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1. REYNOLDS RIVER (EL 5211) AERIAL PHOTOGRAPHY FLIGHT DIAGRAM
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1. **INTRODUCTION**

This report is submitted to the Northern Territory Department of Mines and Energy and details exploration carried out by Greenex in EL 5211 during the period 3rd July 1987 - 2nd July 1988. Greenex the exploration division of Greenbushes Ltd carried out the work on behalf of both Greenbushes Ltd and Barbara Mining Corporation Ltd the partners making up the Bynoe Joint Venture.

2. **LOCATION AND LEASING**

EL 5211 is located in the Reynolds River area approximately 80 km SSW of Darwin (Figure 1). The licence covering an area of 58 sq km and 18 graticular blocks was granted on the 3rd July, 1987. Application for renewal of the licence was made on 20th May 1988.

3. **TOPOGRAPHY**

This exploration licence lies in an area of gently undulating country. The confluence of three water-sheds occurs in the north-eastern part of the licence area making this point the topographic high. From here the water-shed of the McCallum Creek slopes gently away to the north west, whilst two separate and distinguishable water-sheds of the Reynolds River slope gradually to the south west and south (Figure 2).

4. **HISTORY**

Tin mining first commenced in the Finniss River Pegmatite Belt in 1886. However, it was not until 1985 that the Bynoe Joint Venture took an interest in the south-western portion of the belt encompassing the Reynolds River area. This was largely due to the 1985 discovery of La Belle pegmatite (13 degrees 7'S, 130 degrees 33' 38"E) within EL 4923 held by John Walton Holdings.
5. **LA BELLE PEGMATITE**

5.1 Location and Access

La Belle Pegmatite outcrops as a massive quartz core on the crest of a low ridge on the northern margin of the Reynolds River catchment. Access is gained via Wangi and La Belle station roads and an unmade bush track leads south to the prospect 4 km west of the southeastern corner of the Wagait Aboriginal Reserve.

5.2 History

There is no evidence of any work on the pegmatite prior to its discovery in 1985. The current leaseholder has dug a series of costeans along the strike of the body and 1 m channel samples were collected across the width of pegmatite intersections. Bynoe Joint Venture supplemented this evaluation after approval from the leaseholder with its own sampling programme in 1986. Channel samples were collected over 3 m intervals and processed according to standard procedures at the Bynoe plantsite.

5.3 General Geology

Costeaning has exposed pegmatite over a distance of 400 m with most of the trenching concentrated on the massive quartz outcrops over a striklength of 200 m. The maximum exposed width is 25 m at the southern end and 20 m south of this intersection the pegmatite lenses out to a narrow quartz vein. The massive quartz forms a substantial 'core' to the pegmatite, outcropping along the top of the ridge and extending 100 m along its length.

The pegmatite strikes north northeast, parallel to the country rock foliation and at its northern end diverges into two narrow arms which appear to lense out. A single trench has exposed a narrow pegmatite vein 250 m north northeast of the ridge, this vein is aligned 'en echelon' with the main body.
Lithologies are generally kaolin-rich surrounding the quartz 'core' with an increase in the abundance of quartz and muscovite towards the contacts and in the narrower sections of the pegmatite. Hostrocks are ferruginous and carbonaceous shales having a north northeast striking cleavage which dips steeply east (Figure 3). Pegmatite contacts frequently follow the hostrock foliation.

The average grade of twenty one samples is 0.006/0.137 kg/tonne SnO₂/Ta₂O₅. Tantalite enrichment occurs on most contacts with a maximum of 4.26 kg/tonne recorded for a sample between the massive quartz core and the hangingwall contact (Figure 3). Neglecting these anomalous values the average grade becomes 0.004/0.026 kg/tonne SnO₂/Ta₂O₅.

6. PREAMBLE TO THE 1987/88 EXPLORATION PROGRAMME

6.1 Bynoe Laterite Geochemistry Programme

During the 1980/81 field seasons, Greenex geologist R.D. Birrell (Birrell, 1982) conducted a laterite geochemical sampling programme over tenements held at Bynoe. This study was considered useful in a regional context to indicate the presence in laterite capping of widely dispersed detectable geochemical anomalies around mineralised pegmatites. A triangular grid was used (with a 1 km spacing) and 118 samples were taken in an area of 150 km².

The results of the survey were as follows:

* broad geochemical targets were identified
* metal elements defined as pegmatite indicators from orientation programmes at Bynoe were - Sn, Ta, Nb, W, Ba, As, Sb and Li.

A limitation of laterite geochemical sampling is that laterite is generally restricted to topographic highs. So, although a particular grid spacing may be used the absence of laterite in valley situations may lead to holes in the grid network, which make interpretation of results more difficult.

