ANNUAL REPORT ON
EXPLORATION LICENCE 2513
FOR THE PERIOD
3RD DECEMBER 1980 - 2ND DECEMBER 1981

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   (SD52-15A-GC0301-225)

REFERENCE

Kirkpatrick, B. L. - Report on drilling for Cainozoic gravels in the Bonaparte Gulf Basin, N.T.
Geoeko Report D81/9
All results of heavy mineral separation (Appendix 1) and geochemical analysis (Appendix 2) are given in a separate report; GEOPEKO REPORT NO. D81/28.
INTRODUCTION

Exploration Licence 2513 covering 40.81 square miles was granted on the 3rd December, 1980 and this is the Annual Report for the 1st year of tenure.

This Licence is part of a regional exploration programme, mainly for diamonds, comprising Exploration Licences 2411, 2412, 2417, 2418, 2419, 2420, 2421, 2504, 2513, 2514, 2515, 2584 and 2585 which are the subject of a joint venture between Design and Construction Pty Limited, BP Australia Limited and Peko-Wallsend Operations Ltd, where Peko-Wallsend, through Geopeko, are the operators. The joint venture commenced on 1st May, 1981.

Because of recent successful exploration for kimberlites in Western Australia, the recognition of a potential kimberlite province in the Kimberleys, and possible influence of the Hall's Creek Fault on emplacement of the Argyle diamondiferous kimberlite, the Fitzmaurice Mobile Zone and Sturt Shelf in the vicinity of the Victoria River Fault must also be considered prospective for diamonds.

Potential for stratiform base metal deposits in the sediments of the Victoria River Basin was also recognised and samples were taken for geochemical analysis. Sample density was inadequate and was controlled by the sample density used in the diamond search.

LOCATION

Legune Station, Pastoral Lease 679 on the Auvergne 1:250,000 sheet (SD52-15).

TARGET

Diamonds were the primary exploration target with stratiform base metal deposits a secondary target.
SUMMARY

Most of the rocks exposed in the area covered by the Auvergne-Port Keats 1:250,000 Geological Series sheets are Proterozoic. They form part of the Victoria River Basin and consist of sedimentary sequences of sandstone, siltstone, grit and conglomerate which developed on the stable Sturt Block and in the adjacent Fitzmaurice Mobile Zone.

Exploration work carried out included the following:-

(i) Flying the area for colour photography and selection of photo features indicative of ultrabasic intrusion for field checking.

(ii) Collection of 40kg, +0.6mm fraction samples from trap sites in streams.

(iii) Collection of -80 mesh sample for geochemical analysis.

(iv) Collection of bulk gravel samples.

(v) Heavy mineral separation and identification.

Results achieved to date are not encouraging.
GEOLOGY

Extracts from Auvergne and Port Keats 1:250,000 Geological Series - Explanatory Notes.

Most of the rocks exposed in the area covered by the Auvergne-Port Keats 1:250,000 sheets are Proterozoic. They form part of the Victoria River Basin and consist of sedimentary sequences which developed on the stable Sturt Block, and in the adjacent Fitzmaurice Mobile Zone.

The relative age of the Pre-Cambrian rocks on the Sturt Block and in the Fitzmaurice Mobile Zone is unknown; possibly the latter are older. The ages of the Palaeozoic sediments are accurately known from comprehensive palaeontological examinations.

The Fitzmaurice Group is a thick sequence of sandstone, siltstone, grit and minor conglomerate. The formations all contain some or all of these four rock types. The group crops out in a major north-northeast trending synclinorium (Figure 2). On the southeast limb of this structure the three lower formations total about 3000 metres. On the northwest limb, however, they are at least 12,000 metres thick. Most contacts between the constituent formations are conformable and gradational.

Sandstone, siltstone and dolomite of the Auvergne Group were laid down on stable block and are only mildly deformed. The Jasper Gorge Sandstone was laid down during a marine transgression over an erosional surface of Bullita Group rocks. Ripple marks in the Angalarri Siltstone indicates shallow water deposition. The Saddle Creek Formation is a transition between the Angalarri Siltstone and the Pinkerton Formation, which is a mature sandstone deposited in shallow water. The oolitic dolomites, intraformational conglomerates, stromatolitic growths, and holite casts in the Lloyd Creek Formation, Spencer Sandstone and Shoal Reach Formation indicate an active shallow marine environment with intermittent subaerial and lagoonal conditions.
Three tectonic units are distinguished: the Fitzmaurice Mobile Zone, the Sturt Stable Block and the Bonaparte Gulf Basin (Figure 2).

