

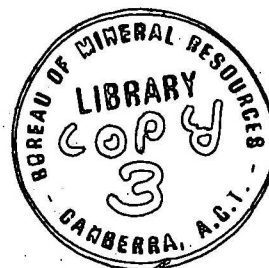
DEPARTMENT OF
MINERALS AND ENERGY



BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

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AIRBORNE GEOPHYSICAL SURVEYS
IN THE TENNANT CREEK REGION,
NT, 1970

by

E.P. SHELLEY

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CONTENTS

	<u>Page</u>
SUMMARY	
1. INTRODUCTION	1
2. RESULTS	2
3. REFERENCES	2
APPENDIX - Operational details	4

ILLUSTRATIONS

FIGURE 1.	Locality map
PLATE 1.	Gamma-ray spectrometer profiles - Tennant Creek
PLATE 2.	Flight-lines and geology - Bonney Well
PLATE 3.	Total magnetic intensity profiles - Bonney Well
PLATE 4.	Radiometric profiles - Bonney Well

SUMMARY

Two airborne surveys were made by BMR in the Tennant Creek region during June 1970.

A detailed airborne radiometric survey was made over part of the Tennant Creek Mineral Field to determine the radiometric response of the various rock types in the area.

A regional airborne magnetic and radiometric survey was made over the northeastern part of the BONNEY WELL 1:250 000 Sheet area to complete the coverage of the Sheet area and to aid the mapping of the Warramunga Group sediments beneath the Cainozoic cover.

The geophysical data for both surveys are presented as stacked profiles together with flight-line locations and generalized geology. The data have not been interpreted.

Copies of the data are available from the Australian Government Printer, Canberra.

1. INTRODUCTION

Airborne surveys in the Tennant Creek region were begun by the Bureau of Mineral Resources (BMR) to assist in the development of the Tennant Creek Mineral Field. Regional surveys were made in 1956 and 1960 (Spence, 1962) and a series of maps displaying total magnetic intensity contours and radioactivity for the TENNANT CREEK 1:250 000 Sheet area were published in 1962 (BMR, 1962a, b, c, d).

Detailed aeromagnetic surveys were made over selected areas, totalling approximately 750 km², from 1964 to 1967 (Milsom & Finney, 1965; Finney, 1967; Shelley & Browne-Cooper, 1967).

During June 1970 a detailed radiometric survey was made over an area of 350 km² in the Tennant Creek Mineral Field. The objectives of the survey were to determine the radiometric response of the various rock types and the distribution of uranium in the area. Traces of uranium had been discovered at the Edna Beryl mine.

The area flown (Fig. 1, Area 2) was chosen to cover a large number of mines and prospects, and a large number of radiometric 'point sources' located in the 1956 survey (BMR, 1962 c, d). As the area had already been adequately covered by aeromagnetic surveys the magnetometer was not operated during this survey. Operational and equipment details are given in the Appendix.

A regional airborne magnetic and radiometric survey over the northeastern part of the BONNEY WELL 1:250 000 Sheet area (Fig. 1, Area 1) was also made during June 1970. This survey covered approximately 2400 km² and was designed to complete the coverage of the BONNEY WELL area and to aid the mapping of the Warramunga Group sediments beneath the Cainozoic cover. Operational and equipment details are listed in the Appendix.

The rest of the BONNEY WELL area has been covered by BMR (1956) and American Overseas Petroleum Ltd (1967).

2. RESULTSTennant Creek

Plate 1 displays the stacked profiles of the potassium, uranium, and thorium channels at a north-south scale of 1:75 000. The flight-line locations, superimposed on generalized geology, are also displayed at a scale of 1:75 000.

The baselines (zero terrain emission) for the profiles are indicated in the legend on Plate 1.

Bonney Well

The flight-lines and generalized geology are shown in Plate 2 at a scale of 1:250 000. Stacked profiles of total magnetic intensity are displayed in Plate 3, and stacked profiles of the potassium, uranium, and thorium channels in Plate 4. All the stacked profiles have a north-south scale of 1:250 000.

The south component of the regional total magnetic gradient has not been removed from the magnetic profiles. A regional gradient correction line has been provided in Plate 3.

The baselines for the radiometric profiles are indicated in the legend in Plate 4.

The geophysical data from both surveys have not yet been interpreted.

Dyelines and transparent copies of Plates 1 to 4 are available from The Copy Service, Government Printer (Production), P.O. Box 84, Canberra ACT, 2600.

3. REFERENCES

AMERICAN OVERSEAS PETROLEUM LTD, 1967 - Tanami - Barrow Creek aeromagnetic survey. Bur. Miner. Resour. Aust. Petrol. Search Subs. Acts Rep. (unpubl.).

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Operational Details

Personnel

J.E. Rees Party Leader
H.J. Alexander Technical Officer
F/O B. Joel Pilot (TAA)

Equipment

Aircraft: Aero Commander 500U - VH-BMR

Airborne Magnetometer: Proton precession type MNS-1 of BMR design,
output to Moseley 7100B recorder.

Ground magnetometer: MMS-1 (prototype), output to Esterline Angus Recorder (set up at Mount Isa).

Gamma-ray spectrometer: Detector - Two Harshaw 15 cm x 10 cm NaI (Tl) crystals optically coupled to photomultipliers.

Electronics - Hamner modules

Stabilization - Cs 137

Recorders - DeVar, 3-channel

Ancillary: Radar altimeter - Bonzer TRN-70.

Camera - Vinten 35 mm with wide angle lens.

