The Shell Company of Australia Limited entered into a Joint Venture (J.V.) Agreement with Driffield Mining Ltd over Exploration Licence 4730 on the 28th October 1989.

Billiton Australia, The Metals Division of The Shell Company of Australia Limited are managers and operators of the Joint Venture.

The tenement overlies two historical mining areas, namely the Wolfram Hill and Hidden Valley group of mines which were operated in the early 1900’s. Tin, tungsten, and minor copper, lead and silver were mined from these two areas.

The Early Proterozoic Burrell Creek Formation is the dominant rock type in the area and is host to the mineralisation. Early Proterozoic Tollis Formation occurs in the northeastern corner of the licence adjacent to the Wolfram Hill Granite. The granite is also exposed on the eastern boundary of the licence and has caused extensive contact metamorphism to albite-epidote hornfels facies of the adjacent rocks.

An airborne magnetic and radiometric survey has located significant northeast striking anomalies which are historically associated with gold mineralisation in the Pine Creek region. Soil samples collected from this anomalous region returned values of 23.8 ppb Au and 36.3 ppb Au.

Regional stream sediment and rockchip sampling programmes have not located significant mineralisation.

Further work will consist of ground magnetics, soil sampling and drill testing if warranted.
TABLE OF CONTENTS

SUMMARY

1.0 INTRODUCTION

2.0 GEOLOGY AND MINERALISATION

3.0 WORK COMPLETED AND RESULTS

4.0 PROPOSED PROGRAMME

5.0 EXPENDITURE STATEMENT

LIST OF FIGURES

Figure 1 Location and Access 1:100 000
Figure 2 Geology
Figure 3 Aeromagnetic anomalies 1:50 000
Figure 4 Ground Magnetic Contours
Figure 5 Stream sediment & rock chip sample locations and results 1:25 000
Figure 6 Soil Grid 1:10 000
1.0 INTRODUCTION

Exploration Licence (EL) 4730 was initially granted to Top End Mineral Ventures Pty Ltd on the 15th February 1988 for a period of six years. Immediately after granting, the licence was subsequently transferred to G.B.Scimegor on the 18th February, 1988. Further to this a second transfer was registered by the Northern Territory Department of Mines on 8th September 1988 between G.B.Scimegor and Driffield Mining Pty Ltd. On the 28th October 1989, Billiton Australia, The Metals Division of The Shell Company of Australia Limited entered into a Joint Venture Agreement (JV) with Driffield Mining Pty Ltd with Billiton being managers and operators of the Joint Venture.

Initially the licence consisted of fourteen graticular blocks. The area was reduced to 10 blocks during compulsory half-term reduction in January 1990.

A further reduction in January 1991 reduced the area of the licence to 5 graticular blocks.

Exploration Licence 4730 is located approximately 50 kms southeast of Pine Creek and 22 kms northeast of the Batman gold deposit which is operated and managed by Billiton Australia. Access to the area is via a gravel road which turns off the Stuart Highway 3.5 kms northwest of the Edith River crossing.

Access within the area is via bush tracks and off-road driving (FIGURE 1). The western half of the tenement has a flat topography thus making off-road access easy but impassable in the Wet Season. The eastern half of the tenement is steep and inaccessible in 4WD vehicles.

A summary of the mining and exploration history of the licence area is available for review in the Annual Report for EL 4730, 15 March, 1990.

This report contains a description of the regional geology, work completed and results of exploration during the reporting period to March 1991.
2.0 GEOLGY AND MINERALISATION

The geology within EL 4730 consists predominantly of the Early Proterozoic Burrell Creek Formation, intruded along the eastern margin by the Wolfram Granite.

Within the vicinity of the Wolfram Granite (< 1 km) the Burrell Creek Formation has been contact metamorphosed to albite-epidote hornfels facies with minor zones of hornblende hornfels adjacent to the granite. Away from the granite the Burrell Creek Formation consists of interbedded phyllite, siltstone and feldspathic greywacke striking in a north-west-westerly direction.

The Wolfram Granite contains grey fine equigranular leucogranite and pink medium to coarse equigranular biotite leucogranite. Both types of granite are extensively altered.

