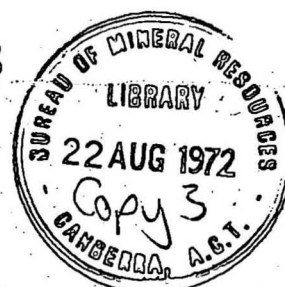


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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF  
NATIONAL DEVELOPMENT  
BUREAU OF MINERAL  
RESOURCES, GEOLOGY  
AND GEOPHYSICS



**RESTRICTED**

**Record 1972/58**

**DEAF ADDER CREEK AND JIM JIM CREEK  
AIRBORNE GEOPHYSICAL SURVEYS, N.T., 1971.**

by

**K.R. Horsfall**

**RESTRICTED**

The information contained in this report has been obtained by the Department of National Development as part of the policy of the Commonwealth Government to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus or statement without the permission in writing of the Director, Bureau of Mineral Resources, Geology & Geophysics.

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1972/58  
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Plate 3 : Flight-line diagram - Deaf Adder Creek.

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### SUMMARY

In November 1971 the Bureau of Mineral Resources conducted a detailed radiometric survey in the Deaf Adder Creek and Jim Jim Creek areas of the Northern Territory. This was flown concurrently with a regional magnetic survey in the Mount Evelyn 1:250 000 sheet area.

The radiometric data reveal five weak anomalies in the Jim Jim Creek area which can be attributed to thorium. The magnetic results disclose a trend which is possibly due to the basic rocks of the Zamu Complex, and anomalies associated with volcanics in the Kombolgie Formation.

## 1. INTRODUCTION

In November 1971 the Bureau of Mineral Resources conducted a detailed radiometric survey in the Jim Jim Creek and Deaf Adder Creek areas, NT (Plate 1). These were flown in conjunction with a regional magnetic survey covering the northern half of the Mount Evelyn 1:250 000 sheet area.

The surveys were conducted at the request of the Northern Territory Administration as part of an environmental study of the Alligator River region. The Jim Jim Creek and Deaf Adder Creek areas are of major ecological interest and have been placed under mining reserves, closing them to private mineral exploration.

Staff, equipment, and survey specifications are listed in the Appendix.

## 2. GEOLOGY

The geology of the area (Plate 2) is taken from the Mount Evelyn 1:250 000 geological sheet and its accompanying explanatory notes (Walpole, 1962).

The area is dominated by the massive sandstone cliffs and plateau of the Kombolgie Formation, which covers much of the eastern half of the Mount Evelyn 1:250 000 Sheet. It comprises a 1 400-m thick sequence of quartz-greywacke conglomerate, sandstone, and intrusive volcanics.

In the south, along the floor of the Jim Jim Creek gorge, there is an exposure of Jim Jim Granite. This is a discordant mass of biotite granite.

The Zamu Complex, which consists of basic to intermediate dyke swarms and sills, occurs near the upper reaches of Nourlangie Creek.

The area is extensively covered by sand and soil.

### 3. DETAILED RADIOMETRIC RESULTS

#### Deaf Adder Creek

This area was flown with a ground clearance of 30 to 60 m; a constant ground clearance could not be maintained owing to the ruggedness of the country. The flight-line diagram (Plate 3) shows the coverage of the area.

Background count rates for the three channels are:

Potassium	- 40 counts/s
Uranium	- 26 counts/s
Thorium	- 15 counts/s

The gamma-ray spectrometer did not reveal any anomalous areas.

#### Jim Jim Creek

This area was flown at much the same altitude and spacing as Deaf Adder Creek.

Background count rates for the three channels are:

Potassium	- 52 counts/s
Uranium	- 38 counts/s
Thorium	- 20 counts/s

On the flight-line diagram (Plate 4), the positions of five uranium-channel anomalies are marked. These are of only slightly higher count rates than the statistical noise envelope. The following table describes these anomalies and gives the corresponding count rates in the thorium channel.

<u>Anomaly No.</u>	<u>Fiducial No.</u>	<u>Peak amplitude,</u> counts/s above background		<u>Half-width,</u> seconds	
		<u>Uranium</u> <u>channel</u>	<u>Thorium</u> <u>channel</u>	<u>Uranium</u> <u>channel</u>	<u>Thorium</u> <u>channel</u>
1	597	12	8	5	6
2	672	6	10	10	20
3	679	12	12	13	13
4	753	12	14	26	24
5	765	9	20	30	35

If a stripping ratio of 1:1 for Th:U is applied (Beattie, 1971) these anomalies can be attributed to thorium.

