HD97.11/.02

BILLITON AUSTRALIA

THE METALS DIVISION OF THE
SHELL COMPANY OF AUSTRALIA LIMITED

EXPLORATION LICENCE 6445 - HARDIES SOUTH
ANNUAL REPORT FOR THE PERIOD ENDING 21st MARCH, 1991

AUTHOR: C R MACKAY
DATE: MARCH 1991

REPORT NO: 08.5511
COPY NO:

OPEN FILE

CR91/224

DISTRIBUTION:

Original : NT Dept of Mines & Energy - Darwin
Copy 1 : Billiton - Melbourne
2 : Billiton - Darwin

RECEIVED 17 APR 1991 DEPARTMENT OF MINES & ENERGY

SUMMARY

Exploration Licence 6445 (Hardies South) comprising 9 blocks was granted to The Shell Company of Australia Limited on 22nd March, 1989 for a period of four (4) years.

A 5 graticular block relinquishment nomination was lodged with the NTDME on the 21st of February, 1991 to satisfy second anniversary reduction requirements.

The licence is located approximately 40 km north northwest of the Pine Creek township.

The Lower Proterozoic geology of the licence area comprises:- siltstones, phyllites and greywacke of the Burrell Creek Formation; siltstones and greywackes of the Mt Bonnie Formation; siltstone hornfels and tuffaceous cherts of the Gerowie Tuff; and dolerite dykes of the Zamu dolerite.

Topographically the tenement area is consistently of low relief with the majority of the area covered by the black soil floodplains of the McKinlay River and Horners Creek. The black soil cover considerably hampers conventional exploration techniques.

Work completed within Exploration Licence 6445 over the year has included detailed aeromagnetic processing and interpretation, a ground magnetic survey, and limited reconnaissance mapping/rock chip sampling.

Results of this work have been negative with no significant mineralisation being encountered to date.

Future work will be concentrated in the northern portion of the licence area exploring for gold mineralisation south along strike from the McKinlay gold mine.

C O N T E N T S

1.0 INTRODUCTION

2.0 LOCATION AND ACCESS

3.0 REGIONAL SETTING

4.0 TENEMENT GEOLOGY

5.0 MINERALISATION

6.0 WORK COMPLETED

6.1 Detailed Aeromagnetic Interpretation
6.2 Ground Magnetics
6.3 Reconnaissance Mapping/Rockchip Sampling

7.0 EXPENDITURE STATEMENT

8.0 PROPOSED WORK AND COMMITMENT FOR THE FORTHCOMING YEAR (year ending 21st March, 1992)

9.0 REFERENCES

L I S T O F F I G U R E S

Figure 1.	Location of half-term relinquishment area	1:50,000
Figure 2.	Location PLan	1:2,000,000
Figure 3.	Fact Geology (BMR)	1:25,000
Figure 4.	Detailed Aeromagnetics	Not To Scale
Figure 5.	Ground Magnetics grid	1:25,000
Figure 6.	Stream Sediment and rockchip sampling locations and results	1:50,000

1.0 INTRODUCTION

Exploration Licence 6445 (Hardies South) comprising 9 blocks was granted to The Shell Company of Australia Limited on 22nd March, 1989 for a period of four (4) years.

A five (5) graticular block relinquishment nomination was lodged with the NTDME on the 21st of February, 1991 as per the compulsory half-term reduction requirements of Sections 26 and 27 of the NT Mining Act (Figure 1).

This report details the work completed and results gained by Billiton Australia, The Metals Division of The Shell Company of Australia Limited, during the year ending 21st of March, 1991.

2.0 LOCATION AND ACCESS

The licence area is located approximately 40 kms north-northwest of Pine Creek. Access is best taken from the Stuart Highway, via the gravel Spring Hill Road, then onto the Mt Wells Road north past Mt Wells. Some three kilometres north of Mt Wells the Mt Wells Road runs through the southern boundary of Exploration Licence 6445 (Figure 2).

3.0 REGIONAL SETTING

The Hardies South area lies in the southern part of the Pine Creek Geosyncline. The geosyncline contains Early Proterozoic metasedimentary rocks resting on a gneissic and granitic Archean basement. The metasediments represent a preserved basinal sequence up to 14 kilometres thick (Needham et al., 1980), comprising of a possible original thickness of up to 20 km (Ferguson, 1980), which at 1870-1899 Ma was folded

and metamorphosed mostly to greenschist facies, and in places to amphibolite facies. The geosynclinal sequence is intruded by transitional igneous rocks; including pre-tectonic dolerite sills and syn- to post-tectonic granitoid plutons and dolerite lopoliths and dykes (Stuart-Smith et al., 1987). Largely undeformed platform covers of Middle Proterozoic, Late Proterozoic, Cambro-Ordovician and Mesozoic strata (mainly sandstone and minor volcanics and carbonate rocks) rest on these with marked unconformity (Stuart-Smith et al., 1987).

