AFmeco Mining and Exploration Pty Ltd

FIRST ANNUAL REPORT 1997-1998

EL 3347 KUNBOHWINGGU JOINT VENTURE

ARNHEM LAND

NORTHERN TERRITORY

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P. Kastellorizos

July 1998
CONTENTS

1. INTRODUCTION

2. TENURE

3. LOCATION AND ACCESS

4. GEOLOGY

4.1 Regional Geology
4.2 Geology of the Kunbohwinjgu Area
   4.2.1 Nimbuwah Complex
   4.2.2 Katherine River Group (formerly Kombolgie Subgroup)
      Mamadawerre Sandstone
      Nungbalgarri Volcanic Member
      Gumarrimbang Sandstone
   4.2.3 Oenpelli Dolerite
   4.2.4 Structures

5. WORK COMPLETED AND RESULTS

5.1 Airborne Geophysical Surveys
5.2 Selected Radioactive Anomaly Reconnaissance
   5.2.1 Laterite Anomalies
   5.2.2 Thorium Anomalies
   5.2.3 Kaolinite - Laterite Anomalies
   5.2.4 Black soil - springs Anomalies
5.3 Steven's Anomaly

6. COMMENTS ON RESULTS

7. RECOMMENDATIONS
LIST OF FIGURES

1. EL 3347 Kunbohwinjgu J.V., Location Map
2. EL 3347 Kunbohwinjgu J.V., Geological Base
3. Correlation chart for Proterozoic Rocks of the East Alligator River Area
4. EL 3347 Kunbohwinjgu Tenement, Airborne Anomaly Reconnaissance Location Map
5. EL 3347 Airborne Anomaly Reconnaissance, Steven's Anomaly

LIST OF TABLES

1. Boundary Coordinates for EL 3347 Area

LIST OF PLATES

1. EL 3347 Residual Magnetic Intensity Contours (4 sheets)
2. EL 3347 First Vertical Derivative Magnetic Contours (4 sheets)
3. EL 3347 Total Count Contours (4 sheets)
4. EL 3347 Equivalent Potassium Contours (4 sheets)
5. EL 3347 Equivalent Thorium Contours (4 sheets)
6. EL 3347 Equivalent Uranium Contours (4 sheets)

LIST OF APPENDIXES

I. Airborne Spectrometric Survey Ground Anomaly Reconnaissance

II. Logistics Report of a Helicopter-Borne Magnetic/Radiometric Survey for EL 3419 & EL 3347, Alligator River Region, Northern Territory
1. INTRODUCTION

Exploration Licence 3347 (figure 1) was granted on the 28th of July 1997 for a period of 6 years. The EL lies approximately 310 km east of Darwin in West Arnhem Land, approximately 70 km east of Oenpelli and 40 km ESE of Nabarlek.

Exploration activities carried out in the first year of the licence included a helicopter-borne magnetic-radiometric geophysical survey, followed up by ground reconnaissance over 67 selected radiometric anomalies.

Five different types of radiometric anomalies were observed over the surveyed area. They are either related to uranium-thorium and or radon/radium sources. The most interesting anomaly, Steven's anomaly, is located in the north west part of the project area, where uranium was found associated with gold in altered Oenpelli Dolerite.

2. TENURE

EL 3347 was granted on the 28th of July 1997 for a period of six years and covers a total area of 770 square kilometres. Clockwise, from the NE corner, the boundary co-ordinates (AGD66, zone 53) of EL 3347 are:

Table 1: Boundary Coordinates for EL 3347 Area

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Interest holders in this joint venture comprise Afmeco Mining and Exploration Pty Ltd 19.6%, S.A.E Australia Pty Ltd 19.6%, UAL Pty Ltd 19.6%, Kumagai Gumi Company Ltd 19.6%, Savage Australian Exploration Pty Ltd 19.6% and Kunbohwijnjgu Aboriginal Corporation 2.0%. Afmeco Mining and Exploration Pty Ltd is the operator.

3. LOCATION AND ACCESS

EL 3347 is located on the upper Goomadeer River area in Western Arnhem Land (figure 1). Access to EL 3347 from Darwin is either by air either to the Nabarlek or Mamadawerre airstrips (out station located in the northern fringe of EL 3347). Road access is possible from Oenpelli to Mamadawerre road via the east Arnhem Highway, then by 4x4 all terrain vehicle along the Goomadeer River from Mamadawerre. Access from Myra Camp is usually via helicopter or via an old 4x4 track via Nabarlek to the northern western part of the tenement.

4. GEOLOGY

4.1 Regional Geology

West Arnhem Land is underlain by granitic and tonalitic migmatitic gneisses of the Nimbuwah Complex, which has an “l-type” pedigree and crystallisation ages of 1866 Ma. Field relationships suggest that the Nimbuwah Complex could contain older elements as it forms the basement for the overlying Kakadu Group and Cahill Formation sediments, which were metamorphosed in the 1870 to 1800 Ma Top End Orogeny. Recent work by exploration companies in West Arnhem Land have provided an informal sub-division of the Cahill Formation metasediments into four units: the calcsilicate unit (base), the lower arkosic unit, the amphibolitic unit (Zamu Dolerite) and the upper arkosic unit (top). This is overlain by the Nourlangie Schist. The calcsilicate unit is considered equivalent to the uranium bearing unit of the Lower Cahill Formation of the Jabiru area. The Nabarlek uranium deposit was hosted within the amphibolitic unit of the Lower Cahill Formation. The upper arkosic unit is interpreted as equivalent to the Upper Cahill Formation.
The metamorphic sequences of West Arnhem Land have been intruded by several post-orogenic granites, with minimum intrusion ages of 1750 and 1780 Ma. The extensive Oenpelli Dolerite, a flat-lying gabbroic body, intruded the Palaeoproterozoic rocks of the region around 1688 Ma. Recent field observations have revealed that the Oenpelli Dolerite has also intruded the Kombolgie Formation cover sequence.

The Katherine River Group, (including the formerly named Kombolgie Formation) is a widespread, several thousand metre thick sequence of late Palaeoproterozoic sandstones which unconformably overly the older metasediments. A thin basic volcanic member (Nungbalgarri Volcanics, Phn) divides the sandstones into two units in West Arnhem Land. They include the Mamadawerre Sandstone (Phe, ex Phk1) and Gumarrimbang Sandstone (Ph1, ex Phk2). The regional stratigraphic relationship are schematically illustrated in figure 3.

4.2 Geology of the Kunbohwinjgu Area

The Palaeoproterozoic metamorphic basement is represented by migmatitic and granitic rocks of the Nimbuwah Complex. It is exposed only in the NNW area of the tenement. In the southern portion of EL 3347, the basement may be at depths of 350-500 m (figure 2).

The Mamadawerre and Gumarrimbang sandstone units of the Katherine River Group cover most of the surface and are separated by the Nungbalgarri Volcanics. The Oenpelli Dolerite outcrops in two small areas and is expected to underlie the sandstones in the NW and possibly SW segments of the project area.
4.2.1 Nimbuwah Complex

The Nimbuwah Complex rocks are classified as mesocratic to leucocratic granitoid migmatite. The mesocratic bands of the migmatite are mainly medium-grained, whilst the leucocratic phases are mostly coarse-grained. The mineral assemblage is similar for all migmatite types. The minerals are quartz, feldspar, biotite, hornblende, sphene, zircon and apatite. Biotite and hornblende are the two main mafic minerals and usually coexist, they may be pseudomorphed by chlorite.

