FINAL REPORT

TO

DEPARTMENT OF MINES & ENERGY

NORTHERN TERRITORY

Licencee and Operator:	Agip Australia Pty. Ltd.
Exploration Licence No:	3142
Standard Map Areas:	Tobermory and Hay River
Period:	09.11.83-08.11.84
Date of Submission:	September, 1984

TABLE OF CONTENTS

TABLES

LIST OF FIGURES

1. SUMMARY

Following the completion of an extensive rock chip sampling and drilling programme in 1982 a detailed study of the drill samples and cores was undertaken in 1983. This led to a revised interpretation of the local stratigraphy and structural elements, and their relationship to mineralization.

The review of the data was completed in 1984.

In view of the low potential of the area it is believed that no further exploration is warranted.

2. INTRODUCTION

2.1 Tenement Status

E.L. 3142, with an initial area of 899 square kms, was granted to Agip Australia Pty. Ltd. on 9th November, 1981.

In accordance with section 26 of the Mining Act 1980, two blocks with an aggregate area of approximately 449 square kilometres were retained in November 1983 for the third year's continuance of the licence. Those blocks shown on Figure 1, are now being relinquished and the E.L. surrendered.

2.2 Location and Access

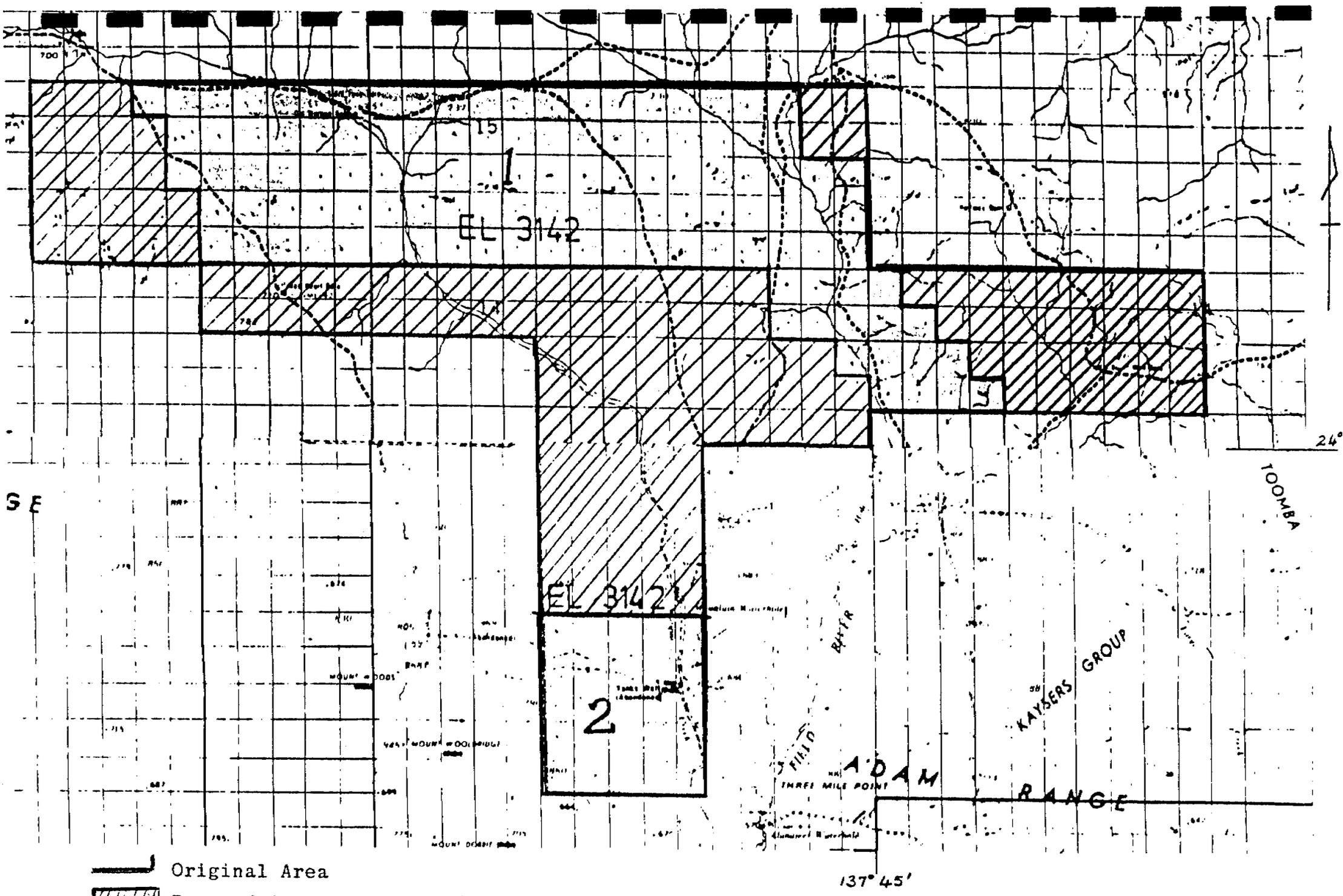
The licence is located in the southern part of the Georgina Basin about 500 kms ENE from Alice Springs (refer Fig. 2).

