GREENEX

1989 ANNUAL REPORT
EXPLORATION LICENCE 4849
COX PENINSULA N.T.
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1. **INTRODUCTION**

This report was submitted to the N.T. Department of Mines and Energy detailing exploration carried out on EL 4849 during the year ending 21st November 1989.

EL 4849 was explored by the Bynoe Joint Venture, which consists of Greenbushes Ltd and Barbara Mining Corporation a subsidiary of Bayer A.G. of West Germany.

The exploration licence is located on the Cox Peninsula southwest of Darwin (Figure 1) and is one of the tenements in a project currently covering approximately 100 km² (Figure 2). The project has a well established camp south-east of Observation Hill and a 100 tonne/hr washing jigging soft-rock plant near to the camp. The Bynoe Joint Venture has been exploring and developing the tin/tantalum resources of the area approximately 5 years. The Joint Venture has spent more than $5 m on exploration and development in the region. Although substantial tin and tantalite resources have been delineated and the metallurgical characteristics of the ore thoroughly investigated, the continued depressed tin and tantalite concentrate prices have seen the development of the resource deferred.

2. **LOCATION AND LEASING**

EL 4849 is located 16 kms south of Darwin. Access is via the bitumen Mandorah Road, then some bush tracks, which are only passable in the dry season between May - November. The licence consists of one graticular block with an area of 3.6 sqk kms. The licence was granted on the 31st November 1985 to Top End Mineral Ventures Pty Ltd. It was subsequently transferred to 50% Greenbushes Ltd and 50% Barbara Mining Corporation. The registration of the transfer was approved by the N.T. Department of Mines and Energy on the 28th October 1986.

3. **CLIMATE, TOPOGRAPHY AND VEGETATION**

The climate is monsoonal and tropical with a wet season from November to April (Ave 1600 mm annually) and dry season from May to September (Ave 50 mm annually). The Exploration licence is totally isolated during the wet season.
Figure 1
LOCALITY MAP
COX PENINSULA
The licence area rises approximately 20 m above sea level. Flat lateritised peneplains form the upland areas and broad mature drainages form the lowland areas. Adjacent to Darwin Harbour the upland plains slope over 100 - 150 m into the marine environment.

Vegetation over the upland plains consists of scattered to medium density eucalypt forest with a sparse to medium understory. Spear grass grows abundantly on the alluvial flats. Along the coast is a 10 - 30 m thick zone of dense mangrove vegetation covering the tidal zone.

4. REGIONAL GEOLOGY

El 1849 is on a northern extremity of a swarm of complex zoned rare element (Li, Ta, Nb, Sn). This swarm is one of at least three in a 60 km x 10 km generally north-south zone generally known as the Mt Finniss Pegmatite belt (Figure 3). The larger pegmatites in the belt (Mt Finniss, Picketts, Hang Gong, Grants) are 300 m long and 20 - 30 m wide, but most intrusions are substantially smaller. The pegmatites are commonly steeply dipping dykes on flat plunging sills.

The pegmatites have intruded Early Carpentarian Burrell Creek Formation shales, siltstones and schists in the north-west portion of the Pine Creek Geosyncline. The Litchfield Complex, granitoid plutons and pegmatitic granitoid stocks are located to the west and south-west of the Finniss River Pegmatite Belt.

Unconformably overlying the Burrell Creek Formation are outliers of flat lying Cretaceous sandstone and siltstone with basal conglomerate. The Kings Table mesa is the only known example in the Finniss River Pegmatite Belt.

Ferruginous laterite (Tertiary) caprock has been developed over extensive areas of the upland plains. The leaching of bedrock has resulted in the kaolinisation of the pegmatite up to 30 m from the surface. The adjacent schists and shales are weathered to a depth of only 3 - 5 m.

Cassiterite is the only recorded tin mineral in the Pegmatite Belt and tantalite (columbo-tantalite) and tattiolite the main tantalum minerals. These minerals occur in the pegmatites of the Finniss River Belt associated with contact zones within the pegmatites and adjacent sediments, which often have been altered with tourmaline, amphibole and sulphides in the altered contact zone. Cassiterite and tantalite can be disseminated through the pegmatite or restricted to a kaolinised zone (albite) marginal to quartz "core" zone. These resistant minerals accumulate in wash horizons within the alluvial channels in the region. These mineralised alluvial deposits can be quite extensive extending several kilometres from the source.
5. HISTORY OF MINING AND EXPLORATION

Most of the pegmatite deposits of the Finiss River Pegmatite belt were discovered in the early 1900s by Chinese tin miners amongst others. The pegmatites in EL 4849 appear to have been discovered at about this time and there are several small shallow workings on Jewellers Pegmatite and Jewellers South that probably date back to that period. There is other discarded equipment at the Jewellers prospect that would suggest at least extensive exploration and possibly some mining took place in the area possibly after World War II. Tantalite was not a saleable product until the late 1930s so almost all mining carried out in the area would have been aimed at exploiting the cassiterite not the tantalite content of the ore.