Equipment settings

Magnetometer: Airborne - 40 and 400 gammas/cm

Ground - 10 gammas/cm

Spectrometer: Channel 1 - 1.0 - 3.0 MeV

50 counts/s/cm

Channel 2 - 1.3 - 1.6 MeV

20 counts/s/cm

Channel 3 - 1.6 - 1.9 MeV

10 counts/s/cm

Channel 4 - 2.4 - 2.8 MeV

10 counts/s/cm

Time constant - 2 s (all channels)

Survey details

Altitude: 75 m above ground (Tennant Creek)

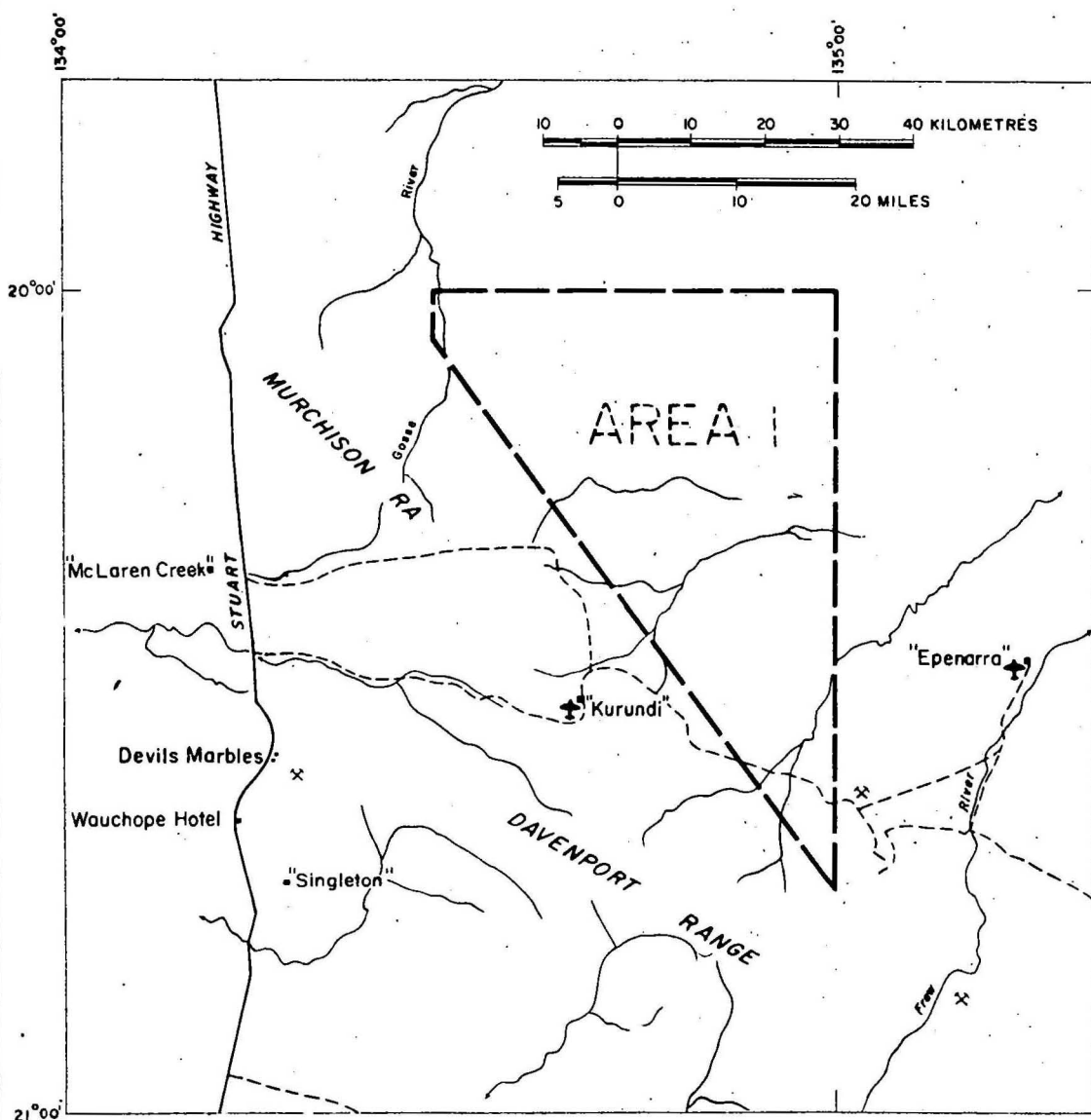
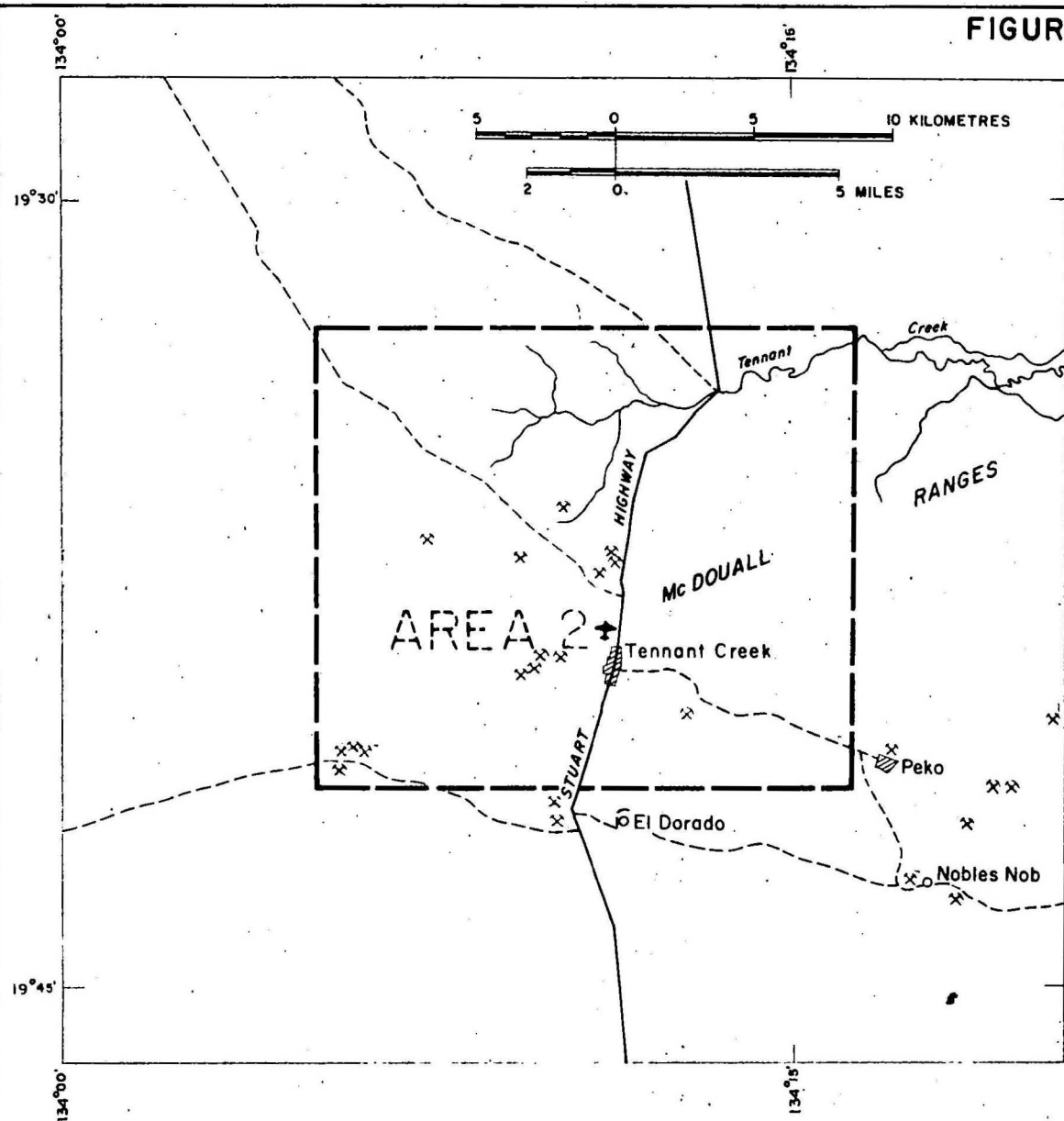
150 m above ground (Bonney Well)