Road access is 70 km north along the sealed Stuart Highway from Alice Springs thence east on the sealed and unsealed Plenty Highway for some 370 kms. Formed dirt roads of reasonable dry weather quality lead to Marqua Homestead. Access within the E.L. is by a sparse network of poor station tracks which are generally unsuitable for continuous traffic of heavy vehicles.

An airstrip suitable for light aircraft is located at Marqua Station.

2.3 Climate, Water Supply and Vegetation

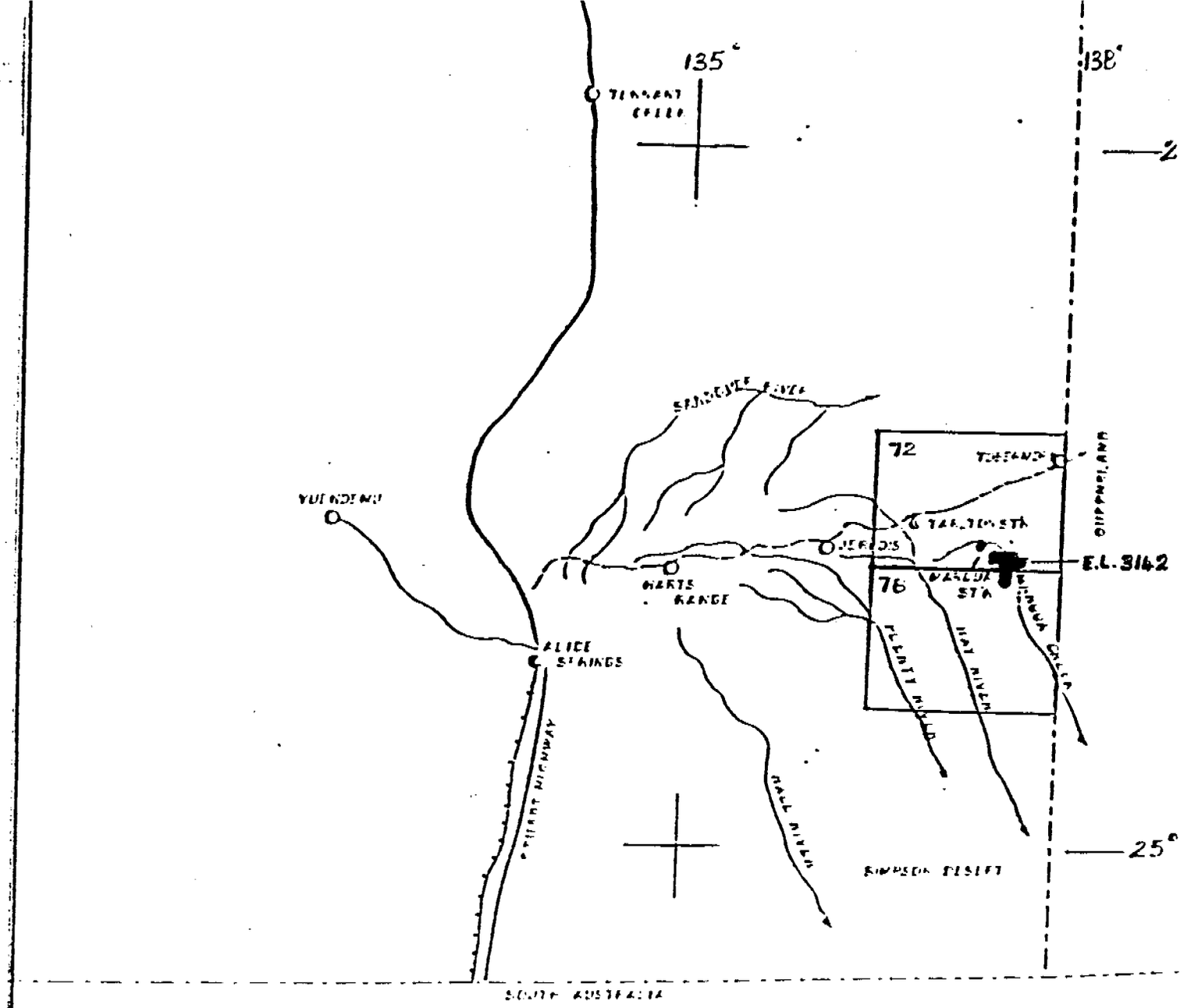
Winters are short and mild with long hot summers when daily temperatures frequently exceed 40^{o}C for periods of weeks. The average annual rainfall is less than 200mm, falling mainly in the summer months, but the reliability is low and droughts are frequent. Conversely, the region suffered two periods of heavy rains and flooding during the early part of 1983.



