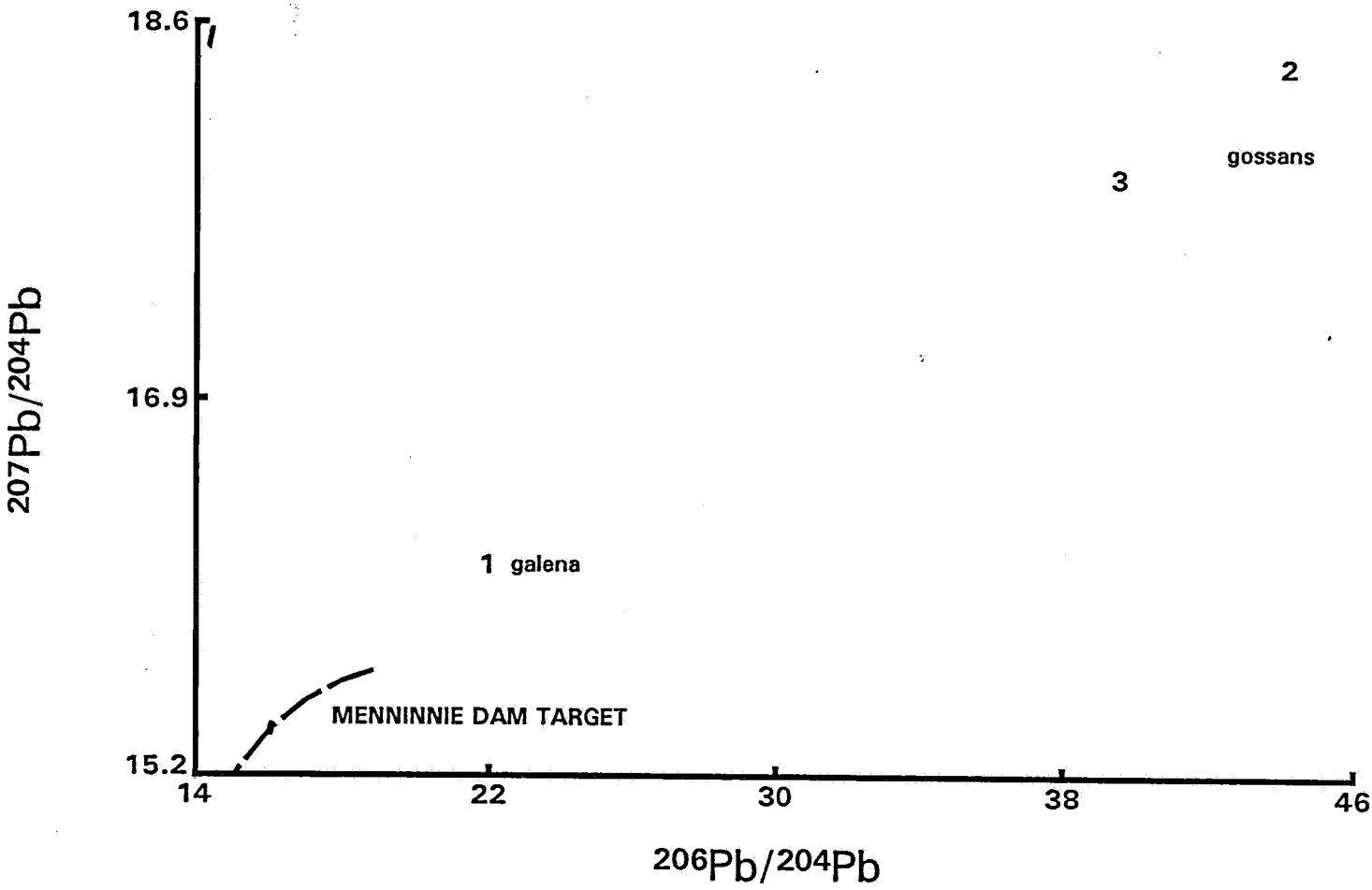
TABLE 1. LEAD ISOTOPE DATA FROM THE MT MILLAR PROSPECT

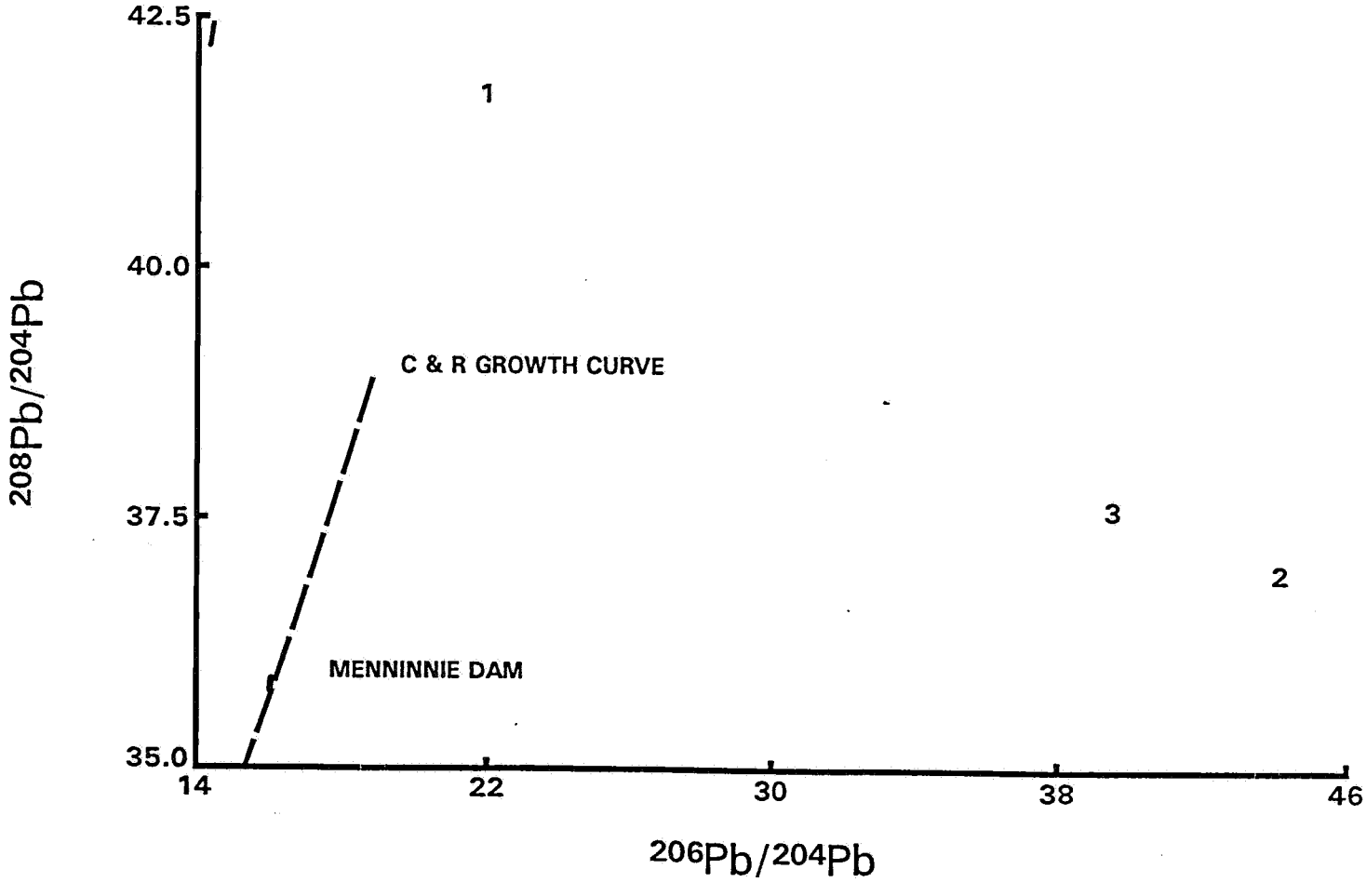
Sample	$\frac{^{208}Pb}{^{206}Pb}$	$\frac{^{207}Pb}{^{206}Pb}$	$\frac{^{206}Pb}{^{204}Pb}$	$\frac{^{207}Pb}{^{204}Pb}$	$\frac{^{208}Pb}{^{204}Pb}$	Pb(ppm)
MT MILLAR GALENA						
1 681205gn	1.9059	0.7374	21.907	16.154	41.753	
MT MILLAR GOSSANS						
2 681253	0.8379	0.4169	44.157	18.409	36.998	6
3 681254	0.9522	0.4532	39.503	17.905	37.614	2

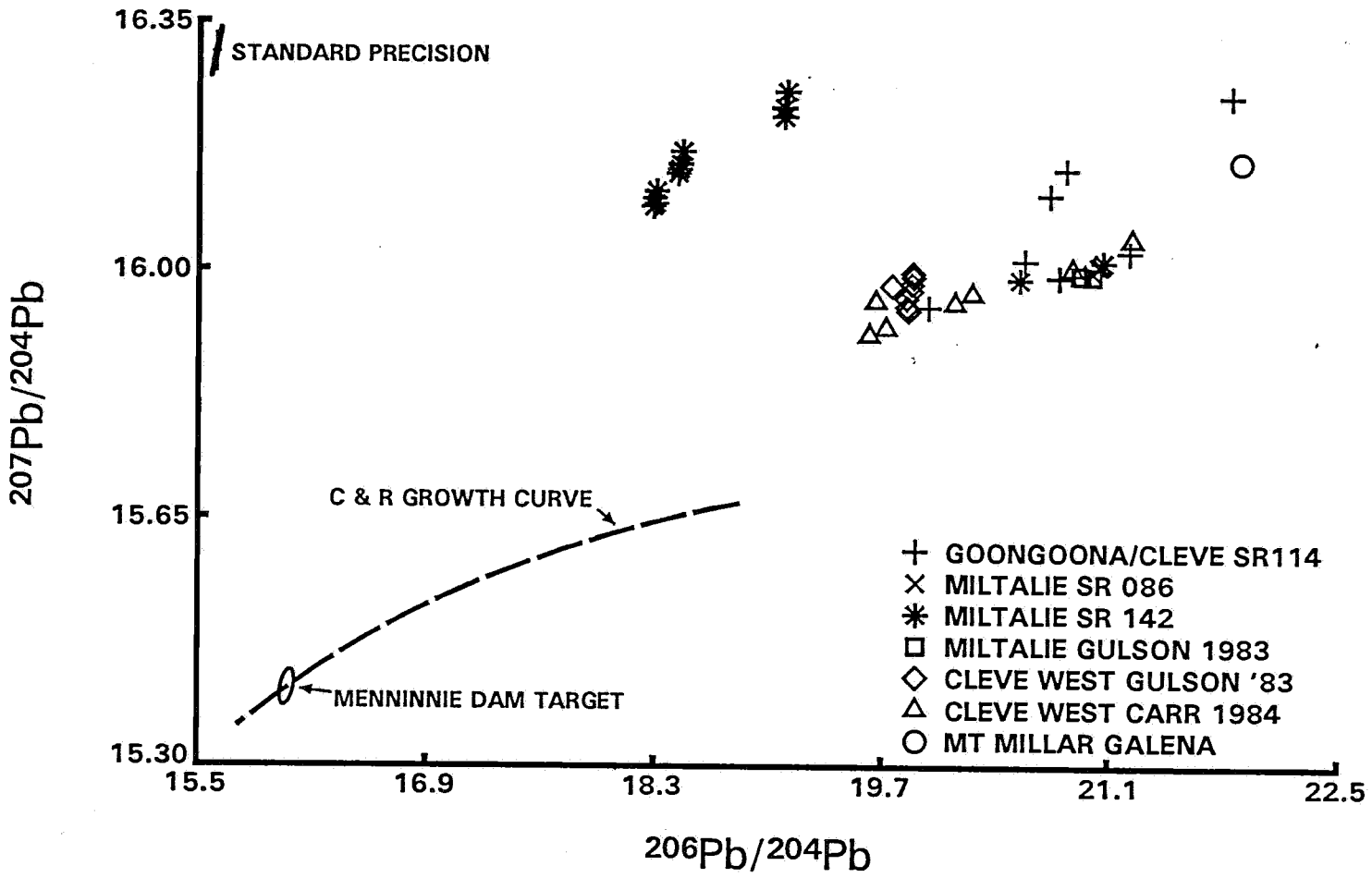
Pb CONTENTS ON GOSSANS DETERMINED BY ISOTOPE DILUTION
SAMPLE NUMBER PREFIXES REFER TO PLOTTED POINTS

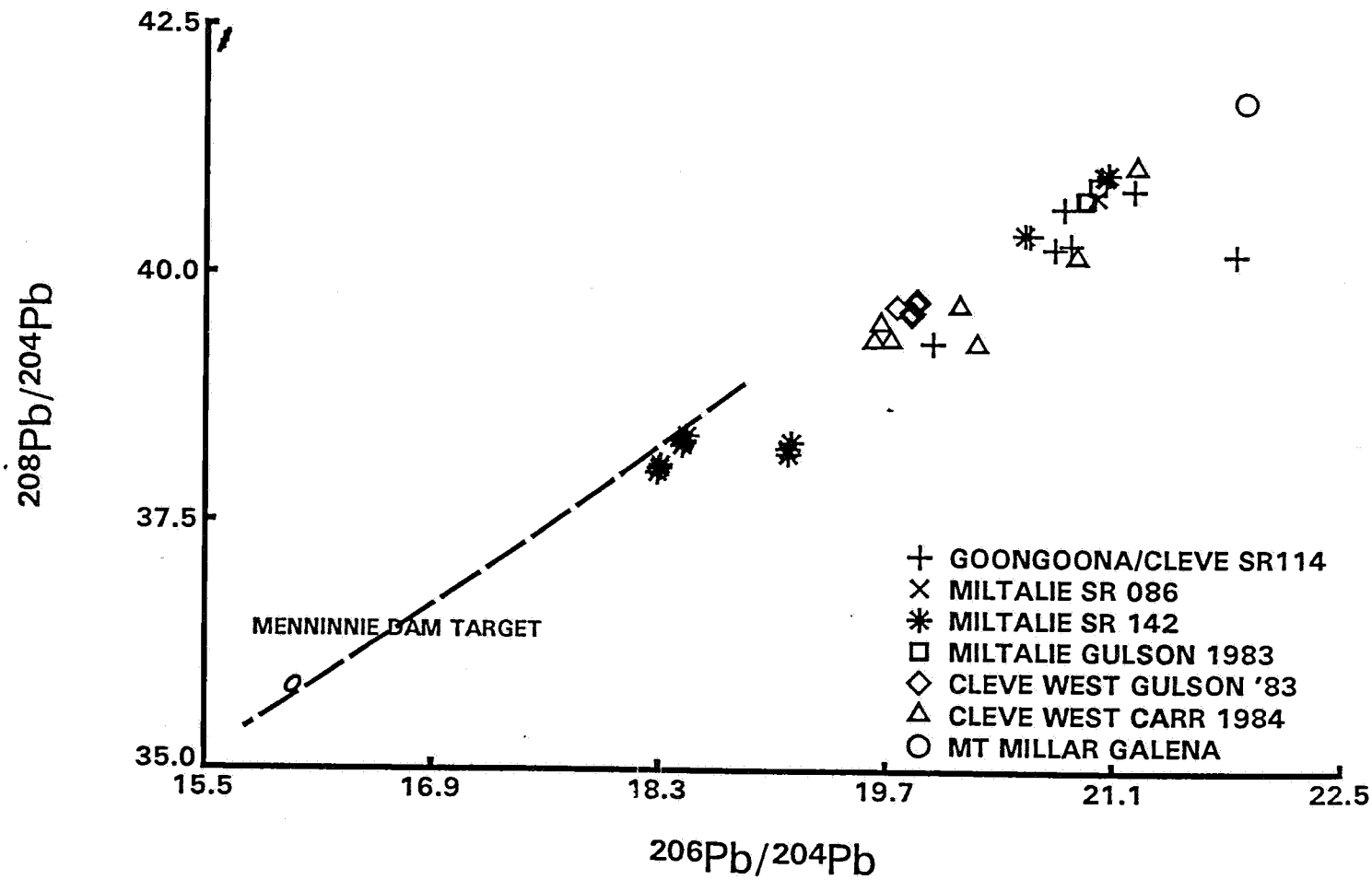
TABLE 2. LEAD ISOTOPE DATA FOR ALL CENTRAL EYRE PENINSULA