As can be seen from the flight-line diagram, anomalies 1 and 3 occur at the turning points of lines and therefore it is reasonable to assume that the detector was closer to a rock face (probably a cliff face) than normal. Unfortunately this could not be confirmed as the radar altimeter was not working. The other anomalies may be due to the effect of reduced ground clearance. This is supported by the large half-widths of these anomalies.



#### 4. REGIONAL MAGNETIC RESULTS

The magnetic data shown in Plate 2 are part of the regional coverage of the Mount Evelyn 1:250 000 Sheet. The northern part of the sheet area will be completed during the 1972 survey program.

The magnetic results in the area are not strongly disturbed; the largest anomaly of 80 gammas occurs over sand to the east of Nourlangie Creek. This anomaly could be due to a subsurface extension of the Zamu Complex. The magnetic trend indicates that the Zamu Complex may exist under the Kombolgie Formation. An estimated depth for the source is 150 m below ground level.

Magnetic anomalies occur over the volcanics in the Kombolgie Formation near Deaf Adder Creek. A magnetic anomaly also occurs over the sand in the northwest of the area. The source of this anomaly is unknown.

#### 5. CONCLUSIONS

All radiometric anomalies recorded on the uranium channel can be attributed to thorium and low ground clearance.

Magnetic results show that the Zamu Complex may extend under the Kombolgie Formation. Outcrops of volcanics in the Kombolgie Formation also coincide with magnetic anomalies.

#### 6. REFERENCES

- BEATTIE R.D., 1971 - Airborne gamma-ray spectrometer survey Rum Jungle, NT 1969. Bur. Miner. Resour. Aust. Rec. 1971/85 (unpubl.).
- WALPOLE, B.P., 1962 - Mount Evelyn, N.T., - 1:250 000 Geological Series. Bur. Miner. Resour. Aust. explan. Notes, D 53/5.

## APPENDIX

### OPERATIONAL DETAILS

#### Staff

Party Leader	:	K. Horsfall
Geophysicists	:	B. Wyatt
	:	R. Taylor
Drafting Officers	:	A. Parvey
	:	I. O'Donnell
Technical Officer	:	J. Walker
Technical Assistants	:	M. Johnson
	:	D. Park
Pilot (TAA)	:	First Officer B. Joel

#### Equipment

Aircraft	:	Aero Commander VH-BMR.
Magnetometers	:	Airborne - MNS-2 proton precession (BMR design). Recorder - Mosely 7100.
	:	Base-station - MNS-1 proton precession (BMR design). Recorder - Esterline Angus.
Gamma-ray spectrometer	:	Detector - Harshaw 15-cm diameter by 10-cm thick thallium-activated sodium iodide crystals optically coupled to photo-multipliers. Electronics - Hamner modules. Stabilization - Cs <sup>137</sup> 10-microcurie source. Recorders - Speedomax MK2, 3-channel.
Camera	:	Vinten 35-mm wide-angle.

#### Survey specifications

Magnetometer recorder sensitivities	:	Airborne - 100/1000 gammas f.s.d., chart speed 2 in/min. Base - 100 gammas f.s.d., chart speed 6 in/h.
Gamma-ray spectrometer	:	Channel settings: K (K <sup>40</sup> ) 1.3 - 1.6 MeV U (Bi <sup>214</sup> ) 1.6 - 1.9 MeV Th (Tl <sup>208</sup> ) 2.4 - 2.8 MeV Time constants - 2 s, all channels.

Sensitivity:

