EXECUTIVE SUMMARY

This annual report describes the work carried out in EL 24841 up to the 31st July 2012. EL 24841 is located in the Southern Macarthur Basin, NT and is held by Murphy Uranium Pty Ltd, which is a wholly owned subsidiary of Bondi Mining Limited (Bondi). EL 24841 has the potential to host unconformity style and sandstone hosted style uranium deposits, similar to those located in the Alligator Rivers Uranium Field at the northern end of the McArthur Basin and the Westmoreland deposit approximately 100km to the east of the project area, respectively.

Exploration during the 2011-2012 field season comprised a ground Transient Electromagnetic (TEM) survey in February 2012 which partially covered the UC19 target within EL 24841. This data has been processed, modelled and an interpretation of the data was completed by Dr. John Coggon of Mines Geophysical Services in March 2012.

A drill hole rehabilitation audit was completed in August 2011 and a follow-up rehabilitation program was conducted in February 2012 which involved locating, rehabilitating and photographing old RAB, aircore and RC holes which had been missed in earlier rehabilitation efforts due to scheduling, or poor access.

A 2,700m drilling program comprising approximately seven RC / diamond drill holes at prospect UC19 is proposed for September 2012.
1 INTRODUCTION

Murphy Uranium Pty Ltd, which is owned 100% by Lyell Resources Ltd (Lyell), is the holder of EL 24841. The license is located west of the Westmoreland Uranium Field and forms part of Lyell’s Murphy Project targeting uranium deposits within the Southern McArthur Basin in the Northern Territory. The Murphy Project currently comprises ELS 24841, 26138 and 26139. Refer to Figure 1 for the Murphy project tenement locations.

This annual report covers all the exploration work carried out within EL 24841 up to 31st of July 2012. Exploration during the 2011-2012 field season comprised a ground TEM survey in February 2011 which partially covered the UC19 target within EL 24841. This data has been processed, modelled and an interpretation completed by John Coggon of Mines Geophysical Services Pty. Ltd. In March 2012.
EL 24841 is located approximately 130km west of the NT - QLD border and 170km south east of the McArthur River mine in eastern NT (Figure 2). The license straddles two 1:250,000 map sheets; Walhallow and Calvert Hills. Access is via the Barkly Highway from Mt. Isa, to the Barkly Roadhouse, then via the Tablelands Highway to the Calvert Hills Road. Access around the project area is via graded station roads and tracks. An alternative access can be gained via Cape Crawford to the north via the Tablelands highway, or from the east by the Calvert Hills Rd which crosses the border near Wollogorang.

Figure 2 - Project Location and Access Map
3 TENURE DETAILS

Global Discovery Pty Ltd originally applied for EL 24841 and it was acquired from them by Canon Investments Pty Ltd (a wholly owned subsidiary of the Canadian company, Buffalo Gold Limited), and subsequently by Murphy Uranium Pty Ltd who are a 100% owned subsidiary of Bondi Mining Limited (Bondi). In December 2008 a Letter of Agreement was signed between Bondi and Japan Oil, Gas and Metals National Corporation (JOGMEC) wherein JOGMEC can earn a 51% undivided interest in the project by funding AUD $3 million in exploration over four years. In December 2011 Bondi merged with World Titanium Resources Ltd and the Murphy project tenements of which EL 24841 forms part were vended into another company Lyell resources Ltd who are now the operators of the exploration program. Tenement details are shown below in Table 1 and sub-block identification is shown in Figure 3. Exploration expenditure for this period totalled $275,676 (excluding tenement costs). Refer to the Expenditure Report in Appendix 1 for details.

Table 1: Tenement details

<table>
<thead>
<tr>
<th>Exploration Licence No.</th>
<th>No. Blocks</th>
<th>Area (km²)</th>
<th>Grant Date</th>
<th>Expiry Date</th>
<th>Expenditure Commitment</th>
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<td>EL 24841</td>
<td>216</td>
<td>706</td>
<td>01/08/2006</td>
<td>31/07/2012</td>
<td>$ 80,000</td>
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</table>

(Renewal Application pending)

Figure 3 - EL 24841 Sub-Block identification Map
The Murphy Project tenements are situated within the Calvert Hills, Walhallow, Mount Drummond and Brunette Downs (Northern Territory) 1:250,000 geological sheets. The first geological observations in the area were reported by explorer Gregory in 1861. The Redbank copper deposit was discovered in 1916 by prospectors, however little geological work was done until the late 1930s when the federal government funded the Aerial Geological and Geophysical Survey of Northern Australia (“AGGSNA”). The discovery of uranium in 1955 at Pandanus Creek led to increased interest from mining companies.

The oldest rocks exposed in the area are early Proterozoic sediments, volcanics and intrusives of the Murphy Metamorphics which were deformed and regionally metamorphosed prior to 1875 Ma (Figure 4). The Murphy Metamorphics are represented mainly by phyllitic to schistose metasediments and quartzite and are overlain by two Proterozoic cover sequences; the Clifftdale Volcanics and the Westmoreland Conglomerate. The cover sequences were laid down after the early deformation and metamorphism of the basement and before a period of major tectonism, which began at about 1620 Ma. The oldest cover sequence is the Clifftdale Volcanics unit, which unconformably overlies the Murphy Metamorphics. The Clifftdale Volcanics contain over 4000 m thickness of volcanics of probably sub-aerial origin, more than half of which consist of crystal-rich ignimbrites with phenocrysts of quartz and feldspar. The remainder are rhyolite lavas, some of which are flow banded. The ignimbrites are more common in the lower part of the sequence, with the Billicumidji Rhyolite Member occurring towards the top.

The Clifftdale Volcanics are comagmatic with the Nicholson Granite and together they comprise the Nicholson Suite. SHRIMP dating of both the Nicholson Granite and the Clifftdale Volcanics gave an age of 1850 Ma (Scott et al, 2000). The Nicholson Granite is predominantly an I-type granodiorite. The Nicholson Suite shows little evidence of fractional crystallisation and on this basis the potential for forming large tonnage deposits is considered to be minor, although small tonnages of high grade are possible. In the vicinity of the granites there are no significant potential host rocks documented. Potential exists for small Sn and W deposits within the granite and for smaller Cu and Au deposits outside the granite.