Line spacing: 300 m (Tennant Creek)

1500 m (Bonney Well)

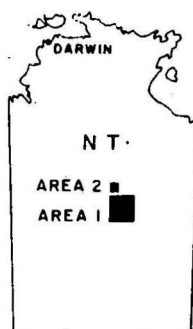
Line orientation: North-south (both surveys)

FIGURE 1

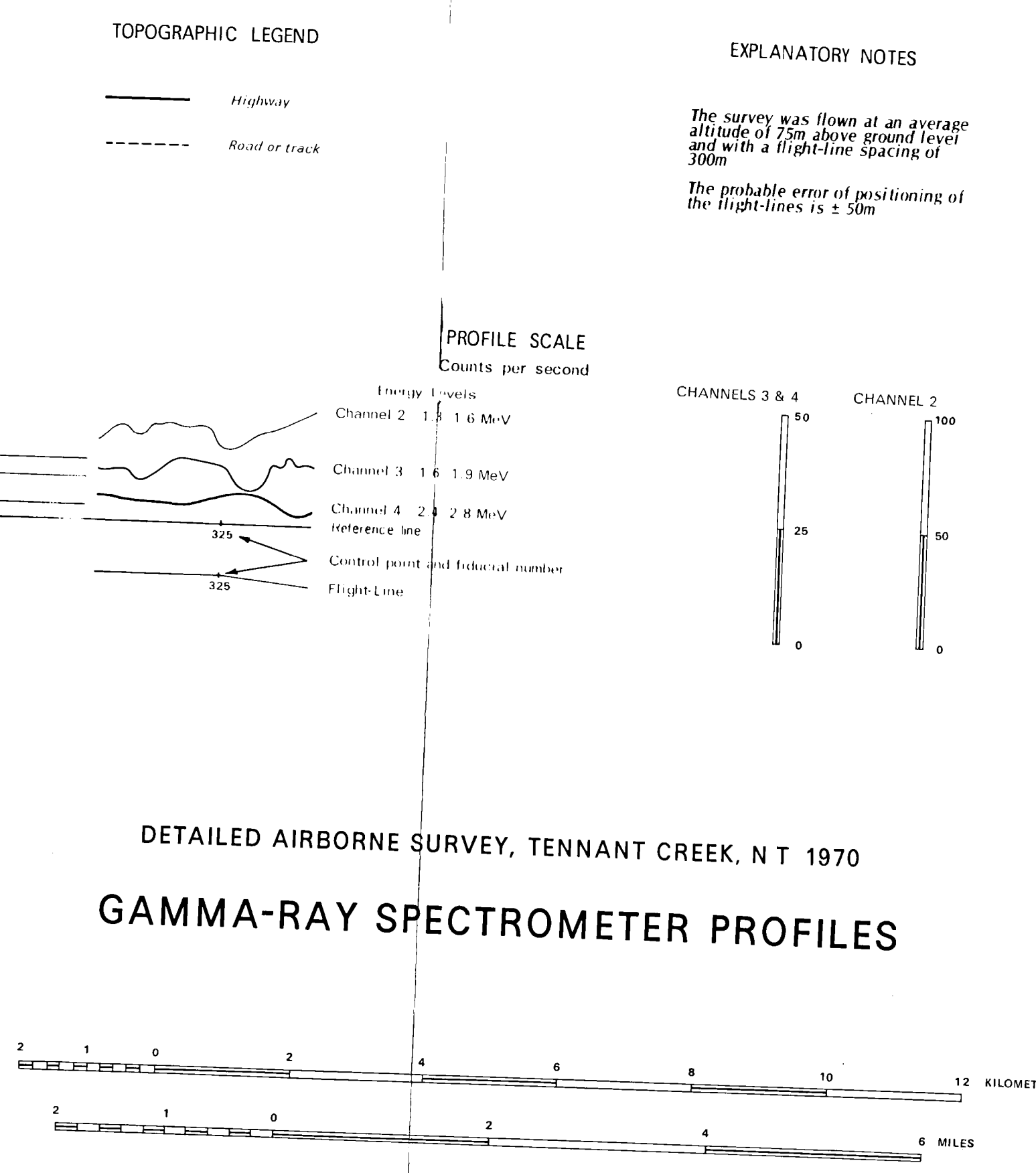