Extensive zones of muscovite-quartz greisen and quartz veins are common, especially in adjacent hornfels where they are associated with tungsten, tin and copper mineralisation.

Regional-scale F1 folding throughout the region, prior to granite emplacement, produced a penetrative and slaty to phyllitic cleavage parallel to fold axes which can easily be identified in siltstone and greywacke units. Folding within the area is typically symmetrical and upright with southward plunging axes.

A second generation of folding (F2), consisting of broad anticlines and synclines which pitch steeply to the southeast has been recognised to the north of the Wolfram Granite.

The Wolfram Hill region has historically been a major centre for metal production, in particular tungsten, tin and copper with minor lead and silver. Historically gold has not been mined economically in the area but anomalous results have been recorded from a number of prospects.
3.0 WORK COMPLETED AND RESULTS

3.1 Airborne and Ground Magnetics
The Wolfram Hill licence area was covered by a detailed aeromagnetic survey flown during the reporting period. Survey specifications are as follows:-

- flight line spacing 300 metres
- Survey Height 80 metres
- Flight line directions E-W, NE-SW
- Spectrometer 33.6 litres
- Flown Austirex 1990

Image processing of the data was carried out by GeoImage, Brisbane and in-house at Billiton, Melbourne. An interpretation of the aeromagnetics is shown in Figure 3.

Prominent northeasterly trends have been recognised by BAUS personnel within the Pine Creek region as significant locations for gold mineralisation. One such northeast oriented magnetic anomaly occurs within the licence area, discordant with the known geology of the area. A small grid has been constructed over the southern portion of the aeromagnetic anomaly (Figure 5) and a ground magnetic survey has been carried out. Contours of the ground magnetic survey are shown in Figure 4.

The area covered by the ground magnetic survey is largely covered by extensive black soil plains. An interpretation of the ground magnetics suggests a north-south striking sequence of moderate-tightly folded sediments (including BIF's) of the Burrell Creek Formation. A possible dextral N-S fault occurs at 199250mE (Figure 4). The strong northeast striking anomaly has not been properly covered by the ground magnetic survey, but appears to be discordant with the surrounding stratigraphy. Further follow-up work is required in this area.

3.2 Stream Sediments
A total of nine BLEG stream sediment samples were collected from prominent drainages within and surrounding the licence area. Samples weighing approximately 5kg were collected and sieved to -8# for analysis
for gold by the BLEG method. Sample locations and results are presented in Figure 5.

Sample No. 240695 recorded a highly anomalous value of 1168 ppb Au. Repeat sampling of the location returned an anomaly below background level (<2 ppb). Several tests and checks were carried out, with the result being that the highly anomalous value for sample No. 240695 was due to laboratory error. The remaining eight samples were below background level.

3.3 Soil Sampling
A total of 30 x 2kg -8# BLEG soil samples were collected from the ground magnetics grid. The samples were composited over 50m (Figure 6). Two significant results of 23.8 ppb and 36.3 ppb gold occur on line 11200N. Due to the thick black soil coverage in this area, identification of the source of these anomalies at surface has not been possible. Further grid based soil sampling will be carried out to determine the nature and extent of these anomalies.

3.4 Rock Chip Sampling
Sixteen rock chip samples were collected as part of a follow-up programme to anomalous areas resulting from earlier stream sediment and geophysical programmes. The samples contained low gold values (<0.26 ppb), but were anomalous in Cu, Pb, Zn, As, Bi and Sn (Table 1). The sample locations and gold values are shown in Figure 5.
TABLE 1
WOLFRAM HILL J.V. ROCK CHIP RESULTS
Results in ppm unless otherwise stated

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<th>Pb</th>
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4.0 PROPOSED PROGRAMME

During the fourth year of tenure for Exploration Licence 4730 it is proposed to undertake the following exploration activities:-

1) Detailed ground magnetics over already identified aeromagnetic anomalies and continuation of present grids.

2) Gridding and BLEG soil sampling over the aeromagnetic anomalies.

3) Geological follow-up and mapping over identified anomalies.

4) Drill testing or cutover testing if warranted.
## 5.0 EXPENDITURE STATEMENT

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**TOTAL EXPENDITURE**  
$38,873