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**ANNUAL REPORT FOR**  
**MCCs 56 AND MLCs 18 & 339-342**  
**FOR THE YEAR ENDING 25 MARCH 1999**  
**EXTENSION REPORTING GROUP**

**EXTENSION LEASES**

**TENNANT CREEK 1:250,000 MAP SHEET NO SE53-14**

**VOLUME 1 OF 1**

**AUTHOR:**

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EXPLORATION GEOLOGIST

**DATE:**

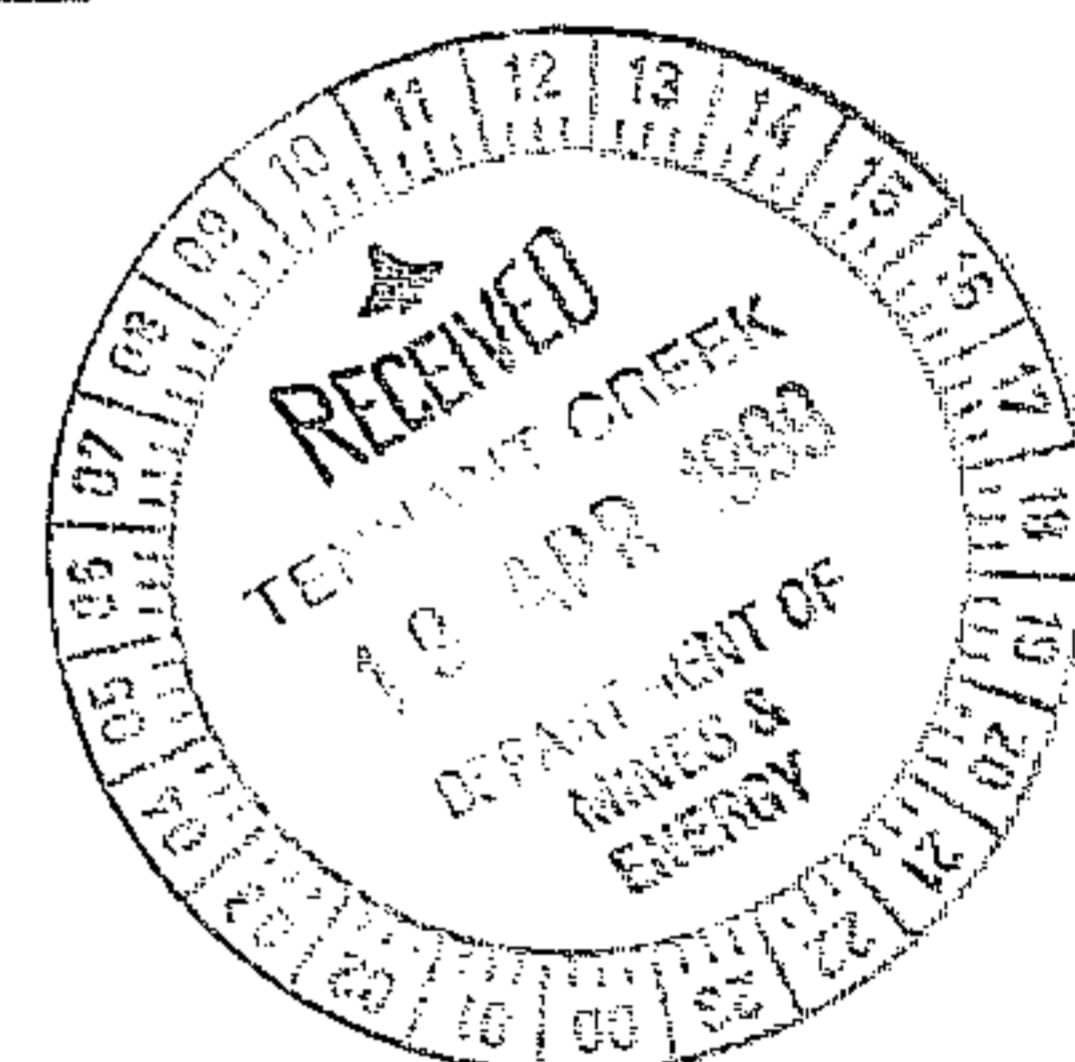
APRIL 1999

**AUTHORISED BY:**

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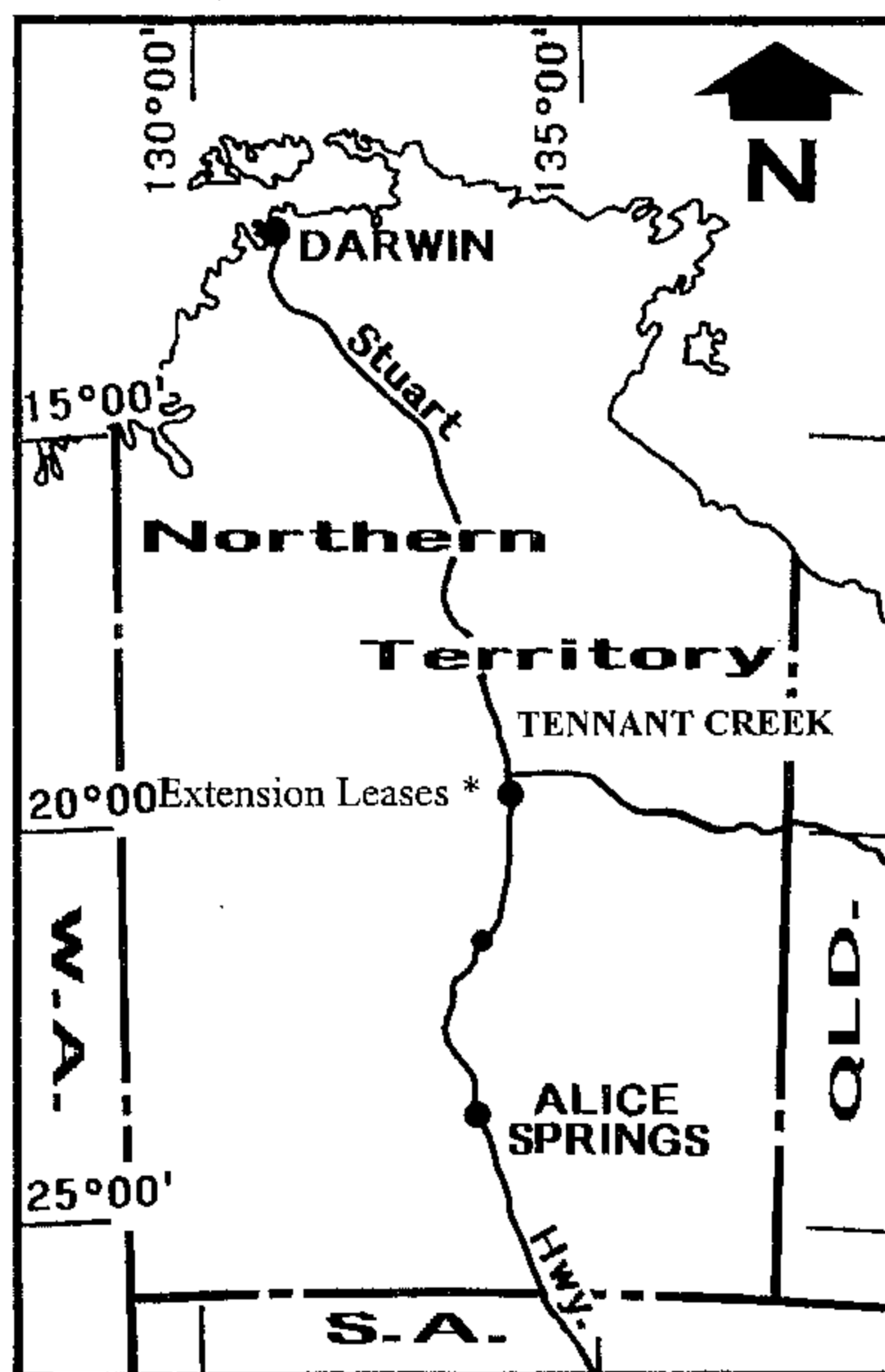
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## SUMMARY

