COMPANY: Gempart(NT)P/L, P.O. Box 97 Parap 0804 NT

PROJECT NAME: Docker Copper

EXPLORATION LICENSE: EL 31531, EL 27581

DATUM / ZONE: GDA94 / MGA52

MAPSHEET: 1:250,000 Bloods Range SG5203
            1:100,000 Hull 4748, Bloods Range 4848

TENURE OPERATOR: Gempart(NT)P/L

GEOPHYSICS CONTRACTOR: UTS Geophysics P/L

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DISTRIBUTION: Gempart(NT)P/L, Northern Territory Geological Survey.
1. SUMMARY

Exploration Licenses 31531 and 27581 are contiguous licenses granted in March 2017 and cover 779 and 514 square km respectively. Both licenses are 100% owned by Gempart (NT) Pty Ltd. EL 31531 is located 30 km east of the town of Docker River and EL 27581 commences 6km east of the WA border.

The objective of the current work was to fly simultaneous regional AEM VTEM and magnetic surveys over a large part of EL 31531 and part of EL 27581. No historical AEM surveying had ever been carried out in the area and historical regional magnetic surveying had been carried out in the mid 1980’s.

New coincident magnetic, AEM and digital terrain survey data was successfully collected over the planned survey area. The survey used wide spaced flight lines 500 meters apart flown with a north-south orientation.

The resulting data were of good quality and some representations of these data are presented in this report.

Magnetic data flight lines were flown to interleave historical NTGS magnetic survey lines so as to give a higher resolution coverage over the area (250 meter spacing). Subsequent research and development will be put into merging new magnetic data with historical NTGS magnetic data to obtain greater resolution to assist with further interpretation.

AEM data were successful in delineating several features of interest. Depth transformation data was able to delineate structures on the eastern and north-western parts of the survey area for follow up. There was a good correlation between Bloods Range Beds geology and conductivity structure observed in conductivity transformation data central to the survey area. Conductivities and time decays observed for the survey area were considered moderate. Some AEM structure was possibly inconsistent with structural orientations observed in magnetics.

Follow up surveying for mineral exploration may test some structures using east-west lines and possibly IP surveying for disseminated mineralisation, or gravity surveying.
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3. INTRODUCTION

Exploration License 31531 was granted in March 2017 and covers 779 square km. Contiguous Exploration License 27581 also granted in March 2017 covers 514 square km. Both licenses are 100% owned by Gempart (NT) Pty Ltd.

Access to the area is via Tjukarura Road with EL 31531 located 30 km east of the town of Docker River. EL 27581 is 6km east of the WA border. Figure 1 is a location map of licenses and new survey lines on the Bloods Range 1:250,000 geology map.

The objective of the current work to fly simultaneous regional AEM VTEM and magnetic surveys over a large part of EL 31531 and part of EL 27581. No historical AEM surveying had been carried out in the area.

Figure 1. Location map with Exploration licenses 31531 and 27581 and survey lines on the Bloods Range 1:250,000 geology map (reference NTGS)
4. REGIONAL CONTEXT

The area consists of 1040 Ma Tjuninanta Formation comprising interlensed silicified epidotised amygdaloidal basalt and sheared quartz-muscovite schist/phyllite.

The Tjuninanta Formation is overlain by 1078Ma Mount Harris Basalt comprising more altered amygdaloidal basalt, which crops out over the survey area. Lithological units are assigned to the Tjauwata Group 1080-1040 greenschist facies rift succession (unconformably overlying Mesoproterozoic Musgrave Inlier Pottoyu Granite basement rocks) and is characterised by, it would seem, altered basalts, grading up into rhyolite, red beds, schistose sediments and copper/gold anomalism.

The above rift succession is unique to the southwest margin of overlying Neoproterozoic-Palaeozoic Amadeus Basin clearly it has potential for Red Bed – hosted copper mineralisation as occurs extensively in central Africa.

Figure 2. Geology map Exploration licenses 31531 and 27581 and survey lines. (MGA52) (Reference NTGS Bloods Range 1:250,000 geology map, see Figure 1 for Legend)
5 PREVIOUS EXPLORATION

In 1962 the First Edition mapping of BLOODS RANGE 1:250,000 map sheet was conducted by the BMR.

