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EL 1099

FREELING HEIGHTS

PROGRESS AND PARTIAL SURRENDER REPORTS FOR THE PERIOD 7/1/83 TO 6/1/84

Submitted by
Marathon Petroleum Australia Ltd
1984

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PRIMARY INDUSTRIES AND RESOURCES SA

CONTENTS ENVELOPE 5480

TENEMENT: E.L. 1099 - Freeling Heights.

TENEMENT HOLDER: Marathon Petroleum Australia Ltd., North Flinders Mines Ltd.

3003

QUARTERLY REPORT
EXPLORATION LICENCE 1099 (VALLEY BORE)
FOR PERIOD JANUARY 7 TO APRIL 6, 1983

Author : I. Hodkinson

Date : April, 1983

Distribution : SADME, Adelaide ✓
Marathon, Brisbane
Marathon, Adelaide
North Flinders Mines Ltd.

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Report No. 1983/23

LIST OF FIGURES

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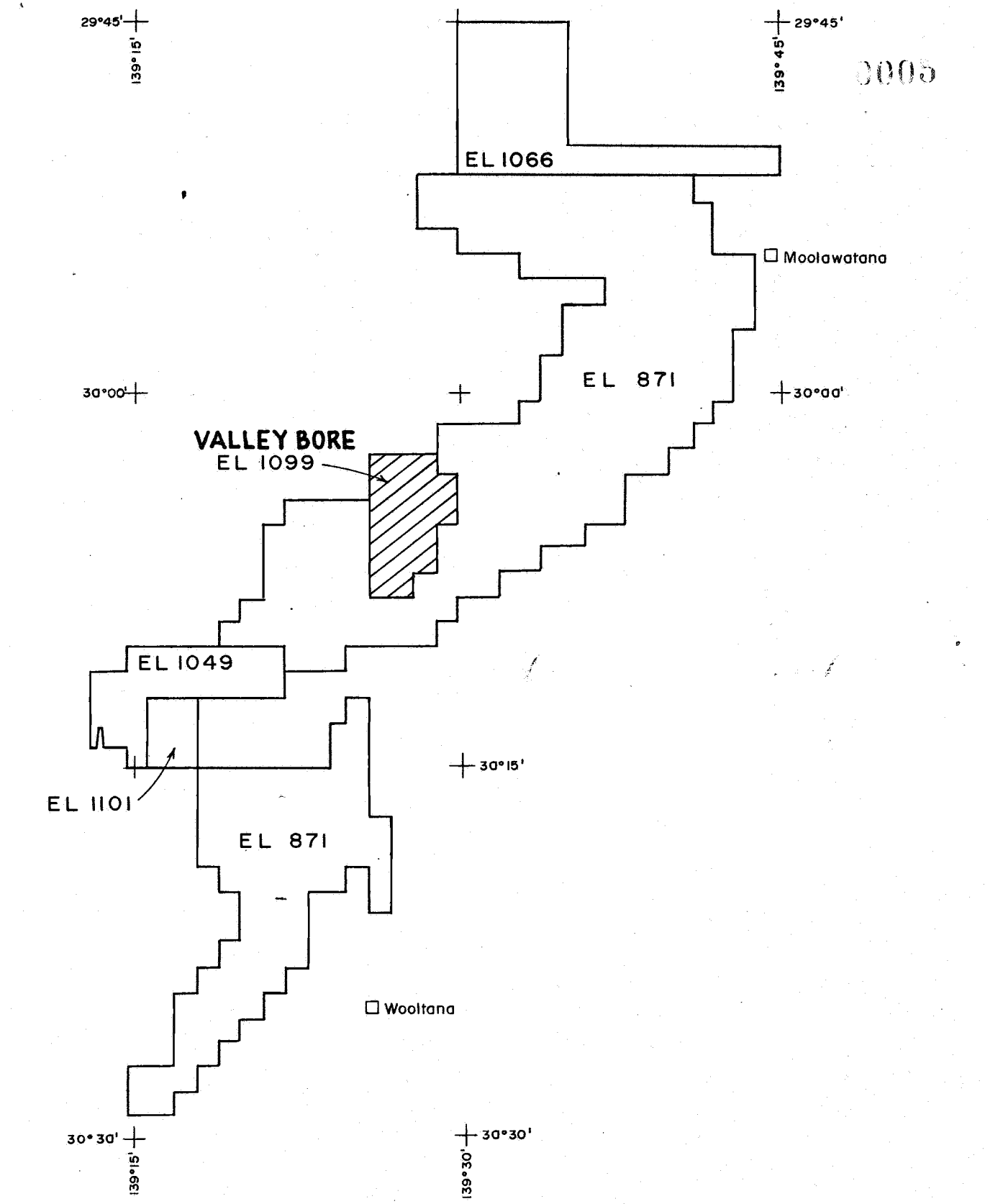
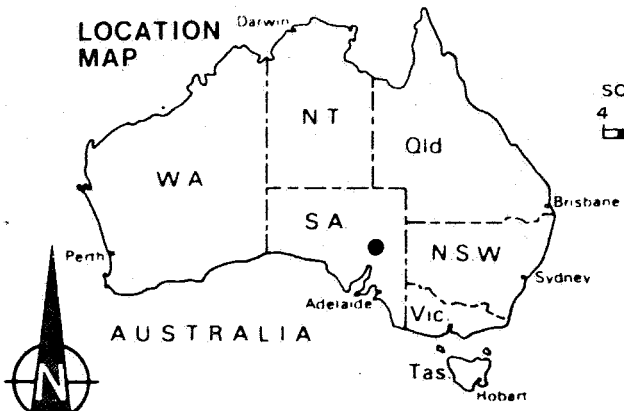
MA 419	2	EL 1099 Valley Bore - Gunsight Project - Extent of Anomalous Areas Located by Previous Investigations	1:20 000

LOCALITY: SH54-09 Copley Map Sheet





SCALE
4 0 4 8 12 16 20 Km

FIGURE 1
REPORT No. 1983/23

Marathon Petroleum Australia, Ltd.
BRISBANE AUSTRALIA

SH54-09 Copley South Australia

GUNSIGHT PROJECT

Plan Showing

LOCATION OF
EL 1099 VALLEY BORE

Mapped by I. H.
Drawn by INTO Drafting Date Feb. 83

Plan No MAU 39B

Exploration Licence 1099 covers an area of approximately 56 square kilometres in the Northern Flinders Ranges, approximately 110 kilometres northeast of Leigh Creek South. The extent of the Exploration Licence is indicated on Figure 1. The licence was granted to Marathon Petroleum Australia, Ltd. and North Flinders Mines Ltd. on January 7, 1983. Exploration for base metals and precious metals is being carried out by Marathon Petroleum Australia, Ltd. as operator under the terms of a Joint Venture Agreement with North Flinders Mines Ltd.

During the quarter, work has focussed on an evaluation of previous company investigations within the area. A summary of significantly anomalous areas is indicated on Figure 2. A number of small zones of anomalous copper and less importantly, zinc, have been identified although these have not previously been considered significant. An airborne radiometric survey by Kennecott Exploration Australia has indicated two zones of uranium enrichment at the contact of the Ordovician granite intrusive - the British Empire Granite. Neither of the anomalies was considered significant on the basis of subsequent rock sampling and diamond drilling. More recent stream sediment sampling and rock sampling by Rockdale Hill Pty. Ltd. indicated some potential for the occurrence of columbite-tantalite and possible tin and tungsten bearing minerals.

The evaluation of the previous work and discoveries has indicated the requirement for a thorough multi-element stream sediment sampling programme. Planning and preparation for this is now underway. Analysis of -40+80# samples will be undertaken for Cu, Pb, Zn, Mo, As, Sn, W, Nb and Ta.

Aeromagnetic and airborne radiometric coverage of the area has been provided by the recent survey undertaken in December 1982. Problems with terrain clearance and magnetic storms have hindered the processing of the data. Interpretation of the data is to be undertaken by Geophysical Exploration Consultants Pty. Ltd. of Melbourne and the results of the survey will be reported on when final results and interpretation become available.

