EXPLORATION LICENCE 2661
Cox Peninsula


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Department of Mines & Energy - Darwin
Greenbushes Tin Ltd.

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NORTHERN TERRITORY GEOLOGICAL SURVEY
GR85/106
CONTENTS

1) INTRODUCTION .................................................. 1
2) LOCATION, CLIMATE & TOPOGRAPHY ...................... 1
3) LICENCE DETAILS ................................................. 2
4) REGIONAL EXPLORATION CONTEXT ......................... 2
5) WORK COMPLETED 1984 to 1985 .......................... 3
   5.1 Initial Evaluation ........................................ 3
   5.2 Potential Targets and Exploration Programme ...... 3
   5.3 Results ....................................................... 4
   5.4 Exploration Expenditure ................................ 8
6) 1985 WORK PROGRAMME ...................................... 9
7) CONCLUSION ..................................................... 10

FIGURES

1 FINNISSE RIVER PEGMATITE BELT
2 EL 2661 - Locality Plan
3 EL 2661 - Exploration 1984
4 ALLUVIAL TRENCHING EL 2661
5 PROSPECT 8 TRENCH

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1) **INTRODUCTION**

This report documents the work carried out on Exploration Licence 2661 during the period 12th March 1984 to 12th March 1985. It was submitted to the Northern Territory Department of Mines and Energy to document exploration activities and in support of a renewal of the exploration licence.

The exploration programme was carried out by Greenex, a subsidiary of Greenbushes Tin Ltd. on behalf of Greenbushes Tin Ltd, and its Joint Venture partner Barbara Mining Corporation, a subsidiary of Bayer A.G. of Leverkusen, West Germany. The Joint Venture is known as the Bynoe Joint Venture.

2) **LOCATION, CLIMATE & TOPOGRAPHY**

The tin-tantalum and niobium resources of the Cox Peninsula south west of Darwin (Fig 1) covers an area 55 km x 9 km. The EL 2661 is part of a larger area being investigated by the Joint Venture partners.

The area's climate is tropical, monsonal with 2 seasons, the wet extending from October to April and the dry May to September. Annual rainfall is 1,600 mm with approximately 97% falling in the wet season. The humidity varies from 50 to 80% in the wet and 45 to 70% in the dry.

The land system comprises 3 main land forms:

2.1 the upland plains consist of gently undulating plains with gravel ridges often associated with quartz veining, or ironstone lateritic crust.

2.2 the alluvial flats are 200 to 300 m wide and several kilometres long. The accumulation of organic material in the drainage means they are commonly known as black soil plains.
2.3 the lower slopes separate the upland from the alluvial flats. In most cases the slopes are scree covered and outcrop is poor.

3) LICENCE DETAILS

Exploration Licences 2661 was approved by the Secretary on the 12th March 1984 and application was made on the 22nd January 1985 for renewal of this licence.

The licence area is approximately 53 sq km in area, and is covered by the graticular blocks:
1861  2261  2162  2562  2563
1961  2361  2262  2263
2061  2461  2362  2363
2161  2561  2462  2463

Fig 2 shows the location of the licence area.

Greenbushes Tin Ltd. undertook an exploration expenditure of $40,000 for the first year of the project.

4) REGIONAL EXPLORATION CONTEXT

Exploration Licence 2661 is one of a number of licences held by the Joint Venture partners in the Finniss River Pegmatite Belt. The exploration plan has been to prove ore reserves for a number of pegmatites and associated alluvial deposits centred on an area suitable for a central plant site and water storage. The satellite mining operations would supply ore to the central plant, which on completion of mining in one area would be moved progressively to other locations.
In May, 1984 the Joint Venture established an exploration camp near Observation Hill in EL 4183. The camp included sample processing facilities. To February 1985 the Joint Venture has spent approximately $1,200,000 on exploration in the Finnis River Pegmatite Belt, much of it within EL 4183.

5) WORK COMPLETED 1984 -1985

5.1 Initial Evaluation

The initial evaluation of the area involved:

- Preparation of Geological and Topographic Basemap, from air photo's.
- Photogeological studies outlining potential pegmatite and alluvial targets.
- Helicopter inspection of the Licence area and potential targets by Greenbushes Tin Ltd. and Bayer A.G. geological staff.
- Evaluating the prospect area with ground reconnaissance.
- Preparation of a systematic exploration programme for the evaluation of alluvial and pegmatite potential.

5.2 Potential Targets and Exploration Programme

5.2.1. Alluvial Targets

Wiggs and Bilato's (Picketts) pegmatites were inspected accompanied by Mr Dino Bilato. These extensive mineralized deposits were seen as a potential source for tin and tantalum mineralization in the main drainage through the western portion of EL 2661 (Fig 3). Exploration by the Bynoe Joint Venture partners have established mineralized alluvial reserves in drainages closely associated with major pegmatite deposits.
5.2.2 Pegmatite Deposits

From helicopter reconnaissance and photogeological evaluation of the exploration Licence eight quartz vein - pegmatite deposits were selected for further evaluation (Fig 3). The aim of this ground survey was to establish whether further work in the form of trenching and sampling was justified. Due to poor access much of the work was done by ground traverses.