**REPORT NO:** TENNANT CREEK: 99025 ADELAIDE: 23907  
**TITLE:** ANNUAL REPORT FOR MCCs 56 AND MLCs 18 & 339-342 FOR THE YEAR ENDING 25 MARCH 1999, EXTENSION REPORTING GROUP, EXTENSION LEASES, TENNANT CREEK 1:250,000 MAP SHEET NO SE53-14, VOLUME 1 OF 1.  
**AUTHOR:** POJ MOUCHET  
**DATE:** APRIL 1999



MCC 56 (Explorer 51) is located five kilometres west of Tennant Creek township. Access to the lease is gained via the sealed road to TC8 Mine, and then a short distance further west via bush tracks. MLCs 338-342 (N6 & N7, Skipper) are located approximately ten kilometres SW of town. Access is gained via the Stuart Highway then WNW along a bush track. MLC 18 (West Gibbet Most Anomalous) is located approximately one kilometre west of the TC8 Mine.

This report details exploration undertaken on MCCs 56 and MLCs 18 & 339-342 forming the Extension Leases of the Extension Reporting Group for the year ending 25 March 1999.

Normandy Tennant Creek Pty Limited contracted Kevron Geophysics Pty Ltd to complete a regional aeromagnetic survey including MCCs 56 and MLCs 18 & 339-342 in late 1998. The data has not been interpreted yet.

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## 1 CONCLUSIONS & RECOMMENDATIONS

Normandy Tennant Creek Pty Limited (Normandy) contracted Kevron Geophysics Pty Limited (Kevron) to complete a regional aeromagnetic survey including MCCs 56 and MLCs 18 & 339-342 in late 1998. The data has not been interpreted yet.

The recommended work programme for the coming year includes the modeling of the magnetic anomalies combined with a prospectivity review of MCCs 56 and MLCs 18 & 339-342

## 2 INTRODUCTION

This report details exploration undertaken on MCCs 56 and MLCs 18 & 339-342 forming the Extension Leases of the Extension Reporting Group for the period 1 September 1997 to 25 March 1999.

## 3 LOCATION & ACCESS

MCC 56 (Explorer 51) is located five kilometres west of Tennant Creek township. Access to the lease is gained via the sealed road to TC8 Mine, and then a short distance further west via bush tracks. MLCs 338-342 (N6 & N7, Skipper) are located approximately ten kilometres SW of town. Access is gained via the Stuart Highway then WNW along a bush track. MLC 18 (West Gibbet Most Anomalous) is located approximately one kilometre west of the TC8 Mine (Figure 1).

The climate of the Tennant Creek district is mild and dry through most of the autumn to spring months. The summer period is hot with seasonal heavy rainfall between January and March making access very difficult during these periods.

## 4 TENURE

The following claims and leases form the Extension Leases Reporting Group (Extension Group): MCCs 56 and MLCs 18 & 339-342.

MCC 56 is known as Explorer 51, MLCs 338-342 as N6 & N7 (or Skipper), and MLC 18 as West Gibbet Most Anomalous. The claim and leases cover 119 hectares. MLCs 338-341 are situated within the Mount Samuel Sacred Site complex (Marla Marla-Kantaji No 5758-00150).

A tenure summary is presented in Table 1 below:

Table 1: Tenure Summary for the Extension Leases

Title	Tenement Name, Location	Area (ha)	Date Granted	Date Expires	Comments
MCC 56	EXPLORER 51	31.00	08/06/83	07/06/98	Report - 1998
MLC 338	N6 & N7, SKIPPER	16.00	02/08/77	31/12/97	Report - 17/11/97
MLC 339	N6 & N7, SKIPPER	16.00	02/08/77	31/12/97	Report - 17/11/97
MLC 340	N6 & N7, SKIPPER	16.00	02/08/77	31/12/97	Report - 17/11/97
MLC 341	N6 & N7, SKIPPER	16.00	02/08/77	31/12/97	Report - 17/11/97
MLC 342	N6 & N7, SKIPPER	7.00	02/08/77	31/12/97	Report - 17/11/97
MLC 18	N6 & N7, SKIPPER	17.00	19/02/58	31/12/99	Ren 78 (CUPREX JV)

