ANNUAL REPORT

ON EXPLORATION WORK CARRIED OUT

ON E.L. 114 MARRAKAI

NORTHERN TERRITORY

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E.L. 114 MARRAKAI

Marrakai E.L. 114 covers a 270 square mile area shaped like a near rectangle which was taken up by John Snyder to prospect the area for syngenetic type ore deposits. The E.L. was originally Authority to Prospect 2605 which was converted to its present status on 6/5/72 with a $25,000.00 work commitment.

Details of access, location and grid lines on this E.L. and adjacent E.L.'s is shown in figures 5 and 8.

WORK DONE

Work carried out on this E.L. consisted primarily of airborne spectrometer work, cleaning up of grid lines and data evaluation of the previous years work and airborne survey results.

A comprehensive base camp was established on Red Lily Lagoon in the adjacent E.L. 623, Rum Jungle Area D, held by the Company.

In view of the extensive Quaternary and Cretaceous cover within the Marrakai E.L., diamond drilling, airtrac operations and regional mapping were in the main carried out over the Rum Jungle E.L., where in comparison with the Marrakai E.L. outcrop and structural information is more readily interpreted. (See plan 1).

It is felt that the Marrakai geology is very similar to that evaluated.

REGIONAL GEOLOGY - Rum Jungle District

The Pine Creek Geosyncline, as outlined by the Bureau of Mineral Resources (BMR) geologists between 1953-58, lies within the Katherine-Darwin Region. It is a shallow composite structure developed during the Lower Proterozoic time. The main axis of the asymmetrical Primary Basin trends to the south-east. The basin is intracratonic within the Archaean metamorphics and granites.

Within the Rum Jungle district, two phases of sedimentation took place within the Primary Basin. The initial phase of sedimentation was from the north and east, comprising of an arkose, quartz - greywacke, siltstone, chert, dolomite assemblage known as the Batchelor and Goodparla Group. The second phase, known as the Finniss River Group, sedimentation was derived from the west through the newly developed north-trending Western Fault Zone. These sediments consist of arkose, greywacke conglomerate, greywacke, quartz pebble conglomerate, sandstone and quartz siltstone, and are regarded as having primarily been deposited by turbidity currents. The sediments of the Finniss River Group and those of the Batchelor Group commonly interdigitate.

With the exception of those sediments immediately surrounding the Rum Jungle Complex, the sediments exhibit a very low grade regional metamorphism despite their age. Because of the higher grade of metamorphism of the sediments around the Rum Jungle Complex, it was initially thought to be intrusive into the Lower Proterozoic sediments. It is now generally accepted to be part of
the Archaean basement which was vertically uplifted resulting in doming and tight folding of the marginal sediments. Low grade metamorphism has been attributed to these phenomena.

Axis of the major folds generally trend to the north-west. This folding was modified by basement inliers such as the Rum Jungle Complex and the early Carpentarian Waterhouse Granite which was in existence before final folding and also, to a certain extent, by the Giants Reef Fault. This fault is a major tectonic feature within the district. It is a north-east trending dextral wrench fault which has a horizontal displacement of 3.5 miles. It cuts across the Complex and Lower Proterozoic sediments.

Granites with subordinate syenitic and gabbroic phases, such as the Waterhouse Granite just south of the Rum Jungle Complex and Mt. Bundy Granite, 15 miles east of Marrakai Homestead, intruded during early Carpentarian time the Archaean basement rocks along the margin of the Geosyncline and into the geosynclinal sediments.

**GEOLOGY Rum Jungle - Marrakai E.L.'s**

Two formations within the Lower Proterozoic sediments have been mapped within the region, namely the Golden Dyke and the Coomalie Dolomite Formations (see geological plan #1). Exposures are poor with deeply weathered Cretaceous sandstone and alluvium black soil being the dominant features. The Golden Dyke sediments crop out primarily as cherty shale and cherty siltstone ridges. The poorly exposed Coomalie Dolomite crops out as silicified dolomite, silicified dolomitic limestone and as silicified algal bioherm reef limestone. Slump breccia is a common feature within the Coomalie sediments.

Although all outcrops within the area have been mapped by the B.M.R., as Golden Dyke Formation, there are a number of features which suggest that Golden Dyke and Coomalie Formations of the Lower Proterozoic sediments are presented namely:

(i) In areas around the Rum Jungle Complex it was found that the pyritic carbonaceous shale within the Golden Dyke Formation is the basal unit of this formation and is in contact with the Coomalie. In DDH 7 and DDH 8 pyritic carbonaceous shales, high graphitic, were intersected just above the dolomitic limestone (see drill hole sections #7 and#8.)

(ii) Algal bioherm reef structure which are a prominent feature within the Coomalie Formation has been found to exist fairly abundantly in silicified limestone, particularly within Prospect B.