4.0 TENEMENT GEOLOGY

The Lower Proterozoic geology within Exploration Licence 6445 comprises rocks of the Burrell Creek Formation (Finniss River Group); the Mt Bonnie Formation and Gerowie Tuff of the South Alligator Group; and the Zamu Dolerite (Figure 3). The Burrell Creek Formation covers the great majority of the tenement area and is comprised of interbedded brown-grey and red sandy siltstone, red-brown phyllite, and brown-grey meta-greywacke. Rocks of the Mt Bonnie Formation and the Gerowie Tuff are found in the eastern boundary area of the tenement and comprise siltstones, greywackes and siltstone hornfels. Zamu dolerite is found intruding rocks of the Burrell Creek Formation as a north-northwest trending dyke, in the central portions of the tenement.

Topographically the licence area is consistently low with the majority of the area covered by black soil floodplains stemming from the McKinlay River and Horners Creek. The black soil cover considerably hampers conventional exploration techniques.

Two major phases of folding can be recognised in the Early Proterozoic sediments of the region, both pre-dating granitoid intrusions. Of these phases, the older (F_1 folds) are well represented in the Hardies South tenement. These folds are tight to isoclinal, and have north to northwest trending axes. The folds seem to plunge at varying degrees to the south.

The second phase and younger (F_2 folds) in the region are widely spaced open types. They are not obvious in outcropping owing to their openness and spacing of several kilometres. They trend east and may be associated with poorly developed mesoscopic similar-trending kink or crenulation cleavages (Stuart-Smith et al., 1987).

5.0 MINERALISATION

Little is known about mineralisation within EL 6445. No old workings are known within the tenement area. In the vicinity of the tenement area several old mining areas can be found. The old Ringwood gold mining centre lies 25 km to the north in rocks of the Burrell Creek Formation, and the old McKinlay gold mine lies only 1.5 km north of the licence area. The McKinlay or Hardies Gold Mine workings are located in an anticline structure within greywacke beds of the Mt Bonnie Formation. The Mt Wells tin mining centre lies 1 km south of the tenement in rocks of the Burrell Creek Formation.

6.0 WORK COMPLETED

6.1 Detailed Aeromagnetic Interpretation

A detailed aeromagnetic survey by Aerodata was commissioned by Billiton Australia during late 1989. A total of approximately 6,000 flight line kms were surveyed, the coverage of which includes the Hardies South licence area. Survey details include:-

- Flight line spacing 200m
- Tie line spacing 2000m
- Sensor Height 70m
- Magnetic sample interval 14m
- Radiometric sample interval 70m
- Cesium vapour magnetometer
- Geometrics GR 800B Spectrometer
- 33.5 litre detector

The survey was flown for the purpose of identifying regional structures and more specifically significant magnetic anomalies that may represent bulk tonnage gold mineralisation (e.g. pyrrhotite bearing veining at Mt Todd).

Detailed processing of the aeromagnetic data was conducted by GeoImage of Brisbane. Interpretation of the processed data over EL 6445 highlighted several aeromagnetic features in the tenement area, including:-

- a discrete aeromagnetic anomaly in the southwest portion of the tenement.
- a series of folded magnetic beds representing the typical tight to isoclinal, north-northwest trending F_1 folds found in the region. It is suspected the magnetic signature of these beds are related to magnetic bearing sandstone (Figure 4).

6.2 Ground Magnetics

A grid with a 200m line spacing was established over the discrete aeromagnetic anomaly that was located in the southwest corner of the licence area (Figure 5). Some 5.6 line kilometres or approximately one half of the intended magnetic survey was completed when it was decided to halt the survey as preliminary data suggested the magnetic signature of the anomaly was related to stratigraphy (ie.magnetite rich sandstone bed or dolerite dyke) and not pyrrhotitic mineralisation. Detailed interpretation and modelling of the data collected was not necessary. The magnetometer used in the survey was a portable Geometrics G856 Proton Precession Magnetometer, with a station spacing of 10 metres.

6.3 Reconnaissance Mapping/Rockchip Sampling

Limited reconnaissance mapping and associated grab rockchip sampling was completed in the southwest corner of the tenement, following up the catchment areas of several anomalous stream sediment samples (ie. 26.9, 5.3, 4.2 ppb Au) which were taken in 1989.

Only limited veining was encountered and grab rockchip samples of several buck quartz veins returned only low gold results. Rockchip sample number 1 proved interesting returning anomalous basemetal results of 559 ppm Cu, 4.85% Pb and 1560 ppm Zn (Figure 6).

