Palace Resources Ltd.
BROWNS RANGE PROJECT
AIRBORNE EM & MAGNETICS
INTERPRETATION
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April, 2009

SOUTHERN GEOSCIENCE CONSULTANTS

SGC Report No. 1932

PROJECT NAME                  BROWN'S RANGE
CLIENT                      PALACE RESOURCES LTD.
COUNTRY                     AUSTRALIA
PROVINCE / STATE            TANAMI, NORTHERN TERRITORY
METHOD KEYWORDS             AIRBORNE EM, MAGNETICS, REPTEM
COMMODITIES                 URANIUM
1:250,000 MAP SHEET:        TANAMI SE 52/15
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SUMMARY

A RepTem airborne electromagnetic-magnetic survey was completed by GPX Airborne over part of Palace Resources Limited’s Brown’s Range tenements in January-February, 2008. The objective of the survey was to help assess the potential of the area for its uranium potential. The area has geological similarities to the Arnhem Land / Alligator River locations and is considered prospective for unconformity associated uranium deposits.

Overall data quality for the survey was fair to good for general mapping-interpretation purposes. The effectiveness of the survey for detection of discrete, massive sulphide type anomalies is questionable.

The Brown’s Range survey has been quite successful in identifying and mapping potentially prospective, conductive (graphitic-sulphidic) units within the Palaeo Proterozoic basement and tracing them under the Meso Proterozoic unconformity. This situation is broadly analogous to the geological setting of the Arnhem Land uranium deposits.

Field checking, geological mapping and or shallow drilling is advisable to confirm the nature of the basement lithologies within this interpreted graphitic-sulphidic metasediment – metavolcanic package.

The data set is also amenable to a basic structural analysis. The combination on favourable lithologies and dilational structural situations warrant checking as possible loci for uranium mineralization.

For most of the prospective areas, surface mapping, sampling and radiometrics, followed by drilling, seems the logical initial exploration approach for further assessing the uranium potential of the areas that are considered prospective based on the general unconformity uranium model.

The interpreted graphitic-sulphidic Palaeo Proterozoic metasedimentary – metavolcanic sequence in the central part of the survey area may have significant base metal ± precious metal potential, using the Rum Jungle area as a guide.
1. INTRODUCTION

An airborne electromagnetic-magnetic survey was completed over part of Palace Resources Limited's Brown's Range tenements in January-February, 2008. Palace’s main exploration focus in the area is the uranium potential. The area has geological similarities to the Arnhem Land / Alligator River locations and is considered prospective for unconformity associated uranium deposits.

The Browns Range area is located within the Northern Territory section of the Tanami Desert, about 200km south-east of Halls Creek (Figure 1). The survey area is in the north-western portion of EL25207.

Figure 1: Browns Range RepTEM Survey Location Plan.
2. GEOLOGY

The project area covers poorly exposed Palaeoproterozoic rocks of the Tanami complex and overlying Palaeo- to Mesoproterozoic rocks of the Birrindudu-Victoria Basin. The Tanami Complex includes deformed granitoids, metasediments and metavolcanics. The Birrindudu-Victoria Basin sequence includes weakly deformed sandstones, grits and conglomerates sediments of the Gardiner and Pargee Sandstone. The unconformity between these two major lithological groups is considered analogous to the Kombolgie unconformity in the Alligator River region and thus prospective for unconformity uranium deposits similar to Ranger, Narbarlek, Koongarra and Jabiluka.

Geological data used in the interpretation included the old (~1975) published Tanami 1:250,000 sheet mapping and newer, digital mapping/interpretation. In this area, the digital geology seems to be primarily an interpretation of regional scale, low resolution aeromagnetics.

Exposure of the prospective Palaeo Proterozoic basement rocks and Palaeo Proterozoic - Meso Proterozoic unconformity surface within the project area is poor. This limits the effectiveness of radiometric survey techniques for direct detection of uraniferous mineralization.
3. SURVEY DETAILS

Basic survey specifications are summarized below. A more detailed summary of the equipment, survey procedures, specifications and data processing undertaken by GPX is available in the ‘Survey Operations and Logistics Report’ generated by GPX upon completion of the survey and basic processing.

All data was processed in MGA Zone 52 (GDA94 datum) coordinates.

