BILLITON AUSTRALIA
THE METALS DIVISION OF
THE SHELL COMPANY OF AUSTRALIA LIMITED

EXPLORATION LICENCE 7275 - MARIA ISLAND
ANNUAL REPORT FOR THE PERIOD ENDING 4TH FEBRUARY 1992

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Summary

Exploration Licence 7275 - Maria Island comprising 30 blocks was granted to The Shell Company of Australia Limited on the 5th February 1991 for a period of six (6) years.

This report details the work completed and results gained by Billiton Australia, The Metals Division of The Shell Company of Australia Limited during the year ending 4th of February 1992.

The licence area is located over Maria Island in the Gulf of Carpentaria. It is situated 130km east of the township of Roper Bar and 150km north-northwest of Boorooloola.

Geologically, three formations are found on Exploration Licence 7275. These include the Lynott Formation, the Yalco Formation, and the Stretton Sandstone. All three formations belong the Batten Sub-Group which in turn comprises part of the McArthur Group. The McArthur Group is one of four groups that comprise the Proterozoic McArthur Basin sedimentary sequence.

Work completed within the licence area over the past year has included: aerial photograph interpretation, stream sediment sampling, mapping, rockchip sampling, and TEM soundings.

Initial further work will concentrate in interpreting a number of interesting EM conductors discovered with the TEM soundings. It is not sure at this time whether these conductors relate to either massive sulphides, graphite, or saline water.
1.0 INTRODUCTION

Exploration Licence 7275 (Maria Island) comprising 30 blocks was granted to The Shell Company of Australia Limited on the 5th February 1991 for a period of six (6) years.

The licence area lies solely within CL(P) portion 2373 held by the Northern Territory Land Corporation, and is covered under aboriginal land claim number NA71 - Maria Island and Limmen River.

This report details the work completed and results gained by Billiton Australia, The Metals Division of The Shell Company of Australia Limited during the year ending 4th of February 1992.

2.0 LOCATION AND ACCESS

Exploration Licence 7275 lies over Maria Island which is located some 30km from mainland Australia in the Gulf of Carpentaria. It is situated 130km east of the township of Roper Bar and 150km north-northeast of Booroolooa (Figure 1).

The licence area can be more accurately described as commencing at a point being the intersection of Latitude 14°50'S and Longitude 135°41'E thence east to Longitude 135°47'E thence south to Latitude 14°55'S thence west to Longitude 135°41'E thence north to the point of commencement.

Access to Maria Island can prove difficult due to its remoteness and its distance from the mainland. After a great deal of work, access to the island for the 1991-92 work programme was secured by firstly taking a commercial airline flight to Groote Eylandt, then chartering a boat from Groote Eylandt for the 150km journey south to Maria Island.
3.0 REGIONAL SETTING

Maria Island lies in the central portion of the McArthur Basin (Figure 1). The McArthur Basin contains mainly mid-Proterozoic sedimentary rocks that form a platform cover sequence near the eastern edge of the North Australian Craton.

The rocks are gently folded and faulted, un-metamorphosed, and appear to have been deposited in mostly shallow environments in an intra-cratic basin, which at times was dominated by a prominent, north-trending half-graben-the Battern Trough (Jackson et.al., 1987). The sedimentary sequence in the McArthur Basin is similar in succession to those in the Lawn Hill Platform and Mount Isa Orogen. The structure of the McArthur Basin is dominated by the Battern Fault Zone (the site of the earlier Battern Trough), and eastward-deepening half-graben-now expressed as a horst-containing up to perhaps 12km of sedimentary rock; the shelves either side of it contain only about 4km of rock (Jackson et.al., 1987).

In the central portion of the McArthur Basin its sequence is divided into four stratigraphic groups, separated by unconformities; ie. Tawallah group which is the oldest and overlies 1800 Ma old crystalline basement; the McArthur Group, the Nathan Group, and the Roper Group which is the youngest stratigraphy.

