CONTENTS ENVELOPE 5851

TENEMENT: E.L. 1252 - Lake Carnanto.

TENEMENT HOLDER: Pan Australian Mining Ltd.

Pan Australian Mining Ltd.

Incorporated in Queensland

C.G.A. HOUSE
379 Queen Street
Brisbane Qld

Telephone (07) 221 1350
Postal Address:
G.P.O. Box 712, Brisbane 4001
Telex: 44416

January 17, 1985

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

Dear Sir

EXPLORATION LICENCE 1252 (LAKE CHARLES)
QUARTERLY REPORT FOR THE PERIOD 24.9.84 TO 23.12.84

No field work was carried out within the area of EL 1252 during the quarter ending December 23, 1984.

Expenditure for the period totalled $99.00 and a Statement of Expenditure is attached.

Yours faithfully
PAN AUSTRALIAN MINING LTD.

L.W. PETERSON
Titles Officer

Encl.

STATEMENT OF EXPENDITURE

LAKE CHARLES (LAKE CANANTO)

FOR PERIOD 24.9.84 - 24.12.84

	$
Communications	4
Contract Geology	83
Outside Reproduction	3
Administration Charges	9
	$99

0005

Pan Australian Mining Ltd.

Incorporated in Queensland

C.G.A. HOUSE
379 Queen Street
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Telephone (07) 221 1350
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Telex: 44416

JEL:CG

April 19, 1985

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

Dear Sir

EXPLORATION LICENCE 1252 (LAKE CHARLES)
QUARTERLY REPORT FOR THE PERIOD 24.12.84 TO 23.3.85

Work during the past quarter has included assessments by Geophysicist, Hugh Rutter, and Geological Consultant, Graham Teale. These geophysical and geological interpretations are being combined to produce a regional geological assessment on which to base future exploration incentives.

Limited exchange of information is scheduled to take place with other Companies working on the Frome Embayment and the Olary Province.

Expenditure for the period totalled $357.00 and a Statement of Expenditure is attached.

Yours faithfully
PAN AUSTRALIAN MINING LTD.

J.E. Lynch
General Manager

Encl.

STATEMENT OF EXPENDITURE

E.L. 1252 (LAKE CHARLES)

FOR PERIOD 24.12.84 TO 23.3.85

	$
Salaries	113
Drafting - Outside Reproduction	180
Travel and Accommodation	32
Administration Charges	32
	$357

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Pan Australian Mining Ltd.

Incorporated in Queensland

C.G.A. HOUSE
379 Queen Street
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Telex: 44416

July 22, 1985

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

Dear Sir

EXPLORATION LICENCE 1252 (LAKE CHARLES)
QUARTERLY REPORT FOR THE PERIOD 24.3.85 TO 23.6.85

Work during the past quarter has included regional geological and geophysical assessments by Geophysicist, Hugh Rutter of Geophysical Exploration Consultants Pty Ltd, and Geological Consultant, Graham Teale. The geophysical analysis by H. Rutter is included in the Benagerie (E.L. 957) quarterly report. The geological assessment by G. Teale is still in progress.

Expenditure for the period totalled $1,655.00 and a Statement of Expenditure is attached.

Yours faithfully,
PAN AUSTRALIAN MINING LTD.

J.E. Lynch
General Manager

Encl.

STATEMENT OF EXPENDITURE

E.L. 1252 (LAKE CHARLES)

FOR PERIOD 24.3.85 TO 23.6.85

	$
TECHNICAL SERVICES	822
OPERATING EXPENSES	191
GEOCHEMICAL SAMPLING	75
TENEMENT HOLDING EXPENSES	333
ADMINISTRATION	234
TOTAL:	$1,655

STATEMENT OF EXPENDITURE

E.L. 1252 (LAKE CHARLES)

FOR PERIOD 24.6.85 TO 23.9.85

	$
TECHNICAL SERVICES	232
GEOCHEMICAL SAMPLING	314
OPERATING EXPENSES	56
ADMINISTRATION	90
	$692

PAN AUSTRALIAN MINING LTD.

FROME EMBAYMENT, SOUTH AUSTRALIA

AUTHOR: G. TEALE

DATE: OCTOBER 1985

REPORT NO. 1985/21

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LIST OF FIGURES

1. INTRODUCTION

Exploration Licence 957 (Benagerie) is located in the southeastern portion of the Frome Embayment, being approximately centred on the Benagerie area. It is 430km north-east of Adelaide and 100km northwest of Broken Hill. The main Sydney to Perth railway line and the Barrier Highway pass 100km south of the project area. The Exploration Licence is held 100% by Pan Australian Mining Ltd. and covers 2037 sq.km. An additional Exploration Licence 1252 (Lake Charles) to the north of Exploration Licence 957 was granted in September, 1984 and covers an area of 600 sq.km. These tenements cover distinctive basement geophysical anomalies forming a discreet circular pattern. Limited reconnaissance drilling has intersected highly anomalous base metal values associated with these distinctive geophysical anomalies. The geological environment in the project area is interpreted to be similar to the environment which hosts the Mt. Isa and Macarthur River ore deposits.

