ANNUAL REPORT ON BLOCKS A AND B, E.L. 1902
MARGARET BASIN, NORTHERN TERRITORY
FOR THE YEAR ENDING 5/6/82

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by

A.C.A. HOWE AUSTRALIA PTY. LTD.

for

EURALBA MINING LTD.

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SENIOR GEOLOGIST

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SUMMARY

This is an annual report describing exploration work carried out over E.L. 1902 during the year ending 5/6/82 by Euralba Mining Ltd. The exploration licence, which consists of two separate blocks, is located approximately 110 kilometers east of Katherine in the Northern Territory.

During July 1981, a rapid, helicopter supported geological reconnaissance survey was undertaken by Euralba geologist Joe Fisher and A.C.A. Howe Pty. Ltd. geologists Steve Harnish and J.B. Felderhof. Although no mineralization was observed on E.L. 1902 (block A and B), the geological environment was determined to be suitable for the occurrence of economic mineral deposits (i.e. diamonds, uranium, base metals etc.).

Following the field trip to the area, a report discussing the available airborne geophysical and ground gravity data was prepared by A.C.A. Howe geologist Steven Harnish (see Appendix I). He recommended ground follow-up of several magnetometer and radiometric anomalies on the two blocks of E.L. 1902.

In October, Euralba consultant Joe Fisher accompanied by Eupene Exploration Enterprises consultant G.S. Eupene and Urangesellschaft Australia Ltd. geologist J. Pearson conducted a helicopter reconnaissance of E.L. 1902. The trip was designed to determine if the area was favourable for the presence of Alligator River type or unconformity - related uranium deposits. Although the investigation indicated this possibility to be unlikely the geologists did conclude that the area has potential for the occurrence of other types of uranium deposits (see Appendix II). During the trip several samples were collected for age determination and results of this study by Amdel are included in Appendix IV.
Also in October 1981, Geoex undertook airborne radiometric and magnetometer surveys over E.L.'s 1902 and 1903 on behalf of Euralba. The airborne work outlined several magnetometer and radiometric anomalies on Block A and B of E.L. 1902 (Appendix III).

This report discusses the work conducted throughout 1981 and recommends a two phase exploration programme for 1982. Initially it is recommended that a reconnaissance geological and geophysical investigation be undertaken to determine the reason for the occurrence of the anomalies outlined by the airborne surveys (Phase I). The cost of Phase I is estimated to be $8,932.00. Should this work provide encouraging results, Phase II or a detailed follow-up programme would be conducted. Although difficult to accurately predict it is anticipated that Phase II will cost approximately ten times Phase I or $89,320.00.

1.0 INTRODUCTION

In 1981, Euralba Mining Ltd. conducted reconnaissance ground investigations and airborne radiometric and magnetometer surveys over Blocks A and B of Exploration Licence 1902 (Margaret Basin) in the Northern Territory. Based on the results of this work a re-evaluation of the geology and economic potential of the permit was undertaken. This report discusses this work in conjunction with other exploration conducted on the E.L. and suggests a programme for further examination of the area.
2.0 LOCATION

Exploration Licence 1902 consists of two separate blocks denoted Block A and Block B for the westernmost and easternmost blocks respectively (see fig I). The blocks are located on Pastoral Leases Eva Valley 705 and Waterhouse 707, approximately 110 kilometers ENE of Katherine, Northern Territory. The blocks lie between the Arnhemland Aboriginal Reserve to the east and the Beswick Aboriginal Reserve to the west.

3.0 ACCESS

Access to the area by 4WD vehicle is possible by travelling along the Stuart Highway from Katherine to the Maranboy turnoff and thence by gravel road and dirt track to the areas of interest. Numerous washouts and seasonal stream beds make vehicular mobility on the licence a slow and trecherous affair.

4.0 GENERAL GEOLOGY (see fig I)

To simplify the geological description, the two parts (ie. Blocks A and B) of E.L. 1902 will be discussed under separate headings.

a) BLOCK A

Block A is the westernmost of the two segments of E.L. 1902. For the most part it is underlain by a conformable sequence of proterozoic sediments and volcanics that nonconformably overlie the Lower Proterozoic Grace Creek Granite. These older rock types are unconformably overlain in part by the relatively flat lying, Lower Cretaceous, Mullaman Beds.
The proterozoic units include from oldest to youngest, the Birdie Creek Volcanic Member, Kombolgie Formation, Diamond Creek Member, Gundi Greywacke Member and the West Branch Volcanic Member.

The most evident structural features on Block A are numerous faults, that cut the proterozoic rock types. They do not appear to have been active during deposition of younger units.

b) BLOCK B

Rock types found on block B are similar to those of Block A excepting that the Grace Creek Granite does not outcrop and several units either are not present or with only minor distribution on Block A showing much more prominent exposures on Block B. The proterozoic rocks mapped on Block B include the Kombolgie Formation, Diamond Creek Member, Gundi Greywacke Member and West Branch Volcanic Member of the Katherine River Group and the Margaret Hill Conglomerate and Bone Creek Formation of the Roper Group. As was the case in Block A these units are often hidden by the flat lying Mullaman Beds or Quarternary alluvial cover.

The most obvious structural feature on Block B is the Diljin Hill Fault which is regional in extent. The Diljin Hill Fault is associated with numerous smaller faults, some of which have been active into the Cretaceous.