4.2.2 Katherine River Group (previously Kombolgie Formation)

*Mamadawerre Sandstone* - This is fine to coarse grained rock, consisting of medium to thick beds of white to grey quartzarenite. Rounded quartz pebbles to pebble-rich bands are common. Ripple marks with planar cross-bedding are present. The Mamadawerre Sandstone unconformably overlies the Nimbuwah Complex and is overlain by the Nungbalgarri Volcanic Member.

*Nungbalgarri Volcanic Member* - The unit is composed predominantly of massive basalts. The composition of the rocks ranges from basalt through trachybasalt and dacite to rhyodacite. Cherty rhyolite and ignimbrite occur locally. Quartz where present is interstitial and scattered opaques, including magnetite, hematite and pyrite are common. The rocks when altered are composed of chlorite, prehnite, sphene, epidote, carbonate and quartz.

*Gumarrimbang Sandstone* - Predominantly fine to medium grained consisting of medium to thick beds of pink to white quartz arenites. Pebble conglomerates are rare. At the base of the sequence cross-bedding dominates, whereas in the middle to upper part planar laminated beds are present. The Gumarrimbang Sandstone conformably overlies the Nungbalgarri Volcanic Member.
4.2.3 Oenpelli Dolerite

The Oenpelli Dolerite is a post-orogenic basic igneous rock which intruded the lower Proterozoic rocks at 1688 ± 13 Ma. It occurs as a flat lying body with very large undulations. Drilling elsewhere has demonstrated that the dolerite intruded not only the lower unit of the Mamadawerre Sandstone, but also the Nungbalgarri Volcanics. The main facies corresponds to a coarse-grained equigranular to porphyritic dolerite. Grain size usually decreases towards the intrusive contact and there are typical chilled-margins. As a result of the intrusion, silicification and chloritisation are present in the surrounding rocks, particularly in the sandstones.

4.2.4 Structures

Fault structures are widespread throughout the EL 3347 area. The faults occur over several kilometres and to date the presence or amount of displacement is unknown. Other structural lineaments include N30°, N70° to N80°, N120°, N160° to N170°. The Goomadeer Fault with a direction of N40° is the main fault zone within the tenement. Widely-spaced, curvilinear EW striking major faults also occur.

5. WORK COMPLETED AND RESULTS

5.1. Airborne Geophysical Survey

A helicopter borne radiometric and magnetic survey was carried out by Geoterrrex-Digham Pty Ltd, from the 30th of August until the 23rd of September 1997.

A total of 8500 line kilometres (780 km²) was surveyed with a Bell 206B Jet Ranger of Rotor Services Ltd from Darwin. The helicopter flew 60 metres above ground, at
an air speed of about 120 kilometres per hour. The flight line direction was N-S at a spacing of 100 metres with E/W tie lines, spaced at 1 kilometre.

The magnetometer was towed below the helicopter at 30 m above the ground. With a data recording rate of 10 samples per second, magnetic data were acquired approximately every 3 metres along the survey line. The results are presented in map form, as Residual Magnetic Intensity Contours and as First Vertical Derivative Magnetic Contours (Plates 1 and 2).

The gamma ray spectrometer was an Exploramum GR820 with a 16 litre crystal located on the floor of the helicopter. The sample rate was 1.0 per second (nominally every 30 metres). Total Count, Potassium, Thorium and Uranium results are presented as contour maps in Plates 3, 4, 5 and 6 respectively. The logistics report for the helicopter borne magnetic/radiometric survey is presented in appendix II.

5.2 Selected Radiometric Anomaly Reconnaissance

Over the whole tenement 67 U/Th radiometric anomalies were selected from the raw data (anologue printout) on a day to day basis during the survey (figure 4). The selection was based on high readings and/or high U/Th ratios. Some Th anomalies were included in this selection, keeping in mind the possibility of Th enriched external hydrothermal halos. Helicopter assisted ground reconnaissance took place subsequent to the survey and involved two geologists and a representative traditional land owner. Nearly all of the anomalous areas were sampled and have been assayed for U, Th, Au, Pt and Pd by Ultratrace, Perth, W.A. Detailed assay results are presented in appendix I. All radioactivity data acquired during the ground reconnaissance were measured in counts per second (cps) using a SPP2 scintillometer.
5.2.1 Laterite Anomalies

In the north central part of the EL, anomalies 22, 23, 41, 42, 43, 45 and 47 are sited within lateritic soils cemented with hematite and goethite or associated with in situ or reworked laterites (figure 4). Colluvial/alluvial deposits (100-200 cps) with readings of up to 240 cps, contained laterite granules and fragments with centimetric to decimetric clasts. The clasts comprise silicified andularia crystals and concentric crust or banded deposits of chalcedony/quartz are invaded by or coated with specular hematite and radiating fibrous aggregates of goethite. The feldspar - silica association/replacement maybe indicative of a hydrothermal event associated with the Nungbalgarri (or the Gilruth Volcanics?). Uranium assay results ranged from 2 ppm U to 23.9 ppm U. Thorium/Uranium ratios are 2/1. Anomalies 22, 23 and 41 have high Pt values, averaging 15 ppb. Gold values are low.

5.2.2 Thorium Anomalies

Thorium anomalies, up to 200 cps, in the south eastern part of the tenement, are associated with a laterite layer, 3 m thick, on top of the upper member of the Mamadawerre Sandstone. Anomaly 38 has a Th/U ratio of approximately 13/1 and anomaly 48 has a ratio of 21/1. Thorium anomalies, up to 260 cps, in the flat of the Goomadeer River, north western part of the tenement, are located within sandy brown soils and mud flats surrounding a hill where slightly foliated, biotite hornblende granitoids sub-outcrop. Anomaly 37 has a Th/U ratio of 17/1. Anomaly 17 has a Th/U ratio of 16/1.

5.2.3 Kaolinite - Laterite Anomalies

A series of anomalies lay in the same area, west of a N160°-170° prominent fault on the central east portion of the project. These include anomalies 49, 55, 24 and 57.
Anomaly 49 is located in the central east part of the tenement (Refer to figure 4). The surface background of 600 cps rises up to 850 cps at 30 cm depth. Kaolinite located in altered siltstone with oxy-hydroxides of iron occurs along the bed of a small creek, on top of Mamadawerre Sandstone, Phe. A slightly disturbed centimetric layer is preserved, suggesting a sedimentary origin (siltstone, mudstones). Geochemistry results show 109 ppm U, 10 ppb Pt and 17.8 ppm Th in white kaolinitic clays.

Anomaly 55 with a background of 250 cps with 300 cps at depth is composed of kaolinite with laterite mixed with chalcedony and quartz on the top of the Mamadawerre Sandstone. Geochemistry results show relatively moderate values of uranium with a maximum of 48.5 ppm U.

Close to the N160° - 170° structure a basal conglomerate on top of Mamdawerre Sandstone contains angular to sub angular clasts of banded or concentric chalcedony mixed with quartz. Anomalies 24 and 57 are located in that same stratigraphic unit and have a similar radiometric value at depth (200cps), as well as similar assay results. Anomaly 24 has 10 ppb Pt compared with 5 ppb Pt in anomaly 57.

