ANNUAL REPORT FOR E.L. 1384

SCARBOROUGH

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December, 1977

P. W. Green
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SUMMARY

Exploration was conducted over the licence area in search of three mineral groups, zinc-copper-lead, tin-tungsten and uranium. Carbonate and skarn environments were considered to be the most promising targets and were investigated mainly by stream sediment and rock chip geochemistry. Minor ground radiometrics were also carried out.

Results were generally disappointing, particularly for the base metal-carbonate association. The most prospective areas appear to be radiometrically anomalous granites detected by the Bureau of Mineral Resources airborne radiometric survey. These have yet to be tested.
1. INTRODUCTION

Exploration Licence 1384, designated as SCARBOROUGH, was granted to Central Pacific Minerals N.L. on December 15th, 1976. Three exploration targets were identified in the licence area.

1. Base metals, particularly copper and zinc, along Precambrian carbonate-amphibolite contacts.
2. Uranium in Precambrian vein and skarn environments.
3. Scheelite-copper mineralization within calc-silicate units.

Field work conducted during the year consisted of stream sediment and rock chip sampling, including heavy mineral concentrates. Elements analysed for were copper, lead, zinc, manganese, tin, tungsten and tantalum. Minor ground radiometrics were also carried out.

2. SITUATION & ACCESS

The licence area, centred on latitude 22°32'30" south, longitude 133°7'30" east, is situated approximately 150 kilometres north-north-west of Alice Springs, and covers 711.0 sq. kms (274.5 sq miles) (Fig. 1).

The Reynolds Range, which is straddled by the licence area, prevents vehicular movement over the central portion. On the flanking sand plains movement is only inhibited by patchy mulga scrub and occasional incised stream channels. Access to the north and south of the area is gained by dirt roads which join the sealed Stuart Highway 141 and 125 kilometres respectively north of Alice Springs.

3. PREVIOUS INVESTIGATIONS

The area was mapped by the Bureau of Mineral Resources during the mapping of the Napperby 4-mile sheet (Evans and Glickson). During this programme, more attention was paid to the Ngalia Basin sediments than to the basement rocks. As a result the Precambrian sequence was only broadly differentiated. More recent mapping (at 1:100,000 scale) over parts of the Arunta Complex, including that covered by E.L. 1384 has produced a considerably improved geological picture.

The Bureau conducted an airborne radiometric survey over the Napperby Sheet area during 1976. A 226 cubic inch sodium iodide crystal was used with a 4-channel spectrometer. Flight elevation was 100 metres at a line spacing of 1.5 kilometres. The preliminary edition available shows two highly anomalous areas within the tenement area. Investigation of these anomalies is discussed in section 5.3.
The only recorded mineral occurrence in the licence area is the White Hill Yard prospect, located 6.2 kilometres west-south-west of White Hill Yard, where copper mineralization is located in a shear zone. The metapelite country rocks are at high amphibolite or low granulite facies (Stewart and Warren, 1977).

4. GEOLOGY OF THE LICENCE AREA

The licence area straddles the Reynolds Range, which is composed of Precambrian granites and metamorphics of the Arunta Complex. The area was initially recognized as the site of the intersection of major structural trends, striking west-north-west, and north-east. Numerous faults have been mapped and in the central part of the licence area these form a sympathetic rhomb fracture system. The combination of these features was considered to produce an extremely attractive structural situation, favourable for the localization of numerous ore types.

Check mapping was done during the current investigations and the accepted geology is therefore that of the B.M.R., as shown on the Tea Tree and Alleron 1:100,000 scale sheets (see Section 3). This mapping programme defined and delineated a number of carbonate units in the sequence, notably the Woodforde River Beds, a limestone, marble and calc-silicate unit, and the Wickstead Creek Beds, composed of calc-silicates. These units lie in a gneissic, schistose and granulitic sequence of metapelite and lesser metapsammitic, and have been intruded by 4 phases of granite.

Despite the frequent occurrences of granite-carbonate contact zones, no skarns were identified during the current exploration programme.

5. EXPLORATION DURING 1977

Exploration was conducted over the licence area in search of three element groups, zinc-copper-lead, tungsten-tin, and uranium. As a result of reconnaissance investigations and the availability of new information, the targets investigated differed slightly from those initially defined (Section 1.).

5.1 Zinc-Copper-Lead

During the reconnaissance work, the Woodforde River Beds were seen to contain ironstone bodies of unknown origin. A programme was initiated to trace, map and sample these ironstones and the hosting carbonate unit. It was considered that the geological environment might be conducive to localization of zinc deposits.

Accordingly, the 56 stream sediment and 19 rock chip samples were
analysed for zinc, copper, lead and manganese. Sample locations and results are shown on Plates 1 and 2. The element manganese was included since experience elsewhere had suggested that scavenging of base metals by manganese might be a problem in this area.