- Data Collection: GPX Airborne; Job Number 2301
- Survey Date: January 12th – February 2nd, 2008
- EM System: RepTEM
- Waveform: Square Wave, 5 S on, 15 S off
- Current: 320 A
- Ramp: 55 µS
- Transmitter Loop Area: ~350 M²
- Transmitter Moment: 112000 AM²
- Transmitter Frequency: 25 Hz
- Receiver Coil Area: ~10000 M² effective
- Receiver Coil Bandwidth: 45000 Hz
- Sample Time Range: From 0 to 14 mS after turn off. 21 channels
- Magnetometer: Geometrics G8221 Caesium Vapour
- Sampling Interval: 9-11m
- Flight Line Separation: 200m
- Flight Line Direction: 090°-270°
- Tie Line Direction: 00°-180°
- Tie Line Separation: 2000m
- Mean Terrain Clearance: ~35m (EM), 50m (magnetometer)
- Navigation: Differential GPS

Data quality for the Brown’s Range survey is fair to good for the general mapping purposes for which it was designed. There are a couple of obvious line busts or sections of bad EM information in the final data set. These are quite restricted in extent and don’t seriously impact on the interpretability of the data.

The resolution achieved by the 200m line spaced survey is reasonable for first pass, project scale exploration purposes but lacks the resolution required for reliable use at detailed, prospect scales. In this environment, the EM data should not be considered a good tool for the detection of discrete, massive sulphide style bedrock conductors. The relatively low transmitter power limits the effectiveness of the RepTEM system and its depth of exploration, particularly in specific, discrete conductor detection and identification mode.
4. DATA PROCESSING

The RepTEM EM and magnetics data has been processed and evaluated by S.G.C. using a variety of software packages. This processing included:

- Gridding, cleaning up, imaging and contouring of the magnetics, DTM and EM channel amplitude data.
- Generation of conductivity depth inversion depth slice images and contours.
- Generation of the flight path for the survey.
- Generation of suites of 1:25000 scale image contour maps of selected magnetic and EM images, including conductivity depth slice information (e.g. Figures 2-5).

The imaged data has been supplied in GIS compatible format and as an A3 sized compendium (PDF format).

S.G.C. has not generated EM or magnetics profiles for the data set. GPX provided a reasonable set of profiles as part of their final data delivery. These should be adequate for general mapping purposes, but S.G.C. would generally regenerate customized profiles if the data was to be used for identification of specific, discrete, late time bedrock conductors.

5. INTERPRETATION AND DISCUSSION

The interpretation approach adopted for the Brown’s Range data set consisted of more or less independent litho-structural interpretations of the magnetics and EM data at 1:25,000 scale. Final interpretation maps of the EM and magnetics data sets are included as Figures 6 and 7 respectively. The main sources of information used to compile the interpretation plans are the suites of image-contour maps mentioned above, published geology and an understanding of the general, unconformity associated uranium deposit model. Final versions of the hand-drawn interpretations have been scanned, digitised and converted to GIS (MapInfo) format. Figures 6 and 7 have been generated from the GIS interpretation projects.

Interpreted-inferred rock types included in these interpretations are based on the published geology and stratigraphic succession for the region. However, because of the limited outcrop and the interpretive nature of the NTGS digital geology, the reliability of the geological control is questionable. Thus the interpreted lithologies and their stratigraphic associations shown in Figures 6 and 7 should be treated with caution.

The EM data has not been rigorously analysed for the presence of responses typically associated with discrete, high quality (massive sulphide style) bedrock conductors. This would require the systematic examination of customised profiles, concentrating on the late time channel data. Ideally, conductors of this type should be reasonably narrow, have short strike length and distinct, relatively strong signal in the latest channels, especially considering the relatively shallow depth penetration achieved by the RepTEM instrument.

The majority of conductive (anomalous) features seen in the channel amplitude and conductivity-depth slice images are interpreted as a mixture of surfical - regolith derived conductive zones and conductive, stratigraphic units within both the older (Palaeo Proterozoic) basement rocks and the overlying, shallow...
dipping Meso Proterozoic sediments. The series of elongate, northerly trending, comparatively narrow conductive zones within the central section of the survey are interpreted as conductive stratigraphic units within the Palaeo Proterozoic metamorphics (predominantly metasediments and metavolcanics). Likely sources are steeply dipping graphitic and or sulphidic sedimentary horizons within the sequence. Graphitic-sulphidic shear zones could produce similar signatures, but are unlikely to be the source of all the observed conductive zones within this domain. Though no modelling has been attempted, the depth to top of the majority of these conductors seems to be quite shallow; i.e. normal depth of oxidation (≤50m?). Similar but less continuous or coherent conductive zones seen in the interpreted predominantly granitoid basement domain interpreted in the eastern and north-eastern portion of the survey area are thought to be relict or partially assimilated conductive (graphitic-sulphidic) sediments.

