ANNUAL REPORT ON
EXPLORATION ACTIVITIES FOR
EXPLORATION LICENCE 1985 TENNANT CREEK
FOR PERIOD JULY 25,1980 TO JUNE 19, 1981

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September 1981

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SUMMARY

Exploration Licence 1985, with an area of 22.62 square kilometres in the vicinity of Tennant Creek in the Northern Territory, was granted to Australian Ores and Minerals Ltd. on 25th June, 1979.

Exploration is being carried out by the Operator, Marathon Petroleum Australia, Ltd. under the terms of a Joint Venture Agreement approved by the Minister for Mines and Energy on 13th December, 1978.

Work carried out during the period consisted of geochemical rock sampling and an open hole drilling programme.

1.0 INTRODUCTION

1.1 Location, Climate, History

The township of Tennant Creek is located on the Stuart Highway approximately 500 kilometres north of Alice Springs and 1,000 kilometres south of Darwin in the Northern Territory. The Exploration Licences held in Joint Venture by Uranerz Australia Ltd. and Marathon Petroleum Australia Ltd. lie within the Tennant Creek 1:250,000 sheet area bounded by latitudes 19°S and 20°S and longtitudes 133°30' E and 135°E. (Fig. 1-1).

The main centre of population is Tennant Creek (population approximately 3500), however smaller settlements occur at Nobles Nob and Warrego Mines, the Threeways Roadhouse, and the two pastoral properties of "Phillip Creek" and "Tennant Creek".

The climate is hot in summer (mean daily temperature ranges from 24°C to 37°C) and mild in winter (11°C to 24°C). Temperatures into the mid-forties are common in summer. The yearly average rainfall is 365mm, confined mainly to the summer months.

The semi-arid country supports semi-desert vegetation comprising porcupine bush, spinifex, turpentine bush, small eucalypts and mulga.

Gold was first recognised in the area probably around 1870, but it wasn't until 1932 that the first significant deposit was discovered. The field subsequently developed into a major producer of copper and gold. Three major mines are in production at the present time:- Warrego (Au, Cu, Bi, Se, Ag), Gecko (Cu, Au) and Nobles Nob (Au). Details relevant to the geology and mineralization of various mines are presented by White (1962), Crohn (1965, 1975), Crohn and Oldershaw (1965), Wright (1965), Dunnet and Harding (1967), Large (1975) and Goulevitch (1975).

Marathon Petroleum Australia Ltd. are currently involved in exploration for U, Cu, Au, Bi and associated mineralization on Exploration Licences in the Tennant Creek field.

1.2 Land Title

Exploration Licence 1985 was granted to Australian Ores & Minerals in June 1979; the tenement has been reduced in accordance with the Mining Act. Figure 1-1 outlines the land situation.

During 1980 exploration on EL 1985 was carried out by Marathon Petroleum Australia, Ltd. under the terms of a Joint Venture Agreement that received Ministerial approval on 13th December 1978.

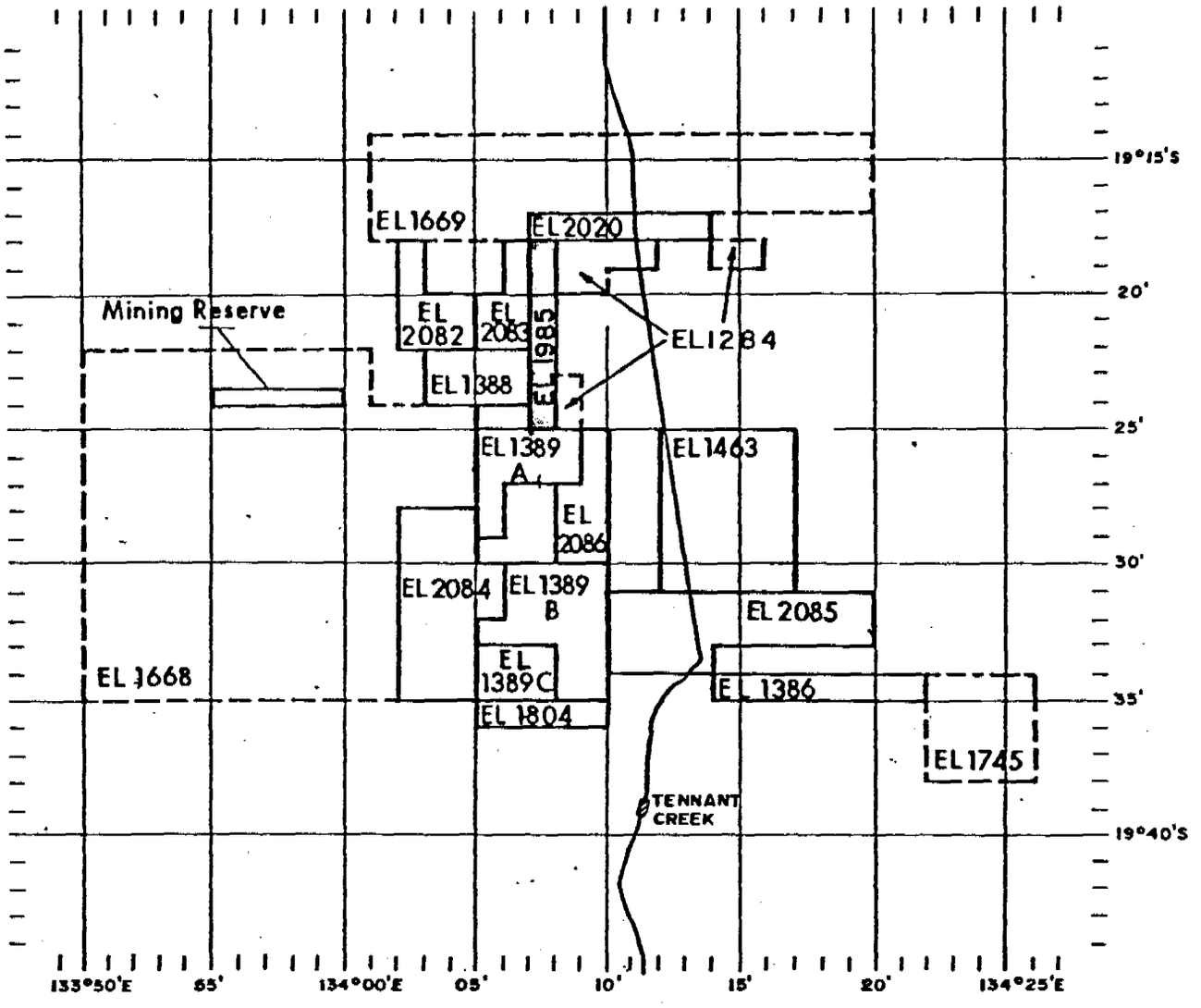
1.3 Previous Exploration

The first geological report on the Tennant Creek goldfield was compiled in 1936 by Woolnough. Ivanac carried out a comprehensive study of the regional geology and mineral deposits of the area in 1954. The geology of the Tennant Creek 1-mile sheet area was described by Crohn and Oldershaw (1965) and this was followed in 1967 by Dunnet and Harding's report on the adjoining Mount Woodcock 1-mile sheet area. Numerous unpublished geological and geophysical reports have been prepared by both government and private bodies (in particular the BMR, Geopecko Ltd., and Australian Development Ltd.). The most recent geological survey undertaken was in 1970-71 (Mendum and Tonkin).

1.4 Acknowledgements

A number of people have contributed in some way to the Tennant Creek programme. Geologists A.M. Mackie, J.A. Littler and M.A. Yates assisted the author in the field.