5.0 WORK CONDUCTED IN 1981-82

a) Field visit by consulting geologists Joe Fisher, J.B. Felderhof and Steven Harnish in July 1981. A helicopter was used to quickly evaluate E.L. 1902 and E.L. 1903. No mineralization was observed, however, the geology was considered to be favourable for mineral deposits to be present.
b) Report on the available regional airborne, and ground geophysical data by Steve Harnish of A.C.A. Howe Australia Pty. Ltd. Mr. Harnish recommended ground follow-up surveys of several anomalies. (Appendix I).

c) Field visit by consulting geologists Joe Fisher and G.S. Eupene and Urangesellschaft geologist J. Pearson in October 1981. Although not thought to possess uranium targets to fit Urangesellschafts exploration philosophy the area was considered to have potential for other types of uranium deposits as well as for diamonds and base metals (see Appendix II).

d) Airborne radiometric and magnetometer surveys undertaken by Geoex on behalf of Euralba in October 1981.

e) Short report on the Geoex survey results by A.C.A. Howe Australia Ltd. geologist J.V. McCarthy in January 1982 (see Appendix III). Several anomalies requiring ground follow-up were noted.

f) Short report on the probable age of several samples collected by J. Fisher by Amdel in February 1982. (Appendix IV).

6.0 DESCRIPTION OF THE AIRBORNE SURVEYS

Navigational control was by reference to photomosaics and/or photo strips. Flight path analysis was achieved by identification of 16 mm ground tracking photographs on the navigational control. The ground tracking camera was operated at the rate of one camera frame for two data samples, such that successive camera frames overlap.

An attempt was made to recover fiducials at intervals of 1 kilometer and only recovered fiducials are shown on the flight plan maps.
The following is a list of equipment used to conduct the survey with each components specifications:

Cessna A 184E Aircraft
Sonotek IGSS 1 Navigational System
0.1 nT Magnetometer
256 Litre NaI (Tl) Detector
King Kra 10 Radar Altimeter
16 mm. Ground Tracking Camera
Industry standard 9 Track 32 RPM Magnetic Tapes
8 Channel Analogue Recorder
3 " " " for the Magnetometer

The nominal flight line separation was 500 meters, and the nominal tie line bearing was 0 degrees.

The observed mean sample interval in the flight direction was 38 meters achieved with a minimal aircraft speed of 100 knots and a reading interval of 0.8 seconds. The mean sensor height was 80 meters, using a towed bird configuration. The magnetometer accuracy is 1.0 nT and the resolution 0.2 nT.

7.0

DISCUSSIONS OF THE AIRBORNE MAGNETOMETER RESULTS ON BLOCKS A AND B,
E.L. 1902

The data is presented on both contour and profile plans drawn to a scale of 1:25,000. The data presented on the contour plans is the residual magnetic intensity, after subtracting the International Geomagnetic Reference Field from the observed Total Magnetic Intensity. The data was corrected for diurnal drift using a base station at Tindal Airfield:

Latitude    14.522S
Longitude   132.377E
Altitude    132 Meters A.S.L.

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The sensor height at the base station was 3 meters. The adopted value of this location was 48,133 nT.

Final detailed levelling of the data was performed using tie-line crossover analysis. A simple 3 point filter was applied to the data, which was then gridded and contoured using a 125 m by 125 m mesh cell. The contour interval is 5 nT.

The aeromagnetic contour plans for Exploration Licence 1902, Blocks A and B, generally reflect the mapped geology and structure of the block. To simplify the description of specific features each block will be discussed independantly;

1) BLOCK A Magnetics

Block A is the westernmost of the two segments of E.L. 1902. Overall the contour plan does not display much in the way of magnetic response suggestive of economic mineralization, however one circular shaped anomaly located in the northwest (coloured red on the map) portion of Block A cannot readily be related to the known geology. It will be necessary to investigate the area of this anomaly on the ground to determine the reason for its occurrence.

2) BLOCK B Magnetics

As was the situation on Block A, the airborne magnetometer map for Block B essentially reflects the magnetic signature of the various rock types or the trace of the larger faults (ie. The Dilgin Hill Fault). One anomaly, circular in shape, located in the centre of the block is not readily explained structurally or geologically and ground follow-up on this anomaly is recommended.
DISCUSSION OF THE AIRBORNE RADIOMETRIC RESULTS ON BLOCKS A AND B,
E.L. 1902

The radiometric results are presented as total count (ie. U + Th + K) contour plans and profiles. As was done previously with the magnetometer results, this information will be discussed separately for each segment of E.L. 1902.

1) BLOCK A Radiometrics

The airborne radiometric contour map of Block A is similar to the magnetic contour plan for the area in that the radiometric response is often directly relatable to the geology. Both the Grace Creek Granite (B.G. 1500-2000 c.p.s.) and volcanic members (B.G. 600-1000 c.p.s.) of the proterozoic rock sequence are anomalously radioactive relative to the sedimentary units (B.G. 500 c.p.s.). The fact that the data is in total count form greatly reduces the usefulness of the results since no determination of the source of the radioactivity is possible. It is recommended that the data be further processed so that a qualitative assessment of the results can be produced.

For the purposes of this report all locations outside the granitic outcrop areas with counts of greater than 1000 c.p.s. were considered anomalous. None of these anomalies (coloured red on the map) were found to occur in areas where they could not be explained geologically, or displayed such a high response to warrant consideration for ground follow-up. It is impossible however, that further processing of the data could delineate follow-up targets.
2) **BLOCK B Radiometrics**

The contour plan of the airborne radiometric results for Block B displays close association to known geology. On average the background for the block is 600 c.p.s. Relatively flat radioactivity is displayed by the cretaceous sediments while exposures of proterozoic units are recognizable as areas of rapid variation and the higher intensity of the data.