Expenditure incurred during the quarter ended April 6, 1983 totalled $6,571. A detailed Statement of Expenditure is attached.

I.P. HODKINSON
Project Geologist

STATEMENT OF EXPENDITURE

VALLEY BORE EL 1099

FOR PERIOD 7.1.83 TO 6.4.83

3006

SALARIES NATIONAL	3,137
GENERAL BUSINESS EXPENSES	143
COMMERCIAL TRANSPORT	93
OFFICE SUPPLIES	6
RENT FLOOR SPACE	200
RENT OTHER	51
COMMUNICATIONS	324
INSURANCE	24
AUTOMOTIVE EXPENSES	96
CONTRACT SERVICES	309
OUTSIDE REPRODUCTION	365
FREIGHT	201
EQUIPMENT EXPENSES & RENTAL	8
CAMP SHELTER	359
CAMP EQUIPMENT & SUPPLIES	39
CAMP GENERAL	460
CONTRACT GEOLOGICAL	71
RENT EQUIPMENT	78
DATA PROCESSING	10
MAGNETICS SURVEY	7,995
ADMINISTRATIVE SERVICES	597
TOTAL EXPENDITURE	**$ 14,566**

346 000mE 48 50 52 54 56

76 74 72 70 68 6466 000mN

30°02'

Hamilton Creek

NORTHERN RADIOMETRIC ANOMALY

EASTERN RADIOMETRIC ANOMALY

Sn W Nb

Nb

Nb Ta

Nb

Nb

Nb Sn W

(Nb)

Cu

Zn

Be

LEGEND

- Zn — ANOMALOUS ZINC IN STREAM SEDIMENTS. ANACONDA S.M.L. 112
- RADIOMETRIC ANOMALIES INVESTIGATED BY KENNECOTT S.M.L. 199
- Cu — ANOMALOUS COPPER IN STREAM SEDIMENTS NORTH FLINDERS MINES S.M.L. 457
- Cu — ANOMALOUS COPPER IN STREAM SEDIMENTS AND ROCKS NORTH FLINDERS MINES S.M.L. 558
- Sn — ANOMALOUS METAL VALUES (Sn, Nb, Ta, W) IN STREAM SEDIMENTS AND ROCKS. ROCKDALE HILL PTY. LTD. E.L. 802
- Be — RECORDED BERYLLIUM OCCURRENCE
- MARGIN OF BRITISH EMPIRE GRANITE

LOCATION MAP

SCALE 1:20,000

0 200 400 600 800 1000 2000 metres

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REPORT No 1983/83

Marathon Petroleum Australia, Ltd.
Brisbane Australia

SH 54-09 Copley South Australia

VALLEY BORE, E.L.1099-GUNSIGHT PROJECT

Plan Showing

EXTENT OF ANOMALOUS AREAS LOCATED BY PREVIOUS INVESTIGATIONS

Drawn by INTO Drafting	Date MAR.83	Plan No. File MA-419 Order	2 FIGURE
Mapped by I. H.	Date MAR 83	Amended by	Date

3009

QUARTERLY REPORT
ON EXPLORATION ACTIVITIES,
EL 1099, VALLEY BORE, SOUTH AUSTRALIA
FOR PERIOD APRIL 7, 1983 TO JULY 6, 1983

AUTHOR: I. HODKINSON

DATE: JULY, 1983

DISTRIBUTION: S.A.D.M.E, ADELAIDE ✓
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REPORT NO. 1983/52

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Locality: SH54-09 Copley 1:250,000 Map Sheet

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MAU 39B	FIGURE 1	EL 1099 Valley Bore - Gunsight Project Location Map	As shown

LIST OF PLATES

PLAN NO.	PLATE NO.	TITLE	SCALE
MA 451	PLATE 1	EL 1099 Valley Bore - Stream Sediment Sampling Sites	1:20,000

LIST OF APPENDICES

3012

SUMMARY

Exploration Licence 1099, covering an area of approximately 56 square kilometres in the Northern Flinders Ranges, extends over the major part of an Ordovician muscovite granite intrusive within probable Lower-Mid Proterozoic metasediments, flanked on the northwest by Adelaidean units of Sturtian and later age. The licence was granted to Marathon Petroleum Australia, Ltd. and North Flinders Mines Ltd. on January 7, 1983.

During the quarter a major programme of stream sediment geochemical sampling was completed throughout the prospective southern and central parts of the area. The principal targets are possible tin-tantalum mineralization within pegmatitic phases or other differentiates of the Ordovician granitic intrusive. In addition, two heavy mineral samples were collected for petrological examination to determine mineralogical compositions within areas yielding anomalous tin and tantalum values to a previous explorer.

3016

1.0 INTRODUCTION

1.1 Location and Setting

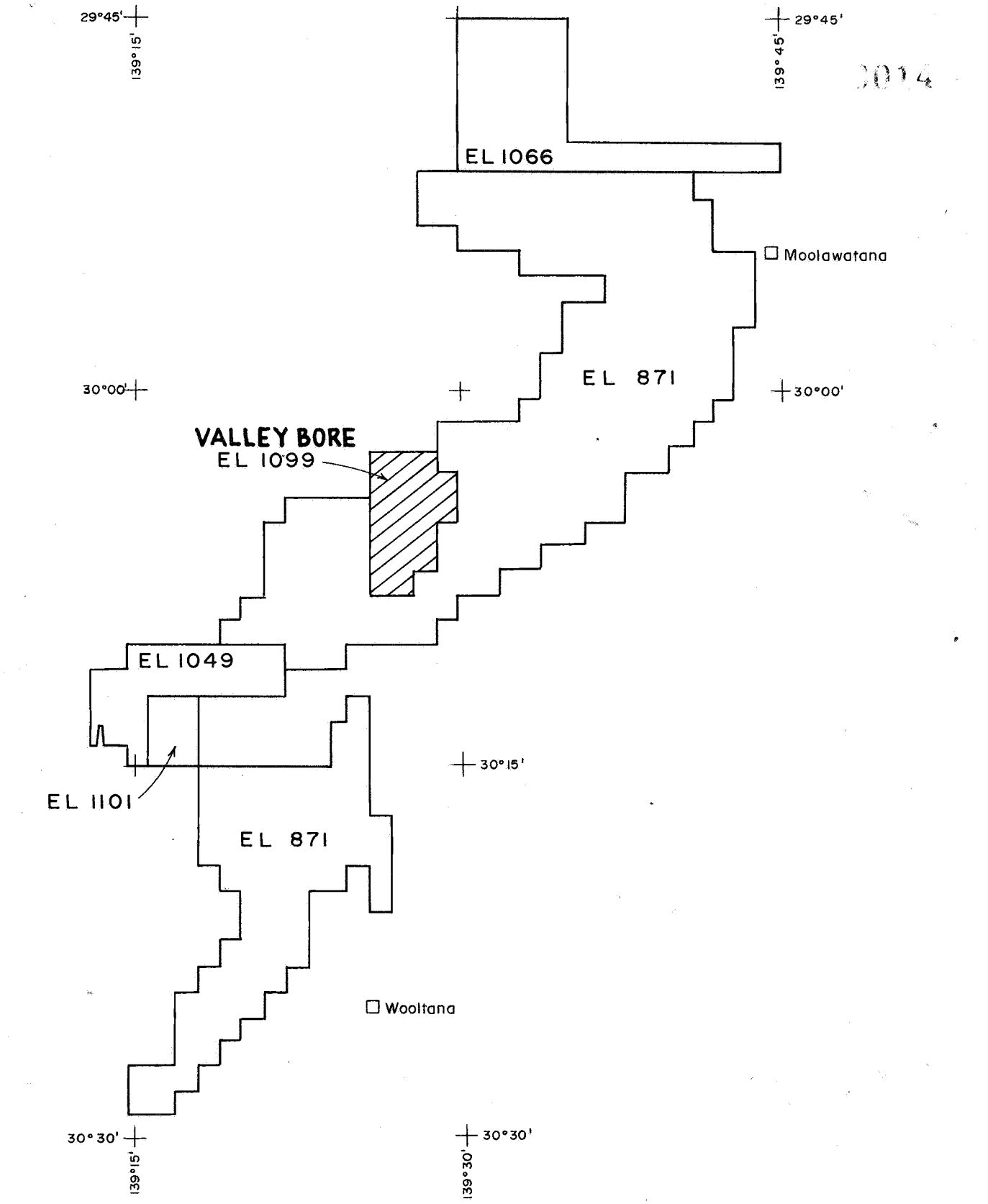
Exploration Licence 1099, Valley Bore, is located in the Northern Flinders Ranges approximately 110 kilometres northeast of Leigh Creek South. The major part of the area lies within the Arkaroola pastoral lease although the northwestern part, including Valley Bore is within the Mount Freeling pastoral lease. Refer to Figure 1.

