

**M.I.M. EXPLORATION PTY. LTD.**

**TECHNICAL REPORT**

**NO. 1993**

**TITLE:** EXPLORATION LICENCE NO. 7223 "BARKLY" N.T.  
PARTIAL RELINQUISHMENT REPORT:  
YEAR ENDED 21.02.1994

**ISSUING  
DEPARTMENT:** EXPLORATION

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**INVESTIGATIONS  
CONDUCTED BY:** DARWIN BASED M.I.M. EXPLORATION STAFF

**SUBMITTED BY:** R.D.M. WILSON

**DATE:** MAY 1994

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## **1.0 INTRODUCTION AND SUMMARY**

Exploration Licence No. 7223 is located approximately 860 km south east of Darwin, Northern Territory, in the Barkly Tableland region. The location of the Licence is shown on Figure 1. It was granted to Mount Isa Mines Limited on the 21<sup>st</sup> February, 1991 for a term of six years.

The Licence straddles the western end of the Murphy Tectonic Ridge, and possible extensions of the north-north west trending Emu Fault. To the north, unconformably overlying the Early Proterozoic intrusives and metasediments of the Tectonic Ridge, are the Tawallah Group sediments of the McArthur Basin. The McArthur Group sediments of the McArthur Basin are known to contain appreciable lead and zinc mineralisation further north of the Licence. To the south of the tectonic ridge lie South Nicholson Basin sediments of Adalaidian age. The Licence is moderately covered by widespread but relatively thin Cambrian and Cretaceous sediments and Cainozoic soils.

At the end of the third year of tenure a total of 122 blocks were relinquished from EL 7223. The relinquishment, effective as from the 21<sup>st</sup> of February 1994, reduced the licence from 244 to 122 blocks.

In recent times the area has been explored by AFMECO Pty Ltd for uranium, and by Ashton Mining Limited for diamonds.

This report describes all exploration carried out by MIM Exploration Pty Ltd on areas relinquished from Exploration Licence 7223 on the 21<sup>st</sup> of February 1994.

## **2.0 LOCATION AND ACCESS**

Exploration Licence No. 7223 is located in the Calvert Hills region, approximately 860 km south east of Darwin, Northern Territory. The Licence lies on three cattle stations, namely Benmara, Brunette Downs and Cresswell Downs.

The location of Exploration Licence 7223 is shown on Figure 1.

The Exploration Licence lies on the Wallhallow (SE53-7), Brunette Downs (SE58-11), Calvert Hills (SE53-8) and Mount Drummond (SE53-12) 1:250,000 topographic sheets, and on the Puzzle (6162), Coanjula (6262) and Boxer (6261) 1:100,000 topographic sheets.

The Licence may be reached from Darwin by sealed and gravel roads, although during the wet season there are times when the roads are impassable due to rain. Benmara Station homestead, just south of the Licence, has an airstrip which is serviceable all year round.

Within the Licence area there are a number of fence line dirt tracks which allow four-wheel drive vehicle access into most parts. Cross-country traversing may be difficult in areas where the country is incised by drainage.

