T A N A M I J O I N T V E N T U R E

ZAPOPAN NL

KUMAGAI GUMI CO LTD

KINTARO METALS PTY LTD

EXPLORATION LICENCE 5420

MT SOLITAIRE

GRANITES - TANAMI REGION

NORTHERN TERRITORY

FIRST ANNUAL REPORT - 1990

MT SOLITAIRE 1:250,000 SHEET SF52-4

MAY 1990

18 JUN 1990
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1. SUMMARY

Exploration undertaken in the first year of the licence comprised data acquisition and interpretation. Airborne magnetic data flown by the TJV show that EL5420 contains a large area of magnetic rocks interpreted as belonging to the Lander Rock Beds (equivalent of Mt Charles Beds) of Lower Proterozoic age. These highly prospective rocks have not been subjected to modern exploration. First-pass reconnaissance geochemical sampling across the magnetic zones is proposed for the second year of the licence.

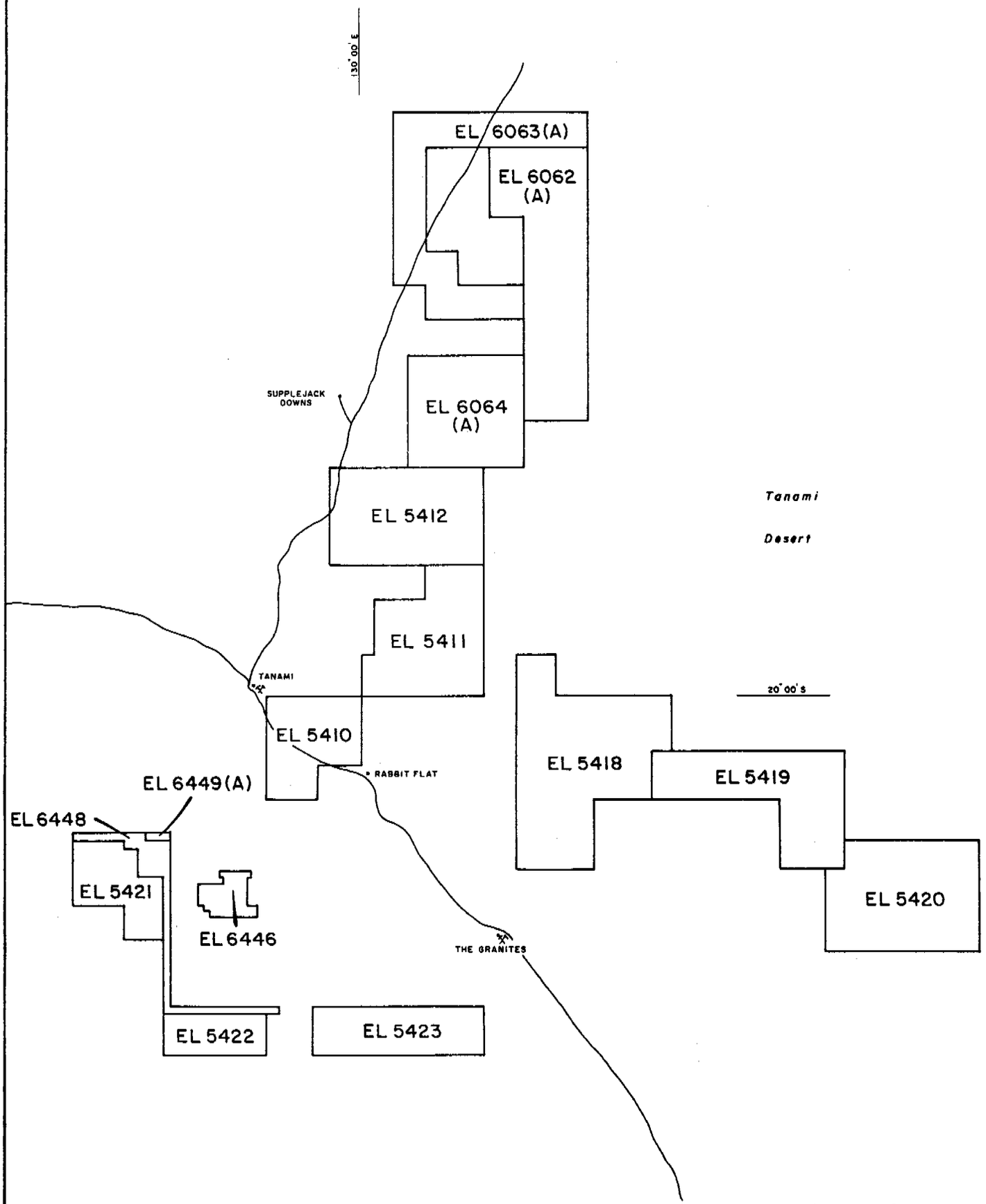

Figure 1

TANAMI JOINT VENTURE		
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TENEMENTS		

