E.L. 6403 - MISTAKE CREEK
ANNUAL REPORT AND RELINQUISHMENT REPORT
TO THE DEPARTMENT OF MINES & ENERGY
1989

CR90/236

D. W. HARROP
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## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. SUMMARY</td>
<td>1</td>
</tr>
<tr>
<td>II. ACCESS</td>
<td>2</td>
</tr>
<tr>
<td>III. REGIONAL GEOLOGY</td>
<td>3</td>
</tr>
<tr>
<td>IV. EXPLORATION</td>
<td>6</td>
</tr>
<tr>
<td>4.1 RADIOMETRIC SURVEYING</td>
<td>6</td>
</tr>
<tr>
<td>4.2 ALPHACARD SURVEYING</td>
<td>6</td>
</tr>
<tr>
<td>4.3 VLF - EM16 SURVEYING</td>
<td>7</td>
</tr>
<tr>
<td>4.4 GEOLOGICAL MAPPING</td>
<td>9</td>
</tr>
<tr>
<td>4.5 TRENCHING</td>
<td>10</td>
</tr>
<tr>
<td>4.6 PERCUSSION DRILLING</td>
<td>10</td>
</tr>
<tr>
<td>V. CONCLUSIONS</td>
<td>16</td>
</tr>
<tr>
<td>VI. EXPENDITURE STATEMENT</td>
<td>17</td>
</tr>
</tbody>
</table>

## APPENDIX

Drilling Logs

Holes TOL-P-29 to TOL-P-37,
TOL-P-62 and TOL-P-63

Not to be reproduced without written permission from TOTAL Mining Australia Pty. Limited.
<table>
<thead>
<tr>
<th>Plate</th>
<th>Description</th>
<th>Scale</th>
<th>Drg. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate 1</td>
<td>Mistake Creek - Geological Interpretation</td>
<td>1:2000</td>
<td>547-224</td>
</tr>
<tr>
<td>Plate 2</td>
<td>Alphacard Contours</td>
<td>1:2000</td>
<td>547-232</td>
</tr>
<tr>
<td>Plate 3</td>
<td>Surface SPP2 Contours</td>
<td>1:2000</td>
<td>547-225</td>
</tr>
<tr>
<td>Plate 4</td>
<td>Down Hole SPP2 Contours</td>
<td>1:2000</td>
<td>547-226</td>
</tr>
<tr>
<td>Plate 5</td>
<td>VLF Profiles (NDT Transmitter)</td>
<td>1:2000</td>
<td>547-228</td>
</tr>
<tr>
<td>Plate 6</td>
<td>VLF Profiles (NWC Transmitter)</td>
<td>1:2000</td>
<td>547-229</td>
</tr>
<tr>
<td>Plate 7</td>
<td>VLF - Fraser Gradient (NDT Transmitter)</td>
<td>1:2000</td>
<td>547-230</td>
</tr>
<tr>
<td>Plate 8</td>
<td>VLF - Fraser Gradient (NWC Transmitter)</td>
<td>1:2000</td>
<td>547-231</td>
</tr>
<tr>
<td>Plate 9</td>
<td>Drilling Cross-Section: 9400N</td>
<td>1:500</td>
<td>547-222</td>
</tr>
<tr>
<td>Plate 10</td>
<td>Drilling Cross-Section: 9600N</td>
<td>1:500</td>
<td>547-219</td>
</tr>
<tr>
<td>Plate 11</td>
<td>Drilling Cross-Section: 9950N</td>
<td>1:500</td>
<td>547-221</td>
</tr>
<tr>
<td>Plate 12</td>
<td>Drilling Cross-Section: 10250N</td>
<td>1:500</td>
<td>547-220</td>
</tr>
</tbody>
</table>
I. SUMMARY

Exploration Licence 6403 was applied for on the 11th November, 1988 and was granted on the 23rd March, 1989 for a period of 6 years. The initial tenement adjoins the Tolmer Project which is a Joint Venture between TOTAL Mining Australia Pty. Limited and PNC Exploration (Australia) Pty. Ltd. This joint venture is called the West Pine Creek Joint Venture, as it includes a number of tenements in the Pine Creek Geosyncline of the Northern Territory.

The tenement was taken after ground prospecting of an airborne radiometric anomaly revealed an increase in the uranium channel of the spectrometry associated with chloritic and graphitic schists and sandstone. These units are part of the Lower Proterozoic metasedimentary pile close to the unconformity with the Middle Proterozoic - the target of the Tolmer Project.

Exploration of the Mistake Creek tenement was carried out using the following methods:

1. Systematic gridding, radiometry above and below the ground.
2. Systematic Alphacard surveying.
5. Trenching and Percussion Drilling.

