ANNUAL REPORT ON EXPLORATION LICENCES

6352, 6353, 6354, 6355 and 8436

BULMAN/MAINORU PROJECT

13/11/98 to 12/11/99

MOUNT EVELYN 1:250,000 SHEET SD 53-05
MOUNT MARUMBA 1:250,000 SHEET SD 53-06

Commodities: Diamonds, Zinc, Lead, Copper, Silver

Author: L A Price

Date: December 1999

Accepted by: [Signature]

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Report No. 25830
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ABSTRACT

Exploration Licences (EL's) 6352, 6353, 6354, 6355 and 8436 form part of the Bulman/Mainoru Project in southern Arnhem Land. The licences are being explored for diamonds and base metals. The licences contain Early to Middle Proterozoic McArthur Basin rocks including Katherine River Group, Mt Rigg Group and Roper Group lithologies transected by the north-west trending Bulman Fault which is associated with Zn-Pb mineralisation near Bulman. Significant areas are covered by Mesozoic and Cainozoic cover.

In October 1998 a 50% relinquishment of all licences occurred. Previous exploration over EL's 6352, 6353, 6354, 6355 and 8436 has been reviewed. A reassessment of Normandy Exploration's priority targets combined with the isolated nature of the project both in a geographical and commodity sense has let to a conclusion that the project is better suited to joint venture.

The data has been reviewed by interested parties and discussions with potential joint venture partners are ongoing.
1. **INTRODUCTION**

The Bulman/Mainoru tenements are considered prospective for both diamonds and base metals. The tenements location within the stable North Australian Craton, proximity to the Bulman Fault, the Bulman Zn-Pb occurrences, and potential black shale host rocks in the McCaw Formation, indicate potential to host both Zn-Pb mineralisation and ultramafic intrusives, possibly Kimberlites.

**Tenement History**

The Bulman and Mainoru tenements have a long history, details of which can be found in 1997 Annual Report.

2. **LOCATION, ACCESS AND CLIMATE**

The Bulman/Mainoru Project Licences are located on the Mount Evelyn (SD53-05) and Mount Marumba (SD53-06) 1:250 000 map sheets and are centred approximately 200 Kms ENE of Katherine. (Figure 1)

All licences are located on Aboriginal freehold land within the Arnhem Land Reserve.

Access is gained via the Stuart Highway to the south of Katherine and then via the partially sealed Central Arnhem Road which passes through the Bulman community in the east of the project area. Unsealed tracks provide limited access within the tenements.

The climate is monsoonal with mean average rainfall of around 1000mm, most of which falls between December and March restricting vehicle access.

Most field work is carried out in the dry season (May to October). Mean temperatures range from 20-34°C.

3. **TENURE**

Exploration Licences (EL's) 6352, 6353, 6354, 6355 and 8436 comprise part of the Bulman/Mainoru Project. In October 1998 as part of the statutory requirements 50% of each licence was relinquished after careful consideration of all previous results. The current tenement status is detailed below:-

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The licences are covered by a Heads of Agreement between Normandy and NAIC.
Four separate joint venture agreements have been negotiated with local Aboriginal corporations as detailed below:

<table>
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<th>Licence(s)</th>
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<th>JV Partners</th>
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<td>NAIC/AED + Margalkmi Aboriginal Corporation</td>
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<td>EL 6352 &amp; 6353</td>
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<td>EL 6355 + 9281</td>
<td>Mount Stretton</td>
<td>NAIC/AED + Bongoi Aboriginal Corporation</td>
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<td>EL 8436 + 9280</td>
<td>Wilton River</td>
<td>Bongoi Aboriginal Corporation</td>
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4. **PHYSIOGRAPHY**

The Project area contains three major physiographic divisions, the Gulf Fall, the Arafura Fall and the Arnhem Land Plateau.

The Gulf Fall includes all the country drained by streams flowing into the Gulf of Carpentaria and covers the bulk of the Project area. Most of the Gulf Fall consists of hilly, dissected country but includes a flat, elevated area in the central-west area named the Lindsay Tableland. The topography in the rest of the Gulf Fall is dominantly controlled by the differential erosion of the underlying strata. In the headwaters of the Wilton River sandstones of the Katherine River Group form strong strike ridges and plateaux while the shales, carbonates and volcanics tend to underlie valleys and depressions. Rocks of the Dook Creek Formation generally form rounded hills while Roper group rocks form cuestas and hogback ridges among low, gently undulating country. Elevations range between 100 and 380m with local relief reaching 120m.

The Lindsay Tableland is mostly flat and soil covered but contains numerous hills and rises of Proterozoic and Mesozoic rocks. Most of the Tableland is underlain by flat lying Mesozoic strata and laterite.

The Arafura Fall covers minor areas in the north east and comprises the country drained by streams flowing into the Arafura Sea and includes two sub divisions, Undifferentiated Arafura Fall and Guyuyu Plain.