5.3 EXPLORATION RESULTS

5.3.1 Alluvial Exploration

Three exploration survey lines spaced at 500m intervals were pegged across the drainage south west of Wiggs Mine. The most northern line 6000 mN was only 600m downstream from Wiggs Mine. The details of exploration are summerized in the following table.

<table>
<thead>
<tr>
<th>LINE</th>
<th>LENGTH</th>
<th>No. of TRENCHES</th>
<th>SAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000 N</td>
<td>640 m</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>5500 N</td>
<td>760 m</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td>6000 N</td>
<td>960 m</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>3 LINES</td>
<td>2,360 m</td>
<td>121</td>
<td>121</td>
</tr>
</tbody>
</table>

The trenches were cut with a Case 680 backhoe - loader and were backfilled with a loader for safety reasons.
Trenching exposed grey-brown mottled sandy clay with minor laterite pebbles. Angular to subrounded gravels with schist, quartz, siltstone and ironstone rock fragments were generally located on the flanks of the drainage. Minor black carbonaceous shale pebbles were present. The gravels formed layers varying up to 2 m thick (Fig 4).

Trench samples were restricted to a maximum depth of 4 m and it is unlikely that in the centre of the drainage the bottom of the channel was reached. Auger drilling will be required to determine whether mineralized wash exists below this depth. The analysis results of the trenching are shown in Fig 4. The following sampling procedure was adopted:

- 6 litre channel samples collected.
- Clay dispersed in puddling machine with clay dispersant calgon.
- Deslimed samples passed through a trommel with 10 mm screen. Oversize discarded after inspection for heavy mineral.
- Deslimed trommeled undersize (10 mm) sand concentrated on a 2 m diameter rotating cone.
- The cone concentrate collected, dried and dispatched to Greenbushes W.A.
- Concentrate weighed, pulverized and assayed by X.R.F. for Sn, Ta₂O₅ and Nb₂O₅.
- Grade of sample calculated in kgms/loose cubic metre.

The results of this work were disappointing with no samples showing potentially economic values. There is the possibility of finding alluvium in the centre of the drainage below the depth of trenching.

5.3.2 Pegmatite Exploration

Eight potential exploration targets were identified as a result of helicopter and/or photogeological studies. The location of the prospects are shown in Fig 3.
Each area was characterized by extensive areas of quartz scree which may have been indicative of weathered and eroded pegmatite or quartz veining.

PROSPECT 1 - This prospect is only accessible by foot. The quartz scree was found to be associated with a massive milky quartz vein, approximately 5 - 10 m wide and between 500 - 1000 m long. The quartz vein strike was north-south and the dip is unknown. The quartz vein outcrops on the crest of a ridge of arenite. There is evidence of brecciation with angular arenite clasts in the vein system. No muscovite was detected and it was concluded that the quartz scree had no pegmatite affinity. No follow up work is recommended.

PROSPECT 2 - The scattered quartz scree was found to be associated with a 2 m wide by 10 - 20 m long massive milky quartz outcrop with traces of muscovite. The quartz strikes north north east and has intruded arenites pebble sandstones and conglomerates of the Burrell Creek Formation. It is on the same line of strike as Wiggs pegmatite to the north north east. The association of quartz and muscovite suggest the quartz scree is associated with a pegmatite rather than a quartz vein. The area is accessible with 4 x 4 vehicle. Several trenches are recommended to expose bedrock in the vicinity of the quartz - muscovite outcrop.

PROSPECTS 3 & 4 - There was only suboutcrop of quartz veining in prospect 3 and a 2 - 5 m wide and 30 - 50 m long quartz vein in prospect 4. The veins strike north north east.

In both locations only massive milky quartz was observed. No further work is recommended for either prospect.
PROSPECT 5 - A 2 x 5 suboutcrop of massive milky quartz was discovered on black soil flats. There was no muscovite associated with the quartz and no further work has been recomended.

PROSPECT 6 - A 2 - 5 m wide and 10 - 20 m long north striking quartz outcrop was located on the edge of a broad black soil drainage plain. The presence of muscovite in the quartz suggests it might be part of a pegmatite intrusion. The area is accessible with 4 x 4 vehicle and warrents trenching to expose bedrock adjacent to the quartz-muscovite outcrop.

PROSPECT 7 - Prospect 7 was a 2 - 3 m wide by 5 - 10 m long massive milky quartz vein, which outcrops on the edge of a broad black soil drainage plain. No muscovite was observed and it has been assumed that the quartz scree formed from the erosion of a massive quartz vein. No further work is recomended.

