Annual Report EL 23726

“801” Project

For the Period ending 31 July 2011

Tenement Holder: Jacaranda Minerals Ltd (50%) and Minerals Australia Pty Ltd (50%)
Date: August 2011

Author: Peter S Collings – Chief Geologist Jacaranda Alliance JV

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Minerals Australia Pty Ltd – Perth
Jacaranda Minerals Ltd - Melbourne
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Processed electronic data for EM survey provided separately;

dalmoredowns_coil.TEM

dalmoredowns_fluxgate.TEM

tablelands_coil.TEM
SUMMARY

EL 23726 was granted to Conarco Minerals Pty Ltd on 1st August 2003 for a period of six years. The EL as granted comprised an area of 500 blocks (approximately 1600 sq km) and is located on Dalmore Downs pastoral lease, 260km east of Tennant Creek in the Northern Territory of Australia. In August 2009 the area of EL23726 was reduced to 41 blocks.

In December, 2007, Conarco Minerals entered into a Joint Venture, the Jacaranda Alliance JV, with Hancock Prospecting Pty Ltd in Perth, W.A. (HPPL), to carry out exploration on all Conarco tenements including EL 23726. The Joint Venture partners are Jacaranda Minerals Ltd, a company wholly owned by the principals of Conarco Minerals, and Minerals Australia Pty Ltd a wholly owned subsidiary of Hancock Prospecting Pty Ltd. In June 2008 the tenement was transferred to Jacaranda Minerals Ltd (JML) and Minerals Australia Pty Ltd (MAPL) in equal shares.

In late 2002, Conarco, while carrying out a regional reconnaissance geochemical survey, discovered strongly anomalous geochemical lead (750ppm Pb) and arsenic (150ppm As) in weathered Cambrian sediments at a location named “801” Literature search by Conarco also discovered drill holes previously drilled in the area containing anomalous lead values up to 370ppm Pb.

Follow-up work by Conarco defined a broad area within EL 23726 containing anomalous lead geochemistry with coincident magnetic response defined from interpretation of the NTGS Barkly airborne geophysical survey. Additional magnetic modeling also revealed several magnetic targets for kimberlite bodies. The targets range in depths from 100m to 200m.

An MMP for a drilling program, submitted by Minerals Australia Pty Ltd, was approved by DPIFM in June 2007 and Authorisation No. 0367-01 was issued on 28 June 2007.

The drilling programme approved by DPIFM in 2007 was commenced in July 2008 when a drilling contractor was finally obtained after completing a contract on the adjacent Wonarah phosphate deposit. To the end of July, 2009 five core holes were completed for a total of 1296 meters.

In June-August 2010 a ground electromagnetic (EM) survey was carried out over the most northwesterly part of EL 23726. Seven lines of moving loop EM were completed over previously identified magnetic anomalies in that part of the EL to locate possible conductors and/or resistors which may indicate potential for base and/or precious metal mineralisation.
1. TENURE

Jacaranda Minerals Ltd and Minerals Australia Pty Ltd are the registered owners of respective 50% interests in EL 23726 which is located on the Dalmore Downs pastoral lease owned by Mr. Sterling Buntine. The area of the EL is subject to registered Native Title claims DC02/2 and DC01/30, the claimants being represented by the Northern Land Council.

EL 23726, with 500 blocks (1600km²) in area, was granted on the 1 August 2003 for a period of six years, expiring 31 July 2009. A portion of EL 23726 was following a compulsory reduction of the area in June 2005. From 1 August 2006, the area was reduced to 149 blocks (460 km²).

An application for a six (6) month deferral of reduction was submitted on 31st July 2007 due to the difficulty encountered in contracting the services of a drilling company to do the planned drilling. A waiver for 12 months to 31st July 2008 was granted by the DPIFM in September 2007 with exploration commitment at $100,000.

A six month extension of time to reduce the area of the EL was granted by DRDPIFR on 20th August 2008. Nomination of 41 blocks to be retained was submitted in July 2009 with the Renewal Application for EL 23726. The Renewal was approved for a period of two years until 31 July 2011. A further Renewal Application was lodged with DoR on 3 May 2011. The current area of EL 23726 is shown in Figure 1.

The tenement schedule for “801” is as follows:

<table>
<thead>
<tr>
<th>TENEMENT NUMBER</th>
<th>EL 23726</th>
</tr>
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<td>REGISTERED HOLDER</td>
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<td>01-Aug-03</td>
</tr>
<tr>
<td>EXPIRY DATE</td>
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<tr>
<td>CURRENT AREA</td>
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<tr>
<td>ANNUAL RENTAL</td>
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<tr>
<td>EXPENDITURE COMMITMENT 2010-11</td>
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2. INTRODUCTION

EL 23726 was granted to Conarco Minerals Pty Ltd on 1st August 2003 for six years and has been renewed until 31 July 2011. A further Renewal Application was lodged with DoR on 3 May 2011. The EL as granted comprises an area approximately 1600 sq km located on Dalmore Downs pastoral lease near the Barkly Homestead Roadhouse in the Northern Territory. The EL was reduced to 41 blocks in August 2009. A location map of the current EL is shown in Figure 1.

