# ANNUAL REPORT ON
# EXPLORATION ACTIVITIES FOR
# EXPLORATION LICENCE 2084 TENNANT CREEK
# FOR PERIOD JULY 25,1980 TO JUNE 19, 1981

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September 1981

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## SUMMARY

Exploration Licence 2084, with an area of 74.20 square kilometres in the vicinity of Tennant Creek in the Northern Territory, was granted to Australian Ores and Minerals Ltd. on 25th July, 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.

A fourteen hole, 772 metre rotary drilling programme was completed during 1980 as part of a larger drilling programme over this an adjacent EL's under similar Joint Venture Agreement. Drill cutting samples were submitted for geochemical analysis.

# 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 2084 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 2084 was carried out by Marathon Petroleum Australia, Ltd. under the terms of a Joint Venture Agreement that received Ministerial approval on 13th December 1978.

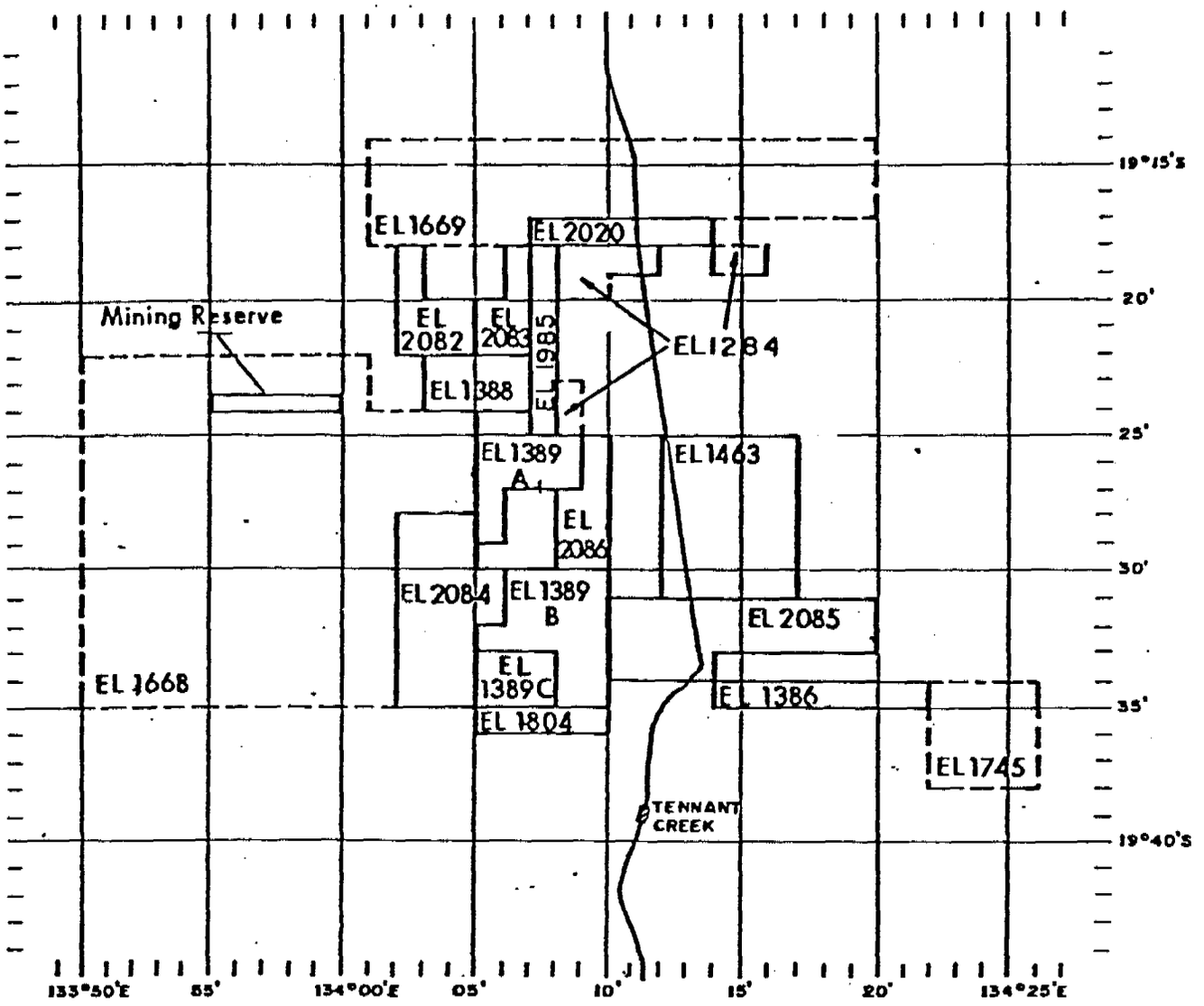
## 1.3 Previous Exploration

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


MARATHON PETROLEUM AUSTRALIA LTD.
BRISBANE AUSTRALIA

# TENNANT CREEK PROJECT

SCALE
5 0 5 10 15 20 km

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.