Planet Mining Company P/L were granted AP1435 in 1966 and focused mainly on base metal potential of gossanous (limonitised) Pinyinna Beds and conducted a heli-borne regional geochemical sampling program over 241 km of the Petermann Ranges – Olia Chain southeast trending strike length. Planet also contracted GRD to fly the Petermann Range aeromagnetic geophysical survey over most of the Hull 100,000 map sheet area on NE-SW orientated flight lines 800m apart at an altitude of 152m. (Wilson, 1966; Geophoto Resources, 1966; Brown, 1966, Wilson, 1966; Woyzbun, 1968; Tassell, 1969)

Ten water bores were drilled (30-60m) testing Docker River Valley near Livingstone Pass during the 1960s yielding up to 7787 litres/hour; total dissolved salts 318-5160 ppm. (Bradberry, 1968)

AP2359 (1451 square miles) was granted to the Docker River Social Club in 1971 over two areas of surface copper mineralisation namely malachite- chrysocolla –chalocite within quartz-calcite veins hosted by altered Bloods Range Beds and/or altered basalt located 24 and 29km from the Docker River Community respectively east of Hull River. At the behest of Community Supervisor the NTGS completed a five diamond core hole program (340.15m) ie DDH 1 tested the Western Prospect and DDHs 2,3,4,5 tested the eastern prospect. 43 split core samples were spectrographically analysed for Cu, Ag and W with a best intersection of 0.21% Cu from 22.25-25m downhole depth in DDH 1. (Fruzzetti and Morlock 1972)

The NTGS flew 500m line spaced Regional aeromagnetics and radiometrics Geophysical surveys over BLOODS RANGE, PETERMANN RANGES, AYERS ROCK, KULGERA 250k map sheet areas from 1985-87 prior to commencing a regional mapping program of the NT Musgrave Province although KULGERA commenced in 1987 the main part of the overall program commenced 1997-2004.

EL5701 was granted to Hosking, Allender and Le Brun in 2003 over the eastern boundary area of current license EL27581. The licence was joint ventured to Goldsearch LTD and the Independence Group NL in 2004. IGO conducted a regional soil sampling program collecting 138 -2mm samples for both BLEG and total digest analyses delineating three gold anomalies. Infill sampling was conducted over all 3 areas ie 200m x100m spacing. The southern most soil sampling grid comprised 3 areas of gold anomalism predominantly covered by shallow Aeolian sand with remnant sub cropping to boldly cropping out northwest to east west trending metasediments /granitoids hosting abundant quartz veining up to 2m wide shallowly dipping south to southwest. The westernmost zone returned up to 13.9ppb Au(BLEG) over a northwest trending semicontinuous strike of 700m from which several highly anomalous grab/ rockchip samples were collected ie 29.71,13.07,3.42 and 1.09 ppm Au respectively. Associated elevated elements include bimuth 723ppm, lead 7492ppm, copper 2402ppm and silver 14.7ppm. (Keillor, 2005, Keillor, 2006; Hellewell, 2007)
6 EXPLORATION CONCEPT

VTEM and magnetic surveying was planned over the northeast margin of EL 27581 and western two thirds of adjoining EL 31531. This covered all known Cu+basemets/ Au mineralisation hosted by deemed highly prospective 1040 Ma Tjuninanta Formation comprising interlensed silicified epidotised amygdaloidal basalt and sheared quartz-muscovite schist/phyllite.

The Tjuninanta Formation is overlain by 1078Ma Mount Harris Basalt comprising more altered amygdaloidal basalt, cropping out over the northern third of the survey area. Both the above lithological units are assigned to the Tjauwata Group 1080-1040 greenschist facies rift succession ( unconformably overlying Mesoproterozoic Musgrave Inlier Pottoyu Granite basement rocks) and is characterised by, it would seem, altered basalts,grading up into rhyolite,red beds, schistose sediments and copper/gold anomalism.

The above rift succession is unique to the southwest margin of overlying Neoproterozoic-Palaeozoic Amadeus Basin clearly it has potential for Red Bed – hosted copper mineralisation as occurs extensively in central Africa.

The survey area is bisected by an east-west-trending zone of regional tectonism/thrust faulting apparent on regional aeromagnetic images which appears to align on host known copper occurrences over a strike length of 25km.

The only previous regional geophysical surveying conducted over the area is the NTGS Bloods Range Aeromagnetic and Radiometric 1987 survey. The VTEM geophysical survey program was a grass roots exploration play designed to test beneath existing surface mineralisation for subsurface conductors possibly indicative of economic massive sulphide –hosted basemetal-gold mineralisation.

7 DETAILS OF COLLABORATION PROGRAM

The Docker Copper program was a geophysical program consisting of a combined VTEM airborne and magnetic survey data acquired simultaneously and completed in September 2017.

Survey lines were flown North-South with a 500 meter interline spacing as shown in figure 3. 1138 line-kilometers were acquired during the survey.

Geophysical sensors included a versatile time domain electromagnetic (VTEM max) system and a caesium magnetometer. GPS navigation and a radar altimeter was used.
Transmitter loop diameter was 35 meters with a peak dipole moment 665,896 nIA, base frequency 25 Hz and pulse width 7.40 ms. X and Z receiver coils were used with effective areas 19.69 and 113.04 square meters respectively. Decay sampling was carried out over a 0.018 – 11.458 millisecond range for the Z component. Average transmitter-receiver loop terrain clearance was 35 meters.