The general absence of laterite in EL 5211 makes laterite geochemical sampling inappropriate, however, the defined metal element pegmatite indicators (Sn, Ta, Nb, W, Ba, As, Sb and Li) should still be of value in other geochemical assessments.
6.2 Alkali Bedrock Geochemistry

An alkali bedrock geochemistry study of Lees Pegmatite (immediately west of the Observation Hill project camp and plantsite) was carried out at Bynoe in 1984 (Hatcher, 1984). The aim was to evaluate this exploration technique as a means of identifying "hidden" or "blind pegmatite bodies" on the Bynoe Joint Venture tenements, by attempting to detect an alkali anomaly at the base of the weathered zone around Lees Pegmatite.

The metal elements Li, Cs and Rb were used as pegmatite indicator elements. Country rock was sampled at the base of drill holes adjacent to the Lees Pegmatite and assayed for the above elements. Results of the study were found to be encouraging, but it was difficult to quantify the weathering effects on Li, Cs and Rb.

Follow-up programmes were recommended which would quantify the weathering effect, determine the regional background for the alkali elements Li, Cs and Rb, and eventually lead to an alkali geochemical programme aimed at identifying hidden tantalum pegmatites.

Alkali bedrock geochemistry would seem to be appropriate for assessments in EL 5211. However, being a large area it was decided to conduct a stream geochemical sampling programme as an initial broad survey method aimed at indicating probable areas for closer assessments utilising, for example, alkali bedrock geochemistry.

7. 1987/88 WORK

The proposed programme for 1987/88 was comprised of a search of Department of Mines and Energy Records of the area. Interpretation of airphotographs and plotting and drafting of base (map) sheets. Stream sediment geochemical programme. Compilation and analysis of all data.

7.1 Literature Search

As far as is known from available records little work has been done in the area of EL 5211 apart from that alluded to above for La Belle pegmatite. Further to the north the Bamboo Creek and Mt Finniss deposits are well known, while to the south the more recently discovered Litchfield deposit has also been worked in recent years (Figure 4).
7.2 Aerial Photography and Base Maps

Aerial photography (flown in 1979) at a scale of 1:25,000 has been obtained from the Division of National Mapping (Appendix 1). With the aid of ground reconnaissance, geological plans supplied by Mr B. Pietch (NT Department of Mines and Energy) have been verified with in-situ geology to facilitate a greater understanding of the lands in EL 5211. A 1:25,000 compilation base geological map has been produced for operations in EL 5211 (Figure 5). In addition, plans have been drawn up depicting stream profiles and identifying water-sheds for each stream and these have been checked in the field (so far as is practicable within the constraints set by access restrictions, due to the predominantly flood plain nature of the region - see Figure 3).

7.3 Stream Sediment Geochemical Programme

Phase 1 – Maps

A 1:25,000 base (compilation) map has been produced over the La Belle and EL 5211 showing the disposition of drainages, geology and major and minor faults. Maps have been produced showing geology and also drainages and drainage divides to assist in selecting locations for sampling or to facilitate the accurate locations of sampling points on maps for later assessment.

Phase 2 – Orientation Stream Sediment Geochemical Programme over La Belle and EL 5211

Aim:

The initial orientation stream sediment geochemical programme over La Belle and EL 5211 is aimed at:

* determining the most appropriate grid spacing for the follow-up stream geochemical programme over EL 5211 eg. 3 km grid vs 2 km grid vs 1 km or perhaps even 500 m.

* confirming the most appropriate mesh size for separation of the fraction which will be assayed for pegmatite indicator metal elements.
FIGURE 5
EL 5211 GEOLOGICAL PLAN

Legend

- Faults
- Joint Pattern
- Dip and Strike of Overturned Strata
- Dip and Strike of Strata
- Dip and Strike of Foliation
- Syncline
- Anticline

Stratigraphy

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<tr>
<th>Symbol</th>
<th>Description</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
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<td>Quaternary Qa</td>
<td>Silt, sand, clay, mud, alluvial</td>
<td>Lt. Gr</td>
</tr>
<tr>
<td>Qc</td>
<td>Silt, sand, clay, mud, colluvium</td>
<td>Gy</td>
</tr>
<tr>
<td>Qcl</td>
<td>Silt, sand, clay, mud, colluvium (?) lateritised</td>
<td>Yw</td>
</tr>
<tr>
<td>Qaf</td>
<td>Silt, sand, clay, mud, floodplain alluvium</td>
<td>Lt. Bl.</td>
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<td>Sand, gravel; colluvial, talus and transported terrestrial sediments</td>
<td>Lt. Or.</td>
</tr>
<tr>
<td>Cz1</td>
<td>Sand, laterite; colluvial, talus and transported terrestrial sediments</td>
<td>Dk. Or.</td>
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<td>Cambrian and Ordovician</td>
<td>Undivide Cambrian and Ordovician Sediments</td>
<td>Rd</td>
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<tr>
<td>Pwt</td>
<td>Volcanics</td>
<td>Bl.</td>
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confirming the metal elements most suitable as
geochemical indicators of pegmatite – these have been
narrowed down in previous surveys to Sn, Ta, Nb, W,
Be, As, Sb, Li, Cs and Rb.