Dr R. Winn (Marathon Research Centre, Denver USA) provided sedimentological advice and Mr. C. Giles (Consultant, Adelaide) undertook a study of the outcropping volcanics in the area.



LEGEND

MPAL-AOM PARTICIPATION

MPAL-UAL PARTICIPATION

SCALE

5 0 5 10 15 20 km

MARATHON PETROLEUM AUSTRALIA LTD.
BRISBANE AUSTRALIA

TENNANT CREEK PROJECT

Drawn by B A W & ASSOC. Plan No. CIG2 Date SEPT. 1980

Fig 1-1

2.0 REGIONAL GEOLOGY, STRUCTURAL AND METAMORPHIC HISTORY

2.1 Regional Geology

Comprehensive reviews of the regional geology have been given by Crohn (1965), Large (1975) and Black (1977). The generalised geology is shown in Figure 2-1.

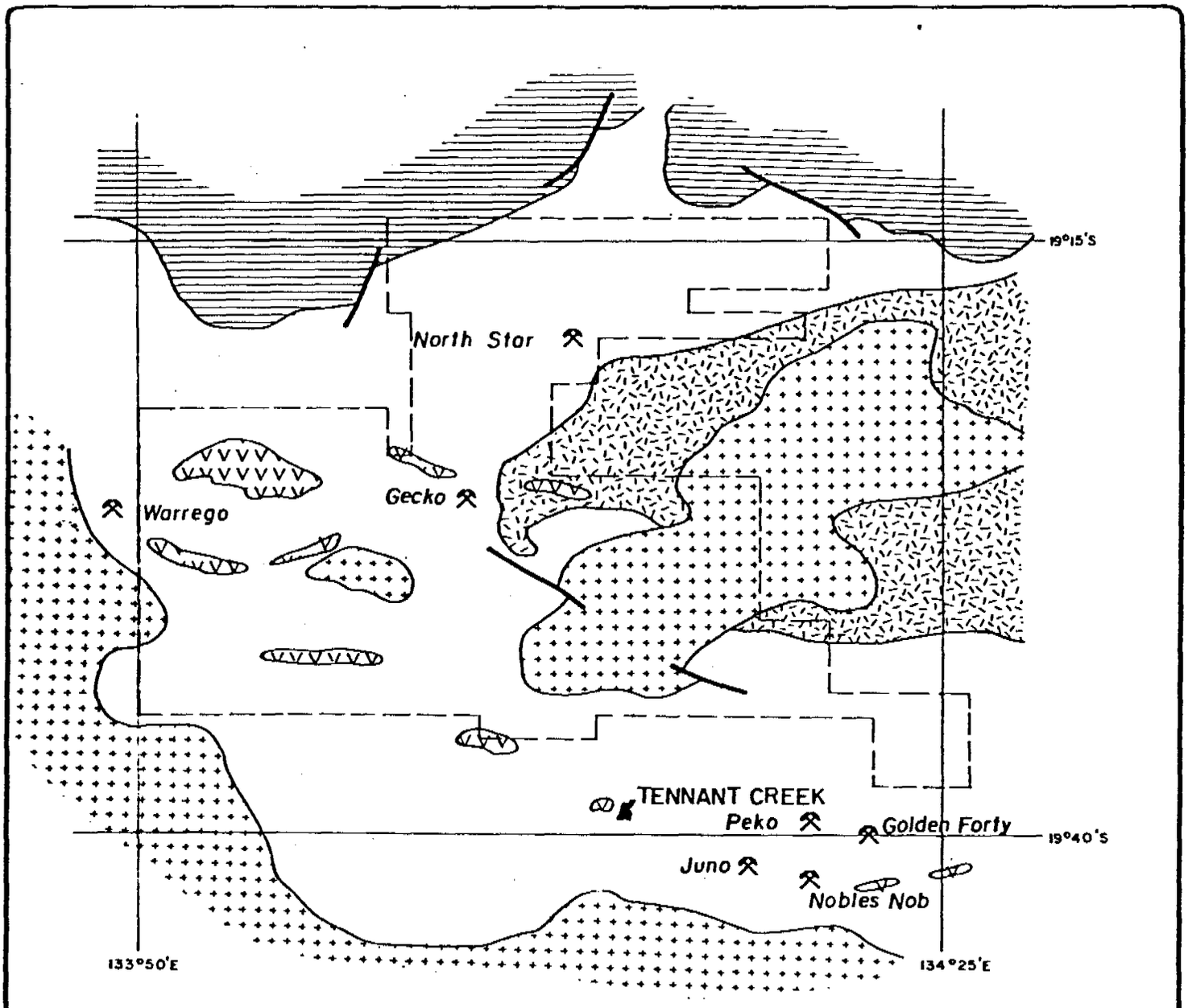
The Lower Proterozoic Warramunga Group forms a large proportion of the Tennant Creek Block and consists predominantly of tuffaceous greywackes, greywackes and shales with major intercalations of acid volcanics and associated pyroclastics. The Group is approximately 3,000 metres thick (Mendum and Tonkin, 1979).

The stratigraphic succession of the Warramunga Group comprises three formations, namely the Whippet Formation, the Bernborough Formation and the Carraman Formation in order of decreasing age.

The Whippet Formation underlies the eastern part of the Tennant Creek area and consists of shallow water sandstone with subordinate amounts of greywacke and shale.

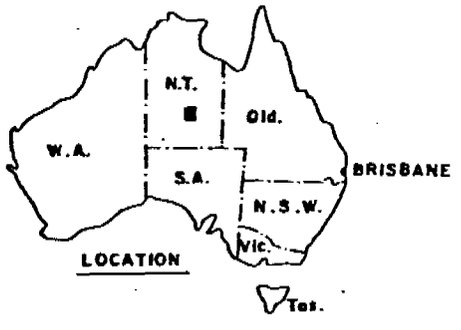
The Bernborough Formation consists of acid volcanic rocks, tuff, and tuffaceous greywacke that are interbedded with subordinate amounts of red shale and siltstone.

The Carraman Formation forms approximately 50 percent of the outcrops in the area, and consists mainly of argillite, shale, siltstone and tuffaceous greywacke that form units with features indicative of deposition by turbidity current. Isolated occurrences of dolomite have been reported at several localities (Dunnet and Harding, 1967, pp. 48-49), as have hematitic shales, ironstones, cherts and conglomerates.



LEGEND

- Geological contact
- Fault
- Major mine workings
- Limit of present exploration activities
- Tomkinson Creek Group
- Corraman Formation
- Bernborough and Whippet Formations
- Rhyolite extrusives and quartz feldspar porphyries
- Granitic intrusives



SCALE
5 0 5 10 15 20km.

MARATHON PETROLEUM AUSTRALIA, LTD.
BRISBANE AUSTRALIA

TENNANT CREEK PROJECT

SOLID GEOLOGY

N

Drawn by L.PETERSON Plan No. C1025 Date SEPT. 80

Fig 2-1

Felsic volcanism is present throughout the formation and forms lenses that have been variously named Warrego, Orlando and Gecko Volcanics on the previous geological maps (Scales 1:63,360 and 1:250,000).

Sills and dykes of diorite and, less commonly, dolerite, intrude the upper parts of the Warramunga Group and lower part of the Tomkinson Creek Beds. Small lamprophyre dykes and sills intrude Warramunga Group sediments, particularly in the vicinity of the granite bodies.

The Warramunga Group is overlain unconformably by sediments of shallower water facies, namely the Hatches Creek Group in the south and the Tomkinsons Creek Beds to the north. The Warramunga Group was intruded by granitic plutons, deformed and metamorphosed prior to the deposition of both of the abovementioned Groups.