Figure 1: EL23726 location map (EL as at August 2011)
In late 2002, Conarco, after carrying out a regional reconnaissance geochemical survey, discovered strongly anomalous geochemical lead (750ppm Pb) and arsenic (150ppm As) in weathered Cambrian sediments. Conarco named this location “801”. A follow-up literature search by Conarco identified previous exploration drill holes in the area containing anomalous lead values up to 370ppm Pb.

Subsequent work by Conarco defined a broad area within EL 23726 containing anomalous lead geochemistry with coincident magnetic response defined by interpretation of the NTGS Barkly airborne geophysical survey. Additional magnetic modeling also revealed several magnetic anomalies interpreted as being possibly caused by intrusive kimberlitic bodies. Estimated depths to these targets range from 100m to 200m. The locations of the “discovery sample” and of the magnetic anomalies identified by Conarco are shown in Figure 2.
In December, 2007, Conarco Minerals entered into a Joint Venture, the Jacaranda Alliance JV, with Hancock Prospecting Pty Ltd in Perth (HPPL), WA to carry out exploration on all Conarco tenements including EL 23726. The Joint Venture partners are Jacaranda Minerals Ltd, a company wholly owned by the principals of Conarco Minerals, and Minerals Australia Pty Ltd a wholly owned subsidiary of Hancock Prospecting Pty Ltd.

A Mine Management Plan (MMP) for a core drilling program, submitted by Minerals Australia Pty Ltd, was approved by DPIFM in June 2007 and Authorisation No. 0367-01 was issued on 28 June 2007.

Five diamond core holes were drilled in EL 23726 during July and August 2008. Completion of this drilling programme followed over twelve months of delays caused by the non-availability of suitable drill rigs due to the then Australia-wide mining and exploration "boom".

In June-August 2010 seven lines of moving loop EM were designed to test the magnetic anomalies on the northwesterly block of EL 23726. A 100m square loop with an in-loop receiver and 50m stations was used.
3. GEOLOGICAL SETTING

The “801” tenement is located in the central western Georgina Basin, a large late Proterozoic to early Palaeozoic basin extending across much of eastern Northern Territory and northwest Queensland. The tenement straddles the northeast-southwest trending Alexandria-Wonarah Basement High, an early Cambrian structural ridge separating the Brunette and Undilla Sub-basins.

Basement in this area are Mesoproterozoic sediments and volcanics overlain by Early Cambrian Peaker Piker volcanics. The volcanics are tholeiitic in composition, and comprise amygdaloidal and porphyritic basalts and dolerite. The volcanics are overlain by dolomitic rocks equivalent to the Thorntonia Limestone, and overlain by dolostone, mudstone, and phosphorite of the lower Middle Cambrian Upper Gum Ridge Formation, and mudstone, siltstone and dolostone of the Middle Cambrian Wonarah Beds (Figure 3).
Figure 3: Local stratigraphic setting
(Partial Relinquishment Report for EL22167 Wonarah 5 and EL22168 Wonarah 6, 2nd July 2002 NT Report 25614)
4. PREVIOUS EXPLORATION

**IMC**

The Wonarah phosphate deposit to the south-east of the “801” tenement was identified in 1967 by the US industrial minerals and chemicals group, IMC Development Corporation (“IMC”). Between 1967 and 1970 IMC undertook regional mapping, geophysical, drilling and test work activities in the Wonarah region, including the area containing EL 23726.

In the period to March 1970, IMC drilled 294 non core holes totaling 11,660m in the region, and delineated a phosphate resource at Wonarah of 669 million short tons of 15.73% P$_2$O$_5$ (using a 10% P$_2$O$_5$ cut-off) including 532 million short tonnes at 16.74% P$_2$O$_5$ (using a 14% P$_2$O$_5$ cut-off) and 307 million short tons at 18.98% P$_2$O$_5$ (using an 18% P$_2$O$_5$ cut-off). The global resource at Wonarah identified by IMC totaled 1,955 Mt @ 14.4% P$_2$O$_5$.

A few holes drilled by IMC within EL 23726 returned anomalous Pb values some up to 370ppm (IMC drill hole W019). Locations of these IMC drill holes were provided in the 2004 Annual Report.