Methodology:

A stream sediment map with selected sample locations based
on stream profiles overlaid with a 500 m circular grid
has been produced (Figure 6). Additional sample sites
were selected for comparative purposes upstream of roads
(to prevent contamination influences) and major stream
junctions.

Sampling involves digging to a level just below the
immediate level of surface vegetative influence and taking
a 6 - 10 litre sample of stream sediment. The sample is
taken from as near as practicable to the designated sample
location. Samples are dried and sieved and examined by
light microscopy to determine which sieve fraction
contains the major portion of appropriate mineralogy; this
is expected to be the -80 mesh (or 150 mm) fraction. A
representative number of different sieve fractions will be
assayed to confirm the results of the assessment by light
microscopy. Sieved fractions will be sent for assay for
the metal elements indicated above to determine their
suitability as geochemical indicators in the La Belle/EL
5211 area.

At the time of writing this report aerial photographs and
appropriate maps have been forwarded to the two geologists
presently engaged in field work in the Darwin area. The
orientation survey is expected to commence shortly, once
the logistics of the field operation have been finalised,
and the land holders (Appendix 2) have been notified.

Compilation and Analysis of Data:

Results generally take about 1 month for analysis and will
take an additional month for compilation and analysis to
the point of producing maps as a prelude to Phase 3 of the
programme.
Phase 3 - Stream Geochemical Programme EL 5211

Based on the results of the initial programme a detailed stream geochemical sampling programme is being implemented. Samples will be processed and analysed according to the constraints set by the orientation stream geochemical programme, and a series of metal element geochemical maps produced. Follow-up work will then be considered in relation to these results.

The ultimate aim of the survey is to delineate tantalum rich pegmatites of a 'hidden' nature, which are related to the larger deep seated aplitic granites of the Litchfield Complex.

8. ESTIMATED EXPENDITURE 1987/88

The Bynoe Joint Venture has spent in excess of $4.5 million on its exploration licences on Cox Peninsula and in the Reynolds River area since 1984. In the last 12 months expenditure has been in the order of $400,000.

$  

MOBILE FLEET

Toyota - repairs and maintenance & hire vehicles   1,500
Fuel, Oil and Tyres                                 500

CAMP CANTEN

Facilities                                           2,000
Food and Accommodation                              500
Power and Water                                      150

WORKSHOP

General - tools, equipment, rags, greases           500
LABORATORY

Upgrading Laboratory - sieves etc and sieving equipment 750
Light Microscope - Binocular 350
Sample Bags - tags, bags etc 200
Drying Facilities 100

ADMINISTRATION

Accommodation 500
Communication 150
Travel and Food 2,000
Insurance 250
Tech Materials 100
Tenement, Admin & Charges 400
Office Overheads 2,500

EXPLORATION/SURVEYING

Geological 4,000
Drafting and Reports 1,500
Aerial Photography 200

ESTIMATED EXPENDITURE $18,150

9. EXPLORATION PROGRAMME 1988/89

Exploration during 1988/89 will continue on with aspects of the Stream Geochemical Sampling Programme of EL 5211 commenced in 1987/88. Exploration targets identified from the programme will be trenched, sampled and drilled in their further evaluation.
10. REFERENCES


APPENDIX I

REYNOLDS RIVER (EL 5211) AERIAL PHOTOGRAPHY
FLIGHT DIAGRAM
APPENDIX 2

LAND HOLDERS EL 5211
LAND HOLDERS

at 28th October 1986

Henry Leroy Townsend
Henry Leroy Townsend Jnr
James Robert Townsend
Townsend Cattle Company Pty Ltd
C/- Wilson, Bishop, Bowes and Craig
Chartered Accountants
62 Cavenagh Street
DARWIN NT 5790

The Townsend Cattle Co - Pastrol Lease 858 cover area

Mr Henry Leroy Townsend - over and partly over Sections 1859, 1860, 1863, 1864, 1865, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1877 and 1878 Hundred of Hart, NT.

Mr Henry Leroy Townsend Jnr - partly over Section '876 Hundred of Hart, NT.

Mr James Robert Townsend - over and partly over Sections 1839, 1840, 1841, 1851, 1866, 1867, 1869, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887 and 1888 Hundred of Blyth, NT.

Notified of our intent and of the following proposed programme for year one of the licence:

A search of all Department of Mines and Energy records on the area. Interpretation of airphotographs and plotting and drafting of base (map) sheets. Stream sediment geochemical programme. Compilation and analysis of all data.
SECOND SCHEDULE
(Plan of Area)

EL 5211
18 BLOCKS
58 sq km

"Wooanning"

"Wong"