The Proterozoic rocks are overlain by flat-lying Cambrian rocks, and Mesozoic and Cainozoic sediments.

2.2 Structural and Metamorphic History

The structural and metamorphic histories of the region are only vaguely understood. Dunnet and Harding (1967) and Mendum and Tonkin (1979) briefly touch on both topics in their reports.

It seems that the structural and metamorphic events in the Tennant Creek area can be summarized as follows:-

(i) The Warramunga Group was intruded by the Tennant Creek Granite Complex and then tightly to isoclinally folded during D_1. Parallel S_1 surfaces in the sediments and the granite confirm this. Metamorphism accompanying this deformation was of low greenschist facies grade.

(ii) Uplift and erosion occurred. The Tomkinsons Creek Group was deposited unconformably over the Warramunga Group and the Tennant Creek Granite Complex.

(iii) During a second deformational event (D_2) the Warramunga and Tomkinsons Creek Groups were folded into broad, open anticlinal and synclinal structures.

(iv) A third, weak deformational event (D_3) affected the region causing flexuring of pre-existing folds; and

(v) Cambrian strata laid down unconformably on all Proterozoic rock types.

3.0 MINERALIZATION

Comprehensive details of the geology, structure and mineralization are described in White (1962), Crohn (1965 and 1975), Crohn and Oldershaw (1965), Dunnet and Harding (1967), Large (1975) and Goulevitch (1975).

Mineralization in the Warramunga Group is widespread and consists of gold deposits associated with more massive ironstones, and copper-gold-bismuth orebodies associated with quartz-hematite and quartz-magnetite lodes and chlorite alteration.

According to Large (1977), all known economic gold, bismuth and copper mineralization in the field occurs within the Carraman Formation.

According to Large, economic gold-bismuth-copper mineralization within the Tennant Creek field invariably occurs within lenticular, ellipsoidal or pipe-like bodies rich in magnetite and/or hematite.

Seven to eight hundred ironstone bodies of various sizes occur within the Warramunga Group, but only carry economic concentrations of ore minerals when located within the hematite facies of the Carraman Formation. Within this environment, mineralized magnetite-hematite bodies are commonly found close to thin beds of argillaceous banded iron formation and hematite rich shales (e,g. Nobles' Nob, Juno and Eldorado Mines), which Large interprets as representing "normal shales which received contributions from iron-rich submarine volcanic exhalations during their period of deposition".

Economic ore minerals found comprise gold, silver, sulphides of copper, lead and iron, sulfosalts of lead, bismuth and sellenium. Uraninite is known to be present in submicroscopic grains with values of over 80 ppm in the Juno ore deposit (Large, 1975, p. 1401), and monazite is present at Warrego (Goulevitch, 1975) with uranium values up to 500 ppm.

4.0 WORK UNDERTAKEN

4.1 Ground Magnetic Survey

Prior to drilling a ground magnetic survey was conducted on all traverse lines. A hand-held Geometrics proton precession magnetometer was used. All field readings were subsequently corrected for diurnal drift. Results are shown as Plate 1.

4.2 Geochemical Investigations

4.2.1 Geochemical Approach

The basic approach for the 1980 field programme within EL 1985 was a geochemical one wherein rock and drill chips were assayed for a suite of elements suggested by Marshall (1980b).

Marshall (1980a) undertook a study of geochemical data collected in the 1979 programme on areas held in the MPAL-AOM Joint Venture. As a follow-on Marshall undertook an orientation geochemical survey in the Tennant Creek area on April-May, 1980. From this he recommended that for routine survey work the most cost-effective suite of elements to assay for could be limited to Cu, Pb, Zn, Bi, As, Fe and Co. MacMillan and Debnam (1961) had previously concluded that copper was a useful pathfinder element in the area.

4.2.2 Sampling of Hematite Fragments

Marshall (1980b) suggested that pisolites when assayed, may give an idea as to trace element content in the subsurface. Marshall (1980b) suggests that these pisolites represent a deflated relict ferricrete layer formally developed over lateritized parent bedrock in a laterite or perhaps lateritic soil (B horizon) profile. These developed in times of intense subaerial oxidation, probably in Precambrian times when the area was exhumed. In such a process, a fluctuating ground water table would concentrate elements such as Cu, Pb, Zn and As within the zone of Fe enrichment in ferricretes. Just as in present-day soils, this fossil laterite and/or fossil B horizon soil would contain any chemically dispersed and homogenized metal anomalies developed from underlying oxidised bedrock. The dispersion probably would be more homogeneous and widespread than in the bedrock.

Phillip Creek North

15

55525

55524

LEGEND

Drainage

Track

55521 Geochemical sample site

01 M.P.A.L Drillhole prefixed A85--

55523

55522

55521

55520

14 13 12 11 10 09 08 07 06 05 04 03 02 01

South

55519

55518

55517

55516

Phillip

55526

55510

55511

55512

55514

55513

Creek

55515

To Butchers Waterhole

To Bishop Bore

Uncontrolled base map from colour photography 21/1155

SCALE 1:12000 metres

100 0 100 200 300 400 500

Fig 4-1

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BRISBANE AUSTRALIA

TENNANT CREEK - NORTHERN TERRITORY

Phillip Creek Area - Tennant Creek Project

Plan Showing

GEOCHEMICAL SAMPLE SITES E.L.1985

Drawn by L. PETERSON Plan No. CIA3/N5-15 Date Feb 81

Fig 4-1

Subsequently, if the laterite was stripped by erosion, deflated remnants of the ferricrete layer would remain as rounded pisolitic ironstones, which may have been locally redistributed by mechanical means.

Thus, pisolite sampling is somewhat akin to sampling a relict fossil B horizon soil, with the advantages therefore of fairly uniform composition, good dispersion and homogenization to swamp out any local "spotty" effects of bedrock interbeds.

As angular hematite fragments predominated over pisolites these were collected and treated by Comlabs Pty. Ltd. of Adelaide. The samples as collected in the field were treated with boiling 6N HCL/5% HNO_3 for thirty minutes, diluted to 100ml volume and analysed by AAS for Cu, Pb, Zn, Co, Bi and Fe. XRF determinations for As and U were undertaken on an unpulverized portion of the sample.

The reason for collecting angular hematite fragments in EL 1985 was to test for possible mineralization associated with reported dolomite outcrops in Phillip Creek South. A traverse along the creek was completed without the dolomite outcrops being recognized. Fig. 4-1 indicates sample sites and Appendix I details assay data.

4.3 Drilling Programme

In August, 1980, Rockdril Contractors of Brisbane drilled a total of 37 rotary-percussion holes on three profiles within EL 1985. An aggregate of 1917 metres was realized from holes that varied in depth from 31m to 99m.

Profile 1S was sited so that a broad area of no outcrop could be tested to ascertain what the subsurface geology consisted of. It was thought that the reported dolomites may have occurred in that area as soil types and vegetation are somewhat different to elsewhere in the region. Profiles 2S and 3S were drilled in the vicinity of a Geopeko anomaly - Explorer 166.

All holes spudded into Carraman Formation lithologies. Lithologies intersected include shale, hematite shale, siltstone, sandstone and minor amounts of chert and vitric tuff. The colours of the shale and siltstone are due entirely to surface oxidation effects. The vitric tuff level intersected in hole U8503 was studied by Giles (1980) who concluded that its precise origin is difficult to determine owing to the fine grainsize however it is

probably a non-welded air-fall tuff. Appendix II contains Giles (1980) thin section description and Plate 1 indicates location and geological cross-sections of the drill profiles.

