 Exploration Licence 1444, N.T.

 Final Report

 C.J. Kojan
 February '80
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## 1977 EXPLORATION PROGRAM

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## 1979 EXPLORATION PROGRAM

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       AND RADIOMETRIC RESULTS
INTRODUCTION

EL-1444 was granted on March 15, 1977. The licence is located in the Napperby 1:250,000 Sheet area, north of Alice Springs, (Refer Fig. 1.)

The Licence was considered prospective for uranium, base and precious metal mineralisation. No mineral occurrences of interest had previously been reported from the Licence Area. However minor and precious metal mineralisation with anomalous uranium values occurs at the old Reward Mine to the west of the area and lithologies comparable to the mine host rocks (carbonaceous Lander Rock Beds) are believed to underly the southern part of EL 1444. The greater part of the Licence is underlain by gneisses and granulites comprising the centrally located Anmitjira Range.


Initial results were encouraging, highly anomalous uranium values were obtained from bore water in the southern part of the Licence and they appeared to relate to drainage from the Anmitjira Range, which showed a large number of airborne anomalies. Follow up work indicated that the radiometric anomalies related to monazite rich gneisses. Massive monazite was encountered at one anomaly (N1-4) but pitting and scintillometer gridding showed that the occurrence was of very limited dimensions.

EL 1444 will be relinquished at the end of the current term. (March 14 1980).
1977 EXPLORATION PROGRAM

AIRBORNE RADIOMETRIC SURVEY.

All tenements held on the ALCOTA, NAPPERBY AND MT. PEAKE SHEET areas have been systematically surveyed for uranium mineralisation, using an airborne detector system. A number of tenements on the HUCKITTA SHEET have also been systematically surveyed, including Red Tank, Molyhill, Unca Hill and Bonya Creek (part of). The systematic airborne survey work extended from late May to late September 77.

Equipment and Flight Details.

**Aircraft:** Cessna 182.
**Line Spacing:** 1 kilometre.
**Aircraft Speed:** 40-80 nautical miles per hour.
**Mean Terrain Clearance:** 400 feet.
**Detector System:** 4 crystal thallium activated sodium iodide sensor, total volume 452 cubic inches, (Scintrex GSA64), linked to a four channel gamma ray spectrometer, (Scintrex GAD-4) and chart recorder.
**Count Time:** 1 count/second.
**Data Recorded:** 4 channels - Total Count, Potassium, Uranium and Thorium. The compton stripping facility was not employed.
**Navigation:** Visual reference system using 1:84,000 scale air photos or 1:100,000 scale orthophotomaps. Reference points and corresponding fiducial numbers from a fiducial counter were marked on the appropriate flight line drawn on the air-photography. A fiducial trace was recorded on the chart together with the radiometric data.

Data Presentation. (Refer Fig. 5)

Anomalies have been plotted onto plans reproduced from the survey flight patterns. Anomalies have been distinguished using three parameters, namely local total count in relation to total count regional background, uranium count in relation to local uranium
background and uranium/thorium ratio. These parameters are shown in numerical form for each anomaly. (This data is not currently available in a drafted format).
RESULTS

A total of 39 airborne radiometric anomalies were detected in the survey and are shown on Figs. 2 and 5. On the basis of the magnitude of the 3 parameters outlined above and knowledge gained concerning the relationship between parameter strength and uranium content elsewhere in the region, it appears that at least 9 of these anomalies are due to anomalous concentrations of uranium.

BORE WATER SAMPLING

Bore water sampling was undertaken in the southern part of the Licence area. Results in parts per billion (ppb) uranium are as follows:

- Pine Hill Bore: 430 ppb
- Sandy Creek Bore: 170 ppb
- Hanks West Bore: 185 ppb

These results are all anomalous in relation to regional background (20-80 ppb).
INTRODUCTION

The Licence area is located in the Napperby 1:250,000 map sheet area. It was granted on March 15, 1977. It is considered to be prospective for uranium mineralisation.