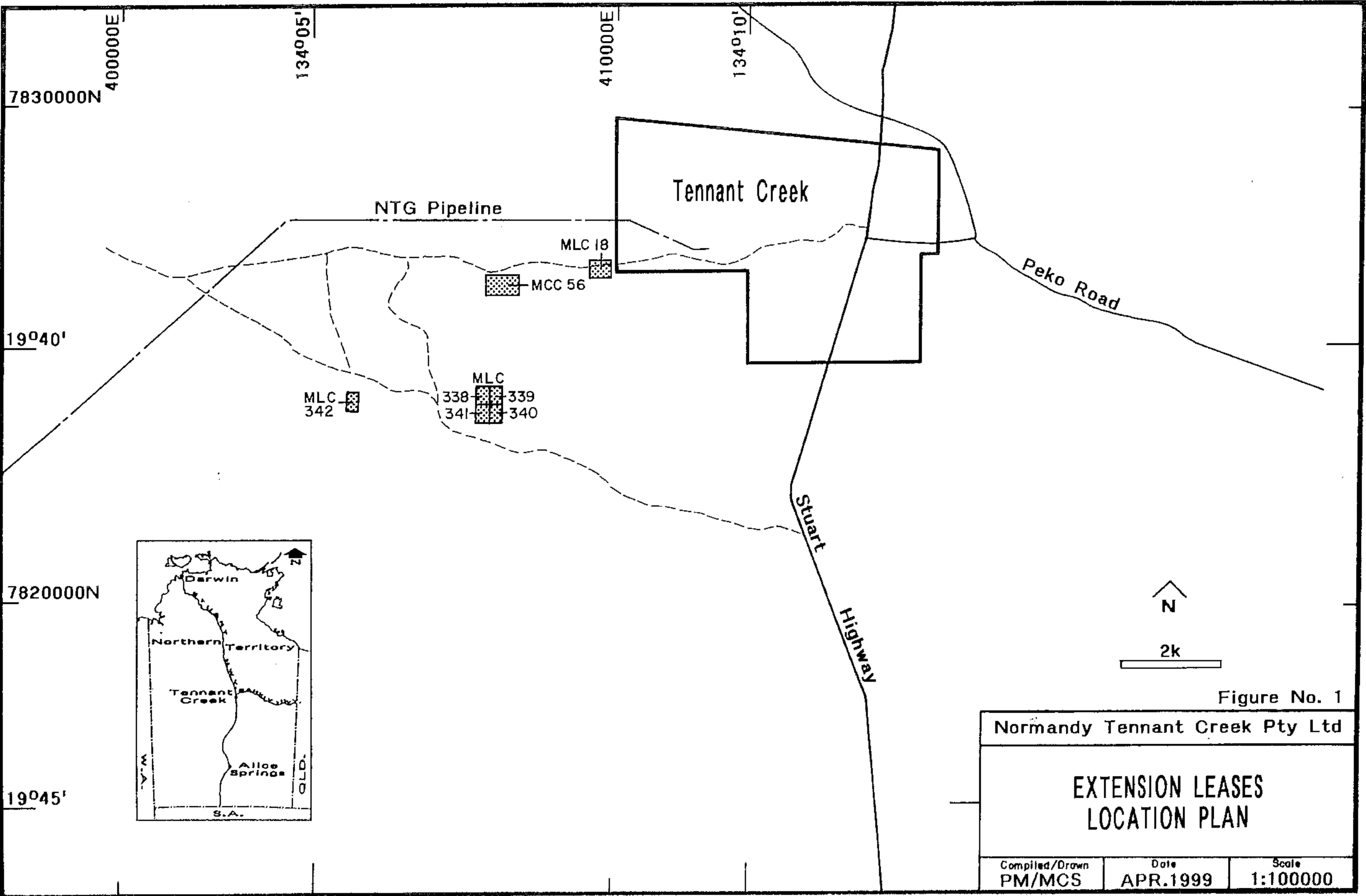


Figure No. 1

Normandy Tennant Creek Pty Ltd		
<b>EXTENSION LEASES LOCATION PLAN</b>		
Compiled/Drawn PM/MCS	Date APR.1999	Scale 1:100000



## 5 REGIONAL GEOLOGY

The geological understanding of the Tennant Creek Inlier has been recently advanced by detailed geological mapping over the Tennant Creek and Flynn 1:100,000 map sheets (Donnellan et. al. 1995), precision dating of stratigraphic components of the region (Compston, 1995) and regional geophysical interpretations.

The oldest exposed Proterozoic lithofacies in the Tennant Creek Inlier are the metasedimentary rocks of the Warramunga Formation, which are the hosts to the ironstone Au-Cu-Bi mineralisation of the Tennant Creek Goldfield. These Palaeoproterozoic metasediments were deposited approximately 1860 Ma. Deformation and intrusion of the Warramunga Formation by volumous porphyries and granitoids occurred during the Barramundi Orogeny (1858 Ma to 1845 Ma).

Following deformation and uplift the volcanics and volcanoclastics of the Flynn Sub-Group were erupted (1845 Ma to 1827 Ma), with intrusion of porphyries and minor granitoids into the Warramunga Formation. An additional deformation event preceded the deposition of the Hatches Creek Group/Tomkinson Creek Sub-Group (1820 Ma to 1785 Ma) and the intrusion of late-stage granitoids and porphyries into both the Warramunga Formation and Flynn Sub-Group at 1650-1712 Ma.

## 6 LOCAL GEOLOGY

### 6.1 MCC 56 (Explorer 51)

MCC 56 is covered by colluvium with no exposed outcrop. The magnetic anomaly lies on a major East-West trending shear zone that hosts numerous ironstone bodies including the TC8 Mine, the Explorers 11, 107, 50 and Gibbet prospects.

### 6.2 MLC's 338-342 (N6 & N7, or Skipper)

The Proterozoic geology of the area of the tenements is relatively well exposed in weathered outcrop, although approximately 60% of the area is under proximal colluvial cover. Outcrop has been mapped as hydrothermally altered and sheared Proterozoic Warramunga Formation and Proterozoic porphyritic intrusives. Drill testing indicates the presence of these lithofacies in the subsurface, with abundant disseminated magnetite alteration and hematite shale facies within the metasedimentary rocks (Clifford, 1997).

### 6.3 MLC 18 (West Gibbet Most Anomalous)

Analysis of bedding foliation relationships indicates that the prospect is situated on the northern limb of an anticline. Bedding generally dips at a shallow angle (15–20°) towards north and the pervasive foliation dips more steeply (50–70°) towards north (Wedekind, 1987). The lithologies present include typical Warramunga Group sediments, including low-greenschist metamorphosed shale and greywacke. The base of oxidation extends to approximately 100 metres. A mineralised magnetite ironstone lode conformable to bedding (unusual to Tennant Creek ironstones as flat lying) is intruded by a number of lamprophyre dykes between seven metres and two metres in width post-dating metamorphism, deformation and mineralisation (Ward, 1997).

## **7 PREVIOUS WORK**

### **7.1 MCC 56 (Explorer 51)**

MCC 56 lies adjacent to MCCs 55 & 57 and covers 31 hectares. The tenement was originally pegged by GeoPeko Limited (GeoPeko) in 1967 and renewed by Peko Wallsend Operations Limited (Peko) on 8 June 1983 for a period of ten years. Normandy acquired the Peko interest in the tenements and renewed it in 1993 for a five-year period ending 7 June 1998. An application for the renewal of the lease was lodged earlier this year by Normandy (Mouchet, 1998).

Previous work on MCC 56 by GeoPeko has included grid surveying and ground magnometry surveys. Analysis of the geophysical work concluded that the small magnetic anomaly located within MCC 56 was an extension of the large anomaly located within the mineral tenements immediately adjacent to the east (in Worland, 1993).

Exploration conducted by Normandy over MCC 56 (Explorer 51) during the period 8 June 1993 to 7 June 1998 has included a review and interpretation of previously collected data. The Explorer 51 magnetic anomaly is of lower magnitude than the adjacent Explorer 50 magnetic anomaly in MCC 55. However the Explorer 50 anomaly has been explained by drill testing that identified a shear hosted Au-Cu mineralised ironstone alteration system. The potential therefore exists for a similar system to occur in MCC 56 but of slightly smaller dimensions (Mouchet, 1998).

