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EXPLORATION LICENCE 4277

ROSIE CREEK, MOUNT YOUNG, N.T.

ANNUAL REPORT FOR YEAR ENDED 8th AUGUST, 1985

D. CARVILLE
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FIGURE 1: Location Map EL 4277

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APPENDIX 1: EM-37 Sounding Data and Interpretation
Exploration Licence 4277 was granted to BHP Minerals Limited on the 8th August, 1983, and forms part of the company's Batten Project. A request has been made to defer the relinquishment required at the completion of two years of tenure.

The exploration target in the project area is a sediment-hosted massive sulphide deposit modelled on the HYC deposit at McArthur River.

About 380 line kilometres of grid were established to carry out an EM-37 sounding survey in the 1984 field season. 306 soundings were conducted at 1200 metre separation on lines one kilometre apart. Four sites have been selected for diamond drilling in the 1985 field season, three of which are part of a group of soundings referred to as the Rosie Creek Prospect.

A gravity survey over part of the grid resulted in the definition of a three milligal gravity ridge adjacent to anomalous EM-37 soundings and reinforcing the significance of the Rosie Creek group of anomalies.
EXPLORATION LICENCE 4277, ROSIE CREEK, MOUNT YOUNG, N.T.

ANNUAL REPORT FOR YEAR ENDED 8th AUGUST, 1985

1. INTRODUCTION

Exploration Licence 4277 was granted to BHP Minerals Limited on the 8th August, 1983, and consists of 119 graticule blocks (about 383 square kilometres). An application was made to defer the fifty percent relinquishment required at the end of the second year of tenure.

The exploration licence is one of a group of licences held by BHP Minerals Limited in this area which is explored as a single entity called the Batten Project.

The north-east corner of the exploration licence is located at latitude 15° 30' south, longitude 136° 00' east on the Mount Young 1:250,000 sheet (SD53-15, Figure 1).

Access to the area is gained via dry weather tracks which intersect the formed gravel road between Borroloola and Bing Bong Station about seven and thirty-six kilometres from Borroloola.

The exploration target in EL 4277 is a sediment-hosted massive sulphide deposit. The target is modelled on the HYC deposit at McArthur River which is hosted by dolomitic, carbonaceous and pyritic shale of the Barney Creek Formation of the Carpentarian McArthur Group.

Work carried out during the second twelve months of tenure consisted of -

1. Establishing a grid of cleared lines.
2. EM-37 sounding survey.
4. Air photography.
5. Start of a diamond drilling programme.
2. **GEOLOGY**

Outcrop geology within EL 4277 is dominated by Cretaceous and Cambrian sandstone which is further obscured by Cainozoic sand and lacustrine deposits.

Outcrop of units of the Umbolooga Sub-group of the McArthur Group is restricted to Tatoola Sandstone, Emmerugga Dolomite, and Reward Dolomite in Pine Creek along the southern margin of the area, and to Tatoola Sandstone in Warramana Creek along the western margin (Plate 1).

Units of the Batten Sub-group of the McArthur Group, specifically the Yalco Formation and Lynott Formation outcrop in some areas. The Yalco Formation delineates a prominent "basin" structure in the southern part of the area.

Additional geological information is provided by percussion and diamond drill holes drilled under previous title.

Major structures in the area are interpreted from regional geophysical data and the limited geological information. Near the western margin of the area a major syndepositional fault (east side down) is considered to be the northern equivalent of the Emu Fault Zone. In the northern part of the exploration licence, this fault forms the eastern side of a postulated horst block.

3. **PREVIOUS EXPLORATION BY BHP**

Exploration work carried out during the first year of tenure consisted of:

- geological mapping of the area in conjunction with mapping of adjacent exploration licences

- re-assessment of previous work including re-logging of diamond drill holes drilled by previous tenement holders

- a detailed aeromagnetic survey including the flying of new airphotography for navigation
- EM-37 surveys conducted as part of a programme to test the suitability of the method and to develop interpretation techniques

4. FIELD INVESTIGATIONS AND RESULTS

An EM-37 sounding survey and a gravity survey were carried out during the 1984 field season. About 270 line kilometres of new bulldozed and graded grid lines were established for this work, in addition to re-grading of 110 line kilometres of grid lines established under previous titles.

New airphotography was flown to provide control for base maps of the new grid.

Work being carried out during the 1985 field season consists of a diamond drilling programme testing targets defined by the EM-37 programme.

4.1 EM-37 Sounding Survey

The Geonics EM-37 ground TEM system was applied in the sounding mode at 306 locations in EL 4277 as part of an extensive survey covering this exploration licence and parts of adjacent tenements. The original grid was established with a one kilometre line spacing and soundings taken at 1200 metre intervals along the lines. In some areas, more detailed lines were required by reducing line spacing to 500 metres. The 1200 metre sounding spacing was maintained although offset 600 metres from the original pattern (Plate 1).