PROSPECT 8 - This prospect is located 300 m at 020° from Prospect 6. Minor shallow (LT 0.5 m) workings were noted in the immediate vicinity of this prospect. A 10 m east-west trench was cut across this deposit to expose a weakly weathered quartz-muscovite pegmatite beneath sandy gravel. No cassiterite of tantalite mineralization was noted in the 5 m wide pegmatite exposure. (Fig 5)

A channel sample of pegmatite processed in the same way as the alluvial samples (Section 5.3.1) yielded 0.161 kgm/L.C.M. SnO₂  0.003 kgm/L.C.M. Ta₂O₅ and 0.003 kgm/L.C.M. Nb₂O₅. A sample of the sandy gravel eluvium yielded 0.013 kgm/L.C.M. SnO₂  0.007 kgm/L.C.M. Ta₂O₅ and 0.006 kgm/L.C.M. Nb₂O₅.
### 5.4 Exploration Expenditure

This is an estimate of the expenditure on EL 2661 during the 1st year of tenure. It includes operating costs and a percentage of the capital costs of major items of equipment used during the programme.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>ESTIMATED EXPENDITURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Backhoe (10 days)</td>
<td>$4,500</td>
</tr>
<tr>
<td>International FEL (5 days) access, fill in trenches.</td>
<td>$2,500</td>
</tr>
<tr>
<td>Toyota Land Crusiers 1 x 14 days.</td>
<td>$1,050</td>
</tr>
<tr>
<td>1 x 28 days.</td>
<td></td>
</tr>
<tr>
<td>Fuel, Oil, Tyres</td>
<td>$800</td>
</tr>
<tr>
<td>Food Supplies ($ 25 per man day).</td>
<td>$1,400</td>
</tr>
<tr>
<td>Staff House Facilities.</td>
<td>$480</td>
</tr>
<tr>
<td>Camp Electrical Power.</td>
<td>$50</td>
</tr>
<tr>
<td>Water Supply.</td>
<td>$200</td>
</tr>
<tr>
<td>Workshop Overheads</td>
<td>$1,000</td>
</tr>
<tr>
<td>Laboratory - Sample Preparation.</td>
<td>$700</td>
</tr>
<tr>
<td>Sample Assay and Check Samples.</td>
<td>$2,600</td>
</tr>
<tr>
<td>Administration - Accomodation</td>
<td>$500</td>
</tr>
<tr>
<td>Communication</td>
<td>$350</td>
</tr>
<tr>
<td>Entertainment</td>
<td>$300</td>
</tr>
<tr>
<td>Travel and Food (Perth-Darwin; Germany-Darwin, Hire Cars etc).</td>
<td>$5,000</td>
</tr>
<tr>
<td>Technical Materials</td>
<td>$500</td>
</tr>
<tr>
<td>Tenement Charges and Administration.</td>
<td>$500</td>
</tr>
<tr>
<td>Helicopter.</td>
<td>$1,000</td>
</tr>
<tr>
<td>Wages-Sampler-Plant Operator.</td>
<td>$1,000</td>
</tr>
<tr>
<td>Wages-Conc. Preparation.</td>
<td>$1,100</td>
</tr>
<tr>
<td>Sample Transport incl. Air Freight.</td>
<td>$200</td>
</tr>
<tr>
<td>Wages-Geologist-Project.</td>
<td>$2,800</td>
</tr>
<tr>
<td>-Supervision</td>
<td>$1,500</td>
</tr>
</tbody>
</table>
Administration - Bayer Technical Personnel
   Sample Bags, Survey Pegs etc.
   $2,000
   $300

Capital Items:
Puddler (10%) (10%) $500
Cone (10%) $500
Caravan (25%) $1,000
Generator Set (10%) $100
Power Supply-Puddlings Shed (10%) $2,000
Water Supply-Puddlings Shed (10%) $900
Camp Facilities (3%) $1,050

TOTAL $38,880

Head Office, Company Overheads.
On Costs (20%) etc. $7,800

$46,680

6) 1985 WORK PROGRAMME

The 1985 Exploration programme is planned to follow up the rather disappointing results of the 1984 programme. It will consist of:

° Auger drilling the deeper sections of the main drainage south of Wiggs and Bilato's pegmatites.
° Follow up trenching, mapping and sampling of pegmatite prospect No.'s 2, 6, and 8.
° Ground reconnaissance of the areas as yet unexplored within the exploration Licence with particular reference to quartz scree areas and the Litchfield Complex in the west.
° Auger drilling of any pegmatite prospects, which yield significant results from trenching.
A minimum expenditure for this programme is expected to be $30,000.

7) CONCLUSION

The drainage south of Wiggs and Bilato's pegmatites was considered to be one of the prime alluvial targets in the Finnis River Pegmatite Belt. The poor trenching results were disappointing but there is the possibility that the alluvial wash was deeper than the 4 m reach of the backhoe. During 1985 auger drilling will be used to explore the deeper sections of the drainage.

Of the eight quartz areas inspected three were found to have pegmatite affinities, the remainder were quartz veins. The one pegmatite trenched produced sub-economic cassiterite and tantalite results.
THE FINNISS RIVER PEGMATITE BELT

Figure 1
LOCATION 8, 300 m AT 20° FROM OUTCROPPING
QUARTZ VEIN AT LOCATION 6:
(TRENCH BEARING E–W)