Composite samples over one metre intervals were collected from the holes drilled and submitted for analysis. A duplicate sample was submitted to the N.T.G.S. for storage at Tennant Creek. Composite samples over one metre collected every five metres were submitted to Comlabs of Adelaide who analysed for Cu, Pb, Zn, Co, Bi, Fe, Mn, As and U. These assay results are enclosed as Appendix III.

5.0 EXPENDITURE

During the period June 25th 1980 to June 19th 1981 a total of $47,292.96 was incurred as a direct exploration expense.

A detailed Statement of Expenditure appears as Table 5-1.

STATEMENT OF EXPENDITURE

EXPLORATION LICENCE 1985 (BISHOP CREEK)

FOR PERIOD 25.6.80 TO 30.6.81

	$
Salaries and Associated Costs	1 538.74
Business Expense	22.75
Motor Vehicle Rental	327.59
Commercial Transportation	275.04
Communications Expense	12.94
Motor Vehicle Expenses	48.18
Aircraft Hire	78.69
Technical Publications	162.88
Contract Services	4.80
Reproduction Expense	15.50
Frieght	174.74
Denver Research Centre	7.54
Roads and Sites	428.40
Materials and Supplies	208.56
Field Equipment Expense	203.95
Camp Costs	36.82
Geological Services	1 557.70
Geochemical Services	50.74
Geochemical Assays	3 844.83
Drilling Costs	33 993.21
Administrative Services	4 299.36
	$47,292.96

APPENDIX I

ASSAY DATA FROM

ANGULAR HEMATITE FRAGMENTS,

E.L. 1985

ASSAY DATA FROM ANGULAR HAEMATITE FRAGMENTS, EL 1985

SAMPLE	Cu	Pb	Zn	Co	Bi	Fe	As	U
555 10	1.5	1.3	2.0	0.9	0.2	11000	34	4
12	2.4	1.7	2.9	1.6	0.2	17000	34	<4
14	2.7	2.0	3.2	1.6	0.2	19000	42	<4
15	2.2	2.3	2.0	1.7	0.2	14000	130	<4
16	2.2	2.0	2.6	1.5	0.3	17000	32	4
17	2.3	2.2	2.6	1.5	0.2	14000	26	6
18	2.6	2.6	3.0	3.2	0.2	17500	38	<4
19	2.4	2.1	2.6	2.0	0.3	16000	36	<4
555 20	2.4	2.1	3.8	2.4	0.3	15000	26	<4
21	2.8	2.9	3.8	2.7	0.2	18000	22	4
22	3.7	2.3	3.6	2.5	0.2	18000	36	<4
23	0.5	0.8	0.5	0.2	0.2	7900	14	<4
24	1.3	1.3	0.6	0.4	0.2	9800	24	<4
25	1.2	1.5	0.9	0.8	0.2	13000	30	<4
55526	0.9	1.7	0.6	0.4	0.2	11000	20	<4
			Pisolite Samples					
55511	4.4	3.0	5.4	2.6	0.2	28000		
55513	5.0	3.6	6.2	2.5	0.5	30000		

Note: Results in ppm

APPENDIX II

THIN SECTION DESCRIPTION

E.L. 1985

Sample number: A 8503

Rock name: Vitric tuff

Sample locality: Drill chips from 69-70m, hole A8503.

Description: Composed of a devitrified felsic mosaic that has developed from glassy volcanic ash. Ghosted outlines of minute glass shards are visible in thin section. Rare, fine-grained crystal "chips" of quartz are scattered through the sample.

Comments: This sample greatly resembles the vitric tuffs collected from the Great Western syncline. The precise origin is difficult to determine owing to the fine grainsize, but this unit probably represents a non-welded air-fall tuff.

APPENDIX III

ASSAY DATA FROM DRILLHOLES

WITHIN E.L. 1985

Hole No Depth (m)	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
A8501/ 4- 5	16	20	28	6	-4	4.10	100	8	4
/ 9-10	10	8	36	4	-4	2.60	70	8	-4
/14-15	8	8	30	-4	-4	2.60	55	4	-4
/19-20	8	8	40	4	-4	2.75	70	6	-4
/24-25	10	8	20	-4	-4	2.55	80	4	4
/29-30	8	12	16	-4	-4	3.00	75	4	4
/34-35	8	8	22	-4	-4	2.65	65	2	-4
/39-40	8	8	28	-4	-4	2.90	85	6	4
/44-45	10	10	30	-4	-4	2.90	100	4	-4
/49-50	8	6	75	32	-4	2.85	980	2	6
/54-55	12	6	90	14	-4	2.95	820	4	6
/59-60	8	4	38	-4	-4	2.45	65	6	-4
/64-65	8	4	60	8	-4	2.50	380	4	8
/69-70	6	4	85	6	-4	2.45	140	2	4
/74-75	8	6	110	18	-4	2.60	520	2	8
/79-80	8	4	150	16	-4	2.50	370	6	8
/84-85	14	-4	60	10	-4	1.15	510	-2	4
/89-90	10	-4	38	-4	-4	1.35	120	-2	-4
/94-95	10	-4	75	4	-4	1.30	310	-2	6
/98-99	10	-4	60	4	-4	1.25	480	-2	4
A8502/ 4- 5	4	10	12	6	-4	1.95	90	4	4
/ 9-10	4	8	14	4	-4	2.35	110	4	4
/14-15	6	-4	20	-4	-4	1.60	155	2	8
/19-20	4	8	26	4	-4	2.75	190	-2	-4
/24-25	4	10	24	4	-4	2.65	175	-2	-4
/29-30	4	10	18	-4	-4	2.05	295	2	-4
/34-35	6	12	34	4	-4	2.60	600	6	-4
/39-40	4	18	24	-4	-4	2.40	275	6	6
/44-45	4	6	28	-4	-4	1.20	320	4	4
/49-50	4	10	20	-4	-4	1.95	180	6	-4

NOTE: -4 denotes less than 4)

Method of Analysis:

Cu, Pb, Zn, Co, Bi	AAS 1
Fe, Mn	AAS 2/2A
As, U	XRF 1

Hole No Depth(m)	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
A8503/ 4- 5	12	8	20	10	-4	3.05	170	3	-4
/ 9-10	4	-4	8	-4	-4	1.00	20	-2	6
/14-15	4	4	8	-4	-4	0.70	18	-2	-4
/19-20	4	4	12	-4	-4	0.95	24	2	-4
/24-25	8	10	38	8	-4	1.90	220	5	8
/29-30	6	4	24	-4	-4	0.95	60	4	6
/34-35	4	4	22	-4	-4	0.70	60	2	8
/39-40	6	4	75	-4	-4	1.10	110	-2	-4
/44-45	6	4	110	4	-4	1.40	620	-2	6
/49-50	4	4	90	-4	-4	1.25	155	6	4
/54-55	4	-4	75	4	-4	1.10	1050	3	-4
/59-60	2	10	36	4	-4	2.35	290	-2	-4
/64-65	2	4	80	-4	-4	0.85	400	-2	4
/69-70	4	-4	38	-4	-4	0.90	310	-2	4
/74-75	4	4	44	-4	-4	1.10	420	-2	14
/79-80	4	-4	48	-4	-4	0.80	820	3	-4
/84-85	4	12	34	4	-4	2.80	1100	6	4
/89-90	4	12	60	6	-4	2.50	660	4	-4
/92-93	8	12	55	8	-4	1.70	1050	5	4
A8504/ 4- 5	12	10	20	4	-4	2.05	60	4	-4
/ 9-10	8	10	34	6	-4	3.70	200	8	6
/14-15	6	10	40	-4	-4	3.90	85	10	8
/19-20	6	8	65	-4	-4	3.65	85	8	6
/24-25	6	10	38	-4	-4	2.95	70	-2	4
/29-30	6	10	26	-4	-4	2.55	125	-2	-4
/34-35	8	10	48	-4	-4	3.50	155	6	-4
/39-40	4	14	32	-4	-4	3.60	135	8	-4
/44-45	4	18	26	-4	-4	3.15	85	8	-4
/49-50	4	24	26	4	-4	3.15	100	8	4