GENERAL GEOLOGY  (Refer Fig. 2)

The major topographic feature in the Licence area is the Anmatjira Range (highest point Mt. Finniss, 979m), which consists of a series of Lower Proterozoic leucocratic and mafic gneisses, granulites and granites. The Tyson Creek Granulite (a fine grained massive biotite-hypersthene-clino-pyroxene-plagioclase mafic granulite) overlies the Weldon Granulites. These are a series of gneisses, granofels and granulites, sillimanite, oligoclase, orthoclase, garnet, biotite and cordierite forming the major mineral assemblages, with occasional clino and orthopyroxene, hornblende and spinel. Relationships between the members are confused, due to the intense folding, accompanied by faulting.

North-east of this sequence is the Anmatjira Granite, a coarse foliated granite, with porphyritic feldspars.

The Lower Proterozoic Lander Rock Beds outcrop sporadically in low hills on the southern margin of the Reynolds Range.

South of Pine Hill Homestead occurs the Yaningidjara Granite - a granite similar in mineralogy and texture as the Anmatjira Granite, but with garnet. Strong fault and shear zones, all trending north-west to south-east cut the rock types. Most are quartz filled, some are filled with mylonitic material.

No mineral occurrences have previously been reported from the Licence area. Minor copper, lead and zinc mineralisation occurs within brecciated vein quartz and muscovite schists of the Lander Rock Beds, at the Reward Mine, 20 kilometres west of the Licence area. Separate occurrences of very minor wolfram, gold and copper mineralisation are known from the Reward Mine area.

Copper mineralisation has also been reported from the White Hill Yard area, 7 kilometres south of the Licence area. Lander Rock Beds are faulted against formations of the Reynolds Range group (quartzites and locally calc-silicates), at this location.
EL.1444 continued...

A rare earth/uranium prospect has been discovered recently in the southern Anmatjira Range, to the north of the Pine Hill homestead, in the south of the Licence area.

WORK COMPLETED (1978-1979)

This has included office and fieldwork with the object of identifying the more significant airborne anomalies from the various airborne surveys, (Otter 1977, BMR 1976 plus an early undocumented BMR survey), and evaluating these anomalies in the field. A plan showing geology, anomalies and sample locations at a scale of 1:100,000 has been drawn up. Data sheets for anomalies and other sample locations are located in the Appendix, together with an Assay Data Summary.

Additional bore water samples have been taken and analysed for uranium. Results for all bore water analyses in the Napperby/Mt.Peake region, (which includes the Pine Hill Licence area), have been plotted on a 1:250,000 scale plan for the purpose of locating possible hydrothermal skarn uranium deposits in the Reynolds and Anmatjira Ranges and defining prospective targets for secondary uranium concentrations in Tertiary calcretes/carbonaceous sediments.

RESULTS

Following the 1977 airborne spectrometer survey, 41 anomalies were found. These did not include 2 anomalies reported from the earlier BMR radiometric survey. Of the 41 anomalies, 15 occurred over Quaternary alluvial sand, 26 on the granite or gneissic outcrop. Eleven anomalies were investigated in a short reconnaissance trip in December 1978 none proved to be due to anomalous concentrations of uranium and thorium. However, two anomalous sources of radioactivity were found during ground traverses.

- N1-4. This sample was found amongst rubble on a steep scree slope. Background readings on the Scintrex BGS-1SL average from 60 cps to 150 cps, highly localised (up to 1 metre across), anomalous zones gave 1000 cps on the surface. Shallow pits gave greater than 10,000 cps (off scale). Petrographic and assay results show that the radioactivity is due to uranium and thorium concentrations
(1000 ppm and 6.3% respectively) in the mineral monazite, a rare earth phosphate. The monazite occurs as the dominant mineral in a monazite-garnet gneiss. The unit in which the monazite-garnet gneiss occurs appears to have a maximum width of 300 metres (air-photo interpretation only). No field relationships are as yet known, as the anomalous rocks were found in shallow pits dug into a scree/rubble slope. Quartz-feldspar-biotite-gneisses outcropping nearby had a low count (less than 200 cps).