**CRAE**

During 1983-1984, CRA Exploration Pty Ltd (“CRAE”) carried out an exploration program for phosphate in an area immediately to the south of the Wonarah deposit. CRAE completed a low level (80m) aeromagnetic survey at 1km line spacing which suggested potential for phosphorite at 20-30m depth. Although tracks and drilling grids were prepared CRAE withdrew from the project due to low prevailing world phosphate prices and the lack of infrastructure at the time in Central Australia.

In 1992, CRAE (and later Rio Tinto) explored the area for diamonds south of the Barkly Highway on the Joildung and Barry Caves 1:100,000 map sheets. A total of 21 loam samples were collected over weak magnetic anomalies and one 0.175ct microdiamond and one non-kimberlitic chromite were recovered. The distribution of microdiamonds and kimberlites occurring in the Northern Territory and the location of gravel and loam samples collected in the Barkly region by various explorers for diamond were provided in the 2004 Annual Report.

Regional Sampling Program – Conarco (2002)
In late 2002, Conarco discovered strongly anomalous geochemical lead (750ppm Pb) and arsenic (150ppm As) in weathered Cambrian sediments at a location named “801” while carrying out a regional geochemical reconnaissance survey. This area was subsequently applied for by Conarco under the application ELA 23726.

Conarco also demonstrated that the Pb anomalism, especially at the 750ppm site, was related to sub-cropping siliceous breccia. The breccia was interpreted to be a weathered silicified “crackle breccia” typical of MVT, Pb-Zn mineralisation.

Following the encouraging sample results, Conarco undertook a review of the NTGS 2001 Barkly Airborne Geophysical Survey which was flown on 400m line spacing.

Magnetic modeling of the geophysical data was undertaken by Conarco using a software package called Quickmag. Conarco’s modeling revealed a large (20km$^2$) magnetic anomaly co-incident with the location of the 750ppm Pb sample anomaly at “801” (Attachment 2). Several magnetic dipole anomalies reflecting possible kimberlite type intrusions were also interpreted within EL 23726 (refer to Annual Report year ending July 2005).

Following the formation of a joint venture between INDO and Conarco, INDO undertook a review of the Conarco data base and commissioned consultant geophysicists, Southern Geoscience, to review the data relating to the NTGS 2001 Barkly Airborne Geophysical Survey.

Southern Geoscience also compared Conarco’s modeling of the magnetic data over EL 23726 using a software package called Potent. The Potent modeling used by Southern Geoscience produced similar depths to that of the Quickmag modeling for just over half of the models (refer to Annual Report year ending July 2005). Magnetic anomalies C2, C4 and E4 are significantly deeper, while E2 and E3 are significantly shallower.

The automated modeling shows no responses within 100m of the surface, but a reasonable scatter of model solutions is in the range of 100m to 200m. The results should be taken as general guide to depths across the area.

In 2005, INDO undertook a review of the magnetic modeling completed in 2004 (refer to Annual Report year ending July 2005). The work undertaken by Southern Geoscience indicated similar depths to that of the Conarco modeling for just over half of the models. Some of the magnetic anomalies were significantly deeper, while some were significantly shallower, however in general, the targets range in depths from 100m to 200m. Work also completed during 2005 involved the plotting of the magnetic targets in suitable format and the compilation of additional maps comparing the magnetic targets against regional gravity and digital elevation (refer to Annual Report year ending July 2005).


Indo commenced preparations in late 2005 and the first half of 2006 for a drilling program to test a number of the magnetic anomalies. The preparations involved native title/site clearance programs by INDO for the proposed drilling program. Ground truthing of specific targets by Conarco were to take place following clearance.


Minerals Australia, a subsidiary of HPPL, submitted an MMP to the DPIFM in May 2007 for a drilling program of 5 holes, each to a depth of 250m (total 1250m) to test a number of the magnetic anomalies. Authorisation No. 0367-01 was issued by DPIFM on 28 June 2007 in respect of this work.

A field visit was made to the area by geological consultants for the JV, Bill Fraser and Peter Collings. The purpose of their visit was to;

- attend a meeting on 20 June 2007 with Native Title claimants over the EL area, notified in writing to the Northern Land Council,

- carry out geological reconnaissance and collect additional geochemical rock chip samples from the areas in which drilling has been planned. Samples not assayed locate with GPS and flag proposed drill sites to identify the amount of access clearing which will be required.
6. CORE DRILLING PROGRAMME – JACARANDA ALLIANCE JV (2008-09)

The core drilling programme was conducted between the 14th July 2008 and 6th August 2008. Five core holes (DDH0001-DDH0005) were completed for a total of 1296.2 meters at the locations shown in Figure 4. Drilling was contracted to Jerry’s Drilling Service Pty Ltd. Summary details of the holes drilled are shown in Table 1.