7.0 EXPENDITURE STATEMENT

EXPLORATION LICENCE 6445 - HARDIES SOUTH
22nd March 1990 - 21st March, 1991

	$
Staffing - Regional Office (incl. Geological Contract Staff)	5586
Support - Regional Office	4619
Tenement Costs	95
Geophysical Surveys	2000
Analyses	-
Aerial Photography	-
Head Office Management, Administration Technical Services	1033
Overheads	1334
TOTAL	$14667

8.0 PROPOSED WORK AND COMMITMENT FOR THE FORTHCOMING YEAR
(Period ending 21st March, 1992)

Proposed work on EL 6445 during the forthcoming third year of tenure from the 22nd of March 1991 to the 21st of March, 1992 includes:-

- a soil sampling programme in the northern portions of the licence to test for a southerly strike extent to the McKinlay Gold Mine.
- mapping and rockchip sampling of the same area.
- if results of the above work are positive then further work may include detailed mapping, rockchip sampling, costeaning and RAB or reverse circulation drilling.

Proposed Expenditure on EL 6445 for the forthcoming year should include:-

-	Staffing	$4,000
-	Assays	400
-	Overheads	440
	TOTAL	$4,840

9.0 REFERENCES

FERGUSON, J., 1980 Metamorphism in the Pine Creek Geosyncline and its bearing on stratigraphic correlations. In FERGUSON, J., & GOLEBY, A.B. (Editors) - URANIUM IN THE PINE CREEK GEOSYNCLINE International Atomic Energy Agency, Vienna, 91-100.

NEEDHAM, R.S., CRICK, I.H., & STUART-SMITH, P.G. 1980 Regional geology of the Pine Creek Geosyncline. In FERGUSON, J., & GOLEBY, A.B. (Editors) - URANIUM IN THE PINE CREEK GEOSYNCLINE International Atomic Energy Agency, Vienna, 1-22.

STUART-SMITH, P.G., NEEDHAM, R.S., BAGAS, L., & WALLACE, D.A., 1987 - PINE CREEK, NORTHERN TERRITORY (SHEET 5270) 1:100,000 Geological Map Commentary Bureau of Mineral Resources, Canberra.

TAUBE, A., 1966 Report on a visit to the Spring Hill Gold Mine. Northern Territory Geological Survey Report GS 66/6 (unpublished).

SHELL METALS REPORT DATABASE

DATA INPUT SHEET

CHAPTER NAME: _____
(Office use only)

==========

TITLE : Exploration licence 6445 - Hardies South - Annual Report for the period ending 21st March, 1991

DATE : 13.3.91

AUTHOR : CRAIG MACKAY

SOURCE : N.A.

(If Non-SCOA)

DESCRIPTOR : N.A.

(Not indexed)

PROSPECT/PROJECT : Hardies South - Exploration Licence 6445

KEYWORDS : Gold, Aeromagnetics, Ground magnetics, Lower Proterozoic, Pine Creek Geosyncline

LOCATION : NORTHERN TERRITORY

SHEET NAME : (1:250,000) PINE CREEK (SD 52.08)