- **N1-7,8.** These samples were taken from the south-east of the range near anomaly PH-4. High radioactivity (750 cps) was encountered over a small detrital fan, surrounded by porphyroblastic feldspar-biotite quartz pencil gneisses. Deeply weathered chloritic schist at the bottom of a shallow pit gave 2000 cps on the BGS-ISL scintillometer. However, assay results (see Appendix) showed that the radioactivity was due to the relatively anomalous concentrations of thorium in the schist and gneiss. The samples were not assayed for rare-earths, but the possibility of monazite in the alluvial fan, and surrounding lithologies cannot be ruled out, as sediment samples were not taken.

- Bore waters were sampled where possible, and assayed for uranium. The Pine Hill Stock Bore is directly downstream from the monazite occurrence at N1-4, so its anomalous value of 720 ppb U in the ground water may be due to leaching of relatively extensive deposits of monazite, or other uranium rich mineral assemblages in this area. The low U content in the waters of the Home Bore, in the same drainage channel, does not reflect the uranium concentration in the groundwaters, as it is a shallow well collecting subsurface stream waters.

Sandy Creek Bore downstream from Pine Hill Stock Bore gave a lower, but still anomalous, value of 430 ppb U. This indicates dilution by uranium-poor waters running off the Anmatjira Range, between Pine Hill Stock Bore, and Sandy Creek Bore.

Hawk's Nest Bore gave the anomalous value of 310 ppb U, but this may only represent leaching from the high uranium-content granites of the Reynolds Range, rather than leaching or precipitation of a uranium body of economic interest. Bore water results are shown on the enclosed plan. (Refer Fig-7)
INTRODUCTION

The licence area is located in the Napperby 1:250,000 map Sheet area. It was granted on March 15, 1977. In March 1979, the eastern and northern portions of the E.L. were relinquished. In 1978, 11 out of 41 airborne anomalies, discovered by airborne spectrometer survey in 1977, were checked. None proved to be due to anomalous concentrations of uranium or thorium. Ground traversing in 1978 did reveal two radiometric anomalies, N1-4 (PH-13, 1979) and N1-7,8. N1-4, an occurrence of monazite garnet gneiss was checked in detail in 1979 by a scintillometer grid. N1-7,8 were rock samples from an area of chloritic schists reading 2000 c.p.s. A sample assayed at 740 ppm Th and 20 ppm U.

As part of the 1979 program Otter carried out a scintillometer survey over the N1-4 monazite prospect. Results of the survey indicated that the mineralisation was of very restricted dimensions. In addition seven previously unchecked airborne anomalies were evaluated by scintillometer.

GENERAL GEOLOGY (Refer 1978 Report and Fig 2)

WORK COMPLETED AND RESULTS (Refer Fig. 2 and 1978 Report)

This included gridding and scintillometer surveying of the monazite prospect (N1-4), discovered during reconnaissance traversing in 1978. In addition seven airborne anomalies were evaluated.
Excavation at the monazite prospect indicated that the monazite was confined to a pod or lens of approximately one metre in length, apparently conformable with the foliation in the gneiss host rock. Very high scintillometer counts (20,000 cps) were obtained at the prospect. Gridding and scintillometer surveying over an area of 100 x 100 metres surrounding the prospect failed to disclose any additional mineralisation.

Two 'hot spots' were noted with counts of 2800 cps and 6000 cps but again were very localised.

Of the twenty five airborne anomalies that remained to be checked in the reduced E.L., seven were evaluated by ground scintillometer (Scintrex BGS-2) on a southwest to northeast traverse across the trend of lithologies. The results were interesting e.g., PH-12 recorded upto 1800 cps in a quartz-feldspar-garnet lens in gneiss, probably enriched in monazite. Most anomalies occurred in gneiss. However, all anomalies were very localised and of no economic importance (Refer Radiometric Anomaly Sheets, Appendix). Anomalies located in creek gravel and alluvium varied from 60 to 200 cps.