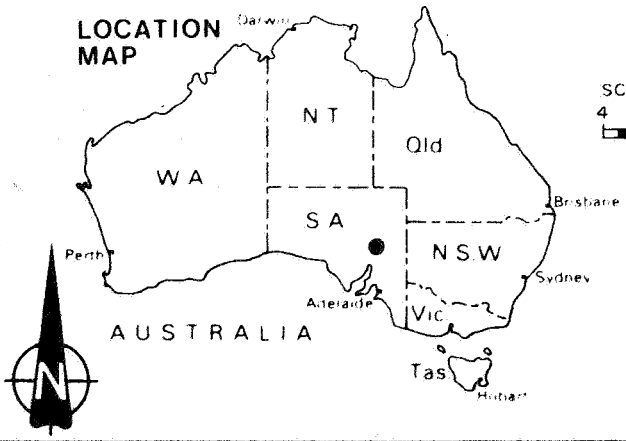
Topographically the area is rugged in the extreme. Elongate strike ridges are developed over tough, resistant Adelaidean lithologies with roughly parallel major drainage directions. Discordant drainage patterns are developed on the more homogenous Lower-Mid(?) Proterozoic quartzites and gneissic units. A very distinct topography is developed on the Ordovician granite body. Rock outcrops are common and extensive with a distinct lack of vegetation cover. Major drainages within the granite are deeply incised.

Access is poor and roads are restricted to a track from Mt. Shanahan on Hamilton Creek passing via Valley Bore, within the area, to Greenhill Hut. Other tracks in the area are not accessible, even to a 4 wheel drive vehicle. Some access on foot is afforded by the major drainage which joins Hamilton Creek at Mt. Shanahan or from the plains to the east of the Ranges in the vicinity of Four Mile Creek.

1.2 Tenement Situation

Exploration Licence 1099 was granted to Marathon Petroleum Australia, Ltd. and North Flinders Mines Ltd. on January 7, 1983. Marathon Petroleum Australia, Ltd. is the operating company under the terms of a joint venture agreement with North Flinders Mines Ltd.





SCALE
4 0 4 8 12 16 20 Km

FIGURE 1
REPORT No. 1983/23

Marathon Petroleum Australia, Ltd.
BRISBANE AUSTRALIA

SH54-09 Copley South Australia

GUNSIGHT PROJECT

Plan Showing

LOCATION OF EL 1099 VALLEY BORE

Mapped by I. H.
Drawn by INTO Drafting Date Feb. 83

Plan No. MAU 39B

1.3 Local Geological Setting

The oldest lithologies within the area are a sequence of quartzites and quartzofeldspathic gneisses of Lower Proterozoic and possible Mid-Proterozoic age. These are complexly deformed and extensively metamorphosed both by regional tectonometamorphic events and later thermal metamorphism as a result of Delamerian intrusive activity. Accordingly, early structures are generally obscured. Apparently intruded into this metasedimentary sequence is a major tongue of Terrapinna granite, a coarse rapakivi textured granite which probably predates the main metamorphic and deformational episodes and, in popular parlance, could be termed synorogenic.

Unconformably overlying these units are a sequence of calcareous tillites, pelites and quartzites assigned to the Fitton Formation of the Yudnamutana Sub-Group of Adelaidean age. These occur within the northern part of the area and pass upwards into the tillitic Bolla Bollana Formation in the immediate area of the Valley Bore.

Centrally disposed within the area, and covering some 40% of the exploration licence is a body of Ordovician muscovite granite emplaced during the Delamerian event. The overall intrusive has a southwest-northeast orientation and is considered to consist of a number of sub-parallel sheets dipping to the northwest. The eastern contact is relatively simple and planar while the northern margin of the body is complex and characterised by pegmatitic apophyses and numerous engulfed blocks of quartzite. Within the body there are numerous pegmatitic zones, usually vein or dyke-like in morphology although some bodies are more irregular. Pegmatite mineralogy is chiefly quartz and microcline with accessory muscovite, biotite and tourmaline (var. schorl). Apatite and beryl are present in small quantities.

1.4 Previous Exploration

The area under review has been held, at least partially, by a number of previous companies.

016

Kennecott Explorations (Australia) Pty. Ltd. held the area from 1968 as S.M.L. 199. The main effort involved an airborne radiometric survey which identified two anomalous areas within the present licence area. These were referred to as the northern and eastern anomalies and were concluded to be of too low a grade for continued evaluation after a short drilling programme. The location of the areas is indicated on Figure 2 of the previous quarterly report for EL 1099.

Subsequent to this, the area was held by North Flinders Mines Ltd. during tenure of S.M.L.'s 457 and 558 during which periods extensive stream sediment sampling for Cu, Pb and Zn was undertaken. An area of Cu mineralization was defined along the far eastern edge of the granite intrusive although this did not constitute a significant discovery after follow-up.

Also of interest was the recognition by Rockdale Hill Pty. Ltd. (EL 802) that the area contained anomalous levels of Nb and Ta together with interesting values of Sn and W. Attention was focussed on cemented conglomeratic material of Recent age within a tributary valley, off the main drainage within the granite. It is suggested that this resource is somewhat limited although hard rock Ta-Nb potential may exist within this area. For this reason and for the uranium potential the area was taken up by Marathon Petroleum Australia, Ltd. and North Flinders Mines Ltd. in early 1983.

2.0 EXPLORATION ACTIVITIES

2.1 Reconnaissance Geological Observations

During the course of a stream sediment sampling programme routine geological observations were made although no specific mapping programme was undertaken. Attention was focussed in two main areas; firstly an assessment of the composition of the numerous pegmatite bodies with a view to locating a pegmatitic Nb-Ta deposit and secondly an assessment of the cemented conglomeratic deposit which was the focus of attention by Rockdale Hill Pty. Ltd.

Routine observations of pegmatites within the area failed to locate any with a significant content of opaque phases, specifically a columbite-tantalite component. Without exception the pegmatites are mineralogically simple consisting of quartz and microcline with lesser amounts of muscovite. Accessory phases reported are tourmaline (var. schorl), apatite, garnet and beryl. Garnet commonly forms vermiform intergrowths with quartz. Beryl occurs as translucent, cloudy, individual crystals or as aggregates rarely greater than 8 cm across with a pale blue to greeny-yellow coloration. A wide variety of aplitic and porphyritic phases are associated with the various pegmatitic bodies.

An assessment of the cemented conglomerate unit outlined by Rockdale Hill Pty. Ltd. revealed it to be of limited extent and not a viable resource. This material is limonite cemented alluvium with a predominance of coarse grit to pebble size clast components. This material is seen to exist in a number of areas within both tributaries and the major drainage of the area and in view of the coarse clast component has acted (pre-cementation) as a natural trap for heavy minerals. This may explain some of the interesting values obtained by Rockdale Hill Pty. Ltd. for this material. It is suggested that similar material may be seen developing today where flocculant iron oxide is precipitating and locally cementing alluvium in stagnant water holes in various parts of the area. Any resource thus formed is inclined to be somewhat limited. No significant spreads of alluvial material occur within the area due to the rugged topography and steep drainage gradients.