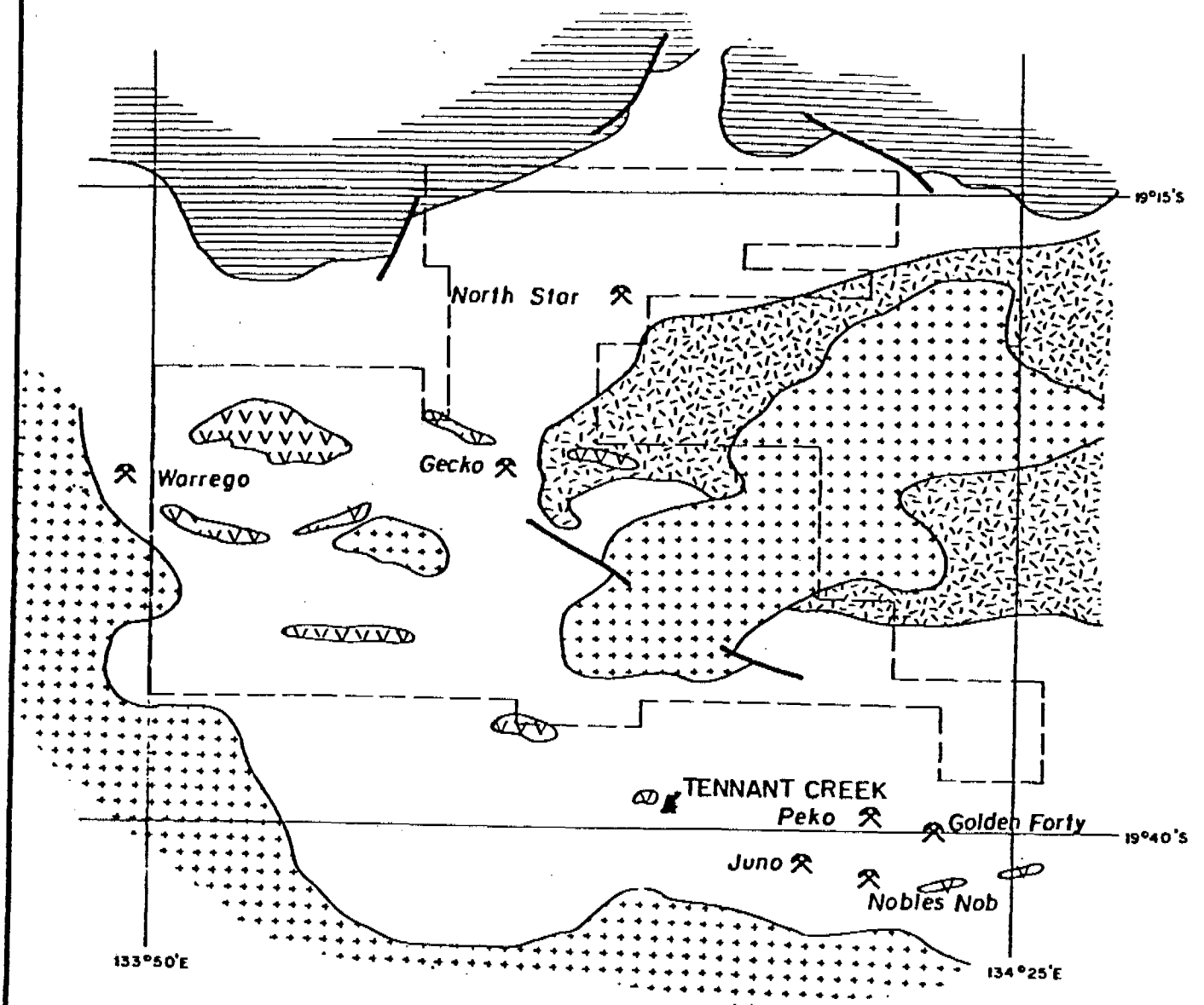
The Lower Proterozoic Warramunga Group forms a large proportion of the Tennant Creek Block and consists predominantly of tuffaceous greywackes, greywackes and shales with major intercalations of acid volcanics and associated pyroclastics. The Group is approximately 3,000 metres thick (Mendum and Tonkin,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

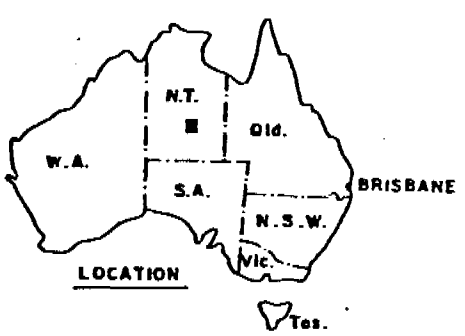
The Bernborough Formation consists of acid volcanic rocks, tuff, and tuffaceous greywacke that are interbedded with subordinate amounts of red shale and siltstone.

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

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 Geochemical Investigations

#### 4.1.1 Geochemical Approach

The basic approach for the 1980 field programme within EL 2084 was a geochemical one wherein soil 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 in 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.

#### 4.1.2 'Base of Slope' Sampling

Base of slope samples consist of fairly fine rubble collected as composites at topographic depressions along both sides of a ridge. About 30-40 chips of the rock type occurring as rubble at the base of the slope were taken over a length of about 25 metres, at intervals of about 250 metres or wherever a change in the trend of the ridge being sampled occurred.

If the rubble was very fine and of one rock type (which is preferable), it was collected by shovelling portions into a large, coarse sand sieve. The composite samples were then forwarded to Comlabs Pty. Ltd. of Adelaide for analysis. Sample preparation in the laboratory involved pulverization followed by AAS determinations for Cu, Pb, Zn, Co, Bi and Fe. XRF analysis for As and U were also undertaken.

The aim of the base of slope sampling programme was to attempt to define areas of similar geochemical environments which could help in future exploration planning.

Little outcrop amenable to sampling by this technique is present within the limits of EL 2084. A number of hills adjacent to the old Ivanhoe Road were sampled (Fig.4-1). Assay results from these samples are enclosed as Appendix I.