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2. INTRODUCTION

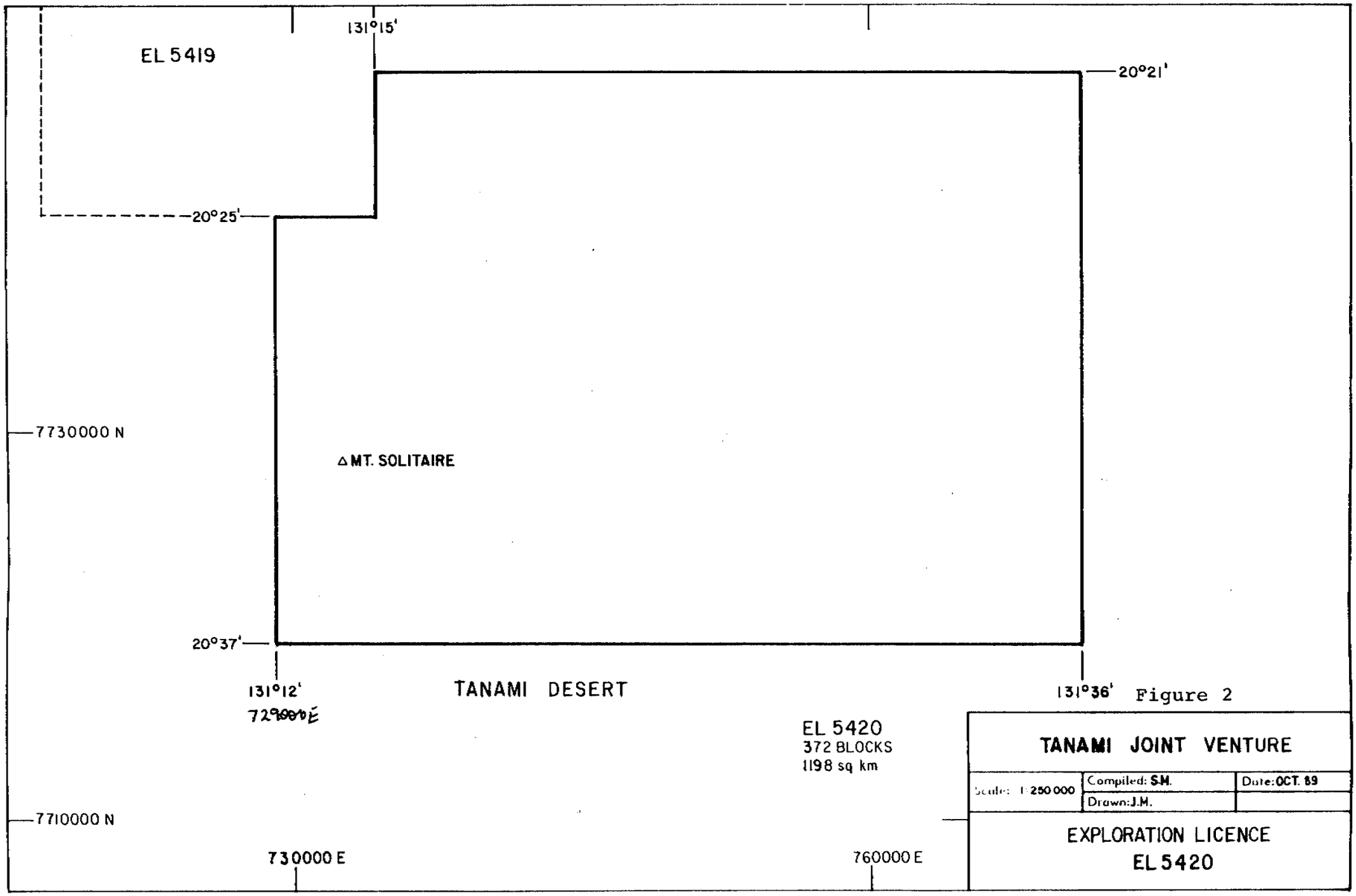
Exploration Licence 5420 was granted on 3 May 1989 to Harlock Pty Ltd. A 50% interest was subsequently transfered to Zapopan NL. Harlock's interest is held in trust on behalf of Kumagai Gumi Co Ltd (30%) "Kumagai" and Kintaro Metals Pty Ltd (20%) "Kintaro". Zapopan, Kumagai and Kintaro comprise the Tanami Joint Venture "TJV".

