CONTENTS

SUMMARY
INTRODUCTION
LOCATION AND ACCESS
GEOLICAL SETTING
RESULTS OF PEGMATITE INVESTIGATION
   1. Work completed
   2. Pegmatite Geology
   3. Texture and Internal Structure
   4. Minerology
WORK DONE
CONCLUSIONS
EXPENDITURE STATEMENT

FIGURES

1. EL 2613 Finniss River, Location Map.
2. EL 2613 Finniss River, Location of Pegmatite Bodies
SUMMARY

Exploration Licence 2613, comprising 11 blocks, is located 46 kilometers south of Darwin in the Finniss range area.

Talmina Trading Pty. Ltd. has been exploring the area for tin/tantalite mineralization in the pegmatite under a joint venture agreement with the licencsee J.W. Benger.

Exploration during the 1985/86 consisted of costeaming, costean mapping, bulk sampling and sampling of pegmatites and alluvial/elluvial material from all over EL 2613.

The pegmatites, which have been emplaced in Burrell Creek Formation, are zoned and a large proportion contain visible mineralization.

Microscopic and microbe studies of mineral concentrates has established that the ore minerology consists of tantalite-colombite, cassiterite, rutile, ilmenite, magnetite and amblygonite.

The distribution of mineralization throughout individual pegmatites is patchy. Therefore, as exploration proceeds it is planned to utilise the pilot plant currently being used for bulk testing ore from MLN 1052 to sample and test material from EL 2613.
INTRODUCTION

Exploration Licence 2613 comprising 11 blocks of approximately 35 square kilometers was granted to J.W. Benger on 5th October, 1983.

Talmina Trading Pty. Ltd. which currently holds rights to three leases, MLN 1052, MLN 814 and MLN 815, is located within EL 2613 is carrying out exploration on the area through a joint venture agreement with the licensee. In September, 1985 an application was lodged to convert the area contained within EL 2613 into two large mineral leases MLN 990 and MLN 991.

The licence area is located in a geological environment thought to contain tin/tantalite mineralization of significant economic potential. The mineralization is contained within an extensive suite of discrete granitic pegmatites generally trending northerly with the regional structure.

Current exploration activity by Talmina has been directed towards defining and mapping the pegmatite bodies and locating economic quantities on mineralization including columbite-tantalite, cassiterite, amblygonite and rare earth elements. In October 1985 Normet Pty. Ltd was commissioned to make a report on the treatment of amblygonite.

This report outlines the work done and results of exploration carried out by Talmina Trading Pty. Ltd. during 1985/86.

Exploration completed to date has comprised identification of pegmatites followed by ground checking, costeaming, mapping, sampling, and bulk sampling to establish the more important pegmatite occurrences requiring further mineralized assessment by drilling and bulk sampling.

Talmina has been operating a small 10 ton/hour heavy-mineral extraction plant in MLN 1052 since 1981 for bulk sampling purposes to assess the grade and economic potential of the Saffums No. 1
Pegmatite. This plant has been replaced in May 1985 by a larger pilot plant 40 ton/hour to test material from pegmatite occurrences in EL 2613.

LOCATION AND ACCESS

The licence is located east of the Finnis Range on the Darwin 1:250,000 sheet approximately 46 kilometers south of Darwin Access is possible via the Stuart Highway and Mandorah Road then 17km along the Mt. Finnis Road towards Wangi then westward for about 10km to the base camp along a dirt road upgraded to all weather standard by Talmina.

The location map (figure 1) shows the tenement situation and access to MLN 1052 and the base camp.

GEOLOGICAL SETTING

EL 2613 is located within a belt of sediments belonging to Burrell Creek Formation of lower Proterozoic Age which runs in a general north to north-north-east direction through the centre of the Bynoe 1:100,000 sheet.

The majority of sequence consists of finely laminated siltstone interbedded with more massive beds of sandy greywacke siltstone, graphitic shale and minor quartz pebble and lithic conglomerate.