The Fitzmaurice Mobile Zone consists of thick, moderately folded and intensely faulted sediments, the Fitzmaurice Group. Within this group, north of the Victoria River are windows of Lower Proterozoic and Archean rocks.

The Sturt Stable Block is a sequence of Adelaidean or Carpentarian sediments, the Auvergne Group, which were deposited on a stable cratonic area and are subsequently gently deformed.

The Bonaparte Gulf Basin is a deep structural and sedimentary basin containing Palaeozoic and Mesozoic sediments.
WORK DONE

Aerial Photography
The area delineated in Figure 3 was flown and photographed in colour by Quasco Pty Ltd. Prints were produced at a scale of 1:25,000. The photographs were studied in stereo with the objective of selecting photo features indicative of ultrabasic intrusions. The only features observed were of minor interest and easily explained upon field inspection. No ultrabasics were discovered.

Geological Mapping
No formal mapping programme was carried out other than brief field observations at sample sites.

Scout Drilling
Four reverse circulation holes were drilled as part of a larger reconnaissance drilling programme, to search for potentially diamondiferous gravels (Fig. 4). Holes 1 to 4 totalling 57 metres were drilled within this licence. Holes 1 to 3 reached basement without intersecting any gravel. Hole 4, drilled to 18 metres, did not reach basement and bottomed in clay.

Details of the results of the full drilling programme are presented in: "Report on Drilling for Cainozoic Gravels in the Bonaparte Gulf Basin, N.T." by B.L. Kirkpatrick (Geopeko Report No. D81/9). 82/122.

Stream Sediment Sampling
Gravel Samples:
1. Sample sites were selected in the office to give a sample density of one 40kg sample representing 10 km² and one 2,000kg sample representing 100 km².
2. The sample area was reached by helicopter and the streams were flown along to aid selection of the best possible trapsites for heavy minerals.

3. Gravel from the trapsites were sieved by hand to give the required fraction (0.6mm - 4mm) and weight of sample.

4. Samples were transported by helicopter to the base camp for processing.

5. Here the samples were sieved into three fractions; 0.6mm - 1.0mm, 1.0mm - 2.0mm, 2.0mm - 4.0mm.

6. Each fraction was put over a Plietz jig and the heavy mineral concentrates removed, dried and bagged.

7. These concentrates were despatched to Geopeko, Perth, for mineral identification by a trained observer.

Results:
Sample localities are given on Map 1. The results of the heavy mineral identification are given in Appendix 1. Neither diamonds nor kimberlitic indicator minerals were observed.

Geochemical Samples:
Three hundred grams (300g) of sample were taken from each 40kg sample and despatched to Analabs, Perth, for analysis. The elements assayed for by X.R.F. were Cu, Pb, Zn, Fe, Co, Sn, W, Cr, Ni, Nb, Mg and the mineral barite. Only the -80 mesh fraction was used.

Results:
Details of all results are given in Appendix 2.
EXPENDITURE

As this licence is part of a regional programme, expenditure has been allocated according to its areal percentage.

Total allocated expenditure from 3rd December, 1980 to 30th November, 1981 was $8,191.
FIGURE 1.1
EXPLORATION LICENCE NO. 2513
TENEMENT LOCALITY PLAN

SCALE: 1:250,000

AREA: 40.81 SQUARE MILES
105.70 SQUARE KILOMETRES
**FIGURE 3**

**DIAGRAMATIC WORK CHART**

- **Area covered by sampling**
- **Area covered by aerial photography**
- **Line of scout drilling**
FIGURE 4.
LOCATION OF SCOUT DRILL HOLES
Extract from LEGUNE 1:100,000 sheet
TABLE 1

STREAM SEDIMENT SAMPLING

<table>
<thead>
<tr>
<th>No. of Samples</th>
<th>Weight</th>
<th>Type</th>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>40kg</td>
<td>gravel sample</td>
<td>0.6mm - 4mm</td>
</tr>
<tr>
<td>4</td>
<td>300g</td>
<td>geochemical sample</td>
<td>-80 mesh</td>
</tr>
<tr>
<td>1</td>
<td>800kg</td>
<td>gravel sample</td>
<td>0.6mm - 4mm</td>
</tr>
<tr>
<td>nil</td>
<td>1000kg</td>
<td>gravel sample</td>
<td>0.6mm - 4mm</td>
</tr>
<tr>
<td>nil</td>
<td>1500kg</td>
<td>gravel sample</td>
<td>0.6mm - 4mm</td>
</tr>
<tr>
<td>nil</td>
<td>2000kg</td>
<td>gravel sample</td>
<td>0.6mm - 4mm</td>
</tr>
</tbody>
</table>