NORTHERN GOLD N. L.

ANNUAL REPORT FOR THE YEAR ENDING
JUNE 1984

EXPLORATION LICENCE 4238
HOWLEY AREA NORTHERN TERRITORY

LICENEE: Talmina Trading P.L.
OPERATOR: Northern Gold N.L.
LICENSE: EL 4238
LOCATION: Pine Creek 1:250,000 5052-8
Batchelor 1:100,000 5171
PERIOD: JUNE 1983 - JUNE 1984
DATE SUBMITTED:
AUTHOR: B. D. Richardson

NORTHERN TERRITORY GEOLOGICAL SURVEY
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1. STATEMENT OF EXPENDITURE
   EL 4238 JUNE 1983 - JUNE 1984
SUMMARY

Exploration Licence 4238 is located 140 kilometres south of Darwin and is one of the 22 licences operated by Northern Gold N.L. in the Howley area. The tenement contains units of the Gerowie Tuff, Mt Bonnie and Burrell Creek Formations and is prospective for gold associated with an interpreted anticlinal structure paralleling the nearby Howley anticline.

Exploration during the year consisted of gridding, soil sampling and the visual inspection of panned concentrates under a x 60 microscope. Eleven samples contained gold and further infill gridding is planned to locate leaders. Detailed grid mapping will be carried out to determine the main structures away from the Howley anticline.
1. INTRODUCTION

Exploration Licence 4238 is one of twenty two licences operated by Northern Gold N.L. in the Howley area (Fig 1). The licence was first granted to Talmina Trading Pty. Ltd. and Chrsp de Vries and Associates on the 30th June 1983 and in December of that year Northern Gold N.L. became the operators of the lease.

The licence is located 140 kilometres south of Darwin and several hundred metres west of the Stuart Highway. Rock units of the Gerowie Tuff, Mt Bonnie and Burrell Creek Formations strike through the licence and the gold bearing Howley Anticline runs just to the east of the tenement.

The area is prospective for gold mineralization associated with the Mt Bonnie Formation and within possible anticlinal structures paralleling the Howley Line. Exploration was carried out during January and February and consisted of gridding, soil sampling and panning of samples. The preliminary results are given in this report.

1.1 HISTORY AND PRODUCTION

Gold was first discovered in the Howley district in 1873 during the construction of the Overland Telegraph. Gold mining in the tenements was initiated by Chinese during the 1880's from both alluvials and reefs. The largest reef mine, the Metropolitan Howley (sometimes referred to as the Big Howley) operated between 1883 and 1903 and since that time there has been no significant production except for cyaniding of tailings. Officially
LEGEND

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cret Kp</td>
<td>Petrel Fm</td>
</tr>
<tr>
<td>Pgb</td>
<td>Burnside Granite</td>
</tr>
<tr>
<td>Pdz</td>
<td>Zomu Dolerite</td>
</tr>
<tr>
<td>PtB</td>
<td>Burrell Creek Fm</td>
</tr>
<tr>
<td>Pso</td>
<td>Mt. Bonnie Fm</td>
</tr>
<tr>
<td>Psg</td>
<td>Gerowie Tuff</td>
</tr>
<tr>
<td>Psk</td>
<td>Koalpin Fm</td>
</tr>
<tr>
<td>Ppw</td>
<td>Wildman Siltstone</td>
</tr>
</tbody>
</table>

SYMBOLS

- ✧ Old workings
- ✦ Anticline
- ✦ Syncline
- ✧ Overturned anticline

NORTHERN GOLD N.L.

EXPLORATION LICENCES AND MINING TENEMENTS

HOWLEY, BRIDGE CREEK AREAS.
recorded production from the Metropolitan Howley totals about 1,000 kilograms of gold; however old unofficial reports suggest production may have been considerably more. The workings consisted of an open cut, two three-compartment shafts to depth of 52 and 58 metres and extensive underground workings. 1,300 metres to the southeast the Chinese Howley mine was operated between 1892 and 1896 with official recorded production about 360 kilograms (ore grade 28 g/t). By 1896, problems with sulphide ore treatment, underground water, periodic flooding and mine collapses were encountered in the Chinese Howley mine. During the 1890's medium grade gold ore was produced from dozens of pits along the Howley Line northwest of Metropolitan Howley, but few records are available. At Bridge Creek, a group of small but very rich leaders, ranging in width from 1 or 2 inches to about 18 inches, has been intermittently worked since 1873 (Parkes 1892). Five shafts were recorded from 50 to 70 feet deep in this area. The total recorded production is 1190 oz, but this is known to be incomplete. Since 1960 the only work carried out in the area has been the limited testing of the alluvials.

The Howley Line is semi-continuous from the Cosmopolitan Howley prospect and is marked by numerous shafts and pits. Several intermittent sub-parallel reef systems were worked on both sides of the Howley Line, other significant lines of reefs were worked, the most prominent known as the John Bull and Britannia Lines.
Production usually ceased at the water table. Below the water table gold was associated with strong sulphide mineralization causing treatment problems. The major producers along the John Bull Line were Zapopan (2146 kgs of gold) and the Brocks Creek mine where 40,000 tonnes of ore were crushed for a recovery of 682 kgs of gold (17.1 g, Au/tonne) and 18,326 tonnes of tailing were treated for 147 kgs of gold (8 g, Au/tonne).