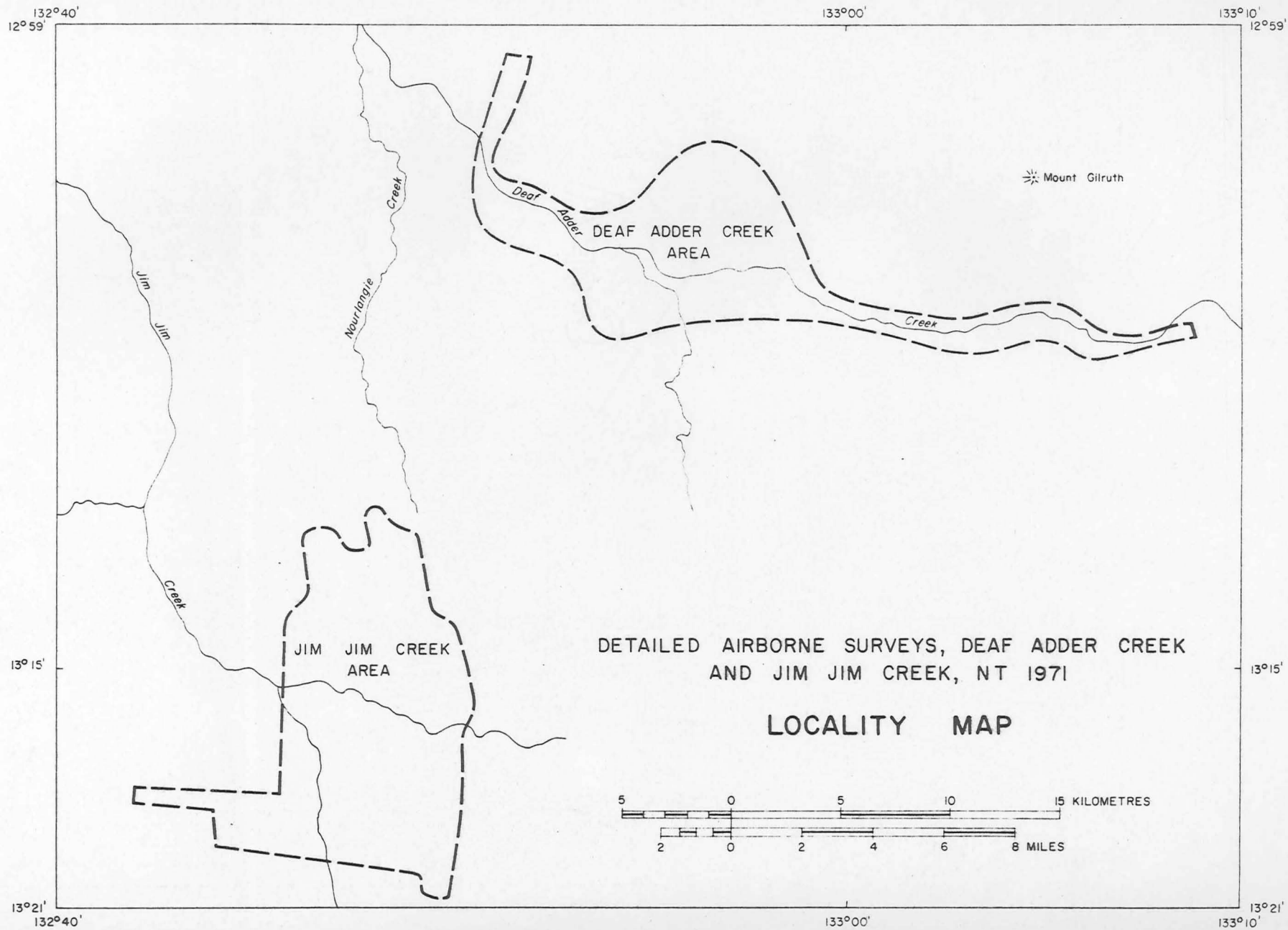
K 200 counts/s f.s.d.