4.2 Ground Magnetic Sruvey

Prior to drilling, a ground magnetic survey was conducted on all traverse lines. A hand-held Geometrics Proton procession magnetometer was used. All field readings were subsequently corrected for diurnal drift. Results are shown as Plate 1. The presence of a major discontinuity (fault) is inferred to exist near Hole A8404.

4.3 Drilling Programme

During August 1980, Rockdril Contractors Pty. Ltd. of Brisbane supplied a truck-mounted Schramm 685 rig to carry out the open-hle rotary-percussion drilling programme.

A total of fourteen holes aggregated 722 metres in a profile within EL 2084 (Fig.4-2).

All holes spudded and intersected Carraman Formation shale and siltstone. The only outcrop in the area is a quartz blow 50 metres south-east of Hole A8402.

The geological data obtained in the drilling programme is enclosed as Plate 1.

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

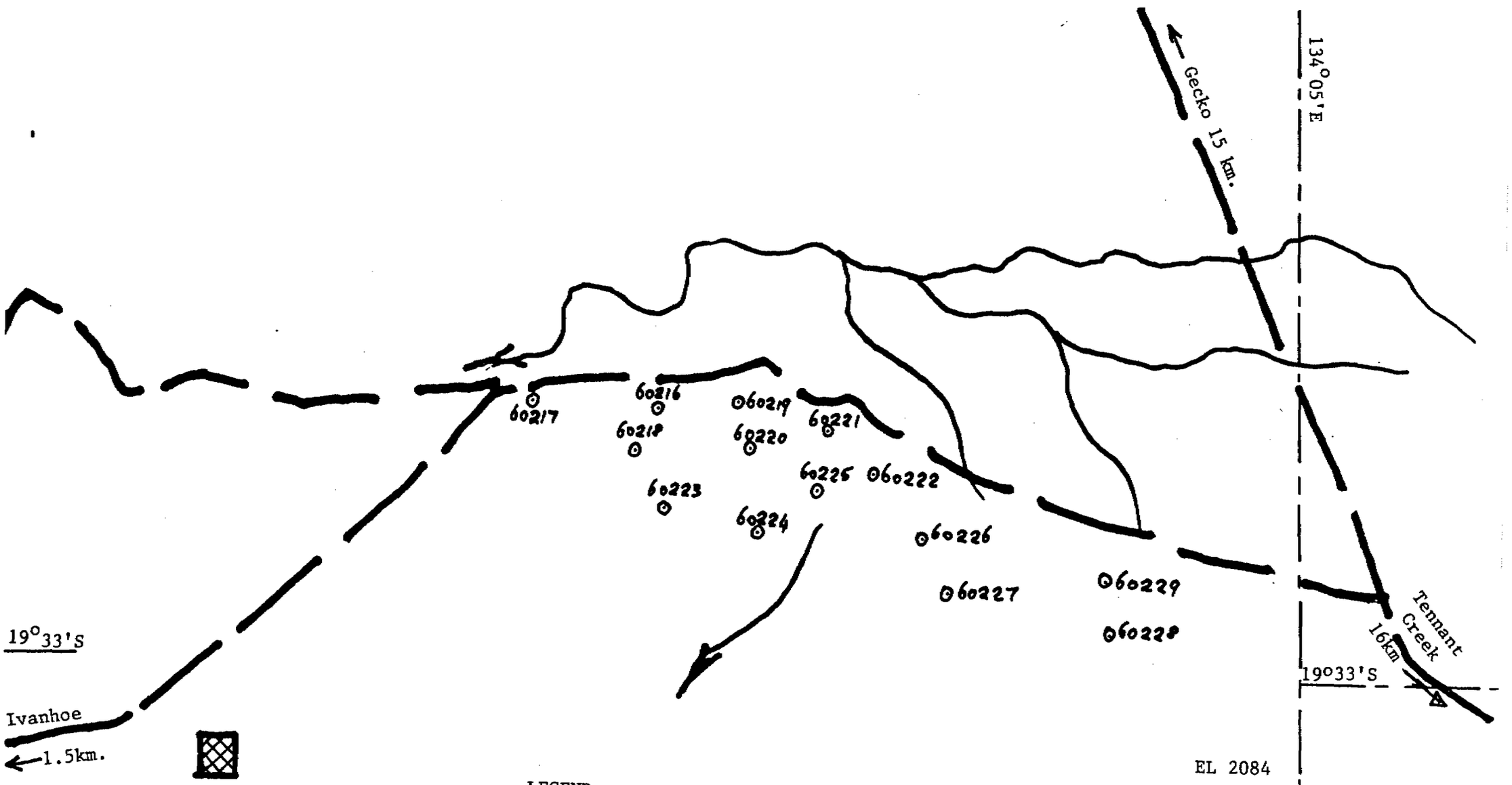



FIG. 4-1

LOCATION OF BASE OF SLOPE SAMPLES, EL2084

SCALE:- 1:12000

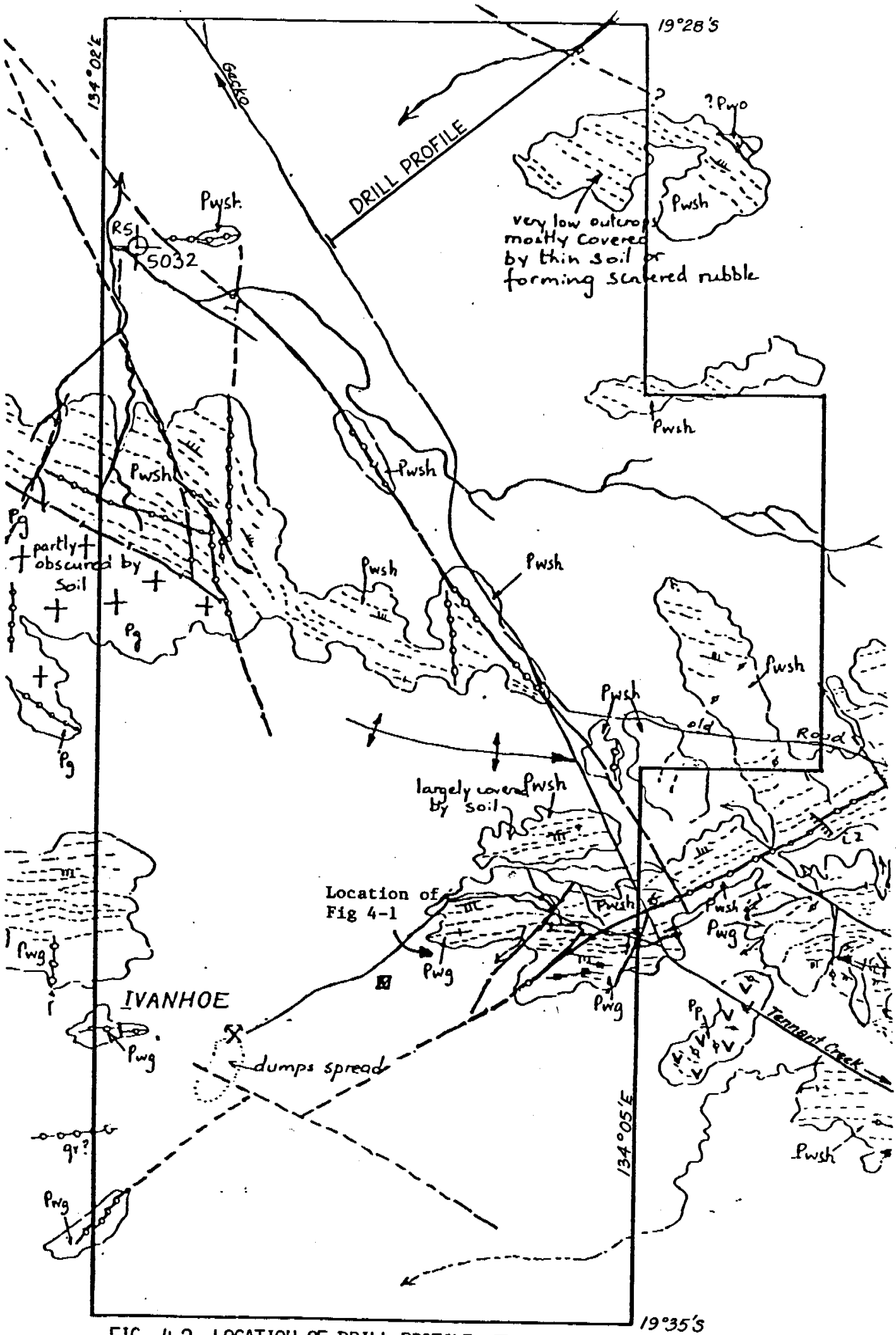



FIG. 4-2 LOCATION OF DRILL PROFILE, EL 2084

Comlabs of Adelaide who analysed for Cu, Pb, Zn, Co, Bi, Fe, Mn, As and U. These assay results are enclosed as Appendix II.

## 5.0 EXPENDITURE

During the period July 25th 1980 to June 19th 1981 a total of $20,354.80 was incurred as a direct exploration expense.

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

