KEN DAY PTY LTD

EXPLORATION LICENCE 2770

MARGARET DOME – NORTHERN TERRITORY

ANNUAL REPORT FOR YEAR 5 (1985/86)

CR 86/199
NORTHERN TERRITORY
GEOLOGICAL SURVEY

A. JETTNER

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DEPARTMENT OF MINES & ENERGY
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1. **INTRODUCTION**

Exploration licence 2770 is situated in the southern portion of Prices Springs pastoral station (PL716), located about 150km south east of Darwin, the owners of which are Messrs. Henry, Walker, Bailey and Wright.

EL2770 was granted on 31.5.81 for a period of 6 years.

This report gives details of work completed on the exploration licence in its fifth year of occupancy.

2. **LOCATION AND ACCESS**

The location of EL2770 is shown in Figure 1. EL2770 is located in the Cullen Mineral Field outside the southern boundary of the Mt. Wells Policy Reserve and to the east of the Golden Dyke Dome.

EL2770 has its northern boundary on 13°35'S, its eastern boundary on 131°34'E, its southern boundary on 13°37'S and its western boundary on 131°33'E. Its area is 2 graticular blocks, i.e. 6.5km².

The exploration licence covers the central southern portion of the Margaret Dome, the sister to the adjacent Golden Dyke Dome.
Access to the exploration licence can be accomplished in two ways.

In gaining access to the eastern portion it is necessary to drive through the Mt. Bonnie Camp and along the East Margaret River to a point north of Frith's Margaret Diggings camp then turn west and drive through the scrub.

In gaining access to the western portion of the exploration licence it is necessary to follow an old road to the south of the Golden Dyke Mine. This road was presumably constructed by Nord Resources during their investigations of the area. This road gives access to a number of costeans located in the northwest corner of the exploration licence. From there on it is necessary to drive or walk through the scrub to points of interest.

So far we have not managed to traverse the exploration licence from west to east except on foot as the country is extremely rugged.
Figure 1. Location map of EL2770.
3. DESCRIPTION

3.1 TOPOGRAPHY

The northern graticular block consists of rugged hill slopes dessicated by narrow high energy streams. This area represents that of a juvenile landscape. In areas that geologically consist of the Zamu Dolerite, chemical weathering has caused the disintegration of the dolerite leaving relatively wide valleys which follow the sills and consist of a rich red-brown soil whose appearance is not unlike the Tipra Soils of the Douglas-Daly region.

In the southern graticular block the geology changes abruptly from Lower Proterozoic Sediments (containing the Zamu Dolerite) to the geologically younger Cullen Granite. This change of rock-type also brings with it changes in topography and vegetation. The topography changes from steep sided narrow valleys to a more mature topography with shallower hill slopes and occasional mesas topped by the Mesozoic Petrel Formation. The broad flats that lie between the exposed granite outcrops consist of sandy soils derived from the Cullen Granite.
3.2 VEGETATION

The vegetation also shows great variation with the changes in geology, varying from predominantly sparse woodland containing Iron Bark and Eucalypts with very little ground-cover, with the exception of speargrass, on the Lower Proterozoic sediments of the Margaret Dome through open woodland containing Woolybutt, White Gum and Iron Bark containing a higher proportion of shrubs and groundcover in the richer soils derived from the weathering of the dolerite sills to the sparse scrub containing hardy Eucalypt species growing on the sandy soils derived from the Cullen Granite.

4. GEOLOGY

This exploration licence was applied for with the intention of searching for stratiform gold deposits associated with the middle dolerite sill and the middle member of the KoolpinFormation.

In this interpretation the deposits would be analogous to those found in the adjacent Golden Dyke Dome.

In the Margaret Dome the middle dolerite sill forms the exposed core so exploration is concentrated in the lithologies between the exposed central dolerite core and the surrounding upper dolerite sill.
Figure 2. Stratigraphic column of lowe section of the middle member of the Koolpin Formation, Margaret Dome, N.T.
In moving up the stratigraphic column and away from the
dolerite core, at the contact there is a well developed
quartz "sill" indicating an increased quartz content in
the area immediately adjacent to the dolerite, next to
this there is a massive textured gossanous hematite
rich unit, (which unfortunately due to a misunder-
standing, was never sampled). This is followed up
by a sequence of mudstones and siltstones.
Overlaying this sequence is a well developed
nodular chert unit containing abundant
saccharoidal quartz nodules, iron and finely
laminated sills.
See photo 1. and Figure 2.

On the south eastern edge the chert nodules, now
altered to saccharoidal quartz nodules and its
surrounding iron and mudstone rich matrix were
relatively undeformed. A sample taken here (MA10)
gave a background assay for gold (0.03 ppm Au).

