ANNUAL REPORT

FOR

EXPLORATION LICENCE  5006

EMERALD SPRINGS AREA

NORTHERN TERRITORY

FOR

CALVERT RIVER MANGANESE PTY LTD

D. HOLDEN
C.R.M. PTY LTD
JUNE, 1989
INTRODUCTION:

The following report is submitted as a Final Report for Exploration Licence 5006, and covers one graticular block with the excision of 5 MCN's.

Extensive alluvial workings covers almost half the licence area, along the tributaries and main waterway of the Margaret River.

Representation of the Lower South Alligator Group Lithologies and numerous suitable structural sites suggested the ground to be highly prospective, with the rich alluvial Margaret Diggings also located within the Licence boundary.

LOCATION:

The licence is located approximately 6km south of the Mt. Bonnie Mine and 5 km NW of Emerald Springs Roadhouse.

Access is readily gained off the Stuart Highway, along the all weather unsealed road to Mt. Bonnie Mine (see Fig. 1).

The area is covered by high ridges on the western side, with vegetation by largely 1m to 1.5m tall spear grass and scattered shrubby trees up to 4m tall.

TENURE:

Calvert River Manganese were granted the licence on 14th October, 1987. Within the area however, 5 claims have been excluded totalling an area of approximately 156ha, leaving approximately 177 Ha covered by the existing licence.

REGIONAL GEOLOGY:

Regionally the goldfield is situated within the Pine Creek geosyncline (a macroscopic structure of some 40,000km2), in the Katherine and Darwin region of the Northern Territory. The regional geology was mapped in detail by Walpole et. al. (1968) and later Needham et. al. (1980). A good outline of the history
of the syncline has been written by Eupene and Nicholson (1984) and may be summarised as follows:

Approximately 2400-2100mya, arkose, pelitic, carbonate and iron rich sediments were deposited upon a crystalline Archaean basement. This sequence suffered deformation and amphibolite facies metamorphism through to 2000mya. Uplift and erosion of these sediments led to the deposition of early Proterozoic sediments of arkose, conglomerates, carbonaceous mudstones, limestones and tuff beds as fluvialite sediments and turbidites with a final flysh sequence of greywacke and shales. Near the end of the deposition, igneous dykes and sills were intruded, followed by further deformation and lower greenschist facies metamorphism. The metamorphism is dated at approximately 1800mya. Extensive granitic intrusions occurred as a post metamorphic event.

The tectonic history has been detailed by Johnston (1984) in an unpublished Phd thesis and suggests four phases of deformation have occurred. $D_1$ and $D_2$ are related to the metamorphic development with $D_2$ developing low angle shear zones as a response to overthrusting and crustal shortening during basinal compression. $D_3$ is the development of $F_3$ folds which are tight to isoclinal N-S trending folds seem to dominate the syncline. A final folding episode $D_4$, refolded $F_3$ folds along an E-W axis.

The chronostratigraphy of the synclinal sediments is shown in figure 1 with a regional geology map in figure 2.

**LOCAL GEOLOGY:**

The licence has been mapped previously by Nord Resources Pty Ltd during 1980/81 and more recently by S. Thornett for Calvert River Manganese in 1988. A summary of their work is as follows.

Units from uppermost Mt. Partridge Group to mid South Alligator Group have been identified within the licence area. Through the area also passes a major anticlinal hinge with the Wildman Siltstone (Mt. Partridge Group) exposed around the hinge. About the margins of the siltstone is sil-like bodies and Zamu Dolerite intrusive with Koolpin Formation (South Alligator Group) exposed over much of the remaining area.

Minor exposure of Gerowie Tuff beds are seen are seen in the south-west corner of the licence.

Quaternary to recent the sandy alluvial gravels fill in along the Margaret River and is tributaries with scree obscuring outcrop and formational contacts especially about the ridges.
Structurally two fold hinges trending north-south pass through the licence. There is some evidence of a later phase of deformation with the development of east-west folds.

The later deformations has resulted in dubley plunging folds with minor faulting.

Numerous high-angle faults cross cut the structure with a preferred NE-SW orientation there is marked displacement of stratigraphic units with some indication of a strike slip as well as dip slip movement.

The faults are often seen on the ground to be haematite-rich breccias with some quartz infilling.

Quartz veining is also found in the core of the major anticline and is reportedly confirmable with bedding.