The results of all this detailed work were very disappointing in that the anomalies were found to be due mainly to thorium. This is surprising as the airborne spectrometric analysis of the anomaly gave a very strong uranium channel anomaly with little to no thorium being registered. It is still not clear what the mineralogy of the rocks is that produces the thoron gas known to exist here.

The tenement was relinquished because of these disappointing results. However, the exploration has shown that the Lower Proterozoic sequence here consists of suitable rocks to host a major uranium orebody. There is abundant chlorite and graphite alteration within the Lower Proterozoic sequences which suggests that the stratigraphic position of these units is much lower than the name Burrell Creek Formation would imply. TMA have not changed the stratigraphic nomenclature in this area but believe that it may have to be changed. The lithologies found within the Mistake Creek tenement are known to exist elsewhere along the western contact of the Tolmer Group and hence represent a good exploration target for an unconformity related uranium orebody.
II. ACCESS

Access to the tenement is via the Stuart Highway from Darwin to Adelaide River then by the old Stuart Highway to the Daly River road, along this road to the Blackfellow Creek crossing and then north along exploration tracks to the licence. The area is relatively flat to undulating, lightly wooded grassland, that has been used for grazing. There are a number of billabongs within the tenement although there is no obvious well-preserved drainage pattern and access is only possible in the dry season, that is between April and November each year (depending on the rainfall).

The tenement is on the REYNOLDS RIVER 1:100000 map sheet and the PINE CREEK 1:250000 map sheet.
III. REGIONAL GEOLOGY

Stratigraphic Column

Quaternary and Tertiary

Tolmer Group
- Stray Creek Member
- Depot Creek Member

Synorogenic Granites

Burrell Creek Formation
- Noltenius Member

Archaean Granites

Burrell Creek Formation

The Burrell Creek Formation has been variously described as consisting of flyschoid sediments - fine to medium grained clastic material. The basal unit of the Burrell Creek Formation is the coarse grained to conglomeratic Noltenius Formation. It seems that in the west these Lower Proterozoic metasediments are more varied and heterogeneous than the Burrell Creek Formation described further east. It was clear that west of the Tolmer Group the sediments of the Lower Proterozoic consist of a highly variable lithofacies including quickly alternating coarse and very fine grained units. Graphitic and chloritic schists were found interbedded with sandstones and grits. East of the Tolmer Formation the Burrell Creek Formation appears closer to its type locality description, that is as a monotonous sequence of poorly sorted sandstone and grits.

It is thought that in the west of the Tolmer Group outcrop the Lower Proterozoic sequence may be lower in the stratigraphy than those units occurring in the east. They are thought to have been derived from the Archaean domes which were remobilised in the Carpentarian (Middle Proterozoic).

The tenement is situated on the Giants Reef Fault, a major fault trending north-northeast and affecting the entire Tolmer Project. The Giants Reef Fault is really a fault zone which, in places, has affected an area of more than 1 km in places. The surface expression of this massive fault is very variable. It ranges from no surface expression at all to massive discontinuous quartz and/or pegmatitic injection along the fault trend. There is also, in places, the development of massive crystallized graphite, particularly where the fault cuts a carbonaceous horizon within the Lower Proterozoic metasediments. The Giants Reef Fault also cuts the Tolmer Group just to the northeast of the tenement. The Tolmer Group sandstone units have been displaced laterally and vertically but, other than the stratigraphic evidence, there is little other indication of the amount of throw or the dislocation caused by such a large fault zone.

There are a number of subsidiary faults associated with the Giants Reef Fault. These are generally feather faults that have been generated at the points where the main fault changes direction. Some of these faults are in themselves very substantial and have a significant effect on the stratigraphy of the Lower Proterozoic and the Middle Proterozoic sedimentary sequences. These massive fault zones have obviously been active since the Archaean and have been
reactivated at various stages in the geological time since then up until at least the Cambrian. The Giants Reef Fault effectively forms the western margin to the Pine Creek Geosyncline.

The Lower Proterozoic metasedimentary units are generally strongly folded. The limbs of these folds are often almost vertical and are even sometimes isoclinal in nature. The folding is thought to have been the result of the effects of the Giants Reef Fault and its subsidiary faults, the intrusion of the synorogenic granites, and the formation and subsequent deformation of the Pine Creek Geosyncline and the Daly River Basin. There is an accompanying regional metamorphism which is of low grade and probably due to the deformation by intense folding. This metamorphism results in the development of sericite and minor green chlorite in the pelitic sedimentary units and various degrees of silicification in the more psammitic units.

Overprinting this regional metamorphism is a more local form of metamorphism that can be attributed to a number of different factors.