2.2 Stream Sediment Geochemical Sampling

A total of 111 stream sediment samples were collected in the area, attention being focussed on sampling the Ordovician granite body and its adjacent aureole zone. The -40 +80# fraction was despatched for assay with the -80# fraction being retained for possible future requirements. Assaying was undertaken by Comlabs Pty. Ltd. by both XRF and AAS techniques and the details of assaying procedures are outlined in Table 1.

TABLE 1

ASSAY INSTRUCTIONS EL 1099 STREAM SEDIMENTS

ORDER NUMBERS 11846,7,8

-40+80# SAMPLE

↓

SPLIT

↙ ↘

UNPULVERIZED	PULVERIZED
↓	↓
WARM LEACH, 60-70°C	X.R.F. DETERMINATIONS
16 HOURS IN 3N HCl	Sn, W, Nb, Ta, As
5% HNO_3	↓
AGITATE AFTER 8 HOURS	
DECANT AFTER 16 HOURS	RESULTS AND REMNANT
↓	RETURNED TO MPAL
RESULTS AND UNPULVERIZED	
REMNANT RETURNED TO MPAL	

The location of the stream sediment sample sites are indicated in Plate 1 and the assay results for the programme are given in the appendix. At this stage no interpretation of the results has been undertaken.

3019

2.3 Heavy Mineral Sampling

During the course of the stream sediment sampling programme two heavy mineral samples were collected from sites of obvious heavy mineral concentrations. The locations of these two samples are indicated on Plate 1. In order to determine the mineralogical composition of these samples they have been forwarded to I.R. Pontifex and Associates for examination. No results have yet been received.

3020

3.0 CONCLUDING REMARKS

The period under review has seen the completion of a major programme of stream sediment sampling. Although no detailed interpretation of the results has yet been undertaken there are several clearly anomalous results and some follow up stream sediment sampling is anticipated.

Geological investigations within the area have revealed the simple composition of many of the pegmatite bodies associated with the Ordovician granite intrusive. Heavy mineral examination is currently underway to determine the nature of concentrations of heavy opaque mineral phases in some parts of the area.

4.0 EXPENDITURE

Direct exploration expenditure for the period 7.4.83 to 6.7.83 totalled $12,727. A statement of expenditure appears as Table 2.

TABLE 2

STATEMENT OF EXPENDITURE

VALLEY BORE

FOR PERIOD 07.04.83 TO 06.07.83

	$
TECHNICAL SERVICES	8,684
OPERATING EXPENSES	2,058
CAMP COSTS	828
ADMINISTRATIVE SERVICES	1,157
TOTAL EXPENDITURE	12,727

APPENDIX I

Assay Results, Stream Sediment Samples,
Valley Bore, EL 1099

COMLABS Pty. Ltd.
COMPUTERISED ANALYTICAL LABORATORIES

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ANALYTICAL REPORT

3025

JOB COM831348 O/N : 11846 - 11848

Results in ppm

SAMPLE	Sn	W	Nb	Ta	As
104664 -40+80#	12	85	10	<10	<2
104665 -40+80#	18	95	30	<10	2
104666 -40+80#	12	90	14	<10	<2
104667 -40+80#	14	80	16	<10	3
104668 -40+80#	8	80	16	<10	2
104669 -40+80#	12	70	14	<10	2
104670 -40+80#	10	85	16	<10	<2
104671 -40+80#	8	80	10	<10	3
104672 -40+80#	16	85	26	<10	<2
104673 -40+80#	14	55	40	<10	2
104674 -40+80#	6	80	32	<10	<2
104675 -40+80#	10	60	30	<10	4
104676 -40+80#	8	70	55	<10	<2
104677 -40+80#	6	90	50	<10	2
104678 -40+80#	8	80	16	<10	3
104679 -40+80#	34	75	55	<10	<2
104680 -40+80#	85	90	170	<10	<2
104681 -40+80#	22	60	160	<10	8
104682 -40+80#	18	65	140	<10	<2
104683 -40+80#	18	190	115	<10	4
104684 -40+80#	16	105	135	<10	<2
104685 -40+80#	60	55	95	<10	3
104686 -40+80#	38	70	40	<10	2
104687 -40+80#	30	65	40	<10	5
104688 -40+80#	42	85	46	15	<2

.../ 2

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ANALYTICAL REPORT

3024

JOB COM831348 O/N : 11846 - 11848

Results in ppm

SAMPLE	Sn	W	Nb	Ta	As
104689 -40+80#	38	70	36	10	<2
104690 -40+80#	18	70	44	<10	<2
104691 -40+80#	24	55	65	<10	7
104692 -40+80#	60	60	110	<10	4
104693 -40+80#	34	65	48	<10	2
104694 -40+80#	4	60	24	<10	2
104695 -40+80#	4	55	22	<10	<2
104696 -40+80#	6	70	26	<10	3
104697 -40+80#	8	65	38	<10	2
104698 -40+80#	<4	60	38	<10	<2
104756 -40+80#	30	70	30	<10	4
104757 -40+80#	28	65	34	<10	<2
104758 -40+80#	<4	40	22	<10	3
104759 -40+80#	8	45	60	<10	3
104760 -40+80#	12	70	28	<10	2
104761 -40+80#	4	40	42	<10	<2
104762 -40+80#	<4	35	20	<10	4
104763 -40+80#	12	80	30	<10	3
104764 -40+80#	12	65	26	<10	2
104765 -40+80#	14	80	28	<10	3
104766 -40+80#	18	60	38	<10	4
104767 -40+80#	14	60	38	<10	3
104768 -40+80#	12	60	38	<10	3
104769 -40+80#	18	45	38	<10	4
104770 -40+80#	36	50	65	<10	3

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ANALYTICAL REPORT

JOB COM831348 O/N : 11846 - 11848

Results in ppm

SAMPLE	Sn	W	Nb	Ta	As
104771 -40+80#	20	70	34	<10	2
104772 -40+80#	24	80	44	<10	3
104773 -40+80#	10	60	22	<10	2
104774 -40+80#	10	75	28	<10	<2
104775 -40+80#	10	70	22	<10	3
104776 -40+80#	28	85	20	15	6
104777 -40+80#	4	70	16	<10	3
104778 -40+80#	8	70	50	<10	<2
104779 -40+80#	4	45	28	<10	<2
104780 -40+80#	<4	50	70	<10	2
104781 -40+80#	4	65	50	<10	2
104782 -40+80#	6	50	26	<10	<2
104783 -40+80#	6	50	26	<10	2
104784 -40+80#	8	55	28	<10	<2
104785 -40+80#	10	70	30	<10	<2
104786 -40+80#	8	65	26	<10	<2
104787 -40+80#	30	55	75	<10	<2
104788 -40+80#	10	50	40	<10	<2
104789 -40+80#	8	50	28	<10	<2
104790 -40+80#	26	35	46	<10	5
104791 -40+80#	12	55	50	10	2
104792 -40+80#	6	60	50	<10	2
104793 -40+80#	4	55	95	<10	<2
104794 -40+80#	20	50	48	<10	2
104795 -40+80#	14	60	48	<10	<2

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ANALYTICAL REPORT

302b

JOB COM831348 O/N : 11846 - 11848

Results in ppm

SAMPLE	Sn	W	Nb	Ta	As
104796 -40+80#	8	55	48	<10	<2
104797 -40+80#	22	55	85	<10	<2
104798 -40+80#	6	70	44	10	<2
104799 -40+80#	6	60	24	10	<2
104800 -40+80#	12	65	40	<10	2
104801 -40+80#	6	55	32	<10	<2
104802 -40+80#	12	60	38	<10	<2
104803 -40+80#	<4	65	28	<10	<2
104804 -40+80#	6	60	30	<10	2
104805 -40+80#	8	85	30	<10	<2
104806 -40+80#	110	90	140	60	<2
104807 -40+80#	6	45	28	15	<2
104808 -40+80#	10	65	55	15	<2
104809 -40+80#	12	80	32	10	<2
104810 -40+80#	6	65	32	15	<2
104811 -40+80#	<4	55	36	<10	5
104812 -40+80#	<4	60	28	<10	<2
104813 -40+80#	32	85	50	10	2
104814 -40+80#	65	90	36	<10	<2
104815 -40+80#	4	85	24	<10	2
104816 -40+80#	16	95	48	15	<2
104817 -40+80#	6	70	36	<10	2
104818 -40+80#	4	70	24	<10	3
104819 -40+80#	6	65	36	10	3
104820 -40+80#	32	95	140	40	<2