Metana Minerals NL (Metana) explored, in a joint venture agreement with Allender/Lebrun, the area surrounding MCC 56 under EL 5729 (Southern Strip) in the late 1980s. Work completed by the joint venture partners included regional geology, aeromagnetic interpretation, stream sediment sampling, soil sampling, ground magnetics and is detailed in Eeles (1989) and Pearson (1989).

Normandy NFM Limited (NFM) explored the area under EL 7415 in the 1990s. No reports are yet available in the Normandy's Exploration Library.

### **7.2 MLCs 338-342 (N6 & N7, or Skipper)**

Metana explored, in a joint venture agreement with Allender/Lebrun, the area surrounding MCC 56 under EL 5698 (Southern Policy) in the late 1980s. Work completed by the joint venture partners included aboriginal negotiations, regional geology, aeromagnetic interpretation, stream sediment sampling and is detailed in Eeles (1989).

There is no recorded production from the area of the tenements. However, the Skipper Mine (4,250oz Au) occurs between the two blocks of tenure and the Mt Samuel Mine (4,170oz Au) is proximal along strike to the east. In addition, the tenements fall within the Juno 'Line of Lode'. This structural setting was (and is) considered highly prospective when Australian Development Limited (ADL) selected it for exploration and identified the Nail 5 and Nail 6/7 magnetic anomalies in the early 1970s under Authority to Prospect 1528 'Nail'. ADL carried out mapping, rock chip sampling, costeaning and ground magnetics on both anomalies. The defined anomaly Nail 6/7 (MLCs 338-341) was drill tested with three drill holes ADLD 368, 374 and 433, for 1159m. Mineralisation intersected consisted of sheared chlorite-magnetite alteration with local disseminated sulphides. No massive ironstone alteration was intersected. Peak assay values include 3.6ppm Au, 120ppm Cu, 0.12% Pb, 550ppm Zn and 95ppm



Bi over 1.2 metre assay intervals. No drill testing was conducted on MLC 342 (in Clifford, 1997a).

In 1976, the Northern Territory Aboriginal Land Rights Act (ALRA) was enacted and not long after a land trust application was made over the area of the leases. During the land trust application period and hearing, no exploration was carried out in the tenement area. After the grant of the Warrumungu Aboriginal Land Trust and to the present time, all exploration licences over the area have been vetoed under the ALRA.

In addition, during 1988 the Aboriginal Sacred Sites Protection Authority contacted ADL regarding concerns expressed by traditional custodians of Sacred Sites in the area of the tenements. In 1989 the Marla Marla-Kantaji (Mt Samuel) Sacred Site 'complex' (11.36 sq kms) was declared. The defined boundaries of the Sacred Site 'complex' cover a portion of some and all of the area of other tenements within this group. Since this time exploration has been restricted to remote sensing techniques. Data from a multi-client aeromagnetic survey flown in 1989 was reprocessed using proprietary Normandy software. Details of processing and original survey specifications are given in Clifford (1997). The processing refined the defined anomaly Nail 6/7 in a broader context than the spatially restricted historical ground magnetics. This prominent discrete anomaly is not adequately explained by the disseminated magnetite encountered during drill testing and requires further geophysical modeling and drill testing. The centre of the strong discrete magnetic anomaly Nail 5 is clearly located to the west of MLC 342, but the anomaly does continue into the tenement. It is important to note that the margins as well as the peak of the anomaly are considered prospective.

In addition, Normandy has tenure over the peak of the anomaly, within MLC 48, allowing the anomaly as a whole to be explored. Normandy has conducted on going in-fill gravity surveys and refinement of processed images within the Tennant Creek district since 1991. Details of data collection and processing are contained on the Bouguer Gravity Contour Map presented in Clifford (1997). The area of the MLC's occurs on the western portion of a gravity ridge that is coincident with the Juno 'Line of Lode'. A moderate gravity peak considered a prospective setting occurs between the two blocks of tenure.

No work was done on the claim by PosGold Limited (PosGold; now Normandy) during the period 1 September 1996 to 31 August 1997 (Clifford, 1997b).

### **7.3 MLC 18 (West Gibbet Most Anomalous)**

The West Gibbet tenure, MLC 18, was granted to GeoPeko on the 19 February 1958 and will expire in the 31 December 1998. GeoPeko completed an interpretation of the available aeromagnetic survey data followed-up by one diamond hole that intersected 222 feet of dense siliceous magnetite (Ryan, 1959). A re-assessment of the drill core from West Gibbet holes 1 and 2 was undertaken by GeoPeko in order to determine if further drilling was required (MacNeil, 1961). GeoPeko drilled six more diamond holes into the magnetic anomaly between 1961 and 1977 revealing a shallow dipping conformable magnetite body with minor gold and bismuth mineralisation (Duck, 1977). GeoPeko undertook an auger-drilling programme over several of their leases and claims in 1985; 70 samples were taken on West Gibbet (Explorer 44) and assayed for Cu, Pb and Zn; 13 samples were assayed for Se only. All results are presented in GeoPeko (1985). Peko entered into a joint venture agreement with Cuprex Ltd (Cuprex) in which Cuprex had the opportunity to buy in through

exploration expenditure. Cuprex drilled six diamond holes into the anomaly in 1987. All results are presented in Wedekind (1987). By 1991 Cuprex earned a 40% interest and elected to cease as sole contributor. Poseidon Gold Limited (Poseidon; now Normandy) bought all Peko assets in June 1991 and became Cuprex's joint venture partner over MLC 18.

The Bureau of Mineral Resources (BMR) undertook geochemical testing for Selenium as a pathfinder in 1967. Geochemical traverses to assess this possibility were made over four known localities of mineralisation in the Tennant Creek area: at West Gibbet, Golden Forty, Nobles Nob and Warrego. The West Gibbet Prospect yielded anomalous selenium values over a complex ironstone body at depth. The traverses were made using a Gemco auger drill belonging to the Mines Branch NT. The samples were assayed for Se, Mo, Bi, Cu, Pb and Zn. GeoPeko duplicated the selenium assays on the West Gibbet Prospect. Details of the traverses are discussed in Taube (1969).

Metana explored in a joint venture agreement with Allender/Lebrun the area surrounding MCC 56 under EL 5729 (Southern Strip) in the late 1980s. Work completed by the joint venture partners included regional geology, aeromagnetic interpretation, stream sediment sampling, soil sampling, ground magnetics and is detailed in Eeles (1989) and Pearson (1989).