Hole No. Depth (m)	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
A8505/ 4 - 5	12	14	18	12	-4	2.90	125	3	-4
/ 9-10	10	8	16	4	-4	2.20	40	4	4
/14-15	8	8	34	4	-4	3.60	50	8	-4
/19-20	4	10	40	-4	-4	2.70	44	6	4
/24-25	4	14	34	-4	-4	3.00	80	9	-4
/29-30	4	18	32	4	-4	3.30	230	8	-4
/34-35	4	16	60	8	-4	2.75	400	8	6
/39-40	4	18	60	38	-4	2.95	1950	7	6
/44-45	4	18	55	26	-4	3.10	1000	8	-4
/49-50	6	10	105	40	-4	2.60	1750	6	4
A8506 / 4- 5	16	20	20	10	-4	3.45	160	-2	-4
/ 9-10	16	14	32	4	-4	3.50	155	6	6
/14-15	40	18	50	4	-4	4.85	230	30	6
/19-20	4	14	30	4	-4	2.05	200	6	-4
/24-25	6	18	30	4	-4	2.60	210	18	-4
/29-30	6	8	38	6	-4	1.70	150	10	-4
/34-35	8	22	28	-4	-4	2.85	310	6	-4
/39-40	30	8	46	16	-4	2.15	1750	-2	-4
/44-45	32	6	48	10	-4	1.90	1150	3	6
/49-50	16	12	55	30	-4	3.15	2400	4	4
/54-55	8	10	44	18	-4	2.20	680	2	4
/59-60	4	10	38	22	-4	2.20	1000	-2	8
/64-65	4	4	65	18	-4	1.90	940	5	6
/69-70	6	8	65	34	-4	1.95	1350	-2	8
/74-75	4	10	50	26	-4	2.40	770	2	8
/79-80	4	-4	50	32	-4	1.45	1000	2	8

Hole No. Depth(m)	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
A8507/ 4- 5	14	12	20	12	-4	2.30	360	3	-4
/ 9-10	10	10	20	6	-4	2.35	50	-2	-4
/14-15	6	10	30	4	-4	3.20	135	6	-4
/19-20	4	6	36	-4	-4	1.80	85	-2	6
/24-25	6	4	34	4	-4	1.50	120	-2	10
/29-30	4	4	26	-4	-4	1.25	46	-2	8
/34-35	6	-4	46	4	-4	1.95	220	-2	8
/39-40	4	-4	260	24	-4	1.55	1200	-2	8
/44-45	2	-4	80	4	-4	1.25	980	4	6
/49-50	4	4	60	-4	-4	1.40	550	5	-4
/54-55	4	-4	46	-4	-4	1.05	400	2	-4
/59-60	-2	6	24	6	-4	1.75	300	-2	6
/64-65	-2	4	50	-4	-4	1.10	400	-2	-4
/69-70	2	-4	50	4	-4	1.30	490	2	-4
/74-75	2	-4	44	-4	-4	1.20	550	3	-4
/79-80	2	-4	44	-4	-4	1.10	410	-2	4
/84-85	6	4	55	6	-4	2.00	660	-2	-4
/89-90	4	4	50	8	-4	2.00	610	-2	8
A8508 / 4- 5	18	12	30	10	-4	3.35	100	4	-4
/ 9-10	14	10	18	8	-4	3.45	115	2	-4
/14-15	6	8	10	-4	-4	0.55	60	-2	6
/19-20	6	4	34	4	-4	3.10	48	4	-4
/24-25	6	8	34	4	-4	2.75	55	-2	4
/29-30	4	8	65	18	-4	3.10	110	3	6
/34-35	4	8	42	6	-4	2.45	105	-2	6
/39-40	8	4	60	8	-4	2.70	120	2	6
/44-45	6	12	34	6	-4	3.15	230	2	-4
/49-50	8	8	40	-4	-4	2.45	60	4	-4
/54-55	8	8	40	4	-4	2.50	80	-2	4

Hole No. Depth(m)	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
A8509/ 4- 5	18	18	28	10	-4	3.25	270	3	-4
/ 9-10	16	12	20	8	-4	5.30	150	10	-4
/14-15	6	4	20	6	-4	9.00	250	14	-4
/19-20	4	4	18	-4	-4	1.60	65	5	-4
/24-25	6	6	34	4	-4	2.45	70	4	-4
/29-30	4	10	32	-4	-4	2.75	46	-2	-4
/34-35	10	8	75	10	-4	3.30	200	-2	6
/39-40	6	8	48	10	-4	2.30	170	-2	4
/44-45	6	10	105	60	-4	2.80	1450	-2	-4
/49-50	6	6	55	8	-4	2.25	210	4	4
/54-55	4	4	80	36	-4	2.30	1050	6	-4
A8510 / 4- 5	18	14	24	14	-4	3.45	110	5	6
/ 9-10	8	10	12	4	-4	2.00	50	-2	4
/14-15	4	4	6	-4	-4	0.75	30	-2	4
/19-20	4	8	8	-4	-4	0.50	26	3	6
/24-25	4	6	10	-4	-4	0.45	20	-2	6
/29-30	4	8	10	-4	-4	1.20	28	-2	-4
/34-35		Not Received							
/39-40	4	8	18	-4	-4	2.60	28	-2	-4
/44-45	4	6	55	-4	-4	2.40	28	-2	-4
/49-50	4	10	38	4	-4	2.05	30	2	-4
/54-55	4	6	30	-4	-4	2.65	30	3	6
A8511/ 4- 5	14	16	16	4	-4	3.40	120	4	-4
/ 9-10	16	16	30	14	-4	2.40	280	2	-4
/14-15	4	12	18	4	-4	3.25	390	4	-4
/19-20	12	10	55	6	-4	1.40	80	4	-4
/24-25	6	8	14	-4	-4	3.45	44	-2	6
/29-30	14	8	55	12	-4	3.05	110	3	12
/34-35	26	-4	115	22	-4	3.05	140	-2	4
/39-40	12	10	46	6	-4	2.75	65	-2	-4
/44-45	8	6	50	4	-4	2.85	80	-2	6
/49-50	10	12	75	8	-4	2.70	100	-2	6
/54-55	6	10	155	165	-4	3.85	2200	6	6