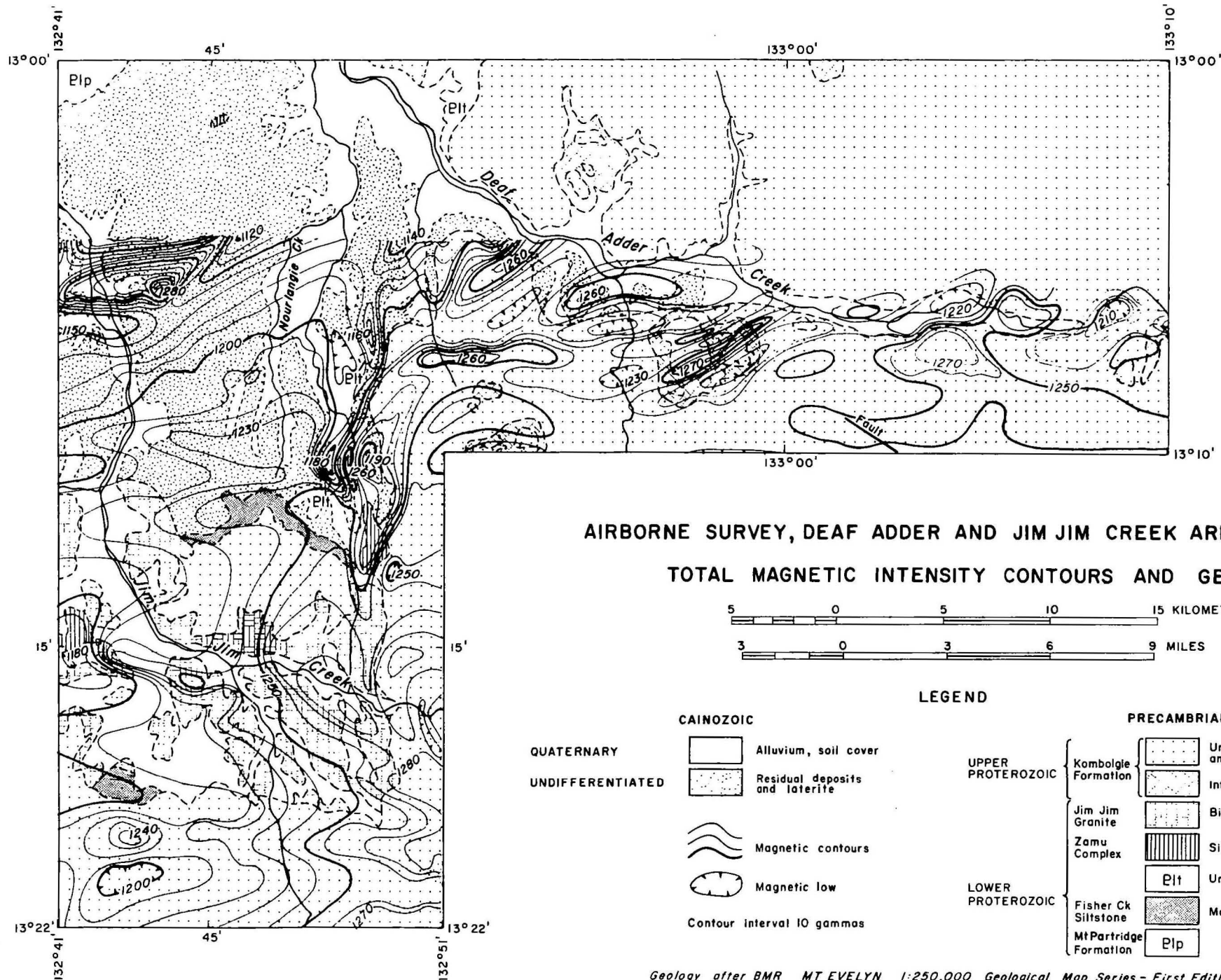
U 100 " "

Th 100 " "

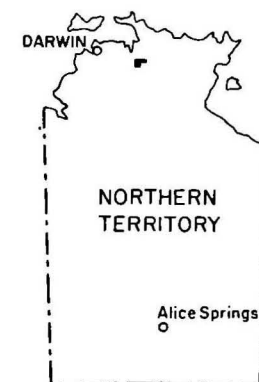
Radiometric flying : Altitude 60 m above ground.  
Aircraft speed 185 km/h  
Line spacing variable  
Line orientation variable

Magnetic flying : Altitude 150 m above ground.  
Aircraft speed 185 km/h  
Line spacing 1.5 km  
Line orientation east-west.