NFM explored the area surrounding MCC 56 under EL 7415 between 26 August 1991 and 14 August 1995 under a joint venture agreement with Roebuck Resources NL. Exploration undertaken by the joint venture partners included RAB drilling (92 holes, 1,738m) followed-up with four holes for 212m over a copper-bedrock anomaly. A regional aeromagnetic survey interpretation was completed in 1993 followed-up by vacuum drilling (105 holes, 992m) and RAB drilling (12 holes, 194m). Work completed during 1994 included infill vacuum drilling, a ground magnetic survey and RAB drilling (143 holes, 1,438m). Four zones of anomalous bedrock geochemistry were tested in 1995 by 12 inclined RAB holes (639m); a fifth zone (Anomaly 3) was tested with 14 vertical holes (377m). All results are presented in Romanoff (1996).

No exploration has been conducted on the West Gibbet tenure, MLC 18 during the period 1 October 1996 to 30 September 1997 (Ward, 1997).

## **8 WORK CARRIED OUT DURING REPORTING PERIOD**

Normandy contracted Kevron to complete a regional aeromagnetic survey including MCCs 56 and MLCs 18 & 339-342 in late 1998.

The survey was flown on fifty metre spaced NS lines, at a sensor height of forty metres, with an in-line sample spacing of seven metres.

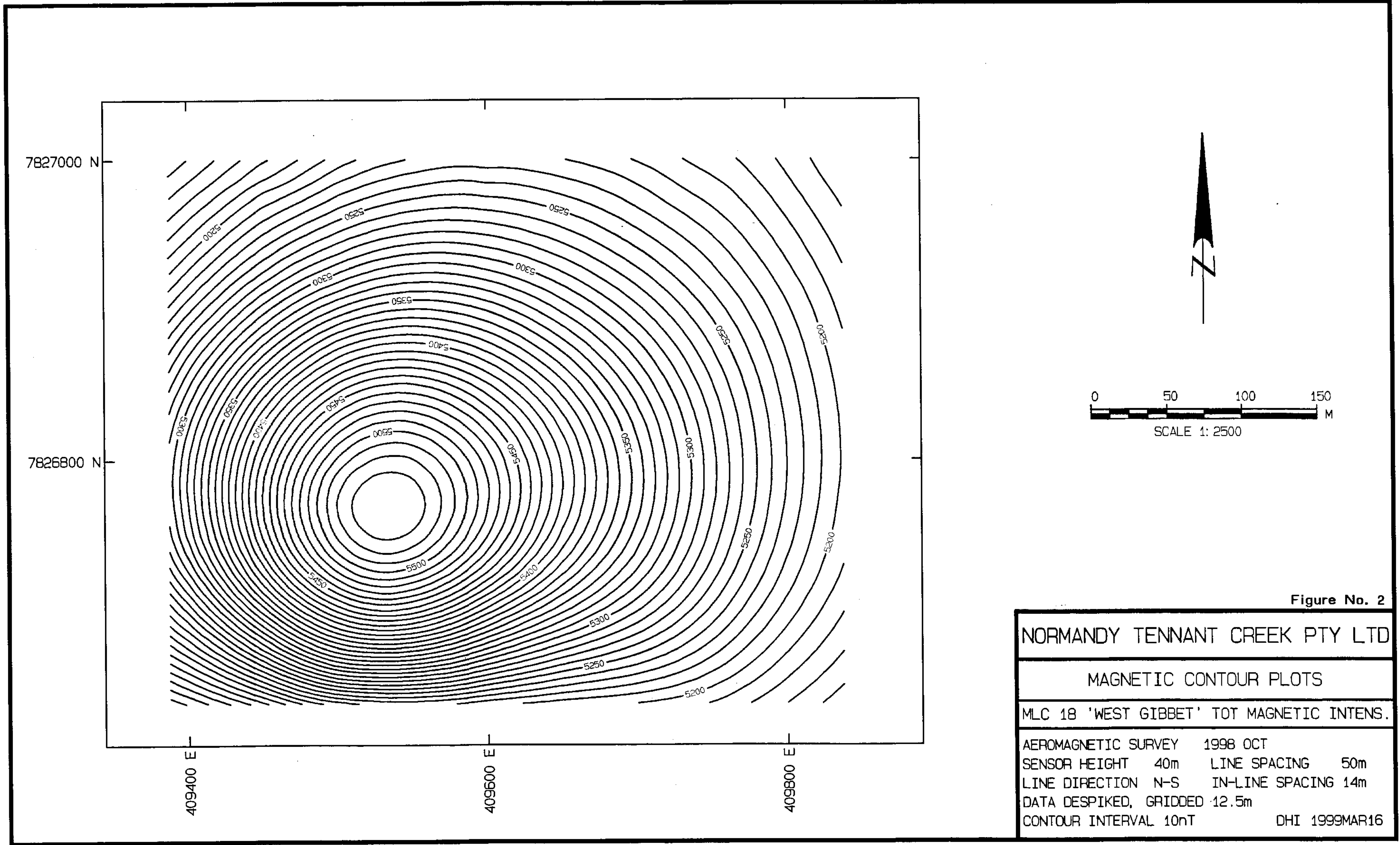
A contour plot of the acquired data for the Extension Leases (MCCs 56 and MLCs 18 & 339-342) is provided in Figures 2 to 5.