Hole No. Depth (m)	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
A8512/ 4- 5	18	16	28	8	-4	3.85	110	6	-4
/ 9-10	10	10	16	4	-4	2.45	70	-2	-4
/14-15	10	12	30	10	-4	3.70	195	10	-4
/19-20	8	6	18	6	-4	1.55	130	-2	-4
/24-25	18	8	38	4	-4	1.95	125	4	6
/29-30	12	10	30	12	-4	2.05	290	5	6
/34-35	14	8	40	10	-4	1.95	290	-2	10
/39-40	30	6	50	80	-4	1.25	990	2	4
/44-45	20	8	44	30	-4	1.45	500	4	6
/49-50	8	4	80	38	-4	1.45	460	3	6
/54-55	6	4	125	32	-4	1.15	1150	-2	4
A8513/ 4- 5	14	16	22	8	-4	5.40	155	4	-4
/ 9-10	10	6	22	4	-4	5.05	185	-2	-4
/14-15	12	10	26	-4	-4	2.90	95	2	-4
/19-20	8	6	20	-4	-4	1.90	48	-2	-4
/24-25	6	12	32	4	-4	3.20	105	-2	-4
/29-30	8	10	34	4	4	3.10	135	-2	8
/34-35	8	8	50	65	-4	2.75	980	4	6
/39-40	6	10	32	8	-4	2.90	220	3	4
/44-45	6	10	36	16	-4	3.00	310	-2	6
/49-50	2	10	38	18	-4	2.15	350	7	6
/54-55	2	8	60	24	-4	2.30	480	-2	6

Hole No. Depth(m)	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
-A8514/ 4- 5	10	10	18	4	-4	2.10	55	2	-4
/ 9-10	4	8	16	-4	-4	2.10	100	-2	-4
/14-15	2	6	22	-4	-4	2.45	48	-2	-4
/19-20	2	8	18	-4	-4	2.30	46	-2	-4
/24-25	2	8	16	-4	-4	2.05	36	-2	-4
/29-30	4	8	18	-4	-4	2.25	50	-2	-4
/34-35	2	6	20	-4	-4	2.15	42	-2	6
/39-40	2	6	28	-4	-4	2.70	50	2	6
/44-45	2	6	18	-4	-4	2.30	55	2	6
/49-50	2	4	22	-4	-4	2.40	55	-2	4
/54-55	2	4	18	-4	-4	2.05	50	3	4
A8515/ 4- 5	4	20	18	4	-4	4.10	95	-2	-4
/ 9-10	4	8	26	-4	-4	2.35	60	-2	6
/14-15	6	8	26	-4	-4	2.70	75	2	4
/19-20	4	8	20	-4	-4	2.80	60	-2	6
/24-25	4	10	28	-4	-4	2.90	70	-2	-4
/29-30	4	8	22	-4	-4	2.55	70	-2	-4
/34-35	4	6	30	-4	-4	2.15	90	-2	8
/39-40	4	18	44	34	-4	5.10	1200	5	8
/44-45	6	4	48	32	-4	2.25	600	-2	8
/49-50	4	6	65	16	-4	2.40	570	-2	8
/54-55	4	6	80	14	-4	2.65	640	6	8
/59-60	2	14	48	20	-4	3.10	1900	3	10
/64-65	2	12	28	8	4	2.75	200	4	-4
/69-70	4	-4	60	4	4	1.40	440	4	-4
/74-75	4	6	95	12	-4	2.90	430	6	-4
/79-80	2	16	46	8	-4	3.40	390	9	4
/84-85	4	12	42	8	-4	3.45	360	10	-4
/89-90	-2	10	55	12	-4	3.10	350	4	-4
/94-95	4	-4	60	6	4	1.60	710	3	8
/96-97	4	-4	90	10	-4	2.25	840	-2	12

Hole No. Depth(m).	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
A8516/ 4- 5	20	12	30	8	-4	3.75	100	3	-4
/ 9-10	10	8	18	6	-4	5.60	150	4	-4
/14-15	6	-4	18	-4	-4	2.00	40	2	-4
/19-20	6	-4	44	-4	-4	3.50	42	-2	-4
/24-25	4	-4	32	-4	-4	1.40	22	-2	-4
/29-30	4	-4	32	-4	-4	3.35	28	-2	-4
/34-35	4	-4	40	4	-4	2.30	34	-2	6
/39-40	2	-4	34	-4	-4	3.10	34	-2	4
A8517/ 9-10	14	10	26	8	-4	4.95	220	5	-4
/14-15	6	4	26	-4	-4	3.00	55	-2	-4
/19-20	6	4	26	-4	-4	2.90	30	3	-4
/24-25	4	4	30	4	-4	2.75	30	-2	-4
/29-30	6	6	26	-4	-4	2.60	24	-2	-4
/34-35	8	6	40	-4	-4	2.70	20	-2	4
/39-40	8	4	20	-4	-4	1.95	30	-2	-4
A8518/ 9-10	14	10	20	6	-4	9.30	185	9	-4
/14-15	4	4	20	-4	-4	2.70	65	-2	4
/19-20	4	-4	26	-4	-4	3.00	48	-2	6
/24-25	4	-4	26	-4	-4	2.75	32	2	6
/29-30	2	4	28	-4	-4	2.95	50	3	-4
/34-35	2	4	42	8	-4	2.95	130	-2	4
/39-40	2	4	65	22	-4	2.80	300	2	6
A8519/ 9-10	14	12	22	8	-4	4.20	165	-2	6
/14-15	4	10	16	-4	-4	2.30	125	2	-4
/15-16	4	-4	14	-4	-4	2.45	210	4	6
/16-17	4	-4	18	-4	-4	2.80	60	8	14
/17-18	2	-4	20	-4	-4	2.70	80	2	-4
/18-19	4	-4	46	16	-4	2.80	1100	-2	-4
/19-20	4	-4	50	48	-4	2.70	1600	2	-4
/24-25	4	4	36	8	-4	3.50	190	2	-4
/29-30	4	-4	22	4	-4	2.45	85	2	4
/34-35	6	4	70	12	-4	4.00	450	18	8
/39-40	6	-4	85	65	-4	2.50	1450	6	-4

Hole No. / Depth (m)	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
A8520/ 9-10	12	8	20	6	-4	3.80	70	6	-4
/14-15	4	-4	14	-4	-4	1.10	48	4	-4
/19-20	6	-4	16	-4	-4	1.30	60	-2	-4
/24-25	8	-4	16	-4	-4	1.00	120	-2	6
/29-30	6	-4	14	-4	-4	1.05	120	-2	6
/34-35	8	-4	24	6	-4	1.25	390	-2	6
/39-40	8	-4	26	-4	-4	1.35	200	-2	-4
A8521/ 9-10	6	6	16	4	-4	2.75	70	-2	4
/14-15	4	6	14	-4	-4	2.95	70	2	-4
/19-20	2	6	18	-4	-4	2.65	38	-2	-4
/24-25	4	-4	22	-4	-4	2.55	80	-2	4
/29-30	4	4	10	-4	-4	1.85	44	3	6
/34-35	4	6	26	-4	-4	2.70	60	3	4
/39-40	6	-4	26	-4	-4	1.95	70	5	-4
A8522/ 9-10	12	8	20	6	-4	2.95	150	5	-4
/14-15	6	4	14	-4	-4	1.85	60	2	6
/19-20	4	4	22	-4	-4	2.60	50	-2	-4
/24-25	4	-4	22	-4	-4	2.85	34	2	-4
/29-30	6	6	20	-4	-4	2.75	34	2	4
/34-35	4	-4	22	-4	-4	2.65	80	-2	4
/39-40	4	4	18	-4	-4	2.85	100	2	-4
A8523/ 9-10	8	8	26	6	-4	3.20	65	4	-4
/14-15	4	-4	22	-4	-4	2.55	38	-2	6
/19-20	4	6	18	-4	-4	2.60	38	2	6
/24-25	4	4	22	-4	-4	2.30	28	2	6
/29-30	4	-4	20	-4	-4	2.55	34	2	8
/34-35	4	-4	24	-4	-4	1.80	50	2	10
/39-40	2	-4	28	-4	-4	2.10	18	-2	6