## **3.0 TENURE**

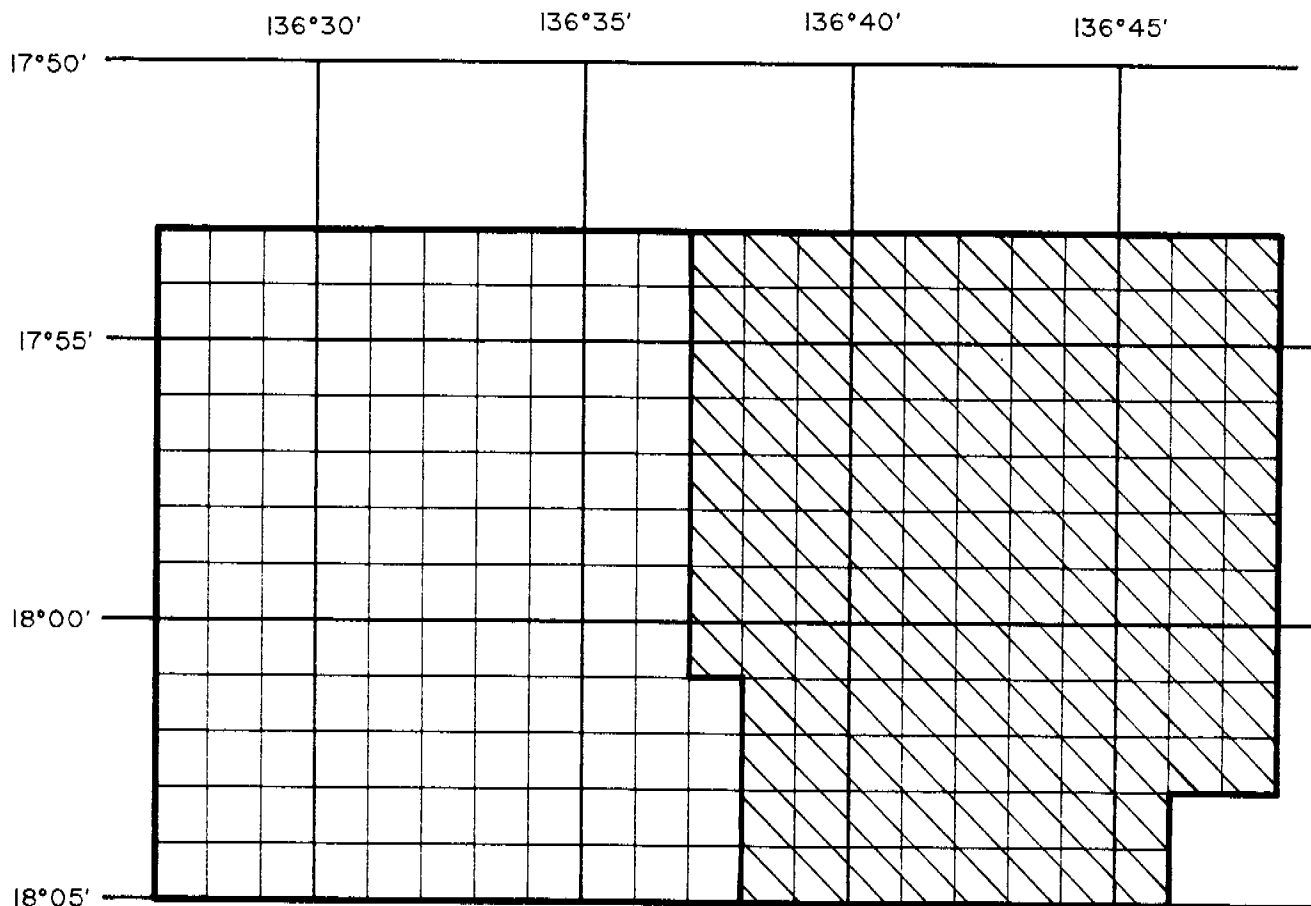
Exploration Licence No. 7223 was granted to Mount Isa Mines Limited on the 21<sup>st</sup> February 1991 for a term of six years. The Exploration Licence originally consisted of 490 blocks with an area of 1578 square kilometres. At the end of the second year a total of 246 blocks were relinquished, reducing the E.L. to 244 blocks (area 785.68 square kilometres).

A further 122 blocks were relinquished from E.L. 7223 on the 21<sup>st</sup> February 1994, at the end of the third year of tenure. The E.L. was reduced from 244 blocks to 122 blocks (area 395 square kilometres).

The original tenement holding and subsequent relinquished portions are indicated in Figure 1.

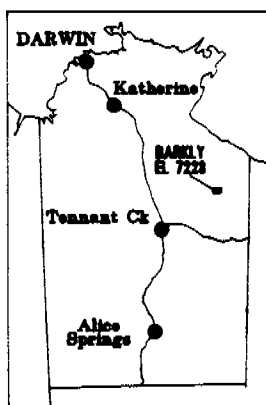
Group reporting of Exploration Licences 7219, 7222 and 7223 was granted by the Northern Territory Department of Mines and Energy on the 7<sup>th</sup> January, 1992.

In May, 1992, the "Brunette Downs Joint Venture Agreement" was signed by MIM and Ashton Mining Limited, allowing Ashton certain rights to explore for diamonds within Exploration Licence 7223. Exploration Retention Licence No. 104 is held by Ashton Mining Limited.




Area relinquished 21.2 94

### LOCALITY MAP



Scale 1: 250 000



 <b>M.J.M. EXPLORATION PTY. LTD.</b> NORTHERN TERRITORY			
PROJECT		<b>BARKLY EL 7223</b>	
TITLE			
<b>LOCATION SUB-BLOCK DETAILS</b>			
Mineral Field	Northern	Author	S.B.
1:250 000	SE53-8	Drawn	E.L.K.
1:100 000	6262	Drawing No.	41272
		Date	3/94 Revised
		Fig. No. 1	

#### 4.0 GEOLOGY

Exploration Licence No. 7223 straddles the western end of the Murphy Tectonic Ridge, a geographical and geological feature where the Early Proterozoic Nicholson Granite intrudes older Murphy Metamorphics, and the Clifdale Volcanics.