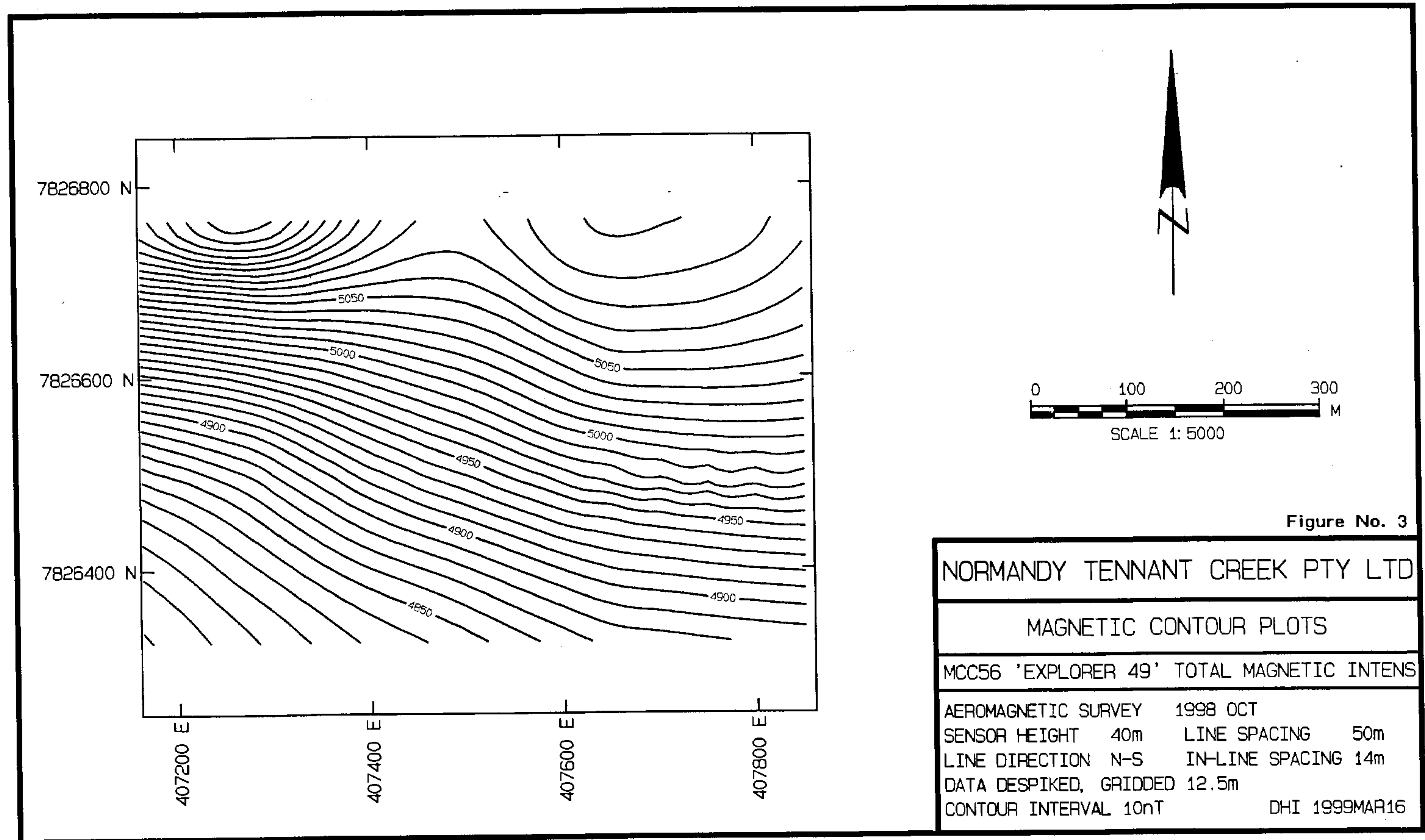
The data has not been interpreted yet.

## **9 EXPENDITURE STATEMENT FOR THE PERIOD 1/9/97 TO 25/3/99**

During the reporting period, the Extension Leases incurred an estimated exploration expenditure of \$4,700.00. A breakdown of this expenditure follows (Table 2):









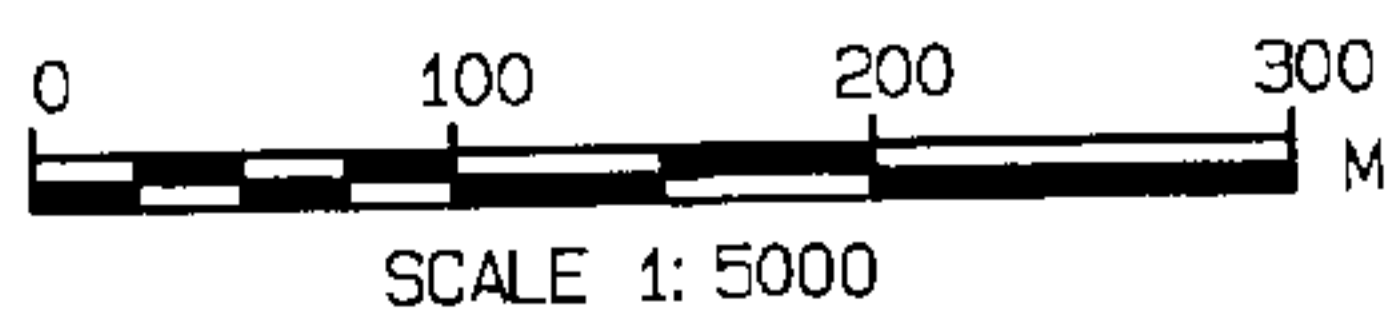
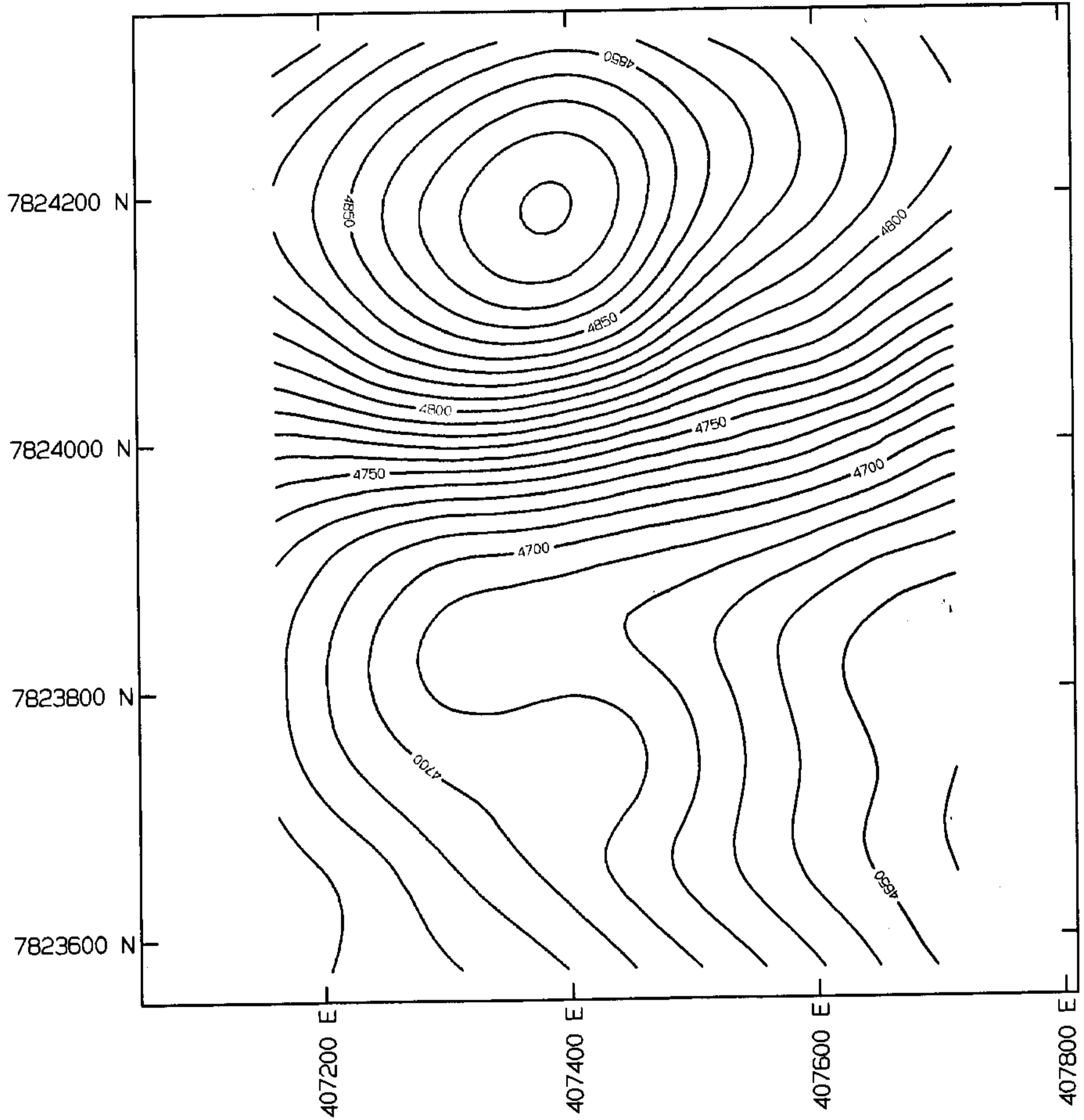