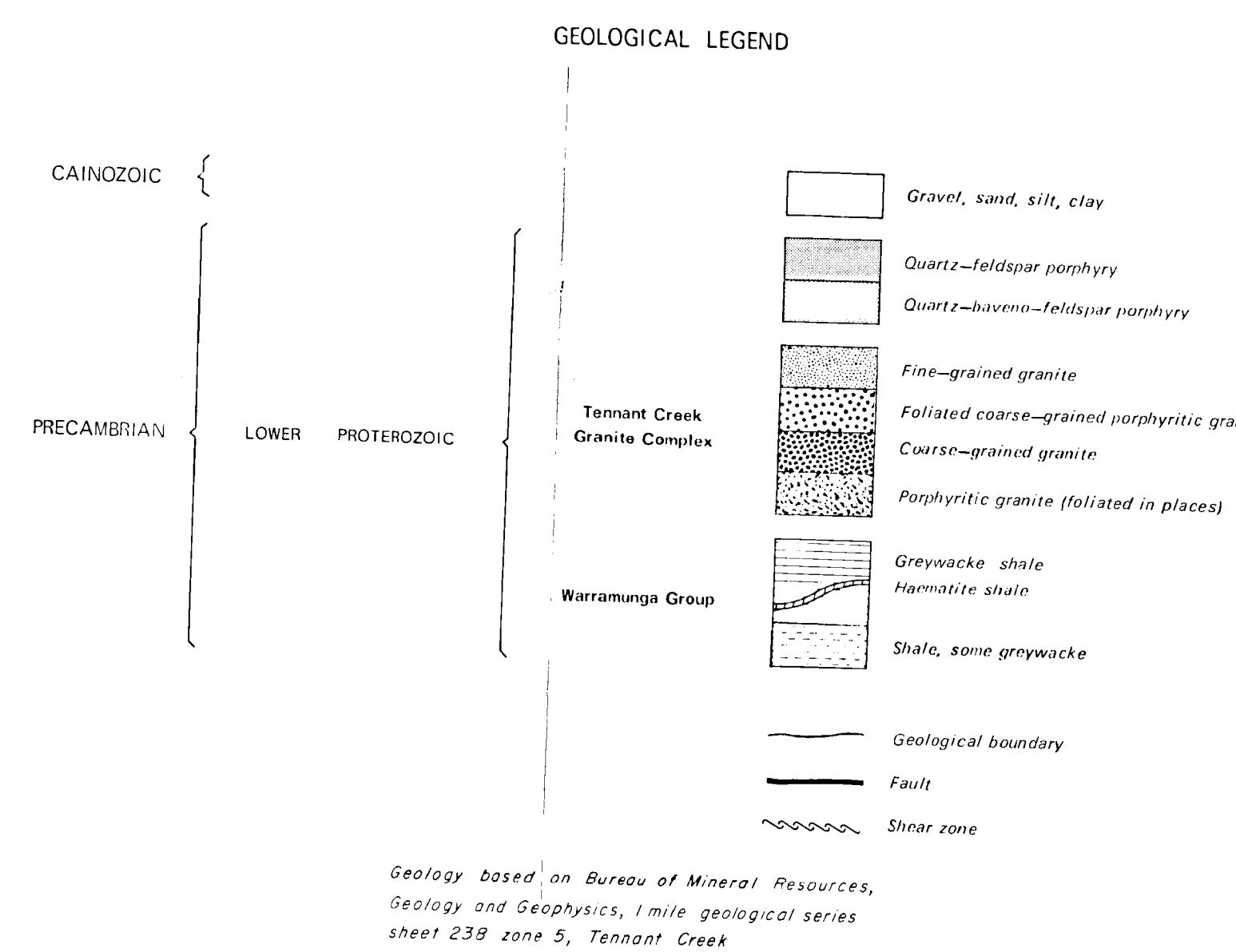
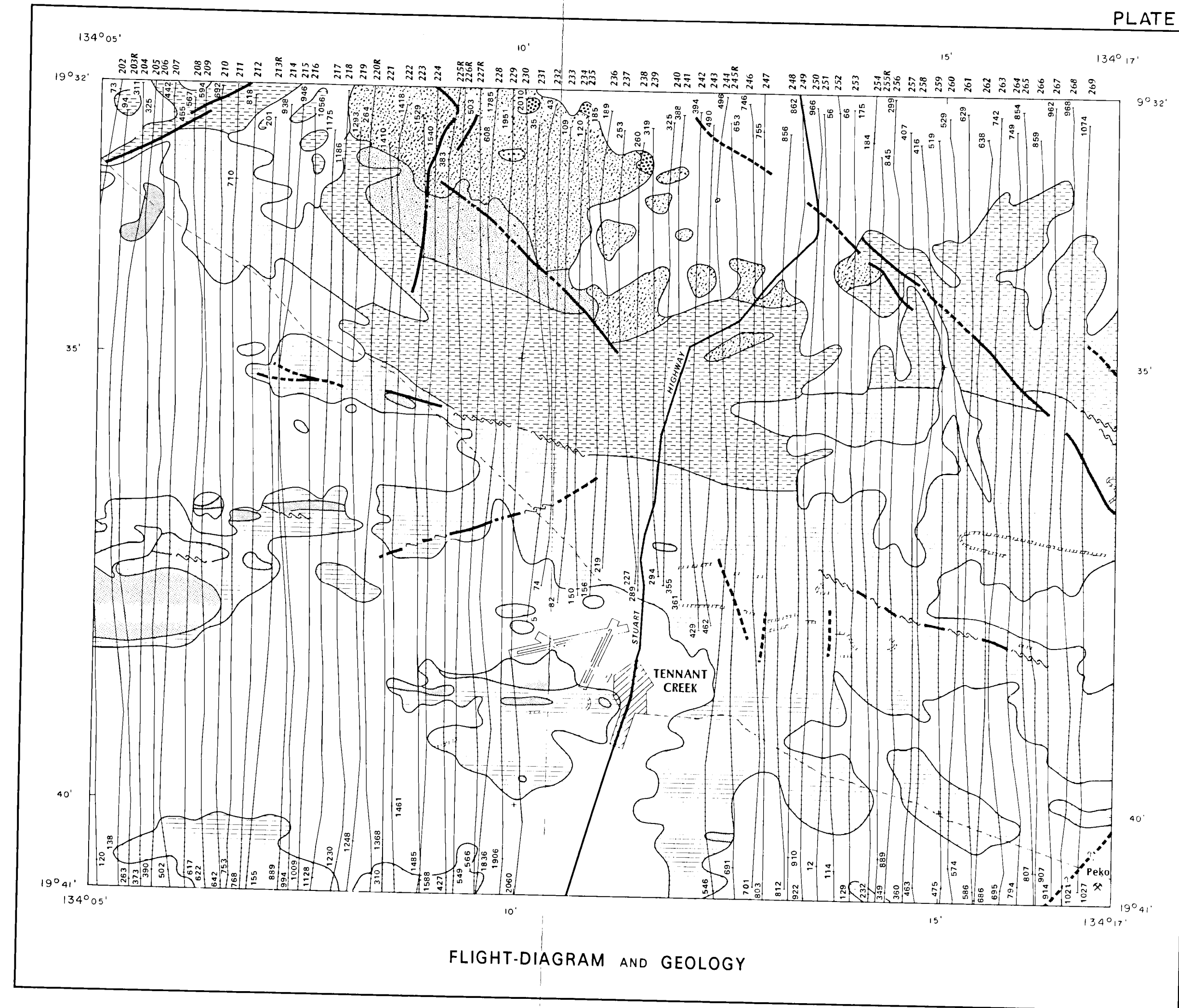
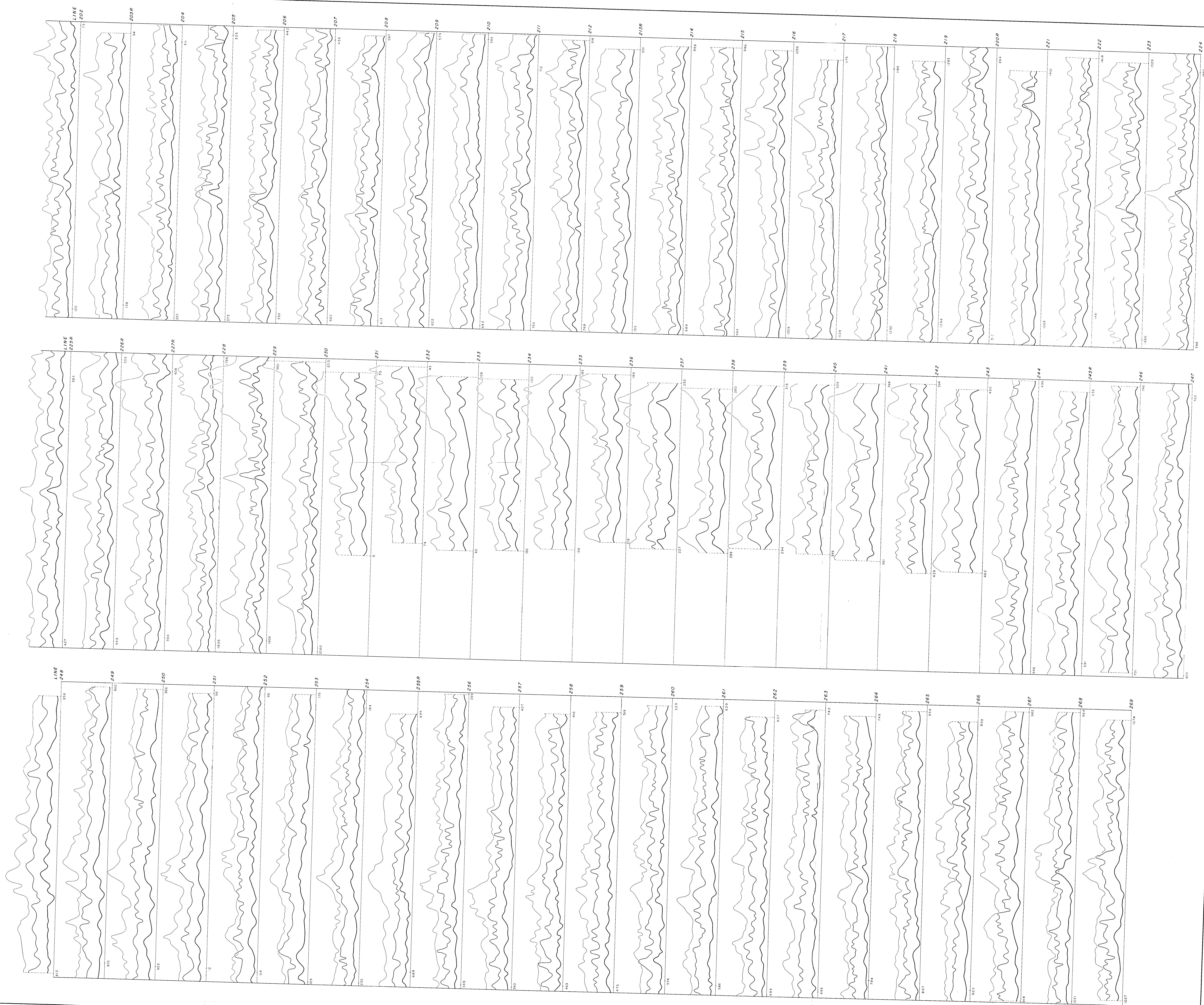