4.0 TENEMENT GEOLOGY

Rocks of three formations in the McArthur Basinal sequence can be recognised on Maria Island. These include the Lynott Formation, the Yalco Formation and the Stretton Sandstone. These formations form part of the Battern Subgroup which is part of the McArthur Group (Figure 2).

The Lynott Formation is the oldest found on the island and outcrops in the far northern portion. On Maria Island the formation comprises mudstone and chert units. These rocks are gently folded and strike dominantly east-west and dip mainly north at 10-15° (Figure 3).
Resting the Lynott Formation is the Yalco Formation which is found over the majority of the island. The formation is typically highly interbedded and gently folded. Lithologies include: laminated, fossiliferous, silicified, dolomite (fossils are mainly various forms of stromatolites); fine to coarse grained, massive to laminated sandstone; massive to laminated mudstone; and massive silty dolomite (siltstone) (Figure 3).

The Stretton Sandstone represents the youngest of the basinal rocks found on the island and is found forming caps on hills in the centre as well as outcropping on the southern peninsula. The Stretton Sandstone is typical massive to laminated, fine, white quartzite. The sandstone units strike north-south and dip to the west of 5-20° (Figure 3).

Apart from the rocks of the Battern Subgroup found on Maria Island a number of recently deposited/formed rocks can be found. These include substantial laterite development in the centre of the island with laterite profiles of 2 to 3 metres in thickness. Around the island’s coastline recent deposits of partly consolidated, sandy, fossiliferous limestone can be found perched unconformably on rocks of the Battern Subgroup. These limestone beds range from 1 to 3 metres in thickness. Perched sand dunes are found at various locations around the coastline and an extensive deposit of mud can be found in the low central western coast area (Figure 3).

Various sites of faulting were noted around the island. In these areas localised brecciation can be found around northerly trending zones of shearing.

5.0 MINERALISATION

Little is known about mineralisation within EL 7275. No old workings are known within the tenement area.

Billiton’s exploration target for Maria Island is the location of either structural or stratigraphicly controlled base metal (Ag-Pb-Zn) mineralisation.
It is thought Maria Island may be an attractive target area as its stratigraphy lies only several hundred metres above that which hosts the HYC stratigraphic Ag-Pb-Zn deposit, to the south, and it is located near the intersection of two major structures i.e., the Bulman Fault and the Emu Fault which are known to host minor deposits of Ag-Pb-Zn.

6.0 WORK COMPLETED

6.1 Aerial Photograph Interpretation
Both black and white and colour aerial photographs covering Maria Island were obtained to attempt a structural interpretation. No major structures were located. The photos depicted well the different stratigraphic formations found on the island.

6.2 Stream Sediment Sampling
A total of eleven 500g, -80# stream sediment samples were collected from various sites around the coast of the island. The creeks sampled flow intermittently in the wet season, draining hills in the central portions of the island.

These samples were submitted to Classic Laboratories in Darwin for analysis of a suite of elements including Ag, Au, Pb, Zn, Cu, Ni, Bi, Mn, As, Sn and Fe.

The results for the majority of elements were very low or below detection. Some anomalies Fe and Mn results were obtained which could be expected in lateritic terrains (Figure 4).

6.3 Mapping/Rockchip Sampling
A number of mapping traverses were completed around the coast and across the island. Details on the geology are noted in Section 4.0 of this report, and depicted in Figure 3.

Little mineralisation was encountered during mapping. That found included some iron-rich siliceous breccia (i.e. polymict fragments of quartz and mudstone in a silicified iron matrix) relating to several narrow subvertical shear zones, and some loose cobbles of ironstone with relic pyritic textures found on a beach. No evidence of basemetal mineralisation was encountered.
A total of nineteen grab rockchip samples were collected whilst mapping on Maria Island. Samples were collected of the forementioned mineralisation along with any other rocks which may have been of interest eg. laterite.

These samples were submitted to Classic Laboratories in Darwin for analysis of a suite of elements including Ag, Au, Pb, Zn, Cu, Ni, Bi, Mn, As, Sn, Al and Fe.