LOCATION DIAGRAM



# AIRBORNE SURVEY, DEAF ADDER AND JIM JIM CREEK AREAS, NT 1971

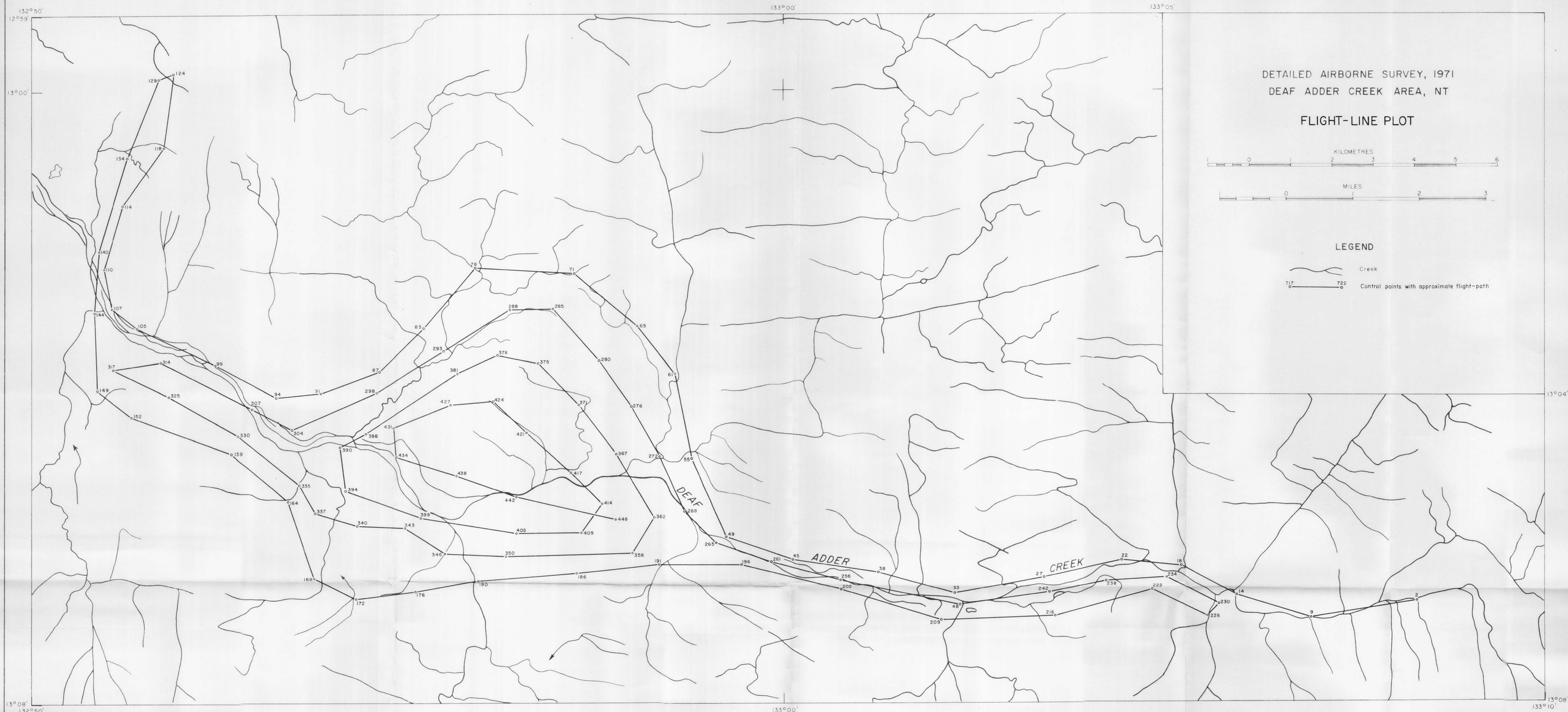
## TOTAL MAGNETIC INTENSITY CONTOURS AND GEOLOGY



### LEGEND

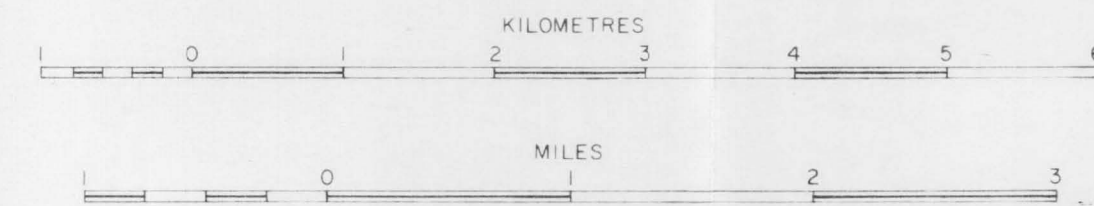
CAINOZOIC		PRECAMBRIAN	
QUATERNARY	Alluvium, soil cover	UPPER PROTEROZOIC	Kombolgie Formation
UNDIFFERENTIATED	Residual deposits and laterite		Jim Jim Granite
	Magnetic contours		Zamu Complex
	Magnetic low	LOWER PROTEROZOIC	Fisher Ck Siltstone
	Contour Interval 10 gammas		Mt Partridge Formation
			Undifferentiated arenites and rudites
			Intercalated volcanics
			Biotite granite
			Sills and dykes of dolerite and gabbro
			Undifferentiated
			Mainly siltstone
			Undifferentiated





DETAILED AIRBORNE SURVEY, 1971  
DEAF ADDER CREEK AREA, NT

FLIGHT-LINE PLOT



LEGEND

- Creek
- Control points with approximate flight-path



DETAILED AIRBORNE SURVEY, 1971  
JIM JIM CREEK AREA, NT  
FLIGHT-LINE PLOT  
AND  
RADIOMETRIC RESULTS



LEGEND

- Creek
  - Control points with approximate flight-path
  - Actual position
  - Approximate position
- Uranium channel anomalies