5.2.4 Black Soil - Springs Anomalies

Anomaly 52, located about 1.6 km south of anomaly 49, is associated with water springs and black organic rich muds along a major NS structure. Radiometric values of up to 1700 c/s have been recorded within a pluri decimetric area; assay results of 7.25 ppm U and 4.05 ppm Th suggest that this anomaly is probably related to radon or radium.
5.3 Steven's Anomaly

Located in the NW corner of EL 3347, Steven's Anomaly corresponds to a N95°
elongate anomalous zone (airborne anomalies 2, 28, 30, 31 and 65) about 500 m in
length. It is located to the north of an inferred N95° faulted - or intrusive - contact
between the Oenpelli Dolerite (Pdo) and the Katherine River Group (Mamdawerre
sandstone, Phe) (figure 5).

Anomaly 2 composed of brown soil with oxidised dolerite fragments assayed 93 ppm
U, 4 ppb Au and 1.7 ppm Th. Anomaly 28 is also composed of brown soil with
oxidised fragments of coarse dolerite partially covered by, or mixed with, a
Mamdawerre sandstone scree slope. Weathered dolerite outcrops, in the bed of a
small running creek, contain scarce N95/80° N centimetric quartz veins with 700 c/s
on the surface and 3200 cps in shallow scrapings. The sample assayed 529 ppm U,
227 ppb Au with 219 ppm Th, possibly associated with quartz veining in altered
Oenpelli dolerite. Anomaly 30 is different in that the anomaly was located in the
scree slope of Mamdawerre sandstone on brown soil of dolerite. Surface counts
measured 750 cps with 2100 cps after shallow digging. Assay results are: 360 ppm
U, 110 ppb Au with 2.45 ppm Th. Anomaly 31 was sampled in light yellow soil with
laterite, near a termite mound (400 cps on surface and 850 cps at depth) and
assayed 39.3 ppm U and 14 ppb Au. Anomaly 65 (1100 cps) which was discovered
during the ground survey, is controlled by a N40° fissure. This assayed the highest
Au value in the weathered dolerite along the creek. It has values of 578 ppb Au, 212
ppm U and 3 ppm Th.

A preliminary air photo interpretation suggests that Steven's anomaly may be
spatially associated with a major N165° lineament. Several N15° elongated bodies
of druzy-quartz breccias, some of them around 10 metres wide, are outcropping in
the vicinity, as shown in figure 5.
6. COMMENTS ON RESULTS

Data processing of the magnetic and radiometric survey is on going. To date the best anomaly is Steven's anomaly with uranium and associated gold in Oenpelli Dolerite. Weak anomalies bearing platinium/paladium in laterite were observed in the central part of the project area. Kaolinite-laterite and black soil-spring anomalies are located west of a major N170° fault and lineament structure which could have acted a conduit for a favourable mineralising hydrothermal event.

Sixty seven (67) selected anomalies were selected for ground radiometric reconnaissance: other anomalies which may be defined by the ongoing data processing should be checked in the field.

7. RECOMMENDATIONS

- Follow up of any significant radioactive anomalies not yet checked in the field
- Stream sediment sampling over the tenement (helicopter-supported)
- Detailed radiometric ground follow up and mapping in the Steven's anomaly area
- Regional geological heli-drilling and sandstone sampling of core along cross sections, to identify the basement stratigraphy close to major interpreted structural features.
CORRELATION CHART FOR PROTEROZOIC ROCKS
OF THE EAST ALLIGATOR RIVER AREAS
AFMECO MINING AND EXPLORATION PTY LTD

EL 3347 KUNBOHWINGU J.V.
AIRBORNE ANOMALY RECONNAISSANCE LOCATION MAP
(Anomalies selected from raw data)

- **U anomaly associated with Oenpelli dolerite**
- **U (?) springs and black mud anomaly**
- **U-Th anomaly, kaolinitic clays**
- ***12 Anomaly in laterites and alluvial deposits**

Figure 4
Anomaly nb - c/s SPP2
150 c/s SPP2
Oepelle Dolerite
Mamadawre Sandstone (Kombolgie Subgroup)
Breccia
Fault
Lineament
Creek

SCALE 1 : 10 000

EL 3347 KUNBOHWINJGU J.V.
AIRBORNE ANOMALY RECONNAISSANCE
STEVENS ANOMALY

Figure 5
APPENDIX I:
EL 3347
KUNBOHWINJGU
AIRBORNE SPECTROMETRIC SURVEY GROUND
ANOMALY RECONNAISSANCE
## EL 3347 Airborne Spectrometric Survey Ground Anomaly Recon.

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<th>CPS DIG</th>
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Thursday, 26 March 1998

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APPENDIX II:
EL 3347
KUNBOHWINJGU

LOGISTICS REPORT OF A HELICOPTER-BORNE MAGNETIC/RADIOMETRIC SURVEY FOR EL 3419 & EL 3347, ALLIGATOR RIVER REGION,
NORTHERN TERRITORY
LOGISTICS REPORT OF A HELICOPTER-BORNE
MAGNETIC/RADIOMETRIC SURVEY
FOR AFMECO MINING AND EXPLORATION PTY LIMITED

EL 3419 & EL 3347,
ALLIGATOR RIVER REGION, NORTHERN TERRITORY
AUSTRALIAN MAP SHEETS
SD 53-01 "ALLIGATOR RIVER", SD 53-02 "MILINGIMBI"

JOB NO. 3-488
March, 1998

GEOTERREX - DIGHEM PTY. LTD.
7-9 GEORGE PLACE, ARTARMON NSW 2064, AUSTRALIA

Compiled by
Daniel Newman
ABSTRACT

This report describes the logistics and results of a magnetic / radiometric geophysical survey carried out by Geoterrex-Dighem Pty Limited for AFMECO Mining and Exploration Pty Limited, over two areas near Myra Falls, Northern Territory. Total coverage of the survey areas and rim flights amounted to 9,306.2 line kilometres. The survey was flown during August and September 1997.

The purpose of the survey was to delineate fault and fracture zones which may host gamma-ray emitting conductive clays and to provide information that could be used to map the geology and structure of the survey areas. Data were collected with a towed bird below a Bell 206B JetRanger helicopter (VH-JRO).

Magnetic data was collected in a towed bird with a highly sensitive Cesium magnetometer. Radiometric data was collected using a helicopter-borne sodium iodide crystal spectrometer. The information from these sensors were processed to produce maps which display the magnetic and radiometric properties of the survey areas. The navigation system used GPS with real time corrections from Fugro’s Starfix system.
10. APPENDIX D. RMS THERMAL PAPER STORAGE ................................................................. 27

FIGURES

FIGURE 1: LOCATION MAP: EL 3347 SURVEY AREA .......................................................... 2
FIGURE 2: LOCATION MAP: EL 3419 SURVEY AREA .......................................................... 3
FIGURE 3: SAMPLE ANALOGUE ......................................................................................... 9
FIGURE 4: DAILY SOURCE CHECKS .................................................................................. 23
FIGURE 5: MYRA FALLS TEST LINE .................................................................................. 24

TABLES

TABLE 1: SURVEY AREAS ................................................................................................. 1
TABLE 2: SURVEY PROGRESS .......................................................................................... 4
TABLE 3: SURVEY PERSONNEL ......................................................................................... 4
TABLE 4: AIRBORNE EQUIPMENT SPECIFICATIONS ....................................................... 5
TABLE 5: EXAMPLE OF A MAGNETIC LAG TEST ............................................................... 11
TABLE 6: RADIOMETRIC PROCESSING COEFFICIENTS .................................................... 14
TABLE 7: LOCATED DATA TAPE FORMAT 1 SAMPLES / SECOND - SURVEY AREAS .... 16
TABLE 8: LOCATED DATA TAPE FORMAT 10 SAMPLES / SECOND - SURVEY AREAS .... 16
TABLE 9: LOCATED DATA TAPE FORMAT 1 SAMPLES / SECOND - RIM FLIGHTS ......... 16
TABLE 10: DAILY SPECTROMETER SOURCE CHECKS .................................................... 22
TABLE 11: TEST LINE COORDINATES ............................................................................. 24
1. INTRODUCTION

A magnetic / radiometric survey was flown by Geoterrax-Digheim Pty Limited for AFMECO Mining and Exploration Pty Limited, from the 30th of August to the 24th September 1997. The survey areas were located in the Alligator River region, Northern Territory. The survey areas can be located on the Australian 1:250,000 Map Sheets: SD 53-01 "Alligator River" and SD 53-02 "Milingimbi".