Sample	$\frac{^{208}Pb}{^{206}Pb}$	$\frac{^{207}Pb}{^{206}Pb}$	$\frac{^{206}Pb}{^{204}Pb}$	$\frac{^{207}Pb}{^{204}Pb}$	$\frac{^{208}Pb}{^{204}Pb}$	Pb(ppm)
GOONGOONA AND CLEVE SR 114						
1 DA 223724	1.8401	0.7436	21.848	16.246	40.203	870000
2 DA 223731	1.9343	0.7747	20.836	16.142	40.303	870000
3 DA 223734	1.9416	0.7767	20.736	16.106	40.261	870000
4 DA 223762	1.9664	0.7979	19.986	15.948	39.301	870000
5 DA 225199	1.9628	0.7781	20.581	16.014	40.395	870000
6 DA 225221	1.9245	0.7550	21.227	16.027	40.852	870000
7 DA 225300	1.9559	0.7690	20.794	15.991	40.670	870000
MILTALIE SR 086						
1 MILT 01	1.9426	0.7619	20.998	15.999	40.791	870000
2 MILT 01	1.9487	0.7608	21.039	16.007	40.998	870000
3 MILT 02	1.9469	0.7604	21.052	16.009	40.988	870000
MILTALIE SR 142						
1 RS527	1.9997	0.8492	19.095	16.216	38.185	1500