## STATEMENT OF EXPENDITURE
## EXPLORATION LICENCE 2084 (IVANHOE)
## FOR PERIOD 25.7.80 TO 30.6.81

| | $ |
|---|---|
| Salaries and Associated Costs | 922.72 |
| Business Expense | 116.90 |
| Motor Vehicle Rental | 174.72 |
| Commercial Transportation | 93.16 |
| Office Supplies | 67.76 |
| Communications Expense | 28.92 |
| Motor Vehicle Expenses | 198.87 |
| Aircraft Hire | 157.37 |
| Miscellaneous | 8.65 |
| Technical Publications | 284.59 |
| Contract Services | 33.60 |
| Reproduction Expense | 167.99 |
| Freight | 229.06 |
| Denver Research Centre | 15.07 |
| Roads and Sites | 151.20 |
| Materials and Supplies | 353.63 |
| Field Equipment Expense | 209.90 |
| Camp Costs | 359.71 |
| Geological Services | 1 512.20 |
| Geochemical Services | 25.16 |
| Geochemical Assays | 1 658.84 |
| Drilling Costs | 11 734.35 |
| Administrative Services | 1 850.43 |
| | $20 354.80 |

## 6.0 PROPOSED PROGRAMME FOR 1981-82

The proposed programme for the 1981-82 tenement year will consist of geophysical traversing and geochemical sampling surveys.

It is planned that approximately 15 line-kilometres of reconnaissance gravity and ground magnetic traversing be undertaken; minimum station spacings of 100m are proposed. Anomalous areas located will be gridded on 100m spacings and soil sampling will be undertaken prior any plan to drill.

Some 1000m of drilling is proposed to test anomalies identified in this programme.