Survey coverage consisted of 9,306.2 line kilometres, flown in 46 flights. Tie lines were flown perpendicular to the flight lines for both of the survey areas. The details of the survey areas are given in the table below.

The survey employed a magnetic and radiometric surveying system. Ancillary equipment consisted of a radar altimeter, video camera, analogue and digital recorders and an electronic navigation system. The instrumentation was installed in a Bell 206B JetRanger helicopter (Registration VH-JRO), provided by Helicopter Resources Limited. The helicopter was flown at an average airspeed of 100km/h with an magnetometer bird height of 30 metres.

Table 1: Survey Areas

<table>
<thead>
<tr>
<th>Area</th>
<th>Base of Operations</th>
<th>Line Kilometres</th>
<th>Line Direction</th>
<th>Line Spacing (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL 3419</td>
<td>Myra Falls</td>
<td>617.1</td>
<td>0° / 180°</td>
<td>100</td>
</tr>
<tr>
<td>EL 3347</td>
<td>Myra Falls</td>
<td>863.1</td>
<td>0° / 180°</td>
<td>100</td>
</tr>
<tr>
<td>Rim Flight 0001</td>
<td>Myra Falls</td>
<td>5.0</td>
<td>20° / 200°</td>
<td>N/A</td>
</tr>
<tr>
<td>Rim Flight 0002</td>
<td>Myra Falls</td>
<td>21.0</td>
<td>170° / 350° &amp; 45° / 225°</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Figure 1: LOCATION MAP : EL 3347 Survey Area
Scale : 1:250,000
Figure 2: LOCATION MAP: EL 3419 Survey Area
Scale: 1:250,000
2. SURVEY OPERATIONS SUMMARY

Table 2: Survey Progress

<table>
<thead>
<tr>
<th>Date</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 1997</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Mobilise to Myra Falls, equipment set-up, tests flight, flight 1</td>
</tr>
<tr>
<td>September 1997</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Begin production on EL 3419, flight 2,3, equipment repair</td>
</tr>
<tr>
<td>2</td>
<td>Equipment repair</td>
</tr>
<tr>
<td>3</td>
<td>Equipment repair</td>
</tr>
<tr>
<td>4</td>
<td>Flight 4,5,6,7, EL 3419 completed</td>
</tr>
<tr>
<td>5</td>
<td>Helicopter stand-by day</td>
</tr>
<tr>
<td>6</td>
<td>Begin production on EL 3347, flight 8,9,10,11</td>
</tr>
<tr>
<td>7</td>
<td>Equipment repair</td>
</tr>
<tr>
<td>8</td>
<td>Flight 12,13,14</td>
</tr>
<tr>
<td>9</td>
<td>Flight 15,16,17</td>
</tr>
<tr>
<td>10</td>
<td>Flight 18,19 ½ day stand-by (windy)</td>
</tr>
<tr>
<td>11</td>
<td>Flight 20,21</td>
</tr>
<tr>
<td>12</td>
<td>Flight 22,23,24</td>
</tr>
<tr>
<td>13</td>
<td>Flight 25,26,27</td>
</tr>
<tr>
<td>14</td>
<td>Flight 28,29</td>
</tr>
<tr>
<td>15</td>
<td>Flight 30,31,32</td>
</tr>
<tr>
<td>16</td>
<td>Flight 33,34</td>
</tr>
<tr>
<td>17</td>
<td>Flight 35,36, ½ stand-by (gearbox problems)</td>
</tr>
<tr>
<td>18</td>
<td>1 day stand-by (gearbox repair)</td>
</tr>
<tr>
<td>19</td>
<td>½ day stand-by (gearbox repaired &amp; inspected by engineer), flight 37</td>
</tr>
<tr>
<td>20</td>
<td>Flight 38,39</td>
</tr>
<tr>
<td>21</td>
<td>Flight 40,41</td>
</tr>
<tr>
<td>22</td>
<td>Flight 42,43</td>
</tr>
<tr>
<td>23</td>
<td>Flight 44,45,46, EL 3347 completed, tie lines &amp; rim flying completed</td>
</tr>
<tr>
<td>24</td>
<td>Demobilise from Myra Falls</td>
</tr>
</tbody>
</table>

Table 3: Survey Personnel

<table>
<thead>
<tr>
<th>Position</th>
<th>Crew Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crew Manager</td>
<td>Drewett</td>
</tr>
<tr>
<td>Pilots</td>
<td>Bitcon*, Hamilton*</td>
</tr>
<tr>
<td>Aircraft Engineer</td>
<td>Taylor</td>
</tr>
<tr>
<td>Electronics Technician</td>
<td>Eichorn</td>
</tr>
<tr>
<td>Geophysicist / Processor</td>
<td>Pulford, Donnollan</td>
</tr>
</tbody>
</table>

* employees of Helicopter Resources Limited
3. SURVEY EQUIPMENT

This section provides a brief description of the geophysical instruments used to acquire the survey data.

Table 4: Airborne Equipment Specifications

<table>
<thead>
<tr>
<th>System Parameters</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft</td>
<td>Bell 206B JetRanger</td>
</tr>
<tr>
<td>Navigation</td>
<td>Real time DGPS</td>
</tr>
<tr>
<td>Nominal aircraft speed</td>
<td>100km/h (28m/s)</td>
</tr>
<tr>
<td>Nominal Aircraft Height (m)</td>
<td>60</td>
</tr>
<tr>
<td>Magnetic Bird Height (m)</td>
<td>30</td>
</tr>
<tr>
<td>Radiometric Crystal Height (m)</td>
<td>60</td>
</tr>
<tr>
<td>Sample Interval (seconds)</td>
<td>0.1 - magnetic data</td>
</tr>
<tr>
<td></td>
<td>1.0 - radiometric data</td>
</tr>
</tbody>
</table>

3.1 Data Acquisition System

Model: Geoterrex-Dilghem Pty Limited GEODAS

The GEODAS is a computer-based software system which runs multiple DOS programs in a multi-tasking environment. The modular design of the GEODAS allows for reconfiguring of the system to record different types of surveys by adding, removing or changing task modules.

Data is recorded on hard disks and a cartridge tape system is used for data transfer to the field processing centre.