Anomalies of twice background value are rare on Block B. Two adjacent circular shaped anomalies located on the central eastern portion of the block are the only examples noted. These anomalies are intimately associated with the trace of the Diljim Hill Fault. Due west of these anomalies a feature is located which is coincident with a similarly shaped magnetic anomaly. It is recommended that ground follow-up surveys be undertaken in the area of these three features.

**9.0 RECOMMENDED EXPLORATION PROGRAMME ON E.L. 1902, BLOCKS A AND B FOR 1982**

Reconnaissance geological investigations have suggested that further exploration of E.L. 1902 should be undertaken for deposits of uranium, diamonds and base metals. Airborne geophysical surveys have outlined specific targets where ground follow-up is recommended. If these anomalies are found to be related to economically interesting mineralization further detailed work will be required. A two phase exploration programme is therefore recommended as follows:

**PHASE I - Ground check of Airborne Anomalies**

- Geologist - 2 weeks @ $4,200/Mo. = 2,100.00
- Assistant - 2 weeks @ $2,000/Mo. = 1,000.00
- Transportaation - Airfare (Sydney - Darwin) = 1,800.00

A. C. A. HOWE AUSTRALIA PTY. LTD.
- 4 WD Vehicle @ $1,400/Mo. 700.00
- fuel (approx.) 300.00
Instrument Rental - GIS 4 Spectrometer @ $10/day 140.00
- Proton Magnetometer @ $20/day 280.00
Board and Lodging @ $50/day 1 man 1,400.00
Assay Costs (approx.) 200.00
Expendables (field books, flags, tapes, bags, etc.) 200.00

Sub-total $8,120.00
Contingency @ 10% 812.00

Phase I Total $8,932.00

The cost duration and scope of Phase II is dependant on encouraging results from Phase I of the programme. A rule of thumb estimate at ten times the cost of the reconnaissance work can be applied to Phase II (ie. $89,320.00).

10.0 BREAKDOWN OF EXPENDITURE ON E.L. 1902 IN 1981

Airborne Surveys 20,448.35
Helicopter Supported Ground Surveys 5,072.50
Travel 1,840.18
Miscellaneouse Field Expenses 617.94
Communications, Postage, etc. 892.47
Consulting Fees 17,846.08
Office Overheads and Administration 2,608.54

$49,326.06

Respectfully Submitted:
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J.V. McCARTHY
SENIOR GEOLOGIST

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APPENDIX I
Interpretation of available Airborne Geophysics and Gravity Data over E.L. 1902.

Interpretation of Available Airborne Geophysics and Gravity Data over E.L. 1902

By

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(Project Geologist)

for

Euralba Mining Limited

July 22, 1981
CONTENTS

Introduction
Location

1. Magnetic Intensity Survey

2. Radiometric Survey
   a. Total Counts (TC) 0.84 – 3.00 Mev
   b. Potassium (K) 1.36 – 1.60 Mev
   c. Uranium (U) 1.60 – 1.90 Mev
   d. Thorium (Th) 2.40 – 2.48 Mev

3. Gravity Survey

4. Anomaly Correlation
   4.1 Magnetic Anomalies
   4.2 Radiometric Anomalies
   4.3 Gravity Anomalies

Figures

Figure 1. Magnetic Intensity Survey
Figure 2. Total Count Radiometric Survey
Figure 3. Potassium Channel Radiometric Survey
Figure 4. Uranium Channel Radiometric Survey
Figure 5. Thorium Channel Radiometric Survey
Figure 6. Gravity Survey
Figure 7. Geology over 1902 and 1903
Introduction

This report is a compilation of available airborne geophysical data and gravity survey over Exploration Licence 1902. This report was undertaken on behalf of Euralba Mining Ltd., by A.C.A. Howe Australia Pty. Ltd., to support the proposed exploration programme budget.

Location

Exploration Licence 1902, is located on Pastoral Leases Eva Valley No. 705 and Waterhouse No. 707 east of the Katherine approximately 70 Km. The licence lies between Arnhemland Aboriginal Reserve and Beswick Aboriginal Reserve.

1. Magnetic Intensity Survey

Operator: BMR  Date of Survey: 1975  Line spacing: 1.5Km
Sampling Interval: 60 m  Instrument: Flexgate magnetometer
Along line sampling: 600 m  Elevation: 150 m above ground level

Magnetic "low" 4900 gammas  negative anomaly
Magnetic "high" 5000 gammas  positive anomaly

There are many "small" irregular to circular magnetic lows and highs. These "small" anomalies do not correlate to surface feature and will not be discussed further.

Anomalies of some significance are numbered on the Magnetic Intensity Survey Map (figure 1).

<table>
<thead>
<tr>
<th>Anomaly</th>
<th>Type / Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Negative anomaly, several isolated low values - 4748 and 4781 gammas, irregular lensoidal shaped</td>
</tr>
<tr>
<td>2. a,b,c,d,</td>
<td>positive anomalies, parallel to magnetic anomaly #1 high values of 5092 and 5096 gammas, lenticular shaped</td>
</tr>
<tr>
<td>3. a,b,c,</td>
<td>negative anomalies, with many isolated low values - 4827 and 4738</td>
</tr>
</tbody>
</table>
Anomaly                      Type / Intensity

4.                            negative anomaly, low value of 4778 gammas, irregular
                              shaped
5.                            positive anomaly, high value of 5148 gammas, lenticular
                              shaped

The size and shape of the above anomalies will change drastically
with the line spacing and altitude. The altitude at which the survey was
flown, is low enough to show relatively near surface magnetic anomalies,
with deeper anomalies over printed. Since the lines are spaced at 1.5 Km,
the "true" shape and size of the anomalies are not shown. A closer line
spacing would tend to produce many smaller lenticular to circular parallel
anomalies, centred about the low and high values given. In addition, a
closer line spacing would enhance surface overprinting. Therefore,
increasing the difficulty of defining significant near surface trends.

