E.L. 1655 Northern Territory
Final Exploration Report

P.A. Treasure, November, 1981
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1.0 INTRODUCTION

The following report comprises a detailed analysis of mineral exploration undertaken on Northern Territory Exploration Licence 1655, prior to its relinquishment on the 27th October, 1981. The Licence originally encompassed an area of some 10 square kilometres and lay approximately 120 kilometres to the south east of Darwin, directly north of the Arnhem Highway. Exploration was conducted, during the years 1979 to 1981 under the aegis of a joint venture between Pan d'Or Mining, Aquitaine Australia Minerals Ltd and Jimberlana Minerals N.L. Geological investigations were effected under the direction of A.C.A. Howe Australia Pty Ltd, an international group of geological and mining consultants.

The Licence is more precisely illustrated by Text Figure 1 herewith. Subsequent to the 1979 and 1980 field seasons, its area was reduced to comply with Northern Territory Mining regulations (as indicated). Subsequent to further fieldwork and interpretation, the low potential displayed prompted relinquishment of the small portion retained during 1981.

Exploration in this area has formed a portion of an overall study, loosely termed the 'Mt Bundy Exploration Programme', on which some $600 000 has been expended in the past two years. Although exploration for uranium and base metals has been conducted over the region in the past, it was considered that the methods utilised and the detail of coverage achieved was limited. It was suggested that the uranium potential of the areas held had not been fully assessed.

The study area is underlain predominantly by lithologies belonging to the Lower Proterozoic, South Alligator Group, which forms part of the Pine Creek Geosynclinal infill. Although local conditions, of metamorphic grade and basement geology, differ considerably from those portions of the geosyncline in which economically viable uranium deposits have been located, the presence of horizons at recognisably similar levels in the stratigraphy suggested a potential for that mineral. Uranium comprised, therefore, the prime target for detailed geologic and radiometric surveys over the Licence.

Ground surveys were conducted, over two seasons by field crews based on site for the duration of the programmes.
TEXT FIG. 1: Geographic location

131° 45' W

131° 50' W

T

T

EL 1655

A

B

Arnhem Highway

1979: Whole area retained
1980: Areas A & B
1981: Area B

Scale = 1:100,000
In the light of limited potential now displayed by the Licence, much of the data following will be summarised.
2.0 EXPLORATION PROGRAMME (Method and Approach)

Details of the exploration programme will not be separated into periods over which they were conducted, as they form a integral part of an overall survey. The following constitutes a summary of the work carried out.

a) Literature Research

All records of past work, in and adjacent to the study area, were examined with a view to more fully defining target horizons for detailed exploration. The data collected will not be repeated here, as most are available on open file with the Northern Territory Department of Mines, or in recognised publications.

b) Photogeological Studies

Prior to the initiation of fieldwork, a detailed study of black and white aerial photography of the Licence was effected. The aim was to provide an initial definition, by differing photo-tones and competency, of the lithologies underlying the study area. Structural complexities were relatively easily discernible and formed a focus for subsequent geological mapping. Base plans for projected fieldwork were produced concurrently.

Subsequent to preliminary geological mapping, the area was reflown for false-colour infra-red coverage. An examination of the resultant photography yielded no information additional to that acquired from the black and white coverage.

c) Detailed Radiometric Survey

A detailed ground-radiometric survey was effected over the entire Licence, along controlled and semi-controlled traverse lines. The intention was primarily to locate and closely define relatively low order radiometric anomalies that may have been dismissed by previous surveys.
The survey was based on pace and compass cross traverses, conducted perpendicular to cut and surveyed base-lines. The latter were permanently marked and recovered onto the Australian Mapping Grid. Survey lines were spaced, over 75% of the Licence, at intervals of 100 metres, along which gamma radioactivity was recorded at 33.3 metre intervals. Total count radioactivity was measured by Mt. Soprise gamma scintillometers. Closer spaced readings were recorded where radioactivity became markedly anomalous.