WORK COMPLETED:

From 1977 onward serious exploration on the region has been conducted by Nord Resources Pty Ltd Exploration for Base Metals, Uranium and Gold.

Calvert River Manganese have completed (in the 1988 Exploration Programme); air photo interpretation, lithological mapping, sampling and a previous literature search.

Since October, 1988 to the surrender date (since 1989) a re-assessment has been conducted with some air magnetic interpretation work.

RESULTS AND DISCUSSIONS:

Gold has been recovered from the Margaret Diggings since the turn of the century. Recent exploration into the hard rock prospects of the licence area has indicated that much of the alluvial resource is locally derived. Twelve samples collected by Nord from within the anticlinal closure have yielded results greater than 0.1g/t Au up to 5.10g/t Au.

Similarly material collected by S. Thornett (1988) from within central shear zones have assayed between 3 and 6 to 7g/t Au.
Unfortunately the more promising values have been struck within the area of the claims. And whilst slightly elevated values may be found within main fault structures and breccia zones the remainder of the licence appears unmineralised. Further to this assaying for base metals that also failed to located any anomalies.

**CONCLUSIONS AND RECOMMENDATIONS:**

From the information forwarded for this re-assessment it would appear that the possibility of significant mineralisation (either gold or base metals) is low within the licence area (excising the MCN’s).

If any follow-up work was to be considered, then it would be recommended that the numerous MCN’s be considered for mutual Joint Venture. As the few numerous values gained are from within this area.

At this stage, however there is insufficient evidence of economic mineralisation existing to recommend that an approach be made to the MCN holders, and as there have no obvious targets for follow-up exploration in the remainder of the licence, the licence has subsequently been surrendered.
EXPENDITURE:

Re-assessment of previous data 1,200
Air magentic data aquisition 2,500
Report writing and drafting 1,450
Administration and overheads 1,250

TOTAL: $6,400

REFERENCES:

Needham R and Stuart Smith P., (1984); Revised Stratigraphic nomenclature and correlation of early Proterozoic rocks of the Darwin-Katherine region.


Proceedings of the Aus I.M.M. conference,
Johnston J. (1984); Structural Evolution of the Pine Creek inlier and mineralization therein Northern Territory, Australia.


Walpole, Crohn, Dunn, Randal (1968); Geology of the Katherine-Darwin region, NT;

B.M.R. Bulletin number 82
<table>
<thead>
<tr>
<th>Group</th>
<th>Formation</th>
<th>Member</th>
<th>Lithologies</th>
<th>Thickness (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finnie River</td>
<td>Burrell Creek</td>
<td>Upper</td>
<td>Greywacke, siltstone, mudstone, rare chert, iron formation and conglomerate</td>
<td>&gt;3000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td>Greywacke, mudstone, siltstone, chert, carbonaceous mudstone, rare conglomerate</td>
<td>50-150</td>
</tr>
<tr>
<td>South Alligator</td>
<td>Mount Bonnie</td>
<td>Upper</td>
<td>Mudstone, siltstone, chert, iron formation</td>
<td>100-250</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td></td>
<td>50-150</td>
</tr>
<tr>
<td>Gerowie Tuff</td>
<td></td>
<td></td>
<td>Chert, mudstone</td>
<td>200-400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>siltstone</td>
<td></td>
</tr>
<tr>
<td>Loolpin</td>
<td></td>
<td>Upper</td>
<td>Carbonaceous mudstone, mudstone, siltstone</td>
<td>50-150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Middle</td>
<td>Iron formation, mudstone, carbonaceous mudstone, siltstone</td>
<td>10-100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td>Carbonaceous mudstone, mudstone, siltstone, limestone</td>
<td>0-250</td>
</tr>
<tr>
<td>Mount Partridge</td>
<td>Wildman Silstone</td>
<td></td>
<td>Mudstone, phyllite, siltstone, carbonaceous mudstone, sandstone</td>
<td>200-400</td>
</tr>
<tr>
<td></td>
<td>Mundogie Sandstone</td>
<td></td>
<td>quartzite, arkose, pebble conglomerate, mudstone, siltstone</td>
<td>&gt;500</td>
</tr>
</tbody>
</table>
Legend

- Exploration licence boundary
- Mineral claim boundary
- Claim peg
- Track

CALVERT RIVER MANGANESE
TENEMENTS
MARGARET Diggings AREA

Scale 1: 25000