West of the licence area and the Finnis range the Burrell Creek sediments have been intruded by the Two Sisters Granite.

The siltstones which have been metamorphosed to muscovite phyllite and quartz mica schist have a well developed slaty cleavage whereas the more competent sandy units display a characteristic refracted sandstone cleavage. This major foliation is regional in extent and is related to the predominant NNE fold direction. In high strain zones a crenulation cleavage has developed as a result of granite
intrusion and/or introduction of pegmatite.

The pegmatites are present as discrete steeply dipping intrusives which strike generally in a NNE direction parallel to the regional foliation. An estimated 30 kilometer of strike length pegmatite has been identified by air photo interpretation and exploration to date. The pegmatites are suspected to be related to the nearby Two Sisters Granite but their origin and relationship to granitic rocks in the area has not been established.

Some of the outcropping pegmatites show significant heavy mineral content at surface and visible tantalite mineralization, although patchy.

RESULTS OF PEGMATITE INVESTIGATION

1. WORK COMPLETED

Following regional field assessment and aerial photographic interpretation carried out by G.M.Kater of Greg Kater and Associates Pty. Ltd. the distribution of pegmatite occurrences and potential mineralized alluvial deposits within EL 2613 were postulated as shown on the accompanying 1:50,000 map (figure 2).

Mineralized pegmatites were located in the field and some 1000 meters of costeans were completed to establish the form, structure and contact relationships of various pegmatites as well as provide sample material for bulk testing. Approximately 2000 meters of costeans were examined and mapped.

2. PEGMATITE GEOLOGY

Host rock sediments crop out as persistent low undulating ridges with the pegmatites represented especially on the ridge tops as quartz mica aggregates or milky quartz rubble. Recrystallization of the contact rocks has made them more resistant to erosion and as a consequence pegmatite contact zones are readily identifiable.
Trenching has shown that pegmatite bodies are not limited to ridge tops but are also located under the alluvial flats.

The pegmatites vary greatly in size but are mainly discrete tabular bodies up to about 10 meters thick which may swell and thin along strike or branch into thin apophyses less than a meter across. More lenticular or bulging types similar to the Saffums No. 1 pegmatite thicken to 35 meters at surface.

Mapping has shown that the surface representation of the various pegmatites may extend for more than 200 meters.

In general, the steeply dipping contacts which strike NNE are semi-concordant with the bedding and the regional axial plane foliation.

Mapped field relation suggests that the form of intrusion is controlled by the more competent arenite members of the Burrell Creek Formation and regional fold structures.

The pegmatites everywhere associated with quartz mica chiastolite schist. The chiastolite is present as small knotted aggregates or as larger interlocking rods to 10cm in length especially in the contact zones. Otherforms of wall rock alteration include development of tourmaline needles, aligned with the long axis parallel to the contact, in areas where pegmatite has intruded grey to black shales.

During emplacement of some pegmatites a secondary crenulation cleavage was developed which has deformed the pre-existing foliation in adjacent schist outward from the contact zone. The deformation appears to be more severe in the vicinity of the lenticular or bulging pegmatite bodies.

3. **TEXTURE AND INTERNAL STRUCTURE**

The granitic pegmatites generally have a coarse uneven texture with irregular variations in grain size of the component quartz, feldspar, brownish muscovite, occasional tourmaline and garnet.
Many of the pegmatite bodies have zoned internal structure consisting of prominent border zones less distinct wall zones and poorly developed cores.

All of the pegmatites have border zones which are easily identified because of their sharp contacts, regular thickness rarely exceeding 50cm and fine grained greisen or aplitic composition. Not all the pegmatites are symmetrical because they may have only one border zone with the other contact showing some evidence of assimilation of wall rock although no wall rock inclusions have been noted.

Inside the border zone the texture becomes coarser and is characterized by development of book mica and orientation of the elongated quartz/feldspar minerals normal to the contact surface producing a distinctive stellar structure. This wall zone is not always present but quite often when well developed contains large tabular tantalite crystal aggregates. Internal greisenized zones carry similar rich values.

