EL 28563 “Bonney Well North”
FINAL REPORT
Cu – Au – Bi

Reporting Period from 25/08/2011 to 10/07/2013

Tennant Creek SE53-14
Bonney Well SF 53-02

A W Mackie
August 2013
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SUMMARY

EL 28563 Bonney Well North butts up to Cabbage gum bore field 10km south of Tennant Creek township extending east to Stuart Highway south to Edinburgh Creek and west to the NT Gas pipeline comprising 336sqkm.

The licence area is considered prospective for IOCG deposits hosted by mineralised subsurface magnetic ironstones which have produced 155 tonnes Au, 400,000 tonnes Cu since 1950 in the Tennant Creek field 40km to the north.

Prospectivity is confined to an arcuate array of AMAG anomalies notated B, C, D and E which occur around the inferred contact from west to east of the Explorer granite and interpreted Warramunga Formation (1862 – 1870Ma host to all known ironstone mineralisation discovered in the Tennant Creek goldfield).

The licence area is dominated by Cabbage gum granite (1848Ma) to the north and ‘Explorer’ granite to south with a raft of Palaeoproterozoic metasediments wedged between the above quartz-monzonite to granodioritic intrusives. Pn-Flynn Subgroup siltstones/volcanics (1852Ma) crop out at two significant localities however Warramunga Formation does not, even though diagnostic lithologies were intersected in E42 Geopeko DDH 001 thus confirming the underlying presence of Warramunga Fm-Pw across most of the licence area possibly a continuation of Rover sub-basin commencing 40km west of the licence area hosting Rover 1 (6MT @ 5.6gms/t, Au) a mineralised ironstone-hosted, Tennant Creek field deposit analogue.

AMAG anomalies B4 and C4 are deemed worthy of GMAG followup and subsequent drill testing. E3/E42 is a 1000 nanotesla dipolar anomaly however after 5 previous drillholes no significant mineralisation has been intersected even though (by an order of magnitude) its the most intense subsurface magnetic response within the licence area.

Review of available located, digital aeromagnetic data implies prospective Warramunga Fm (182Ma) underlies Flynn Sub Group metavolcanics at somewhat prohibitive depths (>250m) rendering ongoing proposed drill testing unsustainable hence licence is surrendered.
1. INTRODUCTION

EL 28563 Bonney Well North comprising 337sqkm of flat-lying, aeolian sand country predominantly vegetated by native grasses, turpentine and spinifex butts up to the western side of the Stuart Highway for 25km commencing 20km south of Tennant Creek township. This report is a summary of previous exploration conducted since the mid 60s and current program undertaken over first year of tenure.

2. LOCATION AND ACCESS (refer Figure 1)

Access from Tennant Creek is south via Stuart Highway for 35km to Kelly Well turnoff then west for 19km until the Alice to Darwin gas pipeline service road is reached. There are numerous Tennant Creek station tracks trending east of the gas pipeline providing excellent vehicular access to most of the licence area.

There is also a south turnoff 10km west of Kelly Well, along the well-formed beef road to magnetic prospects B, C and D. Prospect E is about 1.5km southwest of the double gates facing the Stuart Highway at Edinburgh Creek 10km south of Kelly Well, wedged between the Alice to Darwin railway and the Stuart Highway.

3. TENURE

EL 28563 Bonney Well North comprising 115 sub blocks of Tennant Creek Station (PPL1142) was granted to A W Mackie 25 August 2011 for 6 years.

4. PREVIOUS EXPLORATION

1966 – 1967

The Explorer 42 dipolar anomaly is readily apparent on Government one mile spaced AMAG survey data flown in 1956 progressively released by BMR during the 60s.

A Mining Lease was pegged over the anomaly namely ML327F by Geopeko who completed a 10 line kilometre GMAG survey revealing a classical Tennant Creek - style discrete “bullseye” anomaly subsequently tested by one diamond drill hole namely DDH1, TD328.5 metres in 1967. Collar inclination is 70° towards 240° true azimuth designed to intersect a magnetic body dipping steeply northeast?

The original log of the hole is missing however relogging was undertaken by Shell Australia Ltd in 1983. Assay data is also missing however Davidson reported (1984) the hole intersected “low grade auriferous BIF”.

1971 – 1975

Australian Development Ltd as managers for Nobelex NL contracted Geometrics International to fly a low-level AMAG survey over EL41 comprising 1856 line km (north-south flight lines) 320m apart, altitude 91m. The proton precession magnetic data were digitally recorded and processed to generate TMI contour plans. Only GW606 was followed up by GMAG.
A permanently marked baseline was surveyed. The area gridded on 61m x 91m spacing. Ground magnetometry defined a discrete 270 nanotesla circular anomaly interpreted as a broad, shallow, low susceptibility source therefore unlikely reflecting a Tennant Creek ironstone analogue.

1975 – 1979
Geopeko flew two AMAG surveys over northeast quadrant of BONNEY WELL namely C (1974) and B (1976). Both flown on north-south flight lines, 330 metres apart, altitude 100 metres. Within the area 26 AMAG anomalies were followed up by gridding and ground magnetometry. Of major interest were the Explorer 191 anomalies comprising 4 separate grids trending eastnortheast straddling or near the concealed Explorer granite/Warramunga contact.

Geopeko Explorer 191 anomalies 1, 2, 3, 4, 5, and 6 (A1-A6) have undergone several changes of name since 1975 i.e.

E191, A3 was called Golf by Normandy in 1998 and B2 by TNG in 2005
E191, A2 and A4 were renamed B1 and B3 respectively by TNG in 2005
E191, A1 was renamed B4 by TNG in 2005
E191, A5 was covered by the Normandy Rugby grid in 1998 and subsequently renamed C1, C2 and C3 by TNG in 2005

Nobelex, 1973 Greenwood anomaly GW609 was renamed D2 by TNG in 2005 while GW610 and 611 became TNG E1 and E2

Geopeko 1966 Explorer 42 became TNG E3 in 2005

Corresponding EL28563 tenure from 1975 – 1979 were Geopeko ELs 1128 and 1129.

Other AMAG anomaly matchups include:
Occidental 1981 T1 and T2 = Geopeko A28
PNC (1987) KLG-E = Geopeko A14
Nobelex 1973 GW602 = Ex191, A4 = TNG B3

1981 – 1983
EL 2719 granted, 16 February 1981 to Desertex Joint Venture comprising Peko Wallsend Operations Ltd 60% and Shell Company of Australia 40%.