The EL covers an area of 1198sq km, equivalent to 372 blocks, and is located approximately 90 - 130km east of The Granites gold mine. There are no access roads into the area, the nearest road being at Mt Davidson Outstation, 30km west of the licence area.

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

The area is predominantly a sandplain with scattered low rises and pediments, red earth plains and quartz ridges.

This report details exploration carried out in the first year of the licence.


EL 5419
131°15'
20°21'
20°25'
7730000 N
△ MT. SOLITAIRE
20°37'
131°12'
729000E
TANAMI DESERT
131°36'
EL 5420
372 BLOCKS
1198 sq km
7710000 N
730000 E
760000 E
TANAMI JOINT VENTURE
Scale: 1:250 000
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Date: OCT. 89
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EXPLORATION LICENCE
EL 5420

Figure 2

3. PREVIOUS WORK

EL5420 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	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 now known.
1962	BMR carried out an airborne magnetic on radiometric survey of The Granites and Tanami Sheet area (Spence, 1964; BMR, 1965a, 1965b).
1965	BMR conducted a helicopter gravity survey of the Mt Solitaire sheet (Flavelle, 1965). Photo-interpretation of the Sheet area by BMR (Rivereau and Perry, 1965) preceded a reconnaissance geological survey (Milligan et al, 1966).
1967	BMR carried out a reconnaissance gravity survey of The Granites Sheet (Whitworth, 1970).
1971 - 1979	BMR carried out several geological investigations in The Granites - Tanami area (Blake, 1974, 1975, 1978; Blake and Hodgson, 1976; Blake et al, 1973, 1975, 1979; Page et al, 1976).
1975	BMR geologically mapped the Mt Solitaire Sheet area (Offe and Kennewell, 1978).

4. GEOLOGY

EL5420 is predominantly covered by sandplains with scattered low rises and pediments, red earth plains, and quartz ridges.

Interpretation of airborne magnetic data suggests that up to 35% of the licence underlain by magnetic rocks of the Lander Rock Beds of Lower Proterozoic age. These rocks are the equivalent of the Mt Charles Beds, host to gold mineralization at Tanami and The Granites. They have been metamorphosed and folded and form steeply dipping biotite-muscovite phyllite and schist, sandy schist and minor gneiss.

Granite crops out as low rounded hills and pavements, and ranges from porphyritic to non-porphyritic and gneissic to strongly foliated. Quartz-muscovite-tourmaline pegmatites occur in the north-east part of the licence.

Northwest-trending quartz ridges of assumed Lower Proterozoic age occur in the central part of the licence and also form the prominent Mt Solitaire in the south-west part of the licence. The quartz infills major fractures which cut the area.

A veneer of Cainozoic sediments restricts most outcrop to small low areas of generally weathered rock. These sediments include areas of silcrete, ferricrete, gravel, calcrete, lacustrine clays, red soils, alluvium, colluvium and aeolian sand. The latter forms a few dunes in the northeast part of the licence. The area forms part of an old land surface in an advanced stage of planation known as the Tennant Creek surface (Hays, 1967).

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 all the open-file airborne magnetic data compiled by the NTGS for The Granites 1:250,000 and part of Mt Solitaire 1:250,000 sheet.

The TJV has flown a comprehensive airborne magnetic survey of its own across six exploration licences including EL5420 (see section 5.2).

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 EL5420. These photographs are being used to interpret relevant landforms, outcrop extent, drainage lineaments etc to assist in target selection of 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

All the open-file airborne magnetic data for The Granites and Mt Solitaire sheets have been purchased and interpreted to assist in target selection and regional interpretation.

EL5420, which was not covered by the NTGS data has been covered by an airborne magnetic survey flown by Geoterrex Pty Ltd on behalf of the TJV (see figure 3).

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

The specification of 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:	Geoterrex MADACS acquisition system. Digital to magnetic tape.

NOMINAL TERRAIN CLEARANCE:	Both detectors in aircraft at 90m
NOMINAL LINE SPACING:	Traverse lines at 500 metres Tie lines 5km
FLIGHT PATH NAVIGATION:	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

The airborne magnetic contours for EL5411 at 1:50,000 scale are attached (Figure 4). TJV's airborne magnetic data plus the NTGS open-file data were merged and image processed by Geoimage Pty Ltd of Brisbane. A report by Geoimage is appended (Appendix IV).