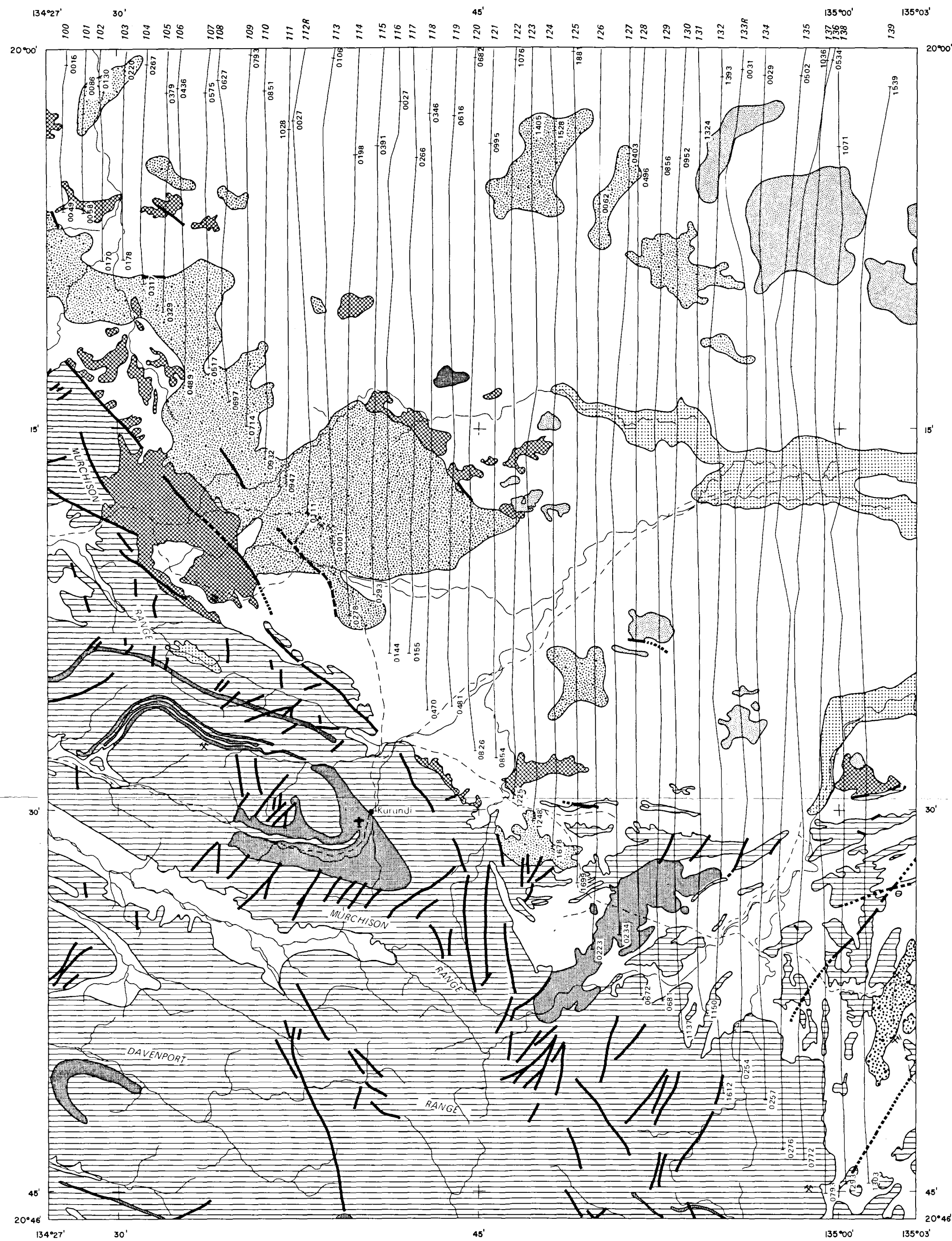
AIRBORNE SURVEYS, TENNANT CREEK, NT 1970