Geopeko (Exploration Division of Peko Wallsend) were operators. The area was geologically mapped. A review of historical AMAG and followup GMAG survey data undertaken by Nobelex NL during early to mid seventies was completed. An AMAG survey was flown over the eastern part of the licence at a 250 metre north-south line spacing.

A comprehensive review of Explorer 42 data including magnetic susceptibility and specific gravity readings on DDH 001 drill core was completed.

In August 1981 Occidental Minerals (Oxymin) farmed into EL 2288 held by Australian Ores and Minerals (AOM). Geometrics flew a high resolution AMAG survey delineating 16 anomalies (T series) worthy of gridding (north south lines 100 metres apart), 10m station GMAG followup. Unfortunately T series anomalies are west of the current licence area.
However, all 16 T-anomalies were modelled of which only one, T3 was tested by two diamond core holes namely DDH T3/1 abandoned at 105m and T3/2, TD 258.45m intersecting “trachyitic to rhyodacitic lavas and pyroclastics”, which appear to have undergone kaolinisation, sericitisation, ferruginisation and occasionally chloritisation? T3 is located 3.5km west of licence area on the Kelly Well – gas pipeline beef road.

Interestingly “traces of disseminated hematised magnetite plus hematite with minor chalcopyrite and bornite were observed.” Modelling concluded the T3 anomaly is a steeply dipping (47°S) tabular body, 300 metres long by 38 metres wide at a vertical depth of 580 metres.

Anomaly T5 is 8km west of licence area also on beef road. It fits a block-type equidimensional model, 300m by 30m wide dipping steeply south, at a vertical depth of 350m subsequently tested by a traverse of 11 RAB drill holes 25m apart.

Unfortunately high water flows (34m) prevented RAB drillholes penetrating deeper. Anomaly T15 was tested by 16 RAB drillholes ranging between 20m – 56m depth. Surface sampling by Roebuck in 1993 demarcated a weak gold anomaly over T15. Several gravity traverses were completed over 13 of the 16 T anomalies.

The 1966 GMAG data over E42 was remodelled by Desertex JV showing DDH001 had not sufficiently tested the target. The prospect was regridded and re-read for magnetic and gravity. The resulting anomalies were slightly displaced. DDH001 was relogged. In December 1983 DDH002 was collared to intersect a north-west dipping body and subsequently drilled to a final depth of 420m intersecting weakly auriferous BIFs interbedded with chloritised magnetic sediments over the last 80 metres of the hole which according to Davidson adequately explained the anomaly?

1987 – 1989 (Figure 02a)

PNC Exploration applied for EL 5200 in 1987. The northern half of which was deemed prospective for East Alligator River – type uranium deposit analogues where Palaeoproterozoic turbiditic metasediments of Warramunga Formation overly “Archaean basement”? Whereas the southern half was considered prospective for IOCGU deposits similar to Olympic Dam model? A reconnaissance gravity survey was undertaken over an area 50km x 65km (3250 sq km) comprising three north south and one east-west traverse (244 stations).

An airborne geophysical survey was flown over the southern half of EL 5200 covering a 25km x 20km area (350 sq km, north-south flight lines, 500m apart, 80m altitude).

Two parallel north-south stratigraphic, RC drillhole traverses were completed over the northern part of EL 5200 (19RCDHs for 1165m). Unfortunately shallow basement of adamellite granite was intersected in 17 drillholes thus, PNC’s EARU model was no longer applicable.

Several discrete thorium anomalies delineated by the airborne spectrometer/magnetometer survey are attributable to surface laterite. No significant uranium anomalies observed however interpretation of magnetic data identified seven anomalies two of which namely KLE and KLF within the licence area deemed worthy of ground follow-up.

Six anomalies were grided and read for magnetics (50m x 10m stations). The KLC, GMAG anomaly was tested by one, 76m vertical RAB drill hole namely KLC 21 intersecting 66m of
Flynn Subgroup interbedded siltstone, sandstone, shale before terminating in glassy, fine grain tuffs with shale interbeds (66 – 76m) assayed for copper, lead, zinc, bismuth, silver and gold returning background values only. KLC22 (60m) was collared 800m northeast of KLC21 again intersecting interbedded siltstone/sandstone with hematitic horizons. The last 4m assayed for Cu, Pb, Zn, Bi, Ag, Au returned background values only. KLC23 (60m) was collared 900m southeast of KLC21 intersecting hematitic, fissile sandstone/shale with myriads of quartz veinlets. The last 4m were assayed (Cu, Pb, Zn, Bi, Ag, Au) returning background values only. KLC24 was collared 900m southeast of KLC24 intersecting from 0 – 48m fissile siltstone/shale underlain by greywacke from 48 – 60m. The last 4m assayed (Cu, Pb, Zn, Bi, Ag, Au) returning background values only.

The KLB magnetic anomaly was tested by one 67m vertical RAB drillhole namely KLB20 intersecting sandstone to 56m followed by fine grain porphyry from 56 – 67m. The last 2m were assayed (Cu, Pb, Zn, Bi, Ag, Au) returning background values only.

Anomaly KLD was read for magnetics only. Radon measurements using alphacards were taken over KLC grid. Values up to 12ppm uranium were recorded over the western portion of KLC grid attributed to clayey soils rather than anomalous uranium occurrences.

The RAB drilling program was cut short due to the rig's inability after penetrating near-surface Tertiary gravel deposits to cope with voluminous groundwater flows. Eight RAB drillholes (449m) were collared on three gridded anomalies namely KLB, KLC and KLG (west of EL 28563) however none of the magnetic anomalies are resolved and remain untested?

Nine rock chip drill samples were petrologically described by Pontifex i.e. KLB20, 66 – 67m, fine to medium grain quartz sandstone with an extensive very fine sericitic/biotite matrix possibly hydrothermally altered feldspar including poikiloblasts of altered cordierite or andalusite implying a metasediment. Minor quartz veining and disseminated fine oxides are also present. KLC21, 73 – 74m comprises mainly clay-sercite shale with accessory fine leucoxene all 15 chips have a primary cleavage while many have a superimposed crenulations cleavage and a vague lamination. Some chips are clouded by hematitic fine to medium grain meta-greywacke comprising a weakly schistose, lithic, felsic, quartzose sandstone facies with an essential matrix (30%) of sericite, muscovite and rare biotite with fine hematite dispersed throughout. Some chips are a loose-packed aggregate of vein quartz and chert grains within a matrix dominated by ultrafine epidote with lesser cherty silica plus minor chlorite and sericite perhaps indicative of contact metamorphic or hydrothermal alteration of (Ca Al Fe-rich) calcareous clays?