Unconformably overlying the Nicholson Suite is the Tawallah Group. This is the oldest segment of the southern McArthur Basin. The base is a sequence of conglomerates and sandstones comprising the Westmoreland Conglomerate. The conglomerates thin out to the southeast and are in turn conformably overlain by the Seigal Volcanics; an andesitic to basic sequence containing interbedded agglomerates, tuffs and sandstones. Together these units comprise about two-thirds of the total thickness of the Tawallah Group. The Seigal Volcanics are overlain (in ascending order) by the McDermott Formation, the Sly Creek Sandstone, the Aquarium Formation and the Settlement Creek Volcanics. Age dating of volcanics within the Tawallah Group indicates a depositional age of between 1780 and 1710 Ma.
To the south and south-west of the Murphy Tectonic Ridge, the Tawallah Group is unconformably overlain by shallow marine and fluvial sandstone and siltstone of the mid Proterozoic (1570 -1590 Ma) South Nicholson Group. To the southwest of the Murphy Tectonic Ridge, the South Nicholson Group appears to have been deposited directly onto lithologies of the Murphy Metamorphics.

To the west of the exposed parts of the Murphy Tectonic Ridge and the area in which the Murphy Project tenements are located, Proterozoic Rocks are concealed by Quaternary colluvium and black soil plain and Cambrian shallow marine sediments of the Barkly Group. Sporadic outcrop of Westmoreland Conglomerate and Murphy Metamorphics indicates that the depth to potentially prospective lithologies is minimal in the eastern half of the tenement holding. Interpretations of Proterozoic geology presented with the BMR Calvert Hills 1:250 000 geological map publication indicate that the Murphy Tectonic Ridge continues to the west under younger cover rocks and the Murphy Project tenement block.

Refer to Figure 5 for the regional stratigraphic sequence.
Figure 5 - Stratigraphy of Murphy Inlier Region
4.1 Structure and tectonics

Cratonisation of the northern Australian orogenic domains during the Barramundi Orogeny was accompanied by the establishment of a fundamental framework of deep-seated NW, NNW to NNE and NE-trending crustal structures (Etheridge et al., 1987). It is widely speculated that these structures were reactivated and became the major controlling influence on the depositional geometry of succeeding basin phases and the localisation of subsequent deformation (e.g., Plumb, 1979; Etheridge and Wall, 1994; Rogers, 1996). The majority of models for the evolution of the McArthur Basin promote extensional tectonics, in which specific fault orientations acted as normal or ‘growth’ structures and others acted as accommodation or transfer structures during various stages of basin formation. The most influential aspect of McArthur Basin geology that has driven extensional models is the presence of significant volcanic and coarse grained clastic rocks at the base of the basin succession (Rogers, 1996).

The igneous rocks of the Westmoreland region are markedly bimodal with respect to silica content, a typical feature of intracratonic rifting. No rocks older than the Murphy Metamorphics are known east of the Westmoreland area, implying that the detrital sediments of the Tawallah Group were derived from either within or west of the Murphy Tectonic Ridge. The Tawallah Group is dominated by shallow-water marine sediments deposited on a regionally extensive platform.

Subsequent contractional reactivation of earlier ‘extensional fault systems’ is thought to have occurred at least three times during and after basin development (Plumb, 1994; Rogers, 1996).
Most of EL 24841 is covered by Cainozoic material consisting of recent alluvium, tertiary laterite, sandstone and siltstone, black soils and accreted carbonate outcrops of an undesignated formation (refer to Figure 6 - Detailed Geology). Small exposures of Cambrian sediments, belonging to the Georgina Basin, are scattered through the tenement and consist of conglomerates, partially fossiliferous, dolomitic limestone, ferruginous grey and white quartz sandstone and mudstone. Neoproterozoic sediments belonging to the South Nicholson Group occur of tenement to the south and small outcrop of Westmoreland Conglomerate, which is part of the McArthur Basin, occurs in the northern part of the tenement. Palaeoproterozoic Nicholson Granite and Murphy Metamorphics outcrop to the east but do not outcrop in the tenement.

Figure 6 - Detailed Geology
A comprehensive review of previous mineral exploration was carried out and an outline is presented here. Important information gained from this review includes the following:

- First recorded work in the area was by Mount Isa Mines in 1956 and consisted of crude airborne radiometric surveys. The results of this work located the Westmoreland deposits and most likely all of the significant outcropping occurrences.

- There was a distinct hiatus in exploration between 1963-1970, reflecting a slump in the global demand for uranium; the post war proliferation of nuclear weapons had slowed and the nuclear power industry was still in its infancy.

- A second wave of exploration commenced in the 1970's as the demand for uranium for use in nuclear power stations increased. Many of the companies were also operating in the Alligator Rivers region, at the northern end of the Pine Creek fold belt, and much of their focus was on this area after the discovery of significant deposits at Jabiluka, Ranger, Naborlek and Koongarra. The similarity between the two areas was known, however at this time the nature of the Alligator Rivers deposits was poorly understood and exploration was targeted toward roll front and sandstone hosted uranium deposits in both areas. By the time unconformity type uranium deposits were understood, uranium exploration restrictions were in place and work did not resume in the area until recently.

- More detailed radiometric surveys have been carried out. This work has revealed many outcropping anomalies related to brecciation, quartz veining (silicification) and iron-metasomatism (ferruginisation) associated with faulting in the Nicholson granite and Murphy Metamorphics. None of these anomalies appear to warrant follow-up work, however they indicate that processes associated with the formation of unconformity type uranium deposits have been active in the early Proterozoic basement.

- The region has been explored for gold, basemetal (sedex type deposits) and kimberlite hosted diamonds by several major companies. No significant gold or basemetal discoveries were made. A large number of diamonds were recovered from Ashton's Creswell prospect outside the licence and the area is currently under an ERL.