Original Area

Renewed Area - Nov. 1983.

Fig. 1 : E.L. 3142 - Original and Renewed Areas.
Scale - 1:250,000



KILOMETRES

Agip Australia pty.ltd.

MAROUA AND TARLTON E.L.s

LOCATION MAP

E.L.3142

SCALE 1:5,000,000

DRAWN S.J.

DRAWING 1GU3.3.2.

DATE NOV. 1982

Although some water holes hold water for several months after good rains there is no permanent surface water. Underground water of poor to good quality is sporadically distributed, largely from depths below 50m. In the Boat Hill area brecciated cherts have good acquifers at 30-50m depth.

The area is lightly vegetated with plains of grass and spinifex and scattered Gidyea (Acacia Sp) with Bloodwood and Coolabah trees in water courses.

3. PREVIOUS WORK

Regional Mapping was commenced by the B.M.R. during 1959-1960.

The B.M.R. carried out a regional gravity survey during 1960-1961 and a regional aero-magnetic survey during 1963.

Fimeston Pty. Ltd. held Authorities to Prospect over parts of the E.L. during 1970-1971 and Carpenteria Exploration Pty. Ltd. during 1976-1977.

A preliminary edition of the "Adam Special" comprising 1:100,000 geological map No. 6451 and parts of 6450 and 6351 was published by the B.M.R. This considerably refined the structure and stratigraphy of areas adjacent to the present study.

During 1982 Agip carried out reconnaissance and detailed geological mapping and surface sampling followed by exploratory percussion and diamond core drilling by 15 holes into the prime zone of Pb/Zn anomalism. Results of this work have been given in detail in the previous Annual Reports.

In 1983-1984 drill samples and cores were re-examined and additional detailed geological mapping was carried out in the prospect area. This resulted in a revised interpretation of the local stratigraphy and structural features and their relationship to mineralization.

4. REGIONAL GEOLOGY

4.1 Stratigraphy

Stratigraphic units recognised in the general region of the Tobermory and Hay River map sheets are listed in Table 1.

Within the licence area all of the units between the Arunta Complex and the Lower Ordovician Kelly Creek Formation have been recognised with the exception of the Tomahawk Beds. Small mesas capped by flat-bedded Tarlton Formation are scattered throughout the licence. As can be seen from Table 1, several Ordovician and Silurian-Devonian units are missing from the stratigraphic sequence between the Kelly Creek Formation and Tarlton Formation in the licence area.

Lithologies recognised in E.L. 3142 are as follows:-

Qa	Soil and alluvium often with a veneer or a mixture of red wind blown loess.
Qs	Recent scree.
€m	Limestone dark grey and very fine grained. Thin bedded with common small brachiopods (Lingula sp) unconformably on:-
€mb	Black to whitish grey chert with limonitic patches - correlated with the Hay River Beds. Where drilled at Boat Hill usually strongly brecciated at depth.
Psg	Poorly outcropping red and green fissile shale. Intersected in several drill holes at Boat Hill where it has been subdivided (sections and drill logs only) into:
Psg^1	Black carbonaceous mudstone, foetid sulphurous and kerosene odours.
Psg^2	Limey shales and siltstones sometimes carbonaceous, and or pyritic with fossiliferous bands.