The Murphy Metamorphics are comprised of metamorphosed shales, siltstones, volcanics and greywackes. The rocks are isoclinally folded along steep E-W axes, and are generally rather poorly exposed to the east.

The Metamorphics are overlain unconformably by the Clifdale Volcanics. The Volcanics consist of rhyolite, ignimbrite and tuffs.

The Nicholson Granite consists of biotite and hornblende adamellite and granite, leucogranite and microgranite.

The northward dipping, Middle Proterozoic McArthur Basin sequence unconformably overlies the Murphy Tectonic Ridge, represented in outcrop by the Westmoreland Conglomerate of the Tawallah Group. The Westmoreland Conglomerate crops out in the western and eastern portions of the Licence. The formation consists of conglomeratic arenite, quartz arenite, and conglomerate.

On the eastern half of the Calvert Hills sheet, the southern side of the Murphy Metamorphic Ridge is unconformably overlain by the Lawn Hill Platform sequence, commencing with gritty sandstones and conglomerates of the Wire Creek Sandstone which is conformably overlain by the Peter's Creek Volcanics. These are considered to be equivalent to the whole of the Tawallah Group to the north, and although the Wire Creek Sandstone is correlated with the Westmoreland Conglomerate, there is no evidence that these two formations were ever deposited in connecting basins (Ahmad & Wygralak, 1989).

Overlying the Peter's Creek Volcanics are basal conglomerates overlain by clastics and dolomitic units of the Fickling Group which are of a similar age to the McArthur Group sediments to the north.

The Fickling Group, part of the Lawn Hill Platform sequence is disconformably overlain by clastic sediments of the Adalaidian South Nicholson Group.

Cambrian Bukalara Sandstone crops out in parts of the Licence, and unconformably overlies the Proterozoic sediments. The Bukalara Sandstone is in turn unconformably overlain by the Late Jurassic to Early Cretaceous Mullaman Beds. The Mullaman Beds are part of an extensive belt of fluvial and shallow-marine sandstone and siltstone that covers vast areas of the Northern Territory.

Cainozoic black soil and lateritic soils cover much of the Licence.

## **5.0 PREVIOUS WORK**

Between 1979 and 1981, AFMECO Pty Ltd held the ground under Exploration Licences 2111, 2136 and 2137. They flew magnetic and radiometric surveys and carried out stream sediment and water bore sampling programs in search for uranium.

Ashton Mining Limited held the ground as Exploration Licences 4342, 4352, 4359 and 4360 in their search for diamonds between 1983 and 1989. Aberfoyle Exploration Pty Ltd was the Licensee of Exploration Licence 4342.

An extensive aeromagnetic survey was flown for Ashton Mining in the Brunette Downs area, covering all of Exploration Licence 7223. Follow up by Ashton of aeromagnetic targets included ground magnetics, RAB line traverses, and sixty diamond drill holes.

In 1985 Ashton Mining Pty. Ltd. commissioned Geotrex Pty. Ltd. to fly an airborne electromagnetic INPUT survey covering the majority of the original E.L. 7223

## **6.0 WORK BY M.I.M. EXPLORATION PTY LTD**

### **6.1 1991**

#### **Assessment of Magnetic Susceptibility Drill Hole Logs**

In 1991 an assessment of magnetic susceptibility logs acquired down a number drill holes, within the relinquished area, was undertaken. Drawing No. 33520a contains the location of the relevant holes.

The following conclusions were made, based on the susceptibility data:

1. The overburden layer (including Cretaceous material) is generally non-magnetic, having an average susceptibility of around  $100 \times 10^{-6}$  SI units.
2. Cambrian rock types are generally non-magnetic within the relinquished area.
3. Proterozoic clastic rock types are generally non-magnetic, with an average response of around  $100 \times 10^{-6}$  SI units. However zones of weak magnetic susceptibility were noted in holes MD12 and CJ19.
4. Meta-sediments within the Murphy Metamorphics are generally non-magnetic, again with an average susceptibility around  $100 \times 10^{-6}$  SI units. Weakly anomalous schists in CJ109 ranged up to  $1000 \times 10^{-6}$  SI units. Porphyritic basic-ultrabasic volcanics within the Murphy Metamorphics ranged between  $1000-100000 \times 10^{-6}$  SI units.