The Undifferentiated Arafura Fall is similar to Gulf Fall but relief is more subdued with local relief rarely exceeding 30m and elevation ranges of 80-180m.

The Guyuyu Plain has elevation ranges of 80-200m. Most of the area is covered by sand and soil. Numerous sink holes indicate that carbonates of the Dook Creek Formation underlie much of the Plain.

The Arnhem Land Plateau occurs over the westernmost licences and ranges in elevation up to 430m with local relief rarely exceeding 100m. Most of the Plateau is comprised of sandstones of the Katherine River Group, where they are exposed in low rises, mesas and broad craggy hills and ridges. Narrow gullies and clefts, which have developed along joints, are common in the Plateau.
The Gulf Fall is drained by the Wilton, Phelp and Mainoru River Systems. The principal drainage is through the Wilton River which flows southwards to join the Roper River.

The Arafura Fall is drained by the north flowing Mann, Blyth and Goyder River Systems.

The Arnhem Land Plateau is drained by the west flowing Katherine River System and the south flowing Waterhouse River system, which joins the Roper River.

5. REGIONAL GEOLOGY

The licences are located in the north-western McArthur Basin on the Arnhem Shelf (Fig 2).

The McArthur Basin comprises the principal element of the North Australian Platform Cover, a group of mid-Proterozoic basins which unconformably overlie the Palaeoproterozoic North Australian Orogenic Province.

The basin outcrops over an area of about 200,000 km² and contains up to 12,000 m of relatively undeformed and unmetamorphosed sedimentary rocks which are subdivided into four groups or mega sequences, separated by regional unconformities.

Lowermost is the Katherine River Group-Tawallah Group, which mainly consists of sandstones with subordinate volcanics, fine-grained clastics and rare carbonates, up to 4,500 m thick and about 1700-1800 Ma old.

Overlying this are the McArthur and Mt Rigg-Nathan Groups which both largely comprise evaporitic and stromatolitic cherty dolostones interbedded with dolomitic sandstone and shale, totalling up to 5,500 m. The McArthur Group hosts the giant McArthur River (HYC) shale-hosted Zn-Pb-Ag deposit. (102 Mt @ 14.0% Zn, 6.4% Pb, 64 g/t Ag) The McArthur Group is estimated to be between 1600-1700 Ma old.

Uppermost is the significantly younger Roper Group which consists of up to 5,000 m of alternating quartz-rich sandstones, siltstones and mudstones, estimated to be at least 1430 Ma old.

The McArthur Basin overlies and is bounded to the north-west, north-east and south-east by basement, but it is concealed by younger basins to the east, north and south-west. The Arnhem shelf is shown in Figure 2 juxtaposed with the major structural and tectonic elements identified in the Tawallah and McArthur Groups, which are attributed to a rift model in which a north-south trough and adjacent shelves are dissected by north-west trending faults (including the Bulman and Mallapunyah Faults) and a west-north-west trending basement rise, the Urapunga Tectonic Ridge (UTR). A cratonic sag basin or platform setting is preferred for the Roper Group.

6. LOCAL GEOLOGY

The summarised geology for the Tenements area is shown in Figure 3 and displays package of Katherine River Group (north-west area), Mt Rigg Group (Central area) and Roper Group (south-east area) lithologies gently dipping to the south-east, intruded by late Proterozoic dolerite sills and dykes.
McARTHUR BASIN - MAJOR TECTONIC UNITS

LEGEND

POST McARTHUR BASIN
McARTHUR BASIN
TROUGH SEQUENCES
BASEMENT

NORMANDY EXPLORATION LTD
BULMAN and MAINORU Project

McARTHUR BASIN
MAJOR TECTONIC UNITS
Figure 2

LOCALITY MAP

NORTHERN TERRITORY
Alice Springs

SCALE
0 100 200Km
1:5 000 000
The oldest rocks within the licences belong to the Katherine River Group which includes the following formations:

Kombolgie Formation - base of the McArthur Basin, dominantly medium to coarse grained sandstones and lesser mafic volcanic units.

McKay Sandstone - conformable on the Kombolgie Formation, includes ferruginous, fine to medium grained quartz sandstone, feldspathic sandstone and quartz greywacke.

Cottee Formation - conformable on the McKay Sandstone, includes red and green mudstones, fine grained ferruginous, feldspathic and glauconitic sandstones and dolostone.

Shadforth Sandstone - conformable on the Cottee Formation, includes medium to coarse grained sandstones.

McCaw Formation - conformable on the Shadforth Sandstone, includes carbonaceous mudstone, dolostone, medium to coarse grained sandstone, minor conglomerate lenses.

Diamond Creek Volcanics - conformable on the McCaw Formation, includes vesicular and amygdaloidal mafic lava, minor tuff and volcanic sandstone.