- An airborne GEOTHEM survey carried out by BHP targeting unconformity U-Au-PGE deposits indicated the usefulness of input EM surveys in targeting unconformity uranium deposits under cover. In particular the ability to locate basement conductors related to graphite in fault zones or clay alteration. Part of the BHP survey covers the current EL.

- The western covered region of the Murphy Inlier has the potential to host an unconformity type uranium deposit at depth

A list of the ATPs and ELs previously covering area about EL 24841 is provided in Table 2.
<table>
<thead>
<tr>
<th>Licence</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATP 444</td>
<td>MIM</td>
</tr>
<tr>
<td>ATP 983</td>
<td>Carpentaria Exploration Company</td>
</tr>
<tr>
<td>ATP 3401</td>
<td>ESSO Australia</td>
</tr>
<tr>
<td>EL 122</td>
<td>Noranda Australia</td>
</tr>
<tr>
<td>EL 886 &amp; EL 887</td>
<td>T.W. Cawley and R.A. Weston</td>
</tr>
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<td>EL 1339</td>
<td>AAR Ltd/Otter Exploration “Coolibah” JV</td>
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<tr>
<td>EL1427</td>
<td>Mines Administration/Otter Exploration “Bowgan Creek” JV</td>
</tr>
<tr>
<td>EL 1253</td>
<td>Mines Administration/Union Oil JV</td>
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<tr>
<td>EL1234</td>
<td>Mines Administration/ESSO Australia JV</td>
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<td>Ashton Mining</td>
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<td>EL 8997, 8998, 9163 &amp; 9660</td>
<td>BHP</td>
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</table>
6 PREVIOUS EXPLORATION BY BONDI

6.1 Summary of Work Completed to July 2007

In summary, the work completed up to 31 July 2007 consisted of;

- A comprehensive review and assessment of previous mineral and diamond exploration work.
- A detailed airborne EM and magnetic survey over the eastern side of tenement.
- A mineral assessment and target selection by Douglas Haynes Discovery Pty Ltd comprising:
  o Compilation of public domain geological, geochemical and geophysical data;
  o An interpretation of the geological and structural data for the region;
  o A geophysical and geochemical interpretation of available data, incorporating the airborne EM survey.
  o Selection of potential target areas.

A detailed account and assessment of the 2007 work has been presented in the 2007 Annual Report by D. Hedger. This will not be repeated in this report.

6.2 Summary of Work Completed to July 2008

In the 2008 period, Bondi carried out programmes designed to test some of the targets defined by the assessment of all the previous work to July 2007. Work comprised the following.

- Detailed airborne magnetic and radiometric survey over the entire tenement.
- Geological interpretation of the airborne geophysical results to select targets for follow up exploration.
- Alpha (radon) track etch surveys.
- RAB drilling.
- Downhole radiometrics.
- Hychip survey report

6.3 Summary of Work Completed to July 2009

- An orientation Radon X cup survey was conducted over UC19 and UC24. The anomalous results at UC19 were coincident with the alpha track cup anomaly.
- An orientation Ionic Leach survey, which is a low detection partial digest technique, had strong uranium anomalies 6 to 30 times the threshold. The highest values were 113 and 192 ppb U which are coincident with anomalous gamma log and RAB geochemistry.
- An analysis of the Ionic leach results showed a positive correlation between Uranium, Thorium and all Rare Earth elements.
• Ionic Leach soil sampling on targets UC24 and UC25 did not define any anomalies on EL 24841.

• Four drainages had a BLEG (5kg unseived) and a -40# / 500g sample collected. The BLEG assays showed three samples were anomalous for gold and one of those samples was also anomalous for palladium (BOM04275 assayed 5.8 ppb Au and 0.5 ppm Pd).

• Four RAB holes were drilled to a depth of approx 20 to 60m to test for phosphate mineralisation. The limestone thins to the east and did not contain significant P2O5 values. Holes MPRB002 and 004 both intersected quartz sandstone (probably Westmoreland) and little or no limestone.

• RC / diamond drill hole MURD002 at target UC19, intersected two gabbroic intrusives with highly silicified Westmoreland Conglomerate quartz sandstones between them. The lower gabbro has zones of carbonate veining, and minor brecciaation with associated strong, ‘brick red’ hematite alteration. The alteration is also associated with uranium and copper mineralisation and is magnetite destructive.

• MURD002 intersected significant uranium and copper mineralisation in the lower gabbro. The mineralised interval comprised 99m at 1260 ppm Cu and 14.2ppm U between 405 to 504m, including 2m at 1% Cu and 85ppm U from 447 to 449 m.

6.4 Summary of Work Completed to July 2010

• A ground magnetics survey, comprising 225 line kilometres at 25m and 50m line spacing was completed at UC19.

• A re-interpretation of the regional geology was then carried out by Dr Douglas Haynes and new interpretation was conducted by Dr John Coggon. This work also included 3D inversion modeling of the UC19 and Camp target areas.

• Re-interpretation by Dr Haynes defined 2 new unconformity uranium target areas (UC25 and UC26), in addition to locating 7 base-metal target areas, and also redefined the position and shape of older targets area.

• An interpretation of the magnetic character of the covered rocks was carried by Dr John Coggon of Mines Geophysical Services.

• Two inversion models were made for UC19 area; a regional model, with 180m cells covering a 18.7km EW x 15.1km NS block around the main target area and detailed model with 50m cells covering a 6.6km EW x 3.2km NS block over the main target.

• Modeling of the detailed airborne magnetics at the Camp target area was carried out using two approaches; a slab modeling and 3D smooth susceptibility isosurafces.

• A regional RC / diamond drill hole (MURD013) was completed in September 2009 to a depth of 400.4m.