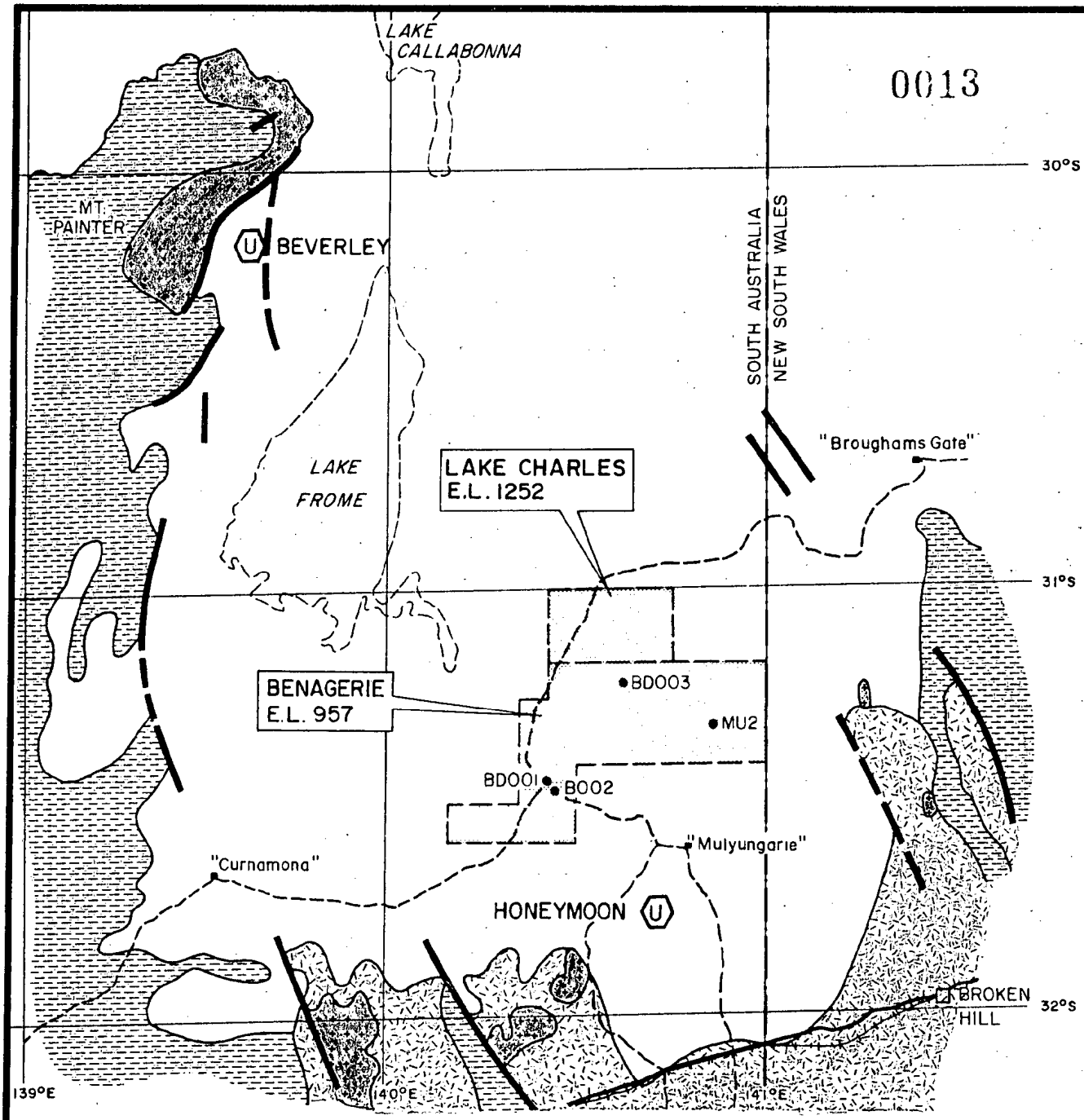
2. REGIONAL AND LOCAL GEOLOGY

The Frome Embayment, a southern lobe of the Great Artesian Basin, is underlain by a stable basement cratonic nucleus (the Curnamona Nucleus) of Early Proterozoic metamorphics beneath a cover of Early-Middle Proterozoic meta-sediments and Middle Proterozoic volcanics. The latter sequences are in turn blanketed by Quaternary/Tertiary sediments (up to a maximum of 100m in the Exploration Licence areas). The embayment is bounded by the Early Proterozoic Broken Hill and Olary Blocks (to the southeast and south respectively), the Mount Painter and Mount Babbage Blocks (to the northwest) and the Late Proterozoic and Cambrian Adelaidean Fold Belt (to the west). The Arrowie Basin, a Late Proterozoic-Cambrian half graben, containing in excess of 3km of Cambrian and (upper) Late Proterozoic sediments is situated to the west and west-north-west.

Running north-south through the centre of the embayment is a north-plunging, fault-bounded basement structure known as the Benagerie Ridge. This "ridge", which is almost fully concealed, is considered to have influenced Middle Proterozoic volcanism as well as Late Proterozoic and Cambrian sedimentation. The Exploration Licence areas held by Pan Australian Mining Ltd cover geochemical and geophysical "target zones" sited on and immediately adjacent to the Benagerie Ridge.

3. SUMMARY OF EXPLORATION CARRIED OUT BY MARATHON PETROLEUM AUSTRALIA, LTD. AND PAN AUSTRALIAN MINING LTD.

The area under discussion, Exploration Licence 957 and Exploration Licence 1252 were granted to Marathon Petroleum Australia, Ltd. in late 1979 and taken over by Pan Australian Mining Ltd. in April 1984. Initial exploration activity was directed at delineating shallow Tertiary palaeochannel uranium mineralisation. Some non-economic uranium mineralisation was encountered. Concurrent exploration for Roxby Downs style mineralisation was also being undertaken under the Mulyungarie Joint Venture with the Oilmin Group. Diamond drill hole MU-2 (Figure 1) was cored to 546 metres. This drill hole did not intersect economic mineralisation, however it did provoke thought on the age and depositional environment of the pre-Adelaidean (Late Proterozoic) meta-sediments encountered.

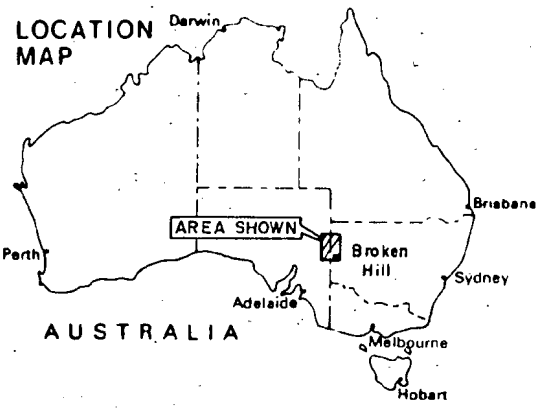


REFERENCE

- Tertiary and Quaternary
- PRECAMBRIAN
  - Sediments
  - Metamorphics
  - Granite
- Interpreted fault

LEGEND

- Diamond drill hole
- Highway
- Track
- Railway
- Homestead



Scale
0 50 100 Km.

PAN AUSTRALIAN MINING LTD.
BRISBANE AUSTRALIA

EL 957 BENAGERIE
EL 1252 LAKE CHARLES

LOCATION MAP

Mapped by G. Teale Date Sept. '85 FIGURE No. 1
Drawn by C. Chapman Plan No A4 UG-8

During the course of uranium exploration occasional sampling of the basement had been carried out to obtain petrological and geochemical data on the little known Cambrian and Proterozoic sequences underlying the Tertiary (and Mesozoic) sediments of the embayment. Anomalous base metal values were found in a number of these drill holes and exploration for Proterozoic base and precious metals commenced in late 1982. The best results from this early drilling are summarized below:

Hole No.	Cu	Mo	Ag	Pb	Zn	Interval
BE6	-	-	20	-	-	1 metre
BE7	2000	60	-	-	-	1 metre
BE37	1900	11	1	760	130	1 metre
BE39	350	-	-	-	-	1 metre
BE61	530	29	6	-	130	1 metre
BE195	1150	18	-	-	3600	10 metres

(results in ppm)

An examination of available gravity, magnetic and Landsat data in 1981 indicated that BE7 (drilled in 1980) appeared to be immediately east of a large magnetic high and close to a magnetic interpreted north-northeast fault zone which was also evident on the Landsat imagery. Early in 1982 a core hole, BE162c was drilled adjacent to BE7 to further evaluate the anomalous values. The sequence was cored from 110 to 138.7 metres and values of up to 5000 ppm Cu, 1450 ppm Zn, 450 ppm Pb, 2350 ppm Ba and 135 ppm U were intersected.

A geophysical interpretation by H. Rutter (Geophysical Exploration Consultants) in May 1982 of the regional gravity and magnetics confirmed a broad geophysical similarity to the Stuart Shelf and Roxby Downs area. According to Rutter "the similarities to the Andamooka area are quite striking and the potential for significant deposits of copper and uranium is very high". Ground magnetics and gravity were subsequently carried out over 198 line kilometres of grid covering the most significant magnetic anomalies on Exploration Licence 957. The objectives were to define the magnetic features in more detail and examine the gravity response in the light of the coincident gravity and magnetic anomalies at Roxby Downs. The gravity results did not exhibit any marked coincidence with the magnetics and were considered inconclusive.