The survey was carried out by Geoterrrex Pty. Limited. Data was directly stored in the field on Hewlett Packard HP75 computers and transferred daily to a Hewlett Packard HP85 format. Further processing was carried out using BHP in-house computers, either a VAX 11/780 or an MV6000, both located in Melbourne and accessed using a Hewlett Packard 9845 in Darwin.

Apparent resistivity data and interpreted resistivity sections are compiled in Appendix 1.

Four soundings have been selected for drill testing in the 1985 field season -
1. Sounding B119 (Line 116) indicates a 19.6 ohm metre conductor of 62.8 metres thickness.

2. Sounding B139 (Line 119) indicates an 8.4 ohm metre conductor of 37.9 metres thickness.

3. Sounding B159 (Line 121) indicates a 15.7 ohm metre layer of 61.4 metres thickness overlain by a 176 metre layer of 61.1 ohm metre resistivity.

4. Sounding B168 (Line 123) indicates a 26.8 ohm metre layer 63.8 metres thick overlain by a 214 metre layer of 94.4 ohm metre resistivity.

The low resistivity layer in each of these soundings is possibly indicative of massive sulphides. Soundings B159 and B168 also indicate an overlying conductive layer which might be interpreted as pyritic black shale.

Soundings B186 (Line 122) and B169 (Line 123) also reflect "massive sulphide"-type resistivity layers, but will not be tested in the first stage drilling programme.

The group of anomalous soundings between Lines 119 and 123 and between about 12000 east and 16800 east closely reflect the target model of a massive sulphide deposit within a pyritic shale basin. This group of anomalies is known as the Rosie Creek Prospect.

4.2 Gravity Survey

A gravity survey was carried out over part of the grid established for the EM-37 survey. The aim was to provide additional information on areas of interest defined by the EM-37 survey so that anomalies could be ranked. Modelling indicates that a massive sulphide occurrence of the type sought may cause a positive gravity anomaly in the order of three milligals.

Optical levelling was used and station spacing was 100 metres. Contoured gravity data is shown in Plate 2.
The most significant gravity feature is a three milligal gravity ridge within a four milligal low which is adjacent to anomalous EM-37 soundings on Lines 121, 122 and 123. The ridge does not directly correspond with EM sounding locations on these lines, so it is not known if it is directly associated with an EM conductor.

The gravity survey reinforces the significance of the area between Lines 119 and 123 (the Rosie Creek Prospect).

4.3 Air Photography

Although air photography had been flown in May 1984, the 380 line kilometres of newly established grid required photographic control for the preparation of grid base maps. Air photography was being flown as a prelude to flying an aeromagnetic survey in an adjacent exploration licence (EL 4678), and so the air photography was extended to cover EL 4277. The photography was flown in colour by Kevron Aerial Surveys at 1:80,000 scale, and enlarged to 1:50,000 scale.

4.4 Diamond Drilling

A diamond drilling programme designed to test the EM-37 sounding anomalies as outlined in Section 4.1 was started at the end of the reporting period. Four drill holes are planned within EL 4277 for the 1985 field season for an estimated total of about 1600 metres. Results of this programme will be reported in the next annual report.

5. FUTURE PROGRAMME

The diamond drilling programme started at the end of this reporting period will be completed.

Subsequent to encouraging results in the Rosie Creek area, an in-fill survey of EM-37 soundings will be carried out to define targets for further drilling.

Both of these programmes are likely to lead to further diamond drilling.

Expenditure on the drilling and EM programmes outlined above is estimated at $100,000.
6. **EXPENDITURE**

(Year ended August 8, 1985)

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**Total** | **$189,388**
APPENDIX 1

EM-37 SOUNDING DATA AND INTERPRETATION
306 EM-37 soundings were undertaken in EL 4277 during the 1984 field season. Transmitter loops were 300m x 300m with the current generally being 13–17 amps. Twenty channels were read at the centre of the loop while two out-of-loop readings of the last 5 or 6 channels were taken. The out-of-loop readings were used to -

(a) test for lateral homogeneity
(b) apply a correction to remove the "loop effect".

Standard EM-37 channels were used ranging from 0.08 msecs to 7.1 msecs.

Using the late time approximation by Kaufman, apparent resistivity-time plots were prepared in the field and matched to master curves to give a first pass ID interpretation. Inversion of the field data, using this first interpretation as a starting point, was computed on either a VAX 11/780 or MV6000 computer.

Attached for each sounding is -

(a) The field measured Raiche apparent resistivity-time plots.
(b) The model apparent resistivity-time plot superimposed on (a).
(c) The interpreted ID section.