• An RC / diamond drill program comprising two drill holes for a total of 662.3m at target UC19 was completed in December 2009.
6.5 Summary of Work Completed to July 2011

- On 6th October 2010 Fugro Airborne Services completed an Airborne Electo-Magnetic survey (AEM) comprising a total of 2,355 line kilometres covering the Murphy West target area (1,478 line km at 500m spacing), the UC19 area (624 line km at 300m spacing) and the UC 17 survey (253 line km). Refer to Figure 7 for location of the AEM surveys. A portion of the Murphy West survey area (130 sq km out of 600 sq km) covered the southern portion of EL 24841 and UC19 AEM survey area was completely within EL 24841 (Figure 7). The data from the Murphy West Aerial EM survey was included as Appendix 2 in the 2010 annual statutory exploration activity report for EL’s 26138, 26139 & 26140, the data from the UC19 AEM survey is presented in Appendix 2 of the 2011 annual statutory report.

- An interpretation of the data from the AEM survey was completed in November (J. Coggon, 2010). The interpretation identified a thick, weakly conductive sequence which corresponds with the Cambrian limestone and Proterozoic Westmoreland sandstone in the Murphy West area.

- The interpretation of the GEOTEM data for the complete AEM survey area was completed by Dr John Coggon in October 2010 and a final version for the Murphy West area was completed in March 2011 both these reports are attached as Appendix 3 in the 2011 annual statutory report. Significant anomalies identified will be followed-up using ground electro-magnetics (EM).

![Figure 7 - Location of Aerial EM Survey](image-url)
7 EXPLORATION IN THE CURRENT REPORTING PERIOD

7.1 Ground Transient Electromagnetic Survey

A transient electromagnetic (TEM) survey comprising a total of 35.2 line kilometres was carried out at prospect UC19 in February 2012. The survey was designed to find conductors that may be associated with uranium or other metallic mineralisation. A moving ‘in-loop’ survey was chosen, as best suited to detect conductors of unknown size, geometry and orientation. Zonge Engineering and Research Organization (ZERO) Australia was contracted to carry out the survey, using a powerful Zonge transmitter and an EMIT SmarTEM receiver.

The bulk of the survey area, comprising a 3 km (east-west) x 2 km (north-south) was covered with of north-south lines spaced at 200 m, with a station interval and loop size of 100 m. The line spacing had been set at 150 m, but this was increased after the first four lines to speed up the survey due to the thick vegetation and rough black soils / clays. Measurements were made using both coil and fluxgate sensors. Refer to Figure 8 for a map of the survey area.

Figure 8 - Location of UC19 Ground EM Survey
The TEM survey at UC19 was completed despite difficult weather conditions. The results provided data on the conductivity structure of the ground and showed the presence of a local anomaly suggesting a buried strong conductor.

The report which describes the survey and interprets the results was compiled and written by John Coggon of Mines Geophysical Services is supplied as Appendix 2 of this report.

7.2 Drill hole audit and rehabilitation

In August 2011 a Bondi Mining field crew did an audit of rehabilitation conducted on all tenements within the Murphy project, paying particular attention to previous drill collars. The audit discovered that a number of drill holes had not been satisfactorily rehabilitated and therefore a follow-up rehab program was completed in February 2012 with a field crew from Arnhem Exploration Services. During the second program the field crew located, rehabilitated and photographed each drill hole which was not previously rehabilitated. Refer to the

7.3 Drill Planning

A drill program has been planned for September 2012, at prospect UC19, to test the conductor defined by the TEM survey and to test for along strike and down-dip extensions to uranium and copper mineralisation defined by two drilling programs in 2009. There will be approximately 7 holes for 2,700m of combined RC / diamond drilling.

The interpretation of the ground electro-magnetic (EM) survey by John Coggon, and an interpretation of the airborne magnetics was loaded into the MICROMINE modelling program and the proposed drill holes, shown in red below, were orientated to test the conductors identified by the ground EM survey (TEM01a and 02a) ; to test for extensions to the Cu – U mineralisation intersected in hole MURD002 and 015; and also to test a zone of weak conductivity on the south side of the NW trending fault zone. Refer to Table 3 and Figure 9 for the proposed drill hole statistics, and plan of collar locations with conductor models.

Table 3: Proposed Drill Hole Collars

<table>
<thead>
<tr>
<th>HOLE ID</th>
<th>EASTING (m)</th>
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Figure 9 - Location of drill hole collars and down-hole traces, with conductor models
8 CONCLUSIONS

A transient electromagnetic (TEM) survey comprising a total of 35.2 line kilometres was carried out at prospect UC19 in February 2012. The survey was designed to find conductors associated with uranium or other metallic mineralisation. A moving ‘in-loop’ survey was chosen, as best suited to detect conductors of unknown size, geometry and orientation. The TEM survey defined several conductors in the centre of the grid and a drill program is planned to test these targets, based on the modelling of the conductors by geophysicist, John Coggon.

A drill hole rehabilitation audit was completed in August 2011 and a follow-up rehabilitation program was conducted in February 2012 which involved locating, rehabilitating and photographing old RAB, aircore and RC holes which had been missed in earlier rehabilitation efforts due to scheduling, or poor access.

9 FUTURE WORK

Future work will involve a drill program comprising approximately 7 holes for 2,700m of combined RC and diamond drilling at the UC19 prospect to test the conductors defined in the TEM survey and test for extensions to known mineralisation intersected in the 2009 drilling program. The drilling is scheduled for September 2012.
REFERENCES


Appendix 1: Expenditure Statement (Presented under separate cover)
Appendix 2: Ground TEM Survey Report
MURPHY URANIUM

UC19 AREA: RESULTS OF
TRANSIENT ELECTROMAGNETIC SURVEY
FEBRUARY 2012

J H COGGON
MARCH 2012
UC19 AREA:

RESULTS OF TRANSIENT ELECTROMAGNETIC SURVEY,
FEBRUARY 2012

SUMMARY

The transient electromagnetic (TEM) survey carried out at UC19 in February 2012 was designed to find any conductors that may be associated with uranium or other metallic mineralisation. A moving in-loop survey was chosen, as best suited to detect conductors of unknown size, geometry and orientation. Zonge Engineering and Research Organization Australia was contracted to carry out the survey, using a powerful Zonge transmitter and an EMIT Smartem receiver.