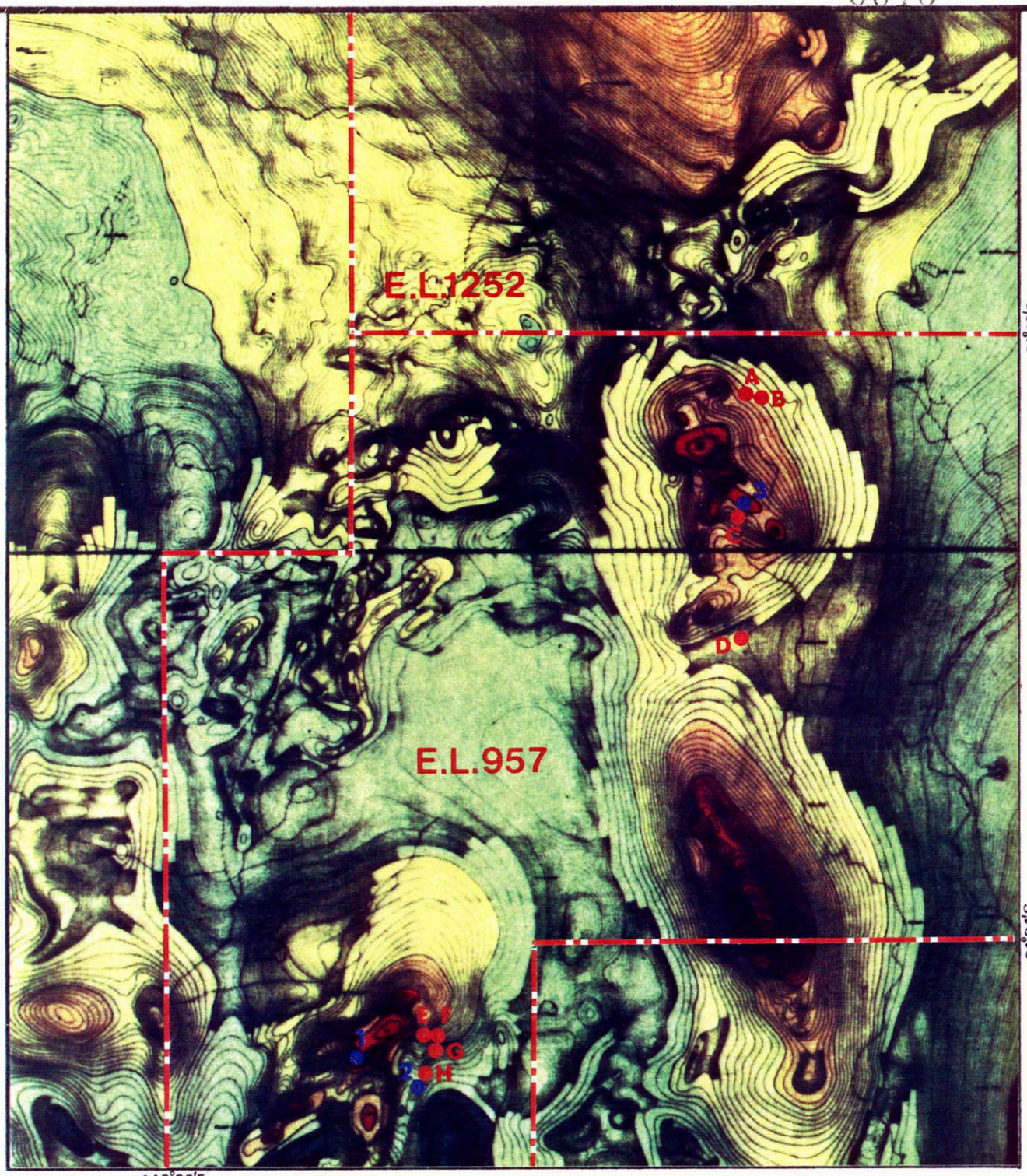
In late 1982 a three hole diamond drilling programme was carried out to:

a) provide more reliable stratigraphic information;

b) test the known geophysical anomalies; and

c) evaluate (at depth) previously located anomalous base metal values within the Proterozoic basement.

Drill hole BD001 (542.7 metres) was collared 2.8 kilometres south of "Benagerie" on the west of a magnetic anomaly covering the Benagerie area (Figure 2). Drill hole BD002 (302.5m) was collared adjacent to an earlier drill hole, BE195 (a Tertiary palaeochannel uranium hole) sited



● Diamond drillholes
1-BD01
2-BD02
3-BD03

● Percussion drillholes

A-BE5	E-BE7
B-BE6	F-BE162c
C-BE37	G-BE61
D-BE39	H-BE195

LOCATION MAP

Scale
0 5 10 15Km

PAN AUSTRALIAN MINING LTD.
BRISBANE AUSTRALIA

EL 957 BENAGERIE & EL 1252 LK. CHARLES Sth. AUST.

DRILLHOLE LOCATIONS AND REGIONAL AEROMAGNETIC PATTERN

Mapped by DME/SA-LP Date OCT. 85
Drawn by L.P. Plan No A4/UG-9

FIGURE No. 2

approximately 3km east-southeast of drill hole BD001. Drill hole BD003 (276.45m) was collared adjacent to BE37, approximately 30km northeast of BD001. All core was halved and analysed over 1m intervals for Cu, Pb, Zn, Co, Ag and Mo, with some intervals being analysed for Au, W, As, Ba, Ni, Cd and Mn.

Results from the essentially reconnaissance drilling were surprising with numerous low but significant metal values being intersected. The results are summarized below and shown diagrammatically in Figure 3:

Hole No.	Depth (m)	Interval (m)	Cu %	Mo %	Ag g/t	Zn %
BD001	96-97	1	0.40	0.04	2	-
	118-119	1	0.28	-	3	-
	122-130	8	0.16	-	-	-
	135-137	2	-	0.14	3	-
	152-159	7	0.35	0.14	-	-
	includes 4m @		0.54	0.24	2	-
	171-173	2	0.13	-	-	-
	221-222	1	0.19	-	1	-
BD002	127-206	79	-	-	-	0.37
incl.	127-132	4	-	-	-	0.35
	137-143	6	-	-	-	2.1
	143-152	9	-	-	-	0.55
	202-204	2	-	-	-	2.3
BD003	147-148	1	0.43	-	-	-

Anomalous values of Au (to 0.7 ppm), Co (to 880 ppm), Ba (to 0.84%), Cd (to 185 ppm), W (to 70 ppm) and As (to 1200 ppm) were also intersected.

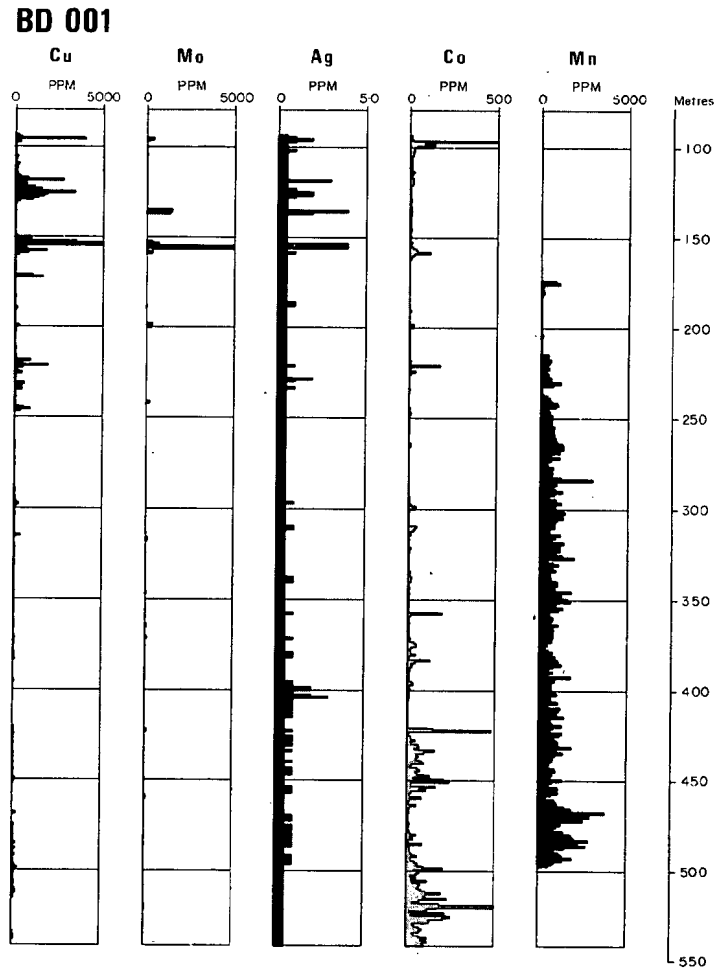
During 1983 and 1984 Pan Australian Mining Ltd. was being established which limited the amount of work that could be carried out on the Exploration Licence area. However, during this period considerable geological work was done on the available information and concepts were formulated on environment of deposition, stratigraphy and age of the observed sequences. Petrological and mineragraphic investigations, electron microprobe, x-ray diffraction studies and magnetic susceptibility investigations of core material were also applied. Field visits and geochemical and petrographic data collected from the sequences in the Mt. Painter, Olary, Broken Hill and south-east Gawler Blocks confirmed Pan Australian Mining Ltd's geological concepts regarding the Curnamona Nucleus in general and more specifically in the area of the Benagerie Ridge.

