TANAMI JOINT VENTURE

ZAPOPAN NL
KUMAGAI GUMI CO LTD
KINTARO METALS PTY LTD

EXPLORATION LICENCE 5418

TANAMI REGION
NORTHERN TERRITORY

FIRST ANNUAL REPORT - 1990

TANAMI 1:250,000 SHEET SE 52-15
THE GRANITES 1:250,000 SHEET SF 52-3
MT SOLITAIRE 1:250,000 SHEET SF 52-4

MAY 1990
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1. SUMMARY

Exploration undertaken in the first year of the licence comprised data acquisition and interpretation. Airborne magnetic data suggest that Lower Proterozoic magnetic rocks form only a small portion of the licence area with granite forming most of the rest. Selected targets will be sampled with a helicopter-borne programme in the second year.
2. INTRODUCTION

Exploration Licence 5418 was granted on 3 May 1989 to Harlock Pty Ltd. A 50% interest was subsequently transferred to Zapopan NL. Harlock holds its interest in trust on behalf of Kumagai Gumi Co Ltd (30%) "Kumagai" and Kintaro Metals Pty Ltd (20%) "Kintaro". Zapopan, Kumagai and Kintaro comprise the Tanami Joint Venture "TJV".

The EL is situated 40km - 80km east of Rabbit Flat and 20km-70km NNE of The Granites gold mine, and covers an area of 1594sq km, equivalent to 495 blocks.

There are no access roads into the area, the nearest access being the roads from The Granites to Rabbit Flat or The Granites to Mt Davidson Outstation.

The area is generally covered by sandplains, with a monotonous cover of spinifex and small shrubs, with a few low rises and pediments covered by iron-rich rubble and weathered rock. Red earth plains comprising recent alluvial and colluvial material are often covered with thick mulga scrub. A large west trending floodout occurs to the south of the licence area and few sanddunes are present along the northern boundary.

The EL lies totally on Aboriginal land within the Central Desert Land Trust area.

This report details work carried out in the first year of the licence.
Figure 2

EL 5418
495 blocks
1594 sq. km.

TANAMI JOINT VENTURE
EXPLORATION LICENCE 5418

Scale 1:250,000
Compiled: C.S.M.
Date:
3. PREVIOUS WORK

EL5418 has had very little geological work completed on it and has no history of modern exploration. The following is a brief description of some of the previous work carried out in the region.

1900 A prospecting expedition led by Davidson (1905) discovered gold at Tanami and The Granites. The party crossed the Mt Solitaire Sheet area and recorded outcrops of metamorphosed sediments and granite. Traces of gold and pyrite were found in the western part of the Mt Solitaire sheet. The exact location is not known.

1962 BMR carried out an airborne magnetic and radiometric survey of The Granites and Tanami Sheet areas (Spence, 1964; BMR, 1965a, 1965b).


1971 BMR geologically mapped the Tanami Sheet (Hodgson, 1975).

4. GEOLOGY

The Lower Proterozoic Mt Charles Beds (Blake et al, 1975) crop out sporadically in EL5418 forming low rubbly mounds and ridges. This unit, when exposed, comprises ferruginous quartzite.

The majority of EL5418 is underlain by granite from interpretation of the airborne magnetic data.

Cambrian-age dolomite crops out in the northwest corners of the Mt Solitaire Sheet and is continuous with the Montejinni Limestone and Hooker Creek Formation of the adjoining Tanami East Sheet. Sandstone and claystone of the Lothari Hill Sandstone overlie the dolomites.

A veneer of Cainozoic sediments covers most of the area and reduces outcrop to small, low areas of generally weathered rock. These sediments include areas of silcrete, ferricrete, gravel, calcrete, lacustrine clays, alluvium, colluvium and aeolian sand. The latter covers most of the EL and forms dunes to the north.

The area forms part of an old land surface in an advanced stage of planation known as the Tennant Creek surface (Hays, 1967).

The landforms in the area are typical of an arid environment with relics from a wetter tropical period.

Appendix I describes some of the landforms and regolith geology found in The Granites - Tanami region.
5. EXPLORATION COMPLETED

5.1 Data acquisition and interpretation

All relevant open-file, geological, geophysical and historical data for the region have been obtained. These data include the regional airborne magnetic survey compiled by the Northern Territory Geological Survey for the Ptilotus and Davidson 1:100,000 sheets. The portion of EL5418 falling on the Tanami 1:250,000 Sheet area was covered by an airborne magnetic survey completed by the TJV.