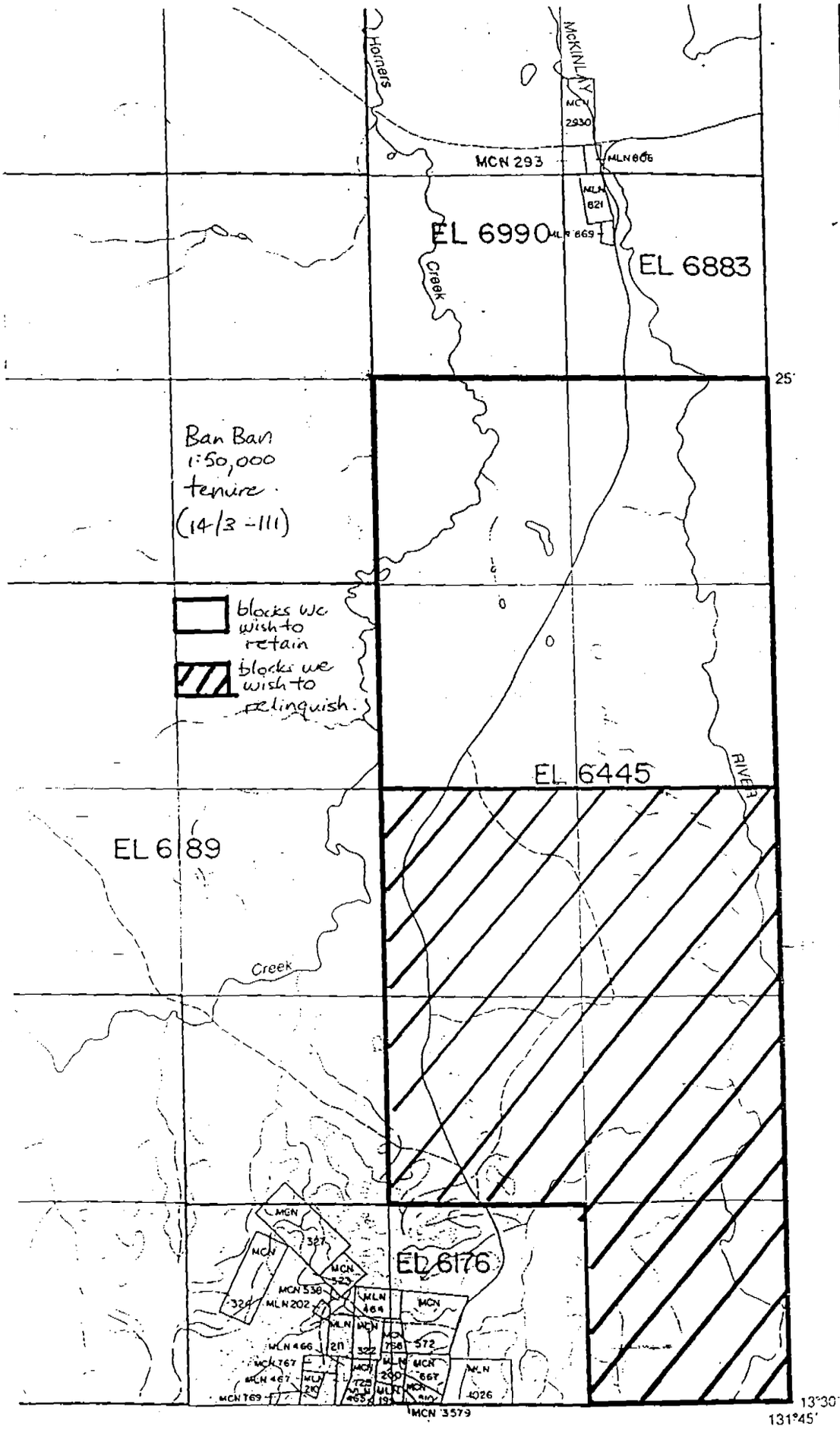
