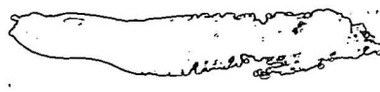

COMMONWEALTH OF AUSTRALIA
DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

RECORDS 1956, No. 141

CARBORNE RADIOMETRIC SURVEY OF THE A.B.C. PROSPECT, KATHERINE, N.T.

by

A. J. BARLOW

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ABSTRACT

The A.B.C. Uranium Prospect, near Katherine, N.T., was discovered by a geologist of the Bureau of Mineral Resources while engaged on a regional survey of the area. It occurs in intermediate volcanic rocks of Upper Proterozoic age as a small body containing secondary uranium minerals.

As part of an intensive prospecting programme in the Bureau's reserve around the prospect, a car-borne survey was made over the volcanic horizon in which the prospect occurs. A Geiger-ratemeter type equipment mounted on a Land Rover was used. Traverses approximately 100 feet apart were located by means of recognisable land-marks from aerial photographs.

Although no new uranium prospects were found the survey showed that the car-borne unit is capable of rapidly covering large areas in detail.

1. INTRODUCTION.

The A.B.C. prospect is about eleven miles north-north-east of Katherine in the Northern Territory (see Plate 1). It was found by A.B. Clark, a geologist of the Bureau of Mineral Resources, while engaged in a regional geological survey of the area. The Bureau obtained a reserve of 252 square miles surrounding the prospect but this was later reduced to 36 square miles.

The reserve has been prospected in detail by geologists of the Bureau (Gardner, Rade and Britten, 1955) and geophysical methods were tried to see whether any were applicable to a uranium ore deposit of this type. This report describes only the application of car-borne radiometric techniques to the area. Other geophysical surveys of the prospect are described in a separate report by Misz (1954).

The field work and plotting of the results was done by M.W. Stevens from May to August 1954.

2. GEOLOGY

The geology of the area is described by Gardner, Rade and Britten (1955). The prospect occurs in intermediate volcanic rocks of Upper Proterozoic age and is situated near the southern end of a synclinal basin of alternate sandstone and volcanic beds elongated in a north-west direction (Plate 2). The prospect may be genetically connected with faults and fractures associated with the nose of the north-west - pitching syncline.

The volcanic beds, being less resistant to erosion than the sandstones, generally form soil-covered valleys with relatively steep sandstone scarps on each side. Secondary uranium minerals occur in a section of the volcanic beds localised by faulting.

The car-borne radiometric survey was restricted to the volcanic beds as it was considered that other similar deposits might occur. The areas of sandstones are generally inaccessible to vehicles, being sharply eroded along joint planes and minor faults, as well as strewn with large boulders.

3. DETAILS OF SURVEY

The survey was divided into three separate areas (Plate 3), namely :-

A. Near the prospect on the southern limb of the syncline.

B. Around the regional fault about three miles north-west of the prospect; also on the southern limb of the syncline.

C. An area including the nose of the syncline and a large part of the eastern limb.

Traverses were surveyed across the valley at intervals of approximately 100 feet. Most of the traverses were at right angles to the strike of the beds, the only exception being a part of area B where they crossed the fault.

Traverses were located by means of an aircraft magnetic compass mounted in the vehicle and by visual checks

on prominent features which could be identified on aerial photographs. The steep sides of the valley and small watercourses enabled a close check to be maintained on the position of the vehicle.

4. EQUIPMENT

The carborne radiometric equipment, type 1181B, was designed by the Atomic Energy Research Establishment, Harwell, and produced by Ediswan Ltd. It includes four units, namely the power supply, probe, ratemeter and recorder, with connecting cable, all mounted in a Land Rover. The high-voltage power supply, which runs off the vehicle battery, uses a 12-volt to 500-volt dynamotor and a voltage regulator circuit. The probe unit has six G60H Geiger tubes connected in parallel and mounted near the roof of the Land Rover. The ratemeter employs a conventional cold-cathode tube trigger circuit, pulses from the Geiger tubes being amplified and integrated. The average count rate is indicated on a 50-microampere meter. The scale is logarithmic and no scale-switching is therefore necessary. A background of 30 counts per second is indicated by a reading of about 10 microamps.

The recorder is a single-channel Kelvin-Hughes MK5 model, which has been modified to include a take-up spool and a side-marking pen. The paper feed was further modified to run from the vehicle speedometer drive. This was considered necessary in order to produce reasonably accurate radiometric contour plans.

The equipment was very reliable in operation, and practically no time was lost due to instrument breakdown.

