EXPLORATION LICENCE 1907

"YIYINTYI BLOCK", NORTHERN TERRITORY

ANNUAL REPORT FOR THE YEAR ENDED 14TH AUGUST, 1982
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1. GENERAL

Exploration Licence 1907 of 302.27 square miles in the Mount Young 1:250,000 sheet area, was granted to BHP Minerals Limited on 14th August, 1979, for one year, and renewed for a second year on 14th August, 1980. On 14th August, 1981, the EL was renewed for a third year over a reduced area of 142.71 square metres.

On 14th August, 1982 application was made for renewal for a fourth year over 50% of this area.

EL1907 is one of a group of six exploration licences (ELs 1301, 1907, 2383, 2834, 2966 and 4032) known collectively as the "Yiyintyi Block" (Figure 1).

Prior to the 1981 field season, the emphasis was largely on manganese exploration by drilling. During 1981, emphasis gradually shifted toward the search for 'blind' base metal orebodies in the McArthur Group below Cretaceous cover, employing remote sensing techniques such as gravity, magnetics, INPUT, and geological mapping of the sparse Proterozoic outcrops. This changing emphasis resulted from a discovery of favourable McArthur Group rocks during the 1980 field season.

2. LOCATION AND ACCESS

The location of the Yiyintyi Block of EL's is shown on Figure 1. Access is by rough and sandy four wheel drive track via Borroloola or Nathan River Homestead, taking about 4 to 5 hours from either direction.

Generally, the country is moderately heavily timbered and vehicular access away from tracks is restricted. Geological mapping away from the tracks is carried out mainly by foot and motorcycle traverse.

3. FIELD INVESTIGATIONS

3.1 Geological Mapping

Using colour 1:25,000 aerial photographs flown for BHP by Kevron, a geological base map was prepared. The interpretation of this map (Figure 2) is based on extensive field mapping of all outcrop, as well as
information from numerous shallow holes drilled during 1980 and 1981.

3.1.1 Precambrian

The oldest rocks exposed are interpretable as Tawallah Group, and subdivided into probable Masterton Formation (Pt - A beds) and Mullholland Sandstone (Pt - B beds).

These are overlain by McArthur Group, probably Mallapunyah Formation (Pm - A and Pm - B beds). Because of the poor outcrop, it is difficult to establish sequence, and further interpretation will be possible only after stratigraphic drilling. (Such drilling is proposed for the adjacent EL2383). At this stage it is possible only to state that components of the Mallapunyah Formation are red shale, brown bimodal sandstone, black dolomitic shale and a bed of conglomerate capped by gysiferous sandstone (locality 68).

Anomalous copper has been recorded in the black shale unit of the Mallapunyah Formation (e.g. LB135).

Possible Amelia Dolomite equivalent (Pm - C beds) and Tatoola Sandstone (Pm - D beds) are mapped overlying the Mallapunyah Formation. The small Pm - C beds outcrop is the only carbonate outcrop known in the Vijingyi area. It consists of a 30+ metres thick unit of flake breccia and laminar grey buff dolomite. The base of the overlying (Pm - D) sandstone contains friable holey sandstone typical of original carbonate and evaporite content. The sandstone unit consists of 50 metres of coarse grained whitish sandstone capped by 10 metres of brownish sandstone with shale flakes.

It must be stressed that the lack of carbonate within the Pm - D beds differs significantly from the Tatoola Sandstone in the Tawallah Range to the south, and for that reason the above correlation must be treated with caution.

3.1.2 Cambrian

Probable Cambrian sediments (Elb beds) are mapped as flat and tilted strata within the EL and areas five kilometres to the south. The Cambrian may be subdivided into a lower unit of cobble conglomerate with a sandstone matrix (10-30 metres thick) overlain by at
least 50 metres of thin bedded medium sized rough grained quartz sandstone. Planar bedding is more common, but some broad trough bedding is present. These Cambrian strata unconformably overlie a number of McArthur Group units throughout the region.

3.1.3 Cretaceous

Pre-Cretaceous rocks provide in general a gently seaward sloping "basement" between outcropping highs. Cretaceous sediments overly this topography without covering the "basement" ridges.

By analogy with Groote Eylandt, assuming no large scale differential in elevation of the two areas since the Cretaceous, the coastal strip was seen to be prospective for Groote Eylandt style manganese deposits.

At least three facies are evident within the Cretaceous.

1. A clean, highly indurated, overgrown quartz sandstone with plant casts, and a ferruginised, finer grained quartz sandstone with plant fossils and marine fossils outcrop close to the Yiyintyi Range.

2. Saccharoidal sandstone forms the bulk of outcrops as a clayey sandstone around the Yiyintyi Range, generally within several kilometres. This unit is the most commonly intersected in drilling and may also be that which often gives a distinctive truncated fining upwards sequence in gamma logs. The appendixed paleontological reports indicate a marine deltaic environment of deposition consistent with these gamma logs.

3. A dark carbonaceous siltstone, generally below 20 m R.L. and distant from "basement" outcrops, may represent the distal facies of the above units in a transgressive-regressive wedge (ref. drill hole LB 83).
3.1.4 Cainozoic

Recent BMR work suggests that a Tertiary fluvialite basin, the Karumba Basin, covered much of the Carpentaria Basin including the licence areas. While it is likely that much of the unconsolidated sands and some of the clay sands in drilling belong to this period, accurate dating of a dolomitic unit as Pleistocene (1.8 m.y) has only been obtained for an area in the east of the tenements (drill hole LB 123 in EL 2834).

3.2 Geophysics

3.2.1 Airborne Electromagnetic INPUT

The entire EL was flown with INPUT EM by Geoterrrex Pty Ltd for BHP. Results are on Figure 3.

3.2.2 Aeromagnetics

Concurrent with the INPUT, an aeromagnetic survey was carried out. Results are on Figure 4.

3.2.3 Ground Gravity

Ground gravity traverses were conducted in order to learn something about the basement McArthur Group rocks below the surficial cover. Results are on Figure 5.

4. DISCUSSION

4.1 Manganese

The area has been adequately tested for manganese deposits of Groote Eylandt type within Cretaceous sediments bordering the coast, without obvious success. Trace amounts of manganese were encountered in some holes.

4.2 Base Metals

Anomalous copper is recorded from the Mallapunyah Formation in several drill holes. The ultimate assessment of these values is dependant on clarification of the stratigraphic sequence, and in particular, some certainty that all of the sequence has been tested.

Hopefully, some of this information will come from the stratigraphic drilling in progress on the adjoining EL 2383.
5. **FUTURE PROGRAMME**

Check field mapping is planned for the 1982 field season. Further work will depend on the assessment of stratigraphic drilling on the adjoining EL 2383.

6. **EXPENDITURE**

Expenditure debited to EL 1907 during the twelve months ended 31st July, 1982, was:

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<th>Item</th>
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Total expenditure to 31st July, 1982 $223,880

This report is submitted to the Department of Mines and Energy as required by Condition 7 of Exploration Licence 1907.
Appendix I

T.E.M. Profiles
E.L. 1907 - YIXINTYI BLOCK N.T.

PHOTO INTERPRETATION AND DETAILED OUTCROP GEOLOGY
WITH DRILL HOLE LOCATION – FIG. 2.

INPUT E.M. SURVEY INTERPRETATION MAP INPUT
ANOMALIES – FIG. 3.

TOTAL MAGNETIC INTENSITY SMOOTHED CONTOURS FIG. 4.

TRAVERSES G.1 TO G. 5 GRAVITY PROFILES FIG. 5.