The following are recorded digitally using the GEODAS every second:

- Flight number
- Navigation data
- Fiducial number (time in seconds)
- Barometric pressure
- Altitude (radar and barometer) (every 0.1 secs)
- Ambient humidity
- Ambient temperature
- Gamma spectrometer live time
- 256 gamma spectrometer channels
- Total magnetic field (every 0.1 secs)
3.2 Magnetometers

3.2.1 Airborne Magnetometer

Model: Cesium vapour optical absorption magnetometer - Cs₂
Field measured: Total magnetic field
Mounting: Towed bird
Sample period: 50 milliseconds
Sample interval: 0.1 seconds (nominally 3 metres)
Sensitivity: 0.001 nanoTeslas (nT)

3.2.2 Base Station Magnetometer

Model: G856 Proton Precession
Sample interval: 5 seconds
Sensitivity: 0.1 nT

The base station is set up in an area of minimum magnetic noise and away from high magnetic gradients. A second base station is operated as a back up.

3.3 Airborne Gamma Ray Spectrometer

Model: Exploranium GR-820 (self calibrating) airborne spectrometer
Detectors: 5 all directional NaI crystals, 4.195 litres each. Crystals, photomultiplier tubes and preamplifiers are protected by internal shock mounting and from thermal extremes by internal insulation. Automatic gain control based on tracking the Thorium peak is an important feature of the GR-820 spectrometer and counteracts any effects caused by temperature variations.
Channels: 256 channel conversion
Sample rate: 1.0 second (nominally 33 metres)
Synchronisation: The spectrometer sample is allocated to the time recorded at the end of the sample interval.

Window Definitions:

- Total Count - Channel 34 to 254
- Potassium - Channel 115 to 133
- Uranium - Channel 139 to 161
- Thorium - Channel 206 to 239
- Cosmic - Channel 255

Window MeV:

- Total Count - 0.4 to 3.0 MeV
- Potassium - 1.35 to 1.57 MeV \(^{40}\text{K}, 1.46\text{ MeV}\)
- Uranium - 1.63 to 1.89 MeV \(^{210}\text{Bi}, 1.76\text{ MeV}\)
- Thorium - 2.42 to 2.81 MeV \(^{232}\text{Th}, 2.61\text{ MeV}\)
- Cosmic - 3.01 to 6.00 MeV

The results from the four defined windows and one cosmic channel are displayed on the aircraft chart recorder. This data, spectrometer live time, all of the raw channels above and including channel 23, representing the gamma ray spectrum above 0.4 MeV are recorded on digital tape.
3.4 Tracking Camera

Type: Panasonic Video
Model: AG 2400 / WVCD132

The tracking camera is equipped with a 4 mm wide-angle lens. The video tape is synchronised with the geophysical record by a digital fiducial display that increments every tenth of a second. These fiducials are recorded on the video tape and displayed on the bottom left of the video screen. Times are recorded from the digital information provided by the GEODAS system. This procedure ensures accurate correlation of analogue and digital data with respect to visible features on the ground.

3.5 Altimeters

3.5.1 Barometric Altimeter

Model: A.I.R
Type: Digital Recording Barometric Altimeter
Sample Interval: 0.1 second
Sensitivity: 0.3 metres

3.5.2 Radar Altimeter

Model: Sperry Stars AA300 radio altimeter system
Sample interval: 0.1 second
Accuracy: 1 metre

The Sperry radio altimeter is a high quality instrument whose output is factory calibrated. It is fitted with a test function which checks the calibration of a terrain clearance of 100 feet and altitudes which are multiples of 100 feet.

3.6 Navigation System (RT-DGPS) and Post-Processing Trajectography

DGPS Equipment: OMNISTAR MK-2 real time satellite Differential GPS system with WGS84 lat/long co-ordinates.
Differential Corrections: Omnistar Plus by Fugro Starfix Pty Ltd
GPS Equipment: Sercel NR-103 GPS acquisition unit and base GPS station with palm-top data recorders
Sample rate: 1 per second

The Global Positioning System (GPS) is a line of sight, satellite navigation system which utilises time-coded signals from at least four of the twenty-four NAVSTAR satellites. GPS signals provide a raw position. The Starfix system receives GPS differential corrections via satellite which are applied real time. The on-board system calculates the flight path of the helicopter while providing real-time guidance.

The GPS records data relative to the WGS84 Conversion software is used to transform the WGS84 co-ordinates to Australian Map Grid (AMG) co-ordinates.

The positioning accuracy of the real time differential GPS navigation system and the post-processing Sercel GPS positioning was checked by hovering over published coordinates (trig stations). The flight path was recovered, plotted and checked against the flight video tracking with the fid numbers.
3.7 Analogue Recorder

Model: RMS GR33 Thermal Dot Matrix Printer
Chart speed: 11 cm/minute; time increases from left to right
Chart width: 30.5 cm
Event marks: 20 second marks are recorded on the bottom of the chart with the associated fiducial numbers being printed at the base of the chart.
Channels Displayed: Total magnetic field - fine and coarse scale
Magnetic 4th difference
Barometer
Terrain clearance - radar
Upward looking uranium channel
Total counts
Cosmic counts
Potassium channel
Uranium channel
Thorium channel
Figure 3: Sample Analogue
4. SPECTROMETER CALIBRATION AND PROCEDURES

4.1 Background Determination

All radiometric data is corrected for aircraft background and cosmic background. The aircraft background in each channel is constant, while the cosmic background in a channel varies and is related to the cosmic counts (counts for energies >3.0 Mev). The value of the coefficients for the backgrounds is determined in a test flight over a site with negligible radiometric response, typically a water body.

The coefficients used in this survey came from a test flight flown off the coast of Darwin at the conclusion of the survey. The test was flown over the ocean with the spectrometer system correctly calibrated as for survey work. Data was recorded for 60 secs at 1000 foot intervals from approximately 1000 feet to 7000 feet ASL.

Cosmic test : 24/09/97

TC  background  =  0.506 x Cosmic + 74.56
K   background  =  0.004 x Cosmic + 7.58
U   background  =  0.009 x Cosmic + 4.41
Th  background  =  0.031 x Cosmic + 0.83

Here:

*cosmic*  =  counts of energies greater than 3.0 MeV stored in channel 255.

*background*  =  counts to be subtracted from window #.

The cosmic test results used to get these coefficients are given in Appendix A.

4.2 Source and Test Line Checks

The operation of the spectrometer system is checked daily, both on the ground and then as the system is airborne and in survey configuration.

On the ground at the beginning and end of each selected day, readings are taken from a uranium source, a thorium source and from the background. Total counts, uranium and/or thorium channels are recorded for each source. The source is held in a standard position relative to the crystals and the aircraft in a standard parking position. Recordings are taken for 200 seconds.

On the ferry to the survey area, a test line of at least 5 km length is recorded at survey altitude at the beginning of each day. This checks the operation of the system in survey configuration and for the presence of excessive radon in the atmosphere.

The results of the daily source checks and test lines are presented in Appendix B. Appendix B also has the location of the test lines flown for each base of operations.
5. CALIBRATIONS AND PROCEDURES

5.1 Magnetometer Calibrations

The following calibration tests were carried out for the magnetometer during the survey. The standard "Figure of Merit" test, which measures aircraft effects on the measured magnetic field as the aircraft manoeuvres is not applicable to operations with a helicopter towed bird because the helicopter is approximately 30 metres from the bird and effects are negligible, consequently no compensation coils are needed on the bird to compensate for the helicopter.