Further petrological and lithogeochemical investigations during 1985 were carried out and an analysis of the regional gravity and magnetic data completed. The latter study, carried out by Geophysical Exploration Consultants and incorporating the extensive geological data base generated since their 1982 study, covered the entire Curnamona Nucleus and adjacent, outcropping basement complexes (e.g. Broken Hill, Olary and Mount Painter Blocks). This study is complimented by a regional geological evaluation carried out by Graham Teale.

4. "BASEMENT" LITHOLOGIES ENCOUNTERED IN DIAMOND DRILL HOLES MU-2, BD001, BD002 AND BD003

(a) MU-2: The pre-Adelaidean (Late Proterozoic) lithologies encountered consist of low metamorphic grade graphitic schists which contain

GEOCHEMICAL VALUES IN DIAMOND DRILL HOLES— FROME PROJECT



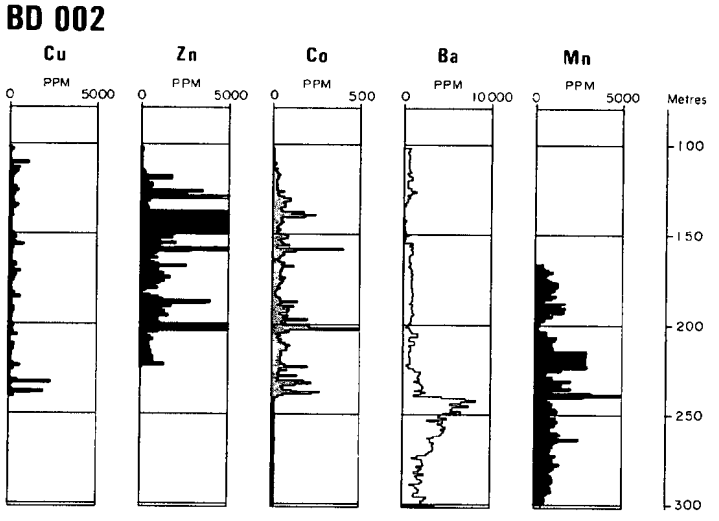


Figure 3

varying proportions of graphite, chlorite, muscovite, quartz, apatite, hematite and altered chloritoid. The sediments exhibit planar bedding with some sedimentary structures (cross-bedding, slumping, flame-textures) present. Graphite content of individual laminae can be up to 40%. Similar lithologies were observed in earlier rotary drill holes (e.g. BE61, BE11).

(b) BD001: This hole encountered a sequence of fine-grained, finely laminated to massive, occasionally brecciated, quartz-albite-magnetite ± pyrite ± calcite ± chlorite lithologies. Scapolite, actinolite, siderite and clay minerals are also present in some samples. Magnetite content can range from 2% to 30% (bedded and disseminated) and in rare instances cobaltian pyrite (± molybdenite) can be observed ("bedded" and disseminated with no magnetite associated).

(c) BD002: This hole consisted of predominantly fine-grained, finely laminated meta-calc-pelites which can contain porphyroblasts of Mg-biotite, Mn-rich garnet, epidote, tourmaline, scapolite, Fe-chlorite, siderite and fluorite. Scapolite-pyrite ± magnetite-bearing limestones are present as are beds which are rich in scapolite (up to 60%). Fine-grained biotite, quartz, K-feldspar and calcite are the dominant matrix phases found in the calc-pelites. Intergrown albite-tourmaline aggregates, associated with sulphidic horizons (pyrite ± sphalerite), suggest that borax may have been originally present. Halite and gypsum were present in the sediments initially, with halite reacting with clays to form scapolite and gypsum being pseudomorphed by K-feldspar.

Bedded pyrite, pyrite-chalcopyrite, pyrite-sphalerite, pyrite-fluorite and pyrite-albite-tourmaline are present. Pyrite "beds" up to 6cm thick have been observed, and pyrite contents of 25% - 30% over a few metres are not uncommon.

(d) BD003: Fine-grained, albite-quartz ± hematite ± scapolite ± K-feldspar lithologies dominate in this hole. Brecciation of the meta-sediments is common.

The above lithologies form part of an Early-Middle Proterozoic, saline, shallow water sequence, considered to be the most economically important by Pan Australian Mining Ltd. The sequence is one of four recognisable "sequences" underlying the Quaternary-Tertiary (and Cretaceous) sediments which blanket the Exploration Licence areas. These sequences (from oldest to youngest) are:

(a) High metamorphic grade quartzo-feldspathic gneisses and garnetiferous, biotite-plagioclase gneiss. These are considered to represent small, Early Proterozoic basement inliers within the younger (Early-Middle Proterozoic), low metamorphic grade meta-sediments. These lithologies can be equated to the high grade gneissic basement of the Olary Block, which, in this instance, is thought to correlate with the Thackaringa Group of the Willyama Supergroup.

(b) The Early-Middle Proterozoic, saline, shallow water sequence intersected in the diamond drill holes which is thought to have a similar age and depositional environment to the Mt. Isa Group. It is considered by some other workers to be equivalent to the Willyama Supergroup and yet by other workers to be of Late Proterozoic age.

There are many points which argue against both of the above interpretations.

(c) A sequence of Middle Proterozoic, bimodal volcanics (tholeiitic basalts and alkaline, silicic volcanics of rhyodacitic to rhyolitic composition) and cogenetic intrusives. This sequence, which occurs predominantly to the west and north of the Exploration Licence areas, unconformably overlies the abovementioned (b) shallow water, metasedimentary sequence.

(d) A Late Proterozoic (Upper Adelaidean) shallow water sequence which disconformably overlies the Middle Proterozoic volcanics.

5. GENESIS OF MINERALISATION AND ECONOMIC EVALUATION

Two styles of mineralisation have been observed in drill core from the Exploration Licence areas, viz.

(a) A sulphur-rich, reduced, stratiform mineralisation which is intimately associated with the metamorphosed calc-pelites of the Early-Middle Proterozoic sequence (e.g. BD002). Bedded sulphides, predominantly pyrite with lesser sphalerite and chalcopyrite and rare molybdenite, occur in the more scapolite-rich lithologies. This lithotype was encountered in rotary drill hole BE7 which contained, for example, approximately 12% sulphur over 15m including 1m at 26% sulphur, emphasising the sulphur-rich nature of these sediments.

This stratiform style of mineralisation is considered similar to that at Mt. Isa and Macarthur River and probably owes its origin to one (or more) of the following mechanisms:

- Heating of the sedimentary pile leading to a migration of metal-enriched fluids which rise up major fault or hinge zones and are debouched onto the floor of shallow sub-basins. This is shown diagrammatically in Figure 4. Mineralisation is associated with chlorine, boron and fluorine-rich meta-evaporitic sediments.

- Metals are emplaced "diagenetically", moving out of fault zones into unconsolidated sediments.