1. There is a contact metamorphism noted around the margins of many of the synorogenic granite intrusions. This type varies in its extent but is generally not occurring more than a hundred metres from the actual contact itself. The contact metamorphic effect is diagnostic in that it often contains the development of andalusite crystals and sometimes cordierite nodules. In places andalusite crystals have been noted up to 8 cm in length, but more usually they are needle-like.

2. There are some areas in which dynamic metamorphism has obviously been effective. There is the development of crystalline graphite associated with the movement on the Giants Reef Fault and its subsidiary faults.

3. Chlorite and graphite development also occurs in the highly deformed Lower Proterozoic metasediments. This may be, in part, due to metamorphism but may also be due to the injection of hydrothermal fluids along these zones of weakness caused by the degree of deformation. The chlorite noted in these areas is generally the dark green to black magnesium-rich variety and occurs in a much more restrictive area immediately surrounding some structural (usually a tensional opening) deformation. These loci are also prime targets for the consequent deposition of uranium mineralization.

**Synorogenic Granite**

Carpentarian synorogenic to post-orogenic granites are represented by the Mt. Litchfield, Allia Creek and Jammine granites and the Soldiers Creek granite at Collia (Pxl, Pxs, Pxgi and Pgs).

The Mt. Litchfield granite outcrops to the south of the tenement. This granite is partly intrusive and partly an S-type granite exhibiting well-developed garnet crystals. It is thought that the pegmatite veins and greisen noted within the Mistake Creek tenement may be consanguineous with the Mt. Litchfield granite intrusive phase.
5.

There has been a number of pegmatitic intrusions which are interpreted as being the last stage of the synorogenic intrusion. These pegmatites are often coarsely crystalline in nature with muscovite, feldspar, tourmaline and, in some places, tin and tantalum. They occur in the folds of anticlines, along structural breaks, i.e. faults, and as dykes cross-cutting the stratigraphy. They often do not have any obvious connection to any granite bodies, however it is thought that a granite intrusion is not far away either in the vertical or horizontal sense. There is often associated contact metamorphic effects as described above which are considered to be greater than that expected to have been caused by the intrusion of the pegmatite by itself.

Tolmer Group

The Tolmer Group regionally consists of four formations, however only the lower two of these occur in the north, to the east of E.L. 6403 Mistake Creek.

+ Waterbag Creek Formation: red mudstone with thin arenite horizons. +134 m. (Ptw)
+ Hinde Dolomite: dolomite, dolomitic shales and arenites, quartz arenites. +134 m. (Ptw)
+ Stray Creek Sandstone: flaggy, micaceous, ripple-marked quartz arenite. +300 m. (Pts)
+ Depot Creek Sandstone: thickly bedded, medium to coarse quartz arenite. +450 m. (Ptd)

Cambrian

+ Daly River Group: basal conglomerates, Antrim Plateau Volcanics (basalts) and the Tindall Limestone. (Ela)

Cambrian sequence crops out as thin remnants on the Tolmer Group capping east and southeast of the tenement. None is known west of the Tolmer Group in this area.
IV. EXPLORATION

4.1 RADIOMETRIC SURVEYING

A detailed and thorough radiometric prospection was carried out on the ground over the airborne spectrometric anomaly within the Lower Proterozoic sequence at the Mistake Creek tenement (E.L. 6403). This survey was carried out using a hand held scintillometer (SPP2) on selected sections taking into account the lithologic variation and the structural elements within the tenement. A number of anomalies were discovered and named. These occurred within a broad lithological framework even although they were not always within the same unit and there was a propensity towards the more sandy units rather than the pelitic units. The latter, however, often showed a higher background radiometry, particularly when it was graphitic and/or chloritic.

Systematic radiometric surveying was also carried out using the scintillometer (SPP2) both at the surface of the ground and in a hole drilled to 30 cm. This survey, which was carried out on a grid of 25 x 50 m gave a better definition to the radiometric anomalies. It showed that the anomalies had little lateral surface expression although the trend of the anomaly could be related to specific lithological units. There was less definition given by the down hole radiometry although there was still a lithologic control obvious. No further significant radiometric anomalism was noted from this survey, it did however define the trends of the anomalism more accurately for drilling purposes.

4.2 ALPHACARD SURVEYING

A systematic Alphacard survey was carried out over the main radiometrically anomalous zone. This survey used the same survey points as the radiometric survey described above and consisted of placing an Alphacard in an upturned flower pot at the bottom of a 30 cm deep hole, then sealing the hole with plastic sheeting and soil. The cup was removed 12 hours later, once equilibrium had been reached between the emission and decay of alpha particles. The hole was sealed to minimize the effects of the wind which has a local effect on the atmospheric pressure and hence an effect on the radon emission.