Table 1: Stratigraphy of the Tobermory and Hay River Map Sheets. (From 1:250,000 Geological Series Explanatory Notes - Tobermory).

Age	Rock Unit	Map Symbol	Lithology	Thickness (feet)	Stratigraphical Relationship
Quaternary		Q2 Q3	Soil, alluvium, sand. Sand..	1–70	
Tertiary	Austral Downs Limestone	Ta	Silicified limestone chalcedony	10–50	Unconformable on Palaeo units
					UNCONFORMITY
Cretaceous	Longsight Sandstone	K11	Conglomerate, sandstone, siltstone.	50–100	Unconformable on Palaeoz units
Triassic	Tarlton Formation	Rt	Boulder, cobble and pebble conglomerate, coarse-grained silty sandstone, sandy siltstone	60–140	Unconformable on Palaeoz and Precambrian units
					UNCONFORMITY
Silurian-Devonian	Cravens Peak Beds	S–Dc	Pebble and boulder conglomerate, red and cream coarse-grained cross-bedded quartz sandstone	100	Unconformable on Mitha Formation
					UNCONFORMITY
Middle Ordovician	Mithaka Formation	Omm	Brown and grey gypsiferous siltstone and sandstone, calcareous siltstone, some coquinite	5–200+	Conformable on Carlo S stone
	Carlo Sandstone	Omc	Medium to thick-bedded fine to medium-grained quartz sandstone, with clay pellets in lower half. Flute casts and ripple marks	100–250	Conformable on Nora F tion
	Nora Formation	Omn	Brown and grey siltstone, dolomite and quartz sandstone thin brown coquinite	200–300	Conformable on Coolibah F mation
Lower Ordovician	Coolibah Formation	Olc	Blue-grey and brown-grey calcilutite, green-white marl, calcarenite, dolarenite, chert	175	?Disconformable on Kelly C Formation
					? DISCONFORMITY
Lower Ordovician	Kelly Creek Formation	Olk	Quartz, sandstone, calcereous glauconitic sandstone, calcarenite, dolarenite, dolomite, green siltstone, chert.	250–550	Conformable on Ninmaroo F mation; laterally equivalent upper part of Tomaha Beds
Lower Ordovician–Upper Cambrian	Ninmaroo Formation	C–On	Dolarenite, dolomite, calcarenite, limestone, oolitic limestone, algal limestone, quartz sandstone, siltstone.	500–840	? Disconformable on Arri thrunga Formation; lateral equivalent to lower part Tomahawk Beds
Lower Ordovician–Upper Cambrian	Tomahawk Beds	C–Ot	Dolomite, dolarenite, glauconitic sandstone, siltstone, calcarenite	200–400+	? Disconformable on A thrunga Formation
					? DISCONFORMITY
Upper Cambrian	Arrinthrunga Formation	Cma	Dolarenite, limestone, oolitic limestone, quartz sandstone, dolomite, siltstone	400+–2,000	Conformable on Marqua Be
Middle Cambrian	Marqua Beds	Cmf	Blue chert, buff siltstone, blue, blue-black and grey limestone, calcareous sandstone.	675 1280+ in the subsurface	Unconformable on Field Riv River Beds and Arunta Co plex
					UNCONFORMITY
?Lower Cambrian–Upper Proterozoic	Grant Bluff Formation	B–Cg	Thin-bedded fine to medium-grained grey glauconitic quartz sandstone; siltstone with dolomite bands.	1500	Conformable on Field Riv Beds
Upper Proterozoic	Field River Beds	Buf	Boulder beds, siltstone with tillitic texture, dolomite, dolomitic arkose, limestone, siltstone, quartz sandstone	400 in west, 3000 in east	Base not exposed, unconfon able on ?Lower Proterozo and ?Archaean
					UNCONFORMITY
?Lower Proterozoic	Un-named	Bg	Coarse-grained muscovite granite, with pegmatite veins		Intrude Arunta Complex
?Archaean	Arunta Complex	Aa	Schist, gneiss, metaquartzite.		Forms crystalline basement

The Psg units were correlated with the Red Heart Dolomite and Adam Shale.