KLC22, 58 – 59m (900m NE KLC21) is predominantly very fine muscovite schist showing two phases of deformation. In all chips about 80% is similarly orientated, cloudy fine mica however there are numerous flakes of a clear muscovite orientated across the prevailing schistosity thus indicating a second deformational event? KLC23, 58 – 60m (900m SE KLC21) rock chips comprise fine to medium grain lithic sandstone set in a sericised matrix and sericitic shale/mudstone. KLC24, 58 – 60m (900m SE KLC23) comprises sericitic shale gradational to mudstone and weakly schistone fine to medium grain feldspathic sandstone.

1996 – 2004 (Figure 4a)

ELs 9431 and 9421 were granted to Normandy Gold Pty Ltd, May 13, 1996 over Tennant Creek Pastoral Lease, south of 20 degrees. Normandy (51.4%) were operators of a joint venture with Acacia Resources Ltd (48.6%) over East Billiat, targeting Tennant Creek-style mineralised
ironstone structural targets within iron-rich lithologies and volcanic exhalative – type deposits for gold, copper mineralisation.

During the first year of tenure (1996 – 1997) the following program was carried out:

Regolith mapping  
Reprocessing and interpretation of existing AMAG data  
Regional RAB drilling (14 holes for 453m)  
78 rockchip samples  
10 rocks thin sectioned

Field mapping and regional RAB drilling indicate the presence of siltstones/tuffs assigned to Flynn Subgroup overlying Warramanga Formation.

Previous exploration within the area has targeted AMAG dipole anomalies indicative of Tennant Creek-style mineralised ironstones however Kovac’s prospect 30kms to the southeast has grades of 10.8 grams/tonne, gold in a pyritic chert unit probably belonging to the Flynn Subgroup? Therefore Flynn Subgroup rocks may be prospective for volcanic exhalative gold deposits?

During the second year of tenure 1997 – 1998 the following program was undertaken:

WGC Billiat Helimag Survey N-S, 75m line spacing sensor height 40m.  
WGC Billiat Radiometric Survey N-S, 75m line spacing, sensor height 40m.  
Gravity Survey AMG N-S grid 4km line spacing 500m stations. A total of 336 stations were read by Haines Surveys Pty Ltd.  
Basement geological Interpretation from aerial geophysical and ground gravity survey data.  
Aerial geophysics identified 12 prospects. A 50m x 100m grid was established over 9 of the 12 prospects for 243 line km of gridding. GMAG surveys on 50m line spacing was completed over 3 of the above grids namely Soccer, Rugby and Hockey (off licence).

Three prospects were tested by RC drilling, two within EL 28563 namely;

Soccer-BTRC001 TD138m designed to test a negative magnetic anomaly intersected quartz-feldspar porphyry from 7 metres (Flynn Subgroup). 30 x 30m composite samples assayed for Au, U, Pb, Zn, Ag, As, Bi, Co and Fe.

Golf-BTRC002 TD220m (abandoned in high water flows) designed to test a large positive magnetic anomaly. Anomaly explained by the relatively high magnetic susceptibility of a lower Flynn Subgroup volcanics unit?

A single 380m RC drillhole was designed to test the shallowest modelled target within an interpreted Warramunga - hosted magnetic anomaly cluster however high water flows at base of Cenozoic prevented RC holes reaching target zone.

During the fifth year of tenure (2000 – 2001) a helicopter-borne surface sampling program was implemented collecting:

102 lag samples  
57 soil samples  
19 rock chip samples
The LAG and rock chip samples were assayed for Au, Ag, As, Bi, Co, Cu, Fe, Mo, Ni, Pb, Sb, Sn, Th, U, W, Zn. The soil samples were assayed for Au, Ag and Cu only.

During the sixth year of tenure (2001 – 2002) a vehicle supported surface sampling program was carried out collecting 60 LAG and 23 rockchip samples assayed for Au, Ag, As, Bi, Co, Cu, Fe, Mo, Ni, Pb, Sb, Sn, Th, U, W, Zn.

2005 TNG

TNG acquired AGSO P694 Tennant Creek Survey 200 metre line space AMAG data and Normandy 1997 Billiat Helimag survey, 75 metre line space data stitching them together to provide continuous coverage over EL 24471 tenement area.

The AMAG data was analysed in various formats to identify the more obvious patterns i.e. structures or zones with particular reference to the signatures associated with the Tennant Creek field deposits such as Argo, Peko, Nobles Nob etc.

Seven areas of interest are identified, comprising 22 anomalies, notated A through to G. A description of the various AMAG anomalies are as follows:

A2 – AMAG profiles from Tennant Creek Regional data set confirm an isolated 110nT airborne response (northwest of current licence area)

B1 – (Explorer 191, Anomaly 2) linear rather than Tennant Creek- style equidimensional feature. Similar magnetic response to B2 and B3. Interpreted source is Flynn Subgroup felsic porphyry

B2 (Normandy Golf prospect, Explorer 191 Anomaly 3). Tested by Normandy BTRC002 intersecting unprospective Flynn Subgroup felsic porphyry. Apparently collared to intersect the highest amplitude response of 900nT, in the area?

B3 (Ex 191 Anomaly 4, GW602) similar and further along strike from B2 but of lesser amplitude – 550nT.

B4 (Ex 191 Anomaly 1)a distinct equidimensional 300nT anomaly.

C1, C2, C3 (Normandy Rugby prospect) discreet airborne responses of 130, 100 and 150nT respectively.

C4 (Normandy Soccer prospect Ex 191 Anomaly 6). Discreet airborne response of 100nT. Tested by BTRC001 to 138m TD again intersecting Flynn Subgroup felsic porphyry although it appears Normandy were testing a negative anomaly. However neither target (delineated by GMAG) were tested by Normandy RC drillhole?