The Alphacard method, as its name suggests, measures the alpha emissions from the soil. As these emissions are almost solely from the decay of radon gas, and radon is a daughter product of uranium, it indirectly gives a measure of the uranium content in the ground. The limitations of the method are related to the variations caused by the permeability of the different lithologic units and particularly the surface covering, and the barometric pressure at the time of the sampling. Radon, being a light gas, migrates from its source through the rock and soil horizon emerging at the surface for measurement. It will obviously take the route of least resistance which is not always the most direct path from the source to the surface. The anomaly may be, and is often, offset from the source. Another source of error in the interpretation can be caused by the fact that radium, one of the sources of radon gas, may be transported in the ground water system for some considerable distance before the radon is emitted as a gas.
Notwithstanding the above limitations to the Alphacard survey technique, with care and proper understanding the results can be interpreted and are a very useful tool in the exploration for uranium orebodies.

The Alphacard method can be used to distinguish between thoron and radon. This is done by using the fact that there is a difference in the decay time for thoron as opposed to the radon and this can be measured by the cards.

A number of anomalies were identified from this survey. These anomalies, however, bore little relationship to the radiometric anomalies except that the graphitic and chloritic schists gave a higher background alpha radiation reading than the more psammitic units. It was hoped that some of the strong anomalies noted by this survey would have substantial uranium deposits as their source. Unfortunately, all the anomalies tested were found to be due to thorium rather than uranium as expected.

4.3 VLF - EM16 SURVEYING (Plates 5 - 8)

VLF, using the EM16 instrument, was run over the surveyed grid on a 25 x 50 m spacing from 9400N to 10400N and 5000E to 4200E. As the Lower Proterozoic outcrops well over the prospect area, it was expected that direct correlation could be made between EM conductors and lithological/structural features.

In general, conductive anomalies appear to be representing structural elements such as the north-northwest and east-west trending faults observable on both the aerial photographs and to some degree on the ground.

+ NDT Japan - Profile Interpretation

Both the profile interpretation and Fraser Gradient reflect the same conductive features, although some offsetting is evident.

The most evident feature on the profile sheet is the NNW linear, which is represented on-ground by a 'laminated' quartz-rich schist. Intensive quartz vein ing, the occurrence of quartz 'blisters' and localized, very intense deformation point to this being a zone most likely to have a strongly conductive signature.

Planking the main fault are a series of parallel structures outlined by the VLF. To the east, feature (2) coincides with an "island" of outcrop comprising interbedded, fine sericite schists and coarse andalusite schist. There is no surface evidence of faulting or lithology that would account for the conductor.

Feature (4-5-6) can be related, in part (up to 9900N), to a combination of a quartz-veined quartzite and an altered, gossanous graphitic/carbonaceous bed. As no mapping has been done north of about 9900N the continuation of the conductor as (6) can only be assumed.
Conductors (7) and (9) represent observed quartz-veined faults in grey, coarse grained, quartz-rich metasandstones. The former caps a high ridge, forming a bold linear outcrop, quartz-veined throughout. A similar outcrop occurs in the vicinity of (9).

Conductor (8) and the outline of the conductive zone are more or less coincident with the outcrop limit at the base of the ridge.

**NDT Fraser Gradient**

The distribution of the various conductors implies a series of east-west faults which appear to have caused marked offsets to the stratigraphy and/or cross structures.

Fault I is possibly coincident with a mapped flexure. Fault II is not supported by mapping or photo interpretation. Trace II(1) is the course taken by the surface expression of the structure as outlined by mapping. Fault III is not supported by ground mapping but could be a subsurface offset of conductor (5) (on NWC profile map). Fault IV is coincident with a photo-fault; no mapping was done in that area.

In summary, the Mistake Creek Prospect is traversed by a series of faults approximately at right angles to the strike of the beds. These are seen quite clearly on the aerial photo and can be traced on-ground as alluvium-filled valleys.

The north-south structures mapped and observed also corroborate the VLF data. The interpretation of east-west faulting using the VLF conductor-offsets, however, shows some discrepancies with observable data.

**NWC Australia - Profile Interpretation**

This data shows well the grid east-west faults. Features (1) and (5) are coincident with structures proposed on the 1988 geology map. The conductive zone (2) could be related to topography - a series of sand-filled valleys, although this is not conclusive. There is no lithological/structural feature this zone can be correlated with.

(4) cross-cuts the lithological trend and occurs both within alluvium and outcrop. There could be an influence from a subsidiary structure related to (3).

The conductive zones (5) also cross-cut areas of outcrop and soil/alluvium. A discrete photo-linear approximates the position of these conductive areas, so this is advanced as the reason for its presence.