LOCALITY MAP



— Survey boundary





GEOLOGICAL LEGEND

- CAINOZOIC
- QUATERNARY
- Alluvium, soil
 - Soil, gravel, arkose, alluvium, sand
- PALAEZOIC
- MIDDLE CAMBRIAN
- Gum Ridge Formation
- Chert, siltstone, sandstone, dolomite, conglomerate
- PRECAMBRIAN
- LOWER PROTEROZOIC
- Hatches Creek Group
- Gabbro, dolerite
 - Granite, adamellite, granite, porphyry
 - Quartz sandstone, feldspathic sandstone, pebble conglomerate, greywacke, siltstone, shale
 - Basic lava
 - Acid lava
- Warramunga Group
- Shale, siltstone, chert, sandstone, greywacke, acid lavas
- Geological boundary
- Fault

GEOLOGY BASED ON BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS 1:250,000 GEOLOGICAL
SERIES MAPS, BONNEY WELL, FIRST EDITION, SF53-2,
AND FREW RIVER, FIRST EDITION, SF53-3

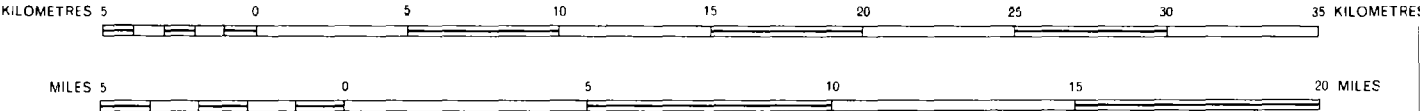
TOPOGRAPHIC LEGEND

- Road or track
- Homestead
- Landing ground
- Stream
- Mine or prospect

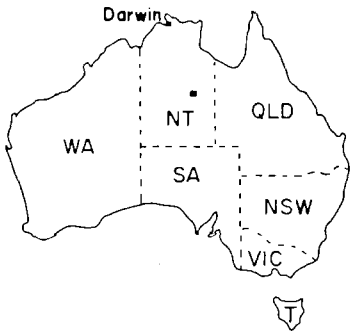
AIRBORNE SURVEY, BONNEY WELL, N T 1970

FLIGHT-LINES
AND
GEOLOGY

SCALE 1 : 250,000

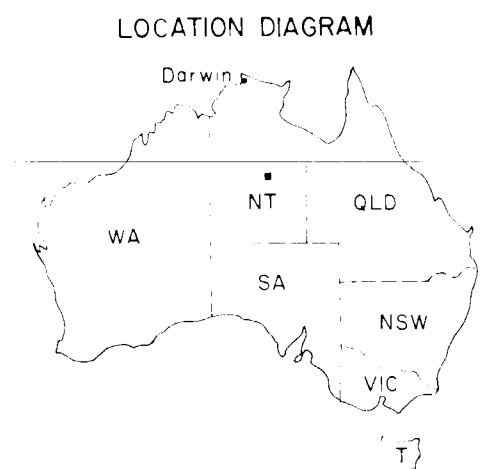
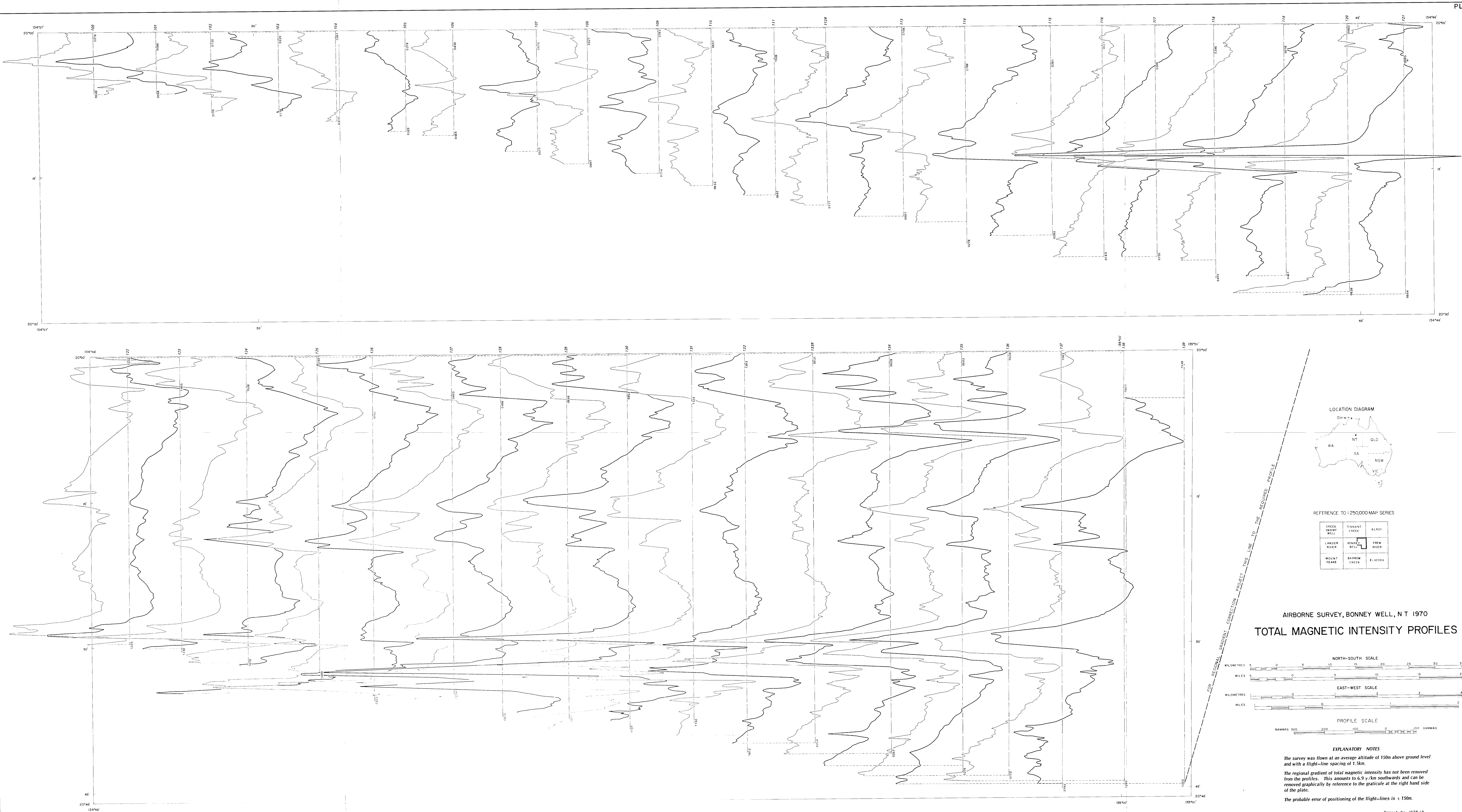