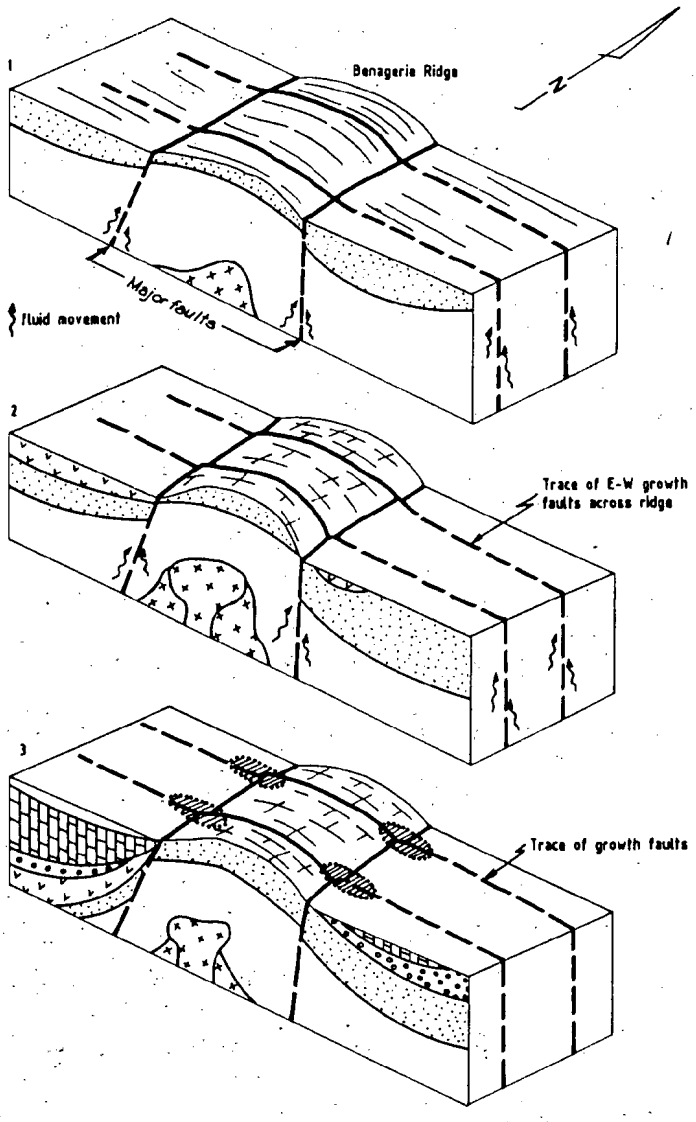
- Metals are associated with fluids emanating from an alkaline/peralkaline volcanic source. These fluids being rich in Na-F-B-S act as a complexing agent for the metal ions and allow transport to the site of deposition.

The stratiform Zn mineralisation also exhibits a distinct "zonation" (see Figure 3) with a Cu, Ba and Mn "enriched zone" underlying the elevated zinc values.

(b) A sulphur-poor, oxidised mineralisation which is associated with breccia zones and cross-cutting veins (e.g. BD001). The veins, and matrix to the breccia zones, contain the following "gangue" phases in varying proportions; siderite, Fe-chlorite, barite, hematite, fluorite, ankerite, quartz and lesser rutile and magnetite. Sulphide phases observed are bornite, covellite, chalcocite, chalcopyrite, marcasite, pyrite, pyrrhotite and molybdenite. Mineragraphic investigations indicate that bornite is the primary copper sulphide; it has been rimmed by chalcopyrite and replaced by chalcocite.

DIAGRAMMATIC RELATIONS BETWEEN FROME MINERALISATION BENAGERIE RIDGE FAULT ZONES (HYPOTHETICAL) AND OBSERVED GEOLOGY (SIMPLISTIC VIEW)

0020



REFERENCE

- Intrusives (co-magmatic with Middle Proterozoic Volcanics; alkaline; c 1500 m.y.)
- Intrusives (c 1600-1700 m.y.)

- Shallow water, marine, Cambrian
- Adelaidean metasediments (Late Proterozoic)
- Early to Middle Proterozoic
- Shallow water sequence (saline) observed in drill holes. (Early - Middle Proterozoic)
- Basement to the observed sequence in DDH BD001, BD002, BD003 and MU 2. (Early Proterozoic)
- Zones with high mineralisation potential at intersection of major N-S fault zones with growth faults

Figure 4

Plan No. A4/UG-11

Figure 4 (continued)

Diagrammatic relations between Frome mineralisation, Benagerie Ridge Fault zones (hypothetical) and observed geology (simplistic view)

The conceptual model presented here has been modified after Derrick, 1982 (B.M.R. Jl. Aust. Geol. Geoph.; V7):

Stages in the model are:

1) Migration of metal-enriched fluids into shallow water (rift) basin. Fluids move upwards via major N-S fault zones and metal enrichment occurs adjacent to growth faults which transect the major N-S zones.

2) Partial melting of lower crust leads to rise of alkaline silicic melts (Middle Proterozoic Volcanics and associated comagmatic intrusives) which heat Early Proterozoic Basement lithologies, Early-Middle Proterozoic lithologies and the base of the Middle Proterozoic volcanic sequence. This "heating" causes remobilisation of metals and subsequent deposition of vein-type mineralisation in Early-Middle Proterozoic lithologies (e.g. BD001-mineralisation) as well as in Middle Proterozoic volcanics.

3) Simplistic view of "present day" geology. Zones of economic interest are marked. The effect of Palaeozoic granitoids is unknown.

The sulphur-poor, breccia and vein-type mineralisation was emplaced subsequent to the deformation and metamorphism of the Early-Middle Proterozoic sequence. The "timing" of this mineralisation suggests an association with Middle Proterozoic alkaline intrusive activity with metals derived from either a cooling granite body or, alternatively, from movement of (and leaching by) heated connate and meteoric waters through an "enriched sequence".

The recently completed geophysical and geological evaluation of the Carnamona Nucleus, and more specifically the Exploration Licence areas, suggest a block-faulting (or basin and range) style of tectonism. Known basement lineaments (e.g. The Thackaringa - Pinnacles Shear Zone) transect the Nucleus and two major directions of faulting can be identified. It is believed that a major orebody could be associated with these major lineaments and that exploration can be guided by use of the geophysical and geological interpretations presented. The possibility of Roxby Downs type mineralisation occurring in the area (associated with Middle Proterozoic bimodal volcanics and cogenetic intrusives) is high and a number of "target areas" have been delineated. Cu-Au±Zn mineralisation associated with intensely altered Middle Proterozic mafic volcanics may also be present within the region.

6. CONCLUSION

Exploration Licence 957 (Benagerie) and Exploration Licence 1252 (Lake Charles), offer excellent promise for stratiform base metals and for "breccia" type and stockwork Cu-Mo±Au mineralisation. The limited amount of diamond drilling supports this promise because:

a) Early wide spread rotary percussion holes drilled to test the overlying Tertiary sediments encountered significant base and precious metal values within the "basement" of the Exploration Licence areas.

b) Diamond drilling which was essentially "stratigraphic" encountered "significant" base metal mineralisation (c.f. BD001, BD002) and in BD002, stratiform zinc sulphides were encountered in shallow water, base-metal enriched calcareous meta-sediments (78m @ 0.38% Zn, with individual 1m intersections of up to 3.4% Zn. This sequence is considered to have potential for stratiform mineralisation similar to that at Mt. Isa and Macarthur River.

c) These sediments containing the stratiform mineralisation are considered to be Early-Middle Proterozoic, lying unconformably above the Willyama Supergroup and overlain unconformably by Middle Proterozoic volcanics.

d) The Exploration Licence areas are transected by numerous, deep seated, linear structures which are as old, if not older, than the Middle Proterozoic.

e) Geophysical and geological targets have been identified within the area and require testing.

The Benagerie and Lakes Charles Exploration Licence areas are considered highly prospective. Whilst the area is blanketted by Tertiary sediments 30m-100m in thickness, the work done to date has identified geological, geophysical and geochemical criteria that can closely direct the exploration effort towards specific targets that can be readily drill tested.

Pan Australian Mining Ltd.

Incorporated in Queensland

C.G.A. HOUSE
379 Queen Street
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Telex: 44416

January 28, 1986

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

Dear Sir,

EXPLORATION LICENCE 1252 (LAKE CHARLES)
QUARTERLY REPORT FOR THE PERIOD 24.9.1985 TO 23.12.1985

A comprehensive review and geological assessment of the Exploration Licence was forwarded to several Companies concerning the possibility of their entering into a Joint Venture on the Exploration Licence. A copy of this review and geological assessment was forwarded to the Department last quarter. Negotiations are current at the end of the period.