**NWC Australia Fraser Gradient**

The strongest anomalies, (2), (3) and (4) are explained under the previous section. Feature (1) could be two separate conductors - the most southerly part being related to (2) and the northern part tied-in with (3).
4.4 GEOLOGICAL MAPPING

A detailed geological map was produced at a scale of 1:2000. This plan shows clearly that, although the regional strike of the sedimentary sequence is north-south, there are many local complications which have resulted in complex local folding, particularly within the more pelitic units. This has been accurately reflected by the contour plan of the Alphacad results.

The mapping of the area in this detailed way also revealed much more graphite and chlorite schist than was previously known. These lithotypes are not as well exposed at the surface as the more psammitic units which are harder and therefore more resistant to weathering. The pelitic units tend to form the eluvium filled valleys between the ridges of sandstone and grits, etc. There were also much more greisen and pegmatite outcrops found than were previously known to exist and typically these were tourmaline-rich, similar to those known elsewhere in the Tolmer Project.

The geological detail shows that the prospect area comprises a predominantly west-dipping sequence of Lower Proterozoic sediments; the rocks have been folded along a NW/SE axis initially, with subsequent folding east of a fault line (approximately the 4750 line), resulting in tight folds (sometimes chevron) with a NE axis. The first episode of folding has been tilted providing the consistent west dips although minor 'normal' folding has been recognized within the sequence. Minor flexures have also been mapped and these occur principally along the western edge of the abovementioned fault.

The lithologies are both silty and sandy, these giving a series of strongly cleaved schistose rocks. The finer variants can be described as slatey phyllites, sericitic schist and quartz-sericite schist; the coarser rocks give quartz-mica schists with some sericite. Quartzites and partially metamorphosed quartz-sandstones are present as thin bands, the former providing good marker beds.

Some of the sandstones are considered to be arkosic. A significant feature of the sequence is the presence of grey-coloured shales; these appear to be gradational into carbonaceous facies, some with considerable graphite. The latter has been noted adjacent to quartz veins. The quartz veining within the mapped area appears to be conformable with the regional strike and may therefore be infilling minor strike slip faults associated with the folding. The veining has associated graphite when in contact with or adjacent to carbonaceous beds; in addition vuggy sections have iron oxide staining. Black tourmaline is notably present as well as occurring in some of the pervasively quartz-veined sandstones and quartzites.

A major fault zone occurs along the eastern edge of the outcrop belt; this feature is fairly obvious on the air photographs and can be traced on the ground for several kilometres. In the prospect area the zone is marked by a strongly silicified bed of "quartz-schist" which can best be described as a laminated, strongly deformed rock with a well developed lineation; localized folds occur where the individual laminae have been strongly deformed giving a ptygmatic style of folding. Several quartz "blows" have developed along the strike where minor cross faults intersect the main trend. These "blows" are actually replacement zones where the remobilization of
silica has occurred to pervasively alter the host rock. Remnants of the host rock can be seen in some areas of the "blows". Bordering this major fault zone is a metre-wide bed of coarse andalusite schist.

There are two types of anomalies at Mistake Creek:

+ SPP2 hot spots occur as apparently linear zones in three separate trends. These are associated with hematized, generally sandy, sericitic facies. They are not necessarily associated with the Alphacard anomalies.

+ Down-hole Alphacard anomalous zones or single spots giving a high reading. Many of these have been tested for thorium (thoron) and have, in the majority of cases, been thoron free.

The SPP2 hot spots can be divided into three distinct trends:

1. Seagoo group which comprises a series of anomalies over a 10 x 10 m area. These occur at the eastern margin of a large and prominent quartz filled fault.


Samples from each of these anomalous trends were submitted to Comlabs, Darwin for the following analyses: U, Th, Au, Co, Ni and As. The results show that uranium is in negligible quantities compared to the amount of thorium in the samples. Spectrometric checks of the samples also showed a high level of thorium but only marginally higher than for uranium. These results gave rise to some concern because there was a discrepancy in the results from the various methods.

4.5 TRENCHING

Several of the main anomalies were trenched using a bulldozer. This was to investigate the anomaly below the surface effects of weathering and scavenging. At the Uno anomaly the surface expression was found to be due to mineralization occurring in a thin fracture zone with an abundance of hematite staining. This anomaly gave a very high thoron reading when an Alphacard was placed on the fracture, and a thorium reading when using the spectrometer.

The other anomalies showed patchy radiometric anomalous once trenched. No specific reason was noted, and in fact many of the anomalies checked by trenching were found to be hosted by sandstones variously stained by hematite.