The bulk of the survey area (3 km east-west by 2 km north-south) was covered with north-south lines spaced at 200 m, with a station interval and loop size of 100 m. The line spacing had been set at 150 m, but this was increased after the first four lines to speed up the survey. Measurements were made using both coil and fluxgate sensors.

The early-mid time TEM responses were found to be relatively strong in the southwest part of the survey, southwest of a northwest trending fault zone evident from magnetic data and drilling information. From layered earth modelling there appears to be thin conductive material (soil and weathered rock) overlying up to about 100 m of moderately conductive ground (Phanerozoic rocks) in this area. In the northeast responses are weaker and include areas where sections of the decays go negative. Modelling indicates that this region is mainly covered by a very thin conductive layer (soil etc), with resistive rocks (Westmoreland quartzite and other sediments and two major gabbroic sills) beneath. The negative EM signals were observed over the sills and are ascribed to induced polarisation effects, probably from clays in the weathered zone. A localised late time anomaly was found near the centre of the survey area, just north of the northwest trending fault and adjacent to the western end of the southern gabbro sill.

Good signal to electrical noise ratios were achieved. However, the negative signals in some areas, and very slow late time decays thought to originate from the ferrite cored coil receiver sensor, slightly reduced the sensitivity in some areas.

The late time anomaly near the centre of the survey was the only indication found of a buried good conductor. Some follow-up stations were read to help define the anomaly. Modelling suggests the source consists of two narrow (<100 m long) conductors with their tops about 100 m below the surface, striking slightly south of west and dipping at 60-75° to the north. Sulphides, or perhaps graphite, are expected to be responsible for the high conductivity.
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Fig 2  Layout for TEM survey at UC19, with Geotem responses  Page 5

Separate plans

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Plan 3  Transient EM response at 2.56 ms delay time
Plan 4  Transient EM response at 6.1 ms delay time
Plan 5  Transient EM response at 14.6 ms delay time
Plan 6  Transient EM response at 27.7 ms delay time
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Plan 14  Conductivity sections from five-layer inversions
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Plan 18  Central TEM anomaly conductor models and magnetic features
Plan 19  Central TEM anomaly section 644650E conductor models
INTRODUCTION

A transient electromagnetic (TEM) survey was completed over the UC19 area with the objective of detecting any conductors that may be related to uranium (or other metallic) mineralisation. The Geotem airborne electromagnetic survey carried out at UC19 in 2010, on north-south lines spaced at 300 m, had not revealed any definite buried conductors, but the ground survey was expected to provide a greater depth of exploration and increased sensitivity to smaller conductors, if present.

The moving in-loop method was chosen. This is suitable where very little is known about possible conductor geometries. Zonge Engineering and Research Organization Australia was contracted to carry out the survey. Zonge provided a 30 kVA GGT-30 transmitter with generator, EMIT Smartem24 receiver, and an induction coil and fluxgate sensors.

This report presents the results from the survey, comments on the information they give on ground structure, and discusses interpretation of an anomaly that suggests local buried conductive mineralisation.

SURVEY

The TEM survey at UC19 was planned to cover an area 3 km east-west by 2 km north-south. Its location in relation to magnetic anomalies is shown in Fig 1. The east-west trending magnetic anomalies represent gabbroic sills within the Westmoreland sequence of quartzite and conglomerate. These rocks are cut by a northwest trending fault zone that runs across the survey area. Anomalous uranium has been found in drilling adjacent to the fault and within some of the mafic rocks in the northwest. The Geotem survey showed that the area northeast of the fault is generally resistive, while the area to the southwest is relatively conductive (Fig 2). This correlates with a Phanerozoic cover probably over 50 m thick in the southwest.

The original design for the TEM survey was for north-south lines spaced at 150 m, as drawn in Figs 1 and 2, and the survey was begun in the west with this spacing. However, the survey was being carried out in the wet season, and to expedite completion during a dry spell the line spacing was increased to 200 m after the first four traverses. The along-line station spacing was maintained at 100 m.

It was intended that the induction coil sensor only be used for the main survey. Comparison with fluxgate measurements showed elevated late time coil signals, and so most of the survey was completed making both coil and fluxgate measurements.

An anomaly suggestive of a local good conductor was found near the centre of the survey. This was followed up with fill-in lines 100 m each side of the original anomalous traverse and with closer stations at 50 m and 25 m, in order to define the anomaly better. The follow-up and the main survey were just completed before wet weather set in.
MURPHY PROJECT
Proposed layout for 100 m moving in-loop TEM survey at UC19:
N-S lines at 150 m spacing with 100 m station interval.
Grid intersections show loop centres, on image of Geotem response (vertical component, channel 10 voltage)

FIG 1

MURPHY PROJECT
Proposed layout for 100 m moving in-loop TEM survey at UC19:
N-S lines at 150 m spacing with 100 m station interval.
Grid intersections show loop centres, on image of Geotem response (vertical component, channel 10 voltage)

FIG 2
GENERAL RESULTS

The results from the survey are presented in the form of plans of transient response at several decay times. Plans 1-6 illustrate the patterns with increasing time, from 0.45 ms to 27.7 ms, for the vertical component signal measured with the induction coil. Coordinates in all plans are MGA (GDA94) zone 53.

At early times there is a strong response in the southwest (in agreement with the airborne Geotem results) and also elevated signals over the two east-west trending magnetic dykes. With time the strong signals in the southwest persist, but the responses over the dykes change rapidly, with some decays going negative (see Plan 3, for 2.56 ms). Areas of negative response are more extensive at 6.1 ms (Plan 4). Later still the negatives disappear and also the signals in the southwest have decayed, so there is little to mark the northwest trending fault. However, Plan 5 (for 14.6 ms) also shows the presence of a local sharp anomaly near the centre of the survey area. This anomaly persists to later times (Plan 6 is for 27.7 ms). Some weak north-south stripes or trends are also evident at the late times. These do not correlate with magnetic or known geological features, and in fact are not visible in the vertical component fluxgate results, shown in Plan 7 for 27.7 ms. The fluxgate data do, however, clearly show the local anomaly near the middle of the survey.