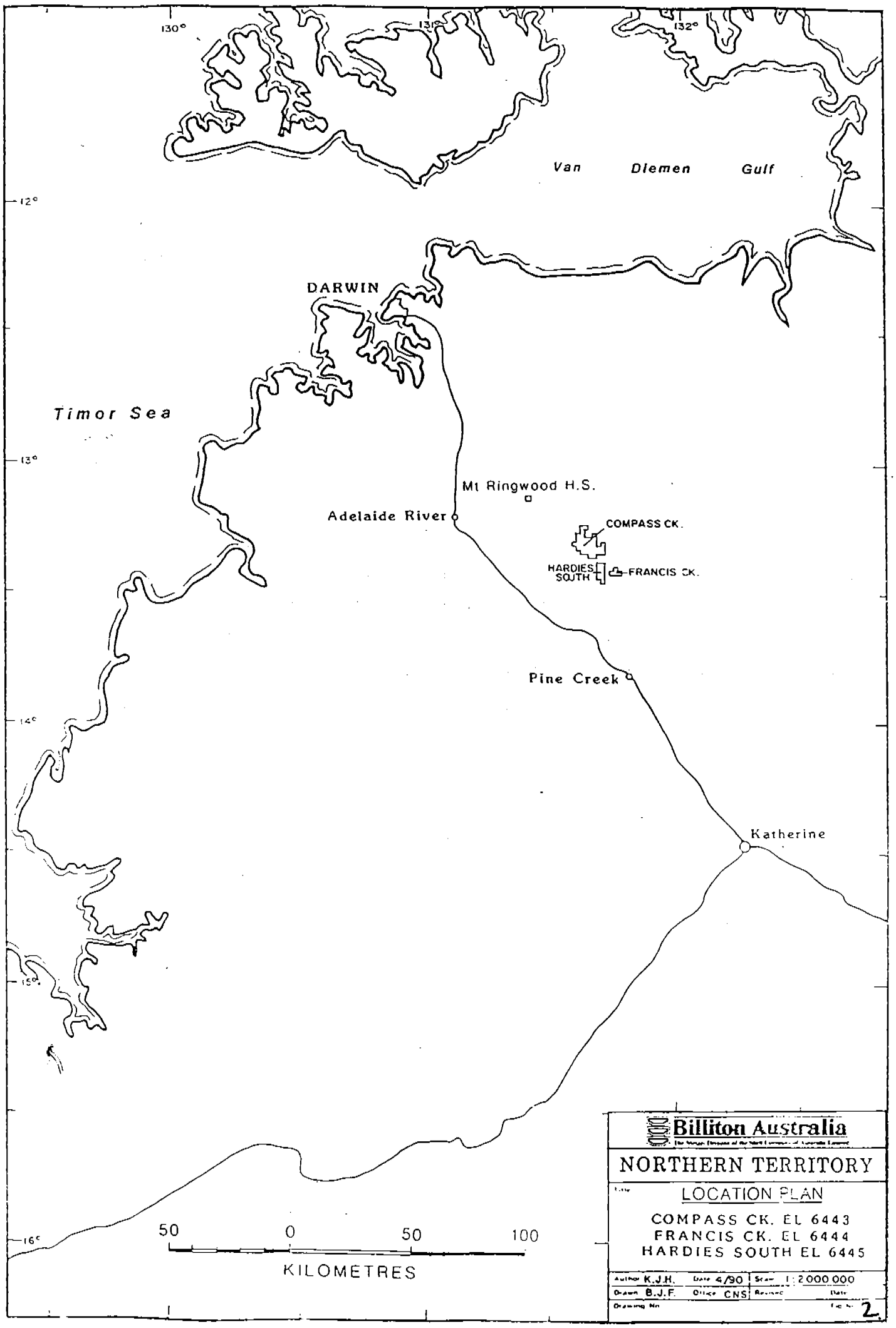
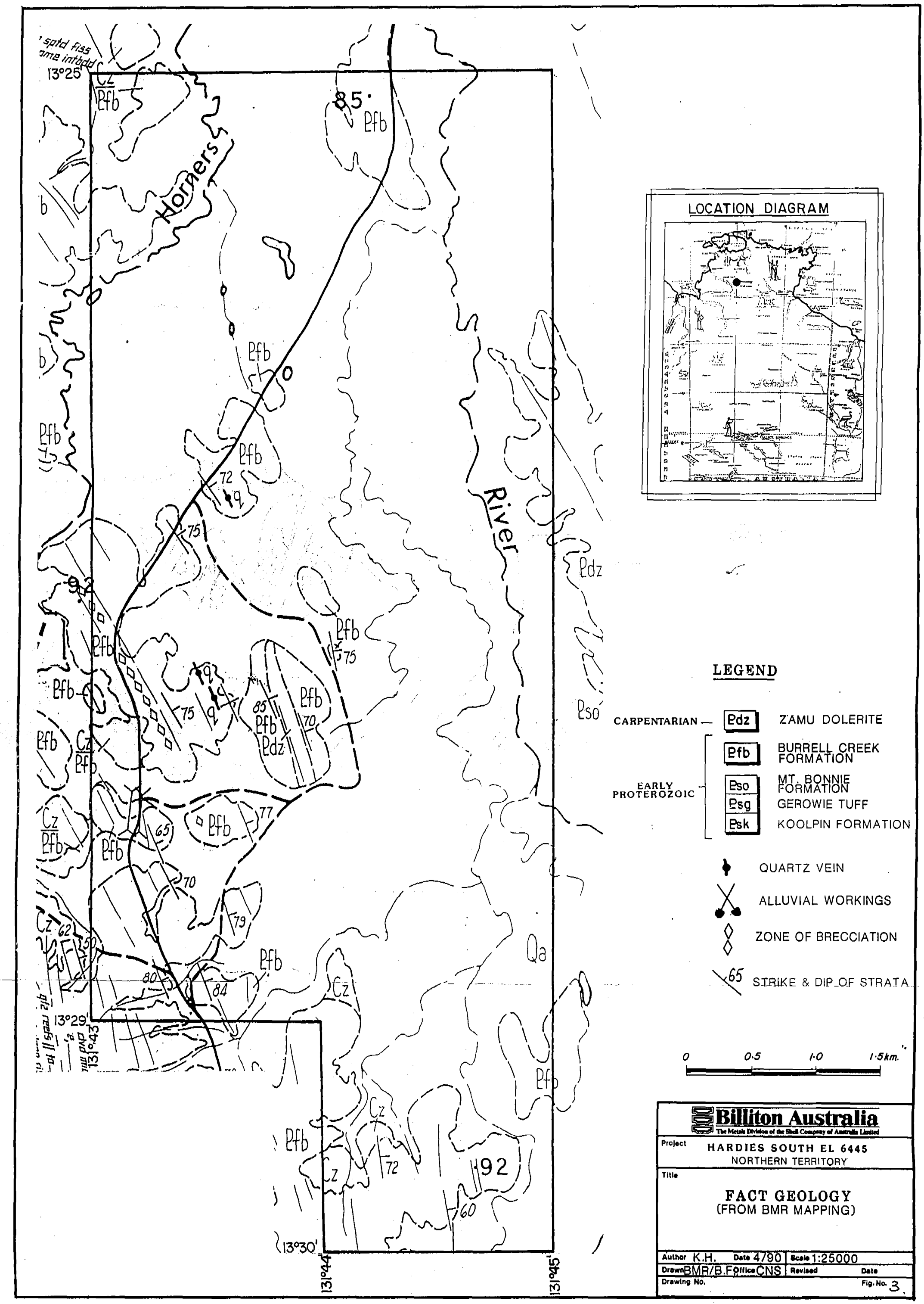