4.6 PERCUSSION DRILLING

A total of 672 m of percussion drilling was completed at the Mistake Creek prospect. This represented 11 holes (TOL-P-29 to 37 and TOL-P-62 and 63 inclusive). All these holes were drilled at an angle of 60° to the horizontal and along the grid lines at an azimuth of 60°.
The aim of the drilling programme, which commenced on 9th September, was to test the radon anomalies located by the systematic surveying and, although the evidence was mounting which implied that these anomalies were due to thoron rather than uranium, it was thought that there may be some spatial relationship between the thorium and the uranium mineralization at depth. This was enforced by the still unresolved fact that the airborne anomaly gave a strong uranium signature with almost no thorium component.

The drill cuttings were taken every 1 m and laid out on the ground for geological logging and sampling for analyses. The hole was logged using a gamma detection probe. This was systematically carried out through the drill stem and later, if the hole remained open, the hole was logged again in "open hole". There is a difference of about 30% in the gamma response between the logs through the drill stem and those from the open hole logging.

No major anomaly was intersected. There was a lithologic control shown by the radiometry. The graphite-rich beds had a higher background radiometry than the more psammitic units. There were abundant graphite-rich beds, particularly in the south of the gridded area where there was a general increase in the Alphacard anomalism.

**TOL-P-29**

Coordinates 9400N/4925E Declination 60° Azimuth 60° Depth 60 m

Mainly fine grained, light brown sericite schist to 25 m with a dark grey graphitic interval between 15-19 m. Greyish sericite schist from 19 m becoming progressively darker in colour to 30 m which was probably due to a carbonaceous and chloritic content rather than containing graphite. This became more silicified and quartzose to the end of the hole.

The radiometric profile was flat apart from an isolated peak at about 8 m giving 138 cps on the down hole log.

**TOL-P-30**

Coordinates 9400N/4900E Vertical Depth 60 m

0-30m quartz veining within a green sericite-chlorite schist, passing into a laminated quartzite with abundant limonite to 9 m. A graphitic horizon extends from 9-11 m and a band of dark green chloritic quartzite occurs to about 14.5 m. Hematite and limonite are present in the latter interval. Interbedded schists and quartzites occur to about 28 m passing into a monotonous dark greenish-grey quartzitic chlorite schist, possibly carbonaceous.

Radiometric logging shows two horizons: one from 0-14 m showing 20-30 cps higher than background, the second shows several radiometrically low points, possibly related to interbedded quartzite bands within a schist sequence.
TOL-P-31

Coordinates 9600N/4950E Declination 60° Azimuth 60° Depth 60 m

0-27 m principally fine grained sericite schists with some coarser sandy intervals; quartz vein fragments between 10-13 m. 27-31 m slightly coarser, sandier horizons. From 31 m onwards there is a rapid change to a dark grey-green chloritic quartzite which extends to the bottom of the hole; possible quartz veining at 30 m.

Radiometrics show little variation throughout except for a slightly higher background from 4.5 to 7.5 m, possibly related to the sandy schistose bed.

TOL-P-32

Coordinates 9600N/4800E Declination 60° Azimuth 60° Depth 60 m.

0-7 m light grey sericite schist, weathered. 7-16 m becoming medium grey schist with sericite and some hematite staining. Becoming medium to dark grey and slightly silicified with increasing carbonaceous/chlorite content. From 28-34 m very graphitic, grading into non-graphitic but carbonaceous dark green-grey quartzite facies to the end of the hole. Quartz veining with pyrite grains occurs at 37 m.

Radiometric log was flat with no anomalies.

The above four holes were drilled on the large SE radon anomaly. The source of the radon was not determined. The intersected facies are mainly sericite schists grading in depth to what appears to be a fairly widespread zone of dark chloritic shales and quartzites. Graphite beds were intersected, however no anomalies were indicated to be related to them.

TOL-P-33 UNO ANOMALY

Coordinates 9970N/4771E Declination 60° Azimuth 60° Depth 60 m

0-8 m reddish, ferruginous, sericite schist and light grey schist; 8-10 m ferruginous sandstone and again at 11-12 m. From 12-25 m interbedded grey, carbonaceous schist and quartzites are present. A well defined graphitic horizon exists between 25-28 m. This grades into a dark greenish-grey formation of silicified carbonaceous schist with chlorite alteration and a further graphite bed from 32-35 m. Below the second graphite horizon is a shaley, chloritic, carbonaceous schist with scattered quartz veining to the end of the hole.