# APPENDIX 1

ASSAY DATA, BASE OF SLOPE

SAMPLING PROGRAMME, E.L. 2084

## BASE OF SLOPE ASSAY DATA, EL 2084

| Sample | Cu | Pb | Zn | Co | %Fe | As | Bi |
|---|---|---|---|---|---|---|---|
| 60113 | 14 | 12 | 10 | 4 | 2.05 | <2 | <4 |
| 4 | 10 | 4 | 8 | 4 | 2.75 | 5 | <4 |
| 60115 | 12 | 6 | 10 | 4 | 1.85 | <2 | 4 |
| 6 | 10 | 6 | 10 | 4 | 2.15 | <2 | <4 |
| 7 | 10 | 6 | 12 | 4 | 2.20 | <2 | <4 |
| 8 | 12 | 10 | 12 | 4 | 2.10 | <2 | <4 |
| 9 | 10 | 4 | 10 | 4 | 2.20 | <2 | 4 |
| 60220 | 10 | 4 | 10 | 4 | 2.40 | <2 | 6 |
| 60221 | 10 | 10 | 10 | 4 | 2.60 | <2 | <4 |
| 60222 | 8 | 12 | 10 | 4 | 2.20 | <2 | <4 |
| 3 | 8 | 8 | 10 | 4 | 2.35 | <2 | <4 |
| 4 | 8 | <2 | 10 | 4 | 2.50 | <2 | <4 |
| 5 | 12 | 6 | 12 | 4 | 2.50 | <2 | <4 |
| 6 | 10 | 4 | 10 | 4 | 3.25 | 3 | <4 |
| 7 | 20 | 10 | 10 | 4 | 3.10 | <2 | <4 |
| 8 | 16 | <2 | 10 | 4 | 3.20 | <2 | 6 |
| 9 | 16 | 10 | 12 | 4 | 2.85 | <2 | <4 |
| 60230 | 10 | 4 | 10 | 4 | 3.75 | <2 | <4 |
| 1 | 8 | 8 | 10 | 4 | 2.85 | 2 | <4 |
| 2 | 10 | <2 | 10 | 4 | 3.40 | 2 | <4 |
| 3 | 12 | 4 | 10 | 4 | 2.80 | <2 | <4 |
| 4 | 12 | 6 | 14 | 6 | 5.70 | <2 | <4 |
| 5 | 16 | 4 | 10 | 4 | 1.75 | <2 | <4 |
| 6 | 8 | 2 | 8 | 4 | 1.80 | <2 | <4 |
| 7 | 10 | 2 | 10 | <4 | 1.40 | 2 | <4 |
| 8 | 8 | 4 | 8 | 4 | 1.80 | 4 | <4 |
| 9 | 8 | <2 | 8 | 4 | 1.75 | 2 | <4 |
| 60240 | 8 | 8 | 8 | 4 | 1.45 | <2 | <4 |
| 1 | 8 | 4 | 8 | 4 | 1.55 | 3 | <4 |
| 2 | 8 | 6 | 8 | 4 | 2.00 | 2 | <4 |
| 3 | 6 | <2 | 6 | 4 | 2.15 | 8 | <4 |
| 60244 | 10 | <2 | 8 | 4 | 2.00 | 3 | <4 |
| 68969 | 8 | 12 | 6 | <4 | 1.25 | <2 | <4 |
| 70 | 12 | 12 | 8 | <4 | 1.75 | <2 | 4 |
| 1 | 14 | 12 | 12 | 4 | 5.80 | 28 | <4 |
| 2 | 12 | 10 | 12 | 4 | 2.80 | 5 | <4 |
| 68973 | 8 | 6 | 6 | <4 | 1.95 | <2 | <4 |

Note: Results in ppm unless stated.

# APPENDIX II

## ASSAY DATA FROM DRILLHOLES

## IN E.L. 2084

# DRILLHOLE ASSAY DATA, EL 2084

| Hole No./ Depth (m) | Cu | Pb | Zn | Co | Bi | %Fe | Mn | As | U |
|---|---|---|---|---|---|---|---|---|---|
| A8401/ 9-10 | 8 | <4 | 8 | 6 | <4 | 3.40 | 55 | 4 | <4 |
| /14-15 | 6 | <4 | 12 | 14 | <4 | 2.85 | 44 | 5 | <4 |
| /19-20 | 10 | <4 | 40 | 34 | <4 | 4.60 | 65 | 2 | <4 |
| /24-25 | 18 | <4 | 85 | 55 | <4 | 7.40 | 100 | 2 | 6 |
| /29-30 | 8 | <4 | 20 | 4 | <4 | 1.85 | 24 | <2 | 6 |
| /34-35 | 8 | <4 | 14 | 4 | <4 | 1.80 | 20 | 2 | <4 |
| /39-40 | 8 | <4 | 8 | <4 | <4 | 1.95 | 14 | <2 | <4 |
| /44-45 | 8 | <4 | 4 | <4 | <4 | 1.70 | 14 | <2 | 4 |
| /49-50 | 6 | <4 | 4 | <4 | <4 | 1.85 | 16 | 2 | <4 |
| /54-55 | 6 | <4 | 6 | <4 | <4 | 1.95 | 18 | <2 | 6 |
| /59-60 | 8 | <4 | 10 | <4 | <4 | 1.70 | 16 | 2 | <4 |
| A8402/* | 12 | <4 | 22 | <4 | <4 | 2.60 | 18 | <2 | <4 |
| | 26 | <4 | 16 | <4 | <4 | 3.15 | 20 | <2 | 4 |
| | 14 | <4 | 8 | <4 | <4 | 3.15 | 32 | <2 | <4 |
| | 10 | <4 | 8 | <4 | <4 | 2.90 | 20 | <2 | 4 |
| | 14 | <4 | 10 | 4 | <4 | 2.85 | 16 | <2 | 4 |
| | 12 | <4 | 8 | <4 | <4 | 2.35 | 20 | 2 | 4 |
| | 16 | <4 | 6 | <4 | <4 | 2.45 | 18 | <2 | 4 |
| | 16 | <4 | 6 | <4 | <4 | 2.45 | 16 | <2 | <4 |
| | 18 | <4 | 6 | <4 | <4 | 2.70 | 28 | <2 | 8 |
| | 16 | <4 | 6 | <4 | <4 | 2.40 | 20 | <2 | 8 |
| | 14 | <4 | 4 | <4 | <4 | 2.40 | 26 | <2 | 8 |

* Sampled interval as for Hole A8401

Note: Results in ppm unless stated otherwise.