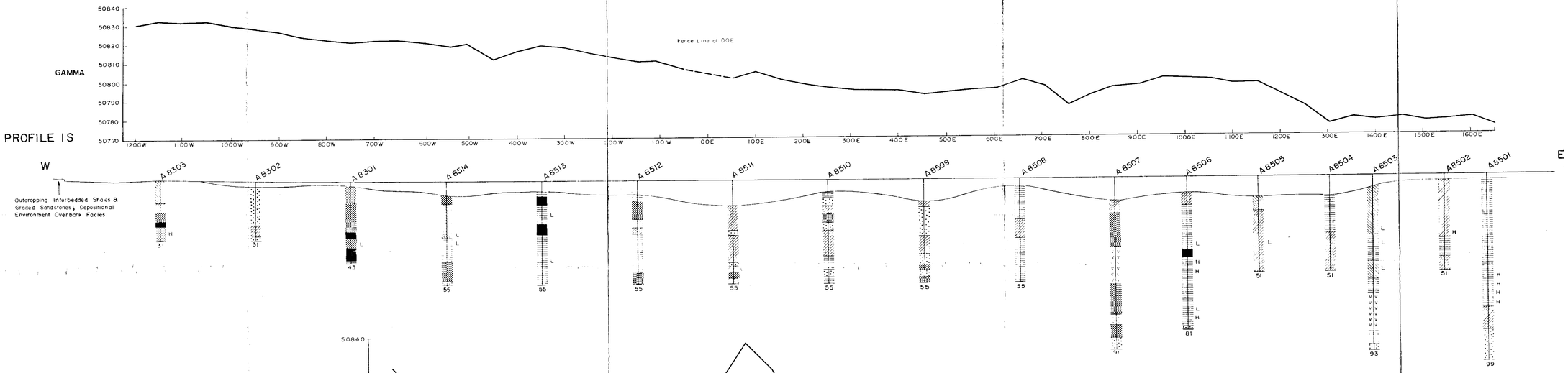
Hole No. Depth(m).	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
A8524/ 9-10	4	-4	14	-4	-4	2.00	50	2	-4
/14-15	4	-4	22	-4	-4	1.85	26	-2	-4
/19-20	2	4	12	-4	-4	2.50	30	-2	-4
/24-25	2	-4	24	-4	-4	2.30	24	-2	-4
/29-30	4	-4	22	-4	-4	2.05	34	-2	4
/34-35	4	-4	18	-4	-4	1.85	32	-2	-4
/39-40	4	6	12	-4	-4	2.45	32	4	-4
A8525/ 9-10	4	-4	24	-4	-4	2.25	32	-2	-4
/14-15	4	4	20	-4	-4	2.20	34	-2	4
/19-20	4	4	26	-4	-4	2.25	40	2	-4
/24-25	4	-4	12	-4	-4	2.05	44	-2	-4
/29-30	4	-4	16	-4	-4	2.15	44	-2	4
/34-35	4	4	18	-4	-4	2.25	120	-2	6
/39-40	4	-4	18	-4	-4	2.60	55	-2	-4
A8526/ 9-10	4	-4	8	-4	-4	1.60	30	-2	-4
/14-15	4	-4	30	-4	-4	1.90	36	-2	-4
/19-20	2	-4	16	-4	-4	1.65	38	2	4
/24-25	4	-4	14	6	-4	1.80	48	-2	8
/29-30	2	-4	20	-4	-4	1.70	30	-2	6
/34-35	6	-4	16	-4	-4	1.50	50	-2	6
/39-40	4	-4	12	-4	-4	1.50	44	2	6
A8527/ 9-10	6	-4	14	-4	-4	3.55	55	5	4
/14-15	4	-4	12	-4	-4	2.80	55	4	-4
/19-20	2	4	12	-4	-4	2.90	36	3	-4
/24-25	4	-4	16	-4	-4	3.10	48	-2	-4
/29-30	4	-4	20	-4	-4	3.00	55	-2	-4
/34-35	4	-4	20	-4	-4	2.65	60	-2	-4
/39-40	4	-4	14	-4	-4	1.80	50	-2	-4

Hole No. Depth (m)	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
A8528/ 0- 1	12	6	14	8	-4	2.10	165	-2	-4
/ 1- 2	14	8	18	8	-4	2.65	110	-2	-4
/ 2- 3	18	12	16	10	-4	3.00	160	5	-4
/ 9-10	16	12	30	8	-4	2.90	110	3	6
/14-15	4	-4	24	-4	-4	2.20	120	3	4
/19-20	4	-4	30	12	-4	2.45	100	2	4
/24-25	4	-4	28	8	-4	2.00	60	-2	-4
/29-30	4	-4	30	4	-4	2.30	55	-2	-4
/34-35	4	-4	28	-4	-4	2.00	50	-2	4
/39-40	2	-4	44	6	-4	2.05	155	-2	6
A8529/ 9-10	10	10	12	4	-4	2.95	60	2	-4
/14-15	2	14	14	-4	-4	2.65	90	-2	-4
/19-20	2	12	14	-4	-4	2.60	65	-2	-4
/24-25	-2	10	18	-4	-4	2.70	55	-2	-4
/29-30	2	12	20	4	-4	2.95	70	-2	-4
/34-35	-2	20	20	4	-4	3.40	105	4	-4
A8530/ 9-10	12	10	20	8	-4	2.50	155	-2	8
/14-15	8	4	42	-4	-4	2.85	145	-2	-4
/19-20	4	4	26	-4	-4	2.80	345	-2	6
/24-25	4	-4	26	8	-4	3.00	880	-2	-4
/29-30	8	-4	40	12	-4	2.95	550	4	4
/34-35	6	6	48	6	-4	3.05	1850	6	-4
A8531/ 9-10	10	6	14	6	-4	2.05	60	3	8
/14-15	8	4	14	4	-4	2.90	185	10	-4
/19-20	4	-4	50	4	-4	3.00	940	-2	6
/24-25	4	8	22	-4	-4	2.40	195	2	12
/29-30	4	4	70	44	-4	3.55	1400	-2	-4
/34-35	10	-4	185	140	-4	2.90	7250	10	4