D2 (GW609) A 130nT discrete airborne response.

E1 (GW610) very low amplitude airborne response of 30nT of some interest due to its close proximity to E 42.

E2 (GW611) discreet 200nT airborne response.

E3 (Explorer 42) 1000nT airborne response. By far the most intense Tennant Creek – style magnetic response underlying EL28563.

E4 – 100nT response similar to E1 and E2
F3 (Explorer 307) – 110nT airborne response. Normandy tested a nearby similar feature (BTRC005 Snooker prospect) intersecting Flynn Subgroup to 187m overlying porphyry/homogenised silts/sands of Warramunga Formation age (off licence).

Ground Magnetometry

Seven areas were selected for followup GMAG

<table>
<thead>
<tr>
<th>Area</th>
<th>Previous</th>
<th>Area grid</th>
<th>LineKm</th>
<th>Anomaly</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>A2</td>
<td>GW304</td>
<td>800mx1200m</td>
<td>9.6</td>
<td>110nT</td>
<td>Isolated</td>
</tr>
<tr>
<td>B4</td>
<td>E191An1</td>
<td>800mx1000m</td>
<td>8</td>
<td>300nT</td>
<td>Equidimensional</td>
</tr>
<tr>
<td>C4</td>
<td>Soccer</td>
<td>1000mx1200m</td>
<td>12</td>
<td>100nT</td>
<td>Discrete</td>
</tr>
<tr>
<td>D2</td>
<td>GW609</td>
<td>600mx1200m</td>
<td>7.2</td>
<td>130nT</td>
<td>Discrete</td>
</tr>
<tr>
<td>E2</td>
<td>GW611</td>
<td>800mx1000m</td>
<td>8</td>
<td>200nT</td>
<td>Discrete</td>
</tr>
<tr>
<td>E3</td>
<td>E42</td>
<td>800mx1600m</td>
<td>12.8</td>
<td>1000nT</td>
<td>Intense dipole</td>
</tr>
<tr>
<td>F3</td>
<td>E307</td>
<td>800mx1200m</td>
<td>9.6</td>
<td>100nT</td>
<td>Vague</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>59.2</td>
</tr>
</tbody>
</table>

Ground Gravity

Haines Gravity Surveys completed the following program

<table>
<thead>
<tr>
<th>Area</th>
<th>Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3</td>
<td>172</td>
</tr>
<tr>
<td>C-Rugby Grid</td>
<td>217</td>
</tr>
<tr>
<td>E2</td>
<td>138</td>
</tr>
<tr>
<td>E3</td>
<td>212</td>
</tr>
<tr>
<td>BTRC005-Snooker Grid</td>
<td>51</td>
</tr>
<tr>
<td>Total</td>
<td>790</td>
</tr>
</tbody>
</table>

Drilling

A three RC drillhole (810m) program was completed. E2RC01 collared 415390E, 7781010N, drilled north at -65°, TD264 metres was designed to test a coincident ground magnetic/gravity anomaly at 100 metres vertical depth. Strong water flows were intersected at the base of the Cenozoic, 18 metres downhole depth causing multiple drilling problems. The only magnetic material intersected in E2RC01 was a layer of blocky, fragmental banded iron formation at the base of a Tertiary gravel sequence (18m).

Summary Log

0-18m  sand/gravel
18-139m red oxidised siltstone (base of oxidation)
139-146m transitional hematitic shale
146-150m quartz-hematite (fault?)
150-171m chloritic quartz-eye porphyry
171-186m sandy, tuffaceous? siltstone
186-264m dark green chloritic hematitic shale (hs)
The highest total iron content was in Tertiary gravels i.e. 0-18m average 15% Fe. 66 x 4m composite samples were assayed for gold, copper, bismuth and iron. Below 18 metres iron content averaged between 2 – 6%. Copper, gold and bismuth values were below detection throughout the hole. However, 0.03ppm gold was intersected between 120 – 124m.

E3RC03 collared 416125E, 7780580N Azimuth 10°, -65°, TD 276m. The hole was designed to intersect Explorer 42 GMAG anomaly at a 180m vertical depth. E3RC03 was drilled on a section striking 010° a rotation of about 60° north of Geopeko/Shell DDH1 and 2 drill section. It was also designed to test a subtle gravity anomaly.

### Summary Log

<table>
<thead>
<tr>
<th>INT</th>
<th>Magnetic Susceptibility</th>
<th>Fe%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-23m calcrite</td>
<td>23</td>
<td>Low &lt; 300</td>
</tr>
<tr>
<td>23-52m pink siltst</td>
<td>29</td>
<td>Low &lt; 300</td>
</tr>
<tr>
<td>52-64m BIF – hematitic</td>
<td>12</td>
<td>Med &gt; 300 &lt; 1500</td>
</tr>
<tr>
<td>64 -91m purple hs</td>
<td>27</td>
<td>Low &lt;300</td>
</tr>
<tr>
<td>91-100m BIF hematitic</td>
<td>9</td>
<td>Low &lt; 300</td>
</tr>
<tr>
<td>100-119m grey hs</td>
<td>19</td>
<td>Low &lt; 300</td>
</tr>
<tr>
<td>119-131m dark grey hs</td>
<td>12</td>
<td>Med &gt;300 &lt; 1500</td>
</tr>
<tr>
<td>131-154m BIF magnetic</td>
<td>23</td>
<td>High-Very High 1500-15000</td>
</tr>
<tr>
<td>154-165m BIF hematitic</td>
<td>11</td>
<td>Low &lt;300</td>
</tr>
<tr>
<td>165-167m BIF magnetic</td>
<td>2</td>
<td>High &gt;1500</td>
</tr>
<tr>
<td>167-174m grey green hs</td>
<td>7</td>
<td>Low &lt;300</td>
</tr>
<tr>
<td>174-180m BIF hematitic</td>
<td>6</td>
<td>Low &lt;300</td>
</tr>
<tr>
<td>180-184m grey-green hs</td>
<td>4</td>
<td>Low &lt;300</td>
</tr>
<tr>
<td>184-186m BIF hematitic</td>
<td>2</td>
<td>Low &lt;300</td>
</tr>
<tr>
<td>186-196m BIF magnetic</td>
<td>4</td>
<td>Med-Very High</td>
</tr>
<tr>
<td>196-205m dark grey-green hs</td>
<td>9</td>
<td>Med&gt;300&lt;1500</td>
</tr>
<tr>
<td>205-211m BIF hematitic</td>
<td>6</td>
<td>Med&gt;300&lt;1500</td>
</tr>
<tr>
<td>211-219m green red hs</td>
<td>8</td>
<td>Med&gt;300&lt;1500</td>
</tr>
<tr>
<td>219-236m BIF magnetic</td>
<td>17</td>
<td>High-Very High 1500-15000</td>
</tr>
<tr>
<td>236-242m dark green hs</td>
<td>6</td>
<td>Med &gt;300&lt;1500</td>
</tr>
<tr>
<td>242-270m BIF magnetic</td>
<td>28</td>
<td>High-Very High 1500-15000</td>
</tr>
<tr>
<td>270-276m dark green hs</td>
<td>6</td>
<td>Low &lt;300</td>
</tr>
</tbody>
</table>