The five boreholes targeted three magnetic anomalies previously modeled during the 2006-2007 period. The estimated depths to these anomalies were re-modeled in 2008. This modeling confirmed that drill holes to 250 meters would most probably identify the source of the anomalies. Consequently all five holes were drilled to at least 250 meters. This depth gained a reasonable understanding of the stratigraphy of the area.
Boreholes DDH005 and DDH004 were drilled into magnetic anomalies originally interpreted as being related to possible kimberlite-type intrusions.

Boreholes DDH003, DDH002 and DDH001 were drilled into an area of coincident magnetic and gravity anomalies interpreted as a target for possible Pb-Zn mineralization of the Mississippi Valley genetic type.

All drill sites were returned to original state and/or rehabilitated. All boreholes were grouted from 20 meters depth to surface and casing pulled.

At the conclusion of the programme all core was transported to a covered storage area at Malanda in north Queensland.

### Table 1: Details of core drill holes
(all holes in GDA94 MGA Zone 53)

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<th>Azimuth</th>
<th>Dip</th>
<th>Depth(m)</th>
<th>Target</th>
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<td>7803571</td>
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<td>0</td>
<td>90</td>
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<td>Coincident Pb and magnetic anomaly</td>
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<td>DDH002</td>
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<td>7841346</td>
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<td>0</td>
<td>90</td>
<td>284.4</td>
<td>Magnetic anomaly possibly related to kimberlite</td>
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</table>

Detailed results of the drilling programme are provided in the 2008-09 annual report for EL 23726 (“Annual Report EL 23726 “801” Project Barkly Highway, NT For the Period ending 31 July 2009”).
7. 2009-2011 ELECTROMAGNETIC (EM) SURVEY BY JACARANDA ALLIANCE JV

During June-August 2010 GEM Geophysical Services completed a ground electromagnetic (EM) survey over the northern and central blocks of EL 23726 as shown in Figure 5. This survey was designed to further investigate the magnetic anomalies previously identified in the area.

A ground EM survey was chosen because the relatively small area of the targets made aerial techniques impractical. Ground EM methods also tend to achieve better depth penetration than do most aerial EM methods.

Twelve lines of moving loop EM were designed to test the magnetic anomalies in the northern area. Ten lines were surveyed to test the magnetic anomalies in the central area. A 100m square loop with an in-loop receiver and 50m stations was used. This resulted in a total of 546 stations being collected on 26.95 line km in the northern area and 948 stations collected on 48.9 line km in the central area (Figure 5).

Full details of the EM survey are shown in the Appendix of this report (“Moving Loop Electromagnetic Survey of Part of the 801 Project – Interpretation report”)

Figure 5: Location of EM survey lines
The EM survey was somewhat interrupted by winter rainfall and some equipment problems. Consequently, neither the raw or the processed EM data was available at the time of the preparation of the 2009-2010 annual report for EL 23726. This data is provided in the Appendix of this annual report for 2010-2011.

8. CONCLUSIONS

- The five core holes drilled in the 801 Prospect were in effect “wildcat” exploratory holes whose purpose was to investigate magnetic anomalies, a geochemical anomaly and some geological concepts.

- As described in the previous annual report for 2009-2010, electromagnetic survey methods were used to explore for both conductors and resistors in the lithologies under the Cambrian carbonate sequence in the vicinity of existing JV core holes.

- Interpretation of the EM survey by Southern Geoscience Consultants has identified a possibly structurally controlled conductive zone in the basement in the northern (Tablelands) area. This conductive zone is spatially related to magnetic anomalies but does not share their source.

- It is planned to test the target identified by EM survey in the northern area of EL 23726 by core drilling.
EXPENDITURE STATEMENT
Annual expenditure for EL 23726 from 1 August 2010 to 31 July 2011 was $103,500 as shown on the separate Expenditure Report.

PROPOSED EXPLORATION PROGRAMME 2011-12

The planned exploration program for 2011-12 includes;

- Core drilling to explore for base and precious metal mineralisation potentially associated with the EM anomaly defined in the northern (Tablelands) area

PROPOSED EXPLORATION EXPENDITURE 2011-12

Core drilling $80,000
TOTAL $80,000
APPENDIX

“Moving Loop Electromagnetic Survey of Part of the 801 Project – Interpretation report” (Kim Frankcombe- Southern Geoscience Consultants)
HANCOCK EXPLORATION MANAGEMENT SERVICES

MOVING LOOP ELECTROMAGNETIC SURVEY OF PART OF THE 801 PROJECT.

Interpretation Report

Kim Frankcombe

Report # 2106
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ABSTRACT

Moving loop electromagnetic (EM) surveys at 801 for Tennant Creek style ironstone hosted gold targets and Norilsk style nickel targets have failed to produce any evidence for either style.