3. Radiometrics Survey

The following technical data applies to all the airborne radiometric
data herein discussed.

Operator:  BMR                          Date of survey:  1975
Line spacing:  1.5 Km                  Altitude:  150 m above ground level
Sampling Interval:  60 m                Instrument:  4-channel differential spectrometer,
detector volume 7400 cm$^3$ (345.6 in$^3$).

Spectrometer Channels:

- 0.84 - 3.00 Mev  Total counts - TC
- 1.30 - 1.60 Mev  Potassium - K
- 1.60 - 1.90 Mev  Uranium - U
- 2.40 - 2.80 Mev  Thorium - Th

Applied Corrections:  background subtraction
                     height correction
                     energy stripping
                     filtering
(a) **Total Counts (TC)** 0.84 - 3.00 Mev

There are eleven anomalies in and adjacent to E.L. 1902. The following is the classification used within for the total count anomalies (TC-).

<table>
<thead>
<tr>
<th>Type</th>
<th>Counts / sec and above background</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>&gt;140</td>
</tr>
<tr>
<td>Medium</td>
<td>&lt;140 &gt; 80</td>
</tr>
<tr>
<td>Low</td>
<td>&lt;80 &gt; 40</td>
</tr>
<tr>
<td>Very low</td>
<td>&lt;40</td>
</tr>
</tbody>
</table>

Background value was taken as 50 counts / sec. It must be noted that all total count anomalies are considered to be third to fourth order anomalies, with the exception of TC-1, which is second order.

See total Count Radiometric Survey map (figure 2), for location of the following anomalies.

<table>
<thead>
<tr>
<th>Anomaly</th>
<th>Type description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC - 1.</td>
<td>High, sharp peaked, very large, circular</td>
</tr>
<tr>
<td>TC - 2.</td>
<td>medium (mainly) to low, somewhat diffuse, large lenticular</td>
</tr>
<tr>
<td>TC - 3.</td>
<td>low, diffuse, lenticular</td>
</tr>
<tr>
<td>TC - 4.</td>
<td>low with two small areas outside of the E.L. that are high, diffuse, irregular lenticular</td>
</tr>
<tr>
<td>TC - 5.</td>
<td>low, diffuse, elliptical</td>
</tr>
<tr>
<td>TC - 8.</td>
<td>low, diffuse, circular</td>
</tr>
<tr>
<td>TC - 9.</td>
<td>very low, diffuse, (a) elliptical (b) circular</td>
</tr>
<tr>
<td>TC - 10.</td>
<td>high to medium, sharp peaked, elliptical</td>
</tr>
<tr>
<td>TC - 11.</td>
<td>low to medium, diffuse, irregular (outside E.L.)</td>
</tr>
</tbody>
</table>
Potassium (K)  1.30  1.60

There are ten potassium anomalies in and adjacent to E.L. 1902. The following is the classification used within for the potassium anomalies (K-).

<table>
<thead>
<tr>
<th>Type</th>
<th>Counts / sec / above background</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>&gt; 35</td>
</tr>
<tr>
<td>Medium</td>
<td>&lt;35 &gt; 20</td>
</tr>
<tr>
<td>Low</td>
<td>&lt;20 &gt; 10</td>
</tr>
<tr>
<td>Very low</td>
<td>&lt;10</td>
</tr>
</tbody>
</table>

Background value was taken as 0 counts / second. See Potassium Channel Radiometric Survey map (figure 3) for location of the anomalies. The anomalies are as follows:

<table>
<thead>
<tr>
<th>Anomaly</th>
<th>Type / Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>K - 1.</td>
<td>high, sharp peaked, very large circular extending outside the E.L. to the west</td>
</tr>
<tr>
<td>K - 2. a,b</td>
<td>medium to high, large sharp peaked and somewhat diffuse; (a) lenticular (b) circular</td>
</tr>
<tr>
<td>K - 3. a,b,c</td>
<td>low, diffuse, irregular to circular</td>
</tr>
<tr>
<td>K - 4. a,b</td>
<td>low, diffuse, irregular lenticular</td>
</tr>
<tr>
<td>K - 5.</td>
<td>medium to low, sharp peaked, triangular shaped</td>
</tr>
<tr>
<td>K - 6. a,b,c</td>
<td>low, diffuse (a) irregular (b) circular</td>
</tr>
<tr>
<td>K - 7</td>
<td>medium to locally high, large sharp peaked in part diffuse, irregular lenticular</td>
</tr>
<tr>
<td>K - 8</td>
<td>high, sharp peaked, oblong shaped</td>
</tr>
<tr>
<td>K - 9</td>
<td>low to medium outside E.L., diffuse to sharp peaked, (a) irregular (b) elliptical</td>
</tr>
<tr>
<td>K - 10</td>
<td>low, diffuse, elliptical</td>
</tr>
</tbody>
</table>

Uranium (U)  1.60 - 190 Mev

There are thirteen uranium anomalies in and adjacent to E.L. 1902.
POTASSIUM CHANNEL RADIOMETRIC SURVEY
The following is the classification used within for the uranium channel anomalies (U-1).