* Channel samples (NI-410A and NI-410B) returned uranium values of 390 and 210 ppm and thorium values of 2.35% and 1.17% (Refer Appendix).
CONCLUSIONS AND RECOMMENDATIONS

* A monazite prospect, discovered in 1978 was relocated. The prospect was excavated and found to be of very limited dimensions. A scintillometer survey over the surrounding area disclosed two 'hot spots' but no significant mineralisation. No further work on the prospect is warranted.

* Seven additional airborne anomalies were field-checked. All were located in areas of gneiss outcrop. Highest scintillometer counts (1800 cps) were obtained from Anomaly PH-12, over a lens of quartz feldspar garnet, probably enriched in monazite. No further follow-up work in the licence area is warranted.
APPENDIX EL 1444

. Anomaly Detail Sheets
. Assay Data
. Petrography
. Expenditure
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH - 1

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: Napperby SF53-9

ANOMALY LOCATION: 298552 (Ref. Fig. 5)

INVESTIGATED BY: G. Turner

DATE: 30/11/78

GENERAL GEOLOGY:
Coarse, foliated biotite-garnet granite

PROBABLE ANOMALY SOURCE:
Garnetiferous granite

RADIOMETRIC DATA:
Instrument Type: Scintrex BGS-ISL
Reading at Outcrop: Max 220 cps
Av. B.G. 120 cps

ASSAY DATA:

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PETROGRAPHIC DESCRIPTION:  
Sample Number:
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH - 2

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: Napperby SF53-9

ANOMALY LOCATION: 298522 (Ref. Fig. 5)

INVESTIGATED BY: G. Turner

DATE: 30/11/78

GENERAL GEOLOGY:
Coarse foliated biotite - garnet granite

PROBABLE ANOMALY SOURCE:
Garnetiferous granite.

RADIOMETRIC DATA:

Instrument Type: Scintrex BGS-ISL

Reading at Outcrop: Max. 240 cps
AV. B.G. 120 cps

ASSAY DATA: None.

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PETROGRAPHIC DESCRIPTION: Sample Number:
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH - 3

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: Napperby SF53-9

ANOMALY LOCATION: 299 529 (Ref. Fig. 5)

INVESTIGATED BY: G. Turner

DATE: 1/12/78

GENERAL GEOLOGY:

Garnetiferous gneisses and granites,

PROBABLE ANOMALY SOURCE:

Biotite - quartz - feldspar gneiss, medium grained, strong foliation.

RADIOMETRIC DATA:

Instrument Type: Scintrex BGS-ISL

Reading at Outcrop: Max 250 cps

AV. B.G. 60 cps

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PETROGRAPHIC DESCRIPTION: Sample Number:
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH - 4

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: Napperby SF53-9

ANOMALY LOCATION: 305 526 (Ref. Fig. 5)

INVESTIGATED BY: G. Turner

DATE: 1/12/78

GENERAL GEOLOGY:

Foliated gneiss, granites coarse porphyritic feldspar gneiss.

PROBABLE ANOMALY SOURCE:

Not found

RADIOMETRIC DATA:

Instrument Type: BGS - ISL
Reading at Outcrop: Average 60 cps

ASSAY DATA:

None.

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PETROGRAPHIC DESCRIPTION: Sample Number:
ANOMALY NUMBER: PH - 5

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: Napperby SF53-9

ANOMALY LOCATION: 10 527 (Ref. Fig 5)

INVESTIGATED BY: G. Turner

DATE: 2/12/78

GENERAL GEOLOGY:
Foliated, coarse porphyritic granite.

PROBABLE ANOMALY SOURCE:
Granite (Garnetiferous)

RADIOMETRIC DATA:
Instrument Type: Scintrex BGS - ISL
Reading at Outcrop: Max 200 cps
Av. Background 150 cps

ASSAY DATA:
None

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PETROGRAPHIC DESCRIPTION: None

Sample Number:
ANOMALY NUMBER: PH - 6

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: Napperby SF53-9

ANOMALY LOCATION: 310 529 (Ref. Fig. 5)

INVESTIGATED BY: G. Turner

DATE: 2/12/78

GENERAL GEOLOGY:
Red sandy alluvium

PROBABLE ANOMALY SOURCE:
Not found

RADIOMETRIC DATA:
Instrument Type: Scintrex BGS-ISL
Reading at Outcrop: Av. B.G. 62 cps

ASSAY DATA: None.