All data were recorded at a scale of 1:10 000, onto a series of base plans previously prepared, copies of which accompany this report (Plates 3 and 4).

d) Detailed Geological Mapping

Detailed geological mapping was effected concurrently with the radioactivity discovered by the latter were examined prior to the mapping, and areas of consequent interest thoroughly examined. All recorded data were transferred to 1:10 000 compilation sheets, copies of which, again, accompany this report (Plates 5 and 6).

e) Geochemistry

Occasional rock and sediment samples, from sites of anomalous radioactivity, were submitted for analysis for uranium, by XRF. As no results of significance were returned, details of those samples will not be repeated.

f) Backhoe Trenching

Limited backhoe trenching was affected, during 1980, over a radio-metrically anomalous area defined in the north west portion of the Licence (coordinates (approx) : 798 700E/ 8 579 700 N), by the ground surveys. The anomalous zone is totally obscured by surface sedimentary cover, the trenching being aimed at testing the possible presence of underlying lithologies anomalous in uranium.
g) Airborne Radiometric Survey

The Licence area was, subsequent to the ground surveys, covered by an airborne radiometric and magnetic survey. This was primarily a part of a detailed study of EL's 2068 and 2146 to the south, certain overlap being caused by the Koolpin Formation forming the target of the latter survey.

h) Interpretation and Presentation of Data

Considerable time was spent in rechecking of field data and comparison with information collected from surrounding areas. As previously mentioned, the examination of EL 1655 has been carried out in conjunction with work on other Licences in the 'Mt Bundey' group, enabling a regional interpretation to be made on data collected on this small title.

To summarise, Exploration Licence 1655 has been subjected to detailed ground investigation aimed at an assessment primarily of uranium potential. This potential was suspected to be high, in that structural and lithologic features may have been present, especially within units of the Koolpin Formation, that may have resulted in the reconcentration of syngenetically incorporated uranium. Highly iron indurated horizons within the Koolpin Formation were subjected to visual examination for a possible base-metal potential. Only limited outcrop of these horizons are, however, present.
3.0 GEOLOGY

Exploration Licence 1655 is largely underlain by Lower Proterozoic metasediments belonging to the South Alligator and Mt. Partridge Groups. These are, in turn, represented by units of the Gerowie Tuff, Koolpin and Wildman Siltstone Formations. Portions of the Lower Proterozoic are unconformably overlain by relatively flat-lying sediments of Cretaceous age. The distribution of these units is displayed by the attached Plates (5 and 6) which are 1:10 000 compilations from the geological mapping carried out.

A brief summary of the characteristics of the units mapped follows:

3.1 Cretaceous (Km)

The Cretaceous is represented by relatively flat-lying, massively bedded sandstone and grit. Grains and clasts are derived locally from underlying rock units, and are cemented into a highly iron-rich fine-grained matrix.

3.2 Gerowie Tuff (P11q)

The Gerowie Tuff Formation consists of interbedded chert, siltstone and tuff units of varying thickness. Within the area of the Licence the chert is subdivided into two distinct types:

a) A dark grey to black massive material, porcellanous in texture which, on weathering, presents a mottled grey and white appearance. Samples of fresh material were identified by AMDEL, in Adelaide, as recrystallised siltstone — however, although textural evidence is difficult to recognise, a tuffaceous origin is suspected.

b) A light coloured finely bedded sequence, also of a slightly porcellanous nature. In thin section it consists predominantly of a cherty, very fine-grained quartz mosaic. Opaque to translucent, reddish brown iron oxides are locally intergrown with the quartz as irregular patches and discontinuous bands — imparting its finely banded appearance. It is considered to have a chemical rather than volcanic origin.
The siltstone units of the Gerowie Tuff also fall into two categories being either ferruginous, of similar aspect to the Koolpin and Kapalga siltstones, or pale green/grey and silicified. The basal portion of the Gerowie Tuff Formation (100-200 metres in thickness) consists predominantly of the latter and it has been possible, in places, to subdivide the Formation accordingly.

On weathering, units of the Gerowie present a predominant white to grey appearance, which facilitates delineation of the Formation in the field. Although a large portion of the Formation contains bands and units of chert, the siltstone component is believed to be predominant. The abundance of chert in areas underlain by the sequence is purely a reflectance of its increased resistance to weathering.

3.3 Koolpin Formation (Psk)

This formation consists of highly ferruginous siltstone with minor greywacke units. Numerous thin bands and nodules of chert are present throughout - a feature that is generally taken to be characteristic of the Koolpin Formation, although they are occasionally present within the Kapalga.

The Central portion of the Koolpin is characterised by the presence of a number of brecciated chert/silicified dolomite horizons. These range in thickness between approximately 5 and 10 metres. Associated brecciation and alteration is considered attributable to the creation of open space structures in competent rock units during regional orogeny. Redistribution of minerals in these horizons has been so extensive that, in many localities, the original lithological unit has been rendered unrecognisable. It often consists exclusively of secondary, cherty silica and haematite/goethite - a secondary goessanous texture sometimes being evident.