Some of the shorter strike length conductive features in either the metamorphic or granitoid domain could represent localized alteration zones. However, similar signatures could be derived from structurally fragmented stratigraphy or xenoliths within the granitoid (migmatite) complex or localized deep oxidation.

The Palaeo Proterozoic metamorphics, including the interpreted conductive sediments discussed above are likely to continue beneath the Meso Proterozoic unconformity crossing the southern section of the survey. The disappearance of the distinct conductivity response below the unconformity is a reflection of the limited depth penetration (~100-150m?) achieved by the EM component of the airborne survey.

The gross conductivity patterns within the sub cropping, Meso Proterozoic sequence underlying the southern and eastern parts of the survey tend to be broad and arcuate, consistent with the south south westerly to west south westerly trending, shallow dipping, sedimentary ± volcanic sequence.

The simple ‘lithological’ subdivision of the stratigraphic units in Figure 6 is based on the apparent conductance of the units.

The magnetics interpretation (Figure 7) is similar in many respects to the EM interpretation. In the central part of the survey, there is a reasonable degree of correlation between specific conductive and magnetic stratigraphic units within the metamorphics. This could indicate that these units / horizons contain significant pyrrhotite contents.

The magnetics data clearly indicates that the northerly striking metamorphic sequence containing the bulk of the conductive (graphitic-sulphidic) horizons continues under the Meso Proterozoic unconformity and overlying sedimentary sequence in the central – southern section of the survey. The effective depth of investigation achieved by the magnetics is not depth constrained to anywhere near the same extent of the EM data.

The interpreted structural patterns shown in Figures 6 and 7 are consistent with a fairly complex and extended deformation history. Major components of this include:

- An early phase of complex faulting (strike slip?) and associated folding within the metamorphics. This strongly influences most of the ‘stratigraphic’ patterns within the Palaeo Proterozoic basement.
- Some of this early deformation, particularly in the eastern part of the area, has been overprinted by the emplacement-development of the granitoids.
There appears to be a later set of upright (normal or block) faults (e.g. north-westerly oriented fault-fracture set) superimposed on the early, strike slip regime. These seem to have affected both the Palaeo Proterozoic and Meso Proterozoic sequences and may have influenced the deposition of the Meso Proterozoic to an extent.

6. TARGET AREAS

Based on the general unconformity uranium mineralization model, the main areas of interest for follow up include:

- The continuation of the conductive Palaeo Proterozoic metasediments beneath the Meso Proterozoic in the southern-central part of the area. These areas have been indicated on the magnetics interpretation plan (Figures 7).
- The conductive Palaeo Proterozoic metasediments north of the mapped – interpreted unconformity. There is a reasonable chance that this area is part of the old unconformity surface, with the Meso Proterozoic rocks stripped off. The radiometrics from the low resolution (400m line spacing) Government radiometrics may be of some value to help identify mineralized zones where the prospective zone outcrops.
- Some of the conductive units (relict stratigraphy) within the granitoids could also be worth checking, particularly those near the present position of the unconformity.

These conductive zones are quite extensive. Other factors that could be significant in localizing possible discrete zones of mineralization include:

- Dilational situations within the interpreted structural regime (from Figures 6 or 7).
- Possible alteration zones along these stratigraphic trends. These could be indicated by demagnetization or enhanced conductivity.

7. CONCLUSIONS & RECOMMENDATIONS

The Brown's Range EM-magnetics survey has been quite successful in identifying and mapping potentially prospective, conductive (graphitic-sulphidic) units within the Palaeo Proterozoic metamorphics and tracing them under the Meso Proterozoic unconformity. Field checking, geological mapping and or shallow drilling is advisable to confirm the nature of the basement lithologies within this interpreted graphitic-sulphidic metasediment – metavolcanic package.

The data set is also amenable to a basic structural analysis. The combination on favourable lithologies and dilational structural situations warrant checking as possible loci for uranium mineralization.

Quantitative modelling of the EM and magnetics data (if possible) could be used to define the depths and dips of the prospective sequence if required. It may also help define drilling positions and parameters, particularly when testing beneath the Meso Proterozoic cover sequence. Ground EM and or magnetics
should be considered if better ground control is required for follow up purposes, or if some of the conductive or magnetic features are directly associated with mineralization.