Expenditure for the quarter totalled $1,334 and a Statement of Expenditure is attached. Your letter dated November 15, 1985, reference EL1252 IGF/RKJ:CMO, has been noted. The Licence adjoins Exploration Licence 957 (Benagerie) where significant zinc mineralisation was previously intersected. Lake Charles will be explored jointly with Benagerie in future exploration programmes.

Yours faithfully,
PAN AUSTRALIAN MINING LTD.

R.J. Morrison
Supervising Geologist

Encl.

STATEMENT OF EXPENDITURE

E.L. 1252 (LAKE CHARLES)

FOR PERIOD 24.9.1985 TO 23.12.1985

	$
TECHNICAL SERVICES	684
OPERATING EXPENSES	176
CONTRACT GEOLOGY	300
ADMINISTRATION	174
TOTAL:	$1,334

Pan Australian Mining Ltd.

Incorporated in Queensland

C.G.A. HOUSE
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G P O Box 712, Brisbane 4001
Telex: 44416

18th April, 1986

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

Dear Sir,

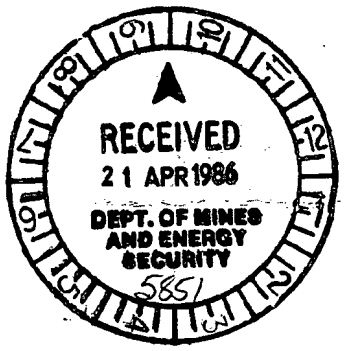
EXPLORATION LICENCE 1252 (LAKE CHARLES)
QUARTERLY REPORT FOR THE PERIOD 24.12.85 TO 23.3.86

No geological exploration work has been completed on the Licence during the period. However, a Joint Venture Heads of Agreement is presently being concluded between Pan Australian Mining Ltd. and Billiton Australia.

Expenditure for the quarter totalled $1,205 and a Statement of Expenditure is attached.

Yours faithfully
PAN AUSTRALIAN MINING LTD.

D.H. HALL
Geologist



STATEMENT OF EXPENDITURE

E.L. 1252 (LAKE CHARLES)

FOR THE PERIOD 24.12.85 TO 23.3.86

0026

PAN AUSTRALIAN MINING LTD.

	$
TECHNICAL SERVICES	328
OPERATING EXPENSES	595
CONTRACT GEOLOGY	125
ADMINISTRATION	157
TOTAL	1,205

BILLITON AUSTRALIA

	$
STAFF AND SUPPORT	618
GEOLOGY AND GEOTECHNICAL	59
ADMINISTRATION	41
	718
TOTAL EXPENDITURE	$1,923

BILLITON AUSTRALIA

THE METALS DIVISION OF THE SHELL COMPANY OF AUSTRALIA LTD

LAKE CHARLES EL 1252 SOUTH AUSTRALIA

PROGRESS REPORT

FOR THE QUARTER ENDING 23 JUNE 1986

AUTHOR: S. A. DASHLOOTY REPORT NO: 08.3337

Distribution:

Copy 1: Department of Mines & Energy
Copy 2: Pan Australian Mining Ltd
Copy 3: Billiton/Melbourne
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1.0 INTRODUCTION

Exploration licence 1252, Lake Charles, is located in the southeast portion of the Frome Embayment, being situated approximately 120 km north-northwest of Cockburn. The licence has been the subject of much exploration during past years, mainly for uranium, by Marathon Petroleum Australia and, latterly, Pan Australian Mining Limited and their partners.

A Joint Venture has recently been negotiated between Billiton Australia, The Metals Division of The Shell Company of Australia Limited and Pan Australian Mining Limited. This allows Billiton Australia to earn an equity in the area and manage exploration activities directed at principally base metal targets within Lake Charles EL 1252 and an adjacent EL 957, Benagerie.

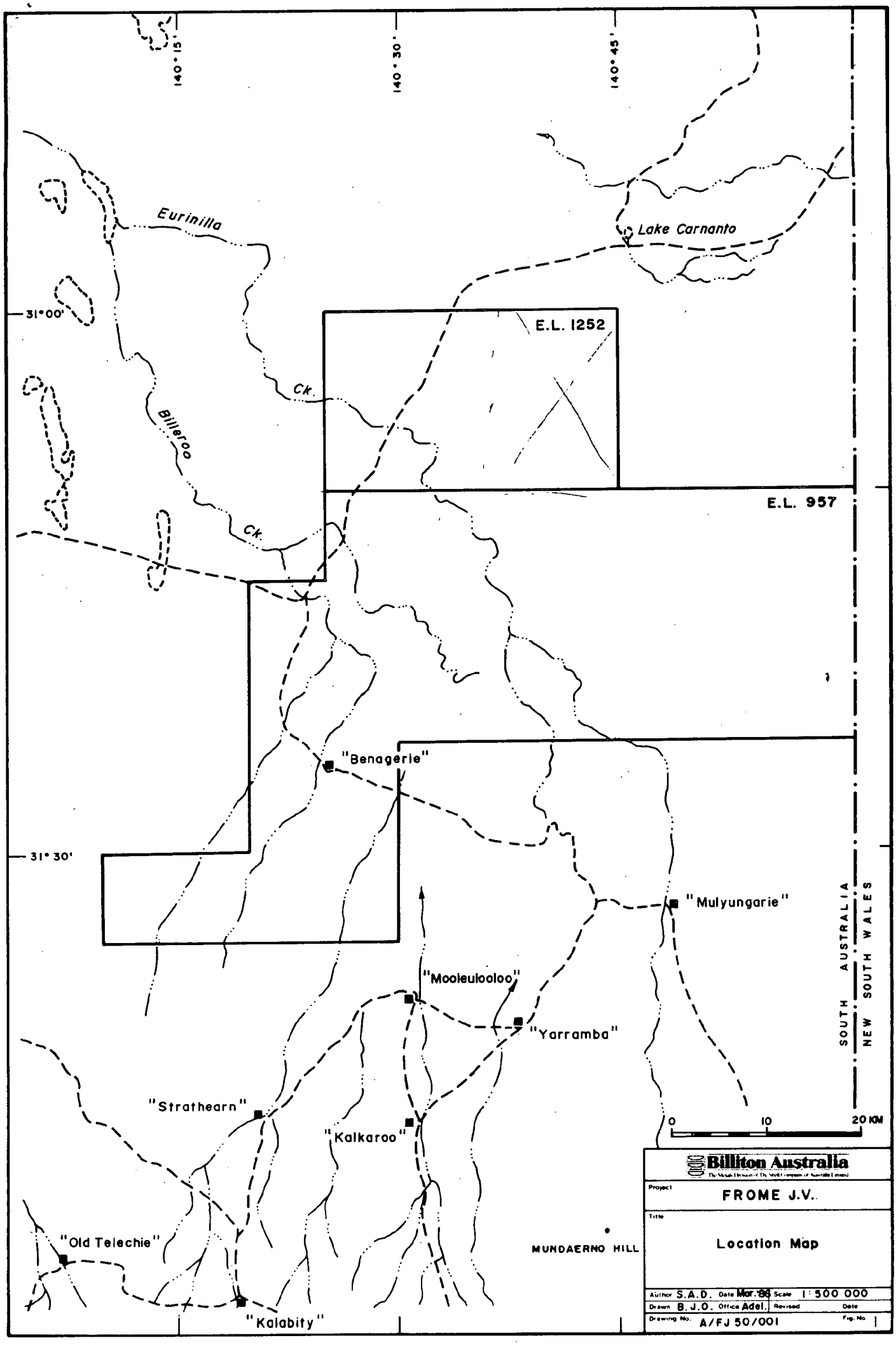
As the Joint Venture came into force only in March 1986, very little work has been done by Billiton to date. We are currently in the process of compiling and assessing previous data and also have undertaken one reconnaissance trip to investigate old drill sites.