At Tablelands a possibly structurally controlled conductive zone within basement has a spatial association with magnetic anomalies but does not share their source. If a sound geological case for these anomalies can be made they could be followed up by drilling.
INTRODUCTION

The 801 prospect near the junction of the Barkly and Tablelands Highways in central Northern Territory had been selected on the basis of anomalous zinc geochemistry in some reconnaissance soil samples taken in 2002. The area lies in the Georgina Basin where Proterozoic metasediments are overlain by Cambrian and Cainozoic sediments. Wavelengths of the magnetic data suggest that this Phanerozoic cover is at least 150m thick over the area of interest.

Interpretation of the publically available government aeromagnetic data, further geochemical sampling and limited drilling had resulted in the original tenement being reduced to three small sub-blocks over magnetically anomalous residual target areas. Two of these had been targeted for kimberlites and one for MVT style deposits. Drilling in 2008 had failed to provide any support for either of these target styles. Hole DDH005 in the northern most of the three blocks, referred to as Tablelands in this report, did however intersect haematitic shales in the Proterozoic basement while hole DDH004 in the central block, referred to as Dalmore Downs in this report, intersected what was interpreted to be a layered gabbro-norite. The age of these mafic units is unclear and it is possible they are Cambrian rather than Proterozoic in which case Proterozoic basement was beyond the base of drilling at 250m.

The presence of haematitic shales at Tablelands and the recognition from reprocessed magnetic data that the bull’s eye magnetic anomalies, previously interpreted as kimberlites, were instead magnetic hot spots, within magnetic stratigraphy, led to the possibility that the area might be prospective for Tennant Creek style ironstone hosted gold deposits. The Tennant Creek Goldfield, about 180km to the west of the project, is home to several very high grade gold and gold-copper ore bodies which are associated with massive magnetite.
ironstones contained within Proterozoic haematitic shales of the Warramanga Group. Magnetics and to a lesser extent, gravity and EM have been responsible for the discovery of the bulk of these deposits and the first two of these techniques have been used extensively around Tennant Creek. Magnetics alone has rarely resulted in quick discoveries for these class of ore bodies however and they have proved particularly challenging to drill. A combination of the very small target size, strong cleavage in the shales and local distortions in the magnetic field caused by the intensely magnetic bodies meant that it has taken explorers an average of between 5 and 10 drill holes into test each target. In an effort to reduce the search time and cost, other geophysical techniques were used to complement the magnetic data.

Gravity was introduced as a method of locating ironstones contained entirely above the oxidation zone which would have their magnetite oxidised to haematite and thus not be as strongly magnetic. The rich Nobles Nob deposit was such an ironstone and although its base protrudes below the oxidation zone at around 120m below surface the pre-mining magnetic anomaly over the deposit is thought to have been quite small. The gravity response, even after mining, was however quite clear. Unfortunately the gravity response from these small targets fades to become unmeasurable when the ironstone top is deeper than 200-300m below surface. The magnetic anomalies at Tablelands had wavelengths consistent with a target depth of 150-250m below surface which is just on the edge of this range indicating that using gravity as a follow up tool on this project has risks.

A less well used or perhaps just less well documented, ironstone mapping technique has been EM. The author has been involved with several EM surveys over Tennant Creek deposits and they all produce a clear response. Depths of investigation of several hundred metres are achievable at Tennant Creek so the method was deemed to be appropriate for
work at Tablelands. EM responses over Tennant Creek deposits were not however unique. The copper poor systems show up as a resistor while the copper rich systems are conductors. As both deposit styles occur at Tennant Creek we need to consider both possibilities for the Tablelands data.

At Dalmore Downs the intersection of Gabbro-norite in the drill hole opened up the possibility for a Norisk style nickel sulphide target. If the sulphide is massive it is generally an excellent conductor and thus EM is an appropriate technique to directly detect these ore systems. Excellent conductors are best explored for with B field sensors rather than the standard dB/dt sensor used for mapping. In order to cover both mapping and direct detection used both a fluxgate B field and coil dB/dt were used.

The ground is lightly wooded with patches of turpentine scrub which can be quite thick in places. It is however generally possible to find a way through it and it poses little barrier to a Landcruiser, other than from staked tyres. The crew based themselves at Alroy Downs homestead which was close to the Tablelands grid.

The survey location is shown in Figure 1 and in more detail overlain on the regional magnetic data in Plate 1.
Figure 1: Location of the two survey areas overlain on tenements and Auslig 1:250k topographic maps.
ACQUISITION DETAILS AND DATA PROCESSING PROCEDURE

The data were acquired by Gem Geophysical Surveys using an EMIT Smartem system. Full details are provided in Table 1.