LOCATION DIAGRAM



REFERENCE TO 1:250,000 MAP SERIES

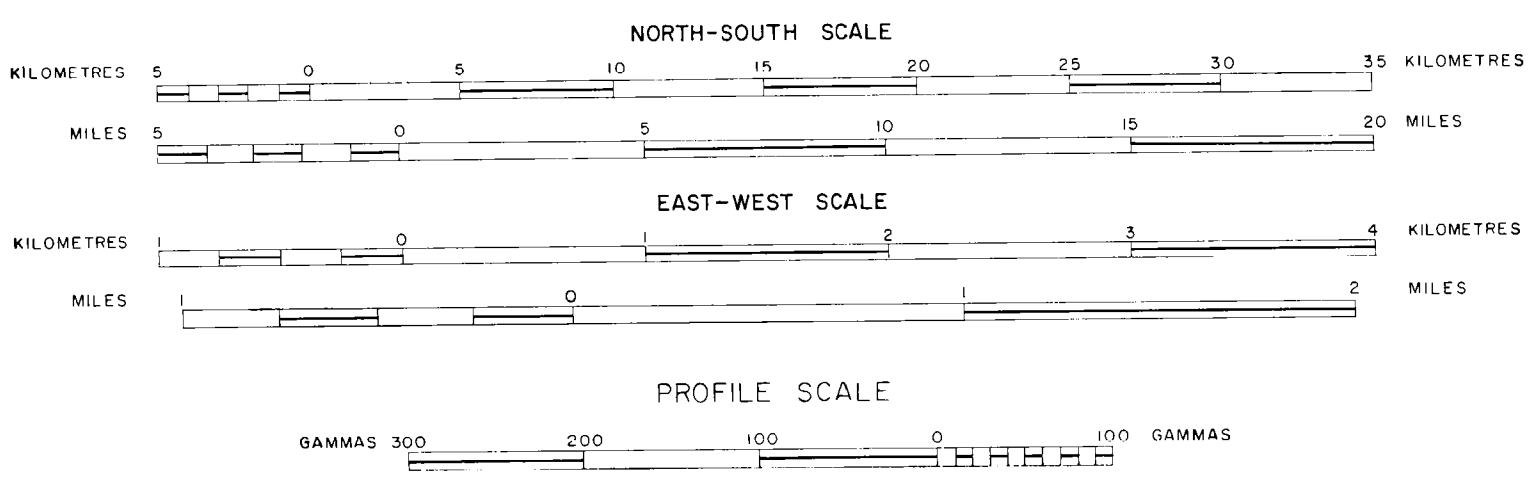
GREEN SWAMP WELL	TENNANT CREEK	ALROY
LANDER RIVER	BONNEY WELL	FREW RIVER
MOUNT PEAKE	BARROW CREEK	ELKEDRA



REFERENCE TO 1:250,000 MAP SERIES

GREEN SWAMP WELLS	TENNANT CREEK	ALROY
LANDER RIVER	BONNEY WELLS	FREW RIVER
MOUNT PEAKE	BARROW CREEK	ELKEORA

AIRBORNE SURVEY, BONNEY WELL, N T 1970
TOTAL MAGNETIC INTENSITY PROFILES



EXPLANATORY NOTES
The survey was flown at an average altitude of 150m above ground level and with a flight-line spacing of 1.5km.
The regional gradient of total magnetic intensity has not been removed from the profiles. This amounts to 6.9 γ/km southwards and can be removed graphically by reference to the graticule at the right hand side of the plate.
The probable error of positioning of the flight-lines is ± 150m.