2.0 PRESENT EXPLORATION

The regional geology has been well described in previous quarterly reports by Pan Australian Mining Limited and will not be elaborately discussed in this report. Suffice it to say that there is virtually no basement outcrop within the EL 1252 area. A structure referred to as the Benagerie Ridge, in a northerly direction through the centre of EL 957 and the western part of EL 1252, is defined by a series of stratigraphic drillholes and also magnetic trends. It perhaps represents a basement horst within the Frome Embayment. Most of the drillholes that have penetrated through into basement occur within this region.

3.0 PLANNED EXPLORATION

- Review of previous drillhole results in the Frome Embayment, including the Lake Charles EL 1252 area.
- Review and assessment of the regional geophysical data.
- Ground magnetic traverses over selected targets.


140° 15'
140° 30'
140° 45'
Eurinilla
Lake Carnanto
31° 00'
E.L. 1252
Ck.
Billeroo
Ck.
E.L. 957
"Benagerie"
31° 30'
"Mulyungarie"
"Mooleulooloo"
"Yarramba"
"Strathearn"
"Kalkaroo"
"Old Telechie"
"Kalabity"
MUNDAERNO HILL
SOUTH AUSTRALIA
NEW SOUTH WALES
0
10
20 KM
Billiton Australia
Project
FROME J.V.
Title
Location Map
Author S.A.D. Date Mar. 86 Scale 1:500 000
Drawn B.J.O. Office Adel. Revised Date
Drawing No. A/FJ 50/001 Fig. No.

BILLITON AUSTRALIA

THE METALS DIVISION OF THE SHELL COMPANY OF AUSTRALIA LTD

LAKE CHARLES EL 1252, SOUTH AUSTRALIA

PROGRESS REPORT FOR THE QUARTER ENDING 23 SEPTEMBER 1986

AUTHORS: S.A. DASHLOOTY

REPORT NO. 08.3470

DATE: NOVEMBER 1986

Distribution:

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08.3470:SAD

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1.0 INTRODUCTION

During the report period, review and interpretation of the regional geophysical data were initiated. This work is currently in progress, and will be reported in the next quarterly report.

2.0 EXPENDITURE STATEMENT - LAKE CHARLES

	Expenditure for Quarter Ending 30/6/86	Project to Date
Staffing/Support	$1 705	$2 323
Geology, Geophysics, Drawing, Research & Computer		59
Overheads		41
TOTALS	$1 705	$2 423

An additional Expenditure of $ 1363 has been allocated to this project by Pan Australian Mining Limited during the quarter.

BILLITON AUSTRALIA

THE METALS DIVISION OF THE SHELL COMPANY OF AUSTRALIA LTD

BENAGERIE EL 957 AND LAKE CHARLES EL 1252
PROGRESS REPORT FOR THE PERIOD ENDING 7 JANUARY 1987

AUTHOR: S.A. DASHLOOTY &
P.J. ELLIOTT

REPORT NO. 08.3596
DATE: MARCH 1987

Distribution

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LIST OF FIGURES

1.0 INTRODUCTION

The exploration activities in the Benagerie EL 957 and Lake Charles EL 1252 areas (Figure 1) during the period ending 7 January 1987 are of a regional nature and consequently the results are presented in one combined report.

Exploration activities during the quarter included review and assessment of previous drilling programmes, compilation and interpretation of aeromagnetic data.

2.0 GEOLOGY

The previous drilling programmes were reviewed and assessed in order to determine the number of drillholes that have penetrated into Proterozoic lithologies, and to ascertain lithology type. The results of the review are presented in Figure 2.

From the abovementioned assessment it can be concluded that the number of holes which penetrated Proterozoic lithologies are far greater than those previously indicated by Marathon Petroleum. It is also concluded that possible mineralised intervals may not have been analysed for base metals and gold, and a sampling programme of selected drillholes is warranted.

3.0 GEOPHYSICS

Preliminary interpretation was carried out at 1:250 000 scale, thus allowing features obvious outside the study area to be traced into it. A compilation of the aeromagnetic contours was then produced at 1:100 000 (Figure 3) and the main elements transformed from the 1:250 000 scale interpretation.

Fourteen magnetic models were run using profiles digitized from the contour sheets. This was done to get an idea of the dip and depths of the main magnetic features. Detailed information from the Homestead Grid was also used to assist the interpretation.

A combination of magnetic models, drillhole information, qualitative interpretation of magnetics and geology (1:250 000) enabled a reasonably detailed picture of the structure and magnetic sources to be constructed (Figure 4).

The main magnetic features in the licences are attributed to quartz-albite-magnetite (QAM) sequences which occur in inferred synclines or basin structures. The QAM's are prospective for copper-gold mineralistion and the adjacent metasediments, mainly pelites, are prospective for lead-zinc mineralisation.

There are four magnetic features (QAM's) which require attention, three of which are considered to be within 100 m of the ground surface. Two features (A and F) already have known mineralisation associated with them, and they have a very similar magnetic signature. The adjacent stratigraphy should also be similar.

There are a number of granite intrusives and two major fault sets which may have caused remobilisation of the otherwise syngenetic mineralisation.

The known existence of copper-gold mineralisation and the presence of iron-rich sediments suggests the possibility of economic copper-gold deposits within major shears where they cross-cut the ironrich sediments.

0041

4.0 EXPENDITURE STATEMENTS - BENAGERIE: LAKE CHARLES

	Expenditure for Quarter Ending 31/12/86		Project to Date	
	Benagerie	Lake Charles	Benagerie	Lake Charles
Staffing/Support	2 640	7 329	53 660	14 825
Concession Payments	4 060	1 093	4 060	1 093
Geophysical Surveys			18 504	
Analyses/Assays			1 656	
Drilling			29 675	
Site Preparation/Payment to Landholders and Consultants			9 879	
Geology, Geophysics, Drawing, Research & Computer	(4 252)	736	10 039	1 405
Overheads	(4 065)	595	7 285	865
TOTALS	($ 1 617)	$ 9 753 ?	$ 134 758	$ 18 188

15 765 to get this total.

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

0042

Your Reference

Our Reference FJ51/904:SAD

Date 18 March 1987.

Adelaide Office:
66 Glen Osmond Road,
Parkside, S.A. 5063
P.O. Box 1319
Adelaide, S.A. 5001
Telex: AA 82532 SAMET
Telephone: (08) 274 1744

Director General
Department of Mines & Energy SA
PO Box 151
EASTWOOD SA 5063

Dear Sir

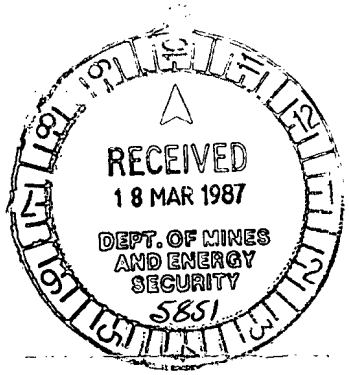
EL 1252 - LAKE CHARLES

Please be advised that as no field work was undertaken during the report period, there will be no Quarterly Progress Report for the period ending 23 March 1987.