5. RESULTS

Results have been plotted as radiometric contours on Plates 4 to 9. Traverse lines have been considered to be straight and any errors introduced by this assumption negligible, as the anomalies are broad and of relatively low intensity. Average background has been taken as that obtained over deep alluvium in the area.

No strong radiometric anomalies were observed other than that over the ABC prospect itself. Of the others, none exceeds three times average background. Generally, the radioactivity of the volcanic rocks is higher than average background, and consequently, the surface count obtained depended largely on the depth of soil or alluvium covering the bedrock. Some of the anomalies have been shown to be due entirely to bare outcrops of volcanic rock.

All anomalies were inspected by D.E. Gardner, and his report (Gardner, 1954) gives full details of the inspection.

A variation of background count is often noticed during the course of a field season and particularly after rain. This is probably caused by soluble uranium salts being dissolved and carried down by water during the wet season, then being brought to the surface and re-deposited during the dry season. No appreciable change was noted during this survey as the work was done during the dry season from May to August.

6. CONCLUSIONS.

The survey revealed many anomalies of low intensity, but subsequent investigations did not reveal any promising uranium prospects. The anomalies were caused mainly by outcrops of volcanic rock.

The survey indicated that large areas can be covered closely and quickly, provided they are reasonably accessible to a motor vehicle. An experienced operator should be able to traverse 10 to 15 line-miles per day. Much of the time is consumed in checking location by means of aerial photographs.

7. REFERENCES.

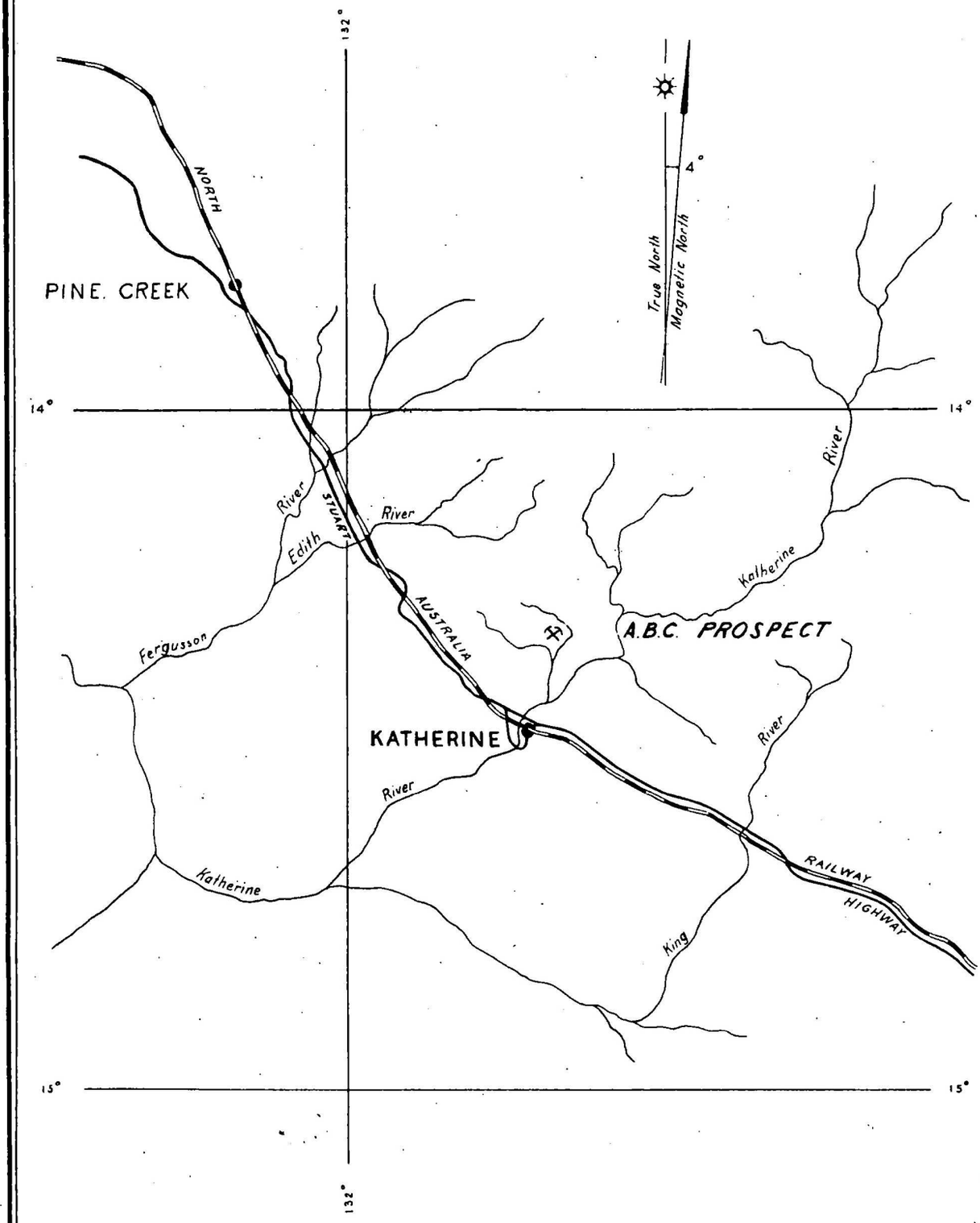
Gardner, D.E., 1954 - Inspection of Radiometric Anomalies, "A.B.C." Reserve, Katherine, N.T. Bur. Min. Resour. Aust., Records 1954, No. 54.