There is a build up of iron content down the hole commencing 52m with a 12 metre intersection of non-magnetic hematitic BIF. BIF intersections steadily become more frequent below the water table (131m) however non-magnetic BIF facies continue to persist intermittently to at least 211m down-hole depth. 72 x 4m composite samples were analysed for copper, gold, bismuth and iron. No above background Cu, Au or Bi values were recorded.

E3RC04 collared at 416020E 7780660N -65°, Azimuth 090°, TD 270 metres was drilled at right angles to E3RC03 designed to intersect a magnetic target at a vertical depth of 180 metres coincident with a subtle gravity anomaly.

### Summary Log

| 0-28m | 28 | sand/gravel/calcrite |
| 28-76m | 48 | red siltstone |
| 76-115m | 39 | grey-red hematitic shale |
| 115-120m | 5 | hematitic BIF nonmagnetic |
120-124m 4  grey-green hematitic shale
124-139m 15  sandstone/tuft (watertable – 132m)
139-162m 23  chloritic hematitic shale
162-174m 12  hematitic BIF non magnetic
174-193m 19  chloritic hematitic shale
193-232m 39  hematitic BIF non-magnetic
232-239m 7  tuff/sandstone
239-248m 9  hematitic BIF non-magnetic
248-253m 5  dark green siltstone/hs
253-255m 2  hematitic BIF non-magnetic
255-270m 15  dark green siltstone/hs

There is a steady increase in magnetic susceptibility from below the base of oxidation (131m) to the end of the hole.

MS readings are basically flat for the entire hole (50-500) as there is a complete absence of magnetic BIF facies in stark contrast to E3RC03 collared 120m to the southeast? Maximum iron content of 8.7% was intersected from 212 metres to 220 metres downhole depth within a hematitic BIF unit. This also corresponds to the highest MS reading of 537, however compared with E3RC03 it is assigned to the low category.

68 x 4 metre composite samples were analysed for gold, copper, bismuth and iron. Total metallic iron assays are plotted on the drill log alongside downhole Mag Sus readings (Appendix 1). No elevated Au, Cu or Bi assay results were recorded.

Discussion

Geopeko DDH 001 collared 22 April 1967 designed to test Explorer 42 AMAG anomaly is significant because it demonstrated hydrothermally-altered Warramunga Formation metasediments/volcanics are present in the northern BONNEY WELL area (even though no significant Cu-Bi-Au mineralisation was intersected i.e. best assay of 0.41ppm Au).

Summary Log (Shell Relogging 1983)

0 – 76.2m No core
76.2 – 225.2 interbedded altered porphyrytic rhyolite, agglomerate/lapilli tuff (very compressed)
225.2 – 245m chloritic siltstone
245 – 327.5m chloritic siltstone with interbedded banded iron formation, jasper, tuffaceous layers. Thin section indicates siltstones are phosphatic partly chemically derived.

Stratiform banded hematite – jasper ironstone appear to have high background gold content ranging from 0.1 to 0.25ppm in DDH 001.Petrography on DDH 001 core shows hematite from BIF rocks is of hydrothermal origin as well as hydrothermally- derived chlorite and carbonate. Significantly, banded iron – rich stratiform rocks are mineralised 20km to the east at Rover 1 deposit (6 Mt @ 5gms/tonne Au equivalent).
5. GEOLOGY (Figures 2a,3,)

Regional Setting

The Tennant Creek copper-bismuth-gold orebodies are either within or adjacent to discordant ironstones showing hydrothermal alteration. Cropping out auriferous ironstones discovered in 1932 were mined, in ever increasing numbers until the 1950’s when the first subsurface, magnetic copper – bismuth - gold mineralised ironstone-deposit namely Peko was mined. Mineralised ironstones occur stratigraphically within a relatively narrow time line of about 20Ma between 1865Ma and the minimum age of mineralisation of about 1845Ma i.e. Warramunga Formation (Pw) whose subsurface location and unequivocal confirmation are paramount exploration parameters for identifying Tennant Creek-style mineralised ironstones in the Rover Field and by inference EL 28563. The Palaeoproterozoic Tennant Creek Inlier is characteristically defined as a sequence of flysch sediments (sequence of sedimentary rocks deposited as a deep marine facies of foreland basin of a developing orogen) and volcanics which accumulated within an intracratonic transtensional basin subsequently deformed (D1) metamorphosed and intruded by syn-orogenic l-type granites during the Barramundi Orogeny (1855Ma).

Fluvial to shallow marine sediments accompanied by felsic volcanism and penecontemporaneous subvolcanic intrusives were deposited unconformably over an early rift sequence. Two mild deformations namely D2 and D3 of folding and faulting produced basin and dome structures subsequently intruded by biotite-muscovite granite.

The above flysch sequence (Warramunga Formation) is restricted to the Central province of the Tennant Creek Inlier. An underformed by D1, group, of silicic volcanic and volcaniclastics (Flynn Subgroup) were deposited subsequently deformed (D2) intruded by anorogenic silicic intrusives and lamprophyre. The oldest rocks are Warramunga Formation turbiditic volcanic litharenites deposited in a rapidly subsiding ensialic transtensional basin between 1862 - 1870Ma. The Tennant Creek Granite suite intruded Warramunga Formation / lower Flynn Subgroup between 1855 − 1840Ma (Barramundi Orogeny) hence postulated mineralising fluid age of 1845Ma coeval with the intrusion of the Tennant Creek granite.