Pts	A flaggy sandstone and siltstone, ripple marked, parting lineation, well sorted, often manganese stained in outcrop. Correlated with Grant Bluff Formation.
Ptd	Laminated black and green shale, polymictic texture with erratics of granite, dolomite and metamorphics together with thin graded bedded calcareous sands and lenses of laminated dolomite. Correlated with the Yardida Tillite.
Pta	Massive bedded arkose with scattered rounded vein quartz and rare dolomite and granite pebbles. Seen in core to be mainly greywacke and mudflow deposit - a lateral facies equivalent of, and interbedded with:
Ptp	Polymictite conglomerate, matrix supported, arkosic and shaley matrix; limey and dolomitic towards the top.
Pta & Ptp	are correlated with the Gnallan-A-Gae Arkose and rest apparently conformably on (probably in part interfingered with):
Pdt	Diamictite, cobbles or dolomite in a dolomitic mud matrix with an arkosic component, grading laterally, with rapid thining, into thin micaceous turbidites of dolimitic sandstone and siltstone - towards the base this is interbedded with:
Pdd	Yellow brown and pink dolomite with algal features including columnar stromatolites, silicified in part.
Pdc	Is a zone within and near the top of the Pdd sequence which weathers to give yellow and brown cherts often anomalous in zinc, lead and silver. In drill core the unit Pdd also contains calcarous grey shales. This unit is correlated with the Wonnadinna Dolomite.

Granite coarse grainted leucocratic granite and granite pegmatites.

Mt. Smith Metamorphics - various gneissic rocks.

4.2 Structure

The basement edge and basin zones are very complicated structurally.

Large, complex fault zones strike broadly parallel to (and in places form), the basin edge. The B.M.R. on the "Adam Special" map sheet have interpreted these as low angle thrusts and klippen.

At Boat Hill there is a monoclinal fold, with the axis north of the Precambrian - Cambrian boundary, where vertical dips occur in Marqua Beds and Arrinthrunga Formation. The Precambrian-Cambrian unconformity itself is close to the axis of a bedding fault, and sigmoidal folds are developed on cross structures. These elements strongly suggest a major transcurrent fault zone.

The deformation events were essentially completed by the time of deposition of the Kelly Creek Formation in the Lower Ordovician as only minor deformation of this unit occurs.

5. EXPLORATION ACTIVITIES

The following is a summary of the exploration activities carried out during the tenure of the licence area between November, 1981 and September, 1984. Additional information and details are given in the relevant Annual Reports.

5.1 Activities in 1982

- A geological and geochemical sampling reconnaissance, supported by helicopter, was carried out at the initial stage of exploration.
- Detailed geological mapping was carried out over a 10 km strike length at a scale 1:1,000 with final maps being completed at a scale 1:2,000. Mapping was controlled by a network of stations established by theodolite.
- A total of 156 rock chip samples were collected and analysed for base metals. Most samples were collected in the Boat Hill project area. Petrological studies were also carried out for rock and mineral identification.
- Fifteen exploration holes, for a total of 1225.45m were drilled. Of these 1,083.75m consisted of percussion and 141.7m of diamond drilling.

5.2 Activities in 1983-1984

5.2.1 Mapping and Geological Re-Appraisal

Activities consisted mainly in re-assessing the geology, stratigraphy and drilling results of the Boat Hill prospect area. The drilling samples and cores were re-logged and additional mapping carried out to remove doubts about relationship and correlation of some of the units in the Boat Hill prospect area.

It appears that the stratigraphic sequence in this area generally correlates fairly well with the established B.M.R. sequence for the region with exception for the Adelaidean Yardida Tillite and Grant Bluff Formation and the Middle Cambrian Hay River Formation (Ref. Fig. 3). Contrary to B.M.R. conclusions it is believed that the Yardida Tillite

[redacted]