### TABLE 1: SURVEY SPECIFICATIONS

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Gem Geophysical Surveys Pty. Ltd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver</td>
<td>EMIT Smartem V</td>
</tr>
<tr>
<td>Transmitter</td>
<td>Zonge ZT-30</td>
</tr>
<tr>
<td>Mode</td>
<td>Time domain</td>
</tr>
<tr>
<td>Array</td>
<td>100m x 100m in-loop, 2 to 3 turns</td>
</tr>
<tr>
<td>Frequency</td>
<td>~ 2 Hz</td>
</tr>
<tr>
<td>Station spacing</td>
<td>50m</td>
</tr>
<tr>
<td>Transmitter Current (turns)</td>
<td>46 - 72 Amp turns - Avg 55A</td>
</tr>
<tr>
<td>Number of lines/stations surveyed</td>
<td>Tablelands - 12 lines, 546 stations</td>
</tr>
<tr>
<td></td>
<td>Dalmore Downs - 5 lines, 549 stations - coil</td>
</tr>
<tr>
<td></td>
<td>Dalmore Downs - 5 lines, 439 stations - fluxgate</td>
</tr>
<tr>
<td>Line kilometres surveyed</td>
<td>Tablelands - 26.8 km</td>
</tr>
<tr>
<td></td>
<td>Dalmore Downs - 27.2 km - coil, 21.7 km fluxgate</td>
</tr>
<tr>
<td>Survey Date</td>
<td>July and August 2010</td>
</tr>
</tbody>
</table>

All data were transformed into a standard SGC database and checked for bad data points. The data were acquired at two different gains in order to get clean data throughout the decay in addition an attenuator was used to lower the voltage at the lowest gain setting to avoid saturation. The attenuator is external to the Smartem receiver and the Smartem is thus unaware of it and the data requires re-scaling as a result. After adjustment for the attenuator the repeat readings taken at different gains could be merged, using the higher gains at late time and the re-scaled, attenuated, low gains at early time. The cleaned and merged data were then converted to conductivity depth images (CDIs) using a fast approximation developed by Davis, MacNae and the author (Davis et al 2010). At Tablelands the CDIs were...
used to locate local resistors and conductors which had the pencil like expression of a
Tennant Creek Ironstone while at Dalmore Downs more emphasis was placed on locating
confined bedrock conductors from profiles of the data.

The data were of average quality. A number of equipment problems with pre-amplifiers and
the Smartem receiver initially used meant that some sections of lines had to be repeated.
The fluxgate pre-amplifier failed at the start of the first line at Dalmore Downs so only half of
line 8 has been recorded with the fluxgate. The operator collected data for all three
components of the fluxgate coil which required that the sample rate of the Smartem was
lowered to 20 kHz. This meant that some of the early windows were less than a sample wide
resulting in two windows overlapping the one sample and consequently having the same
amplitude. One of these windows was deleted prior to computing fast CDIs.
INTERPRETATION

Tablelands:

The survey lines and recovered anomalies are shown in Figure 2 overlain on the second order analytic signal of the aeromagnetic data and in Figure 3 overlain on a second order tiltangle filter. Also shown on these plots is the location of hole DDH005, a vertical hole to 280m depth. White symbols are used for conductors and black for resistors, full circles for strong bedrock features, half circles for weak bedrock features. Anomalies are labelled using a four character label of the form PM## where P is the prospect name, Tablelands in this case, M the method, Electromagnetics and ## is the priority order of the target.

Figure 2: Tablelands EM showing the line locations, anomalies and drilling overlain on an image of the second order analytic signal.
The anomalies will now be discussed in more detail.

**TE01:** This consists of a chain of anomalies across 500-600m of strike. The source is a deep (>200m) conductive zone which appears to be fault related. It behaves as a weak lithological conductor rather than a confined conductor and may represent a lithological unit or a wide zone of alteration around a fault. It is not suggestive of a massive sulphide source, rather, a diffuse conductor. There is a suggestion of strike parallel faulting at this location in the tiltangle image of figure 3 although it appears that the conductor is at an acute angle to the fault and thus the relationship between the two may not be straightforward. The anomaly strength also varies along strike with its peak on line 16 at 601050, 7841600 (MGA94). This appears to be on the south east edge of the magnetic body rather than coincident with it.
indicating that this is unlikely to be a copper rich Tennant Creek ironstone target. Its change in character with strike and the acute angle to magnetic stratigraphy suggests that it is not lithological. The combination of lone magnetic anomalies, structure and conductive features, not obviously associated with lithology, require that additional work be done here to explain this anomaly. This would however require at least one 300-500m long drill hole and therefore a decision needs to be made as to whether a body possibly 300m below surface is likely to be of interest at this locality. A good geological case for a style of mineralisation which is consistent with the geophysical observations needs to be made. In the event that it were decided to test this a hole collared at 600910, 7841740 drilled to 450m with an azimuth of 135° and a dip of 60° should test both the magnetic body and the conductor.