The results for the majority of the elements were very low or below detection. Some high Fe (35.0% Fe), Mn (11.8% Mn) and Al (3.8% Al) were obtained however are not considered to be related to anything of economic significance (Figure 4).

6.4 Transient Electro Magnetic (TEM) Soundings

A total of six TEM soundings were conducted at Maria Island in the attempt to detect possible basemetal mineralisation at depth.

Soundings were taken via a SIROTEM unit on 200m x 200m transmitter loops. A central RVR receiver (10000m$^2$) was used.

Soundings results and locations are depicted in Figure 5. The sounding results on Figure 5 indicate the resistivity-depth section at each sounding. For instance, at Sounding B there are two layers over basement. The top layer to 10 metres depth has a resistivity of 3.8 ohm-metres ($\mu$m). The second layer between 10 and 176 metres is less conductive with a resistivity of 37 ohm-metres. "Basement" is slightly more conductive with a resistivity of 12 ohm-metres. "Basement" means the deepest layer seen by the sounding (the deepest layer that can be seen is a function of conductivity and thickness). Thin resistive layers are "invisible" with EM soundings which can create an error in the actual depths to the individual layers.

A resistivity of less than 1 ohm-metre is very conductive (massive sulphides, graphite, saline water). Fresh rock is usually in the hundreds of ohm-metres.

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Looking at Figure 5 it is clear that there are conductive layers at depth, below soundings B, E, D, and F. From F and B it is possible to speculate a dip to the south-west (conductive layer getting deeper towards F).

**7.0 EXPENDITURE STATEMENT**

**EL 7575 – MARIA ISLAND**

**FOR THE PERIOD 5.2.91 TO 4.2.91**

$ 

- **Staffing – Regional office** 9,740
- **Support – Regional office** 23,749
- **Tenement Costs** 415
- **Analyses** 1,340
- **Aerial Photography** 70
- **Overheads** 3,531

**TOTAL EXPENDITURE** $ 38,845

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8.0 PROPOSED WORK AND COMMITMENT FOR THE FORTHCOMING YEAR
(Year ending 4th February, 1993)

Proposed work on EL 7275 during the forthcoming second year of tenure from
the 5th February 1992 to 4th February 1993 includes:-

- acquisition of seismic data in the vicinity of Maria Island.
- attempt to interpret TEM sounding conductors using seismic data
to regional stratigraphy.
- research in more detail the stratigraphy around the HYC basemetal
deposit.
- if results of the above work are positive then further work may
include the drilling of a stratigraphic diamond hole on Maria

Proposed commitment on EL 7275 for the forthcoming year should include:-

$  
Staffing (research, seismic interpretation, reporting) 2,000
Acquisition of seismic data 1,000
Overheads - 10% 300

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3,300

9.0 REFERENCES

JACKSON, M.J., MUIR, M.D., PLUMB, K.A., 1987
Geology of the southern McArthur Basin, Northern Territory.
Bureau of Mineral Resources
Bulletin No. 220, Canberra

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SHEET NAME: (1:250,000) Roper River (SD 53-11)

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**Regional Stratigraphy.**

- **Ridge Ore Zone**
- **MARIA ISLAND SL.**
- **HYC Ore Zone**
- **"CAULIFLOWER" CHERT**
- **HYC SL.**
- **RADIATING GYPSUM PSEUDOMORPHS**
- **DOLOMITE SILTSTONE**
- **SEDIMENTARY BRECCIA**
- **PYRITIC DOLOMITIC SHALE**
- **DOLOMITE SILTSTONE**
- **TUFFACEOUS SILTSTONE**
- **MASSIVE DOLOMITE**
- **THIN BEDDED & STROMATOLITIC DOLOMITE**
- **MASSIVE GYPSUM PSEUDOMORPHS**
- **"RED BED" SILTSTONE**
- **K-METASOMATIZED BASIC EXTRUSIVES AND SILTSTONE**
- **SANDSTONE**

**Fig.** — Schematic stratigraphic column adjacent to the HYC deposit (from Walker, Gulson and Smith, 1983).