The available radiometrics data over the area should be reviewed for the presence of subtle uranium derived radiometric anomalies. This data is quite low resolution and could quite easily not detect the response from a small area of mineralization. The radiometrics will not be of much use in the areas of Meso Proterozoic outcrop.

For most of the prospective areas, surface mapping, sampling and radiometrics, followed by drilling, seems the logical initial exploration approach for further assessing the uranium potential of the areas that are considered prospective based on the general unconformity uranium model.

The interpreted graphitic-sulphidic Palaeo Proterozoic metasedimentary – metavolcanic sequence in the central part of the survey area may have significant base metal ± precious metal potential, using the Rum Jungle area as a guide.
Conductivity/resistivity contact

Inferred Proterozoic Unconformity

Inferred mylonite, fracture or alteration zone

Inferred fold axes [antiformal or synformal]

Isolated Conductivity high. Noise/culture

Conductivity/resistivity trend or minor unit. Stratigraphy or drainage

Inferred minor fault or fracture zone Tenements

Weakly conductive unit within the MarFarlane Peak Group succession. Probably graphitic-sulphidic metasediments

Strongly conductive unit within the MacFarlane Peak Group succession. Probably graphitic-sulphidic metasediments

Inferred major fault of fracture zone. Hatching indicates inferred dip direction

Moderately conductive unit within the MacFarlane Peak Group succession. Probably graphitic-sulphidic metasediments

Unassigned conductive unit or zone

Inferred secondary fault or fracture zone

Undifferentiated, non to weakly conductive, weakly deformed Palaeo- and Meso-Proterozoic sediments. Predominantly Gardiner Sandstone (Birrindudu Group), possibly locally overlying Killi-Killi Beds (Tanami Group)

Undifferentiated, weakly to moderately conductive Palaeo and Meso-Proterozoic sediments. Predominantly Gardiner Sandstone (Birrindudu Group), possibly locally overlying Killi-Killi Beds (Tanami Group)

Inferred weakly to moderately conductive xenoliths of MacFarlane Peak Group lithologies

Inferred, undifferentiated Palaeoproterozoic granitoids. Non conductive

Inferred, intermixed granitoids and relict MacFarlane Peak Group

Undifferentiated, moderately to strongly conductive Meso-Proterozoic sediments. Predominantly Gardiner Sandstone (Birrindudu Group), possibly locally overlying Killi-Killi Beds (Tanami Group)

Undifferentiated, weakly to non conductive MacFarlane Peak Group sediments and volcanics
Moderately magnetic unit within the MacFarlane Peak Group succession.
Possible magnetite ± pyrrhotite B.I.F., dolerite or magnetic volcanic.
Weakly magnetic unit within the MacFarlane Peak Group succession.
Possible metasediments or meta-volcanics.
Inferred fold axes [antiformal or synform]
Magnetic trend or minor magnetic unit.
Stratigraphy or drainage?
Inferred major fault or fracture zone.
Hatching indicates inferred dip direction
Inferred secondary fault or fracture zone.
Inferred mylonite, fracture or alteration zone
Inferred minor fault or fracture zone
Inferred proterozoic unconformity. Mostly from EM data.
Moderately magnetic unit within the MacFarlane Peak Group succession.
Metasediments or meta-volcanics.
Inferred wealky to moderately magnetic xenoliths of MacFarlane Peak Group lithologies.
Undifferentiated, weakly to non magnetic MacFarlane Peak Group metasediments and volcanics.
Strongly magnetic unit within the MacFarlane Peak Group succession.
Possible magnetite ± pyrrhotite B.I.F., dolerite or magnetic volcanic.
Possible weakly to moderately magnetic phase of the Palaeoproterozoic granitoids.
Inferred, non magnetic local intrusive or alteration (demagnetization) zone.
Inferred, possible magnetic local intrusive or alteration zone.
Inferred, intermixed granitoids + relict MacFarlane Peak Group.
Undifferentiated, non to weakly magnetic Palaeoproterozoic basement.
Predominatly granitiods ± Tanami and MacFarlane Peak Group lithologies.
Commonly below flat lying Mesoproterozoic (and younger) sediments.
Inferred weakly to moderately magnetic xenoliths of MacFarlane Peak Group lithologies.