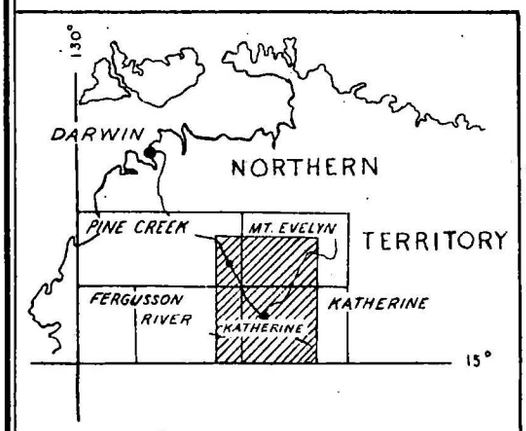
Gardner, D.E., Rade J., and Britten, R.A., 1955 - Geological Report on the A.B.C. Uranium Prospect, Katherine, N.T. Bur.Min. Resour. Aust., Records 1955, No. 41.

Misz, J.B., 1954 - Report on the Geophysical Investigation of the A.B.C. Reservation near Katherine, N.T. Bur.Min. Resour. Aust., Records 1955, No.10.

Rattigan, J.H. and Clark, A.B., 1954 - The geology of the Katherine, Mt. Todd and Lewin Springs 1-mile Sheets, N.T. Bur. Min. Resour. Aust. (Unpublished report)

PLATE 1





REFERENCE TO AUSTRALIAN
4-MILE MILITARY MAP SERIES

SCALE IN MILES
100 50 0 100 200

SCALE IN MILES
15 10 5 0 15 30

CARBORNE RADIOMETRIC SURVEY AT A.B.C. PROSPECT, KATHERINE, N.T.

LOCALITY MAP

Geophysical Section,
Bureau of Mineral Resources, Geology and Geophysics G163-3

PLATE 2

L30

L21

L18

L10

CREEK

14°15'

AREA OUTLINED
IN PLATE 3

L20

A.B.C.
PROSPECT

25

18

20

50

45

RIVER

132°15'

132°20'

132°25'

SCALE IN MILES

1 0 1 2 3 4

LEGEND

- ALLUVIUM
- MULLAMAN GROUP
- DALY RIVER GROUP
- LEIGH CREEK FORMATION
- BULDIVA SANDSTONE E
- BULDIVA VOLCANIC D
- BULDIVA SANDSTONE C
- BULDIVA VOLCANIC B
- BULDIVA SANDSTONE A
- EDITH RIVER VOLCANICS
- BROCKS CREEK GROUP
- FAULTS
- DOLERITE DIKES

CARBORNE RADIOMETRIC SURVEY AT
A B C PROSPECT, KATHERINE, N.T.

GEOLOGICAL SKETCH MAP

DRAINAGE APPROXIMATE.
GEOLOGY BY RATTIGAN & CLARK (1954)

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics. G 163—5

LEGEND

Sandstone Scarp
Creek
+76 Principal Point of Air Photo

TRACED FROM 1:30,000 AIR PHOTOS
KATHERINE RUNS 2 AND 3

APPROXIMATE SCALE IN MILES

1 0 1

CARBORNE RADIOMETRIC SURVEY AT
A.B.C. PROSPECT, KATHERINE, N.T.

AREAS COVERED BY SURVEY

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GEOPHYSICAL SURVEY AT
A.B.C. PROSPECT, KATHERINE, N.T.