The results were uniformly low for copper, lead and zinc, with maxima of 45 ppm and 600 ppm for the stream and rock samples, respectively. The problems of scavenging therefore did not materialize. The manganese stream results however did show a range of results (to 5,200 ppm) and were thus amenable to statistical treatment. A cumulative frequency plot (Fig. 2) and its component break-down (Fig. 3) show three distinct populations, each lognormally distributed. Reference to the drainage map suggests the top population to be associated with the weathering of a cordierite granulite. The cause of the others cannot be unequivocally determined.

For completeness, correlation coefficients between manganese and the other elements were calculated and are set out in Table 1. Due to the low base metal results, little significance can be attached to these figures.

No petrological work was done on the ironstones. From hand specimen examination they appear to generally massive, limonitic and commonly earthy. No gossans were identified although there may be minor patches of boxworks, after pyrite or carbonate. A suggested origin is through lateritization, possibly over pre-existing ferruginous shear or fracture zones.

The rock chip samples were also analysed for tungsten and molybdenum. The results, presented in Table 2, are disappointing. In retrospect this is not surprising since the ironstones occur within the carbonate unit rather than at the granite-sediment contact, and are therefore unlikely to be associated with the development of skarns.

5.2 Tungsten-Tin

In contrast to the Woodforde River Beds, the calc-silicates of the Wickstead Creek Beds are in extensive contact with the intruding Napperby Granite. It was considered that skarns and associated tungsten mineralization may have developed on these contacts and a programme of stream sediment sampling was therefore initiated to test this potential.

In the Mount Allan - Mount Denison area, approximately 95 kilometres to the north-west, pegmatites of the Arunta Complex contain tin and tantalum mineralization. Since the streams to be sampled were also draining granite in which pegmatites were known to be common, the elements tin and tantalum were included in the analysis. Moreover, tin occurs in metasomatic carbonate replacement deposits elsewhere in Australia, albeit of Palaeozoic age.

The samples were sieved to minus 12 mesh, then pan concentrated approximately 50 to 100 times. Analysis was by XRF. Initially 41 samples were taken covering approximately 32 square kilometres. The sample locations and results are presented on Plate 3.
Since there was no standard on which to base the assessment of results, the interpretation of anomalous values was qualitative. On this basis the most interesting area was immediately to the west of Mount Dunkin, where three high tungsten values were grouped with a maximum of 1950 ppm, 30 to 40 times background. Of less interest was an area of 2 to 3 times background tin and tungsten, 3 kilometres south-east of Mount Freeling.

Tantalum values were uniformly low and the element was therefore disregarded during follow-up work. During this programme 27 samples were taken to increase the sample density around the two areas of interest. Results were discouraging, and in some cases cast doubt on the validity of the initial anomalies. The sample locations and results are presented on Plates 4 and 5.

No skarn zones were identified during the programme, nor were any rock chip or petrological samples taken.

5.3 **Uranium**

The previously mentioned airborne radiometric survey flown by the B.M.R. recorded two distinct anomalies on the uranium channel within the licence area. Reconnaissance ground investigations attribute the anomaly to small bodies of granite intruding the Lander Rock Beds, with radiation levels of up to 800 counts per second being recorded with a Scintrex BGS-1S scintillometer. No detailed investigations or sampling have yet been carried out over these areas.
CUMULATIVE FREQUENCY PLOT

MANGANESE - STREAM SEDIMENT SAMPLES

56 SAMPLES
CUMULATIVE FREQUENCY PLOT

MANGANESE

COMPONENT POPULATIONS

Fig. 3
BIBLIOGRAPHY

EVANS, T. G., AND GLICKSON, A. J.
1969 GEOLGY OF THE NAPPERBY SHEET AREA, NORTHERN TERRITORY, B.M.R.
REPORT 1969/85.

STEWART, A. J., AND WARREN, R. G.
AUSTRALIAN GEOLOGY AND GEOPHYSICS 2 1977, 21-34.
CONCLUSIONS & RECOMMENDATIONS

Exploration conducted during the year for zinc-copper-lead and tungsten-tin mineralization was unsuccessful. There appears little likelihood of such mineralization existing on surface in the tenement area, although the heavy mineral sampling programme warrants further work.

The radiometric anomalies delineated by the E.M.R. remain untested and now constitute the most attractive exploration target in the area.
TABLE 1

COEFFICIENTS OF CORRELATION

STREAM SEDIMENT GEOCHEMISTRY

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### TABLE 2

**GEOCHEMICAL ANALYSES FOR TUNGSTEN AND MOLYBDENUM**

**ROCK CHIP SAMPLES**

For Locations See Plate 1

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LEGEND

○ Stream sediment sample location

Sample No.  |  Tin  |  Tungsten |  Tantalum

NOTE - Results in p.p.m.

CENTRAL PACIFIC MINERALS N.L.

SCARBOROUGH  NT 101-
EL 1384
Stage 2 Stream sediment sample
Locations & Geochemistry
MT. FREELING AREA

Scale: 1:10,000 Approx  Plan No.: NT 101-
Date: Dec '77  Drawn by: PWG

PLATE 5.