Colour aerial photography at 1:50,000 scale was flown by AiResearch Mapping Pty Ltd on behalf of the TJV over all their exploration areas including EL5418. These photographs are being used to interpret relevant landforms, outcrop extent, drainage, lineaments etc to assist in target selection for initial exploration sampling.

Landsat images at 1:250,000 scale and black and white NASA photography covering The Granites - Tanami region were purchased and used to assist in target selection.

All available data are thus being utilized to assist in preparation and target selection. The prospectivity of the area will be based on four parameters: aeromagnetics, geology, structure and landforms. Areas with a high priority for initial sampling will contain all four parameters.
5.2 Geophysics

The open-file airborne magnetic data for the Ptilotus and Davidson 1:100,000 Sheets have been purchased and interpreted to assist in target selection (see Figure 3 and 4).

The portion of EL5418 which falls on the Tanami 1:250,000 Sheet has been covered by an airborne magnetic survey flown by Geoterrerex Pty Ltd on behalf of the TJV (see Figure 5).

Both data sets (NTGS and TJV) were merged and image processed by Geoimage Pty Ltd of Brisbane. A report by Geoimage is appended (Appendix II).

The specifications for the TJV airborne magnetic survey are as follows:-

**AIRBORNE SURVEY SPECIFICATIONS**

**Magnetometer:**
Cesium Vapour optical absorption. Sensitivity: 0.04 nT

**Reading Interval:**
0.2 sec (approx 13m sampling) at mean ground speed of 220km/hour

**Spectrometer:**
Nuclear Data 256 channel ADC Volume: 33.5 litres

**Total Count Window:**
0.8 - 3.00 MeV

**Potassium Window:**
1.36 - 1.56 MeV

**Uranium Window:**
1.66 - 1.86 MeV

**Thorium Window:**
2.42 - 2.82 MeV

**Recording Interval:**
1.0 sec (approx 60m sampling) at mean ground speed of 220km/hour

**Data Recording:**
Geoterrerex MADACS acquisition system.
Digital to magnetic tape.
NOMINAL TERRAIN CLEARANCE: Both detectors in aircraft at 90m
NOMINAL LINE SPACING: Traverse lines at 500 metres
FLIGHT PATH NAVIGATION: Tie lines 5km
SYLEDIS STR4 radio navigation system
FLIGHT PATH RECORD: Real time calculation of AMG co-ordinates from the SYLEDIS STR4 navigation system.

RESIDUAL MAGNETIC CONTOURS
Grid notation refers to Australian Map Grid Zone 51
Magnetics : Tie line levelled
IGRF (1985) : Removed, Datum 2000 nT added
Grid mesh size : 100 x 100 metres
Grid filter : None
Contour interval : 2, 20 and 100 nT
### 6. EXPENDITURE

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**Total**                                              **$51111-21**
7. **FORWARD PROGRAMME**

In 1990/91 it is proposed to carry out initial geochemical sampling programmes across targets derived from interpreting all the relevant data acquired in the first year of the licence. Prior to this, an aboriginal sacred site survey will be carried out.

Estimate costs are as follows:

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<td><strong>TOTAL</strong></td>
<td><strong>$ 15000</strong></td>
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An expenditure commitment of $15000 is requested for 1990/91.
REFERENCES


APPENDIX I

TANAMI-GRANITES REGION LANDFORMS
TANAMI - GRANITES AREA LANDFORMS

EROSIONAL LANDFORM

Unit 1. Low rises of outcrop and small rounded hills.
Low rises above the sand covered pediplain that are generally mottled
zone or saprolite with a thin veneer of piscolitic/nodular laterite and/or
quartz and ironstone lag after the degradation of lateritic duricrust.

Unit 2. Etched laterite plateau/uplands and breakaways.
Discontinuous piscolitic/nodular duricrust on mottled zone exposed by
erosion. The duricrust can be cemented or loose. Surficial silicification
is common. Commonly locally obscured by soil or aeolian sand.

Unit 3. Outcropping areas.
Areas where there is a >70% exposure of recognizable bedrock. Occurs as
ranges of dissected hills with a well developed drainage pattern. Rare
lateritic duricrust preserved. Local areas with a semi residual soil
development.

Unit 4. Pediplains
Pediplains with semi residual red earthy soils and belts of thick
vegetation. Sheet washed in places.