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ANALYTICAL REPORT

JOB COM831348 O/N : 11846 - 11848

Results in ppm

SAMPLE	Sn	W	Nb	Ta	As
104821 -40+80#	8	50	42	<10	<2
104822 -40+80#	4	55	32	<10	2
104823 -40+80#	18	55	95	<10	<2
104824 -40+80#	6	45	32	<10	<2
104825 -40+80#	16	70	55	<10	<2
107058 -40+80#	6	60	32	<10	3
107059 -40+80#	<4	45	38	<10	<2
107060 -40+80#	34	60	42	<10	5
107061 -40+80#	60	60	44	<10	<2
107062 -40+80#	20	60	28	<10	3
107063 -40+80#	6	70	20	<10	<2

Method of Analysis : Sn W Nb Ta As : XRF1

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ANALYTICAL REPORT

JOB COM831348 O/N : 11846 - 11848

Results in ppm

SAMPLE	Cu	Pb	Zn	Co	Mo
104664 -40+80#	18	4	8	<4	<4
104665 -40+80#	20	<4	14	<4	<4
104666 -40+80#	12	<4	10	<4	<4
104667 -40+80#	12	4	10	<4	<4
104668 -40+80#	8	4	12	<4	<4
104669 -40+80#	10	<4	10	<4	<4
104670 -40+80#	14	6	12	<4	<4
104671 -40+80#	10	<4	8	<4	<4
104672 -40+80#	10	<4	8	<4	<4
104673 -40+80#	14	<4	6	<4	<4
104674 -40+80#	10	6	6	<4	<4
104675 -40+80#	8	<4	8	<4	<4
104676 -40+80#	8	4	8	<4	<4
104677 -40+80#	8	6	6	<4	<4
104678 -40+80#	12	6	8	<4	<4
104679 -40+80#	8	4	8	<4	<4
104680 -40+80#	8	6	6	<4	<4
104681 -40+80#	8	12	6	<4	<4
104682 -40+80#	8	8	8	<4	<4
104683 -40+80#	8	8	6	<4	<4
104684 -40+80#	6	12	6	<4	<4
104685 -40+80#	8	6	6	<4	<4
104686 -40+80#	10	28	10	<4	<4
104687 -40+80#	10	6	10	<4	<4
104688 -40+80#	8	6	8	<4	<4

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ANALYTICAL REPORT

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JOB COM831348 O/N : 11846 - 11848

Results in ppm

SAMPLE	Cu	Pb	Zn	Co	Mo
104689 -40+80#	10	4	8	<4	<4
104690 -40+80#	8	4	6	<4	<4
104691 -40+80#	8	4	8	<4	<4
104692 -40+80#	6	4	6	<4	<4
104693 -40+80#	8	6	6	<4	<4
104694 -40+80#	8	10	4	<4	<4
104695 -40+80#	8	6	4	<4	<4
104696 -40+80#	6	6	4	<4	<4
104697 -40+80#	6	6	4	<4	<4
104698 -40+80#	4	6	4	<4	<4
104756 -40+80#	6	4	10	<4	<4
104757 -40+80#	4	4	10	<4	<4
104758 -40+80#	4	<4	2	<4	<4
104759 -40+80#	6	12	4	<4	<4
104760 -40+80#	6	4	8	<4	<4
104761 -40+80#	10	8	4	<4	<4
104762 -40+80#	6	6	6	<4	<4
104763 -40+80#	12	6	12	4	<4
104764 -40+80#	14	12	20	6	<4
104765 -40+80#	16	12	14	6	<4
104766 -40+80#	6	6	4	<4	<4
104767 -40+80#	4	4	6	<4	<4
104768 -40+80#	4	<4	6	<4	<4
104769 -40+80#	4	4	2	<4	<4
104770 -40+80#	4	6	4	<4	<4

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ANALYTICAL REPORT

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JOB COM831348 O/N : 11846 - 11848

Results in ppm

SAMPLE	Cu	Pb	Zn	Co	Mo
104771 -40+80#	4	4	4	<4	<4
104772 -40+80#	6	4	6	<4	<4
104773 -40+80#	6	<4	6	<4	<4
104774 -40+80#	6	4	6	<4	<4
104775 -40+80#	8	6	12	<4	<4
104776 -40+80#	6	6	6	<4	<4
104777 -40+80#	12	6	6	<4	<4
104778 -40+80#	10	8	6	<4	<4
104779 -40+80#	10	10	6	<4	<4
104780 -40+80#	6	8	6	<4	<4
104781 -40+80#	10	12	4	<4	<4
104782 -40+80#	6	8	4	<4	<4
104783 -40+80#	6	8	4	<4	<4
104784 -40+80#	6	6	2	<4	<4
104785 -40+80#	8	6	2	<4	<4
104786 -40+80#	6	6	6	<4	<4
104787 -40+80#	6	8	6	<4	<4
104788 -40+80#	6	6	4	<4	<4
104789 -40+80#	6	6	12	<4	<4
104790 -40+80#	6	6	6	<4	<4
104791 -40+80#	6	6	14	6	<4
104792 -40+80#	4	6	2	<4	<4
104793 -40+80#	4	6	6	<4	<4
104794 -40+80#	4	6	4	<4	<4
104795 -40+80#	6	6	4	<4	<4

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ANALYTICAL REPORT

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JOB COM831348 O/N : 11846 - 11848

Results in ppm

SAMPLE	Cu	Pb	Zn	Co	Mo
104796 -40+80#	4	6	2	<4	<4
104797 -40+80#	4	6	2	<4	<4
104798 -40+80#	4	5	2	<4	<4
104799 -40+80#	4	6	4	<4	<4
104800 -40+80#	4	4	4	<4	<4
104801 -40+80#	4	4	2	<4	<4
104802 -40+80#	4	4	<2	<4	<4
104803 -40+80#	4	6	4	<4	<4
104804 -40+80#	4	4	4	<4	<4
104805 -40+80#	4	4	4	<4	<4
104806 -40+80#	4	4	<2	<4	<4
104807 -40+80#	4	6	<2	<4	<4
104808 -40+80#	4	6	4	<4	<4
104809 -40+80#	4	<4	2	<4	<4
104810 -40+80#	4	4	<2	<4	<4
104811 -40+80#	6	12	6	<4	<4
104812 -40+80#	4	6	4	<4	<4
104813 -40+80#	4	<4	4	<4	<4
104814 -40+80#	4	4	6	<4	<4
104815 -40+80#	4	6	6	<4	<4
104816 -40+80#	4	6	4	<4	<4
104817 -40+80#	4	6	6	<4	<4
104818 -40+80#	4	6	6	<4	<4
104819 -40+80#	4	6	6	<4	<4
104820 -40+80#	4	6	4	<4	<4

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ANALYTICAL REPORT

JOB COM831348 O/N : 11846 - 11848

Results in ppm

SAMPLE	Cu	Pb	Zn	Co	Mo
104821 -40+80#	4	6	6	<4	<4
104822 -40+80#	2	8	4	<4	<4
104823 -40+80#	2	4	6	<4	<4
104824 -40+80#	4	6	16	<4	<4
104825 -40+80#	4	4	4	<4	<4
107058 -40+80#	4	6	6	<4	<4
107059 -40+80#	2	6	8	<4	<4
107060 -40+80#	2	4	6	<4	<4
107061 -40+80#	2	6	6	<4	<4
107062 -40+80#	2	6	6	<4	<4
107063 -40+80#	4	8	6	<4	<4