6. EXPENDITURE

	$
Aerial Photography	4500-00
Aircraft hire	1161-00
Drafting etc	98-00
Geological Consultants	6199-70
Geophysics	45036-05
Helicopter hire	3598-40
Land Council	9206-89
Legal Costs	2320-69
Salaries and wages	345-00
Surveying	2117-34
Travel and accommodation	618-00
Tenement - maintenance and rents	1960-00
Administration costs	7716-11
TOTAL	$84877-18

7. FORWARD PROGRAMME

In 1990/91 it is proposed to carry out initial geochemical sampling programmes across various target zones 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 across the whole of the EL.

Estimated costs are as follows:-

Helicopter hire	$ 15000
Land Councils	$ 2000
Salaries and wages	$ 12000
Consumables, messing, vehicles etc	$ 2000
Geochemistry, assaying	$ 8000
Drafting, printing	$ 1000
	$ 40000

A commitment of $40,000 is requested for 1990/91.

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A P P E N D I X 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 pisolitic/nodular laterite and/or quartz and ironstone lag after the degradation of lateritic duricrust.

Unit 2. Etched laterite plateau/uplands and breakaways.
Discontinuous pisolitic/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

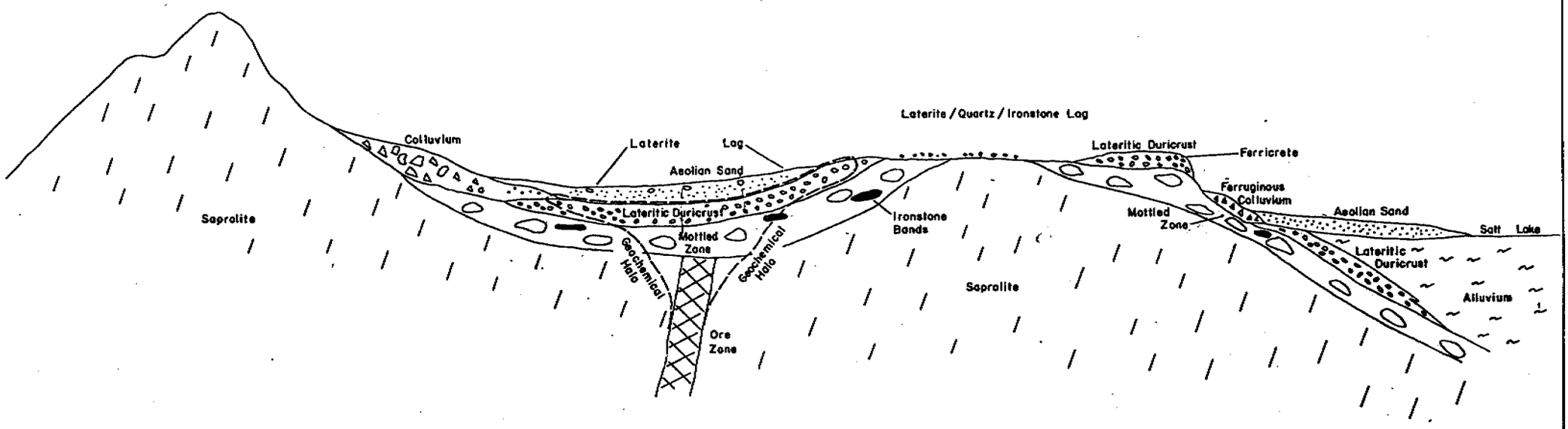
Grey brown cracking clays of the montmorillonite family and claypans.

Unit 9. (a) *Alluvium plain* - upper tributary

(b) *Alluvium plain* - lower tributary

(c) *Alluvium floor in valley tract* - braided wash areas

LANDFORM	UNIT 3	UNIT 6	UNIT 5	UNIT 1	UNIT 2	UNIT 7
	Outcropping areas	Colluvial outwash plains	Alluvial and aeolian covered pedimented slopes and plains	Low rises of outcrop and small rounded hills	Etched laterite plateau / uplands and breakaways	Linear playa drainage lines
REGIONAL GEOCHEMICAL EXPLORATION TECHNIQUE	B L E G stream and/or soil sampling	Drill to lateritic / duricrust / saprolite	(a) Surficial laterite sampling (b) Drilling through cover to lateritic duricrust	(a) Laterite lag sampling (b) Composite BLEG soil sampling	Laterite sampling	Drill to lateritic duricrust / saprolite



aupene exploration enterprises

Client :

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	Drawn: C. S. D. S.	