CARBORNE RATEMETER TRAVERSES AND RADIOMETRIC CONTOURS AREA 'A'

SCALE IN FEET

400 0 400 800 1200 1600

LEGEND

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PLATE 5

LEGEND

- 1" X 5" = 1 mile
- 2" X 5" = 1 mile
- Traverse
- Creek
- Fence

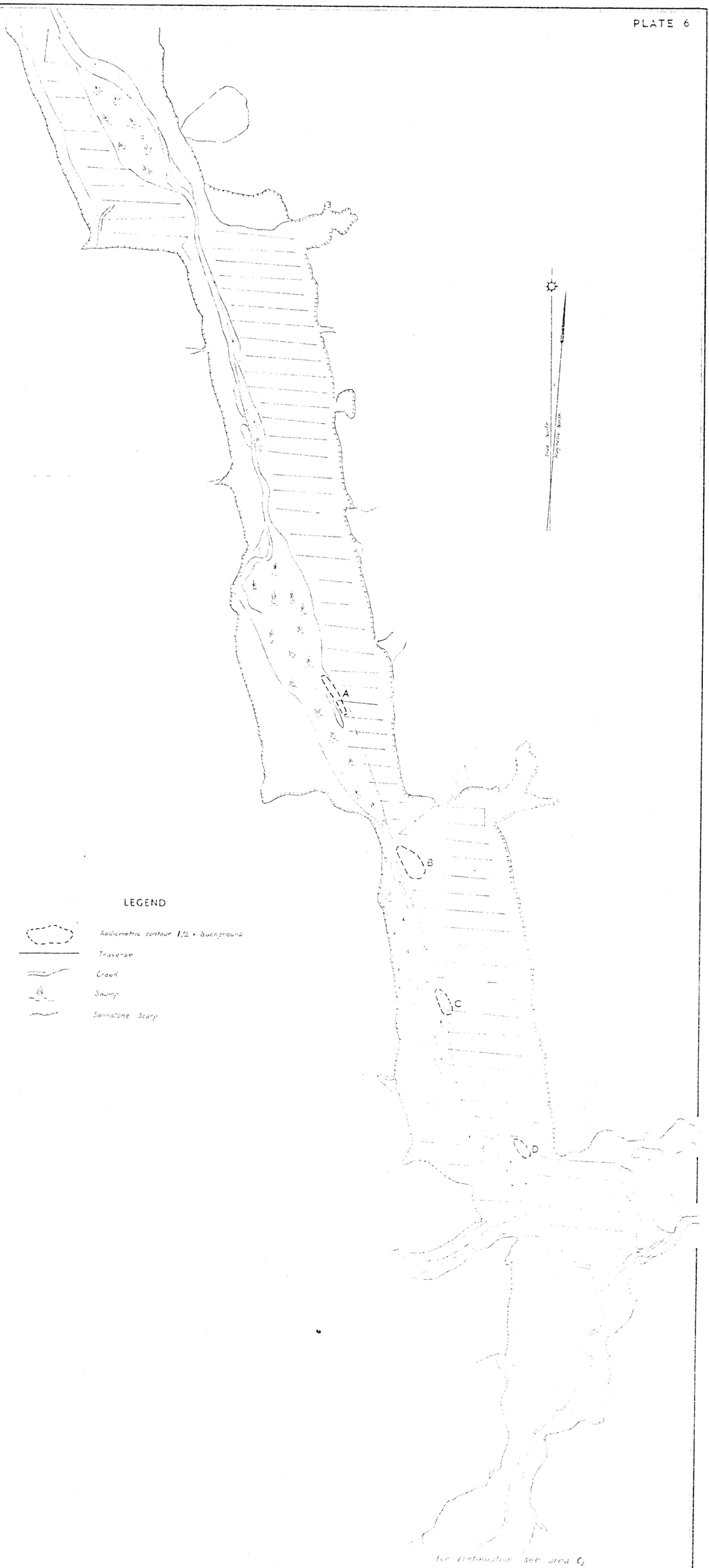
SCALE IN FEET

400 0 400 800 1200

GEOPHYSICAL SURVEY AT
A. B. C. PROSPECT, KATHERINE, N.T.