<table>
<thead>
<tr>
<th>Type</th>
<th>Counts / sec / above background</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>&gt;14</td>
</tr>
<tr>
<td>Medium</td>
<td>&lt;14 &gt; 8</td>
</tr>
<tr>
<td>Low</td>
<td>&lt;8 &gt; 4</td>
</tr>
<tr>
<td>Very low</td>
<td>&lt;4</td>
</tr>
</tbody>
</table>

Background value was taken as 0 counts / second. For location of the anomalies see Uranium Channel Radiometrics Survey map (figure 4).

Listing of the anomalies follows:

<table>
<thead>
<tr>
<th>Anomaly</th>
<th>Type / description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U - 1.</td>
<td>high to medium, very large, sharp peaked, somewhat circular shaped</td>
</tr>
<tr>
<td>U - 2. a,b,c,d</td>
<td>low, diffuse, rounded peaks, ellipsical to irregular shaped</td>
</tr>
<tr>
<td>U - 3. a,b,c</td>
<td>low to very low, sharp peaked, lenticular shaped</td>
</tr>
<tr>
<td>U - 4.</td>
<td>medium to (very) low, sharp peaked anomaly, lenticular shaped</td>
</tr>
<tr>
<td>U - 6. a,b,c,d</td>
<td>(a) medium to low, (b,c) low (d) medium, sharp peaked to diffuse, circular to generally ellipsical shaped</td>
</tr>
<tr>
<td>U - 7. a,b</td>
<td>medium, diffuse with rounded peaks, (irregular) lenticular shaped</td>
</tr>
<tr>
<td>U - 8. a,b</td>
<td>low, diffuse with rounded peaks, ellipsical shaped</td>
</tr>
<tr>
<td>U - 9.</td>
<td>medium to low, diffuse with rounded peaks, irregular shaped</td>
</tr>
<tr>
<td>U - 10. a,b,c</td>
<td>(a,c) low (b) medium, rounded peaks, ellipsical shaped</td>
</tr>
<tr>
<td>U - 11. a,b</td>
<td>low, sharp peaked, ellipsical shaped</td>
</tr>
<tr>
<td>U - 12. a,b</td>
<td>medium, sharp peaked, circular shaped</td>
</tr>
<tr>
<td>U - 13.</td>
<td>low, sharp peaked, ellipsical shaped</td>
</tr>
<tr>
<td>U - 14.</td>
<td>low to medium, sharp peaked, jelly bean shaped</td>
</tr>
</tbody>
</table>
URANIUM CHANNEL RADIOMETRIC SURVEY
THORIUM CHANNEL RADOIMETRIC SURVEY
Thorium (Th) 2.40 – 2.80 Mev

There are seven thorium anomalies in and adjacent to E.L. 1902. The classification used within for the thorium anomalies (Th-), is the same as that used for the uranium anomalies. The background value was taken as 0 counts / second. The location of the thorium anomalies are shown in figure 5. The anomalies are as follows:

<table>
<thead>
<tr>
<th>Anomaly</th>
<th>Type / description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Th - 1.</td>
<td>high, very large, sharped peaked, somewhat circular shaped</td>
</tr>
<tr>
<td>Th - 2.</td>
<td>(a,d) low, (b,c) medium small, sharped peaked circular to irregular shaped</td>
</tr>
<tr>
<td>Th - 3.</td>
<td>low, sharp peaked to diffuse, irregular</td>
</tr>
<tr>
<td>Th - 4.</td>
<td>low, medium to high, sharp peaked to diffuse, lensoidal shaped</td>
</tr>
<tr>
<td>Th - 5.</td>
<td>low to high sharp peaked to diffuse, elliptical shaped</td>
</tr>
<tr>
<td>Th - 6. a,b,c,d,</td>
<td>(a) low to medium (b,c) low (d) medium, sharp peaked to diffuse (a,b), elliptical; in 6 a there is a point high</td>
</tr>
<tr>
<td>Th - 7.</td>
<td>low to high, sharp peaked to mainly diffuse, irregular shaped</td>
</tr>
</tbody>
</table>

3. Gravity Survey

Bouger anomalies are in milligals, with the elevations given in metres on figure 6. The assumed average rock density is 2.2 g/cm³.

The north eastern part of the E.L. is a circular zero gravity "anomaly" (G-1). A negative gravity anomaly (G-2) occurs in the north central part of the Exploration Licence. The shouth central to the east and north east centre of the E.L., there is a large +10 to 15 milligal positive anomaly (G-3). This is a large, broad, elliptical anomaly (65 Km x 45 Km to 15 Km) trends approximately 055°.
4. **Anomaly Correlations**

The gravity anomalies do not correlate with the radiometric on magnetic anomalies. In addition, the uranium and thorium anomalies show no correlations with the magnetic anomalies.

4.1 **Magnetic Anomalies**

Magnetic anomalies M-1; 2. a,b,c, correlate reasonably well with potassium anomalies K-6a and part of K-7. In addition, anomalies M-1 and K-6a correlate with the Diljin Fault zone. Anomalies K-7, M-4; 2. a,b,c, correlate with the West Branch Volcanic Member. The combination of magnetic anomalies M-1; a,b,c, could indicate the direction of dip of the Diljin Fault zone.

4.2 **Radiometric Anomalies**

Anomalies U-1, Th-1, K-1, TC-1 correlate with each other and almost perfectly with the mapped Grace Creek Granite. In addition, the above mentioned anomalies define the granite / Lower (?) Proterozoic metasediment contact very well.

Anomalies U-4, Th-3 (western part), K-3, TC-2 correlate with each other and the Birdie River Volcanics, which are below the Kombolgie Formation (north of Block C).