Deformation of Warramunga Formation produced moderate to tight upright folds (F1) with a pervasive subvertical, east west slaty cleavage (S1) accompanied by lower greenschist facies metamorphism. Deposition of the volcanosedimentary Flynn Subgroup is coincident with intrusive events as indicated by the preponderance of rhyolitic to rhyodacitic lava, felsic tuff and ignimbrites derived from the nearby consanguineous plutons between 1840 − 1845Ma. Continuing dextral shearing of the basin produced large scale east west – trending, open folds (F2). Disharmonic folds, box, chevron, kink angular folds and doubly peaking anticlines with a weak crenulation cleavage developed within Warramunga Formation. Northwest trending open folds were generated within Flynn Subgroup sequence. Interestingly the predominant cleavage orientation observed within greywackes of the lateritically capped, low ridge cropping out for over 5kms within what was formerly EL 26706 (now vacant but surrounded on three sides by the current licence area) trends northwest (330 degrees) and dips steeply east north east which is what you would expect to observe if they are indeed Flynn Subgroup metasediments.

To summarise, the oldest unit of Tennant Creek and Davenport Provinces is Warramunga Formation, a polydeformed succession of lithic to sublithic, arenite, wacke, siltstone, terrigenous mudstone and hematitic shale containing immature volcanic detritus indicative of medium-
grained turbidites of proximal to distal fan facies derived from a prograding (coarsening upwards) succession. Magnetite is ubiquitous locally forming distinct laminae a major component of hematitic shales. Carbonaceous shales are rare likewise carbonate rocks. Pw is deformed and metamorphosed to greenschist facies hosting ubiquitous ironstone frequently mineralised forming early in deformatinal history. Felsic volcanics/volcanoclastics/clastic sediments of Flynn and Ooradidgee Subgroups were deposited on deformed Warramunga basement. Importantly, Tennant Creek Supersuite rocks were being emplaced coevally as volcanics within Warramunga Formation as pre-,syn- and post-deformational granites(1840 – 1858Ma) and bimodal volcanics within lower Flynn and Ooradidgee Subgroups(1837Ma). Sedimentation continued via Tomkinson Creek, Wauchope and Hanlon Subgroups dominated by orogenic terrigenous/stable shelf conditions to about 1820Ma.

Tennant Creek and Davenport Province sediments are dominated by clastics with a significant felsic/mafic volcanic component also they are oxidised containing magnetite and hematite. The lack of carbonaceous material locally implies the reduction of oxidised magmatic fluids interacting with methane-bearing connate brines is unlikely hence ubiquitous secondary ironstones are the main Cu – Bi – Au mineralising fluid trap sites hosting all known deposits in the Tennant Creek basin 35km to the north and Rover sub-basin commencing 50km west, trending east south east through the licence area.

Interestingly, many Tennant Creek Supersuite members show either a sodic or potassic alteration overprint such as a mineralisation – associated K – rich alteration of post – ironstone porphyry. Thus, instead of using ironstone geochemistry as a pathfinder to ore, a more effective method is to target alteration signatures of porphyries, granites, quartzofeldspathic metasediments enveloping ironstones as a method of determining whether mineralisation-related alteration has indeed affected immediate wallrocks of specific ironstones? The Tennant Creek Supersuite includes all felsic igneous rocks intruded or extruded within Tennant Creek Province and adjacent Davenport Province between 1870Ma and 1840Ma. The supersuite emplaced in a wide variety of geological settings first appeared as either extrusive volcanics or synsedimentary intrusive porphyries during the latter phases of Warramunga Group sedimentation. Emplacement continued through the compressional deformation with several members emplaced as either syn-late- or post-tectonic granites and porphyries. Two generations of later porphyries are identified through firstly diagnostic deformational signatures and secondly their relationship to regional alteration events. The youngest supersuite members occur either as volcanics within sediments overlying unconformably Warramunga Formation i.e. Bemborough Formation, lower Flynn Subgroup; Epenara Volcanics, Hatches Creek Group or porphyries intruding younger sediments. The Tennant Creek Supersuite is an I – (granodiorite) type, restite – dominated suite with some fractionation occurring late (in there intrusive history) particularly those south east of Tennant Creek. Most granites are deformed or metamorphosed occurring after intrusion possessing a strong foliation. Actinolite after biotite implies an upper greenschist facies metamorphic overprint. Within the licence area Cabbage Gum granite a medium grained porphyritic monzogranite is cut by a wide shear zone containing quartz veins whereas Channingum granite, a white to pink, massive coarse grained leucocratic monzogranite / coarse grained porphyritic granite is strongly foliated and mylonitised. Alteration in granite is widespread reflecting either post intrusion low – grade metamorphism or a late alteration overprint of either firstly the ironstone or secondly the mineralising (1845Ma) events? i.e. plagioclase gone to clinozoisite, K-feldspar to sericite, biotite to chlorite, apparent albitionisation in Channingum granite.
Local Geology (Figure 3)

Cropping out exposures are rare i.e. 90% of the licence area is covered by aeolian sand with minor Tertiary to Recent palaeodrainage channel deposits trending southeast commencing from northwest corner i.e. traversing interpreted Cabbage gum granite terrane.

The northern area of the licence is overlain by up to 80m of Tertiary silts and sands before abruptly giving way to a relatively shallow lateritised granitic regolith of about 12m thickness. A 2km by 1km exposure of Flynn Subgroup greywacke/siltstone crops out in the central area of the licence intermittently capped by remnant, lateritised Neoproterozoic Rising Sun Conglomerate, quartz arenite. Onlapping northwesterly – trending Wauchope Subgroup, Unimbra Sandstone crops over the south east corner of the licence butting up to the Stuart Highway. AMAG interpretation shows a major fault trending east north east across the southern part of the licence apparently terminating northwest extent of Hatches Creek Group sedimentation?

Palaeozoic Wiso Basin, Lake Surprise Sandstone crops out intermittently over 10km commencing from the southwest corner of the licence unconformably overlying interpreted Palaeoproterozoic Flynn Subgroup. Cropping out Warramunga Formation appears to be absent within the licence area likewise Explorer granite however prominent en echelon north to north north east trending quartz reefs, several kilometres long rising up to 10m above the aeolian sand plain, infill faults/fractures within the underlying concealed granite. The reefs cross into the licence area where they are cut by the above east northeast – trending magnetic linear/fault?