5. 'Basement' intrusive igneous rock types ranged in response from non-magnetic granite and adamellite to moderately magnetic dolerite.

#### **Aeromagnetic Survey Interpretation**

In 1991 a regional assessment of aeromagnetic data acquired by Ashton Mining Pty. Ltd. was undertaken. The contours of total magnetic intensity and an interpretation overlay for the relinquished area are presented in Drawings 33521a and 33520a respectively.

The total magnetic intensity response is flat. Murphy Metamorphics have been interpreted in the central portion of the relinquished area and also in a small area to the north. South Nicholson Basin is interpreted to the south of the Murphy Metamorphic trend and Nicholson Granite is interpreted in the north.

#### **6.2 1992**

##### **Ashton INPUT Survey - Re-interpretation**

In 1985 Ashton Mining Pty. Ltd. commissioned Geoterrex Pty. Ltd. to acquire INPUT data over their then tenement EL 4352. In 1992 the INPUT data was acquired by MIM Exploration Pty. Ltd. and re-interpreted to aid in the search for base metal mineralisation.

The flight path map, interpretation overlay and channel 10 pseudo colour image are presented in Drawings 33822a, 33827a and 33994a.

The interpretation outlines a broad conductive domain roughly coinciding with the magnetic trend (referred to in the previous section) interpreted to be Murphy Metamorphics (refer to Drawing 33827a). Within this broad conductive domain individual anomalies have been indicated, however they are not interpreted to be sourced from deep bed rock conductors. Black soil is interpreted to be the most likely source of conductivity anomalies within the relinquished area.

#### **6.3 1993**

No work was carried out over the relinquished area in 1993

## 7.0 CONCLUSIONS

The reassessment of regional magnetics and INPUT data has indicated that the relinquished portion of EL 7223 has little potential for the existence of base metal mineralisation.

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Stephen Busuttil  
Project Geophysicist - Northern Territory

## REFERENCES

Ahmad M. and Wygralak A.S., 1989: 1:250 000 Calvert Hills Map Sheet and Explanatory Notes, Northern Territory Geological Survey.

Ashton Mining Limited, 1989: Final Report Exploration Licence 4342, 26<sup>th</sup> August, 1983 to 25<sup>th</sup> August, 1989.

Ashton Mining Limited, 1989: Final Report Exploration Licence 4352, 21<sup>st</sup> September, 1983 to 20<sup>th</sup> September, 1989.

Ashton Mining Limited, 1989: Final Report Exploration Licence 4360, 13<sup>th</sup> September, 1983 to 12<sup>th</sup> September, 1989.