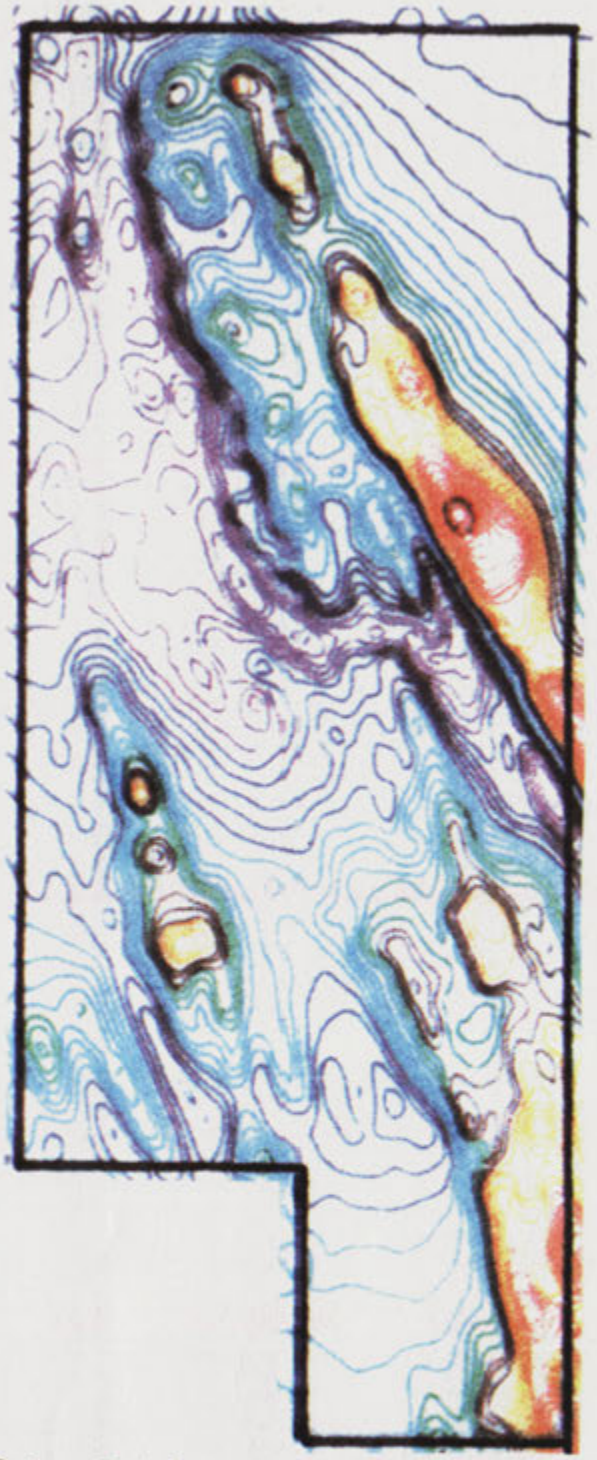