Analytical Methods: Cu, Pb, Zn, Co, Bi, Fe, Mn by AAS
As, U, by XRF

| Hole No./ Depth (m) | Cu | Pb | Zn | Co | Bi | %Fe | Mn | As | U |
|---|---|---|---|---|---|---|---|---|---|
| A8403/ 9-10 | 6 | 8 | 2 | <4 | <4 | 1.50 | 75 | <2 | 6 |
| /14-15 | 4 | <4 | 4 | <4 | <4 | 1.55 | 30 | <2 | <4 |
| /19-20 | 2 | 12 | <2 | <4 | <4 | 1.25 | 8 | <2 | <4 |
| /24-25 | 4 | 6 | <2 | <4 | <4 | 1.70 | 20 | 3 | <4 |
| /29-30 | 4 | 8 | <2 | <4 | <4 | 0.79 | 8 | <2 | <4 |
| /34-35 | 4 | <4 | 4 | <4 | <4 | 0.95 | 10 | <2 | <4 |
| /39-40 | 4 | <4 | 2 | <4 | <4 | 1.05 | 12 | <2 | 4 |
| /44-45 | 4 | <4 | 6 | <4 | <4 | 2.10 | 20 | <2 | 6 |
| /49-50 | 8 | <4 | 4 | 14 | <4 | 1.80 | 50 | <2 | 4 |
| /54-55 | 4 | <4 | 8 | 18 | <4 | 2.00 | 60 | <2 | 4 |
| A8404/+ | 6 | <4 | 10 | 4 | <4 | 2.00 | 115 | <2 | <4 |
| | 4 | 6 | <2 | <4 | <4 | 1.10 | 8 | <2 | <4 |
| | 4 | <4 | 8 | <4 | <4 | 1.60 | 10 | 2 | <4 |
| | 8 | <4 | <2 | <4 | <4 | 1.20 | 12 | <2 | <4 |
| | 10 | <4 | 2 | <4 | <4 | 1.75 | 12 | <2 | <4 |
| | 18 | <4 | 65 | <4 | <4 | 1.45 | 12 | <2 | 6 |
| | 10 | <4 | 20 | <4 | <4 | 1.40 | 14 | 2 | 4 |
| | 4 | <4 | 12 | <4 | <4 | 1.70 | 16 | 4 | <4 |
| | 12 | <4 | 24 | 4 | <4 | 1.65 | 26 | <2 | <4 |
| | 10 | <4 | 12 | 4 | <4 | 1.30 | 30 | <2 | 6 |
| A8405/+ | 14 | <4 | 8 | <4 | <4 | 2.75 | 48 | <2 | <4 |
| | 16 | 4 | 8 | <4 | <4 | 3.05 | 20 | <2 | <4 |
| | 8 | <4 | 10 | <4 | <4 | 2.65 | 14 | <2 | 4 |
| | 6 | <4 | 10 | <4 | <4 | 2.60 | 12 | <2 | 6 |
| | 8 | <4 | 14 | <4 | <4 | 2.55 | 20 | 2 | 6 |
| | 10 | 40 | 40 | <4 | <4 | 2.15 | 28 | <2 | 8 |
| | 6 | 8 | 14 | <4 | <4 | 1.95 | 28 | <2 | <4 |
| | 10 | <4 | 18 | <4 | <4 | 2.05 | 24 | <2 | 8 |
| | 12 | <4 | 16 | 10 | <4 | 2.30 | 60 | <2 | <4 |
| | 16 | <4 | 16 | 12 | <4 | 2.40 | 90 | <2 | 4 |