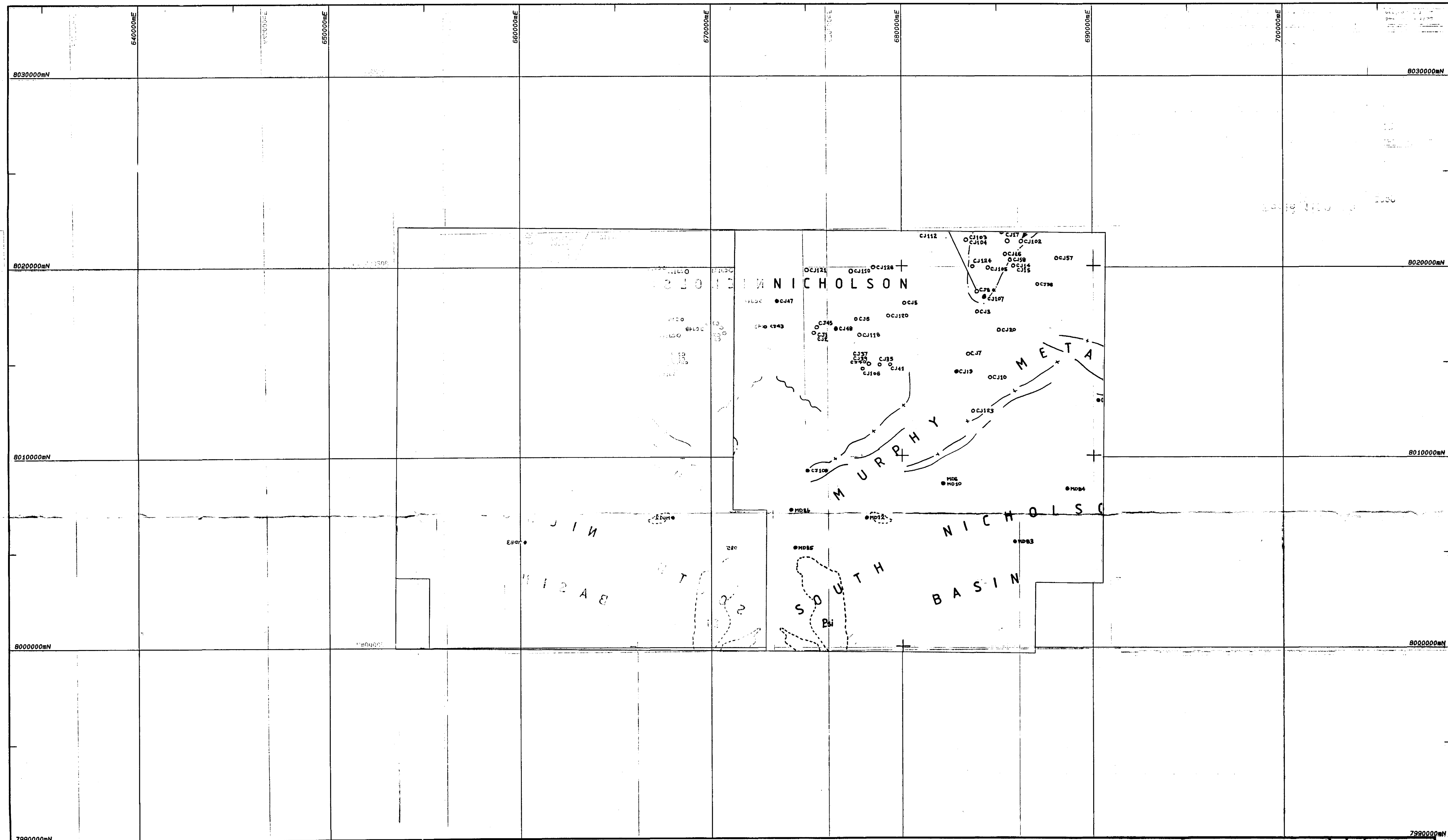
Plumb K.A. and Rhodes J.M., 1964: 1:250 000 Wallhallow Map Sheet and Explanatory Notes, Bureau of Mineral Resources, Geology and Geophysics.

Randall M.A., 1966: 1:250 000 Brunette Downs Map Sheet and Explanatory Notes, Bureau of Mineral Resources, Geology and Geophysics.

Smith J.W. and Roberts H.G., 1963: 1:250 000 Mt. Drummond Map Sheet and Explanatory Notes, Bureau of Mineral Resources, Geology and Geophysics.