(iii) It is estimated that the dolomite-limestone sequence in the area is at least 2500' thick, based on current drill hole information and structural interpretation.
Figure No. 1
MODIFIED DIAGRAMATIC RELATIONSHIP BETWEEN MT. PARTRIDGE, MASSON, GOLDEN DYKE, AND COOMALIE FORMATIONS.
DIAGRAMATIC RELATIONSHIP OF ROCK UNITS AS INTERPRETED BY B.M.R.

REVISED DIAGRAMATIC RELATIONSHIP OF ROCK UNITS

LEGEND
PLn = Nallamassis Formation
PLc = Canaan Creek Formation
PLa = Acacia Gap Trough
PLd = Golden Dyke Formation
PLs = Craig Creek member
PLo = Caenamic Unit
PLm = Masson Formation
A-Pr = Rum Jungle Complex

INDICATES DIRECTION OF SEDIMENTATION.
The Craig Creek member, which crops out six miles south-east of base camp, has not been recognised in the field, nor in any of the drill holes. This member, consisting of pyritic carbonaceous dolomitic siltstone with chert nodules, pyritic siltstone, silicified dolomitic siltstone slump breccia silicified in places, was originally mapped by the B.M.R. as a distinctive formation. However, this member was later included as being the basal unit of the Golden Dyke Formation. I feel, however, based on present information available, that the Craig Creek member represents a natural lateral facies change from east to west, as an eastern transitional environment of the Coomalie Formation (see fig.2 and fig. 3).

The Acacia Gap Tongue, which crops out to the west of the Exploration Licence, has been advocated by the B.M.R. to be the most westerly extension of the transitional environment sedimentation of the Masson Formation, which crops out extensively six miles to the south-east of base camp, (see fig. 3). The Acacia Gap Tongue consists primarily of silicified quartz greywacke and quartz sandstone with pyritic casts. Deep diamond drilling (DDH 7 and DDH 8) has not intersected the Acacia Gap Tongue which is regarded to lie near the base of the Golden Dyke Formation.

During geological mapping within the Exploration Licence and surrounding areas, no outcrops were found which could be regarded as being Acacia Gap. The Acacia Gap Tongue mapped on the Humpty Doo sheet (B.M.R.) east of Humpty Doo Station, consists of grey chert and brecciated siliceous dolomite. Similar outcrops have been mapped by the B.M.R. near Mt. Bundy to represent the top of the Golden Dyke Formation. Consequently, based on structural interpretation I have included this within the Golden Dyke sediments. Furthermore, the Acacia Gap Tongue mapped just west of the Adelaide River, which is shown to dip to the east, dips to the west.

I feel that the Acacia Gap Tongue and the Masson Formation are not related, but that the Acacia Gap Tongue is either:-

(i) An early easterly expression of the Noltinuis Formation of the Lower Proterozoic Finniss River Group, or

(ii) a facies change within the Golden Dyke Formation. The Acacia Gap crops out predominantly around the Rum Jungle Complex. A vertical uplift of this complex, while Golden Dyke sediments were still being deposited, may have created a transitional marginal environment.

The Lower Proterozoic sediments, Coomalie and Golden Dyke Formations, are unconformably overlain by a thin veneer of loosely consolidated Cretaceous quartz sandstone and feldspathic sandstone, in particular within the eastern half of the Exploration Licence.

Although outcrop is sparse, the only prominent outcrop having been encountered at Leaning Tree Lagoon, diamond drill holes 9 and
and 10, and a number of exploratory percussion holes have indicated that this sandstone is approximately 70' to 100' thick over Prospects A and B. The base of the sandstone is commonly strongly limonitic stained. Secondary quartz is a common feature along the unconformity. The sandstone readily weathers into a light reddish sandy soil.

To the western half and south western portion of the mapped area lies a tidal flood plain covered by black soil within which crop out "islands" of both Coomalie and Golden Dyke Formations. Tidal movements have resulted in toxic ground conditions and consequently, are virtually barren of trees. The area becomes inaccessible during the Wet, which commences mid to late November.

No faults have been mapped, although there are a number of distinct north-westerly lineations. The Giants Reef Fault does not appear to extend within the Exploration Licence. However, a section of the Adelaide River may reflect this major tectonic feature.

Major structure within the mapped Exploration Licence, from east to west, are southerly plunging Sink Hole anticlinorium, major Marrakai syncline, and Black Soil anticlinorium, over which are super-imposed a number of anticlinal and synclinal structures. Folding is along a NNE trend. The major structures are nearly symmetrical in outline, and appear to have a double plunge (see Plan 1).

Within the eastern section, adjacent to the Adelaide River Prospect CA, the eastern limb of the anticlinorium consists of a number of isoclinally folded anticlines and synclines (DDH7 and DDH8), whereas the west limb dips 20°W and contains a number of dome-like structure as a result of second stage folding towards and around the nose (see plan 2).

LITHOLOGY

The Coomalie Dolomite appears to be, from drill holes and regional structural information, at least 2500' thick. DDH 10, which was drilled near the axis of the anticlinorium, consists primarily of brecciated and strongly fractured massive dolomitic limestone. The extensive fracture pattern is possibly due to its proximity to the axis. DDH 10 and DDH 9 lithology do not appear to correlate.