+ Sampled interval as for Hole A8403

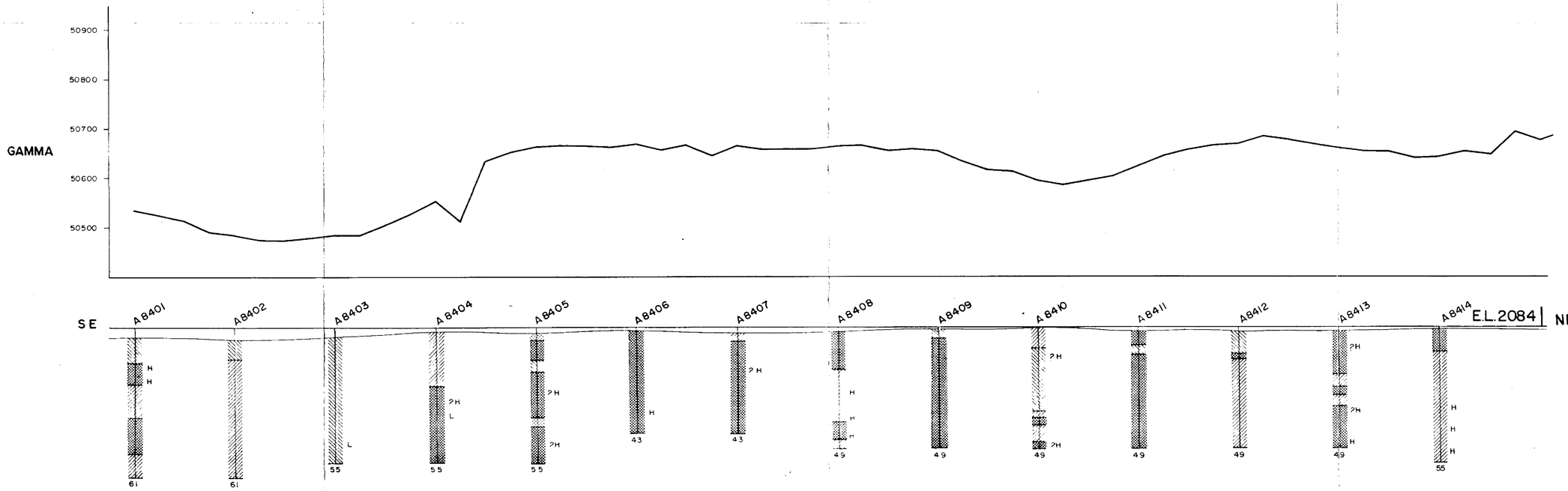
| Hole No./ Depth (m) | Cu | Pb | Zn | Co | Bi | %Fe | Mn | As | U |
|---|---|---|---|---|---|---|---|---|---|
| A8406/ 9-10 | 2 | <4 | 4 | <4 | <4 | 1.40 | 46 | 2 | <4 |
| /14-15 | 2 | <4 | <2 | <4 | <4 | 1.05 | 14 | 2 | <4 |
| /19-20 | 6 | <4 | 2 | <4 | <4 | 1.10 | 14 | 2 | <4 |
| /24-25 | <2 | <4 | <2 | <4 | <4 | 1.30 | 22 | 2 | 6 |
| /29-30 | 4 | <4 | 2 | <4 | <4 | 1.25 | 22 | 4 | <4 |
| /34-35 | 4 | <4 | 4 | 4 | <4 | 1.12 | 22 | <2 | 4 |
| /39-40 | <2 | <4 | 4 | <4 | <4 | 1.60 | 26 | <2 | <4 |
| /42-43 | 10 | <4 | 6 | <4 | <4 | 1.25 | 22 | <2 | 4 |
| A8407/# | 8 | <4 | 4 | <4 | <4 | 1.35 | 20 | <2 | <4 |
| | 6 | <4 | 4 | <4 | <4 | 2.10 | 34 | 3 | 4 |
| | 6 | <4 | 2 | <4 | <4 | 1.30 | 12 | <2 | 4 |
| | 8 | <4 | 6 | <4 | <4 | 1.55 | 8 | <2 | 6 |
| | 8 | <4 | 4 | <4 | <4 | 1.95 | 8 | 5 | <4 |
| | 2 | <4 | 2 | <4 | <4 | 0.65 | 10 | 3 | 4 |
| | <2 | <4 | <2 | <4 | <4 | 0.80 | 26 | 3 | <4 |
| | 8 | <4 | 10 | <4 | <4 | 1.75 | 20 | <2 | <4 |
| A8408/ 9-10 | 6 | <4 | 8 | 4 | <4 | 1.55 | 24 | <2 | 4 |
| /14-15 | 4 | <4 | 6 | <4 | <4 | 1.10 | 8 | <2 | 4 |
| /19-20 | 4 | <4 | 6 | 4 | <4 | 1.50 | 14 | <2 | <4 |
| /24-25 | 8 | <4 | 10 | <4 | <4 | 1.35 | 14 | 2 | <4 |
| /29-30 | 8 | <4 | 12 | <4 | <4 | 1.80 | 115 | <2 | 4 |
| /34-35 | 4 | <4 | 6 | 12 | <4 | 1.20 | 120 | <2 | <4 |
| /39-40 | 4 | <4 | 8 | 14 | <4 | 1.30 | 140 | <2 | <4 |
| /44-45 | 4 | <4 | 10 | 20 | <4 | 1.60 | 165 | 4 | 4 |
| /48-49 | 2 | <4 | 8 | 18 | <4 | 1.55 | 165 | <2 | <4 |