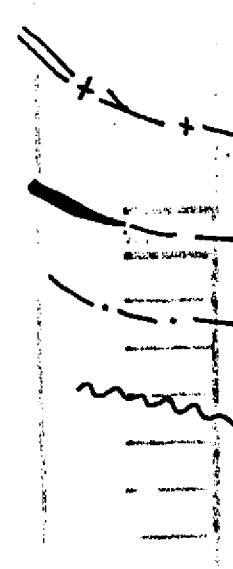






## LEGEND

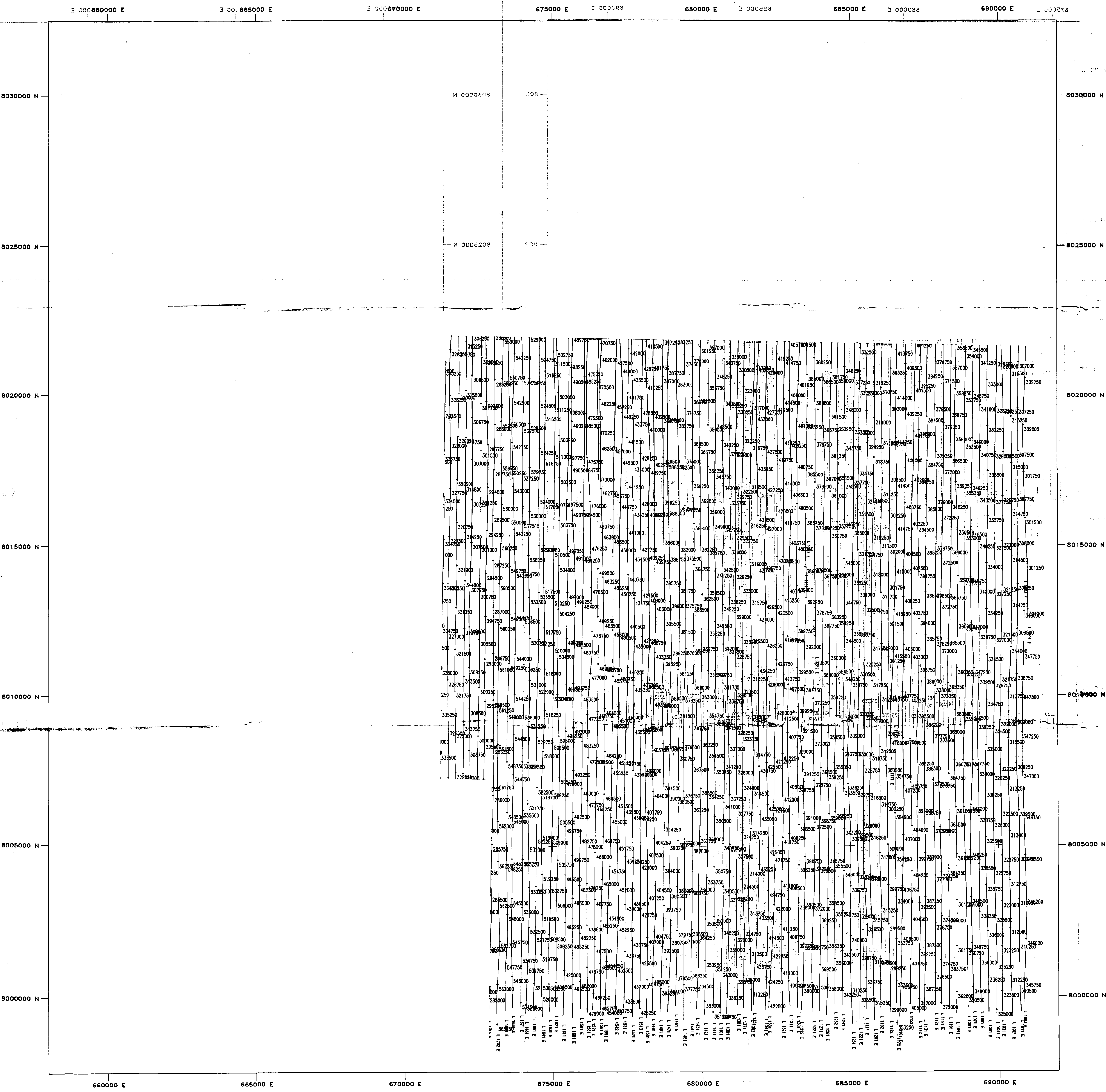
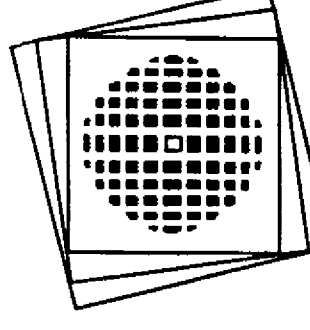
- Ashton Mining Ltd Drillhole
- Ashton Mining Ltd Drillhole With Magnetic Susceptibility Log



Positive Magnetic Anomaly Trend	Czs	Calozoic soil, sand or lateritic detritus	Benmara Beds
Negative Magnetic Anomaly Trend	KI	Mullaman Beds	EARLY PROTEROZOIC BASEMENT
Interpreted Magnetic Boundary	Ps1	Mittiebah Sandstone	Pim
Interpreted Fault	Ps2	Mullera Sandstone	Murphy Metamorphics
	Psa	Constance Sandstone	

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REVISION	SCALE 1:100 000	M.I.N. EXPLORATION PTY. LTD.
	GEO TVH	EE7223 "BARKLY", NT
	DRAFT TVH/SPH	AEROMAGNETIC INTERPRETATION
	CHECKED:	OVER RELINQUISHED AREA
	DATE FEB 92	(ASHTON MINING LTD 1983 SURVEY DATA)
	1:250 000	
	1:100 000	
	MINING FIELD OR DISTRICT: NORTHERN MINERAL FIELD	DWG No: 39820