Petrographic Description: Sample Number:
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH - 7

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: Napperby EF53-9

ANOMALY LOCATION: 301535 (Ref. Fig. 5)

INVESTIGATED BY: G. Turner

DATE: 2/12/78

GENERAL GEOLOGY:

Granitic creek sand, red sandy alluvium. No outcrop

PROBABLE ANOMALY SOURCE:

Unknown.

RADIOMETRIC DATA:

Instrument Type: BGS - ISL

Reading at Outcrop: Sand 150 cps

ASSAY DATA:

None.

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PETROGRAPHIC DESCRIPTION: Sample Number:
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH - 8
TENEMENT NUMBER: 1447
1:250,000 MAP SHEET: Napperby SF53-9
ANOMALY LOCATION: 302 535 (Ref. Fig. 5)
INVESTIGATED BY: G. Turner
DATE: 2/12/78

GENERAL GEOLOGY:
Biotite rich granite

PROBABLE ANOMALY SOURCE:
Tourmaline rich veins invading granite.

RADIOMETRIC DATA:
Instrument Type: BGS-ISL
Reading at Outcrop: Max. 250 cps
Av. BG. 150cps

ASSAY DATA:
None

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PETROGRAPHIC DESCRIPTION:
>95% Tourmaline, some zircon.

Sample Number: N2-1

T.S. 26337
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH - 9

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: Napperby SF53-9

ANOMALY LOCATION: 301534 (Fig. 5)

INVESTIGATED BY: G. Turner

DATE: 2/12/78

GENERAL GEOLOGY:
Large quartz vein in granite.

PROBABLE ANOMALY SOURCE:
Unknown.

RADIOMETRIC DATA:
Instrument Type: BGS - ISL
Reading at Outcrop: <100 cps.

ASSAY DATA: None.

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PETROGRAPHIC DESCRIPTION: Sample Number:
# Radiometric Anomaly Details

**Anomaly Number:** PH-10

**Tenement Number:** 1444

**1:250,000 Map Sheet:** Napperby SF53-G

**Anomaly Location:** 303 531 (Ref. Fig. 5)

**Investigated By:** G. Turner

**Date:** 2/12/78

**General Geology:**
Washouts in red alluvium no outcrop.

**Probable Anomaly Source:**
Unknown.

**Radiometric Data:**
Instrument Type: BGS - ISL
Reading at Outcrop: <100 cps

**Assay Data:** None.

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**Petrographic Description:**

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Sample Number:
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH-11

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: Napperby SF53-9

ANOMALY LOCATION: 305531 (Ref. Fig. 5)

INVESTIGATED BY: G. Turner

DATE: 2/12/78

GENERAL GEOLOGY:
Medium grained, homogeneous granite.

PROBABLE ANOMALY SOURCE:
Unknown

RADIOMETRIC DATA:
Instrument Type: Scintrex BGS-ISL
Reading at Outcrop: 120 cps background,

ASSAY DATA:
None.

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PETROGRAPHIC DESCRIPTION: Sample Number:
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH-12

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: NAPPERBY

ANOMALY LOCATION: 629213

INVESTIGATED BY: D. FORTOWSKI

DATE: 17TH MAY, 1979

GENERAL GEOLOGY:
Gneiss intruded by small pods of dolerite

PROBABLE ANOMALY SOURCE:
Quartz – feldspar – garnet lenses containing monazite

RADIOMETRIC DATA:
Instrument Type: BGS-2
Reading at Outcrop: Gneiss 400 cps
Scree Up to 1200 cps
Qtz – feldspar – garnet lens up to 1800 cps

ASSAY DATA:

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PETROGRAPHIC DESCRIPTION: Sample Number:
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH-13 (N1-4 1978)

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: NAPPERBY

ANOMALY LOCATION: 631212

INVESTIGATED BY: D. FORTOWSKI, C. KOJAN


GENERAL GEOLOGY: "Garnet Gneiss" intruded by small pods of dolerite and pegmatite dykes