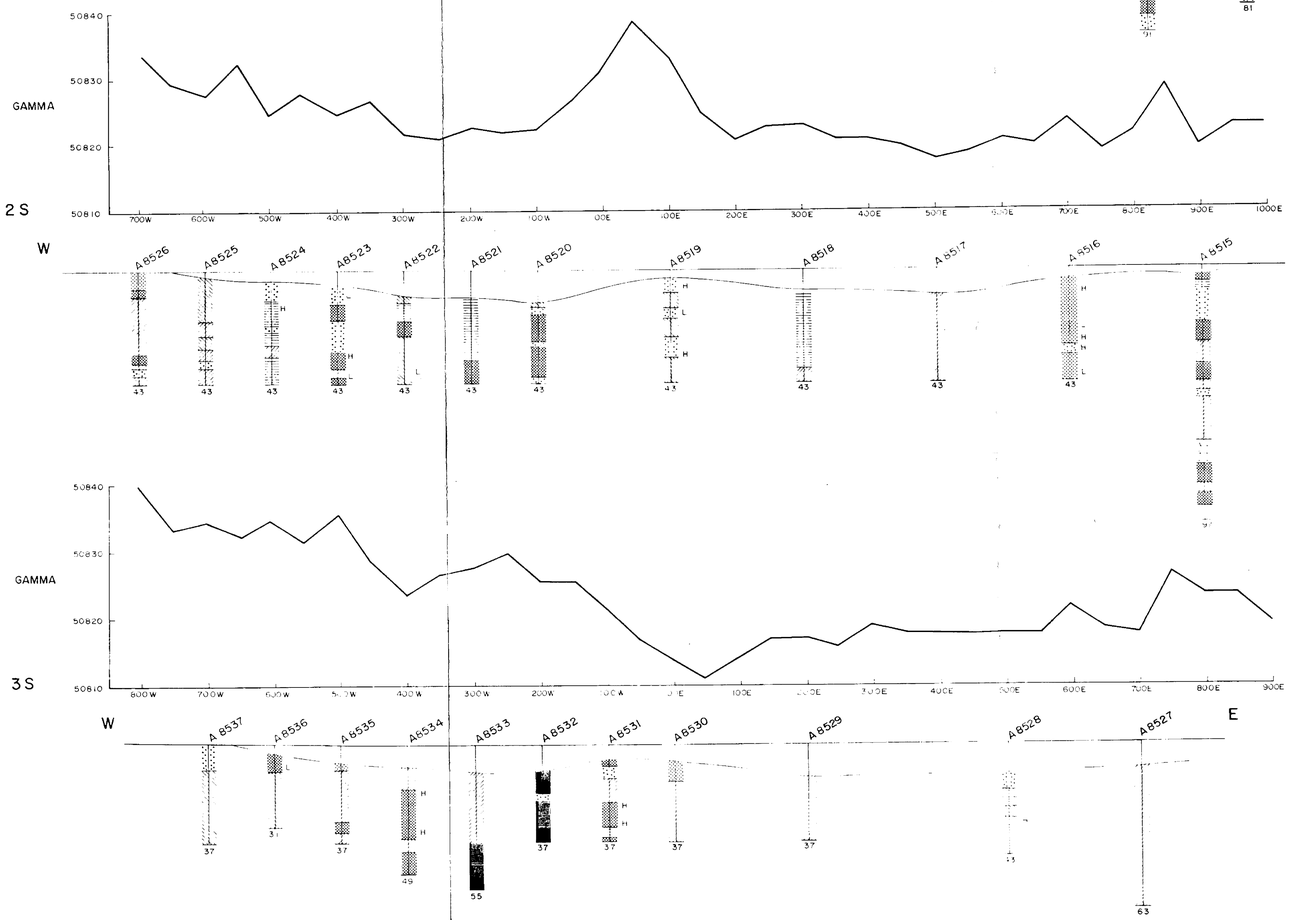
Hole No. Depth (m)	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
A8532/ 9-10	14	8	16	8	-4	2.95	140	-2	-4
/14-15	165	270	95	65	-4	8.50	3.20%	80	6
/19-20	55	18	48	38	-4	1.55	1.28%	65	-4
/24-25	145	390	100	48	-4	6.95	2.70%	60	-4
/29-30	95	450	65	32	-4	6.65	2.20%	65	6
/34-35	160	350	125	65	-4	6.90	2.80%	70	-4
A8533/ 9-10	10	6	20	4	-4	2.65	110	8	-4
/14-15	4	-4	18	-4	-4	2.10	48	8	-4
/19-20	4	4	12	-4	-4	2.00	60	10	4
/24-25	4	4	12	-4	-4	2.25	55	14	4
/29-30	2	8	8	-4	-4	2.95	80	6	4
/34-35	4	6	8	-4	-4	2.85	280	12	6
/39-40	12	20	28	24	-4	7.55	1350	20	-4
/44-45	14	16	65	40	-4	5.75	2950	20	-4
/49-50	16	16	55	24	-4	5.40	1450	20	-4
/54-55	4	28	32	18	-4	8.90	1250	12	-4
A8534/ 9-10	2	-4	8	-4	-4	1.25	55	2	-4
/14-15	4	-4	16	-4	-4	1.00	80	3	-4
/19-20	4	-4	12	-4	-4	0.90	95	-2	-4
/24-25	2	-4	12	-4	-4	1.05	75	5	4
/29-30	4	-4	16	10	-4	0.55	1250	4	6
/34-35	4	-4	36	28	-4	1.15	1250	5	4
/39-40	4	-4	70	36	-4	1.05	1550	-2	-4
/44-45	4	-4	120	155	-4	1.05	7500	-2	6
/48-49	2	-4	50	28	-4	1.05	1350	3	8
A8535/ 9-10	8	6	16	4	-4	4.05	240	4	4
/14-15	4	-4	14	-4	-4	1.90	34	2	-4
/19-20	4	-4	10	-4	-4	1.95	44	-2	-4
/24-25	4	-4	6	-4	-4	1.85	42	-2	-4
/29-30	2	-4	12	-4	-4	1.90	80	3	-4
/34-35	-2	-4	22	-4	-4	1.90	120	3	-4

Hole No. Depth (m)	Cu	Pb	Zn	Co	Bi	%Fe	Mn	As	U
A8536/ 9-10	4	-4	16	-4	-4	2.05	30	3	-4
/14-15	2	-4	18	-4	-4	2.15	16	-2	4
/19-20	2	-4	24	-4	-4	2.05	18	-2	4
/24-25	2	-4	30	-4	-4	2.40	50	2	6
/29-30	4	-4	30	-4	-4	2.25	32	-2	6
A8537/ 9-10	6	-4	14	-4	-4	2.35	44	-2	4
/14-15	4	-4	20	-4	-4	2.25	26	-2	6
/19-20	2	-4	14	-4	-4	2.05	24	3	-4
/24-25	2	-4	14	-4	-4	2.00	26	-2	-4
/29-30	-2	-4	16	-4	-4	2.10	24	3	-4
/34-35	-2	-4	18	-4	-4	1.70	16	-2	-4

PROFILE 1S

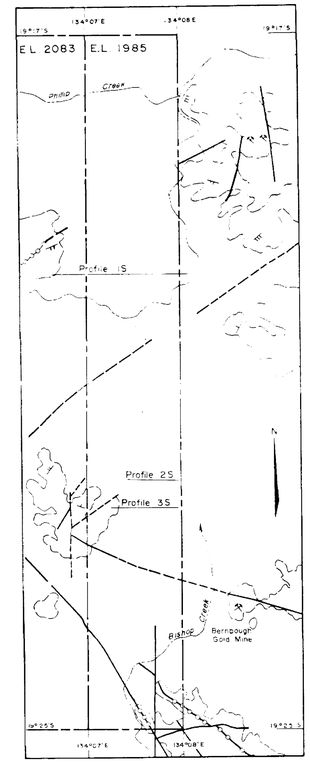


PROFILE 2S



PROFILE 3S

LOCATION MAP



SCALES

200 metres

V = 1
H = 4

20 metres

GEOLOGICAL LEGEND

QUATERNARY
- Silts, Clay
- Unconformity

LOWER PROTERZOIC
- Shale, red brown & ferrugenous
- Shale, purple brown to choc brown
- Shale, light brown to yellow brown, local greys
- Hematite Shale
- Chert
- Siltstone, yellow brown to brick red
- Siltstone, ferruginous
- Sandstone, very fine grained to fine grained
- Vitric Tuff
- L Limonite Traces
- H Hematite Traces

LEGEND

- Ground Magnetic Survey, Readings
- A8528 Hole Number Surface
- 43 Total Depth (m)

Marathon Petroleum Australia, Ltd
Brisbane Australia

Tennant Creek Northern Territory

E.L. 1985 ***Tennent Creek Project***

Plan Showing

DRILL PROFILES 1S, 2S, 3S
WITH GEOLOGY

B.A.B.W.	Dec '80	L.V.P. 98
K. McPhee	Aug '80	