Production from the large and intensely worked shallow alluvial fields is not recorded.

1.2 PREVIOUS EXPLORATION

After the end of mining early this century and prior to 1976, only limited exploration was conducted over the Howley area. In the period 1976 - 1981 BHP Co. Ltd. and Homestake Mining Ltd. carried out an extensive exploration programme covering the Cosmopolitan to Metropolitan Howley belt. They concluded that the resources outlined were to small for viable production rates. The tenure holdings, which consist of Gold Mining Leases and Mineral Claims over the three main deposits, were optioned to a joint venture between Peko-Wallsend and Anaconda Australia in 1982. Exploration by this joint venture is continuing at present and is concentrated at the Cosmo.

In 1980/81 Territory Mining Pty. Ltd. and Greenex conducted and alluvial testing programme, using a
backhoe, over the Bridge Creek workings. The results were not encouraging enough to continue and the licence was relinquished.

In the area covered by EL 4238 there is no reported detailed exploration activity.

2. GEOLOGY

The Howley area is located within the western part of the Pine Creek Geosyncline and contains rocks of Lower Proterozoic age. In the basin, granitic Archaean basement is successively overlain by: coarse clastics and carbonates of the Batchelor group; fluviatile and shallow water platformal clastics of the Mount Partridge group; and a heterogenous sequence of carbonaceous mudstones, acid tuffs, banded iron formations and siltstone/greywacke turbidites of the South Alligator Group and finally the flysch sequence of the Finnis River Group. The sediments were intruded by sills of the Zamu Dolerite prior to the major phase of regional deformation, which was accompanied by greenschist facies regional metamorphism. A second, broad, open phase of cross folding is probably related to widespread granite intrusion, which occurred in the early Middle Proterozoic. Sediments of the South Alligator and Finnis River Group and intrusives of the Zamu Dolerite and Burnside Granite occur in the Howley area. The intrusion of the granite during the Middle Proterozoic was responsible for the formation of the major structure in the area, the Howley Anticline, which has a strike length of over 20 km.
The sediments are tightly folded with western limb dipping at 60° to 80° while the eastern limb is steeply dipping to overturned. The axis runs in a north-westerly direction curving around to the north outside the tenement area. The plunge of the axis is variable, changing from 50° W in the Cosmo Howley area, to 32° NW at the Metro Howley and 50° south at the Bridge Creek working.

The oldest rocks along the Howley Anticline are the carbonaceous shales, mudstones, iron formations and carbonates of the Koolpin Formation exposed at the Cosmo Howley area. These are overlain by acid tuffs, mudstones and siltstones of the Gerowie Tuff. The Mt Bonnie Formation is a transitional sequence between the Gerowie Tuff and the Burrell Creek Formations, and shows a gradual decrease in volcanic component and increase in clastic component. The Burrell Creek Formation is the basal unit of the Finnis River Group and is comprised of greywackes, siltstones, shales and minor conglomerates.

Sills of the Zamu Dolerite occur along the Howley Line area and are most common within the Koolpin Formation and basal Gerowie Tuff units.

Exploration Licence 4238 occurs just to the west of the Howley Anticline and contains a small area of Gerowie Tuff with overlying units of the Mt Bonnie and Burrell Creek Formations. Along the eastern boundary the rocks crop out along well defined ridges but these rapidly give way to low rises and alluvium covered flats to the west. The boundaries between the Formations are only interpreted as it was not possible to define the first
greywacke unit which marks the base of the Mt Bonnie Formation nor the uppermost tuffaceous units. For the purpose of the map (Fig 2) the base of the Mt Bonnie Formation is taken to be the first b.i.f. unit, which is a marker in the area.

The predominant rock types are siltstones and greywackes with interbedded thin (30 cm) b.i.f. horizons. Obvious tuffaceous units only occur in the north-east corner. All units appear to be steeply dipping to the west or vertical and the strike is in a north-south direction. Photo-interpretation work suggests minor folding both in the Mt Bonnie and Burrell Creek Formations but these have not been confirmed on the ground.

To date there have been no alluvial or eluvial workings noted on the licence.

3. EXPLORATION POTENTIAL

The major gold mineralization within the Howley area is structurally controlled, restricted to the hinge line of the Howley Anticline and concentrated at the nose of tight folds e.g. Cosmo and Metro Howley. At Bridge Creek hard rock mineralization appears to be related to the hinge line, with the greatest concentrations occurring within the carbonaceous shales of the Koolpin Formation.

Interpretation of Landsat Imagery by G. Kater has indicated a possible anticlinal structure parallel to the Howley Line and running through EL 4238. This structure is the main
target of exploration within the tenement. The Mt
Bonnie Formation and the Gerowie Tuff are also units
which are prospective especially in the areas of minor
folding.