Method of Analysis : Cu Pb Zn Co Mo : AAS After Special Digest

346000mE 48 350 52 54 56

76 74 72 6670 68 6666000mN

Creek

Hamilton

139°26' 30°02' 30°03' 139°29' 30°05' 139°30' 139°28' 30°07' 30°08'

104671 104775 104776 104678 104673 104674 104672 104675 104677 104777 104668 104669 104670 104667 104676 104666 104778 104665 104664 104779 104780 104761 104762 104760 104781 104782 104759 104758 104757 104783 104784 104765 104756 104764 104785 107063 107059 107060 104763 104687 104688 104689 104768 104767 104766 104769 104770 104772 104771 104773 104774 104786 104787 104789 104788 104791 104790 104690 104691 104679 104692 104693 104686 104685 104680 104681 104684 104682 104683 104694 104696 104695 104697 104698 104808 104804 104805 H101450 104809 104806 H101448 104811 104810 104813 104812 104807 104803 104814 104802 104801 104825 104824 107062 107061 104823 104820 104819 104798 104799 104800 107058 104822 104821 104818 104817 104816 104797 104815 104796 104795 104794 104793 104792

346000mE 48 350 52 54 56

Legend

104774 — Stream sediment sampling site

H101450 — Heavy mineral sampling site

SCALE 1:20,000 (metres)

0 200 400 600 800 1000 2000

LOCATION MAP

5480-2

Marathon Petroleum Australia, Ltd.
Brisbane Australia

Copley SH 54-09 South Australia

VALLEY BORE, EL 1099 — GUNSIGHT PROJECT

Plan Showing

LOCATION OF STREAM SEDIMENT SAMPLING SITES

Drawn by B.K.S SURVEYS Date JLY83	Plan No. File MA-4511 Order	PLATE 1
Mapped by I HODKINSON Date JLY83	Amended by Date	

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QUARTERLY REPORT
ON EXPLORATION ACTIVITIES,
EL 1099, VALLEY BORE, SOUTH AUSTRALIA
FOR PERIOD JULY, 7, 1983 TO OCTOBER 6, 1983

AUTHOR: I. HODKINSON

DATE: OCTOBER, 1983

DISTRIBUTION: S.A.D.M.E, ADELAIDE
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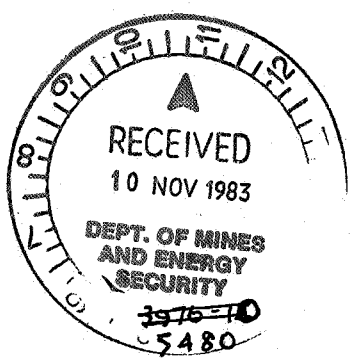

REPORT NO. 1983/68

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Locality: SH54-09 Copley 1:250,000 Map Sheet

LIST OF FIGURES

PLAN NO.	FIGURE NO.	TITLE	SCALE
MAU 39B	FIGURE 1	EL 1099 Valley Bore - Gunsight Project Location Map	Diagrammatic

LIST OF PLATES

PLAN NO.	PLATE NO.	TITLE	SCALE
MA 466	PLATE 1	EL 1099 Valley Bore - Location of Anomalous Cu, Ta, Nb, Sn and W Stream Sediment Assays.	1:20,000

LIST OF APPENDICES

APPENDIX I Mineralogical Investigation of Heavy Mineral Concentrates, EL 1099

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SUMMARY

Exploration Licence 1099, covering an area of approximately 56 square kilometres in the Northern Flinders Ranges, extends over the major part of an Ordovician muscovite granite intrusive within probable Lower-Mid Proterozoic metasediments, flanked on the northwest by Adelaidean units of Sturtian and later age. The licence was granted to Marathon Petroleum Australia, Ltd. and North Flinders Mines Ltd. on January 7, 1983.

During the quarter a review of the results of the stream sediment geochemical programme was undertaken. This outlined a number of areas of anomalous values although mainly of a low order. A zone of anomalous metal values coincides with an airborne radiometric anomaly and is considered to be of interest. Mineralogical investigation of a number of heavy mineral concentrates has also been completed.

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1.0 INTRODUCTION

1.1 Location and Setting

Exploration Licence 1099, Valley Bore, is located in the Northern Flinders Ranges approximately 110 kilometres northeast of Leigh Creek South. The major part of the area lies within the Arkaroola pastoral lease although the northwestern part, including Valley Bore is within the Mount Freeling pastoral lease. Refer to Figure 1.

Topographically the area is rugged in the extreme. Elongate strike ridges are developed over tough, resistant Adelaidean lithologies with roughly parallel major drainage directions. Discordant drainage patterns are developed on the more homogenous Lower-Mid(?) Proterozoic quartzites and gneissic units. A very distinct topography is developed on the Ordovician granite body. Rock outcrops are common and extensive with a distinct lack of vegetation cover. Major drainages within the granite are deeply incised.

Access is poor and roads are restricted to a track from Mt. Shanahan on Hamilton Creek passing via Valley Bore, within the area, to Greenhill Hut. Other tracks in the area are not accessible, even to a 4 wheel drive vehicle. Some access on foot is afforded by the major drainage which joins Hamilton Creek at Mt. Shanahan or from the plains to the east of the Ranges in the vicinity of Four Mile Creek.

1.2 Tenement Situation

Exploration Licence 1099 was granted to Marathon Petroleum Australia, Ltd. and North Flinders Mines Ltd. on January 7, 1983. Marathon Petroleum Australia, Ltd. is the operating company under the terms of a joint venture agreement with North Flinders Mines Ltd.

