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COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES

GEOLOGY AND GEOPHYSICS.

RECORDS.

1956/45

REPORT ON THE CHARLOTTE RIVER RESERVE, N.T.

by

D. B. Dow

REPORT ON THE CHARLOTTE RIVER RESERVE, NORTHERN TERRITORY

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SUMMARY

A small sharp radiometric anomaly was found near the headwaters of the Charlotte River, Northern Territory, by a scintillograph unit of the Bureau of Mineral Resources. The anomaly is in Lower Proterozoic sediments of the Finnis River Group, in an area marked by tight folding.

A reservation, one square mile in area, was proclaimed over the surrounding country, and a trench was dug across the maximum anomaly. Subsequent testing showed that the radioactivity was caused by low grade thorium mineralisation.

Geological mapping and radiometric gridding of the reserve did not disclose any other anomalous radioactivity. No further work is recommended.

INTRODUCTION

The prospect was discovered in September, 1956, by a Bureau of Mineral Resources' geophysical party, at latitude 12° 50' 12", longitude 130° 49' 40", on the Tumbling Waters 1 mile area, Darwin sheet of the Military 4 mile series. It is 26 miles south of Darwin and about 1000 feet north of the junction of two tracks. One track runs from the Darwin River railway siding west to the Lucy Tin Mine. The other runs south from the Southport road about 14½ miles from the Stuart Highway. Both tracks are impassable during the later part of the summer monsoonal wet season.

The prospect is on a low rubble-covered rise. The surrounding country consists of low isolated scrub-covered hills rising from alluvial flats.

The reserve was mapped and prospected geologically by D.B. Dow, and G.F. Clarke supervised the radiometric gridding.

GENERAL GEOLOGY

Lower Proterozoic sediments, tentatively assigned to the Noltenius formation of the Finnis River Group, crop out in the area. They consist of quartz conglomerate, sandstone, greywacke, and micaceous siltstone. The regional strike of the beds is north. Small patches of laterite occur on the edges of alluvial flats.

One mile west of the reserve, similar sediments have been metamorphosed to mica and andalusite schists, and schistose sandstone and conglomerates, and have been intruded by small pegmatite veins bearing tin and tantalite.

East of the reserve, the sediments are exposed on the limbs of fold structures at angles which range from 50° to 70°. The crests of the fold structures are about half a mile apart.

Minor fold structures at the prospect plunge to the south and north at angles between 40° and 70°, but a complete structural picture cannot be obtained from the few exposures available.

Most of the low rises near the prospect are partly covered by quartz rubble derived from muscovite-bearing quartz veins. The veins range in thickness from less than one inch to several feet. They are commonly irregular lenses oriented parallel to the bedding.

Steeply-dipping east-striking joints are common.

Madigan's thorium prospect is 2 miles north of the Charlotte River prospect and is also in rocks belonging to the Noltenius Formation.

THE PROSPECT

The prospect is situated near the centre of the reserve and is in a zone of local crumpling marked by minor north and south plunging drag folds. Sandstone is the main rock type exposed and crops out on the western slope of a low rise. The anomaly was located in rubble. A trench 20 feet long and up to 5 feet in depth was dug across the peak of the anomaly west of the 100W peg (Plate 3). Bedrock was exposed at about 2 feet and consisted mainly of tightly folded micaceous siltstone with bands up to 6 inches thick of purple-coloured sandstone. A plan of the bottom of the trench is shown on Plate 4.

No macroscopic evidence of radioactive mineralisation was noted.

RADIOACTIVITY

The reserve was gridded at 100 feet intervals by means of P.R.M. 200 Geiger Counters. The gridding was controlled from a base-line laid out with chain and compass. Except for the prospect anomaly, no radioactivity greater than twice instrument background was recorded.

The prospect was gridded at intervals of 10 feet using a Harwell 1277B ratemeter. The radiometric contours are superimposed on the geological plan (Plate 3). The 4-times-background contour extends to the west of the baseline for over 200 feet. This is probably due to downslope creep of radioactive rubble. The area of high anomaly, arbitrarily enclosed by the 6-times-background contour, measures about 50 feet by 25 feet: some of this is also due probably to creep. The radioactivity drops sharply to local background within 10 feet east of the baseline.