PROBABLE ANOMALY SOURCE: "Monazite Gneiss" lenses within garnet gneiss

RADIOMETRIC DATA:

Instrument Type: BGS-2

Reading at Outcrop: Main "Monazite Gneiss" lens 20,000 cps + (off scale)
Adjacent lens 6,000 cps

ASSAY DATA: Assay (1979) ppm unless indicated

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<tr>
<td>Pit</td>
<td>N1-4/10A</td>
<td>390</td>
</tr>
<tr>
<td>Pit</td>
<td>N1-4/10B</td>
<td>210</td>
</tr>
<tr>
<td>Cont'd</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>N1-4/10A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N1-4/10B</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>N1-4/10B</td>
<td>0.45</td>
</tr>
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</table>

PETROGRAPHIC DESCRIPTION:
Garnet-Monazite-Biot-Rock (Gneiss)

Sample Number: 015
ANOMALY NUMBER: PH-14

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: NAPPERBY

ANOMALY LOCATION: 631215

INVESTIGATED BY: D. FORTOWSKI

DATE: 8TH AUGUST, 1979

GENERAL GEOLOGY: "Gneiss" intruded by dolerite and pegmatite dykes. NW-SE trending shear zones.

PROBABLE ANOMALY SOURCE: "Gneiss" containing enrichments of monazite.

RADIOMETRIC DATA:

Instrument Type: BGS-IS

Reading at Outcrop: Sheared "Augen Gneiss" 100 cps
                   Sheared Quartzite 100 cps
                   Dolerite 50 cps
                   Gneiss 300m. NE 400 cps

ASSAY DATA:

<table>
<thead>
<tr>
<th>Location Number</th>
<th>Sample</th>
<th>Element (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>U</td>
</tr>
<tr>
<td>Sample Number</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PETROGRAPHIC DESCRIPTION: Sample Number:
ANOMALY NUMBER: PH-15

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: NAPPERBY

ANOMALY LOCATION: 631216

INVESTIGATED BY: D. FORTOWSKI

DATE: 8TH AUGUST, 1979

GENERAL GEOLOGY: "Gneiss" intruded by dolerite and pegmatite dykes. NW-SE trending shear zones. Minor rafts of schist.

PROBABLE ANOMALY SOURCE: Pegmatite dykes.

RADIOMETRIC DATA:

Instrument Type: BGS-IS

Reading at Outcrop: "Augen gneiss" 100 cps
Biotite Schist 200 cps
Dolerite 60 cps
Pegmatite 200m SE 400 cps
of Anomaly

ASSAY DATA:

<table>
<thead>
<tr>
<th>Sample Location Number</th>
<th>Element (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
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</tr>
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<td></td>
</tr>
</tbody>
</table>

PETROGRAPHIC DESCRIPTION: Sample Number:
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH-16

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: NAPPERBY

ANOMALY LOCATION: .632217

INVESTIGATED BY: D. FORTOWSKI

DATE: 8TH AUGUST, 1979

GENERAL GEOLOGY: Alluvial plains adjacent to "gneiss" outcrop.

PROBABLE ANOMALY SOURCE: Unknown

RADIOMETRIC DATA:

Instrument Type: BGS-1S

Reading at Outcrop: Red Sandy Alluvium: 60-80 cps

ASSAY DATA:

<table>
<thead>
<tr>
<th>Location Number</th>
<th>Element (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PETROGRAPHIC DESCRIPTION: Sample Number:
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH-17

TENEMENT NUMBER: 1444

1:250,000 MAP SHEET: NAPPERBY

ANOMALY LOCATION: 628209

INVESTIGATED BY: D. FORTOWSKI

DATE: 18TH MAY, 1979

GENERAL GEOLOGY: Alluvial plain between granite and schist/gneiss outcrops.