CARBORNE RATEMETER TRAVERSES AND RADIOMETRIC CONTOURS AREA "B"

G163-8



LEGEND

- Radiometric contour 1½ × background
- Traverse
- Creek
- Swamp
- Sandstone Scarp

for continuation see area C_2

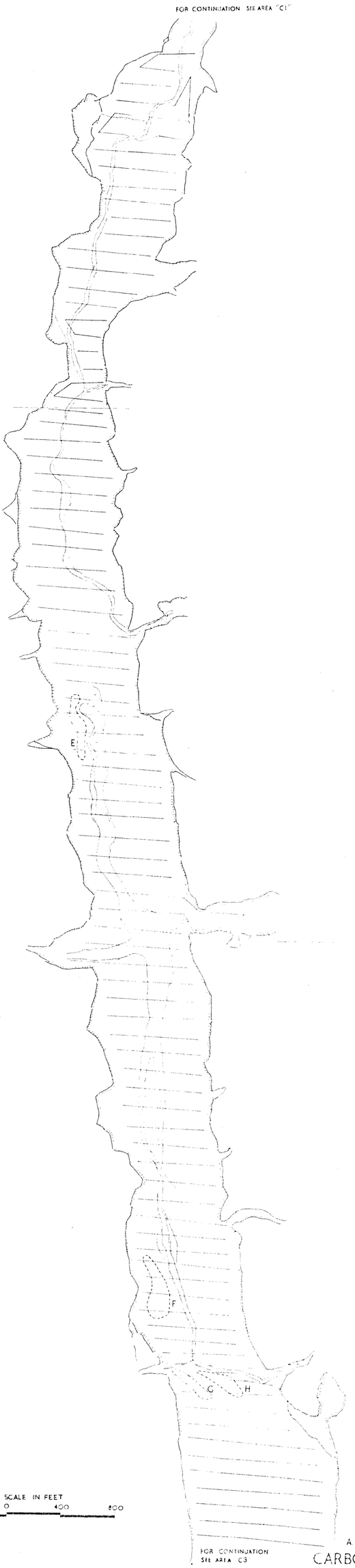
SCALE IN FEET

400 0 400 800 1200 1600

GEOPHYSICAL SURVEY AT
A.B.C. PROSPECT, KATHERINE, N.T.

CARBORNE RATEMETER TRAVERSES AND RADIOMETRIC CONTOURS, AREA 'C1'