Gundi Sandstone - unconformable on the Diamond Creek Volcanics, includes medium to coarse grain lithic and quartz rich sandstone and lesser conglomerate lenses.

West Branch Volcanics - unconformable on the Gundi Sandstone, includes volcaniclastic sandstones and lesser conglomerate, massive to vesicular and amygdaloidal mafic lavas and quartz-feldspar porphyry with microgranite and pegmatite dykes. This felsic intrusive unit is known as the Jimbu Granite and had previously been interpreted as Pine Creek age or basement to the Katherine River Group. Recent work by Rawlings (1996) however suggests that an intrusive emplacement is more likely with the porphyry causing localised diapiric doming of the surrounding Katherine River Group lithologies.

The Katherine River Group is unconformably overlain by the Mt Rigg Group, which is represented by two formations in the project area:

The Bone Creek Sandstone unconformably overlies several of the Katherine River Group lithologies in the area and is composed of fine to medium grained quartz sandstone.

The Dook Creek Formation is conformable on the Bone Creek Sandstone and includes a range of dolomitic lithologies, quartz sandstone and chert breccia.

The Mt Rigg Group is unconformably overlain by the Roper Group, the lowermost units of which occur within the project area and include:

Limmen Sandstone - consisting of a conglomeratic base overlain by fine to medium quartz sandstones.

Mainoru Formation - conformable on the Limmen Sandstone, includes cherty and dolomitic siltstone, micaceous shale and glauconitic sandstone.
Numerous late Proterozoic dolerite sills and dykes intrude the McArthur Basin lithologies. The sills are generally bedding parallel with dykes commonly intruded along faults.

The Bulman and Mt Marumba Faults transect the area trending northwest. While the displacement within the McArthur Basin rocks is small the faults appear to be deep seated features and are related to Pine Creek age mineralisation to the northwest of the project area.

Other fault trends include north, north-north-east and north-east but show little displacement. A series of domes in the northern tenement are interpreted to be due to doming caused by porphyry emplacement as discussed previously.

Remnant areas of lateritised Cretaceous Mullaman Beds occur throughout the area and include siltstones, claystones and sandstones.

Considerable areas are covered by Cainozoic and Quaternary laterite, sand and soil.

7. PREVIOUS EXPLORATION

The Bulman Pb-Zn deposits were discovered in 1908 and worked intermittently up to 1925 with low tonnages of hand picked, high grade ore extracted.

Enterprise Exploration (CRA) in the period 1952 to 1962 drilled 8 holes and calculated a reserve of 375,000 tonnes @ 15% Zn and 2% Pb for the Bulman deposits. Some reconnaissance exploration was also undertaken but results were not reported.

Western Nuclear (Australia) Pty Ltd undertook a range of exploration activities in the period 1965-1970. This included detailed stream and soil sampling, the drilling of 16 holes (mainly around the known Bulman mineralisation) and airborne EM, magnetics and radiometrics with follow up ground based EM, magnetics and IP surveying.

The 1:250,000 Mt Marumba sheet has been fully covered with NTGS airborne magnetics and radiometrics as a result of three surveys in 1989, 1992 and 1994. The flight line spacing was 500m with lines flown east-west. This data has been purchased from the NTGS.

No records have been found of any exploration over the tenements prior to 1996, however, Stockdale Prospecting Ltd. undertook a regional reconnaissance stream sediment sampling program for diamonds in the early 1970's and have lodged ELA's over ground directly east of the Normandy/NAIC tenements.

8. CURRENT EXPLORATION

Previous exploration over EL's 6352, 6353, 6354, 6355 and 8436 has been reviewed. A reassessment of Normandy Exploration's priority targets combined with the isolated nature of the project both in a geographical and commodity sense has led to a conclusion that the project is better suited to joint venture.

Interested parties have reviewed the data and discussion with potential joint venture parties are ongoing.
9. **EXPENDITURE**

**BULMAN/MAINORU**

**Expenditure From 13 November 1998 to 12 November 1999**

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|                                   | $43,100 | $43,200 | $137,512 | $35,218 | $15,912 | $275,131 |

The drilling component of this expenditure was completed and reported on in the previous twelve months 13/11/97 to 12/11/98.
REFERENCES


BIBLIOGRAPHIC DATA SHEET

REPORT NUMBER 25830


PROJECT NAME Bulman/Mainoru

TENEMENT NUMBERS EL 6352, 6353, 6354, 6355, 8436

OWNER/JV PARTNERS Normandy Exploration Ltd
Northern Aboriginal Investment Council

COMMODITIES Diamonds, Copper, Lead, Zinc

TECTONIC UNIT Mc Arthur Basin

STRATIGRAPHIC UNITS Katherine River Group
McCaw Formation

1:250,000 MAP SHEET Mt Eveyn SD53-05
Mt Marumba SD53-06

1:100,000 MAP SHEETS Snowdrop 5570

KEYWORDS Exploration Review