**TE02:** TE02 is an anomaly of the kind that might come from massive sulphide or a thin conductive shale unit. It is not repeated on line 6, 200m away to the NE but may come from south west of line 7 as it has not been closed off by the survey lines. It lies on a folded block of magnetic lithology which is truncated to the west by a major NW-SE trending fault. It can be modelled using a plate model with a body about 150m below the line, steeply (~85° to 80°) dipping to the south east. However as noted previously the anomaly has not been closed off to the south west so it is possible that the body is actually shallower but off line to the west. Line 7 should be straddled by a pair of short follow up lines to better understand the cross line, horizontal location of this target.

**TE03:** This anomaly may be a continuation of TE01 as line 13 has a broad conductive zone consistent with it being sub parallel to a linear feature. It too lies to the south east of a magnetic anomaly although it is offset from the anomaly by a larger distance than TE01. If it is part of the same feature as TE01 it clearly is unrelated, in a direct sense, to the magnetic
bodies. Depending on the results of any follow up of TE01 additional EM to the south of line 13 and west of line 3 to close off the anomaly would be warranted before recommending any drilling follow up.

The remaining anomalies are of a lower tenor so will only be covered briefly.

**TE04:** This is a weak and ambiguous anomaly recorded on both line 3 and line 6. The Fast CDI suggests that it is a resistor however the profile data points to it being slightly more conductive than its surroundings. It is possible that this is just noise however because of its proximity to the magnetic anomaly and occurrence on two lines, it was retained.

**TE05:** TE05 is a broad resistive zone but unfortunately not associated with a magnetic anomaly so unlikely to be caused by a Tennant Creek style body.

**TE06:** This is a weak resistor in proximity to a discrete magnetic anomaly. Like TE04 it may just be noise in the data. It is shown on line 4, however line 5 has a similar but weaker feature. Without the support of line 4 the line 5 feature would be ignored which is why it has not been plotted as an anomaly pick. They are to the north of the magnetic anomaly rather than directly associated with it and as such are unlikely to be caused by ironstones. Both lines hint at a fault or lithological contact on the southern margin of the magnetic anomaly. This is consistent with the aeromagnetic data which suggests a rapid change in depth to magnetic basement at this point (see Fig 3).

**TE07:** This is a broad resistive zone on line 7 and shows as a broken weaker resistive zone on line 6. It is along magnetic strike from TE05 and it is possible that the two both reflect the
same non magnetic, resistive lithological unit. It is unlikely to represent an ironstone.

**Dalmore Downs:**

No high priority anomalies of the kind expected for massive nickel sulphide were encountered in this survey. Four low order anomalies were recorded and they are discussed in more detail below. As none of them warrant further work their priority ranking is a little subjective. Although no bedrock anomalies stand out, the CDIs over this area are interesting and show a 50-70m thick blanket of conductive cover with a deeper and undulating conductive horizon at 200-350m below surface. This might either be a conductive unit within the Cambrian cover or weathering of the proterozioc basement at the unconformity surface. If it does lie in the Cambrian sequence it might be due to manganese mineralisation, which is known to exist in the region. Manganese and the clays associated with it, are conductive and have been successfully mapped with EM elsewhere. (e.g. [http://www.ausquest.com.au/tablehill.html](http://www.ausquest.com.au/tablehill.html))

The anomalies are shown overlain on the second order analytic signal in figure 4 and over the second order tiltangle filter in figure 5. dB/dt anomalies from the coil are shown as circles while B field anomalies from the fluxgate are shown as triangles. As previously used at Tablelands, white is conductive and black is resistive.

**DE01:** This appears to be a lithological conductor however it occurs early in time in both the fluxgate and coil data suggesting that rather being from bedrock it may represent a local conductivity high within the deep conductive unit mentioned above. If the latter and if the conductive unit is associated with manganese it would suggest a local thickening of the alteration zone here. The magnetic data suggests that it coincides with a fault so an alternate interpretation is that it may fault related with post Cambrian movement on the fault allowing
the anomalous resistivity distribution to move closer to the surface.

DE02: DE02 is a local conducive zone within basement coincident with a chain of small magnetic highs. It stands out because of resistive units either side of it not because it is anomalously conductive in a regional sense.

DE03: This anomaly has been picked from the fluxgate profiles as it is only evident in the coil data in hindsight. It is a weak basement conductor, again coincident with a magnetic anomaly and as with DE02 only really evident because of flanking resistive zones.