Radiometric logging shows a 3 m high interval from 8-11 m giving 1750 cps on the down hole log; a less intense sharp peak at about 31 m shows 180 cps. Chemical analysis has confirmed that the anomaly is due to thorium rather than uranium.
TOL-P-34 ANTHILL ANOMALY

Coordinates 9950N/4650E Declination 60° Azimuth 60° Depth 72 m

0-19 m light coloured sericite schist becoming principally grey, carbonaceous schist to 29 m. Minor hematite and limonite throughout. A thick graphite schist zone extends from 30-40 m grading into a slightly graphitic-chloritic horizon at first then to a dark grey-green chloritic, carbonaceous horizon - both quartzitic and schistose. Minor graphite bands were logged down to 60 m. Some fine grained sulphides (pyrite?) were noted.

No anomalous zones were noted in this hole.

TOL-P-35

Coordinates 10200N/4550E Declination 60° Azimuth 60° Depth 60 m

Essentially tan coloured, fine grained, sericite schist 0-35 m with rare, thin bands of sandstone. The latter is hematized at 9 m and at 16 m. The schists display ferruginous alteration throughout. Quartz veins with minor chloride occur at 9 m.

From 35 m the lithology changes to a carbonaceous facies; a distinct graphitic unit exists between 40 to 46 m merging into dark grey-green chloritic-carbonaceous quartzitic facies. Greisen veinlets are present between 48 and 55 m. The facies remain unchanged at the end of the hole.

The radiometric logging gave a very spikey pattern with an average of around 50 cps. There are no obvious indications of anomalous zones; the pattern suggests a fairly homogeneous lithology.

TOL-P-36

Coordinates 10300N/4615E Declination 60° Azimuth 60° Depth 60 m

0-8 or 9 m tan coloured, fine sericite schist. A thin carbonaceous schist band occurs at 10 m. Below the carbonaceous zone the sericite schist becomes strongly limonitic to 15 m. A band of hematized/limonitized sandstone is present from 16-19 m; this band is associated with a radiometric peak of 400 cps at about 15.5 m logged depth. The tan sericite schist extends to 22 m. Below this depth a dark grey carbonaceous unit extends to 28 m. Interbedded, variably coloured schists occur to 34 m grading into a carbonaceous/graphitic unit to about 49 m then a dark green-grey chloritic-carbonaceous-silicified facies. This facies continues to the end of the hole.

The radiometric logging indicated two small peaks: one at 15.5 m and the other at 21 m. The systematic SP2 survey of the cuttings indicated only one peak of 230 cps at 24 m - coincident with the first sign of water. Presumably the SP2 anomaly is equivalent to the down hole anomaly at 21 m. As stated above, one is probably related to the hematized sandstone, the other could be a water table phenomenon. The peaks are 400 cps and 170 cps respectively. Chemical analysis showed anomalous thorium. The remaining sections of the hole show a spikey but fairly monotonous pattern.
The above two holes were drilled on a subsidiary radon anomaly in the northwest corner of the grid. The probable source of the radioactivity was located in TOL-P-36, however its origin is undoubtedly related to thorium mineralization rather than uranium.

**TOL-P-37**

Coordinates 9875N/4680E Declination 60° Azimuth 60° Depth 60 m

This hole was sited in an area of scattered radiometric (SPP2) anomalies collectively named MINNIE. The hosts to the anomalies were thin, steeply dipping beds of quartz-veined, variably hematized sandstones.

The first 15 m comprise the anomalous zone; the facies are sandstones and quartzites, variably ferruginous and with strong chlorite alteration. Some thin bands of graphite schist are indicated along with the quartz veining.

A highly variable sandstone unit occurs to 22 m. Chloritization and limonitization are indicated; some graphite is present. No anomalies occur in this zone. From 22-32 m sericite schists predominate. From 32-42 m sandstones occur again with an increasing chloritization and some graphite. The latter occurs as graphite schist to 48 m grading into a dark grey-green chloritic-carbonaceous-silicified facies.

Apart from the obvious peaks between 0-15 m, the radiometric log is characteristically flat. The highest reading obtained was marginally under 350 cps.

Two further holes were drilled at the Mistake Creek prospect on the 9400N line in order to test the possibility that the radon surface expressions (TOL-P-29 and TOL-P-30) had been offset relative to their source and that there may be a uranium concentration within the more sandy lithologies adjacent to the graphite schist units. Therefore these two holes were collared up to 100 m west of the initial two to check this possibility.

The geology in the vicinity is quite complex, the strata being tightly folded and probably refolded. Various intersections of graphic schists are thought to be a result of this folding. The radon source is thought to emanate from sandy facies underlying the graphite.