UNIT			LITHOLOGY	MINERALIZATION	CHRONOLOGY
€On	NINMAROO FORMATION	€On	LIMESTONE, DOLOMITE, CRYSTALLINE DOLOSTONE, ALGAL BOUNDSTONE		LOWER ORDOVICIAN
€ua	ARRINTHRUNGA FORMATION	€ua	CALCILUTITE, CALCARENITE, DOLARENITE MUDSTONE, SANDSTONE.	Pb. Zn. Ag	UPPER CAMBRIAN
€m	MARQUA BEDS	€m	CARBONACEOUS CALCILUTITE AND SHALE.		MIDDLE CAMBRIAN
€mb	HAY RIVER FORMATION	€h	SILTSTONE, SHALE, CHERT DOLOMITIC COQUINITE, CALCAREOUS SILTSTONE.	Pb, Zn, Ag	
€d	RED HEART DOLOMITE.	€d	DOLOLUTITE, DOLARENITE, DOLOMITIC SANDSTONE, SILTSTONE AND SHALE.	Zn, Pb. Ag	LOWER CAMBRIAN
€s?	ADAM SHALE	€s	GREEN GREY AND BLACK SILTSTONE, SHALE, MINOR SANDSTONE		
Psg	GRANT BLUFF FORMATION	Pa	THIN BEDDED SANDSTONE, SILTSTONE AND SHALE.		ADELAIDEAN
Pts / Ptu	GNALLAN-A-GEA ARKOSE	Pn	PEBBLY ARKOSE, FELDSPATHIC SANDSTONE MINOR SILTSTONE AND SHALE.		
Pdc / Pad	WONNADINNA DOLOMITE	Pw	YELLOW BROWN, GREY AND RED BROWN DOLOLUTITE AND DOLARENITE. FELDSPATHIC SANDSTONE, SILTSTONE AND SHALE	Zn. Ag. Pb.	
	BLACK STUMP ARKOSE.	Pb	ARKOSE (PEBBLY), SILTSTONE AND SHALE. NOT DEFINITELY RECOGNISED AT BOAT HILL.		
Ptp	YARDIDA TILLITE.	Ptd	LAMINATED SHALE (BLACK) MINOR DOLOMITE LENSES. DROPSTONES.		
	DIAMICTITE (UNNAMED)	Pt	DIAMICTITE, SHALE, SILTSTONE, SANDSTONE.		
	YACKAH BEDS.	Py	CHERTY DOLOMITE, SANDSTONE SILTSTONE.		
PEm / Pgd	MOUNT DOUBLE GRANITE 1662 ± 25 my. MOUNT SMITH METAMORPHICS	PEm / Pgd			CARPENTARIAN

MARQUA E.L. 3142
BOAT HILL

B.M.R: UNITS - S.W. GEORGINA BASIN.
M.R. WALTER - 1960 AND
J.H. SHERGOLD AND E.C. DRUCE 1976

UNCONFORMITY
FACIES CHANGE

FIGURE 3

and the Younger Gnallan-A-Gea Arkose are not facies equivalent and mapping and drilling have shown that the Yardida Tillite occurs also at Boat Hill.

Unit Pts previously assigned by the B.M.R. to the Grant Bluff Formation is rather considered to be at places a fine grained interbed of the Gnallan-A-Gea Arkose and at other places to represent sandstone lenses within the Wonnadinna Dolomite.

Unit Psg cannot be assigned with certainty to any of the B.M.R. stratigraphic subdivisions, however its position suggests that it can be correlated with either the Adam Shale (Lower Cambrian) or the Grant Bluff Formation (Upper Proterozoic).

5.2.2 Mineralization

Anomalous lead, zinc and silver values (up to 1.2% Zn and 6 ppm Ag) have been detected in drill and surface rock chip samples from four units in the Boat Hill area; the Wonnadinna dolomite, Red Heart Dolomite, Hay River Formation and the Arrinthrunga Formation. Anomalism extends for 10 km along the southern margin of the basin.

Results of rock chip geochemistry and analysis of drill cuttings are listed in the 1982 Annual Report.

a) Stratigraphic and Lithological Controls

As mentioned above, anomalous base metal values are restricted to four stratigraphic intervals.

The Wonnadinna Dolomite is enriched in base metals within close proximity to the unconformity at the top of the unit and it appears to be more so in dolarenites with little or no terrigenous component. The dolomite is generally vuggy and exhibits chalcedonic silicification at the unconformity. Petrological study indicates that sphalerite is associated with the chalcedonic silicification.

The Red Heart Dolomite was intersected in one drill hole (M2P, Fig. 4) and exhibited minor anomalism within a fossiliferous dolarenite.

The basal cherts and interbedded shales of the Hay River Formation are anomalouse in Pb, Zn and Ag wherever intersected in drilling. The unit is more enriched in lead than the Wonnadinna Dolomite and the highest base metal values occur where the unit has been brecciated.