DEPOSITIONAL LANDFORMS

Unit 5. Alluvial and aeolian covered pedimented slopes and plains.
Gently sloping and flat plains covered by brown red aeolian sand and
alluvial sandy soils with a lateritic debris lag. Abundant spinifex and
low scrub vegetation. Cover generally attains a maximum thickness of 5m.
Often overlays a residual laterite duricrust.
Unit 6. Colluvial outwash plains
Slopes away from outcrop with a sandy soil and often a well developed lag that decreases in size away from outcrop. Can cover a laterite duricrust.

Unit 7 Linear playa drainage lines
Linear areas commonly with playa lakes that are calcrete, silcrete, sand and sediment filled depressions that formed in paleodrainage channels. Often thick vegetation.

Unit 8 Clay filled drainage sumps
Grey brown cracking clays of the montmorillonite family and claypans.

Unit 9. (a) Alluvium plain – upper tributary
(b) Alluvium plain – lower tributary
(c) Alluvium floor in valley tract – braided wash areas
LANDFORM

UNIT 3
Outcropping areas

UNIT 6
Coluvial outwash plains

UNIT 5
Alluvial and esolian covered pedimented slopes and plains

UNIT 1
Low rises of outcrop and small rounded hills

UNIT 2
Etched laterite plains, uplands and breakaways

UNIT 7
Linear playo drainages lines

LEGEND
Drill to lateritic duricrust / saprolite

REGIONAL GEOCHEMICAL EXPLORATION TECHNIQUE

Laterite / Quartz / Ironstone Log
Laterite Duricrust
Ferricrete
Ferruginous Colluvium
Lateritic Edition
Saprolite
Ore Zone
Saprolite
Lateritic Duricrust
Acidian Sand
Laterite
Log
Colluvium
Acidian Sand
Marine Zone
Ironstone Bonds
Colluvium
Ore Zone
Saprolite
Laterite Duricrust
Acidian Sand
Laterite
Log
Colluvium

Client:

Scale: 1:10,000
Compiled: J. K. Butler
Drawn: C. S. G.
Date: April 89

TANAMI—GRANITES AREA
Preliminary Diagrammatic Representation of Regolith Geology and Landform Relationships
APPENDIX II

Processing of Airborne Geophysics

of the

Granites - Tanami area

for the

Tanami Joint Venture

by

GEOIMAGE PTY LTD
PROCESSING

of

AIRBORNE GEOPHYSICS

of the

GRANITES-TANAMI AREA

for the

TANAMI JOINT VENTURE

R.N. Walker
SEPTEMBER 1989
INTRODUCTION

Under instructions from Mr P. Nicholson of Eupene Exploration Enterprises, airborne geophysical surveys over the Granites-Tanami area covering exploration areas held by the Tanami Joint Venture have been processed. The work involved:

- reading data off a number of located data tapes
- gridding the data at 20 metres cell size over the Tanami mine area and 50 metres cell size over the full area for the following parameters
  - magnetics
  - vertical derivative
  - vertical derivative with automatic gain (mine area only)
  - radiometrics
- processing and photography of the above files
Flight line data from several surveys flown for various companies including the NT Geological Survey, BHP, North Flinders and the Tanami JV, were processed. Other than a constant flight line spacing of 500 metres, the specifications for these surveys varied. The North Flinders surveys on the Frankenia and Ptilotus 1:100 000 sheets were flown E-W whereas the remaining areas were flown N-S.

Two major problems were encountered with the gridding-

1. Individual surveys had completely different radiometric responses and this problem was overcome as much as possible by gridding the individual surveys and matching the statistics either over the overlap areas or over the full area.

2. In the case of the vertical derivative (VD), problems were encountered because the original flight lines were separated into individual 1:100 000 sheets. Because of the technique used to calculate VD’s, the responses at the end of the lines differed and resulted in apparent E-W discontinuities where survey or line segments met.

The final grids for the area were

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for magnetics, vertical derivative (VD) and radiometrics. The VD image file was then used to derive shade images at various sun azimuth angles.
Appendix 1 contains output from runs converting the real grid files to byte files.

The magnetics, VD and VDG data were gridded using a minimum curvature algorithm, whereas the radiometrics were gridded using a bicubic spline algorithm.