The late time ‘central anomaly’ is illustrated in more detail in Plan 8. This includes data from the follow-up measurements on 644550E, 644650E and 644750E at 50 m station interval.

The correlation of high early time responses with both the area southwest of the northwest trending fault and with the east-west magnetic gabbroic sills is shown in Plan 9. Negative signals soon develop over these sills, as illustrated in Plan 10. Many decays display ‘notches’ even if they do not actually go negative. These effects are thought to be due to induced polarisation, possibly from clay weathering products of the mafic rocks.

The main cause of the transient electromagnetic responses at early time is conductive material near the ground surface. This is demonstrated by the results of multilayer inversion modelling, carried out using the vertical component voltage data. Three sections from 5-layer ground model inversions are shown in Plans 11, 12 and 13. In much of the area the top layer is up to only a few metres thick but it is conductive. Red colours in the sections indicate conductivity greater than 0.2 S/m, or resistivity less than 5 ohm m. Deeper material of moderately low resistivity (eg light green colours representing 15-20 ohm m) occurs south of the northwest trending fault zone.

Sections from 5-layer inversions for all the traverse lines are shown stacked in Plan 14. The colour legend is as for Plans 11-13, but the sections are only plotted to 290 m depth. Gaps in the model sections are present where negative effects occur in decays or model fits are poor. The ‘central anomaly’ evident from late time signals is seen as a weak buried conductive zone near 8037500N on 644650E. There are some similar features present in the southern parts of three of the sections to the east (645250-645650E), but they appear to be broader and
weaker. The basic data (see Plans 5-7) also suggest a broad area of slightly higher conductivity, rather than localised good conductors, here.

**SIGNAL CONTAMINATION**

The signals from electromagnetic induction in the ground, which form the basis of detecting conductive zones, appear to suffer from several sources of contamination in this survey.

Electromagnetic noise from the atmosphere and from instrument electronics was not a problem. A large transmitted current, 60A, contributed to a giving a high ratio of total signal to this kind of noise.

Negative signals for parts of decays, in some areas, have already been mentioned and ascribed to induced polarisation effects. These certainly interfere with numerical modelling, such as the multi-layer inversions. However, the negative components in this survey have relatively fast decays and fortunately do not appear to affect evaluation of late time data significantly.

Slowly decaying positive late time signals (‘tails’) from the coil sensor were observed from the beginning of the survey. These are similar to those caused by superparamagnetic effects in coincident loop surveys, but are not expected in in-loop surveys. Comparisons of coil and fluxgate measurements (an example is given in Plan 15) showed that the fluxgate did not give the same late time ‘tails’, suggesting that the cause was likely to be the coil. This has a ferrite core, which might cause slow magnetic relaxation transients. With the discrepancy between the coil and fluxgate data, the survey was completed with measurements from both sensors.

Another difference between coil and fluxgate measurements appeared when late time data were plotted in plan. Plan 6, for coil readings, shows north-south trends that are not apparent in Plan 7, which is for fluxgate readings at the same delay time. It is suspected that the ‘stripes’ are related to survey progress along the north-south traverses, with temperature rising during the day’s work affecting the measurements. If this is the case, the coil can be deduced to be sensitive to temperature. Again, the ferrite core may be responsible, as the ‘stripes’ are only evident at late delay times when the coil gives a ‘tail’.

Despite the contamination of late time coil signals, coil data were used for multilayer inversion as they appear more accurate at the early delay times that are important for modelling shallow conductive layers. To avoid introducing spurious widespread deep buried conductors that would be implied by the late time tails the inversions were limited to using the first 20 channels. This corresponds to data up to 6 ms, or 0.8 on the logarithmic time axis of Plan 15, after which the coil and fluxgate readings diverge.

For modelling and interpretation of the ‘central anomaly’ (Plan 8) both coil and fluxgate measurements were used.
ANOMALY MODELLING

The vertical (Z) component in-loop anomaly near 8037500N on 644650E consists of two peaks, as seen in Plan 8. Such an anomaly might be caused by a single steeply dipping conductor lying between the peaks, or by two separate conductors – one causing each peak. Initially modelling was carried out for the simpler case of one conductor.

A suitable model is a sub-vertical zone striking approximately east-west. The limited east-west extent of the anomaly indicates a small strike length, of the order of 100 m. The coil data were used as the fluxgate readings appear a little noisier at late time, but because of the late time ‘tails’ in the coil decays estimated background values were subtracted from each channel used for modelling. In-fill coil readings at 25 m interval were not included as these appeared to be about 80% of the other readings on 644650E (possibly due to temperature effects as discussed above).

The fluxgate measurements, although a little more noisy, include horizontal components along the traverse line (X) and across the line (Y). Examination of the cross components on 644550E, 644650E and 644750E indicated that a single conductor could not account for the observed patterns. Rather, one north-dipping conductor with its top between the two peaks seen in Plan 8, and a second conductor with its top south of the southern peak, appeared more likely. The Y component responses also suggest a strike direction somewhat south of west.

Plan 16 shows several models, all rectangular conductive plates, in relation to the coil vertical component anomaly. The single conductor model (violet colour) is one result based on modelling just the coil vertical (Z) component pattern. From this data the dip may be very steep either north or south, the strike is approximately east-west but is not well determined, and nor is the plunge. The light red and light blue models are also based on coil Z data, but assuming two conductors. The dark red and dark blue models are based on modelling the fluxgate Y component readings. All the models have conductivity-thicknesses of about 500 S (“good” conductors, expected to indicate sulphide or perhaps graphite). However, the conductivity-thickness is difficult to estimate as the anomalous late time readings are very weak and contaminated by noise or coil response as discussed above. Some indication of the uncertainties in anomaly form can be seen by comparing Plan 16 with Plan 17, which is a later time plot of the fluxgate Z response.