The southern apex of the unit as it is folded
through the axis of the dome is postulated to lie
underneath a flat on which minor workings are
situated, (see photos 2 and 3).

It is here that one would expect to find the
greatest concentration of any metaliferous
minerals deposited. This area was not sampled due
to the lack of a suitable machine to remove the
recently deposited silts and underlying Tertiary weathering profile.

Further up the valley that supplied this flat, a ground sluice was constructed by 19th Century diggers and signs of their hard work are evident. See photo 4. From a sample of material obtained of modern age (19th Century to Present) from the bottom of the sluice trough 3 fine colours of gold were obtained from a 12 litre screened sample. This indicates that the valley is presently shedding gold.

The contact between the middle member and the upper member of the Koolpin Formation has not been located as yet as time and money has only allowed an exploration effort in the latter stages of the present exploration year.

Further up the sequence in the upper member of the Koolpin Formation another 2 examples of the iron rich nodular chert unit have been located. What was found here was a good example of the formation of the chert nodules due to local stress regimes. The unit varies from a fully fledged nodular chert unit through a partially boundinaged chert Banded Iron Formation to an undisturbed chert BIF. This shows the process that formed the chert nodules, although on only a local scale at this point.
Differential pressures probably resulting from the folding episode that gave rise to the dome caused the chert bands in the iron rich mudstone unit to contract into the shape of ellipsoidal nodules. No structural studies have been done on pressure directions at this stage.

Elevated temperatures associated with the folding episode and/or due to the emplacement of the nearby Cullen Granite have caused the alteration of the silica in what was originally chert to the present sacharroidal quartz of Eupene - Nicholson and Eupene (1984).

Also noted during traverses was the folding of strata on a much shorter wavelength than that indicated by the NTGS 1:100,000 sheet. To the south of the core of the dome smaller domal structures of wavelengths 100-150m were observed indicating a rapid undulation of the axial trace. This seems to indicate to the author the large magnitude of the stress regime that operated in the area sometime in its history.

Most probably this regime operated during the emplacement of the Cullen Granite which may have caused a north-south compressional trend to be present here by causing a large wavelength crenulation feature, (unfortunately no photos available.)
Figure 3. Geological map EL2770 and surrounds.
5. **PREVIOUS EXPLORATION**

EL2770, while in its fifth year of occupancy has had no previous investigation by Ken Day Pty Ltd until the current exploration year.

Previous investigations by other workers have been researched and are listed below:


6. **INVESTIGATIONS BY KEN DAY PTY LTD., (EXPLORATION FOR YEAR 5)**

In our proposed exploration program for the year we outlined a program that revolved around drainage line geochemistry. Unfortunately, on inspection of the exploration licence, the deep Tertiary weathering found in the drainage lines made this avenue of investigation of little value in a practical sense. The period of weathering and laterization in the Tertiary had the effect of concentrating gold as "micro-nuggets" through changing Eh and pH relationships.


The result is very little gold distributed throughout the drainage lines and the chance of recovering a piece of this nucleated gold from anything other than a large bulk sample is very slim.
It was for this reason and the excellent rock exposure found in the region that we abandoned this type of exploration tool. This was also proven by the taking of a number of samples (5) which when panned showed no signs of gold.

After abandoning geochemistry we returned to classical prospecting and concentrated on locating and sampling gossans, banded iron formations and nodular chert units within the middle and upper members of the Koolpin Formation.

Our resident prospector Mr. John Crago made several traverses across the exploration licence looking for old workings and favourable geology as well as access routes to and throughout the licence. On several of these traverses he was accompanied by his field assistant Mick Hannegan. Access to most of the EL could be gained on foot only.

Because of the rugged terrain it was decided to circumvent these problems by gaining access from the air. To this end John and the author flew over the area in a helicopter looking for several things, the first priority was to locate to old alluvial field of Krana Creek mentioned in Bulletin 16 in 1916. This target is now thought to be located just to the north of the exploration licence. Our second objective was to compare the
geology as seen from the air with both the NTGS 1:100 000 geological map and a map accompanying Nord Resources' 1982 progress report for the area as the two maps disagreed dramatically. On comparison from the air it was decided that the Nord Resources map was unreliable and the nearest thing to true was the NTGS map.

The third target was to locate suitable access areas of our Toyota. This was accomplished satisfactorily.

On investigation of outcrop located by John, and later the author, the geology looked favourable and samples were taken accordingly. Unfortunately only two of the samples showed any anomalous gold values.

A summary of the assay results is given as an appendix to this report.