Several small maxima up to 10 times background occur north-north-west of the main anomaly centre. Because of their small size and because of the predominance of thorium mineralisation on the anomaly investigated, these do not warrant further work.

The trench was logged horizontally and vertically at foot intervals. The profiles are shown on Plate 4. Channel samples were cut from bedrock at 5 feet depth. The maximum radioactivity in the trench coincides with the nose of a tight south-plunging syncline marked by a band of crushed sandstone between 13 feet 6 inches and 15 feet 0 inches from the eastern end of the trench. It decreased markedly on all sides of the radiometric high. The decrease was less rapid southwards along the axis of the syncline.

The trench was deepened to five feet between 10 and 15 feet from the eastern end. The radioactivity decreased with depth.

These results make it clear that the radioactivity decreases away from the sandstone band. The assay results confirm this and show that the higher-grade mineralisation is confined to the siltstone near the silstone-sandstone contact and around a small area on the keel of the synclinal structure.

Radiometric assay results of the channel samples closely follow the radiometric profile of the trench. They are shown in Table I.

TABLE I - MAIN TRENCH, WALL SAMPLES

Distance from west end of trench	Percentage equivalent U_3O_8
7'6" - 8'6"	0.02
8'6" - 9'6"	0.02
9'6" - 10'6"	0.01
10'6" - 11'6"	0.09
11'6" - 12'6"	0.02
12'6" - 13'6"	0.02
13'6" - 14'6"	0.15 *
14'6" - 15'6"	0.08
15'6" - 16'6"	0.03
16'6" - 17'6"	0.02
17'6" - 18'6"	0.03
18'6" - 19'6"	0.02
19'6" - 20'6"	0.02
20'6" - 21'6"	0.03
21'6" - 22'6"	0.03
22'6" - 23'6"	0.02
23'6" - 24'6"	0.03
24'6" - 25'6"	0.02
25'6" - 26'6"	0.02
26'6" - 27'6"	0.01

TABLE II - SIDE BRANCH, FACE SAMPLES 2'6 WIDTH

Distance from south wall of Main Trench	Percentage equivalent U_3O_8
0 ft.	0.1
1 ft. south	0.22 *
2 ft. south	0.07

An absorption test was performed on samples marked *. The ratio of the beta assay to the gamma assay was 0.4. A ratio of less than 0.65 indicates that thorium is the chief mineral present.

One sample, from 14 feet east, was chemically assayed for uranium and thorium by the South Australian Mines Department with the following results:

Uranium Oxide (U_3O_8)	0.008%
Thorium Oxide (ThO_2)	0.74%

The radiometric assay results are thus verified.

CONCLUSIONS

Investigation of the most promising radiometric peak showed that the radioactivity was due mainly to thorium.

The maximum grade is 0.22% equivalent U_3O_8 or approximately 1% ThO_2 and is well below economic level. Only a small quantity of radioactive material is present.

The remainder of the prospect anomaly area is small and is probably due to similar and smaller centres of mineralisation. As the radioactivity is lower than that of the peak investigated, it is considered that the grade of mineralisation is probably also lower.

Prospecting did not disclose any further areas of anomalous radioactivity within the reserve.

It is recommended that the reservation be cancelled.

PLATE 1

Scale.
0 1 2 3 4 5 6
Miles

N.