PROBABLE ANOMALY SOURCE: ? Creek sediment

RADIOMETRIC DATA:

Instrument Type: BGS-2

Reading at Outcrop: Sand and gravel in creek 130-200 cps

ASSAY DATA:

<table>
<thead>
<tr>
<th>Location Number</th>
<th>Sample</th>
<th>Element (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>U</td>
</tr>
</tbody>
</table>

PETROGRAPHIC DESCRIPTION: Sample Number:
RADIOMETRIC ANOMALY DETAILS

ANOMALY NUMBER: PH-18
TENEMENT NUMBER: 1444
1:250,000 MAP SHEET: NAPPERBY
ANOMALY LOCATION: 627208
INVESTIGATED BY: D. FORTOWSKI
DATE: 18TH MAY, 1979

GENERAL GEOLOGY: Alluvial plain between granite and schist/"gneiss" outcrops.

PROBABLE ANOMALY SOURCE: Unknown

RADIOMETRIC DATA:
Instrument Type: BGS-2
Reading at Outcrop: Alluvium 150-200 cps

ASSAY DATA:

<table>
<thead>
<tr>
<th>Location</th>
<th>Sample Number</th>
<th>Element (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>U</td>
</tr>
</tbody>
</table>

PETROGRAPHIC DESCRIPTION: Sample Number:
**ANALYTICAL RESULTS**

Samples from: Otter Exploration N.L.
Area: Alice Springs.
Samples of: Rock.
Preparation: Crush, split and pulverize.
Batch No.: A 2929.

Sheet No.: 1.
Date: 13/6/79.

<table>
<thead>
<tr>
<th></th>
<th>U ppm</th>
<th>Th %</th>
<th>Ce %</th>
<th>La %</th>
<th>Y ppm</th>
<th>Nd %</th>
<th>Gd %</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1-4/10A</td>
<td>390</td>
<td>2.35</td>
<td>10.4</td>
<td>6.5</td>
<td>830</td>
<td>3.0</td>
<td>0.45</td>
</tr>
<tr>
<td>N1-4/10B</td>
<td>210</td>
<td>1.17</td>
<td>4.8</td>
<td>3.1</td>
<td>530</td>
<td>1.3</td>
<td>0.26</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Sm %</th>
<th>Dy ppm</th>
<th>Lr ppm</th>
<th>Yb ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1-4/10A</td>
<td>0.55</td>
<td>300</td>
<td>1000</td>
<td>&lt;100</td>
</tr>
<tr>
<td>N1-4/10B</td>
<td>0.45</td>
<td>150</td>
<td>600</td>
<td>&lt;100</td>
</tr>
</tbody>
</table>
## PINE HILL - ASSAY RESULTS SUMMARY

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Airborne Anomaly No.</th>
<th>W (50)</th>
<th>Sn (1)</th>
<th>Ta(100)</th>
<th>Nb(20)</th>
<th>U (4)</th>
<th>Th(4)</th>
<th>Rock Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>N30-1</td>
<td>PH-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>36</td>
<td>Granite</td>
</tr>
<tr>
<td>N1-4A</td>
<td>BMR</td>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.3%</td>
<td>Gneiss</td>
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<tr>
<td>-4B</td>
<td>BMR</td>
<td>690</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.35%</td>
<td>Gneiss</td>
</tr>
<tr>
<td>-4C</td>
<td>BMR</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1950</td>
<td>Gneiss</td>
</tr>
<tr>
<td>N1-7</td>
<td></td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td>740</td>
<td></td>
<td>Schist</td>
</tr>
<tr>
<td>N1-8</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>130</td>
<td></td>
<td>Pencil Gneiss</td>
</tr>
</tbody>
</table>

Detection limits in brackets, results in ppm unless otherwise stated.

Samples N1-4A, N1-4B, N1-4C were assayed for rare earth elements.