**TOL-P-62**

Coordinates 9400N/4829E Declination 60° Azimuth 60° Depth 60 m

The geology of this hole comprises a grey to greenish-grey schist with variable chloritic alteration. Minor hematite staining is present. Graphitic bands were noted at 17 m and at 21 m and a graphitic-chloritic schist at 25 m. No anomalies were noted in this hole adjacent to these features. Below 40 m the schists become silicified and quartzitic in part, a widespread phenomenon in all the Mistake Creek holes.
TOL-P-63

Coordinates 9400N/4811E Declination 60° Azimuth 60° Depth 60 m

Slatey, light coloured schist, minor quartzite and quartz veining to 16 m. A grey carbonaceous-chloritic schist underlies the above, grading into a slightly chloritic quartzite to 28 m. From 28 to 38 m a slightly carbonaceous chloritic schist occurs grading into the silicified zone which is strongly chloritic and graphitic in part.

Radiometric logging shows several peaks greater than 100 cps on the open hole log: ranging from 110-130 cps. An interval located at approximately 8-13 m corresponds to a slightly hematized zone within light grey schists. An isolated peak near 50 m could be related to a quartz veined zone.
V. CONCLUSIONS

The drilling programme at Mistake Creek was designed to locate the source of various radon anomalies and their associated surface expressions. Chemical analyses of the surface samples and spectrometric surveys on some of the hot spots indicated a rather high thorium content; there was, however, a significant uranium content present as well - this being indicated by the spectrometer. The Alphacard surveys also gave mixed results: both anomalous thoron in some areas and anomalous radon in others.

The holes drilled at Mistake Creek have failed to indicate the presence of uranium. All anomalous zones have been sampled with the results showing that thorium was the dominant source. The holes drilled in the southeast on the radon anomaly failed to intersect any indication of mineralization. As these holes were drilled both into the centre of the anomaly and also investigated the margins they could not have missed the source if it was a uranium accumulation within 60 m of the surface.
VI. EXPENDITURE STATEMENT


<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
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<tbody>
<tr>
<td>PURCHASES</td>
<td>$18</td>
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<tr>
<td>PERSONNEL</td>
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<tr>
<td>SUPPLIES AND SERVICES</td>
<td>$1,713</td>
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<tr>
<td>TRANSPORT AND ACCOMMODATION</td>
<td>$4,574</td>
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<tr>
<td>ADMINISTRATIVE EXPENSES</td>
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<td>GENERAL ADMINISTRATION</td>
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<tr>
<td>CONTRACT SERVICES</td>
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<td><strong>TOTAL</strong></td>
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* ... Upper limit of porosume alteration.
TOTAL Mining Australia Pty. Limited

DRILL HOLE No TOL-P-20

CR90/236

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<th>Depth</th>
<th>Lithology Description / Description</th>
<th>Comment</th>
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</table>

Lithological Description / Description:
- Rock, weathered
- Rock, unweathered
- Rock, weathered and unweathered
- Rock, altered
- Rock, altered and unweathered
- Rock, altered, altered
- Rock, altered, altered and unweathered
- Rock, altered, altered, altered
- Rock, altered, altered, altered and unweathered

End of hole.
TOTAL Mining Australia Pty. Limited

DRILL HOLE # TOLP-30

VERTICAL SCALE: 1:200

CR90/236

<table>
<thead>
<tr>
<th>Lithological Description/Generalization</th>
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<tbody>
<tr>
<td>From diorite contacts grade zone mining.</td>
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<tr>
<td>Deformed quartz. Some quartz veined. Incoherent.</td>
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<tr>
<td>Lithoclasts. Quartz fragments.</td>
</tr>
<tr>
<td>High-potential graphite, vein veins.</td>
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<tr>
<td>Minor quartz. Quartz veins with pyrite veins.</td>
</tr>
<tr>
<td>Graphite. Fe-rich quartz. Some pyrite inclusions.</td>
</tr>
<tr>
<td>Qtz gray slate. Fe-rich quartz.</td>
</tr>
<tr>
<td>Quartz + Fe-rich quartz.</td>
</tr>
<tr>
<td>Becoming less graphitic. See below.</td>
</tr>
<tr>
<td>Some fayalite in quartz.</td>
</tr>
<tr>
<td>Bearcat lignite + Fe-rich quartz. Lithoclasts.</td>
</tr>
<tr>
<td>To above.</td>
</tr>
<tr>
<td>To above. Qtz + Fe-rich quartz. Alluvium.</td>
</tr>
<tr>
<td>Color brown.</td>
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<tr>
<td>Construction of holes.</td>
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<tr>
<td>Lithoclasts quartz veins - small gray material.</td>
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<tr>
<td>Some fayalite veins.</td>
</tr>
<tr>
<td>Dark veins of pyrite, chalcopyrite, and pyrite + quartz in part.</td>
</tr>
<tr>
<td>End of hole.</td>
</tr>
</tbody>
</table>