It is apparent from structural interpretation that DDH 9 sequence lies above DDH 10. This sequence has a number of horizons that consist of shale, siltstone and minor dolomite. The last 335' intersected were banded limestones, with shales and siltstone content rapidly increasing forming an interbedded limestone and shale sequence. This is followed by 418' of banded and massive grey limestone overlain by 130' sandstone-siltstone sequence exhibiting features of shallow deposition. One bed in this horizon is particularly rich in hematite. Above this lies 366' of dolomite, brecciated and fractured in places, which grades near the top of the hole onto another siltstone, shale and siliceous dolomite sequence.
DDH 7 intersected the Coomalie - Golden Dyke contact. The base of this hole should overlap and correlate with DDH 9. There is no apparent correlation which may possibly be due to an east to west facies change. The base of this hole consists of 305' of light grey massive dolomite, followed by 661' of banded siliceous dolomite and limestone, then 186' of dolomite at the contact with the Golden Dyke Formation.

No algal biocerm structures were logged, although these have been recognised in the field, particularly within Prospect B, close to the inferred Golden Dyke - Coomalie contact.

The Golden Dyke Formation is at least 800' thick, but from inference, may be 3500' thick within the Exploration Licence. This formation, intersected in DDH 7 and DDH 8, consists of approximately 80' of black pyritic carbonaceous shales, followed by a 360' sequence of interbedded dolomite and shale, shale with thin limestone interbeds, overlain by a predominantly slate, shale and shale with minor dolomite sequence. The slates and shale generally contain trace amounts of pyrite, but may be pyrite rich in places. It was found that the surface expression has a totally different aspect of those rock types intersected at depth. The dolomite and limestone sequence, at depth, both those within the Coomalie and Golden Dyke Formations are altered to chert or "quartzite" at surface. Those sequences within the Golden Dyke Formation which are at depth rich in dolomite or limestone, constitute 90% of surface exposures and generally crop out as cherty siltstones or interbedded shale and chert. Drag folding is also a common feature associated with these sequences.

Weathering is extensive, and has reached a vertical depth of 650' in DDH 8. Generally, it does not extend beyond 400'.

MINERALIZATION

Both detailed and regional mapping has failed to outline any mineralized areas other than the pyrite rich shales within the Golden Dyke Formation, which is brown to red-brown in appearance, and the massive hematite - goethite caps over brecciated zones within the Coomalie Formation.

The graphitic carbonaceous shales with up to estimated 8% pyrite encountered in DDH 7 and DDH 8, do not crop out. Within this graphitic carbonaceous shale, pyrite occurs primarily as fine disseminations and as discrete thin pyrite aggregates up to 1/16" thick concordant to the bedding plane. There is no doubt that this pyrite is of a syngenetic origin. A recently received report by Robertson Research (Australia) Pty. Ltd., on thin section work done on selected diamond drill core samples from DDH 7 and DDH 8 confirms this observation. A number of anomalous lead and zinc values do occur within DDH 8 from 552.5' to 560' (see DDH 8 assay results). These values may be attributed to remobilization due to deep weathering.
The fairly large hematite - geothite within the brecciated
dolomite zones of the Coomalie Formation test by DDH 9 and DDH 10,
are caps only. These caps may be attributed to oxidation of
diagenetic pyrite and subsequent ferruginization related either to
Cretaceous or Tertiary time. Other than pyrite between 883' and
976' in DDH 10, no mineralization was encountered.

GEOCHEMISTRY

No geochemical work was done during this period.

GEOPHYSICS

An airborne magnetometer and scintillometer survey was
conducted over the area under contract to Aero Service (Australia)
Pty. Ltd. during late November. The resulting data was interpreted
by Layton Geophysical Consultants Pty. Ltd. Their report together
with relative maps covering this E.L. and the adjacent E.L.'s held
by the Company is submitted in appendix II for the Department's
information.

No anomalies have been outlined. The magnetic contours are
extremely broad, flat semi-circular pattern. This appears to be
related to the sub-surface extension of the Mt. Bundy Granite which
crops out just to the south. The number of very shallow magnetic
trends associated with the broad trend has been interpreted as
near surface dykes or veins extending out from the granite.

EXPENDITURE

The expenditure on the area as recalculated following the 1972
field season which includes a small portion of the field camp
expenses allocated to this licence, time spent by consultants, data
and airborne interpretation and related office overhead amounted to
$17,600.00. This is below the expenditure proposed for the year.
However, the Company was dependent to a large extent on the
geological evaluation and diamond drill program carried out over the
adjacent E.L. 623. Total Company expenditure on the E.L.'s in this
region is estimated to be $215,000.00.

Signed on behalf of
Kewanee Australia Pty. Limited

BY:  
FOR: J.B. Feldenhof,
Consulting Geologist.
LOCATION PLAN SHOWING
GRID LINES and BASE LINES
ESTABLISHED FOR GEOCHEMICAL
SAMPLING and GEOPHYSICAL SURVEYS

SCALE