# Sampled interval as for Hole A8406

| Hole No./ Depth (m) | Cu | Pb | Zn | Co | Bi | %Fe | Mn | As | U |
|---|---|---|---|---|---|---|---|---|---|
| A8409/$ | 4 | <4 | 2 | <4 | <4 | 0.45 | 6 | <2 | <4 |
| | 4 | <4 | 4 | <4 | <4 | 1.60 | 34 | 2 | <4 |
| | 4 | 4 | 4 | <4 | <4 | 1.50 | 22 | <2 | <4 |
| | 4 | <4 | 6 | <4 | <4 | 1.50 | 60 | <2 | <4 |
| | 4 | <4 | 4 | <4 | <4 | 1.15 | 40 | <2 | <4 |
| | 4 | <4 | 6 | <4 | <4 | 1.05 | 22 | <2 | <4 |
| | 4 | 4 | 12 | 20 | <4 | 1.10 | 115 | <2 | <4 |
| | 4 | <4 | 10 | <4 | <4 | 1.20 | 28 | <2 | <4 |
| A8410/$ | 10 | <4 | 14 | <4 | <4 | 1.80 | 8 | <2 | <4 |
| | 8 | <4 | 16 | <4 | <4 | 1.45 | 16 | 2 | <4 |
| | 6 | <4 | 8 | <4 | <4 | 1.30 | 6 | <2 | <4 |
| | 6 | <4 | 8 | <4 | <4 | 1.45 | 12 | <2 | 4 |
| | 4 | <4 | 8 | <4 | <4 | 1.30 | 8 | <2 | <4 |
| | 10 | <4 | 8 | <4 | <4 | 1.65 | 22 | <2 | <4 |
| | 6 | <4 | 10 | <4 | <4 | 2.15 | 12 | <2 | 6 |
| | 6 | <4 | 10 | <4 | <4 | 2.10 | 26 | 4 | <4 |
| | 4 | <4 | 14 | <4 | <4 | 1.60 | 18 | <2 | 4 |
| A8411/$ | 6 | <4 | 8 | <4 | <4 | 1.30 | 10 | <2 | <4 |
| | 4 | 4 | 10 | <4 | <4 | 1.85 | 8 | <2 | 8 |
| | 6 | <4 | 18 | <4 | <4 | 2.00 | 8 | <2 | <4 |
| | 4 | <4 | 8 | <4 | <4 | 1.75 | 8 | <2 | <4 |
| | 6 | <4 | 14 | <4 | <4 | 3.10 | 10 | 3 | <4 |
| | 8 | <4 | 10 | <4 | <4 | 2.80 | 18 | <2 | <4 |
| | 4 | <4 | 14 | <4 | <4 | 2.65 | 24 | 2 | <4 |
| | 2 | <4 | 10 | <4 | <4 | 2.50 | 22 | <2 | <4 |
| | 4 | <4 | 12 | <4 | <4 | 2.05 | 24 | 2 | 4 |

$ Sampled interval as for Hole A8408

| Hole No./ Depth (m) | Cu | Pb | Zn | Co | Bi | %Fe | Mn | As | U |
|---|---|---|---|---|---|---|---|---|---|
| A8412/$ | 2 | <4 | 8 | <4 | <4 | 2.25 | 42 | <2 | <4 |
| | 6 | <4 | 8 | <4 | <4 | 2.85 | 18 | <2 | <4 |
| | 18 | <4 | 8 | <4 | <4 | 2.55 | 30 | 2 | <4 |
| | 8 | <4 | 8 | <4 | <4 | 3.10 | 18 | <2 | <4 |
| | 4 | <4 | 6 | <4 | <4 | 3.40 | 20 | <2 | 4 |
| | 8 | <4 | 18 | 4 | <4 | 3.00 | 26 | <2 | 6 |
| | 6 | <4 | 14 | 4 | <4 | 2.85 | 26 | <2 | <4 |
| | 4 | <4 | 8 | 4 | <4 | 2.80 | 28 | 3 | <4 |
| | 4 | <4 | 10 | 4 | <4 | 2.70 | 28 | <2 | 6 |
| A8413/$ | <2 | <4 | 6 | <4 | <4 | 2.70 | 30 | <2 | 4 |
| | <2 | <4 | 4 | <4 | <4 | 1.90 | 16 | 3 | <4 |
| | <2 | <4 | 4 | <4 | <4 | 2.80 | 24 | <2 | <4 |
| | <2 | <4 | 12 | <4 | <4 | 3.05 | 36 | <2 | <4 |
| | <2 | <4 | 8 | <4 | <4 | 2.55 | 26 | <2 | <4 |
| | <2 | <4 | 6 | <4 | <4 | 2.55 | 38 | 3 | <4 |
| | <2 | <4 | 10 | 10 | <4 | 2.45 | 95 | <2 | 6 |
| | <2 | 4 | 12 | 18 | <4 | 2.50 | 180 | <2 | <4 |
| | 2 | <4 | 10 | 14 | <4 | 2.40 | 130 | <2 | <4 |
| A8414/+ | <2 | <4 | 6 | 8 | <4 | 2.65 | 46 | <2 | <4 |
| | <2 | <4 | 12 | 32 | <4 | 2.30 | 150 | <2 | <4 |
| | <2 | <4 | 10 | 16 | <4 | 2.25 | 80 | <2 | <4 |
| | <2 | <4 | 16 | 8 | <4 | 2.45 | 32 | <2 | 4 |
| | <2 | <4 | 12 | 6 | <4 | 2.30 | 40 | <2 | 4 |
| | <2 | <4 | 14 | 4 | <4 | 2.20 | 24 | <2 | 4 |
| | <2 | <4 | 12 | 14 | <4 | 2.15 | 120 | <2 | 6 |
| | <2 | <4 | 12 | 6 | <4 | 2.20 | 60 | <2 | 4 |
| | <2 | <4 | 10 | <4 | <4 | 3.00 | 60 | <2 | 4 |
| | 2 | <4 | 10 | 4 | <4 | 2.80 | 75 | <2 | <4 |




## LEGEND

Ground Magnetic Survey Reading

A8901 — Percussion Drillhole & Number

43 — Total Depth (metres)

SCALES

200 metres

10m — V/H = 1/20

## GEOLOGICAL LEGEND

QUATERNARY — Soil, Silts, Clay

Unconformity

LOWER PROTERZOIC — Shale; yellows, light reds, local greys

Shale; red brown, choc brown, purple, ferruginous

Siltstone; red brown, local grey

Siltstone, ferruginous

L Limonite H Hematite

MARATHON PETROLEUM AUSTRALIA LTD

Tennant Creek Northern Territory

*Tennant Creek Project*

# DRILL PROFILE ACROSS E.L.2084

Plan No VP 428 SEPT 81

PLATE 1