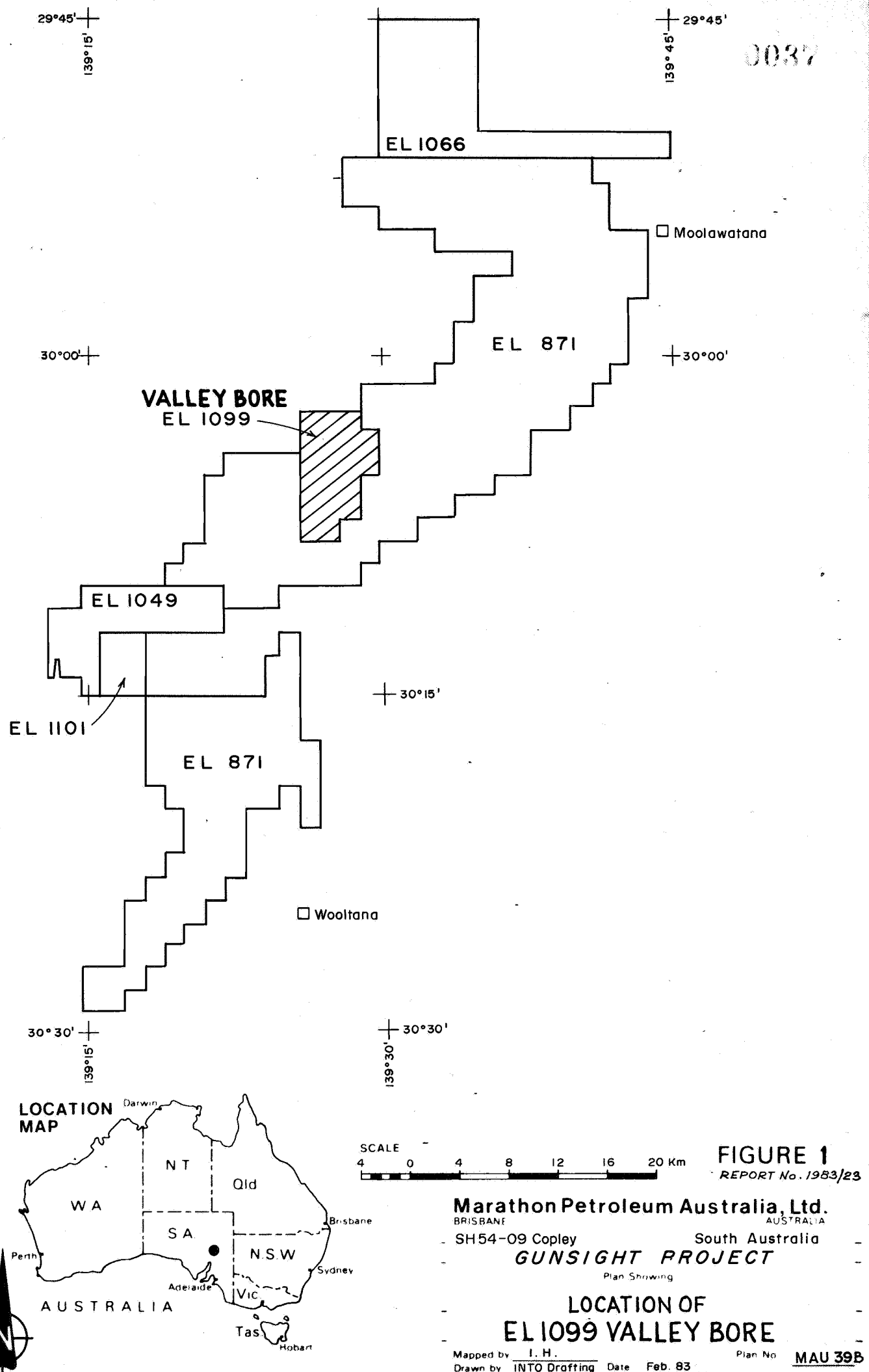

FIGURE 1

REPORT No. 1983/23

Marathon Petroleum Australia, Ltd.

BRISBANE AUSTRALIA

SH54-09 Copley South Australia

GUNSIGHT PROJECT

Plan Showing

LOCATION OF

EL 1099 VALLEY BORE

Mapped by I. H.

Drawn by INTO Drafting Date Feb. 83

Plan No MAU 39B

0036

1.3 Local Geological Setting

The oldest lithologies within the area are a sequence of quartzites and quartzofeldspathic gneisses of Lower Proterozoic and possible Mid-Proterozoic age. These are complexly deformed and extensively metamorphosed both by regional tectonometamorphic events and later thermal metamorphism as a result of Delamerian intrusive activity. Accordingly, early structures are generally obscured. Apparently intruded into this metasedimentary sequence is a major tongue of Terrapinna granite, a coarse rapakivi textured granite which probably predates the main metamorphic and deformational episodes and, in popular parlance, could be termed synorogenic.

Unconformably overlying these units are a sequence of calcareous tillites, pelites and quartzites assigned to the Fitton Formation of the Yudnamutana Sub-Group of Adelaidean age. These occur within the northern part of the area and pass upwards into the tillitic Bolla Bollana Formation in the immediate area of the Valley Bore.

Centrally disposed within the area, and covering some 40% of the exploration licence is a body of Ordovician muscovite granite emplaced during the Delamerian event. Overall, the intrusive has a southwest-northeast orientation and is considered to consist of a number of sub-parallel sheets dipping to the northwest. The eastern contact is relatively simple and planar while the northern margin of the body is complex and characterised by pegmatitic apophyses and numerous engulfed blocks of quartzite. Within the body there are numerous pegmatitic zones, usually vein or dyke-like in morphology although some bodies are more irregular. Pegmatite mineralogy is chiefly quartz and microcline with accessory muscovite, biotite and tourmaline (var. schorl). Apatite and beryl are present in small quantities.

1.4 Previous Exploration

The area under review has been held, at least partially, by a number of previous companies.

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Kennecott Explorations (Australia) Pty. Ltd. held the area from 1968 as S.M.L. 199. The main effort involved an airborne radiometric survey which identified two anomalous areas within the present licence area. These were referred to as the northern and eastern anomalies and were concluded to be of too low a grade for continued evaluation after a short drilling programme. The location of the areas is indicated on Figure 2 of the previous quarterly report for EL 1099.

Subsequent to this, the area was held by North Flinders Mines Ltd. during tenure of S.M.L.'s 457 and 558 during which periods extensive stream sediment sampling for Cu, Pb and Zn was undertaken. An area of Cu mineralization was defined along the far eastern edge of the granite intrusive although this did not constitute a significant discovery after follow-up.

Also of interest was the recognition by Rockdale Hill Pty. Ltd. (EL 802) that the area contained anomalous levels of Nb and Ta together with interesting values of Sn and W. Attention was focussed on cemented conglomeratic material of Recent age within a tributary valley, off the main drainage within the granite. It is suggested that this resource is somewhat limited although hard rock Ta-Nb potential may exist within this area. For this reason and for the uranium potential the area was taken up by Marathon Petroleum Australia, Ltd. and North Flinders Mines Ltd. in early 1983.

2.0 EXPLORATION ACTIVITIES

2.1 Stream Sediment Geochemistry

During the quarter an interpretation and evaluation of previously reported assay results was undertaken. The study identified several areas with anomalous or elevated values although no major anomalies were identified. The locations of the principal anomalous Cu, Ta, Nb, Sn and W values are indicated on Plate 1. The results for each metal are discussed below:-

Tin

Maximum value, 110 ppm; minimum value, 2 ppm. Within the range 2-50 ppm no major modal value is evident. A small sub-population with results >51 ppm and <72 ppm may be defined although these show a broad geographical distribution. The highest values of Sn (>72 ppm) (104680, 85 ppm and 104806, 110 ppm) correlate well with high Nb values and are situated off the northwestern margin of the Ordovician intrusive and in the centre of the intrusive respectively. The anomalous values are interesting although only of a low level when compared to results from elsewhere within the Mt. Painter Province. The occurrence of cassiterite (refer section 2.2) has been confirmed although only in negligible amounts.

Tungsten

Maximum value, 190 ppm; minimum value, 35 ppm. A unimodal population is evident with a mean $\pm$ 65 ppm. Only a single result (104683, 190 ppm) is anomalous. This lies within an interesting area off the northwest flank of the Ordovician intrusive.

Niobium

Maximum value, 170 ppm; minimum value, 10 ppm. A well developed, almost normally distributed, single population can be seen with a mean ±38 ppm. Values above 88 ppm are anomalous with values >130 ppm being most significant. The majority of those higher values lie off the aforementioned north-western contact of the Ordovician intrusive. An isolated result occurs in the centre of the intrusive (104806, 140 ppm) correlating with high Sn, W, and Ta values and another (104820, 140 ppm) occurs in the western part of the sampled area.

Tantalum

Maximum value, 60 ppm; minimum value <10 ppm - background. Only two results are of interest (sample (104806, 60 ppm and 104820, 40 ppm) and these occur at a site in the centre of the intrusive body and in the western part of the area, correlating well with Sn, Nb, and W values (q.v.).

Arsenic

Maximum value, 8 ppm; minimum value, <2 ppm. The maximum value comes from an already well defined area of interest adjacent to the north-western margin of the intrusive.

Copper

Maximum value, 20 ppm; minimum value, 2 ppm. A plot of log metal value against % cumulative frequency on a probability scale does not indicate any anomalous values. However, the higher values (samples 104664, 18 ppm; 104665, 20 ppm and 104765, 16 ppm) all cluster together on the map towards the far eastern margin of the Ordovician intrusive. It is suggested that these values are anomalous and indeed they do coincide with an area of anomalous copper located during previous stream sediment geochemical surveys. Mean value of copper is ±5 ppm and these high values

represent levels 4-5 x mean value. This is a slightly lower ratio (anomaly threshold : mean value) than that noted for the area by North Flinders Mines during a sampling programme in S.M.L. 457. This is most likley a factor of mesh size or analytical technique. Treatment of the -80# fraction from this area by a variety of digestions would shed light on the optimum analytical method for mobile elements in this terrain. The results are not thought to be significant.

Lead

Maximum value, 28 ppm; minimum value, <4 ppm. No statistical investigation of lead values was undertaken. The maximum Pb value was obtained from a sample site within a zone of anomalous metal values adjacent to the north-western margin of the granite. Statistically this result would most likely be anomalous but it is not regarded as significant.