5.2 Cloverleaf Test

The magnetic heading effect was determined by flying a cloverleaf pattern oriented in the same directions as the survey lines and control lines. It was flown to determine the effect on the sensor reading, sensor heading and the associated sensor orientation relative to the direction of the earth's magnetic field. At least two passes in each direction were flown over a recognisable feature on the ground in order to obtain sufficient statistical information to estimate the heading error. The heading error was determined before survey commencement, and after any modifications or equipment additions were made to the aircraft.

5.3 Parallax

This test is also known as a lag test. The aircraft was flown in opposite directions over a sharp magnetic anomaly with the navigation system and magnetometer operating. The position of the magnetic high is determined from the navigation system for each line direction. The numerical difference in position is the 2-way or total lag. The lag to be applied to each direction is this value divided by two. Varying lag due varying ground speed will be compensated for in the processing.

Table 5: Example of a Magnetic Lag Test

![Graph showing magnetic field intensity over a generator shed 1997 with line 500/3 and 500/2, peak to peak offset indicated]
5.4 GPS Positioning Tests

A position accuracy test of the real time satellite DGPS - OMNISTAR navigation system and the Sercel post-processed GPS positioning system was carried out during the survey. The helicopter hovered visually over a known point (government trig station U529).

The position of the Sercel GPS base station was located by placing the mobile Sercel unit on a known trig location and monitoring the movement of the base station at the processing centre (hotel). The position of the processing centre base station GPS was averaged for data recorded over two hours. The Z component of the positioning test can also be used to compare against the radar and barometric altimeter data.

5.5 Barometric Altimeter Calibration

The Sperry radar altimeter is a high quality instrument with a factory calibrated output. It is fitted with a test function which checks the calibration of a terrain clearance of 100 feet and altitudes which are multiples of 100 feet. The barometric data are also calibrated by comparison of data recorded at the airport prior to take-off with the known altitude of the airport as well as a hover test directly above the same point or above a trig point. Calibration of the altimeter systems was routinely undertaken.

5.6 Radar Altimeter Calibration

Once the barometric altimeter is calibrated, the data from the radar altimeter from the same tests can be properly calibrated. This is a very straightforward procedure. Since the altitude at ground is known for both radar altimeter and barometric altimeter, the calibrated barometric altitude for a hover test over the same point is also known, then the radar altimeter data can be checked directly against this. Any variations may be due to atmospheric variations. Via hover tests at a number of different altitudes, a regression can be created to compare atmospheric pressure readings against barometric altimeter and radar altimeter data. Calibrations are performed by comparing the radar altitude with the suitable barometer during flights at altitudes of 100m, 200m and 500m above the base air strip or some other suitable location with known elevation and flat terrain.
6. PRODUCTS AND PROCESSING

6.1 Magnetics

6.1.1 Diurnal Levelling

Base station data is edited so that all significant spikes, level shifts and null data are eliminated. The data is re-sampled and synchronised to the airborne fiducial system prior to subtraction from airborne magnetic readings.

6.1.2 Synchronisation Lag

Magnetic data is lagged to be synchronised with the navigation data.

6.1.3 IGRF Removal

The International Geomagnetic Reference Field (IGRF) 1995 model (updated for secular variation) is removed from the levelled total field magnetics. Finally an arbitrary datum of 2000 nT is added back.

6.2 Radiometrics

6.2.1 Reduction to Standard Temperature and Pressure

The radar altimeter data is converted to effective height \( h_e \) in feet using the acquired temperature and pressure data, according to the following formula:

\[
h_e = h^* \frac{273.15}{T + 273.15} \star \frac{P}{1013.25}
\]

where:
- \( h \) is the observed radar altitude in feet
- \( T \) is the measured air temperature in degrees Celsius
- \( P \) is the barometric pressure in millibars

6.2.2 Live Time Correction

All radiometric channels are corrected for the amount of time that the system was unable to receive signals due to internal processing.

\[
C_e = C_{raw} \star \frac{1000.0}{L}
\]

where:
- \( C_e \) is the live time corrected channel in counts per second
- \( C_{raw} \) is the raw channel data in counts per second
- \( L \) is the live time in milliseconds

6.2.3 Aircraft and Cosmic Background

Aircraft background and cosmic stripping corrections are applied to the total count, potassium, uranium, thorium and upward uranium channels using the following formula:

\[
C_{bc} = C_e \star (a_e + b_e \star \text{Cos} \theta)
\]

where:
- \( C_{bc} \) is the background and cosmic corrected channel
- \( C_e \) is the live time corrected channel
- \( a_e \) is the aircraft background for this channel

AFMECO Mining and Exploration Pty Limited March, 98
b_c is the cosmic stripping coefficient for this channel
Cosrc is the filtered Cosmic channel

6.2.4 Compton Stripping

Following the cosmic correction, the potassium, uranium and thorium are corrected for spectral overlap using the following formulae:

\[ K_c = K_{sc} - \beta \cdot U_{sc} - \gamma \cdot Th_{sc} \]
\[ U_c = U_{sc} - \alpha \cdot Th_{sc} \]
\[ Th_c = Th_{sc} - \delta \cdot U_{sc} \]

where: \( K_c, U_c, Th_c \) are the Compton corrected channels
\( K_{sc}, U_{sc}, Th_{sc} \) are the cosmic corrected channels
\( \alpha, \beta, \gamma, \) and \( \delta \) are the Compton stripping coefficients for (Th into U), (Th into K), (U into K), and (U into Th) respectively.

6.2.5 Height Attenuation Corrections

The total count, potassium, uranium and thorium are then corrected to a nominal survey altitude according to the equation:

\[ C_n = C \cdot e^{(h_{ref} - h_o)} \]

where: \( C_n \) is the output altitude corrected channel
\( C \) is the input channel
\( \mu \) is the attenuation correction for that channel
\( h_{ref} \) is the effective altitude
\( h_o \) is the nominal survey altitude to correct to

**Table 6: Radiometric Processing Coefficients**

<table>
<thead>
<tr>
<th>Aircraft Background (cps)</th>
<th>Total Counts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Potassium</td>
</tr>
<tr>
<td></td>
<td>Uranium</td>
</tr>
<tr>
<td></td>
<td>Thorium</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cosmic Ratio (cps/m)</th>
<th>Total Counts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Potassium</td>
</tr>
<tr>
<td></td>
<td>Uranium</td>
</tr>
<tr>
<td></td>
<td>Thorium</td>
</tr>
</tbody>
</table>

| Compton Stripping Coefficients | Alpha(Th→U) | 0.2610 |
|                               | Beta(Th→K)  | 0.3445 |
|                               | Gamma(U→K)  | 0.8137 |
|                               | Delta(U→Th) | 0.0742 |

<table>
<thead>
<tr>
<th>Height Attenuation (cps/m)</th>
<th>Total Counts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Potassium</td>
</tr>
<tr>
<td></td>
<td>Uranium</td>
</tr>
<tr>
<td></td>
<td>Thorium</td>
</tr>
</tbody>
</table>
6.3 Survey Products

1. **Final Maps @ 1:25,000**

   Colour images overlain with blackline contours and flight-path on paper:

   Residual Magnetic Intensity
   1<sup>st</sup> Vertical Derivative
   Residual Magnetic Intensity reduced to the pole
   Magnetic Analytical Signal
   Total Count
   Potassium
   Uranium
   Thorium
   Uranium squared over Thorium

   Blackline contours overlain with flight-path on film:

   Residual Magnetic Intensity
   1<sup>st</sup> Vertical Derivative
   Residual Magnetic Intensity reduced to the pole
   Magnetic Analytical Signal
   Total Count
   Potassium
   Uranium
   Thorium
   Uranium squared over Thorium

2. **Multi-channel stacked profiles @ 1:25,000**

   Colour profiles for each flight line with corrected parameters:

   Radar, GPS Z, Total Count, Potassium, Thorium, Uranium, Percentage Potassium, Uranium, Thorium, Uranium/<sup>2</sup>/ Thorium, Potassium / Thorium, Uranium / Thorium, Uranium / Potassium

3. **Digital Data**

   FLTPRO Plot-files in HPGL format on CD-ROM
   Located Data files in GEOSOFT *GDB format on CD-ROM
   Gridded Data files in GEOSOFT *GRD format on CD-ROM

4. **Additional Products**

   Survey logistics report
   Analogue chart records
   Flight path video cassettes
Table 7: Located Data Tape Format 1 samples / second - Survey Areas

<table>
<thead>
<tr>
<th>Columns</th>
<th>Description</th>
<th>Parameter</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Fiducial</td>
<td>Seconds after midnight</td>
<td>seconds</td>
</tr>
<tr>
<td>1</td>
<td>X</td>
<td>AMG Zone 53 Easting</td>
<td>metres</td>
</tr>
<tr>
<td>2</td>
<td>Y</td>
<td>AMG Zone 53 Northing</td>
<td>metres</td>
</tr>
<tr>
<td>3</td>
<td>Radar</td>
<td>Radar Altimeter (AGL)</td>
<td>metres</td>
</tr>
<tr>
<td>4</td>
<td>Altitude</td>
<td>AMG Zone 53 Altitude (ASL)</td>
<td>metres</td>
</tr>
<tr>
<td>5</td>
<td>Totalcps</td>
<td>Corrected Total Count</td>
<td>counts / second</td>
</tr>
<tr>
<td>6</td>
<td>Kcps</td>
<td>Corrected Potassium Count</td>
<td>counts / second</td>
</tr>
<tr>
<td>7</td>
<td>Ucps</td>
<td>Corrected Uranium Count</td>
<td>counts / second</td>
</tr>
<tr>
<td>8</td>
<td>Thcps</td>
<td>Corrected Thorium Count</td>
<td>counts / second</td>
</tr>
<tr>
<td>9</td>
<td>Kpc</td>
<td>Potassium Ground Concentration</td>
<td>percentage</td>
</tr>
<tr>
<td>10</td>
<td>Upm</td>
<td>Uranium Ground Concentration</td>
<td>parts / million</td>
</tr>
<tr>
<td>11</td>
<td>Thpm</td>
<td>Thorium Ground Concentration</td>
<td>parts / million</td>
</tr>
<tr>
<td>12</td>
<td>UTTh</td>
<td>Uranium² / Thorium Ratio</td>
<td>ratio</td>
</tr>
<tr>
<td>13</td>
<td>UTh</td>
<td>Uranium / Thorium Ratio</td>
<td>ratio</td>
</tr>
<tr>
<td>14</td>
<td>UK</td>
<td>Uranium / Potassium Ratio</td>
<td>ratio</td>
</tr>
<tr>
<td>15</td>
<td>KTh</td>
<td>Potassium / Thorium</td>
<td>ratio</td>
</tr>
<tr>
<td>16</td>
<td>Latitude</td>
<td>AGD66 Latitude</td>
<td>ddmms.s</td>
</tr>
<tr>
<td>17</td>
<td>Longitude</td>
<td>AGD66 Longitude</td>
<td>ddmms.s</td>
</tr>
</tbody>
</table>

Table 8: Located Data Tape Format 10 sample / second - Survey Areas

<table>
<thead>
<tr>
<th>Columns</th>
<th>Description</th>
<th>Parameter</th>
<th>Units</th>
</tr>
</thead>
<tbody>
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<td>0</td>
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<td>1/10ths second</td>
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<td>AMG Zone 53 Easting</td>
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</tr>
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<td>Y</td>
<td>AMG Zone 53 Northing</td>
<td>metres</td>
</tr>
<tr>
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<td>Raw Magnetic Field</td>
<td>nanoTeslas</td>
</tr>
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<td>Diurnal Magnetic Field</td>
<td>nanoTeslas</td>
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<td>Mag</td>
<td>Residual Magnetic Field</td>
<td>nanoTeslas</td>
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<td>Radar</td>
<td>Radar Altimeter (AGL)</td>
<td>metres</td>
</tr>
<tr>
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<td>Baro</td>
<td>Barometric Height</td>
<td>metres</td>
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<tr>
<td>8</td>
<td>Altitude</td>
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<td>counts / second</td>
</tr>
<tr>
<td>9</td>
<td>VGI</td>
<td>1st Vertical Gradient Magnetics</td>
<td>nanoTeslas / km</td>
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<tr>
<td>10</td>
<td>RTP</td>
<td>Reduction to the Pole Magnetics</td>
<td>nanoTeslas / km</td>
</tr>
<tr>
<td>11</td>
<td>AS</td>
<td>3D Analytical Signal Magnetics</td>
<td>nanoTeslas / km</td>
</tr>
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<td>12</td>
<td>Latitude</td>
<td>AGD66 Latitude</td>
<td>ddmms.s</td>
</tr>
<tr>
<td>13</td>
<td>Longitude</td>
<td>AGD66 Longitude</td>
<td>ddmms.s</td>
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Table 9: Located Data Tape Format 1 samples / second - Rim Flights

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<tr>
<th>Columns</th>
<th>Description</th>
<th>Parameter</th>
<th>Units</th>
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<td>seconds</td>
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<tr>
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<td>X</td>
<td>AMG Zone 53 Easting</td>
<td>metres</td>
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<tr>
<td>2</td>
<td>Y</td>
<td>AMG Zone 53 Northing</td>
<td>metres</td>
</tr>
<tr>
<td>3</td>
<td>Radar</td>
<td>Radar Altimeter (AGL)</td>
<td>metres</td>
</tr>
<tr>
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<td>metres</td>
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<tr>
<td>5</td>
<td>Totalcps</td>
<td>Corrected Total Count</td>
<td>counts / second</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----</td>
<td>-----------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>6</td>
<td>Kcps</td>
<td>Corrected Potassium Count</td>
<td>counts / second</td>
</tr>
<tr>
<td>7</td>
<td>Ucps</td>
<td>Corrected Uranium Count</td>
<td>counts / second</td>
</tr>
<tr>
<td>8</td>
<td>Thcps</td>
<td>Corrected Thorium Count</td>
<td>counts / second</td>
</tr>
<tr>
<td>9</td>
<td>Kpc</td>
<td>Potassium Ground Concentration</td>
<td>percentage</td>
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<tr>
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<td>Uppm</td>
<td>Uranium Ground Concentration</td>
<td>parts / million</td>
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<tr>
<td>11</td>
<td>Thppm</td>
<td>Thorium Ground Concentration</td>
<td>parts / million</td>
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<td>U²Th</td>
<td>Uranium² / Thorium Ratio</td>
<td>ratio</td>
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<tr>
<td>13</td>
<td>UTh</td>
<td>Uranium / Thorium Ratio</td>
<td>ratio</td>
</tr>
<tr>
<td>14</td>
<td>UK</td>
<td>Uranium / Potassium Ratio</td>
<td>ratio</td>
</tr>
<tr>
<td>15</td>
<td>KTh</td>
<td>Potassium / Thorium</td>
<td>ratio</td>
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<td>16</td>
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<tr>
<td>17</td>
<td>Longitude</td>
<td>AGD66 Longitude</td>
<td>ddm.mss</td>
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7. APPENDIX A. COSMIC TESTS

