SUMMARY

Exploration Licence (E.L.) 5439, Boomlera North is located approximately 27 km northwest of Pine Creek.

The licence area has been the subject of a Joint Venture Agreement between Coronation Hill Gold Mines NL, and The Shell Company of Australia Limited, which commenced on the 1st July, 1988. Coronation Hill Gold Mines NL hold the tenements, with The Shell Company of Australia Limited as manager and operator of the joint venture. Shell withdrew from the joint venture effective 14th September, 1990.

The geology within the licence area is comprised predominantly of interbedded siltstones, shales and greywackes of the Early Proterozoic Burrell Creek Formation of the Finniess River Group. Regional metamorphism to greenschist facies occurs associated with at least two phases of deformation, an upright north-northwest folding, and gentle north-northeast warping. There is also some evidence of shearing, probably related to the major north-northwesterly trending Pine Creek Shear zone.

Contact metamorphism up to high grade hornfels is present at the margins of the McKinlay Granite on the western margin of the tenement.

This report contains a summary of all previous work carried out on EL 5439, with respect to the joint venture, and details work carried out during the current reporting period. Recent work has consisted of gridding, mapping, rock chip sampling and soil sampling. Results from this recent work have not been encouraging and no further work is planned.

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1.0 INTRODUCTION

Exploration Licence 5439, Boomlera North, was granted to Coronation Hill Gold Mines NL on the 1st October, 1987 for a period of three years.

During the first half of 1989 the tenement was incorporated into the McKinlay Joint Venture, between Coronation Hill Gold Mines and The Shell Company of Australia Limited, which commenced on the 1st July, 1988. Shell was manager and operator of the joint venture, however effective from 14th September, 1990 Shell have withdrawn from the McKinlay Joint Venture and retains no interest in this tenement.

This report details the work completed and results gained by Billiton Australia, The Metals Division of The Shell Company of Australia Limited, on behalf of the McKinlay Joint Venture, during the period 1st October, 1989 to 14th September, 1990.

Exploration within the licence area has focused on locating near surface bulk tonnage gold mineralisation.

2.0 TENEMENT STATUS

Exploration Licence 5439 was granted on the 1st October, 1987 and will expire on the 30th September, 1990. A two block reduction was carried out in November 1989.

3.0 GEOLOGY

The geology within the licence area is comprised predominantly of interbedded siltstones, shales and greywackes of the early Proterozoic Burrell Creek Formation, of the Finnis River Group (Figure 1).
Granite of the Early Proterozoic McKinlay Granite can be found on the eastern boundary of the licence area. Hornfelsing of rocks of the Burrell Creek Formation produced by contact metamorphic affects of the McKinlay Granite is relatively common in the area close to the granite and up to hundreds of metres from the granite.

A north-northwesterly trending dolerite dyke associated with the eastern margin of the Pine Creek Shear, intrudes the Burrell Creek Formation in the centre of the tenement. Evidence of this shearing, probably related to this zone, can be found throughout the tenement. A report on petrological samples collected from a mylonitic zone 20m wide immediately west of grid line 10600N is shown in Appendix 1.

The geology and structure of the tenement has been described in considerable detail in the Annual Report for Exploration Licence 5439 by Coronation Hill Gold Mines NL in October 1988, and this information will not be repeated here. Readers are referred to this report for details on lithologies, tectonics and structural evolution.

4.0 MINERALISATION

Exploration Licence 5439 lies in a region of known gold mineralisation related to the Pine Creek Shear Zone. Only in the southwest corner of the licence area are there traces of old mine workings located on areas of quartz veining and outcropping gossan.
5.0 PREVIOUS WORK

The previous work outlined below is with respect to the McKinlay Joint Venture only.

5.1 Stream Sediment Sampling

A total of 37 active sediment 5kg, -8# BCL Au samples, and 200g, -80# Ag, Pb, Zn, Cu, As samples were collected from streams within the licence area.

A number of gold anomalous stream catchment areas within the two northern sub-blocks were delineated from the BCL survey (highest value 19.8 ppb). Base metal results were consistently low, with minor anomalies corresponding to areas outlined by rock chip sampling carried out in earlier work by Zapopan NL.