Top End Mineral Ventures Pty Ltd made application for the area in the mid 1980s and carried out limited exploration of the Jewellers Pegmatite. This included exploration gridding and some trenches. The Bynoe Joint Venture acquired the property from Top End Mineral Ventures Pty Ltd in 1986.

5.1 1986 Work Programme

The Jewellers Prospect was mapped in detail and the trenches cut by Top End Mineral Ventures Pty Ltd were channel sampled and geologically mapped. The samples were processed like all pegmatite and alluvial samples collected in the Bynoe Project Area at the Observation Hill Laboratory. A measured volume of sample is puddled in water and calgon to disperse the clays. The puddled sample is deslimed, and then passed through a trommel with a 10 mm screen. The +10 mm oversize is discarded. The -10 mm fraction is fed onto a rotating cone which concentrates the heavy mineral fraction including cassiterite and tantalite minerals.

This heavy mineral concentrate contains 5 - 10% valuable heavies and is dried and dispatched to Greenbushes Mine in Western Australia for XRF analysis for tin and tantalum.

5.2 1987 Work Programme

Reconnaissance in the vicinity of Jewellers Pegmatite lead to the discovery or rediscovery of a number of pegmatite deposits (Figure 1). Jewellers Extended was immediately south of
Jewellers Pegmatite. Small shallow diggings were found adjacent to the mangrove swamps. Further south again some small pegmatites Jewellers South were discovered.

Traverses to the east of the Jewellers Workings eventually found the shallow linear workings at Perseverance.

During 1987 a total of 2,593 m of exploration trenching was carried out:

<table>
<thead>
<tr>
<th>Location</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jewellers</td>
<td>1,116</td>
</tr>
<tr>
<td>Jewellers Extended</td>
<td>721</td>
</tr>
<tr>
<td>Perseverance</td>
<td>729</td>
</tr>
<tr>
<td>Vicki’s</td>
<td>27</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2,593</strong></td>
</tr>
</tbody>
</table>

All trenches were mapped and where there was pegmatite channel sampled. The samples were processed as described in 5.1.

In an attempt to assess the tantalite resource potential of the pegmatite deposits auger drilling was undertaken at Jewellers, Jewellers Extended and Perseverance:

<table>
<thead>
<tr>
<th>Location</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jewellers</td>
<td>200</td>
</tr>
<tr>
<td>Jewellers Extended</td>
<td>54</td>
</tr>
<tr>
<td>Perseverance</td>
<td>105.5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>404.5</strong></td>
</tr>
</tbody>
</table>

Auger drilling is only capable of penetrating soft weathered pegmatite or unconsolidated alluvium. However this is a good guide to material that can be mined without drilling or blasting and processed by washing without any crushing and grinding.

### 5.3 1988 Exploration Programme

Reconnaissance during 1988 discovered Cooks (south west of area Figure 2) and Daves Perseverance Extended (Figure 4). These prospects were trenched with a rubber tyre backhoe mapped and sampled.

<table>
<thead>
<tr>
<th>Location</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooks</td>
<td>126.5</td>
</tr>
<tr>
<td>Jewellers South</td>
<td>50.0</td>
</tr>
<tr>
<td>Daves Perseverance Extended</td>
<td>317.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>193.5</strong></td>
</tr>
</tbody>
</table>
A total of 110 samples were collected and analysed for tin and tantalum.

6. **EXPLORATION PROGRAMME**

The 1989 exploration programme on EL 4849 was carried out in conjunction with mining on MLN 16 (Figure 2) to the south.

6.1 **Grid Survey**

All previous exploration in the licence area had been carried out on a local grid covering the Jewellers and Perseverance Pegmatites (Figure 4). This grid was aligned parallel with the main project grid so that a transformation could be carried out at a later date. Under the direction of geologist Frans Mollemans the baseline 10,000E was surveyed and extended north into the exploration licence area by a contract surveyor. A cross line was surveyed into the area to pickup the local grid. Both grids are shown in Figure 4. The Project Grid based on the Trig Survey point at Observation Hill.