An anomalous area within the Kombolgie Formation is indicated by correlating anomalies U-5 and Th-3 (east of Block A).

The Quaternary alluvial / soil horizons, are indicated to be anomalous by correlating anomalies, U-6a, b; K-9 a,b; Th-5 and TC-4. These anomalies also cover the Diljin Hill Formation in that area.

Thorium anomaly Th-4 and total count anomaly TC-3b, trend north and mainly lies over the Kombolgie Formation. The southern part of these anomalies lie over Joe Fisher's Lower Proterozoic rock types.

Anomalies K-4 a,b adn TC-3b correlate, extend south of the E.L and are centred over station road.
Uranium anomalies U-2. a,b, 10 and 11 are within the Kombolgie Formation, the Birdie Creek Volcanic Member or the Edith River Volcanics. Only U-11 lies outside of Block A and the E.L. Uranium anomalies U-7. a,b, 8. a,b; and 9 correlate almost perfectly with Diljin Hill Formation.

Thorium anomaly Th-7 is over the Mullaman Beds (now called the Petrel Beds).

4.3 **Gravity Anomalies**

Positive gravity anomaly G-2, probably represents a late stage (?) felsic intrusive of the Grace Creek Granite.

Anomaly G-1, which is a negative gravity anomaly is unexplained by the surface geology. The anomaly most probably represents very light density rocks, such as felsic intrusions, at depth.

The large positive anomaly, G-3, is explained by a thickening of the Katherine River Group volcanics. The shape of the anomaly would indicate a northeast southwest trending thickened lens of volcanics and greywackes.

5. **Conclusions and Recommendations**

The following anomalies are considered interesting, and should be specifically followed up on the ground. The geology of the area is shown on figure 7.

<table>
<thead>
<tr>
<th>Anomaly</th>
<th>Priority</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-1, K-6a</td>
<td>medium-high</td>
<td>Diljin Hill Fault Zone</td>
</tr>
<tr>
<td>U-5, Th-3</td>
<td>medium</td>
<td>Kombolgie Formation</td>
</tr>
<tr>
<td>U-4, Th-3 (western part) K-3, TC-2</td>
<td>high</td>
<td>Birdie Creek Volcanic Member</td>
</tr>
<tr>
<td>Anomaly</td>
<td>Priority</td>
<td>Comments</td>
</tr>
<tr>
<td>------------------</td>
<td>------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>4. U-6a, b; K-9a, b; Th-5; TC-4</td>
<td>low-medium</td>
<td>Quarternary alluvial/soil horizons Diljin Hill Formation</td>
</tr>
<tr>
<td>5. U-2a,b; 10,11</td>
<td>medium</td>
<td>Kombolige Formation Edith River Volcanics Birdie Creek Volcanic Member</td>
</tr>
<tr>
<td>6. U-7a,b; 8a,b;9</td>
<td>medium-high</td>
<td>Diljin Hill Formation</td>
</tr>
</tbody>
</table>

Gravity anomaly B-2 and G-3 does not need to be checked out specifically. Their significance, if any, will be checked during the course of geological ground evaluation programme over the area as a whole.

A.C.A. HOWE AUSTRALIA PTY. LTD.

[Signature]

Steve A. Harnish
Project Geologist
APPENDIX II
Report (Letter Form) from Eupene Explorations Enterprises.

Dr. W.E. Schindlmayr,
The Exploration Manager,
Franzoesisch-Australasie Ltd.,
600 St. Kilda Road,
Melbourne, Vic. 3004

Dear Wulf,

E.L.'s 1902 & 1903 -
Secured Loans & Developments Ltd.

On 3.10.81, I made a helicopter reconnaissance of the above area in the company of Mr. W.J. Fisher, local representative of Secured Loans and Developments Ltd., and Mr. John Pearson of UGA Darwin.

The purpose of the visit was to determine whether the area was favourable for the presence of orebodies which fit UGA's exploration criteria, i.e. Alligator Rivers type, or unconformity-related, deposits.

Geology
The 1:250,000 mapping, based on data compiled in the 1950's is the most recent available, apart from a rationalization of the earlier mapping in BMR Bulletin 82 (Walpole et al., 1968). Essentially, apart from Cretaceous platform cover, the area is underlain by volcanics and sediments of the Carpentarian Katherine River Group, most of which were deposited in a sub-basin of the McArthur Basin termed the Upper Waterhouse Basin. An extract from Bulletin 82 is appended which describes in detail all that is published on this area. Our short visit does not enable me to improve on this.

In the south-west of E.L. 1902, a small inlier exposes Edith River volcanics, which underlie the Kombolgie Formation, but are still of Carpentarian age. All of the remainder of the area appears to contain Kombolgie or younger lithologies from the BMR mapping.

Exploration Models
(1) Uranium

The vendors have proposed the concept that the Carpentarian
Aren't may be thinner than is suggested by the BMK work, and that the Carpentarain/Lower Proterozoic unconformity may be exposed in erosional windows in the area. If this were the case, the potential for unconformity-type deposits would be enhanced.

In addition there is the potential for Westermoreland-type and other structurally-controlled deposits which might be found in the area, since rocks of similar age, lithology and structural situation are widespread.

2) Base Metals

Most volcanic members in sequences such as these are commonly enriched in base metals, particularly copper. Mr. Fisher has located traces of copper carbonates in carbonate lenses in the area, and these also have the potential for Pb/Zn accumulations under favourable conditions.