Zinc

Maximum value, 20 ppm; minimum value, 2 ppm. Highest value (104764, 20 ppm; 104665, 14 ppm; and 104765, 14 ppm) correlate well with the zone of maximum copper values described above. This accords well with the earlier work undertaken in S.M.L. 457; North Flinders Mines recorded elevated zinc values in this area.

Cobalt

Maximum value, 6 ppm; minimum value <4 ppm. Cobalt values of 6 ppm (3) correlate with the eastern margin of the Ordovician intrusive. Two of the results correlate well with the Zn-Cu rich zone described above (samples 104764 and 104765) with the other occurring in a similar contact location at the far south-western extremity of the sampled area. The results are not thought to be significant.

Molybdenum

No values exceeded the detection limit of 4 ppm. No significant molybdenum values were recorded.

The stream sediment survey highlighted three areas of interest:-

(i) The eastern "corner" of the Ordovician granite intrusive where elevated values of Cu, Zn and Co were recorded. This confirms anomalous but not significant metal values identified by previous stream sediment geochemical surveys.

(ii) An area in the centre of the intrusive defined by sample site 104806 where anomalous levels of Sn (110 ppm), Nb (140 ppm), and Ta (60 ppm) were recorded. An investigation of this site revealed good concentrations of heavy minerals in what appears to be a natural "trap" and was the focus of investigations by Rockdale Hill Pty. Ltd. (EL 820). Mineralogical investigations of heavy mineral samples from this area have been undertaken (section 2.2). Elevated values of Nb, Ta and Sn from this area are believed to reflect a preponderance of heavy minerals within the sample. No viable alluvial resource, as suggested by Rockdale Hill Pty. Ltd., is thought to exist.

(iii) An area off the northwestern flank of the intrusive in which scattered anomalous levels of Pb, Sn, W, Nb and As were recorded. This area coincides with an airborne radiometric anomaly and is considered to be of futher interest.

2.2 Heavy Mineral Investigations

Petrological examination of two heavy mineral concentrates has been undertaken by I.R. Pontifex and Associates and that report is presented as Appendix I. The samples were collected from a major east flowing tributary of the main creek draining the area of the Ordovician intrusive. The lower site, sample 101448, is coincident with an area yielding anomalous Sn, Nb

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and Ta values both to the recent survey (section 2.1) and to previous tenement operators.

Of major significance is the absence of columbite and tantalite; high values of Ta and Nb reported by earlier workers are thus considered dubious unless heavy mineral concentrates containing Nb-Ta rich complex oxides (other than columbite-tantalite) were assayed - this is considered likely. The absence of columbite-tantalite and the report of only a single grain of cassiterite downgrades the Nb-Ta-Sn potential of the Ordovician granite considerably.

2.3 Airborne Magnetic and Radiometric Survey

An airborne radiometric and magnetic survey was completed over a large part of EL 1099 towards the end of 1982. Owing to the nature of the data it has not proved possible to report this information for separate areas and the reader is referred to the quarterly report covering exploration activities within the adjoining EL 871 (period 1.6.83 to 30.8.83) for full details of that programme.

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3.0 CONCLUDING REMARKS

Analysis of the results of the stream sediment geochemical survey has indicated that no major anomalies exist within the survey area. Confirmation of previously recognized areas with elevated geochemical values was obtained and one area of anomalous values off the northwestern contact of the Ordovician intrusive, coincident with a radiometric anomaly, was recognized.

Heavy mineral investigations failed to identify any columbite or tantalite and only one grain of cassiterite was identified. The mineral potential of the Ordovician intrusive has therefore been downgraded.

4.0 EXPENDITURE

Direct exploration expenditure for the period 7.7.83 to 6.10.83 totalled $9,127. A statement of expenditure appears as Table 1.

TABLE 1
STATEMENT OF EXPENDITURE
EL 1099 VALLEY BORE
FOR PERIOD 7.7.83 TO 6.10.83

	$
TECHNICAL SERVICES	3,461
OPERATING EXPENSES	1,530
CAMP COSTS	190
GEOCHEMICAL ANALYSIS	1,276
GEOPHYSICAL SURVEYS	1,791
DATA PROCESSING	49
ADMINISTRATIVE SERVICES	830
TOTAL	$9,127

APPENDIX I

MINERALOGICAL INVESTIGATION OF HEAVY MINERAL CONCENTRATES, EL 1099

INTRODUCTION

Samples 101448 and 101450 were examined in polished thin section. Particular emphasis was placed on identification of possible tantalite-columbite, of wolframite and scheelite. The heavy mineral assemblage is essentially the same in each sample and is tabulated below, giving a visual estimate of abundance.

In spite of the reported anomalous values of tantalum and niobium, no grains of tantalite-columbite were identified in the sections examined. There is no wolframite, or scheelite, but one grain of cassiterite was seen in 101448.

It suggested that the sections are scanned by a scanning electron microscope in order to establish the distribution and abundance of the anomalous Ta and Nb (?conceivably some of the ultra-fine exsolution phases in hematite carry these elements).

	101448	101450
garnet (almandine)	30 - 35	50 - 60
hematite, single crystal or simple composite grains, commonly with exsolution blebs and lamellae of rutile, and/or ilmenite	35 - 45	15 - 20
rutile, as single crystal grains	7 - 10	10 - 15
ilmenite, generally with fine exsolved hematite	3 - 5	2 - 3
martite pseudomorphs after magnetite	7 - 10	3 - 5
epidote	7 - 10	7 - 10
sphene	1 - 2	<1
zircon	1 - 2	<1
tourmaline	<<1	1
cassiterite (1 grain)	<<1	-

.../.

346000mE 48 350 52 54 56

76 74 72 6670 68 6666000mN

Creek

Hamilton

30°02'

30°03'

30°05'

30°07'

30°08'

135°20'

135°25'

346000mE 48 350 52 54 56

Legend

Stream sediment sampling site

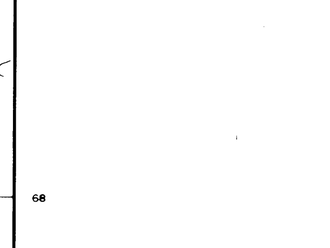
△ Anomalous Copper assays >16ppm

◇ Anomalous Tantalum assays >20ppm

⬡ Anomalous Niobium assays >130ppm

☆ Anomalous Tin assays >72ppm

☼ Anomalous Tungsten assays >140ppm



LOCATION MAP

Scale 1:20 000

5 0 1 2 Km

N

Marathon Petroleum Australia, Ltd.
Brisbane Australia

Copley SH 54-09 South Australia

VALLEY BORE, EL 1099 — GUNSIGHT PROJECT

Plan Showing

LOCATIONS OF ANOMALOUS Cu,Ta,Nb,Sn & W STREAM SEDIMENT ASSAYS

Drawn by L.Peterson Date JLY83 Plan No. File MA-466 Order

Mapped by I HODKINSON Date JLY83 Amended by Date

PLATE 1

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QUARTERLY REPORT
EXPLORATION LICENCE 1099, VALLEY BORE
FOR THE PERIOD OCTOBER 7, 1983 TO JANUARY 6, 1984

Exploration Licence 1099 covers an area of approximately 56 square kilometres in the NOrthern Flinders Ranges, 110 kilometres northeast of Leigh Creek South. The licence was granted to Marathon Petroleum Australia, Ltd. and North Flinders Mines Limited on January 7, 1983.

No work was undertaken during the period in this Exploration Licence with attention being paid to annual reporting commitments for the Gunsight Project as a whole. A decision to substantially reduce the area of the EL for the renewal period 7.1.84 to 6.1.85 was made in the light of work undertaken during 1983.

Expenditure on exploration during the period October 7, 1983 to January 6, 1984 was $1,313 and is detailed in the attached Statement of Expenditure.

I. Hodkinson

I.P. HODKINSON
Project Geologist

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8 FEB 1984
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