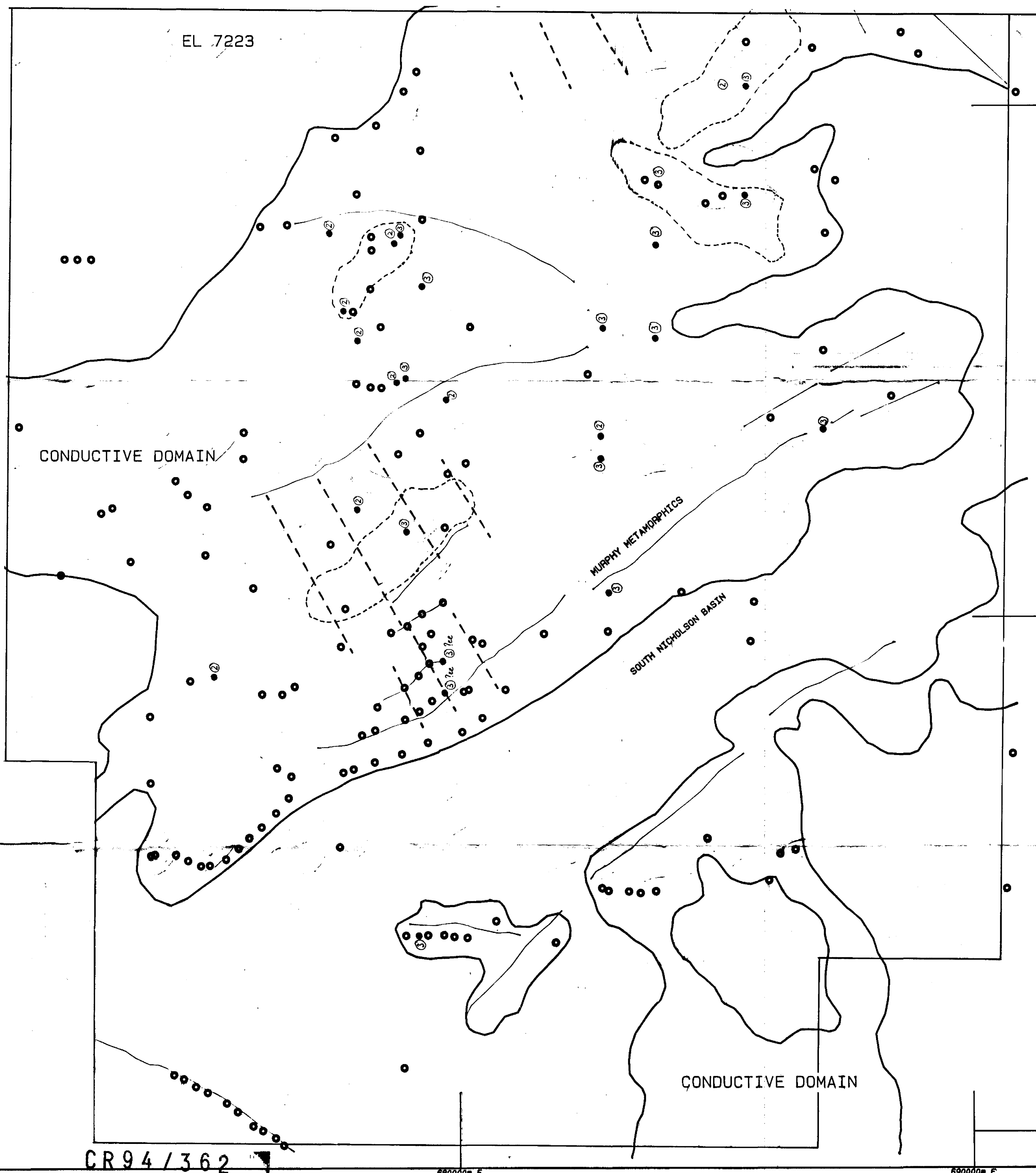


Scale 1:50000  
1000 0 1000 2000 3000  
(metres)  
CR 94 ' 62  
Dwg. No. 3382a

MIM EXPLORATION PTY LTD  
BENMARA INPUT SURVEY  
NORTHERN TERRITORY  
Flight Line Plan - 3 Point Subsample  
Fiducial Interval 250  
AMG Zone 53 Projection

Processed by GEOIMAGE PTY LTD

Date: September 1992  
Scale: 1:50000



Plotted with

**MICROMINE**

Resources Software  
Perth, Australia  
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Fax +61 9 386 7462

NOTES:  
LEGEND

BLACK DOTS-Second order conductors (surficial)  
BLACK SOLID LINES-Domain boundaries  
GREEN SOLID LINES-Trend lines  
BLACK DASHED-High surface conductivity  
BLUE DASHED-Broad anomalies

SCALE

1: 50 000

DATE

17/01/93

SHEET

of

REF No.