6.2 **Evaluation of Resource Potential**

A critical analysis of the resource potential of the tenement area was undertaken. Generally it was concluded that:

* Grades for tantalum were low and predominantly tin mineralisation was restricted to pegmatite contact zones with wall rocks or inliers of country rock. As a result immediately identifiable resources were restricted in potential.

* \( \text{Ta}_2\text{O}_5:\text{Nb}_{20}\text{O}_5 \) ratios were relatively low compared with other columbite-tantalite mineralisation in the region \((1:2.4)\). This ratio is an indication as to the degree of fractionation of the pegmatite.

* The pegmatites in this tenement area are relatively large up to 300 m long and 200 m wide and seem to be associated with major regional lineaments (Figure 4). e.g. Jewellers - Jewellers Ext. - Jewellers South (700 m) Perseverance - Dave's Perseverance Extended (600 m)
There appears to be potential for some small tonnages 5,000 tonnes of weathered pegmatite 'ore' associated with the pegmatites in the tenement area. There is likely to be 2 - 5,000 tonnes of eluvial 'ore' associated with each of the areas pegmatites. There is little potential for significant mineralised alluvium in the tenement area. The mineralisation will be cassiterite rich rather than tantalite.

The size and association of the pegmatites on major lineaments was a significant aspect of the deposits. It is expected pegmatites of this size would be fractionated and segregated. Therefore, while mineralisation is restricted to contact zones there may be segregated albite rich tantalum rich portions of the deposits not exposed at the surface or within the weathered zone. Therefore while the results to date are not particularly significant the hardrock resource potential of a segregated pegmatite should not be overlooked.

6.3 Ground Reconnaissance

The evaluation of previous exploration lead to a ground reconnaissance survey being carried out on the Jewellers and Perseverance lines of pegmatite deposits.

East-west traverses both north and south of known pegmatites were conducted by geologist Frans Mollemans. A pegmatite was discovered SSW of Jewellers South (Figure 4). It appears to fit in with a series of "en echelon" north-south striking pegmatites within a NNE striking regional structure. Having located the shallow pit with obvious pegmatite minerals in the dump the location was recorded with compass and tape but no further work was carried out. North of Perseverance there were several areas with potential for pegmatite (ie low lying areas) and trenching was planned for these areas.
7. **ESTIMATED EXPENDITURE**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landcruisers - 2</td>
<td>$1,500</td>
</tr>
<tr>
<td>530 Loader - clearing grid</td>
<td>$1,000</td>
</tr>
<tr>
<td>Fuel and Oil</td>
<td>$200</td>
</tr>
<tr>
<td>Accommodation - site</td>
<td>$350</td>
</tr>
<tr>
<td>Communication</td>
<td>$50</td>
</tr>
<tr>
<td>Drafting</td>
<td>$50</td>
</tr>
<tr>
<td>Tenement Admin/Legal</td>
<td>$300</td>
</tr>
<tr>
<td>Travel</td>
<td>$500</td>
</tr>
<tr>
<td>Insurance</td>
<td>$50</td>
</tr>
<tr>
<td>Technical materials/supplies</td>
<td>$200</td>
</tr>
<tr>
<td>Surveying</td>
<td>$1,500</td>
</tr>
<tr>
<td>Geological/Field Assistant</td>
<td>$2,500</td>
</tr>
<tr>
<td>Reports</td>
<td>$100</td>
</tr>
<tr>
<td>Overheads (Bynoe and Perth)</td>
<td>$2,000</td>
</tr>
<tr>
<td>Consultants</td>
<td>$350</td>
</tr>
</tbody>
</table>

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**TOTAL**  
$10,650

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8. **CONCLUSION**

The 1989 programme on EL 1849 involved establishing the project exploration grid in the tenement area and coordinating it with the local grid, which had been temporarily pegged to cover the pegmatites discovered.

The tin/tantalum and pegmatite resources of the area were studied and it was concluded that although surface weathered pegmatite and eluvial reserves were limited the pegmatites were sufficiently large to have scope for significantly mineralised fractionated zones within the pegmatite deposits.

Reconnaissance exploration along regional pegmatite trend lines located a "new" deposit south of Jewellers Pegmatite and several areas warranting trenching north of Perseverance.