The Arrinthrunga Formation has not been tested by drilling but anomalous values occur within the formation at the eastern end of the prospect in close proximity to the Toomba Fault Zone.

b) Structural Control

The Hay River Formation and the Wonnadinna Dolomite are brecciated where cut by the thrust faults and it appears that the highest base metal values occur in these areas. This is demonstrated in Figure 5 (M9P and M13PD) where values increase towards the fault zone. The brecciated zone appears to be 10 to 15m in thickness and sulphide veining occurs within it in M13PD within the Wonnadinna Dolomite.

6. CONCLUSIONS

Exploration carried out during late 1981 - 1984 has confirmed that widespread weak anomalism in lead and zinc is present in the E.L. area both at surface and at various stratigraphic levels.

Detailed evaluation failed to locate any mineralization of economic significance in terms of both grade and size.

It is believed that the potential of the E.L. area for Mississippi Valley type deposits is rather low and that further exploration is not warranted.

7. EXPENDITURE

Expenditure in respect of exploration work for E.L. 3142 in the 12 months from 08.11.83 - 31.07.84:-

Labour	$20,288
Purchases and Others	1,948
Services	10,934
	$33,170

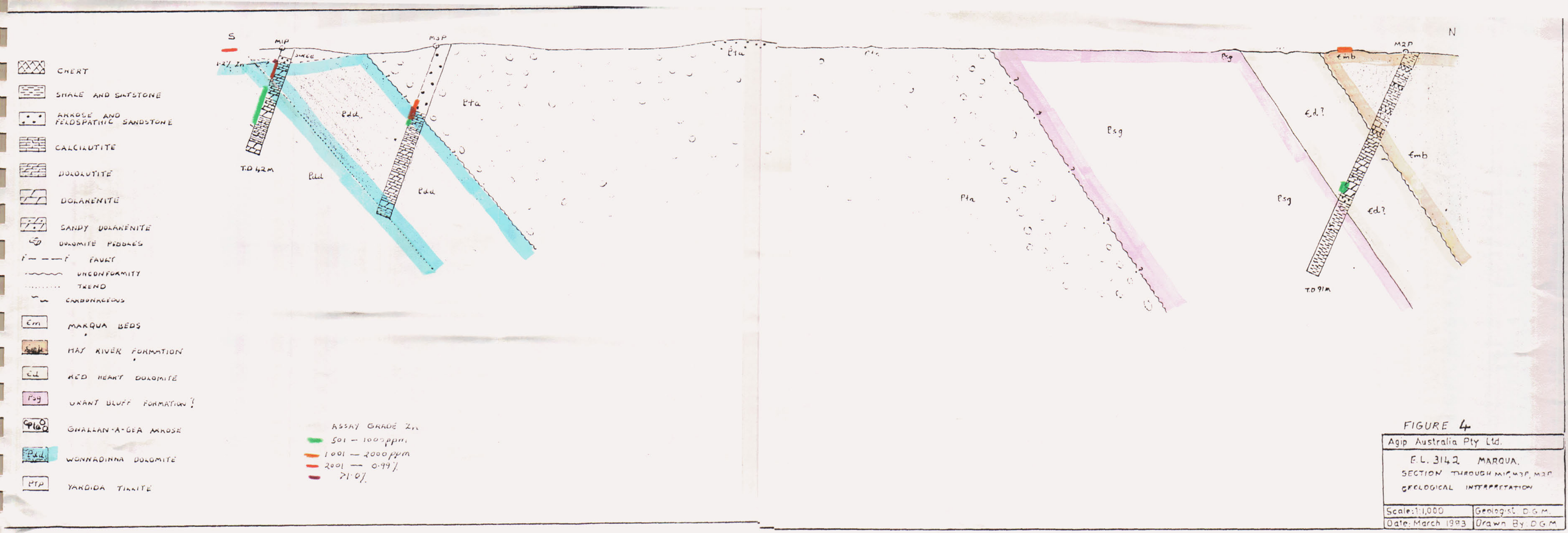


FIGURE 4

Agip Australia Pty Ltd.

E.L. 3142 MARQUA.

SECTION THROUGH M1P, M3P, M2P

GEOLOGICAL INTERPRETATION

Scale: 1:1,000	Geologist D.G.M.
Date: March 1993	Drawn By D.G.M.