Limited follow-up reconnaissance mapping and rock chip sampling within the two northern sub-blocks failed to locate any significant mineralisation (best result 0.2 g/t Au), subsequently the area relinquished in November 1989 to meet N.T. Department of Mines & Energy requirements.

Results from the BCL stream survey within the two remaining southern sub-blocks obtained a highest value of 25.8 ppb Au. A reconnaissance rock chip sampling programme within the anomalous drainage area was carried out with negative results.
5.2 **Aeromagnetics**

Detailed airborne magnetic and radiometric data was acquired from Aerodata Holdings, as part of a major multi-client survey over the Pine Creek Geosyncline. This survey was completed using a 200m flight line spacing, 5000m tie line spacing and 70m mean sensor height. Image processing was completed by GeoImage of Brisbane.

No discrete aeromagnetic targets have been delineated and therefore no detailed interpretation was conducted. The western contact of the McKinlay Granite is well defined by the radiometrics and TM with the granite being a radiometric high and low contrast area in comparison with the aureole sediments. Dolerite Dykes associated with the Pine Creek Shear Zone are clearly defined by linear magnetic highs.

6.0 **WORK COMPLETED**

6.1 **Soil Sampling**

Two phases of soil sampling have been completed across the drainage area of a 25.8 ppb Au stream sediment sample anomaly within the southern half of E.L. 5439. The initial programme involved composite 2kg, -8#, BCL soil samples over a nominal 50m on 200m spaced lines (Figure 2) covering an area of approximately 1.6 square kilometres. Results of 37.0, 41.4, 98.5, 111.7 and 304 ppb Au were received, however, field checking showed the anomalous values were due to recent alluvials in streams draining the Spring Hill gold workings or palaeo-alluvial deposits associated with a fossil billabong of the McKinlay River.

Reconnaissance geological mapping of the grid identified a major zone of mylonitic shearing trending north-northwest on the western margin

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of the grid near line 10600N (see Appendix 1). This represents the western margin of the Pine Creek Shear Zone and separates high grade hornfels (cordierite, K-feldspar rocks) from lower grade (biotite, muscovite rich) rocks to the west. Given this shear trends beneath the alluvials, infill sampling on 50m line spacing and extension of the grid to cover the alluvials to the south and east was considered warranted. Composite 2kg, -8#, BCL Au soil samples were collected at 5m intervals over 25m for this second phase of sampling.

Significantly encouraging results of 398.0, 236.0, 304.0, 557.0, 605.0, 780.0, 220.0, 350.0 and 257.0 ppb Au were received, confirming the gold anomalism of the palaeo-alluvials but failing to define any gold anomalous bedrock. Results for both phases of soil sampling are presented as a contour plot in Figure 3.

6.2 Geology and Rock Chip Sampling

Following the encouraging second phase of soil sampling, detailed mapping was carried out over the southern portion of the grid. The geology consisted of a north-northwest striking interbedded sequence of greywackes, siltstones and shales. A strong cleavage sub-parallel to bedding is prominent within the area, however exposure of significant outcrops containing detailed structural information was poor, inhibiting any accurate interpretation of the structure within the mapped area (Figure 4). Several north-northwest striking massive quartz veins, up to 1m wide, occur within or close to contacts with greywacke units. The quartz veins are commonly orientated parallel to, or 10-20° further west of the strike of the stratigraphy and dip sub-vertically to the west.
The mapping confirmed the gold anomalism resulting from the soil sampling was mainly attributable to the palaeo-alluvials, depicting ancient water courses of the McKinlay River. The alluvials show limited tonnage potential, in the order of 50,000 BCM.

Significant BCL soil anomalies along the southwest margin of the grid were followed-up by rock chip sampling of the quartz veins within the area. The samples were assayed for Au, Ag, Cu, Pb, Zn, Bi, Sn, W and As. The results for Au were all below detection limit (<0.01 ppm), with the base metal values at background levels.

7.0 CONCLUSION

The current exploration programme has failed to locate significant near surface bulk tonnage gold mineralisation. Due to the negative exploration results, no further exploration is proposed for the licence area.

8.0 EXPENDITURE STATEMENT

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REFERENCES

Appendix 1

Pine Creek Shear Zone Petrological Report.