In general, intermediate and core zones are only recognizable in the wider pegmatite bodies. The intermediate zones are usually poorly developed and consist of coarse aggregates of feldspar/quartz or quartz/book mica with occasional greisen zones.

The core zones are characterized by much coarser textures which sometimes consist of massive quartz, giant amblygonite crystals or very coarse crystal masses of amblygonite with quartz.

Commonly the thinner pegmatites have cores of massive quartz especially in areas where the pegmatite swells along strike.

4. MINEROGOGY

Preliminary results from mineralogical studies of pegmatites in EL 2613 by Prof. G. Friedrich have been included in Volume 2 of the 1983/84 report.

Friedrich (May, 1984) established that there are minerals columbite-tantalite, cassiterite, rutile and magnerite are present in the
Pegmatites and noted the occurrence of amblygonite in the pegmatite at Saffums No. 1 deposit.

The minerals of the columbite-tantalite series form an almost continuous series of solid solutions within the range shown in the formula.

$$(\text{Fe},\text{Mn}) \text{Nb}_2\text{O}_5 - (\text{Fe},\text{Mn}) \text{Ta}_2\text{O}_5$$

The name columbite is used for minerals in which $\text{Nb} > \text{Ta}$ and tantalite for those with $\text{Ta} > \text{Nb}$.

Friedrich has shown that the mineralogy at Saffums No. 1 and Sandra Hill contains tantalite-columbite with $\text{Ta} > \text{Nb}$. However, microbe data of selected cassiterite grains showed inclusions of columbite-tantalite in the cassiterite.

Chemically, the average values in weight % indicate high $\text{Ta}_2\text{O}_5$ between 65 and 80%.
WORK DONE

Work carried out during the 1985/86 period was limited due to the company going into voluntary liquidation in January of 1986. From October to January bulk testing work continued with limited results.

Bulk testing samples were taken from Saffums #1 - 1,000 tonnes and Saffums #3 - 1,000 tonnes.

Due to the company liquidation which was brought about in part by the inefficient operation of the bulk testing plant, market forces and bad management decisions there was no real assessment in detail of any or all bulk testing results.

The plant and leases were put on a care and maintenance basis as of mid-January 1986 and the situation remains unchanged at this date. The company liquidator Mr. J. Walker of Walker Wayland, Sydney and company director Mr. J. Benger have pursued various joint venture possibilities. At the date of this report there is nothing conclusive happening in relation to joint ventures, however, at this point in time it is possible that Greenbushes Tin N.L. or Mr. G. Chriss of Darwin may make a bid for the outright purchase of the plant and leases. A decision involving one of these two parties will most likely occur by December 1986, subject to the liquidators approval.

The on-going poor market situation for tin/tantalite has obviously been a hinderence in attracting interested parties to either joint venture or outright purchase of the leases and plant, as well as eroding the potential value of the property etc.

The proposed expenditure on EL 2613 for 1986/87 is $10,000; however this may be increased depending on who the successful purchaser of the leases is.
CONCLUSION

Exploration Licence 2613 contains an extensive suite of granitic pegmatite bodies intruded into sediments of the lower Proterozoic Burrell Creek Formation.

A strike length in excess of 30 kilometers of pegmatite has been estimated from photogeological interpretation but only a small proportion has so far been explored by costeanning and mapping.

Individual pegmatite bodies are mainly tabular in shape but the more important bulging types are zoned and preliminary work has shown that these mineralization is associated with certain zoned.

As the $\text{Ta}_2\text{O}_5$ content is in excess of $\text{Nb}_2\text{O}_5$, tantalite mineralization predominates.

The distribution of tantalite, lesser cassiterite and amblygonite mineralization in individual pegmatites is patchy so that sampling and grade estimation may be a problem.
**STATEMENT OF EXPENDITURE**

Expenditure for the year ending October, 1986 was:

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Total $190,266-38