TANAMI — GRANITES AREA

Preliminary Diagrammatic Representation of Regolith Geology and Landform Relationships

A P P E N D I X I I

Processing of Airborne Geophysics

of the

Granites - Tanami area

for the

Tanami Joint Venture

by

GEOIMAGE PTY LTD

GEOIMAGE
SPECIALISTS IN IMAGE PROCESSING AND REMOTE SENSING APPLICATIONS

PROCESSING

of

AIRBORNE GEOPHYSICS

of the

GRANITES-TANAMI AREA

for the

TANAMI JOINT VENTURE

R.N. Walker

SEPTEMBER 1989

GEOIMAGE PTY LTD
19 Carnaby Street, MacGregor, Qld. 4109 Australia, P.O. Box 395 Upper Mt Gravatt, Qld. 4122
Telephone: (07) 343 2194 Fax: (07) 343 7974

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

PROCESSING (ctd)

Tanami Regional Data

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

BLHC	498 000 E, 7 691 800 N
Samples	5492
Lines	3140
Sample size	50 metres

for magnetics, vertical derivative (VD) and radiometrics. The VD image file was then used to derive shade images at various sun azimuth angles.

PROCESSING (ctd)

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.
3. Greyscale vertical derivative.
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.
14. Greyscale potassium / thorium ratio.

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.

MTS3. Greyscale vertical derivative.

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.

MTS13. Radiometric colour composite.
Potassium in red, thorium in green, uranium in blue.

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

BYTE VALUE	REAL VALUES
1	723.69
16	1203.37
32	1357.29
48	1419.76
64	1457.71
80	1488.85
96	1523.53
112	1571.46
128	1625.21
144	1682.62
160	1743.96
176	1818.22
192	1915.36
208	2044.61
224	2261.82
240	2492.07
256	4183.97

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

BYTE VALUE	REAL VALUES			
1	-19.26	-0.37	-0.51	12.57
16	217.55	12.78	7.21	22.08
32	352.87	19.68	10.77	26.89
48	445.75	25.70	13.56	31.03
64	513.73	31.54	16.27	35.04
80	597.03	37.07	18.85	39.05
96	763.31	42.78	21.41	43.06
112	1018.64	48.73	23.95	47.51
128	1175.35	55.19	26.55	52.74
144	1299.50	62.51	29.20	58.91
160	1454.61	70.96	32.03	66.71
176	1654.08	81.09	35.09	76.92
192	1891.86	93.20	38.40	90.29
208	2154.84	107.02	41.90	105.55
224	2426.77	122.12	45.55	122.86
240	2688.36	139.49	48.96	139.12
256	5795.80	229.87	75.86	302.07

APPENDIX 1 - REAL TO BYTE CONVERSION RUNS (ctd)

Tanami Regional Data - Full Area
Potassium / Thorium Ratio

BYTE VALUE	REAL VALUES
1	-0.13
16	1.43
32	3.09
48	4.75
64	6.41
80	8.08
96	9.74
112	11.40
128	13.06
144	14.73
160	16.39
176	18.05
192	19.71
208	21.38
224	23.04
240	31.66
256	1610.00

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. Rajagoplan (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.

AIRBORNE SURVEY SPECIFICATIONS

MAGNETOMETER	Geosystems GSM-19 Overhauser
RECORDING INTERVAL	Sensitivity: 0.01 nT 0.2 sec (approx. 1.5m separation) Data recorded digitally on magnetic tape
SPECTrometer	Ch.1 and Ch.2 TC Counters Ch.3 and Ch.4 Ratemeter ADC
TOTAL COUNT WINDOW	0.4 - 3.0 MeV
POTASSIUM WINDOW	1.37 - 1.57 MeV
URANIUM WINDOW	1.66 - 2.26 MeV
THORIUM WINDOW	2.41 - 2.81 MeV
RECORDING INTERVAL	1.0 sec
DATA RECORDING	Data recorded digitally on magnetic tape using a Geometrics MICROLOG acquisition system
NOMINAL TERRAIN CLEARANCE	60 metres (200 feet)
NOMINAL LINE SPACING	Flight direction 0° (grid) at 204° (magnetic) line at 300 metres
FLIGHT PATH NAVIGATION	Visual navigation
FLIGHT PATH RECORD	0°-2.00 R.M. radio navigation system Real time computation of NAD coordinates from the CODAR DRN navigation system

RESIDUAL MAGNETIC CONTOURS

Grid reference refers to Australian Map Grid Zone 51
Spheroid: Australian National 1965
Datum: Geodetic datum 2000 (7 parameter)
Grid origin: 100 km W, 1000 km S
Grid origin: 100 km W, 1000 km S
Contour interval: 0.5 gamma (nT)

AIRBORNE SURVEY SPECIFICATIONS

RESIDUAL MAGNETIC CONTOURS

CR90/393

MT SOLITAIRE
RESIDUAL MAGNETIC CONTOURS
SHEET 3 OF 3

EL5420
Figure 3