3) Diamonds

The area appears to contain some fairly fundamental structural features, such as the Diljin Hill Fault. In addition, the tectonic instability evident in the volcanic and sediment patterns of the Upper Waterhouse Basin suggests some fundamental crustal disturbance at least during the Carpentarain. The area thus has potential for diamonds.

4) Manganese

Field examination, some of the volcanic units appeared quite magnetiferous when weathered. It may be that suitable environments exist for manganese deposits, either as supergene concentrations or sedimentary deposits.

Discussion:

Of the concepts presented above, my understanding of the VCA philosophy is that only the unconformity-type model for uranium orebodies would fit their exploration criteria at present. This is a fairly narrow model, and could exclude much other potential. However, we shall only examine the potential for this concept within the areas as a result.

The concept would demand for its viability some indication that the Lower Proterozoic/Carpentarain unconformity was exposed in the area. While this is not be expected for the BMK work, such mapping is old, and was hurriedly done, so that there is usually room for reinterpretation, especially in this first-generation mapping. With this in mind, there were two possibilities worth examining within the area, where evidence of exposed (or nearly exposed) lower Proterozoic might be present:-
(1) In the extreme south-west of E.L. 1902, where Edith River Volcanics crop out beneath Cretaceous cover - it was possible that some Lower Proterozoic was missed in mapping. The area was inspected by helicopter, and several passes were made over it at low level with the scintillator. No anomalous readings for Edith River Volcanics were noted, and furthermore it appeared from the relationship of topography to geology that it was likely that a considerable thickness of either Edith River Volcanics or Kombolgie Formation would exist beneath the Cretaceous cover. It is unlikely that the unconformity is within 100m of the present surface in this area, and I could not recommend detailed investigations in the hope of locating uranium orebodies blind beneath such cover without other indications. These are not obvious to me.

(2) During earlier reconnaissance by W.J. Fisher of Secured Loans and Developments Ltd., a window through the Kombolgie Formation Sandstone was located in the valley of West Branch Creek. This contained green siltstones, thin amygdaloidal basalts, flaggy sandstones, carbonates and carbonatic siltstones, and a weathered red siltstone which appeared to have a steeper dip than the remainder of the section examined. This occurrence was not unlike typical weathered outcrop of carbonaceous shales of the Koolpin Formation, and the situation was suggestive of a window through to Lower Proterozoic. The area was examined on foot during our inspection of the E.L.'s, and a number of specimens were collected for petrographic examination.

It is my view that the sequence is part of the Diamond Creek Formation. I base this view chiefly on the macroscopic appearance of the red weathered shale: I believe it is unmetamorphosed, and we could expect any Koopln Formation outcrop to be more metamorphosed. However, we should await petrographic confirmation of this. If the outcrops are indeed part of the Diamond Creek Formation BMR mapping would suggest that a considerable thickness of the Carpentarian succession lies above the Lower Proterozoic in the area (see Fig. 16 in the attached extract from BMR Bulletin 52), and I could not recommend exploration for unconformity-type deposits there.

This is not to say that the area does not have potential for probably less spectacular deposits which may be controlled by dykes.
or faults, but these would not fit the UGA exploration criteria as I understand it.

A check on the available gravity information for the area suggests that the Grace Creek granite may extend at depth over much of the area, with perhaps some Lower Proterozoic sediments present at depth in the south-west corner. Extrapolating from nearest outcrops of Lower Proterozoic around Yeuralba and Maranboy, these are most likely of anything to be Burrell Creek Formation (i.e. too high up the Lower Proterozoic succession for uranium deposits).

Conclusions

1. I do not regard the area as being amenable to exploration for unconformity-related uranium deposits and therefore it does not fit UGA's target criteria as I understand them. This view is subject to confirmation by petrographic examination of specimens collected during our field visit.

2. This is not to say that the area is not worthy of exploration for other types of uranium deposits, or for base metals and diamonds.

Yours sincerely,

G.S. Eupene
A) GEOLOGICAL AND STRUCTURAL OVERVIEW

Geologically, the areas are located along the western margin of an eastward deepening eugeosyncline in which continental and marine (?) sediments are intercalated with sheet volcanic flows (i.e. amygdoloidal basalts). The sedimentary and interbedded igneous units were deposited disconformably on contorted metamorphic basement rocks and nonconformably on a lower Proterozoic granitic intrusion (Grace Creek Granite). The basement metamorphic and granitic rocks exposed to the west of the E.P.O.'s provided source material for the sediments underlying the permits. The source of the volcanic flows and associated tuffs appears to have been east of the permit area.
Since the area of the E.P.O.'s has only been geologically mapped by airphoto interpretation and subsequently checked by widely spaced reconnaissance geological traversing, details of depositional history and structural development of the eugeosyncline remain largely unknown. It is clear however, from the work completed to-date, that the formations in the area are cut by numerous faults one of which, namely the Diljin Fault, is regional in scope. Folding, although present is probably of a gentle open nature except possibly in the vicinity of the major faults where drag folding may occur.

B) MAIN FEATURES OF THE MAGNETIC DATA OF AREA 1902

The aeromagnetic maps covering Lease 1902 generally correlate well to the known geology and structure. The following is an itemized list of the main features noted:

1) The southwest corner of the block displays high magnetic intensity and variability which is characteristic and clearly indicative of the extent of the West Branch Volcanic Member.

2) Toward the northwest the contact of the volcanics and sediments is sharp. Overall the sediments show typically quiet, low intensity magnetic response in contrast with the volcanics. Where anomalies do occur, in most cases these can be explained as erosion windows through the sediments to the underlying basalts. In one instance however, an isolated circular shaped anomaly is present (coloured red on the map). Positive identification of this anomaly will only be possible by surface geological examination of the area.