History

The oldest rocks within the licence area are 1862 – 1872 Ma - Pw, intersected by Geopeko E42 DDH 001(Appendix 1 Relogging DDH001 Shell 1983) overlain by Pn – Flynn Subgroup wedged between 1848 Ma Cabbage Gum granite to the north and the informally named Explorer granite to the south. Wauchope Subgroup sandstone (Hatches Creek Group) onlaps interpreted Pn over southeast corner of the licence, the most northerly extension of well exposed northwest – trending Murchison Range syncline. Sedimentation over the licence area ceased until the Neoproterozoic when remnant Rising Sun Conglomerate quartz arenite was preserved unconformably overlying Pn. After another lengthy hiatus Devonian - sedimentation of Wiso Basin succession breached the southwest corner of the licence laying – down Lake Surprise Sandstone. Finally, local uplift initiated Tertiary channel deposits from northwest to southeast.

6. EXPLORATION PROGRAM

2012

Vehicular reconnaissance of the licence area revealed very little cropping out geology, which was not unexpected, however dune sand frequently moves in response to weather events sometimes revealing hitherto sand-covered basement exposures.

Consequently, the following aeromagnetic/radiometric data sets were acquired to gain a better understanding of the regional geological setting of the licence area and also its prospectivity potential for copper – bismuth – gold mineralised ironstone IOCG deposits namely AGSO P694 Tennant Creek 200m line space survey, Normandy 1997 WGC Billiat Helimag 75m line space survey, NTGS Bonney Well 500m line space +infill survey and Normandy 1990 Babylon 500m line space survey. Relevant located digital data was reprocessed, computer modelled and image processed over historical AMAG prospects notated B, C, D and E by TNG,2005.
Regional GA, Normandy Billiat 1998 and TNG 2005 E2/E3 ground gravity data was acquired, modelled and also image processed (Appendix 2. Geophysical Consultant Report).

2013 review of all available data.

7. EXPENDITURE

2012

1. Acquisition, compilation, analysis of historical data/reports, reporting
Geologist time 12 days @ $1000/day $12000.00

2. Acquisition, processing, modelling, interpretation geophysical data
Geophysical Consultant, 8 days @ $1200/day $9600.00

3. Administration $2400.00

TOTAL $24000.00

2013

1 Review of located digital AMAG data $4000.00

2 Administration $600.00

TOTAL $4600.00

8. CONCLUSIONS and RECOMMENDATIONS

A program of review of available located digital AMAG/ Radiometric data was undertaken to ascertain the historical veracity of previously interpreted Warramunga Fm underlying the licence area was undertaken to unequivocally ascertain whether relatively deep AMAG drill targets are indeed hosted by Warramunga metasediments or as appears, in this case, Flynn Subgroup rocks? In view of the above conundrum combined with prohibitive costs of deep drill testing the licence is surrendered.

9. REFERENCES


Mackie, A.W., 2005, EL24471 Explorer, NTDBIRD ATR . TNG LTD (unpublished)


Orton, V., 2000 – Fourth Annual Report on Exploration Licence 9421 for the period 13 May 1998 to 12 May 1999 Tennant Creek District, Northern Territory, Packer Prospect,


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APPENDIX 2

GEOPHYSICAL CONSULTANTS REPORT
MEMORANDUM

To: Alistair Mackie
From: Grant Archer (Consulting Geophysicist)
Date: 23 November 2012
Subject: EL28563 Geophysics

Summary and Recommendations

Geophysical interpretation and processing was carried out over exploration license 28563 to come up with potential geophysical target areas for further investigation to target mineralisation.

Data sets used for this task consisted of airborne aeromagnetic data using 200m and 75m interline spacing and the available gravity data. Work with magnetics was mostly focused on the Billiat survey (75m spacing) covering the southern part of the license.

The primary objective of the work was to identify potential mineralized ironstone targets using magnetics and gravity. The Tennant Creek Gold field is to the north of the license area. Tennant Creek type ironstone targets were not an exclusive consideration.

Results show most anomalies over the tenement are small in magnetic intensity of the order 200nT however there are 2 higher anomaly areas over historical target areas with historical target area “E3” having intensity of the order 1200nT and historical “B1 B B3” of the order 600nT.

It is noted by comparison Tennant Creek mineralised ironstones Warrego and White Devil had much higher airborne intensities of 2200nT and 3650nT respectively.

However smaller anomalies have been of interest at Tennant Creek. It is also noted deeper placement of ironstone targets in the ground may considerably reduce intensity (for example forward modelling of a Tennant Creek ironstone showed a drop in intensity from 3000nT to 1500nT in moving from a depth of 100m to 150m).

Also consideration needs to be paid to the oxidation state of an iron body and the gravitational technique may prove successful for exploring for oxidized ironstones.
The available Billiat 1997 gravity survey was considered for detecting anomalous ironstones but was only able to identify potential anomalous areas in interpretation (refer to figure 9) due to sparse data. It is noted a more detailed very local gravity survey exists in the vicinity of historical targets “E1 E2 E3” but was not processed for this exercise.

Based primarily on specialized processing of the magnetics historical and new discrete magnetic anomalism was able to be identified in interpretation and was able to be prioritized for further investigation e.g. further forward modelling (refer to figures 8b and 8c). Interpreted magnetic lineaments and potential structure are annotated in figure 6. While forward modelling is not explicitly presented in this memorandum, some of the results of automatic magnetic depth calculations are presented (Figure 8a) and were able to be linked to some interpreted anomalous target areas, but it is emphasized these results require forward modeling to better understand and verify or reject automatic results; Automatic depths were generally less than 150m. A compilation of the various interpretations is presented in Figure 10 but does not indicate the priority of areas which are shown in figures 8b and 8c.

Many target areas based on magnetics were identified in interpretation (and ranked) but need forward modelling to help create the next phase of raking for exploration. Gravity should be further considered as an exploration tool for oxidized bodies.

All figures referred to in this memorandum are appended to the end of the text.

**Data Source**

Airborne geophysical magnetic data used for the work consisted of three surveys including the detailed “Billiat Project” 1997 aeromagnetic survey covering the southern area of the tenement. The Billiat survey was originally flown for Normandy Gold Limited by World Geoscience but is now open file data. The survey has a 75 meter interline spacing and was flown with a North-South traverse line orientation. Sensor altitude was a nominal 40 meters above the ground.