The same models as drawn in Plans 16 and 17 are shown in relation to magnetic anomalies in Plan 18. Within the limited resolution of both the TEM and the magnetic surveys it appears that the conductors are probably associated with magnetic bodies (that might or might not be parts of the gabbroic sills). The southern conductor models lie about 100 m north of the prominent northwest trending fault as interpreted from the magnetic patterns.
Plan 19 is a section at 644650E showing the various conductor models. The two-conductor scenario is preferred, with the top of the southern conductor near 8037330N and the top of the northern conductor near 8037500N. Depths to top are of the order of 100 m and dip is estimated to be in the range 60-75°. For drill testing a vertical target intersection depth of 150-200 m is suggested.

CONCLUSION

The TEM survey at UC19 was completed despite difficult weather conditions. The results provided data on the conductivity structure of the ground and showed the presence of a local anomaly suggesting a buried good conductor.

The southwestern part of the survey area gave stronger EM responses, as expected from the previous Geotem airborne survey. Layered earth modelling here indicates that some of the ground here is moderately conductive down to about 100 m. Almost everywhere there appears to be a thin conductive layer of soil and weathered material. Transient signals opposite in sign to the normal inductive response, and ascribed to induced polarisation, were observed over parts of gabbroic sills (as interpreted from magnetic data and drilling). A small late-time anomaly near the centre of the area is of particular interest as it is the only indication of a good conductor.

Both the probable induced polarisation signals and an apparent late time signal possibly caused by the ferrite cored coil receiver sensor complicated the evaluation of the survey results. However, they have not significantly affected the sensitivity of the measurements for detection of anomalies of good conductors.

The anomaly found near the centre of the survey is narrow. A comparable feature would be missed if it lay between the 200 m spaced traverse lines. The follow-up work to define this anomaly was not as complete as desirable, because of the need to complete the survey as soon as possible while the weather permitted, and some inconsistencies in the data were apparent. Modelling with rectangular plates and making use of both coil and multicomponent fluxgate measurements suggests that there are two narrow north-dipping conductors. They appear sufficiently conductive that sulphide or graphite is expected. Other possibilities such as thick zones or very shallowly dipping bodies have only been partly investigated. The north dipping models are well enough defined for designing drill holes to test the anomaly.
This plan shows the responses from a 100 m moving in-loop TEM survey in microvolts/amp at 0.45 ms delay time. Loop centres are shown by small crosses.
This plan shows the responses from a 100 m moving in-loop TEM survey in microvolts/amp at 1.07 ms delay time.

Loop centres are shown by small crosses.
This plan shows the responses from a 100 m moving in-loop TEM survey in microvolts/amp at 2.56 ms delay time. Loop centres are shown by small crosses.
This plan shows the responses from a 100 m moving in-loop TEM survey in microvolts/amp at 6.1 ms delay time. Loop centres are shown by small crosses.
This plan shows the responses from a 100 m moving in-loop TEM survey in microvolts/amp at 14.6 ms delay time. Loop centres are shown by small crosses.
This plan shows the responses from a 100 m moving in-loop TEM survey in microvolts/amp at 27.7 ms delay time. Loop centres are shown by small crosses.
This plan shows the responses from a 100 m moving in-loop TEM survey in picoteslas/amp at 27.7 ms delay time. Component is vertical magnetic field. Loop centres are shown by small crosses.
This plan shows the responses from a 100 m moving in-loop survey. Signal is vertical component voltage in microvolts/amp at 14.6 ms delay time. Loop centres are shown by the crosses.
The background image shows the first vertical derivative of total magnetic intensity reduced to the pole, in nT/m.

Overlain in black cross are the areas where the TEM signals at 0.45 ms delay time are greater than 1200 microvolts/amp.

MURPHY URANIUM

UC19 AREA

EARLY TIME TEM RESPONSES AND MAGNETIC ANOMALIES

SCALE 1: 20000

DATE MARCH 2012

DRAWN JHC
The background image shows the first vertical derivative of total magnetic intensity reduced to the pole, in nT/m. Overlain in black boxwork are the areas where the TEM signals at 2.56 ms are negative.
This section shows conductivity in S/m for a 5-layer inversion of TEM data from a 100 m moving in-loop survey. The vertical axis gives depth below surface.
This section shows conductivity in S/m for a 5-layer inversion of TEM data from a 100 m moving in-loop survey. The vertical axis gives depth below surface.
This section shows conductivity in S/m for a 5-layer inversion of TEM data from a 100 m moving in-loop survey. The vertical axis gives depth below surface.
These sections show conductivity in S/m for 5-layer ground model inversions of TEM data from a 100 m moving loop survey. The top of each section is at the left, located on the appropriate traverse line, and each section is 200 m deep. Blank grey portions represent either data with negative signals in the EM decay, or poor layer model fit.
Horizontal axis: log time t (ms).
Vertical axis: log U for coil receiver, where
U = (t.e/I) / L, e being voltage, L loop size, I current;
or log Ub for fluxgate receiver, where
Ub = (t.(10 dB/dt) / I) / L, B being magnetic flux density.
Coil decay is shown in red, fluxgate decay in blue.
This plan shows the responses from a 100 m moving loop survey. Signal is vertical component voltage in microvolts/amp at 14.6 ms delay time. Crosses show loop centres. The coloured parallelograms represent plan projections of conductors fitted to different sets of data:

- Violet - single conductor from coil sensor Z readings,
- Light red - northern conductor from coil sensor Z readings,
- Light blue - southern conductor from coil sensor Z readings,
- Dark red - northern conductor from fluxgate sensor Y readings,
- Dark blue - southern conductor from fluxgate sensor Y readings.
This plan shows the responses from a 100 m moving in-loop survey. Signal is vertical component magnetic field in picotesla/amp at 27.7 ms delay time. Crosses show loop centres. The coloured parallelograms represent plan projections of conductors fitted to different sets of data:

- Violet - single conductor from coil sensor Z readings,
- Light red - northern conductor from coil sensor Z readings,
- Light blue - southern conductor from coil sensor Z readings,
- Dark red - northern conductor from fluxgate sensor Y readings,
- Dark blue - southern conductor from fluxgate sensor Y readings.