Investigation of the gossan line around the Margaret Dome by Nord Resources and now by ourselves has shown that negligible gold values are to be found in surface exposure and near surface exposure in costeans. This is not surprising as the gossan where costeaned lies on an old high energy river terrace of Krana Creek and as such is extremely leached. More reliable results will be obtained where the gossan is sampled away from any weathering interface such as is exhibited here.
CONCLUSION

The conclusions that can be drawn from this years exploration of E2770 are listed below.

1. No significant areas of mineralisation were located.

2. Silt fraction geochemistry in drainage lines is of little practical value due to the deep Tertiary weathering and laterization.

3. Much larger sample sizes need to be taken.

4. Resampling of the Nord Resources gossan line at other locations needs to be undertaken.

5. Extensive sampling along horizons that gave anomalous gold assays should be undertaken.

6. Favourable geology in the area, although giving poor results to date, warrants that the area should be retained and further explored.
### 7. Expenditure on EL2770 in Year 5

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<tr>
<td><strong>Wages:</strong></td>
<td>J. Crago</td>
<td>$1000</td>
</tr>
<tr>
<td></td>
<td>A. Jettner</td>
<td>$600</td>
</tr>
<tr>
<td></td>
<td>M. Hannegan</td>
<td>$500</td>
</tr>
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<td></td>
<td><strong>Total</strong></td>
<td><strong>$2100</strong></td>
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<tr>
<td><strong>Helicopter (Jet Ranger Hire)</strong></td>
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<td>$500</td>
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<td></td>
<td><strong>Total</strong></td>
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<td><strong>Total</strong></td>
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<td><strong>Total</strong></td>
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**Total Expenditure:** $3530
8. **PROPOSED EXPLORATION IN YEAR 6 (1986/87)**

1. Sampling of iron formation units that gave anomalous gold assays.

2. Resampling of nodular chert units in the middle member of the Koolpin Formation.

3. Sampling of the quartz and hermalite-rich units near the contact with the central dolerite core.

4. Sampling of the hematite rich unit in the axial zone of the Margaret Dome.

5. Detailed mapping of the southern area of the Margaret Dome with particular reference to the minor domal structures observed here.

6. Structural study on a magnitude and direction of stain components in the formation of the nodular chert unit.

Expenditure is to be maintained at a level of $3,500.00 in Year 6.
9. REFERENCES


Mann, A.W. (1984), "Mobility of Gold and Silver in Lateritic Weathering Profiles: Some observations from Western Australia", Econ. Geol. Vol. 79.


## APPENDIX 1

**SUMMARY OF ASSAY RESULTS - EL2770**

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<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>ASSAY (ppmAu)</th>
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<tr>
<td>MA1</td>
<td>Composite rock sample</td>
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<tr>
<td>MA2</td>
<td>Iron gossan</td>
<td>0.01</td>
</tr>
<tr>
<td>MA6</td>
<td>Nord gossan</td>
<td>0.03</td>
</tr>
<tr>
<td>MA7</td>
<td>Nord gossan</td>
<td>0.03</td>
</tr>
<tr>
<td>MA8</td>
<td>Banded Iron Formation</td>
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</tr>
<tr>
<td>MA9</td>
<td>Nodular chert unit</td>
<td>0.01</td>
</tr>
<tr>
<td>MA10</td>
<td>Nodular chert unit</td>
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</tr>
<tr>
<td>MA11</td>
<td>Quartz blow gossan</td>
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</tr>
<tr>
<td>MA12</td>
<td>Nodular chert unit</td>
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<tr>
<td>MA13</td>
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**STREAM SEDIMENT SAMPLES**

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<tr>
<td>A1</td>
<td>121 Gravel sample</td>
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</tr>
<tr>
<td>A2</td>
<td>121 Gravel sample</td>
<td>1 med.colour</td>
</tr>
<tr>
<td>A3</td>
<td>121 Gravel sample</td>
<td>2 fine colours</td>
</tr>
<tr>
<td>A4</td>
<td>121 Gravel sample</td>
<td>0</td>
</tr>
<tr>
<td>A5</td>
<td>121 Gravel sample</td>
<td>0</td>
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APPENDIX 2

PHOTOGRAPHS – EL2770

1. Nodular chert unit on south eastern side of central dolerite core - sample site for MA10.

2. View of 19th Century diggings.

5. Nodular chert unit in upper member of the Koolpin Formation containing partially bored chert lenses.

6. Nodular chert unit further along strike from (5) - sample location MA12.
7. Tectonically fragmented chert unit – eastern limb of Margaret Dome.

8. View over eastern limb of Margaret Dome – showing terrain.
9. View of creek near eastern boundary of EL2770 showing deep Tertiary weathering.