Other airborne survey data consisted of Tennant Creek 1998 survey data flown by Kevron and Bonney Well 1999 flown by AGS. These data used a 200m line spacing flown North-South and a 60m flight altitude.
The Billiat 1997 gravity survey was used and consisted of 500m and 4000m station spacings. A small detailed gravity survey (350 stations) in vicinity of historical targets “E1”, “E2” and “E3” was sourced but not used for the work.

**Magnetic Interpretation**

Work was carried out to process and interpret airborne aeromagnetic data and gravity covering EL28563. All figures referred to in this memorandum are appended to the end of the text.

Figure 1a and 1b show the tenement with NTGS published outcrop or interpreted geology (reference: NTGS), with a large part of the south of the tenement cover by sand/silt/clay.

The geometry of data sets used for the work are shown in Figures 1c (airborne magnetics) and figure 9 (gravity station locations plotted).

Figures 2a and 2b show the display of merged and processed magnetic data over the tenement, where the data here have been reduced to the pole. Interpreted and outcrop geology of the NTGS overly these figures.

Some of the multiple enhancements of data used in interpretation are shown in this memorandum with the vertical derivative and enhanced magnetics shown in figures 3 and 4. Figure 5 shows a contoured version of magnetic data with the annotation of “Historical” target areas.

Attempts were made to interpret some “preliminary” magnetic lineaments and possible magnetic structure and are shown in figure 6.

Anomalies were analysed and interpreted with specialized processing with the annotation of unranked discrete anomalies from the Billiat survey (southern part of tenement, 75m line spacing) shown in figure 7.

The objective of this work was to identify potential ironstone targets. It is noted the Tennant Creek Gold field is to the north of the license area. Tennant Creek type ironstone targets were not an exclusive consideration.

Results show most anomalies over the tenement are small in magnetic intensity of the order 200nT however with 2 higher anomalous areas over historical target areas where at “E3” the intensity is of the order 1200nT and at “B1 B B3” of the order 600nT (refer to figure 5).
It is noted by comparison Tennant Creek mineralised ironstones Warrego and White Devil had much higher airborne intensities of 2200nT and 3650nT respectively. However smaller anomalies have been of interest at Tennant Creek. It is also noted deeper placement of ironstone targets in the ground may considerably reduce intensity (for example forward modelling of a Tennant Creek ironstone showed a drop in intensity from 3000nT to 1500nT in moving from a depth of 100m to 150m).

While forward modelling is not explicitly presented in this memorandum, some of the results of automatic magnetic depth calculations are presented in Figure 8a where specific results in the vicinity of interpreted anomaly areas are annotated when a solution was available. Most derived values were <150m. It is emphasized these results require forward modeling to better understand and verify or preclude automatic results.

New and coincident historical interpreted discrete magnetic anomalism was able to be prioritized for future further investigation e.g. possible ranking for further forward modelling and is shown in figures 8b and 8c. Figure 8b label new anomalism according to N1 – N7 (not in priority order).

The many interpreted target areas based on magnetics (and semi-ranked) need forward modelling to help create the next phase of refinement for exploration.

**Gravity Interpretation**

The available Billiat 1997 gravity survey was considered for anomalous ironstones but was only able to interpret and identify potential anomalous areas shown in figure 9 due to sparse data; gravity stations are annotated in the figure with bouguer gravity. It is noted a more detailed very local gravity survey exists in the vicinity of historical “E1 E2 E3” but was not processed for this exercise.

A consideration needs to be paid to the oxidation state of ironstone bodies and the gravitational technique may prove successful for exploring for oxidized ironstones, and gravity should be further considered as an exploration tool for oxidized bodies and to perhaps help rank magnetic bodies.

Various analysis and interpretation presented in this memorandum are compiled and shown in Figure 10, but does not include the (semi) prioritization of areas that are shown in figures 8b and 8c.
Figure 1a. EL28563 NTGS Interpreted Geology Tennant Creek 1:250,000 – MGA Zone 53 (reference: NTGS)
Figure 1b.  EL28563 NTGS Outcrop Geology Bonney Well 1:250,000 – MGA Zone 53 (reference: NTGS)
Figure 1c. EL28563 Airborne Magnetic Surveys. Billiat detailed survey in south (75m spaced lines)
Figure 2a. EL28563 Airborne Total Magnetic Intensity (RTP). NTGS interpreted Tennant Creek Geology boundaries (reference: NTGS)
Figure 2b. EL28563 Airborne Total Magnetic Intensity (RTP). NTGS Bonney Well Outcrop Geology boundaries (reference: NTGS)
Figure 3. EL28563 Airborne Vertical Derivative of Magnetics (RTP)
Figure 4. EL28563 Enhanced Magnetics
Figure 5. EL28563 Contours (100nT) of Airborne Total Magnetic Intensity (RTP).
“Historical” Targets annotated as B1-B4, C1-C3, D2, E1-E4
Figure 6. EL28563 Some interpreted magnetic Lineaments and possible structure (Billiat survey).
Figure 7. EL28563 Some interpreted discrete magnetic anomalies identified in Billiat survey (solid black boxes). Dashed boxes are areas of multiple superimposed anomalies.
Figure 8a. EL28563 location of automatic depth computations carried out over Billiat survey. Depth values when computed in vicinity of interpreted discrete anomalies are annotated; subject to verification or exclusion with forward modelling.
Figure 8b. EL28563 N1 – N6 Interpreted prioritized discrete magnetic anomalies identified in Billiat survey (red rectangles superimposed on black) based on localized intensity of magnetic field.
Figure 8c. EL28563
“Historical” Targets (blue ellipses, also reference Figure 5) prioritized by interpreted discrete magnetic anomalies identified in Billiat survey (blue rectangles superimposed on black).
Figure 9. EL28563 gravity stations and bouguer gravity with interpreted potential anomalous locations.
Figure 10. EL28563 Integration of magnetic and gravity interpretations.
Historical Target Areas (navy blue); Interpreted Magnetic Lineaments and Structure (red/light blue); Interpreted Discrete Magnetic Anomalies (black squares) with Automatic results; Interpreted Potential Gravity Anomalies (black circles)