**MURPHY URANIUM**

**UC19: CENTRAL ANOMALY**

**TEM ANOMALY (Bz) AT 27.7 ms & MODEL CONDUCTORS**

**SCALE 1 : 5000**

**DATE MARCH 2012**

**DRAWN JHC**

**PLAN NUMBER**

17
This plan shows conductor models derived from TEM survey data in relation to magnetic features. The models are shown as coloured parallelograms, representing plan projections [all models dip to the north].

Magnetic patterns are indicated by the colour image of second vertical derivative of magnetic intensity reduced to the pole, in pT, from an airborne survey on north-south lines at 100 m spacing [at 644600E, 644700E etc.].

---

**MURPHY URANIUM**

**UC19: CENTRAL TEM ANOMALY CONDUCTORS MODELS & MAGNETIC FEATURES**

**SCALE 1 : 5000**

**DATE MARCH 2012**

**DRAWN JHC**

**PLAN NUMBER**

18
This section shows the intersections of rectangular conductor models derived from TEM data:

- Violet - single conductor from coil sensor Z readings,
- Light red - northern conductor from coil sensor Z readings,
- Light blue - southern conductor from coil sensor Z readings,
- Dark red - northern conductor from fluxgate sensor Y readings,
- Dark blue - southern conductor from fluxgate sensor Y readings.

Ground surface is at 0.
23 February 2012

**Report on Murphy Uranium drill site rehabilitation carried out on EL24694, 24841 & 25710 (February 2012).**

In February 2012, Arnhem Exploration Services was commissioned by Murphy Uranium Ltd to carry out drill site rehabilitation on Walhallow station. Areas covered within the Murphy project area were UC6, UC15/18, UC16, UC22 and UC25.

Drill sites were checked in these locations. Holes were plugged using concrete plugs at 30cm and any bags or rubbish removed from site. A list of collars is provided.

The following notes are provided:

UC16: As requested drill holes were checked and rehabilitation was found to have been completed at a previous date.
Upon inspection of drill site location MURB106 it was discovered that this drill hole was set up as a diamond drill site with sumps. This site requires heavy machinery to complete rehabilitation by backfilling the sumps.

UC25: Three RC drill holes were located and plugged with cement plugs as required. Photos of this area were taken before and after rehab.

UC22: 12 RAB holes were located and rehabilitation was carried out per instructions. Before and after photos of this area were completed.

UC6: 12 RAB holes were located and rehabilitation was carried out per instructions.

UC15/18: RAB holes in this area were located and photos taken. In some cases there was no rehabilitation required.

**Summary.**

The rehabilitation on all of the areas required has been completed as requested.
Due to the time lapse between initial drilling and rehabilitation, weather, water, fire and cattle have reclaimed most of the drill sites. The areas were cleared of all remaining rubbish. All collars located were plugged to a depth of 30cm with concrete plugs. In some cases the collars were not located due to the drilling being carried out on flood plains where the clay and mud have reclaimed them. Fire and cattle also have had a major impact on the task of locating some collars.
Yours sincerely,

Russell Barnes
Project leader
Arnhem Exploration Services

Attachments:

1. Data disk with photos
2. Mines Dept rehabilitation forms for each of the three tenements
3. Spreadsheet with collar locations and rehabilitation status
4. Garmin GPS track & waypoint file
# AUTHORISATION - REHABILITATION REPORT

## Drill Holes

**Company Name:** MURPHY URANIUM  
**Title/Licence No:** EL 24584  
**DBIRD Authorisation No:**  
**Location:** WALHALLOW - MURPHY PROJECT  
**Approval Date:**  
**Rehabilitation Date:** FEB 2012

This report verifies that the following work has been carried out to a standard required by the Mining Management Act.

### AUTHORISATION - REHABILITATION REPORT

(Mining Management Act Section 35, 37, 39, 46)

<table>
<thead>
<tr>
<th></th>
<th>NAME (Print)</th>
<th>POSITION</th>
<th>SIGNATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. All drill holes are plugged with a concrete plug similar to the design in DME guideline No.1, SEE ATTACHED LIST OF HOLES</td>
<td>R. BARNES</td>
<td>TEAM LEADER</td>
<td></td>
</tr>
<tr>
<td>2. Drill holes are plugged below ground level (0.3-0.5 metres minimum).</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3. Drill holes are backfilled to above ground level.</td>
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<td>4. All sample bags removed and disposed of in an environmentally responsible manner.</td>
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This rehabilitation report **must be signed by the responsible person who has witnessed** the rehabilitation of drill holes.

**NB:** Mining Management Act Section 83  
Minister may cause action to be taken on mining site:  

1. If a person —  
   a. fails to do an act on a mining site that is required by this Act or an Authorisation,  
   b. fails to do an act on a mining site that is required by this Act or an Authorisation,  
   c. the Minister may cause action to be taken on the mining site that the Minister considers necessary.  
2. Subject to section 44, the costs and expenses incurred by the Minister in having action taken under this section is a debt payable to the Territory by the person whose act or failure to act made the action necessary.

For Further Information Contact  
Assistant Director, Mining Performance,  
Mines Division, Department of Mines and Energy  
GPO Box 2901 Darwin NT 0801  
Phone (08) 8999 5190 Fax (08) 8999 6527  
Email: mineral.info@nt.gov.au
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<tr>
<td>Title/Licence No:</td>
<td>EL 25710</td>
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<td></td>
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(b) A person authorised in writing by the Minister to take action for the purposes of this section may enter a mining site and take the action.  
(c) Subject to section 44, the costs and expenses incurred by the Minister in having action taken under this section is a debt payable to the Territory by the person whose act or failure to act made the action necessary.

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