Yours faithfully
for BILLITON AUSTRALIA

S. A. DASHLOOTY
Senior Geologist

cc: AHO: BXHW
Pan Aust



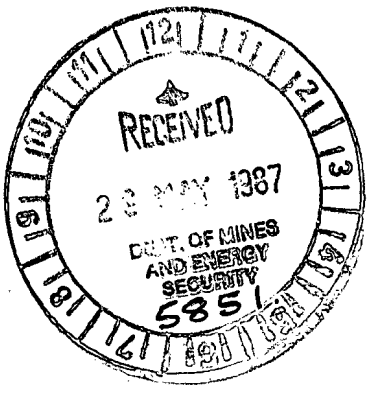
BILLITON AUSTRALIA

THE METALS DIVISION OF THE SHELL COMPANY OF AUSTRALIA LTD

LAKE CHARLES EL 1252, SOUTH AUSTRALIA

RELINQUISHMENT REPORT, MAY 1987

AUTHOR: S.A. DASHLOOTY
REPORT NO. 08.3641
DATE: MAY 1987



OPEN FILE

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08.3641:SAD

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LIST OF FIGURES

FIGURE NO.	TITLE	SCALE	DRAWING NO.
1	Drillhole Geology	1:100 000	A/FJ50/065

APPENDIX I: Analytical Results

1.0 FINAL REPORT

Assessment of previous exploration indicated that a number of drillholes which have penetrated Proterozoic lithologies were not analysed for gold or base metals (Figure 1).

Samples of Proterozoic rock fragments were collected from around drillhole collars and were analysed for Cu, Pb, Zn, Co, Ag, Mo, Sb and Au (Appendix I).

No anomalous values were observed and no further work is warranted.

It is recommended that licence EL 1252, Lake Charles, be surrendered, and relinquishment procedures are being implemented.

0046

2.0 EXPENDITURE STATEMENT - LAKE CHARLES

	Expenditure for Jan to April 1987	Estim. Expend to May 20, 1987	Estim. Project to Date
Staffing/Support	829	2 000	17 654
Concession Payments			1 093
Analyses/Assays		160	160
Geology, Geophysics, Drawing, Research & Computer			1 405
Overheads	83		948
TOTAL	912	2 160	21 260

APPENDIX I: Analytical Results

COMLABS SERVICES PTY. LTD.

305 South Road, Mile End South, South Australia 5031 Telephone (08) 43 5722 Telex LABCOM AA89323 Facsimile No. (08) 234 0321

NATA REGISTERED No. 1526

OUR REF.: COM870921

YOUR REF.: 09192/FJ51/SAD

Copy to MT 33/604

	INFO	ACT	COPY
SAD			
FILE	FJ51/604		
REC'D	12/5/87		

Mr. S. Dashlooti
The Shell Co. of Aust. Ltd.
184 Magill Road
Norwood

SA 5067

May 11, 1987

Dear Syed

RE: JOB COM870921

Enclosed are the assays for the samples delivered to our laboratory on May 5, 1987

Yours Sincerely,
COMLABS SERVICES PTY LTD

per :

c.c.: SHELL ORANGE No. of copies : 1

Report Length 2 pages

COMLABS SERVICES PTY. LTD.

ANALYTICAL REPORT

JOB COM870921
O/N : 09192/FJ51/SAD

SAMPLE	Cu	Pb	Zn	Co	Ag	Mo	Au
LC 00	55	22	46	26	1	4	<0.01
LC 31	18	10	24	14	<1	4	<0.01
LC 32	24	18	40	85	1	8	<0.01
LC 33	14	12	22	16	<1	4	<0.01
LC 34	38	18	50	14	<1	<4	<0.01
LC 36	14	14	40	10	1	<4	<0.01
LC 37	12	14	34	16	1	<4	<0.01
LC 39	8	18	34	10	<1	<4	<0.01
LC 40	40	16	175	14	<1	4	<0.01
LC 41	12	14	42	22	1	4	0.04
LC 42	12	36	28	46	<1	4	<0.01
LC 43	10	12	26	18	1	<4	<0.01
LC 44	44 AAS1	28 AAS1	240 AAS1	165 AAS1	2 AAS3	18 AAS3	<0.01 FAS1

ANALYTICAL REPORT

JOB COM870921
O/N : 09192/FJ51/SAD

SAMPLE	Sb
LC 00	6
LC 31	<4
LC 32	6
LC 33	8
LC 34	4
LC 36	6
LC 37	6
LC 39	6
LC 40	8
LC 41	<4
LC 42	6
LC 43	4
LC 44	<4 XRF1

MERCERS DAM
PROSPECT
(Mag. Bedrock > 300m ?)

BILLEROO
PROSPECT
(Mag. Bedrock > 100m)

TAGO DAM
PROSPECT
(Mag. Bedrock > 500m ?)

BENAGERIE
HOMESTEAD
PROSPECT
(Mag. Bedrock > 150m)

31° 20'

31° 30'

140° 30'

"Benagerie"

LEGEND

TERTIARY / CRETACEOUS

- Silcrete and sands
- Clays - micaceous, silty dark grey in colour
- Conglomerate

PROTEROZOIC

- Shale
- Carbonaceous clays
- Mudstone / siltstone
- Quartzite, acid volcanics, rhyolite metasediments
- Magnetic lithologies inferred

0 1 2 3 4 5 KM

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project: FROME J.V.

Title: Drillhole Geology

Author S A D	Dept	Scale 1:100 000	
Drawn B J O	Date DEC 1986	Revised	Date
Checked	Date	Sheeded	Date
FIG 2		Drawing No. A/FJ 50/065	

5851—1


E.L. 1252
E.L. 957
31° 30'
Kalkaroo Main Dam
"Mulyungarie"
Hunters Dam
Mt. John Dam
MT. JOHN
"Yarramba"
0 1 2 3 4 5 KM
Billiton Australia
The Metals Division of the Shell Company of Australia Limited
Project
FROME J.V.
Title
Aeromagnetic Map
of Total Intensity
(S.A.D.M.E.)
Author P.J.E.
Dept
Scale 1:100 000
Drawn B.J.O.
Date DEC '86
Revised
Date
Checked
Date
S'ceded
Date
FIG 3
Drawing No A/FJ 50/063

5851-2

E.L. 1252

E.L. 957

LEGEND

- Magnetic trend
- Magnetic boundary
- Inferred dolerite dyke
- Fault with displacement
- Fault with throw
- Antiform with plunge
- Synform with plunge
- Inferred granite
- Gravity low (possible deep granitic pluton)
- Approx. position of 200m depth contour of Pre-Adelaidean sediment
- Approx. boundary of shallow magnetic sources
- 300m 87° Modelled dip and depth
- A Listed Magnetic Feature (Report No. 08/3521)
- Grid position approx. only

OAKLANDS-FROME STRUCTURAL CORRIDOR

AXIS

RIDGE

BENAGERIE

BENAGERIE

COMPLEX

WILLYAMA

STRATHEARN FAULT

FAULT

Windbag Dam

Bonavie Bore

Jacks Reward Dam

Birksgate Bore

Lake Charles Bore

Lake Charles

Granite or hematite/magnetite body?

Billeroo Tank

Tilted Block?

Lake Yantawena

Billeroo W.H.

Magnetic Complex

Lake Benagerie

"Benagerie"

Sullivans Dam

Blueshirt Dam

Marker Horizon

Crozier Dam

Mt John Dam

Ntn. Manning Dam

Mercers Dam

Madras Dam

Tago Dam

Burmah Dam

Childs Dam

Stirling Dam

Lake Dam

Catch Dam

Satchell's Dam

Kalkaroo Main Dam

"Mulyungarie"

Hunters Dam

MT. JOHN

"Mooleulooloo"

"Yarramba"

Manning Dam

Brook Dam

Watsons Bore

Rosetta Dam

Barber Dam

Furlough Dam

Little Bore Dam

Yalu Dam

Canegrass Dam

Approx. position of 200m depth contour of pre-Adelaidean

Approx. boundary of shallow magnetic sources

200m depth contour of pre-Adelaidean (CSR)

31°10'

31°20'

31°30'

140°30'

0 1 2 3 4 5 KM

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	FROME J.V.
Title	Regional Magnetic Interpretation Plan
Author P.J.E. Dept.	Scale 1:100 000
Drawn B.J.O. Date Nov. 1986	Revised Date
Checked Date	S'ceded Date
FIG. 4	Drawing No. A/FJ 50/062

5851-3