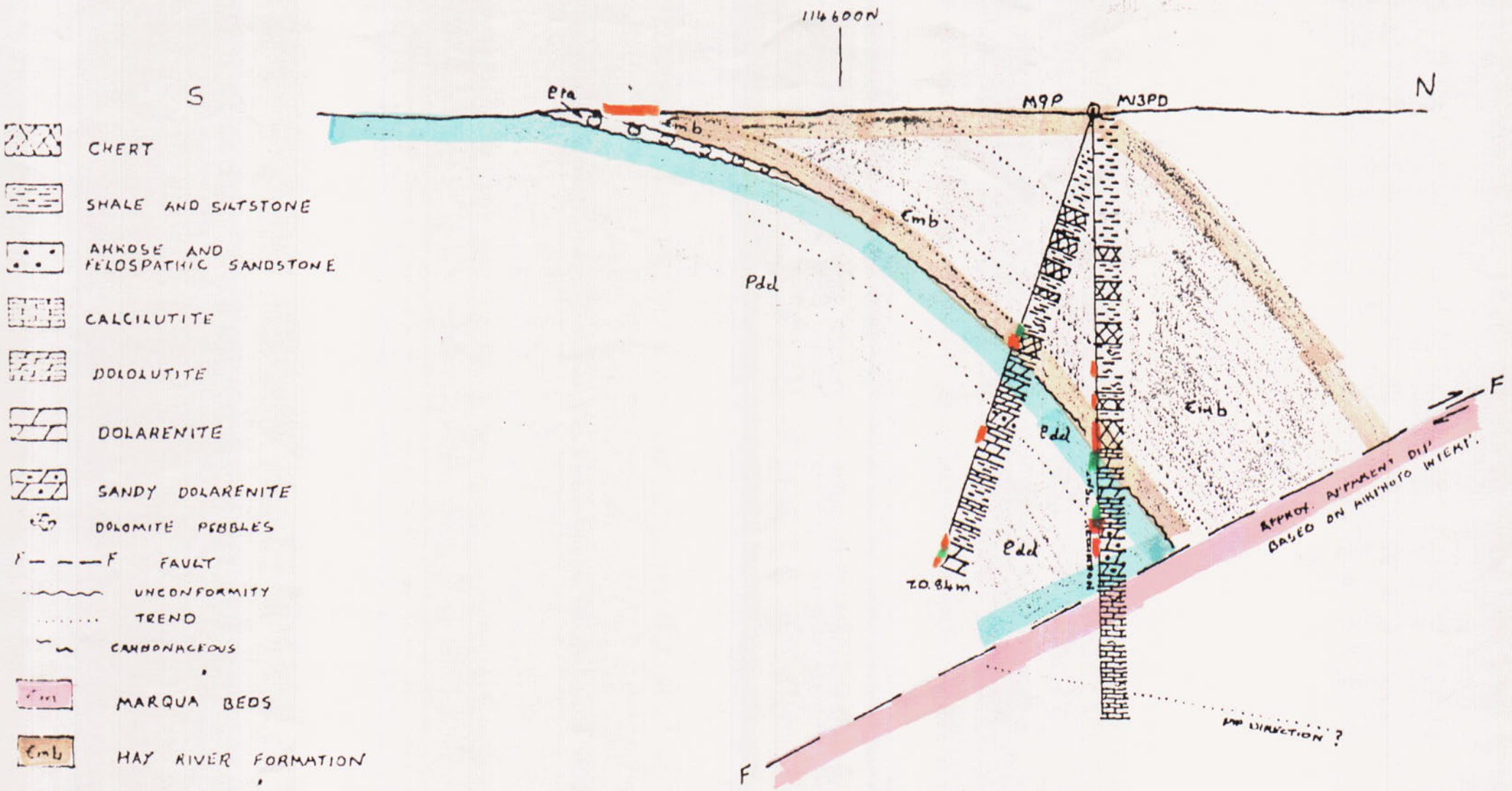


FIGURE 5

Agip Australia Pty Ltd.	
E.L. 3142 MARQUA. SECTION THROUGH M9P AND M13PD GEOLOGICAL INTERPRETATION	
Scale: 1:1,000	Geologist: D.G.M.
Date: March 1983	Drawn By: D.G.M