2 RS527	2.0026	0.8499	19.094	16.229	38.237	1580
3 RS527	2.0037	0.8503	19.113	16.251	38.296	1360
4 RS529	2.0762	0.8750	18.448	16.142	38.302	870000
5 RS529	2.0754	0.8750	18.441	16.136	38.272	870000
6 RS529	2.0775	0.8753	18.469	16.167	38.369	870000
7 RS529	2.0766	0.8751	18.453	16.149	38.320	870000
8 RS513	1.9661	0.7780	20.551	15.988	40.404	870000
9 RS513	1.9471	0.7601	21.067	16.013	41.018	870000
10 RS643	2.0786	0.8793	18.303	16.093	38.044	870000
11 RS643	2.0779	0.8797	18.288	16.089	38.001	870000
12 RS643	2.0799	0.8800	18.307	16.110	38.077	870000
13 RS643	2.0798	0.8801	18.294	16.101	38.049	870000
MILTALIE MINE GULSON 1983						
1 MINE1 GALENA	1.9479	0.7645	20.921	15.995	40.752	
2 MINE2 GOSSAN	1.9469	0.7640	20.935	15.994	40.760	
3 MINE3 ORE	1.9475	0.7615	21.002	15.994	40.900	
CLEVE WEST E.L. GULSON 1983						
1 DDHSC2A134.8	1.9943	0.8034	19.850	15.949	39.587	1000
2 DDHSC2A134.2	1.9948	0.8028	19.859	15.943	39.614	1000
3 DDHSC2A134.4	1.9962	0.8041	19.848	15.960	39.620	1000
4 PDB1 186-188	1.9988	0.8039	19.880	15.981	39.737	2200
5 PDB1186-188	1.9972	0.8035	19.877	15.971	39.697	2200
6 PDB1 146-148	2.0078	0.8087	19.758	15.978	39.671	1400
7 PDB1 182-184	1.9969	0.8040	19.889	15.990	39.717	1600
8 PDB1 182-184	1.9979	0.8043	19.888	15.996	39.734	1600
CLEVE WEST CARR 1984						
1 609727	2.0092	0.8116	19.659	15.956	39.499	1200
2 609728	2.0046	0.8109	19.618	15.908	39.326	1640
3 609750	1.9945	0.8072	19.720	15.918	39.333	2000
4 609773	1.9692	0.7917	20.150	15.954	39.679	1510
5 636135	1.9249	0.7666	20.875	16.002	40.182	440
6 636148	1.9397	0.7882	20.258	15.967	39.296	250