The VD and VDG were processed on the flight line data using an along line 31 point FFT derived filter. A description of the methodology is attached as Appendix 2.
LIST OF SLIDES

TANAMI REGIONAL DATA - FULL AREA

1. Greyscale magnetics.
2. Rainbow pseudocoloured magnetics multiplied by a vertical illumination.
4. Rainbow pseudocoloured vertical derivative multiplied by a vertical illumination on the vertical derivative.
5. Greyscale 00 azimuth 26 degree altitude shade illumination on the magnetics.
6. Rainbow pseudocoloured magnetics multiplied by a 00 azimuth 26 degree altitude shade illumination on the vertical derivative.
7. Greyscale 45 azimuth 26 degree altitude shade illumination on the magnetics.
8. Rainbow pseudocoloured magnetics multiplied by a 45 azimuth 26 degree altitude shade illumination on the vertical derivative.
9. Greyscale 90 azimuth 26 degree altitude shade illumination on the magnetics.
10. Rainbow pseudocoloured magnetics multiplied by a 90 azimuth 26 degree altitude shade illumination on the vertical derivative.
11. Greyscale 135 azimuth 26 degree altitude shade illumination on the magnetics.
12. Rainbow pseudocoloured magnetics multiplied by a 135 azimuth 26 degree altitude shade illumination on the vertical derivative.
13. Radiometric colour composite.
    Potassium in red, thorium in green, uranium in blue.
LIST OF SLIDES

TANAMI REGIONAL DATA - MOUNT SOLITAIRE

Subsampled 4007 521 1480 1024 2 2 (for magnetics)
Subsampled 2063 261 1480 1024 2 2 (for radiometrics)

MTS1. Greyscale magnetics.

MTS2. Rainbow pseudocoloured magnetics multiplied by a vertical illumination.


MTS4. Rainbow pseudocoloured vertical derivative multiplied by a vertical illumination on the vertical derivative.

MTS5. Greyscale 00 azimuth 26 degree altitude shade illumination on the magnetics.

MTS6. Rainbow pseudocoloured magnetics multiplied by a 00 azimuth 26 degree altitude shade illumination on the vertical derivative.

MTS7. Greyscale 45 azimuth 26 degree altitude shade illumination on the magnetics.

MTS8. Rainbow pseudocoloured magnetics multiplied by a 45 azimuth 26 degree altitude shade illumination on the vertical derivative.

MTS9. Greyscale 90 azimuth 26 degree altitude shade illumination on the magnetics.

MTS10. Rainbow pseudocoloured magnetics multiplied by a 90 azimuth 26 degree altitude shade illumination on the vertical derivative.

MTS11. Greyscale 135 azimuth 26 degree altitude shade illumination on the magnetics.

MTS12. Rainbow pseudocoloured magnetics multiplied by a 135 azimuth 26 degree altitude shade illumination on the vertical derivative.


MTS14. Radiometric colour composite with gradient defined by 0 azimuth 26 altitude shade on the magnetics.

MTS15. Greyscale potassium / thorium ratio.
APPENDIX 1 - REAL TO BYTE CONVERSION RUNS (ctd)

Tanami Regional Data - Full Area
Magnetics

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Tanami Regional Data - Full Area
Radiometrics (TC, K, U, Th)

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## APPENDIX 1 - REAL TO BYTE CONVERSION RUNS (ctd)

Tanami Regional Data - Full Area
Potassium / Thorium Ratio

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APPENDIX 2 - VERTICAL DERIVATIVES

Vertical derivatives are used to improve the resolution of small scale anomalies caused by near surface magnetic sources, and to suppress the longer wavelength anomalies resulting from deeper sources. Derivatives can be calculated using a one dimensional operator and this is usually done on the original flight line data prior to gridding, or using a two dimensional operator on the grid file.

One dimensional operators tend to suppress local anomaly trends which parallel or near-parallel the flight line direction. This however can also be an advantage of the one-dimensional operator in that on poorly levelled data it will suppress or even remove artefacts caused by poor levelling.

In image products produced from vertical derivative grids, the usual distribution of data is such that the major anomalies will be very obvious however the weaker trends in the less magnetic units will tend to fall around a greyscale value of 127 and be difficult to see. This can be overcome using the technique of "Automatic Gain Control" (AGC) as suggested by S. Rajagopalan (Conference Volume, 5th ASEG Conference, 1987). In this technique, the vertical derivative is calculated along the flight line and the relative amplitude of each data point is adjusted by dividing by the gain in a window around the data point. The gain is defined as the inverse of the root mean square of the original data values in the window.

The result of the vertical derivative with AGC is to emphasise small anomalies in low gradient areas while suppressing high amplitude anomalies in high gradient areas.

Geoimage routinely carries out vertical derivative and vertical derivative with AGC operations on the original flight line data prior to gridding.