<table>
<thead>
<tr>
<th></th>
<th>Ce</th>
<th>La</th>
<th>Y</th>
<th>Nd</th>
<th>Gd</th>
<th>Sm</th>
<th>Dy</th>
<th>Er</th>
<th>Yb</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1-4A</td>
<td>10.1%</td>
<td>4.75%</td>
<td>2750</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N1-4B</td>
<td>6.9%</td>
<td>3.15%</td>
<td>1900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N1-4C</td>
<td>4750</td>
<td>2050</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>N1-4 Composite</td>
<td>9.2%</td>
<td>3400</td>
<td>3.98%</td>
<td>0.80%</td>
<td>0.34%</td>
<td>640</td>
<td>900</td>
<td>110</td>
<td></td>
</tr>
</tbody>
</table>

## STREAM SEDIMENT SAMPLES

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Airborne Anomaly No.</th>
<th>W (50)</th>
<th>Sn (1)</th>
<th>Ta(100)</th>
<th>Nb (20)</th>
<th>Rock Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1-1</td>
<td>PH-3</td>
<td>x</td>
<td>1</td>
<td>x</td>
<td>20</td>
<td>Sediment</td>
</tr>
<tr>
<td>N1-2</td>
<td>PH-3</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>&quot;</td>
</tr>
<tr>
<td>N1-3</td>
<td>PH-3</td>
<td>x</td>
<td>1</td>
<td>x</td>
<td>30</td>
<td>&quot;</td>
</tr>
<tr>
<td>N1-5</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>&quot;</td>
</tr>
<tr>
<td>N1-6</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>&quot;</td>
</tr>
<tr>
<td>N28-4</td>
<td></td>
<td>x</td>
<td>1</td>
<td>x</td>
<td>x</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

x = denotes below detection limit.
These two rocks are quite similar, with the same major minerals but slightly different fabric. Since the fabric is gneissic, and the major components are monazite and garnet, they may be termed monazite-garnet gneisses; however, they are of metasomatic origin and their fabrics are probably inherited, and the term "gneiss" may be inappropriate. The field relationships are important in the interpretation. Irrespective of this, they are most unusual rocks.

The main mineral in both rocks is monazite, occurring as well-defined, fresh, polygonal-euhedral crystals 0.2-0.6 mm in size forming mosaics. There are porphyroblastic garnet (grossularite) crystals up to 10 mm in size, containing monazite grains. Other minerals include interstitial and larger stressed patches of quartz, small and large masses of ilmenite, goethite pseudomorphs after pyrite.

Minor components include small shreds of biotite, small zoned zircon crystals, and occasional swarms of green spinel grains.

The identity of the monazite was confirmed by other optical methods, and that of ilmenite by XRD, since the possibility of minerals such as davidite had to be checked.

The mineral components are well-crystallized and unstressed (except for quartz), and are believed to have formed pyrometamorphically. It is believed that monazite is the sole source of radioactivity.
<table>
<thead>
<tr>
<th>Expenditure EL 1444 1977</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Salaries and Wages</strong></td>
</tr>
<tr>
<td><strong>Field Travel</strong></td>
</tr>
<tr>
<td><strong>Meals and Accommodation</strong></td>
</tr>
<tr>
<td><strong>Field Supplies</strong></td>
</tr>
<tr>
<td><strong>Field Office</strong></td>
</tr>
<tr>
<td><strong>Lease Rentals</strong></td>
</tr>
<tr>
<td><strong>Equipment Hire</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

**Portion of General Exploration Expenditure**: 5417

**Portion of Administration Expenses**: 1948

**Total**: $11560
<table>
<thead>
<tr>
<th>Expenditure</th>
<th>EL 1444 1978</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries and Wages</td>
<td>813</td>
</tr>
<tr>
<td>Maps and Drafting</td>
<td>40</td>
</tr>
<tr>
<td>Lease Rentals</td>
<td>550</td>
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<tr>
<td>Assay</td>
<td>406</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>1809</strong></td>
</tr>
<tr>
<td>Portion of General Expenditure</td>
<td>975</td>
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<tr>
<td>Portion of Administration Expenses</td>
<td>521</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$3305</strong></td>
</tr>
</tbody>
</table>
Expenditure EL 1444 1979

Project Expenditure 3,607
Portion of General Expenditure 1,136
Portion of Administration Expenses 2,319

$7,062
KEY: 1. (L) Anomaly indicating Total Count in relation to Regional Background. Uranium Concentrated in relation to local background and Uranium (Thorium) rocks.

2. * Anomalous Point and flight line from air photo. (Scale 1:84,000)