Figure No. 4

NORMANDY TENNANT CREEK PTY LTD	
MAGNETIC CONTOUR PLOTS	
MLC338-341 'SKIPPER' TOT MAGNETIC INTENS.	
AEROMAGNETIC SURVEY	1998 OCT
SENSOR HEIGHT	40m
LINE SPACING	50m
LINE DIRECTION	N-S
IN-LINE SPACING	14m
DATA DESPIKED, GRIDDED	12.5m
CONTOUR INTERVAL	10nT
	DHI 1999MAR16

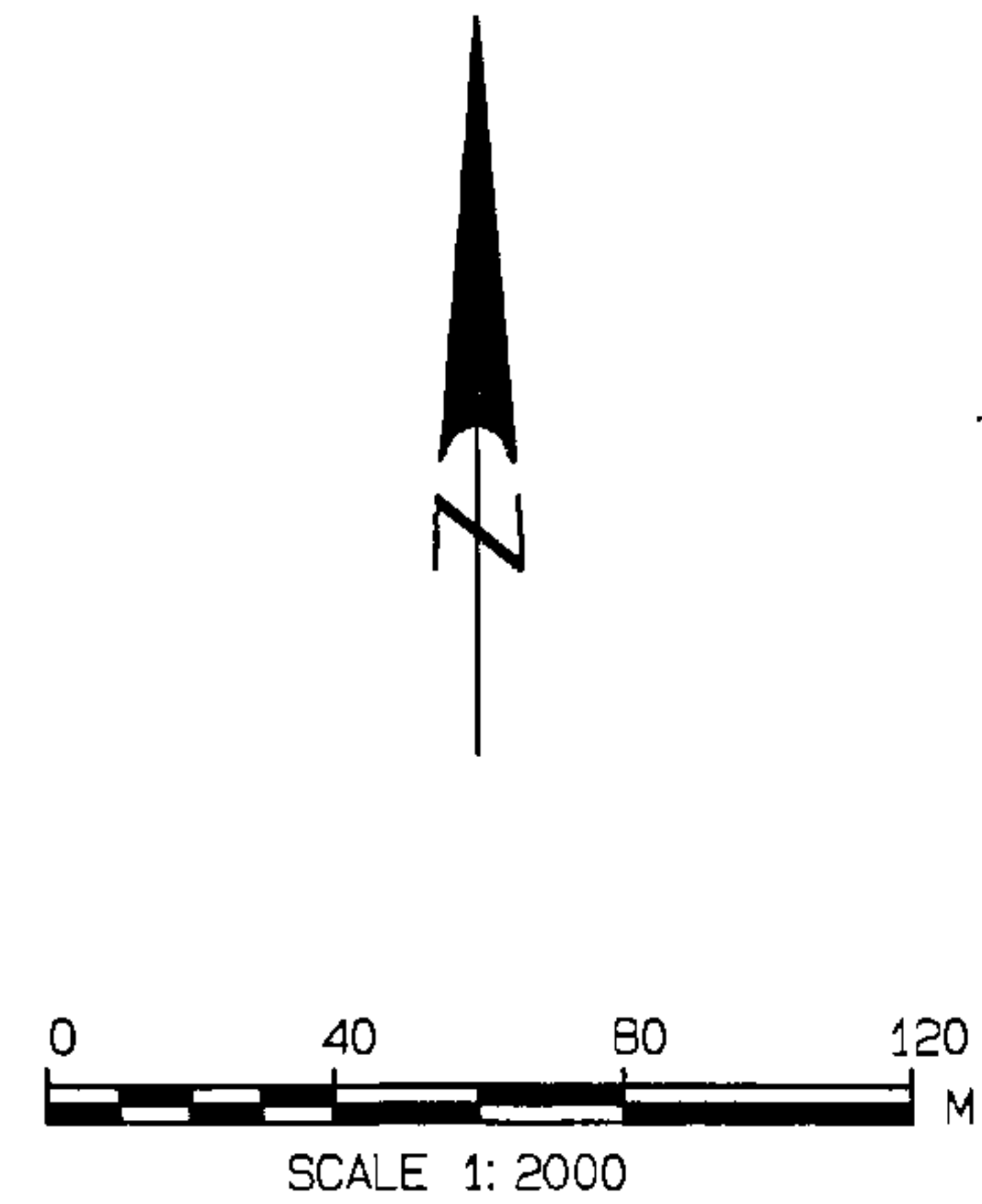
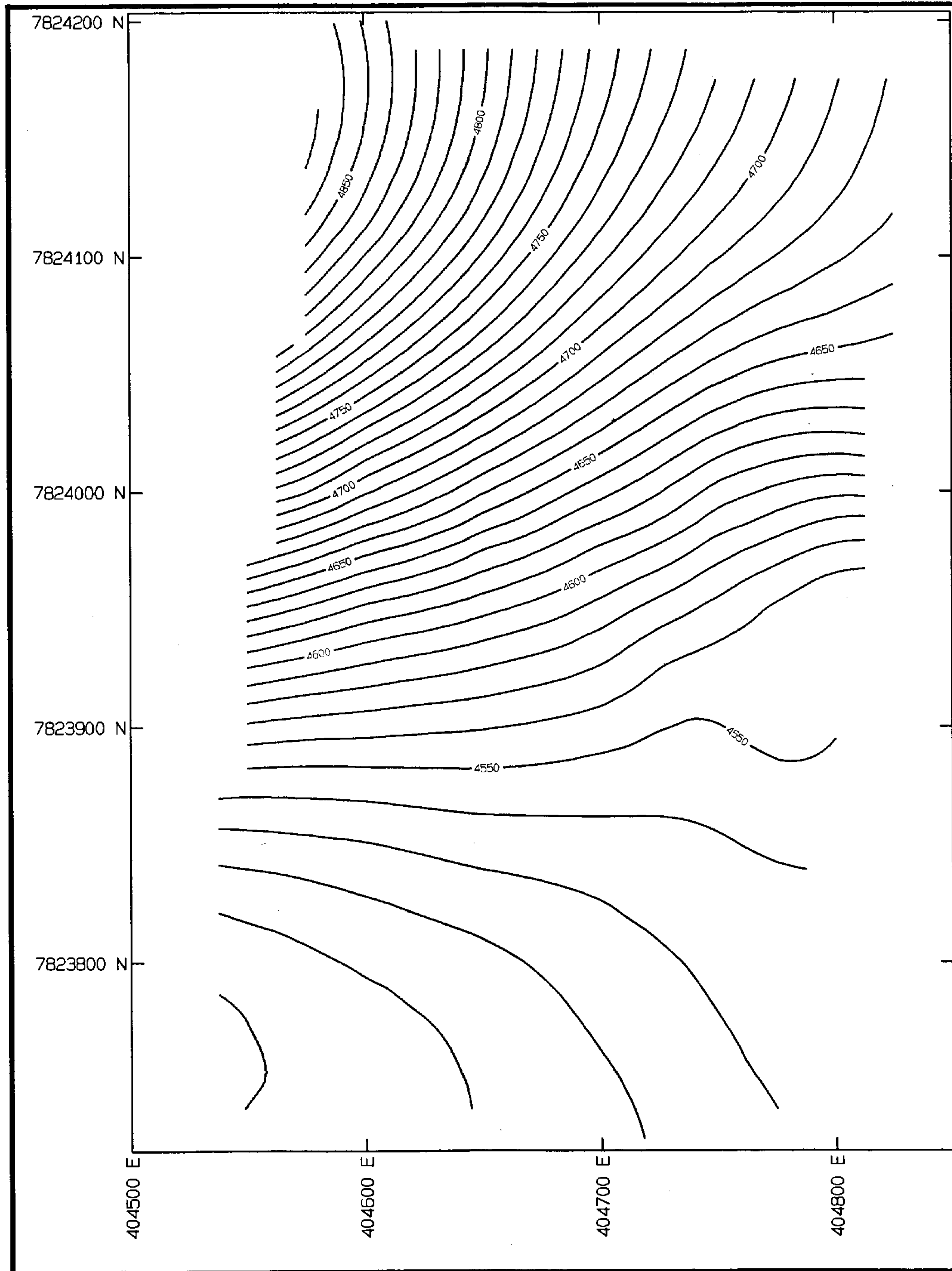