4. WORK DONE

During January and February access to most of the leases
within the Howley area was not possible and nearly all
exploration activity was restricted to the tenements
within walking distance from the base camp. EL 4238 was
gridded with lines extended westward from the base line to
the then impassable Bridge Creek. Soil samples were collected
and panned and limited grid mapping was carried out. The
tall grass made mapping almost a waste of effort away from
the eastern ridges. The exploration programme was carried out
in conjunction with the programme on the neighbouring
tenement EL 1886, and took approximately three weeks to
complete.

4.1 GRIDDING

The north-east corner of EL 4238 was surveyed in by a
licenced surveyors and a base line was run south on
a bearing of 176° magnetic using topofil and compass
(1.8 kms). Steel droppers were placed every 50 m
with cross lines every 200 m (8.55 kms). The length
of the cross lines varied, depending on the position
of the flooded Bridge Creek. The origin of all grids
in the area is taken to be the north-east corner peg,
EL 4238 with the co-ordinates 57400N/44600E.
4.2 SOIL SAMPLING

Soil samples were collected every 50 m along all cross lines (171 samples). Holes averaging 20 cm in depth were dug using a hand auger and these samples were later panned and the concentrates visually inspected under a x 60 binocular microscope. The location of each sample was noted in the field e.g. west slope scree, Qa, etc.

4.3 MAPPING

Grid mapping was commenced over the area but the grass cover made the effort ineffective. A number of quartz veins were noted but outcrop was almost impossible to find away from the eastern ridges. The possible fold structures noted on the aerial photographs were not confirmed on the ground due mainly to the grass cover.

5. RESULTS

5.1 SOIL SAMPLING

The soil sampling/panning programme was designed as an orientation survey over EL 4238 and El 1886. The Howley Ridge area was gridded and sampled and the results showed that broad dispersion of very fine gold occurred down the scree slope of the ridge. Samples were initially collected at different depths but it was found that fine gold was present in all samples collected from in situ and colluvial soils. Samples collected in areas of alluvium were taken
from 30 - 40 cm or the coarse gravel layers but the results are regarded as less meaningful. The shape, size and number of gold grains were noted and it is apparent that gold very rapidly rounds once it is liberated from the host rock.

In the EL 4238 survey, 11 samples showed visible gold. These are listed below and shown as Figure 2.

<table>
<thead>
<tr>
<th>Co-Ords</th>
<th>Location</th>
<th>No. Grains</th>
<th>Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>56.6N/44.45E</td>
<td>Qa</td>
<td>1</td>
<td>v fn angular</td>
</tr>
<tr>
<td>56.4N/44.45E</td>
<td>base west slope</td>
<td>1</td>
<td>v fn angular</td>
</tr>
<tr>
<td>56.4N/43.9E</td>
<td>? west slope</td>
<td>1</td>
<td>v fn rounded</td>
</tr>
<tr>
<td>56N/44.05E</td>
<td>south east slope</td>
<td>1</td>
<td>med rounded</td>
</tr>
<tr>
<td>55.8N/44E</td>
<td>Qa</td>
<td>2</td>
<td>1 med angular</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 rounded</td>
</tr>
<tr>
<td>55.8N/44.1E</td>
<td>Qa</td>
<td>1</td>
<td>med rounded</td>
</tr>
<tr>
<td>55.8N/44.1SE</td>
<td>Qa</td>
<td>1</td>
<td>coarse sub-angular</td>
</tr>
<tr>
<td>55.8N/44.2SE</td>
<td>scree flat</td>
<td>2</td>
<td>v fn rounded</td>
</tr>
<tr>
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<td>base west slope</td>
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<tr>
<td>55.6/44.5SE</td>
<td>base north slope</td>
<td>1</td>
<td>med sub-angular</td>
</tr>
</tbody>
</table>

As yet these sample sites have not been visited in the field but the results are regarded as significant and infill gridding and sampling is planned.
6. CONCLUSIONS AND RECOMMENDATIONS

The soil sampling/panning programme has indicated that gold does occur well west of the Howley Line and within the Mt. Bonnie and Burrell Creek Formations. The next stage of exploration will involve infill gridding and sampling around the anomalous sample sites to try and locate leaders. Grid mapping along all cross lines will be completed with a special emphasis paid to the structure in an effort to determine if an anticlinal axis does exist parallel to the Howley Line. The estimated expenditure for the 1984/85 period is $5000.00. A Statement of Expenditure for the 1983/84 period is given in Appendix 1.
## Appendix 1

### Statement of Expenditure - EL 4238

**June 1983 - June 1984**

<table>
<thead>
<tr>
<th>Description</th>
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<tr>
<td>Wages and Salaries (39 Man Days)</td>
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<tr>
<td>Proportion Construction Cost Bridge Creek Camp</td>
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<tr>
<td>Logistic Support</td>
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<tr>
<td>Insurance</td>
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<td>Vehicle Expenses</td>
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<tr>
<td>Administration Costs</td>
<td>$1200.00</td>
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<tr>
<td>Airfares and Accommodation</td>
<td>$400.00</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>$500.00</td>
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</tbody>
</table>

**Total** $14900.00