7 71826	1.9342	0.7553	21.242	16.044	41.086	740


18.6
16.9
15.2
$^{207}Pb/^{204}Pb$
2
gossans
3
1 galena
MENNINNIE DAM TARGET
14
22
30
38
46
$^{206}Pb/^{204}Pb$


42.5
40.0
37.5
35.0
$^{208}Pb/^{204}Pb$
1
C & R GROWTH CURVE
3
2
MENNINNIE DAM
14
22
30
38
46
$^{206}Pb/^{204}Pb$


16.35
16.00
15.65
15.30
STANDARD PRECISION
C & R GROWTH CURVE
MENNINNIE DAM TARGET
GOONGOONA/CLEVE SR114
MILTALIE SR 086
MILTALIE SR 142
MILTALIE GULSON 1983
CLEVE WEST GULSON '83
CLEVE WEST CARR 1984
MT MILLAR GALENA
15.5
16.9
18.3
19.7
21.1
22.5
207Pb/204Pb
206Pb/204Pb


42.5
40.0
37.5
35.0
MENNINNIE DAM TARGET
GOONGOONA/CLEVE SR114
MILTALIE SR 086
MILTALIE SR 142
MILTALIE GULSON 1983
CLEVE WEST GULSON '83
CLEVE WEST CARR 1984
MT MILLAR GALENA
15.5
16.9
18.3
19.7
21.1
22.5
208Pb/204Pb
206Pb/204Pb