J. Taylor
"Pine Creek Shear Zone"

A ductile high strain zone (mylonite) within fine to coarse grained flyschoid sediments of the Burrell Creek Formation was found immediately to the east of the abandoned railway line, almost 2.0 kms north-west of Boomleera Siding, to the south-east of Spring Hill. This zone was at least 20 meters wide and approximately parallel to bedding, striking 325° MN and dipping steeply (85°) to the south-west. In the field, no clear sense of movement could be inferred from S-C planes or fragment asymmetry in the coarser grained portions. The most notable feature, however, was a strong down dip stretching lineation defined by micaceous assemblages (85° to 235° MN).

Two oriented thin sections were examined from an intensely sheared, very coarse grained greywacke (both perpendicular to the mylonitic foliation, with one parallel to the lineation, and the other perpendicular to it). The protolith was a very coarse grained volcaniclastic greywacke containing silicic to mafic volcanic fragments as well as meta-sedimentary and metamorphic quartz rock fragments (up to ~3mm) comprising 50-60% by volume. The remaining clastic component includes plagioclase, k’spar and quartz crystal fragments with accessory tourmaline and zircon which comprise 20-30 volume %. (Due to the extreme flattening, the original grainsize of the fragments is only approximate). The rock has undergone an essentially bedding parallel shearing event which has resulted in the formation of a mylonitic fabric. The lithic and crystal components have been strongly attenuated and are anastomosed by a fine grained micaceous matrix (10-20 volume %) consisting of white-mica and biotite. The micaceous material displays a strong crystallographic preferred orientation, and defines the mylonitic foliation. While most of the crystal and lithic components have deformed in a ductile fashion during flattening, brittle microstructures within plagioclase crystals emphasize its mechanical strength. Trace quantities of disseminated sulphides (?pyrite) appear to be either pre- or syn mylonitisation, but the elongation of quartz-rich fibres in pressure shadows marginal to rare sulphide euhedra, indicate that some sulphide growth occurs post ductile deformation on the shear zone.

In plan view (i.e. perpendicular to the lineation), attenuated fragments within the shear displayed no sense of asymmetry. In section (i.e. parallel to the lineation), conflicting senses of asymmetry within fragments prevented any clear indication of sense of movement within the shear zone. Fragment attenuation is more evident in the section parallel to the stretching lineation, confirming that the latest recorded sense of movement, and dominant stretching direction was in a near vertical plane (i.e. steep west).

The occurrence of biotite within the micaceous matrix to the attenuated fragments indicates that vertical stretching occurred either syn or pre-granitoid intrusion and hornfelsing. The excellent preservation of the mylonitic fabric suggests that movement occurred during biotite grade hornfelsing. On this basis, the latest movement on the mylonites is likely to be associated with roof lifting during granitoid emplacement, and
is predicted to (marginally) pre-date displacement on the brittle, north-east trending, sinistral strike-slip faults in the Spring Hill region.

This mylonite zone is interpreted to be part of the Pine Creek Shear Zone (PCSZ). The PCSZ is defined by a number of ductile high strain zones within granitoid material in the southern Cullen Mineral Field, and is probably similarly defined by a series of discrete, narrow, discontinuous mylonites within the Lower Proterozoic meta-sediments. It is difficult to reconcile the sinistral strike slip movement (trending ~330° NW) defined by offsets in the granite-sediment contacts in the southern extremities of the PCSZ with the near vertical component evident near Boomlera Siding. It is possible that the sinistral strike-slip component of displacement on the southern shear zones significantly post-dates granitoid emplacement (e.g. Middle Proterozoic).

A reconnaissance traverse within meta-sediments from the south-west corner of the McKinlay aureole, south-west toward the Stuart Highway revealed a number of prograde and retrograde changes in the degree of hornfelsing. The rapidity of some of these apparent grade changes is likely to be the result of localised retrograde shearing, and other more gradual changes due to the proximity of subsurface plutons. Mylonites of the type described above will be retrograde when they are situated in the high grade portions of a thermal aureole (e.g. cordierite-biotite grade), but will be in thermal equilibrium with middle aureole settings.