.../3...
3) To the northwest of the band of sediments the nonconformable contact between the sediments and the Grace Creek Granite is marked by an abrupt change in the character of the magnetic response. The granite displays a relative increase in magnetic intensity and variability in comparison to the sediments. Linear magnetic patterns within the granite are attributable to either faults or joint planes.

4) In the northern portion of Lease 1902 the magnetic data is not as clearly related to geology as was found further south. This is probably a result of the partial masking of underlying volcanic units by a Cretaceous sedimentary cover. One circular shaped anomaly which is located with sediments in the northwest (coloured red on the map) cannot be positively related to the volcanics and will only be explained by field investigation. No other significant anomalies were noted.

C) MAIN FEATURES OF THE MAGNETIC DATA IN AREA 1903

As with the case with Lease 1902, the magnetic data over E.P.O. 1903 strongly correlates to known geology and structure. The following are the main features noted;

1) The most striking feature on the magnetic intensity contour plan is the Diljin Fault which strikes northeastward across the lease. It is well marked by a linear pattern of magnetic anomalies.

2) Large volcanic outcrops and smaller windows of volcanics are marked by relatively high magnetic intensity and variability. The larger bodies of basalt are located to the west of the Diljin Fault and in the southern portion of the eastern segment of the lease.

...4/...
3) The remaining areas of E.P.O. 1902 are underlain by sediments of a variety of types (i.e. sandstone, siltstone, chert, limestone and greywacke) and these areas display relatively quiet magnetics.

4) No isolated anomalies which could have economic significance are evident in this area of the survey.

D) CONCLUSIONS AND RECOMMENDATIONS

1) The aeromagnetic survey over E.P.O.'s 1902 and 1903 very accurately outlines the rock types and main geological structure in the area.

2) Areas of high variability in magnetic intensity can be directly related to basic volcanic rock types or major fault zones.

3) Two isolated magnetic highs were noted in area 1902. A ground check is necessary in the area of these anomalies to determine the cause of these features.

A.C.A. HOWE AUSTRALIA PTY. LIMITED

J. V. McCarthy
Senior Geologist
22 February 1982

APPENDIX IV

Amdel Service Report

GS 3/0/0

Euralba Mining Ltd.,
19 Kirkland Crescent,
Kahlin,
Darwin, N.T. 5790.

Attention: Mr. W.J. Fisher

REPORT GS 149/82

YOUR REFERENCE: Letter dated 6 July 1982

MATERIAL: 4 siltstones

LOCALITY: Northern Territory

IDENTIFICATION: 1-4

DATE RECEIVED: 8 July 1981

WORK REQUIRED: Rb-Sr geochronology

Investigation and Report by: Dr Alan Webb

Chief - Geological Services Section: Dr Keith J. Henley
Manager, Mineral and Materials Sciences Division: Dr William G. Spencer

bs/ 1:1

Keith Henley
for Norton Jackson
Managing Director.
Rb-Sr GEOCHRONOLOGY OF SILTSTONES

1. INTRODUCTION

Four samples of siltstones were received from Mr. W.J. Fisher with a request for Rb-Sr geochronology.

2. PROCEDURES

The samples did not carry a client's label so they were marked Nos. 1-4. No. 1 comprised small, pale brown, soft chips; No. 2, small, light grey chips; No. 3, two small greyish-purple pieces and No. 4, a larger, grey to light brown, slightly micaceous piece. Thin sections were not made because there was insufficient sample to allow for both thin section and analysis.

The four samples were pulverised and Rb and Sr concentrations determined by X-ray fluorescence spectrography and the samples with the most favourable Rb/Sr ratios were chosen for isotopic analysis.

Three samples (Nos. 1, 3 and 4) had similar Rb/Sr ratios, and since No. 4 contained obvious detrital mica flakes, it was considered to be unsuitable for further work.

Sr isotopic analyses were made by mass spectrometry on the remaining 3 samples. Due to a breakdown of the mass spectrometer and the delay in obtaining parts from overseas, work on these samples was delayed for several months.

3. RESULTS

The Rb-Sr isotopic analyses are listed in Table 1. When plotted on an isochron diagram ($^{87}\text{Rb}/^{86}\text{Sr}$ vs $^{87}\text{Sr}/^{86}\text{Sr}$), the data do not define a single straight line. This suggests that (1) the samples may not all be of the same age, (2) the sediments had different initial $^{87}\text{Sr}/^{86}\text{Sr}$ compositions, implying a lack of mixing or homogenisation during deposition, or (3) there has been a transfer of Rb and/or Sr into and out of the samples since the time of their formation. Since the samples come from the same rock unit, the reason for the dispersion of the data on the isochron plot must be a chemical process.

Sample No. 2 has an abnormally high Rb/Sr ratio, which may indicate an enrichment of alkalis, but it has the same age (1460 Ma) as sample No. 1 (1480 Ma) if an initial $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of 0.710 is assumed for these samples. Sample No. 3 gives an age of 1690 Ma for the same assumed value of initial $^{87}\text{Sr}/^{86}\text{Sr}$.

No firm conclusion can be drawn as to the depositional age of these siltstones although they appear to be of Proterozoic (probably Carpentarian) age.
<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Rb/Sr</th>
<th>(^{87}\text{Rb}/^{86}\text{Sr} )</th>
<th>(^{87}\text{Sr}/^{86}\text{Sr} )</th>
<th>Age ((x 10^6 y)) for initial (^{87}\text{Sr}/^{86}\text{Sr}=0.710)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.289</td>
<td>9.690</td>
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