Hornets
McKINLAY
MCN 2930
MCN 293
MLN 806
MLN 821
EL 6990
MLN 869
EL 6883
Creek
25'
Ban Ban
1:50,000
tenure
(14/3 -111)
blocks we wish to retain
blocks we wish to relinquish.
EL 6445
RIVER
EL 6189
Creek
EL 6176
MGN
327
MCN
MCN 523
MCN 538
324
MLN 202
MLN 464
MCN
MLN 466
211
302
756
572
MCN 767
MLN 467
MCN 769
MLN 260
MCN 667
MLN 4026
MCN 3579
13°30'
131°45'

FIGURE 1.


130°
131°
132°
12°
13°
14°
15°
16°
Van Diemen Gulf
DARWIN
Timor Sea
Mt Ringwood H.S.
Adelaide River
COMPASS CK.
HARDIES SOUTH
FRANCIS CK.
Pine Creek
Katherine
50 0 50 100
KILOMETRES
Billiton Australia
NORTHERN TERRITORY
LOCATION PLAN
COMPASS CK. EL 6443
FRANCIS CK. EL 6444
HARDIES SOUTH EL 6445
Author K.J.H.
Date 4/90
Scale 1:2 000 000
Drawn B.J.F.
Office CNS
Revised
Date
Drawing No
File No
2


LOCATION DIAGRAM
LEGEND
CARPENTARIAN
Pdz ZAMU DOLERITE
EARLY PROTEROZOIC
Pfb BURRELL CREEK FORMATION
Pso MT. BONNIE FORMATION
Psg GEROWIE TUFF
Psk KOOLPIN FORMATION
QUARTZ VEIN
ALLUVIAL WORKINGS
ZONE OF BRECCIATION
65 STRIKE & DIP OF STRATA
0 0.5 1.0 1.5km.
Horners
River
13°25'
13°29'
13°30'
131°43'
131°44'
131°45'
Billiton Australia
The Metals Division of the Shell Company of Australia Limited
Project HARDIES SOUTH EL 6445
NORTHERN TERRITORY
Title
FACT GEOLOGY
(FROM BMR MAPPING)
Author K.H. Date 4/90
Scale 1:25000
Drawn BMR/B.F. Office CNS
Revised Date
Drawing No.
Fig. No. 3