DE04: This is a weak resistive anomaly, visible in the coil data only because the fluxgate was not working over this stretch of the line.
Figure 5: Dalmore Downs, image of second order tiltangle overlain with tenements (blue), EM lines (black), drill hole (grey and anomalies (black and white).
CONCLUSIONS

Moving loop EM surveys over two prospect areas within the 801 project have resulted in only one target warranting follow up drilling. The target does not fit the initial model which drove the EM programme so further geological input is required prior to follow up.

At Tablelands the EM survey has failed to provide any supporting evidence for Tennant Creek style ironstones although there are bedrock conductive zones, associated with but not obviously related to, magnetic anomalies. These may be structurally controlled.

To the south east at Dalmore Downs no anomalies of the kind expected over massive nickel sulphide were produced. Several weak lithological anomalies were resolved but it is unlikely that they have any exploration potential. The CDIs at Dalmore Downs show a deep (200-350m) conductive horizon which may be a conductive unit within the Cambrian cover sequence or weathered Proterozoic basement below the unconformity. If this conductor is within the Cambrian cover it may be related to manganese although at depths in excess of 200m it is difficult to see how this could be economically exploited.
REFERENCES

<table>
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<tr>
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ACQUISITION PARAMETERS

Contractor: GEM Geophysics
Array: H Loop
Station Spacing: 50m
Receiver: SMARTem V
Transmitter: Zonge ZT30
Transmitter Loop Size: 100m x 100m
Transmitter ramp time: 500 µSec
Receiver Delay: 500 µSec
Transmitter Frequency: 2.08333 Hz
Survey Date: August 2010

KEY

- Probable regolith feature
- Weak bedrock conductor/resistor
- Strong to moderate bedrock conductor/resistor
- Black = resistor, White = conductor

Image of TMI overlain with EM lines drill holes and anomalies

HANCOCK EXPLORATION MANAGEMENT SERVICES

GROUND ELECTROMAGNETIC SURVEY

Image of TMI overlain with EM lines drill holes and anomalies

Sun Angle: Azimuth 180° / Inclination 45°
Colour Stretch: non-linear / Vertical Exaggeration: 1

Datum: MGA94, Zone 53
Scale: 1:100,000
Exponential Time Constant
Magnitude µV/A
Magnitude µV/A (Windows 18 to 24)

Survey date
Transmitter frequency
Receiver delay
Transmitter Ramp Time
Transmitter Loop Size
Receiver Coil Type / effective area
Array
Contractor

STACKED PROFILES OF WINDOW MAGNITUDE IN LOOP TEM SURVEY
DALMORE DOWNS
LINE 10

HANCOCK EXPLORATION MANAGEMENT SERVICES
D01
DALLURING DOWNS
PL3 LOOP SET SURVEY
STACKED PROFILES OF WINDOW MAGNITUDE
LINE 10

ACQUISITION PARAMETERS
Contractor: GEM Geophysics
Array: Zonge ZT 30
Borehole Spacing: 50m
Receiver Spacing: 50m
Transmitter Spacing: 50m
Receiver Loop Size / effective area: 100m x 100m
Transmitter Loop Size: 100m
Transmitter Frequency: 500 µSec
Survey date: 23/02/2014
Boring date: August 2015

Windows Used: Transmit: 1-7
Receive: 8-17

Survey parameters:
- Window length: 120000
- Window width: 1000
- Window step: 1200
- Window overlap: 80000
- Window type: Exponential
- Window damping factor: 0.01
**Exponential Time Constant**

**Magnitude pT/A** (Windows 17 to 24)

**Conductivity Depth Image**

**Power Law Time Constant**

**Survey date**

**Receiver delay**

**Transmitter Ramp Time**

**Transmitter type**

**Transmitter Center Frequency**

**Survey date**

**Interpretation**

**Line 9**

**GEM Geophysics**

**CONCENTRATES**

**GRAPHIC𝓎(Canvas)**

**GEOLOGY**

**HANGCO Exploration Management Services**
Exponential Time Constant

Magnitude pT/A

Magnitude pT/A (Windows 17 to 24)

Magnitude pT/A (Windows 7 to 11)

Survey date

August 2010

ACQUISITION PARAMETERS

Contractor
DMV Geophysics

Receiver Frequency
0.1 Hz

Receiver Type
SMARTem V

Array
In-Loop

Sensor
EMIT Fluxgate

Transmitter Loop Size
140m x 140m

Transmitter Ramp Time
100s to 150s

Transmitter Frequency
2.0331Hz

Survey Area
100m x 100m

GCSP Consultants

August 2010

EMIT Survey

Staged Profiles of Syncline/Anastomoses

Line 11

HANCOCK EXPLORATION MANAGEMENT SERVICES