Figure No. 5

NORMANDY TENNANT CREEK PTY LTD	
MAGNETIC CONTOUR PLOTS	
MLC342 'SKIPPER EXT' TOT MAGNETIC INTENS.	
AEROMAGNETIC SURVEY	1998 OCT
SENSOR HEIGHT	40m
LINE SPACING	50m
LINE DIRECTION	N-S
IN-LINE SPACING	14m
DATA DESPIKED, GRIDDED 12.5m	
CONTOUR INTERVAL	10nT
DHI 1999MAR16	

Table 2: Exploration Expenditure for the Extension Leases from 1/9/97 to 25/3/99

<b>EXPENSE</b>	<b>COST</b>
Employee Costs	\$ 2,500
Overheads	\$ 200
Drilling	\$ 0
Assays	\$ 0
Operating Costs	\$ 400
Specialist Services	\$ 1,500
Tenement Costs	\$ 1,500
Research	\$ 100
<b>TOTAL</b>	<b>\$ 6,200</b>

## 10 RECOMMENDED WORK PROGRAMME & PROPOSED EXPENDITURE FOR THE PERIOD 26/3/99 TO 25/3/00

Next year's exploration programme will include the modeling of the magnetic anomalies combined with a prospectivity review of MCCs 56 and MLCs 18 & 339-342. The proposed exploration expenditure for the Extension Leases is as follows (Table 3):

Table 3: Proposed Exploration Expenditure for the Extension Leases

<b>EXPENSE</b>	<b>COST</b>
Employee Costs	\$ 2,000
Overheads	\$ 300
Drilling	\$ 0
Assays	\$ 0
Operating Costs	\$ 500
Specialist Services	\$ 500
Tenement Costs	\$ 1,500
Research	\$ 50
<b>TOTAL</b>	<b>\$ 4,850</b>

## 11 ENVIRONMENTAL/REHABILITATION REPORT

Normandy has commenced an active rehabilitation programme over much of the Tennant Creek field. This commitment has been reinforced within the Normandy Group with the appointment of a Group Environmental Engineer to oversee and implement the Group's guidelines and objectives. In addition to this an Environmental Superintendent has been engaged at Tennant Creek to design and implement the Group's objectives throughout the Tennant Creek area.

As an example of the Group's commitment to environmental issues several active rehabilitation programmes are currently being undertaken in the Tennant Creek field. These include programmes at Nobles Nob, Eldorado, White Devil and Warrego.

Environmental Management Plans for the Company's Tennant Creek Operations (Fowler, 1993; Fowler et al., 1998) have been submitted to the Department of Mines and Energy under separate cover. These plans detail the strategies to be implemented over various areas following completion of exploration programmes and mining operations.

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### 12.3 MLC 18 (West Gibbet Most Anomalous)

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**APPENDIX ONE**

**BIBLIOGRAPHIC DATA SHEET**

## BIBLIOGRAPHIC DATA SHEET

**REPORT NUMBER:** TENNANT CREEK: 99025 ADELAIDE: 23907

**REPORT NAME:** ANNUAL REPORT FOR MCCs 56 AND MLCs 18 & 339-342 FOR THE YEAR ENDING 25 MARCH 1999, EXTENSION REPORTING GROUP, EXTENSION LEASES, TENNANT CREEK 1:250,000 MAP SHEET NO SE53-14, VOLUME 1 OF 1.

**PROSPECT NAME(S):** WEST GIBBET (MOST ANOMALOUS), EXPLORER 51, N6, N7, SKIPPER.

**TENEMENT NUMBER(S):** MCCs 56 AND MLCs 18 & 339-342

**OWNER/JV PARTNERS:** NORMANDY TENNANT CREEK PTY LIMITED

**AGREEMENT:**

**COMMODITIES:** GOLD, COPPER

**TECTONIC UNITS:** TENNANT CREEK INLIER

**STRATIGRAPHIC UNITS:** WARRAMUNGA FORMATION

**1:250,000 MAP SHEET:** TENNANT CREEK SE53-14

**1:100,000 MAP SHEET:** TENNANT CREEK 5758

**KEYWORDS:** EXPLORATION REVIEW, AEROMAGNETIC SURVEY, GEOPHYSICS, EXPLORATION PROPOSAL