In-field quality assurance and preliminary processing was carried out on a daily basis. VTEM sensor calibration took place on the ground at the start of the project prior to surveying.

The magnetic sensor used for the survey was a Geometrics optically pumped caesium vapour magnetic field sensor with a sensitivity of 0.02 nanoTesla and sampling rate of 0.1 seconds.

Figure 3  VTEM / magnetic survey flight lines acquired for the collaborative program. (MGA Zone 52)
RESULTS AND INTERPRETATION

New coincident magnetic, AEM and digital terrain survey data was successfully collected over the planned survey area.

The survey used wide spaced flight lines 500 meters apart flown with a north-south orientation. A flight path plot showing full license areas is shown in figure 3 in section 7.

Processed magnetic survey data are show in figures 4 and 5 with reduced to the pole magnetics and the vertical derivative of magnetics respectively. The dynamic range of magnetic data over the survey was 1200 nanotesla. Although these magnetic data were very similar in characteristics to historic magnetic data (though data were acquired with updated technology), new flight lines were flown so as to interleave historic survey lines to form a superior data set with twice the detail. Figure 6 presents digital terrain model data for the new survey.

Figure 4 Reduced to the pole magnetic data (MGA Zone 52)
Figure 5  Vertical derivative of Reduced to the pole magnetic data (MGA Zone 52)

Figure 6  Digital Terrain Model resulting from the survey. (MGA Zone 52)
A version of calculated time decay data (tau) calculated from B field data (the z component) are shown as colour imagery in figure 7 with vertical derivative magnetic data shown as shading. The time decay calculation gave moderate values up to 3.37 milliseconds with the eastern side of the survey exhibiting highest values. Magnetic structures over the survey area tended to have a general east-west orientation. Figure 8 shows a mid-time channel 20 data (end time 0.23 milliseconds) for x-component dB/dt data.

Figure 7 Time decay (Tau from B field Z component) and RTP magnetic vertical derivative shading. (MGA Zone 52)
Figure 8  Channel 20 dB/dt (z component)  (MGA Zone 52)

Figure 9 shows the result of a Conductivity Depth Transformation of B-Field z-component data as an 80 meter depth slice below surface. Conductivities ranged up to 1150 mS/m and general depths of the order up to 100 meters.

The subsequent figure 10 shows Conductivity Depth transformation data (80 meter depth slice) in colour overlying the NTGS Bloods Range 1:250,000 geology (grey image), and with preliminary magnetic linear anomalies illustrated by yellow lines.

The largest conductivity structure was observed on the eastern boundary with a general north-south orientation and near orthogonal to magnetic structure in the area. Unfortunately all flight lines occurs along this apparent structure and possibly alias the measurement and not revealing possible detail across the structure. Follow up traverses could be carried out to better test north-south structure.
Other conductive zones were identified in the north-west corner of the survey and trending north-east across the south-western part of the survey.

Based on the published geology map and Landsat data there was a good correlation between Bloods Range Beds geology and conductivity structure observed in conductivity transformation data.

Some AEM structure was inconsistent with structural orientations observed in magnetics.

Figure 9  Conductivity Depth Transformation from B field; 80 depth slice. (MGA Zone 52)
Figure 10  Conductivity Depth transformation 80 meter depth slice (colour), magnetic linear anomalies (yellow lines) and NTGS Bloods Range 1:250,000 geology (grey image). (MGA Zone 52)
9. CONCLUSION

New coincident magnetic, VTEM AEM and digital terrain survey data was successfully collected over the planned survey area. The survey used 500 meter spaced lines and serves as a regional representation of the data. Prior to this survey no electromagnetic data had ever been collected over this area.

The resulting data were of good quality and some representations of the data are presented in this report.

Magnetic data were flown to interleave historical NTGS magnetic survey flight lines so as to result in a higher resolution coverage over the area.

Subsequent research and development will be put into merging new magnetic data with historical NTGS magnetic data to obtain greater resolution to assist with further interpretation.

AEM data were successful in delineating several features for follow up surveying. Depth transformation data was able to delineate a structures on the eastern and north-western parts of the survey area for follow up. There was a good correlation between Bloods Range Beds geology and conductivity structure observed in conductivity transformation data central to the survey area. Conductivities and time decays observed for the survey area were moderate.

Some AEM structure was inconsistent with structural orientations observed in magnetics.

The possibility of some palaeo-channel structure is also a consideration.

Follow up surveying for mineral exploration may test some structures using east-west lines and possibly IP surveying for disseminated mineralisation, or gravity surveying.
10. REFERENCES


Wilson, A.F., 1966, Preliminary report on mineral prospects of portion of the Scherin – Mural Crescent Area Western Australia for Planet Mining Company Pty Ltd. CR19660046.