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics G 163-6



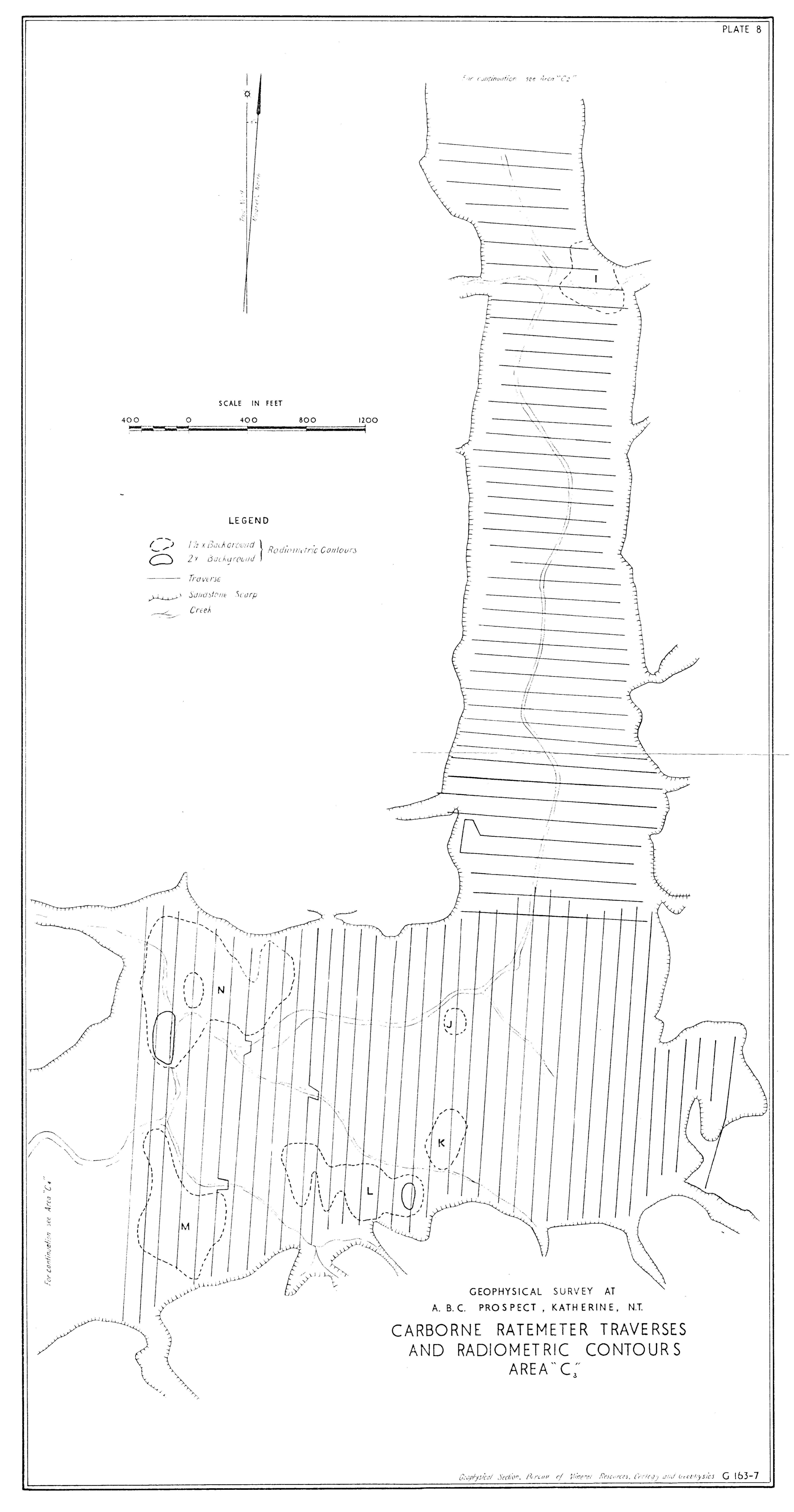
LEGEND

SCALE IN FEET
400 0 400 800

GEOPHYSICAL SURVEY AT
A. B. C. PROSPECT, KATHERINE, N.T.

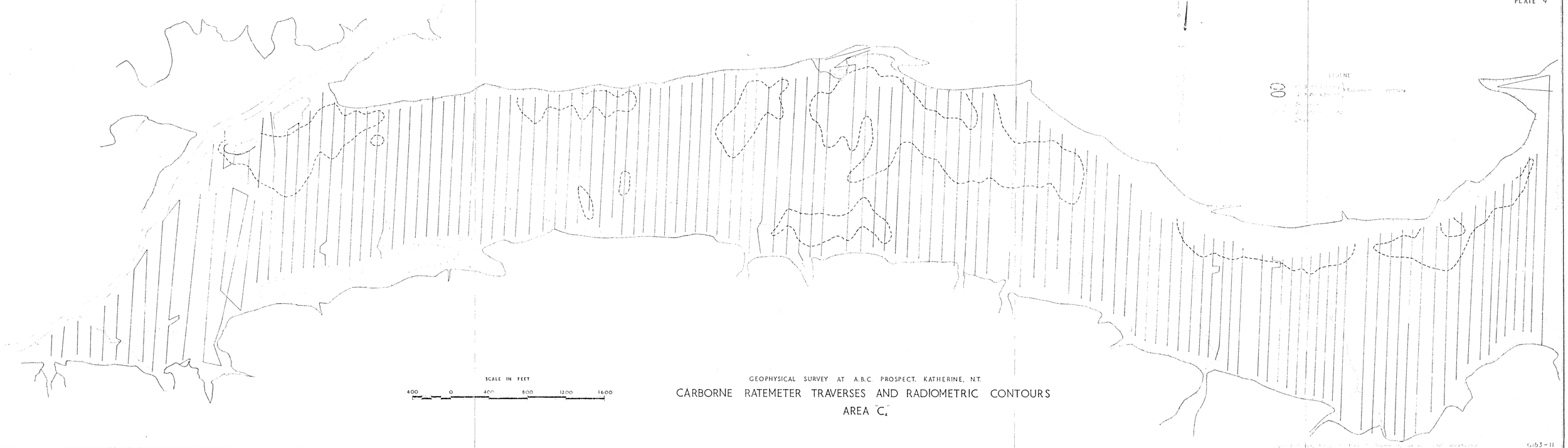
CARBORNE RATEMETER TRAVERSES AND RADIOMETRIC CONTOURS AREA "C2"

G163-9



GEOPHYSICAL SURVEY AT
A. B. C. PROSPECT, KATHERINE, N.T.

CARBORNE RATEMETER TRAVERSES AND RADIOMETRIC CONTOURS AREA "C3"



GEOPHYSICAL SURVEY AT A.B.C. PROSPECT, KATHERINE, N.T.

CARBORNE RATEMETER TRAVERSES AND RADIOMETRIC CONTOURS

AREA "C_4"