3.4 Wildman Siltstone (Pbw)

Again, this formation consists primarily of a thick succession of ferruginous siltstone, of similar aspect to the Koolpin. High concentrations of iron are absent, as are the chert bands and nodules.
It is characterised by the presence of several relatively thick quartzite layers.

The upper limit of the formation is marked by two, laterally persistent quartzite/ grit horizons of up to 10 metres in thickness. They have a marked photogeologic expression and therefore act as valuable marker horizons. The quartzites are massive with well rounded fine to medium grains of quartz with subordinate iron, as a cement. They are generally pale grey and blocky on weathering.

The siltstones are rarely exposed but, where protected from deep weathering by the quartzite horizons, can be seen to be finely bedded and red/white colour banded.

Only very occasional fine grained acid to intermediate intrusives crop out in the Licence. No economic significance is postulated in their occurrence.

Structure is dominated by relatively intense folding on approximately N-S trending axes. Locally, a high degree of fracturing and jointing is evident, with a predominance of quartz-fill. No evidence of major faulting was observed during mapping.

4.0 DISCUSSION OF RESULTS

An examination of the Plates included will show that no radioactivity of direct economic significance was encountered by the ground surveys. However, a broad, low-order anomaly was delineated in the northwestern corner of the Licence (AMG coordinates 798, 700E/8, 579, 700N). Scintillometer readings of up to 400 cps (over a background of 120-130 cps) were recorded, over an irregular shaped sediment-covered zone.

No outcrop was observed and, although small siltstone pebbles abound on surface, it was considered probably that surficial cover is thick. Small boulders of ferricrete close to the anomaly would suggest that the anomalous radioactivity may be attributable to a covered layer of this material - which may have scavenged uranium from circulating ground-waters. Infill radiometric gridding was effected to more closely define the anomaly and subsequent pits and trenches sunk in an attempt to define its origin and potential. This work showed the
radioactivity to peak in iron-rich portions of the recent soil profile and not to reflect a source in underlying rock units.

Subsequent to preliminary geological and radiometric surveys over outcrops of Lower Proterozoic metasediments in the eastern portion of the Licence, closer studies in certain areas were effected. These met with an almost total lack of success, with no geologic horizons favourable to the concentration of either uranium or base metals being recognised. No anomalous radioactivity further to that located by the initial surveys was recorded.
5.0 CONCLUSION

Lack of potential displayed after completion of the initial exploratory phases on Exploration Licence 1655 would normally have prompted a recommendation for its immediate relinquishment. Regional work on adjacent Licences, however, suggested a certain potential in low order radiometric anomalies and in possible base-metal enrichment in certain horizons of the Koolpin Formation. Later work discounted this potential and it was recommended that retained portions of the Licence be relinquished.

6.0 Exploration expenditure

Active exploration was conducted on EL 1655 during the dry seasons of 1979 to 1981. As mentioned, it was carried out in conjunction with work on a number of other exploration titles in its vicinity. Certain of the costs involved are pro rata calculations from total expenditure. Expenditure is totalled over the whole period of tenure and may be broken down as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Geological mapping and radiometric surveying including control survey work</td>
<td>$11 638.55</td>
</tr>
<tr>
<td>2. Supervision, planning and interpretation</td>
<td>$8 407.71</td>
</tr>
<tr>
<td>3. Photographic contractors</td>
<td>$1 764.85</td>
</tr>
<tr>
<td>4. Photogeology</td>
<td>$1 289.00</td>
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<tr>
<td>5. Assays, petrology</td>
<td>$667.52</td>
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<tr>
<td>6. Mobilisation and travel expenses</td>
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<tr>
<td>7. Vehicle hire, service and fuel</td>
<td>$3 028.40</td>
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<tr>
<td>8. Accommodation</td>
<td>$4 648.70</td>
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<tr>
<td>9. Consumables</td>
<td>$1 989.62</td>
</tr>
<tr>
<td>10. Freight/haulage</td>
<td>$260.61</td>
</tr>
<tr>
<td>11. Instrument rental</td>
<td>$700.00</td>
</tr>
<tr>
<td>12. Completion of reports, compilation of data</td>
<td>$2 234.38</td>
</tr>
<tr>
<td>13. Travel expenses/administration</td>
<td>$1 630.57</td>
</tr>
<tr>
<td>14. Joint venture overheads (estimated)</td>
<td>$3 000.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$42 737.64</strong></td>
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