COLOUR LEGEND (nano Teslas)

< 47100			< 47175
< 47125			< 47200
< 47145			< 47240
< 47160			>= 47240

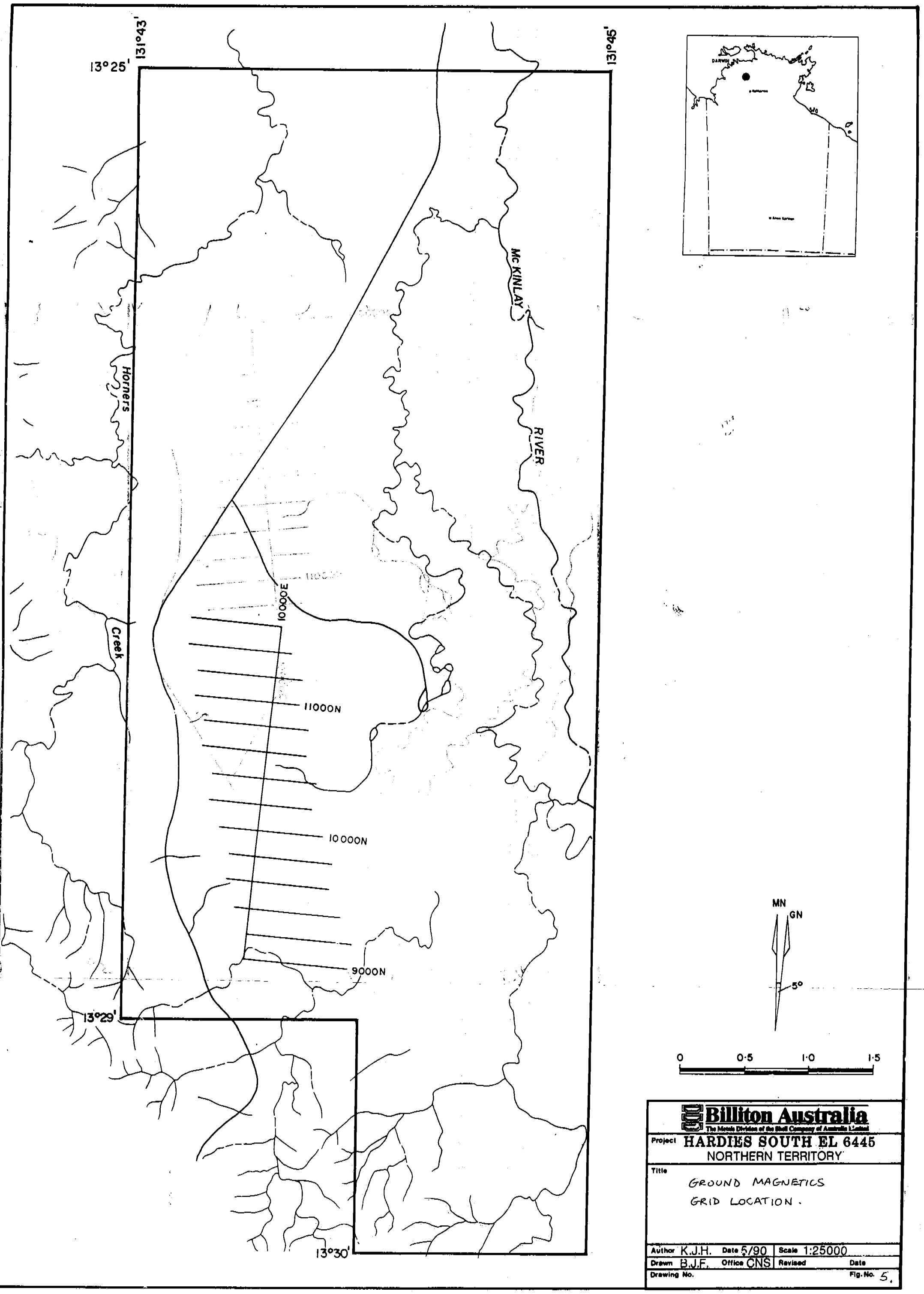
Billiton Australia

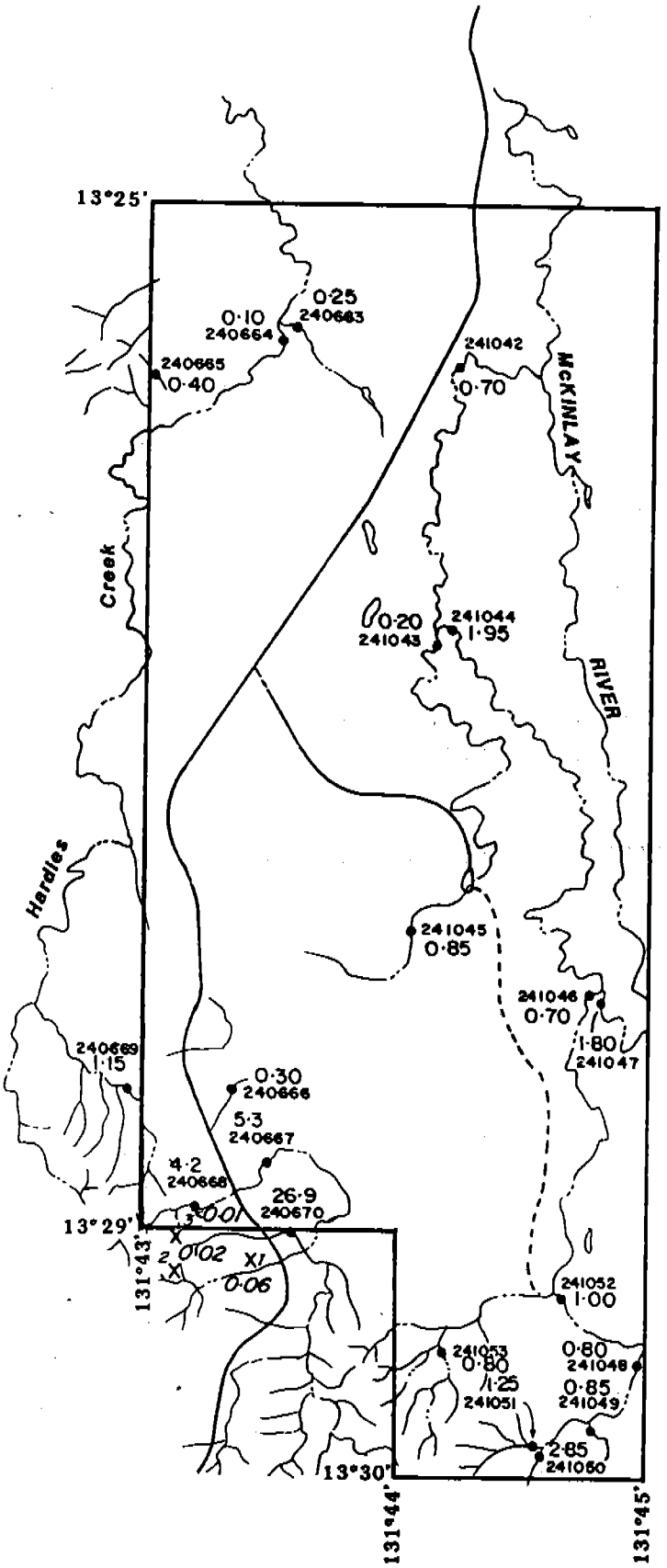
The Metals Division of the Shell Companies of Australia Limited

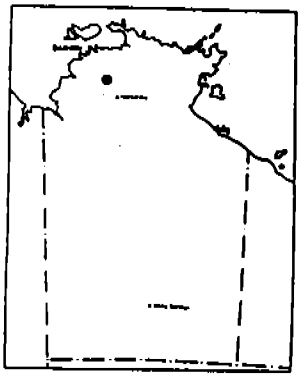
Project: EL 6445 — HARDIES SOUTH

Title: TOTAL FIELD MAGNETIC CONTOURS

Author CRM	Date 15/3/91	Scale Not to scale.	
Drawn	Office	Revised	Date
Drawing No.		Fig. No. 4.	


13°25'
131°43'
131°45'
Mc KINLAY
RIVER
Horners
Creek
10000E
11000N
10000N
9000N
13°29'
13°30'
MN
GN
5°
0
0·5
1·0
1·5
Billiton Australia
The Metals Division of the Shell Company of Australia Limited
Project HARDIES SOUTH EL 6445
NORTHERN TERRITORY
Title
GROUND MAGNETICS
GRID LOCATION.
Author K.J.H. Date 5/90
Scale 1:25000
Drawn B.J.F. Office CNS
Revised Date
Drawing No.
Fig. No. 5.





Rock chip results

Sample No	Cu	Pb	Zn	Ag
1.	559	4·85%	1560	6
2.	92	1200	126	1
3.	28	50	10	1

241046 1·80 — 5kg stream sediment sample location & Au result (ppb)

x 0·06 — Grab rock chip sample location & Au result (ppm)

0 1 2 km.

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project: HARDIES SOUTH EL6445 NORTHERN TERRITORY

Title: STREAM SEDIMENT & ROCK CHIP SAMPLE LOCATIONS & RESULTS

Author C.R.M	Date 4/90	Scale 1:50000	
Drawn B.J.F.	Office CNS	Revised	Date
Drawing No. C/HD97/2X		Fig. No. 6.	