Geoterrex-Dighem Pty
Cosmic Background

Job No: 3-488
Location: Darwin (offshore)
Date: 24/09/97
Aircraft: VH-JRO

<table>
<thead>
<tr>
<th>Alt. (ft.)</th>
<th>Cosmic (cps)</th>
<th>TotCount (cps)</th>
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</thead>
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<tr>
<td>893</td>
<td>69</td>
<td>105</td>
</tr>
<tr>
<td>1868</td>
<td>79</td>
<td>112</td>
</tr>
<tr>
<td>2868</td>
<td>87</td>
<td>119</td>
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<tr>
<td>3880</td>
<td>98</td>
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<td>137</td>
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<tr>
<td>6846</td>
<td>143</td>
<td>142</td>
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X Coeff. 0.506
Y - Inter. 74.56

Cosmic Background Tests

![Graph showing Cosmic Background Tests]
Geoterrex-Dighem Pty
Cosmic Background

Job No: 3-488
Location: Darwin (offshore)
Date: 24/09/97
Aircraft: VH-JRO

<table>
<thead>
<tr>
<th>Alt. (ft.)</th>
<th>Cosmic (cps)</th>
<th>Potassium (cps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>893</td>
<td>69</td>
<td>7</td>
</tr>
<tr>
<td>1868</td>
<td>79</td>
<td>7</td>
</tr>
<tr>
<td>2868</td>
<td>87</td>
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<tr>
<td>3880</td>
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<td>131</td>
<td>8</td>
</tr>
<tr>
<td>6846</td>
<td>143</td>
<td>7</td>
</tr>
</tbody>
</table>

X Coeff. 7.58
Y - Inter. 0.004

Cosmic Background Tests
Geoterrrex-Dighem Pty
Cosmic Background

Job No: 3-488
Location: Darwin (offshore)
Date: 24/09/97
Aircraft: VH-JRO

<table>
<thead>
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<th>Alt. (ft.)</th>
<th>Cosmic (cps)</th>
<th>Uranium (cps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>893</td>
<td>69</td>
<td>5</td>
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<tr>
<td>1868</td>
<td>79</td>
<td>5</td>
</tr>
<tr>
<td>2868</td>
<td>87</td>
<td>5</td>
</tr>
<tr>
<td>3880</td>
<td>98</td>
<td>6</td>
</tr>
<tr>
<td>4874</td>
<td>111</td>
<td>6</td>
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<td>5825</td>
<td>131</td>
<td>5</td>
</tr>
<tr>
<td>6846</td>
<td>143</td>
<td>6</td>
</tr>
</tbody>
</table>

X Coeff. 0.009
Y - Inter. 4.41

Cosmic Background Tests

![Cosmic Background Graph]
Geoterrex-Dighem Pty
Cosmic Background

Job No: 3-488
Location: Darwin (offshore)
Date: 24/09/97
Aircraft: VH-JRO

<table>
<thead>
<tr>
<th>Alt. (ft.)</th>
<th>Cosmic (cps)</th>
<th>Thorium (cps)</th>
</tr>
</thead>
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<tr>
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<td>3880</td>
<td>98</td>
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<tr>
<td>4874</td>
<td>111</td>
<td>4</td>
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<tr>
<td>5825</td>
<td>131</td>
<td>4</td>
</tr>
<tr>
<td>6846</td>
<td>143</td>
<td>6</td>
</tr>
</tbody>
</table>

| X Coeff. | 0.031 |
| Y - Inter. | 0.83 |

Cosmic Background Tests

![Cosmic Background Graph]

AFMECO Mining and Exploration Pty Limited
March, 98
8. APPENDIX B. DAILY SOURCE CHECKS AND TEST LINES

The table below contains the data from the daily source checks carried out during the survey. Sources were typically checked at the beginning and end of every survey day.

Table 10: Daily Spectrometer Source Checks

<table>
<thead>
<tr>
<th>Date</th>
<th>Flight</th>
<th>Avg. counts/second</th>
<th>Variation from avg.</th>
<th>% Var from avg.</th>
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<tbody>
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<td></td>
<td></td>
<td>Thorium</td>
<td>Uranium</td>
<td>Thorium</td>
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<td>52.798</td>
<td>41.731</td>
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<tr>
<td></td>
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<td>50.428</td>
<td>40.309</td>
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</tr>
<tr>
<td></td>
<td>test3</td>
<td>49.221</td>
<td>41.176</td>
<td>-2.26</td>
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<tr>
<td></td>
<td>test4</td>
<td>53.16</td>
<td>41.176</td>
<td>1.67</td>
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<td></td>
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<td>52.248</td>
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<td>31-Aug</td>
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<td>52.674</td>
<td>41.222</td>
<td>1.19</td>
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<tr>
<td>4-Sep</td>
<td>4</td>
<td>49.509</td>
<td>41.266</td>
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</tr>
<tr>
<td>4-Sep</td>
<td>7</td>
<td>51.328</td>
<td>44.098</td>
<td>-0.16</td>
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<tr>
<td>6-Sep</td>
<td>8</td>
<td>50.499</td>
<td>41.375</td>
<td>-0.99</td>
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<tr>
<td>6-Sep</td>
<td>11</td>
<td>53.046</td>
<td>42.589</td>
<td>1.56</td>
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<tr>
<td>8-Sep</td>
<td>12</td>
<td>52.756</td>
<td>40.952</td>
<td>1.27</td>
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<tr>
<td>8-Sep</td>
<td>14</td>
<td>54.513</td>
<td>42.609</td>
<td>3.03</td>
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<tr>
<td>9-Sep</td>
<td>15</td>
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<tr>
<td>9-Sep</td>
<td>17</td>
<td>54.429</td>
<td>44.796</td>
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<td>10-Sep</td>
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<td>52.991</td>
<td>43.456</td>
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<td>10-Sep</td>
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<td>20</td>
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<td>42.19</td>
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<tr>
<td>11-Sep</td>
<td>21</td>
<td>52</td>
<td>43.151</td>
<td>0.51</td>
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<tr>
<td>12-Sep</td>
<td>22</td>
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<td>0.57</td>
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<td>49.066</td>
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<td>-1.42</td>
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<td>1.8215</td>
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<td>52.416</td>
<td>44.272</td>
<td>0.9305</td>
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<tr>
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<td>52.241</td>
<td>44.272</td>
<td>0.9534</td>
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<td>43.505</td>
<td>2.4105</td>
<td>0.9625</td>
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<td>41.532</td>
<td>-0.9325</td>
<td>-1.0105</td>
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<td>40.493</td>
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<td>Average Uranium: 42.5425</td>
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</tbody>
</table>

**Figure 4:** Daily Source Checks

![Graph showing daily source checks for thorium and uranium counts compared to their respective sources.]

**Progressive Source checks**
Figure 5:  Myra Falls Test Line

Table 11:  Test Line Coordinates

<table>
<thead>
<tr>
<th>Base</th>
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<th>Test Line</th>
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<td>End</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Easting</td>
<td>Northing</td>
<td>Easting</td>
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<td>312000</td>
<td>8622000</td>
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