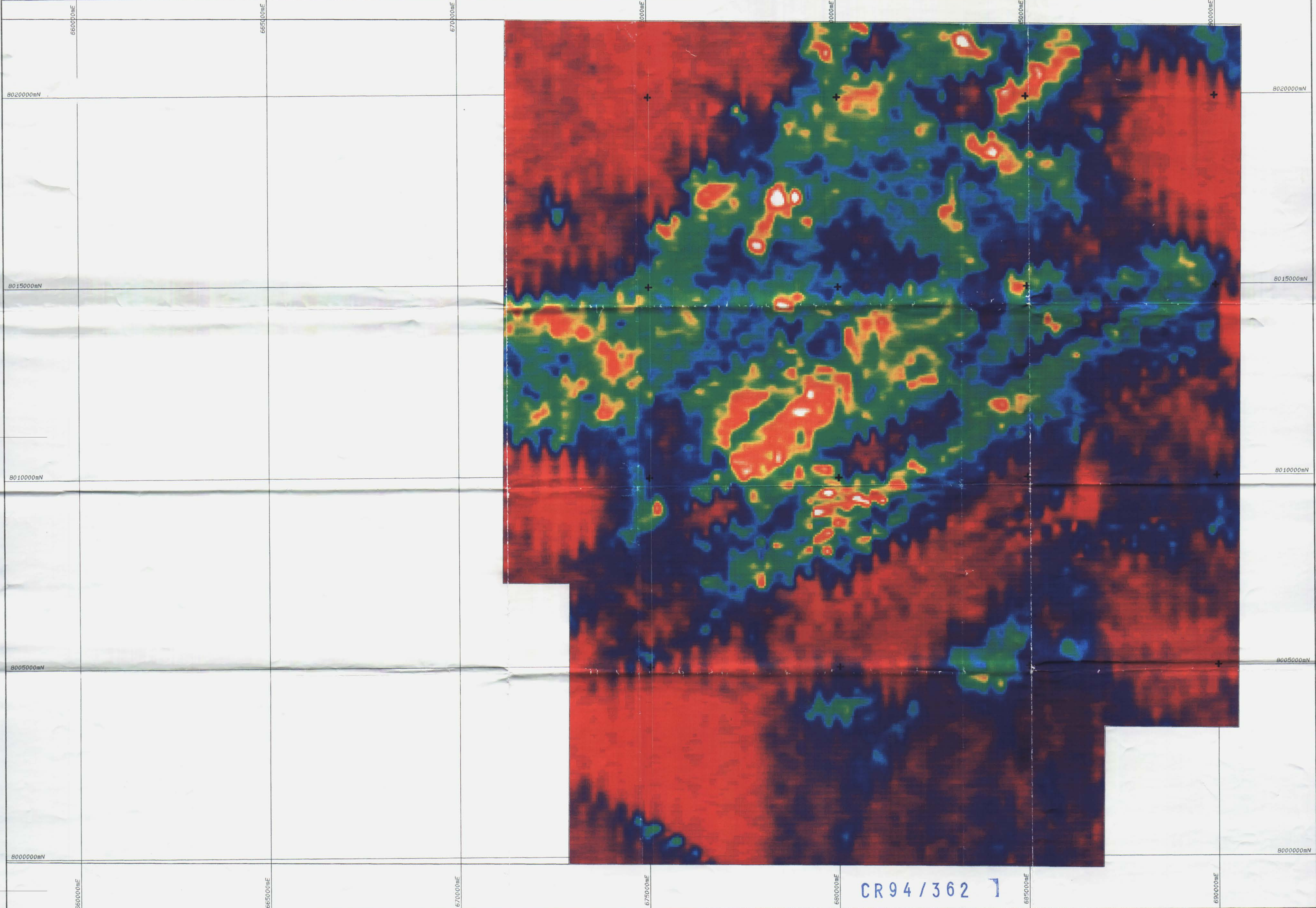
33994a


EL7222 "COOLIBAH" &  
EL7223 "BARKLY", N.T.  
AIRBORNE INPUT SURVEY  
INTERPRETATION OVERLAY

M.I.M. EXPLORATION

PTY LTD





			Scale 1: 50000	DATE 11/05/94	SHEET 1 of 1	BARKLY EL 7223 INPUT CHN 10 Flown Geoterrex Pty Ltd Dec. 1992	MIM EXPLORATION PTY LTD
				REF No. 33827a			
				