Darwin

Darwin Railway

STUART HIGHWAY

PORT DARWIN

EAST ARM

WEST ARM

MIDDLE ARM

To Delissaville

Madigans Prospect

Charlotte River

Blackmore River

Darwin River

To Pine Creek

36 Mls.

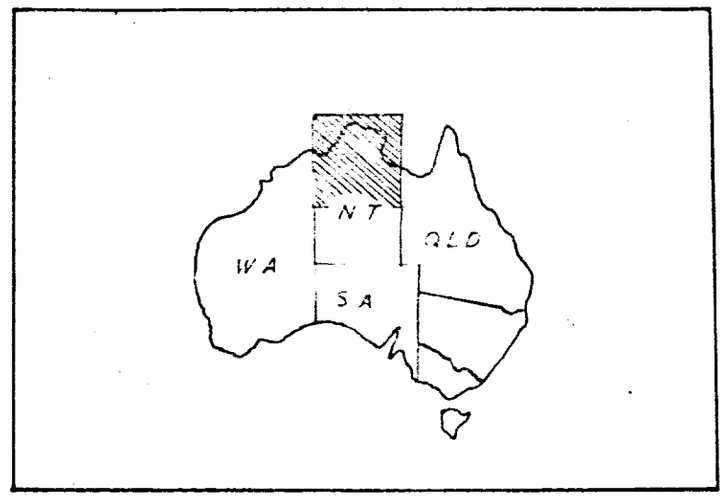
Southport Station

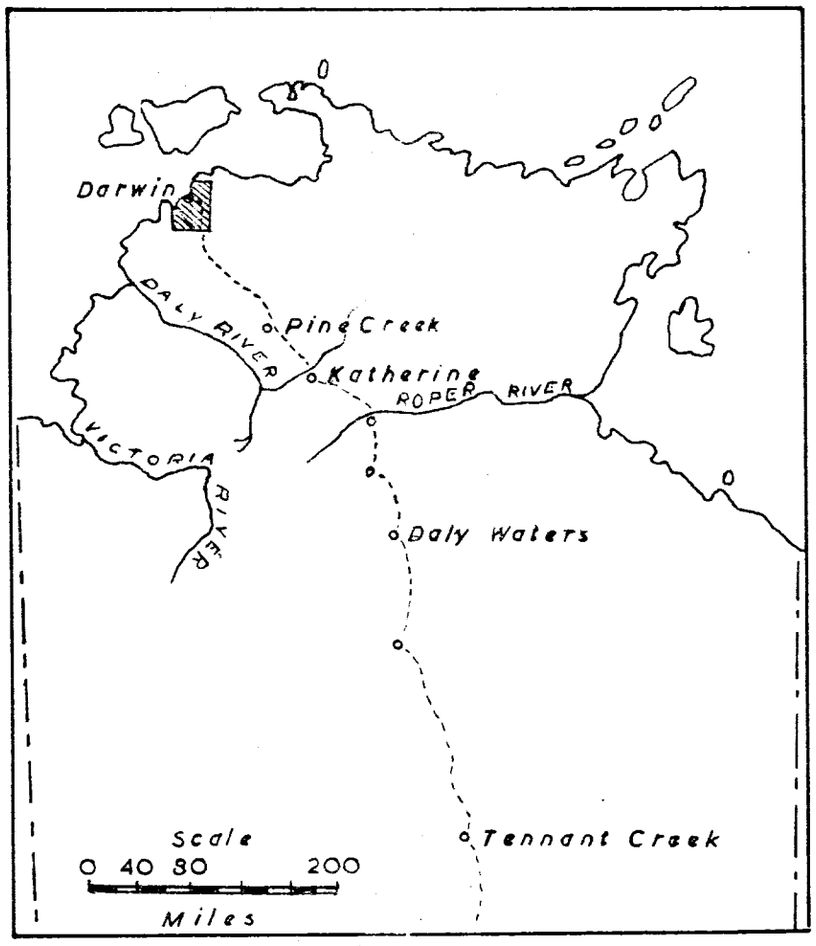
Darwin River Siding

CHARLOTTE RIVER RESERVE

LUCY Tin Mine Sn

To Mt EINNIS





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LOCALITY MAP
of

CHARLOTTE RIVER RESERVE N.T.

D.B.Dow. Dec. 1955

PLATE 2

LEGEND

- Alluvium
- Conglomerate
- Sandstone and Micaceous Siltstone
- Outcrop Boundary
- 80° Measured Strike and Dip
- Measured Strike
- Vertical Bedding
- Quartz Vein
- 40° Pitching Syncline
- Geophysical Baseline
- Vehicle Track

Charlotte River

To Southport

2500N
2000N
1500N
1000N
500N
Zero
500S
1000S
1500S
2000S
2500S

CHARLOTTE RIVER PROSPECT

To Lucy Tin Mine

Siltstone rubble

Laterite

To Darwin River Siding

Schistose Sandstone

To Mt. Finnis

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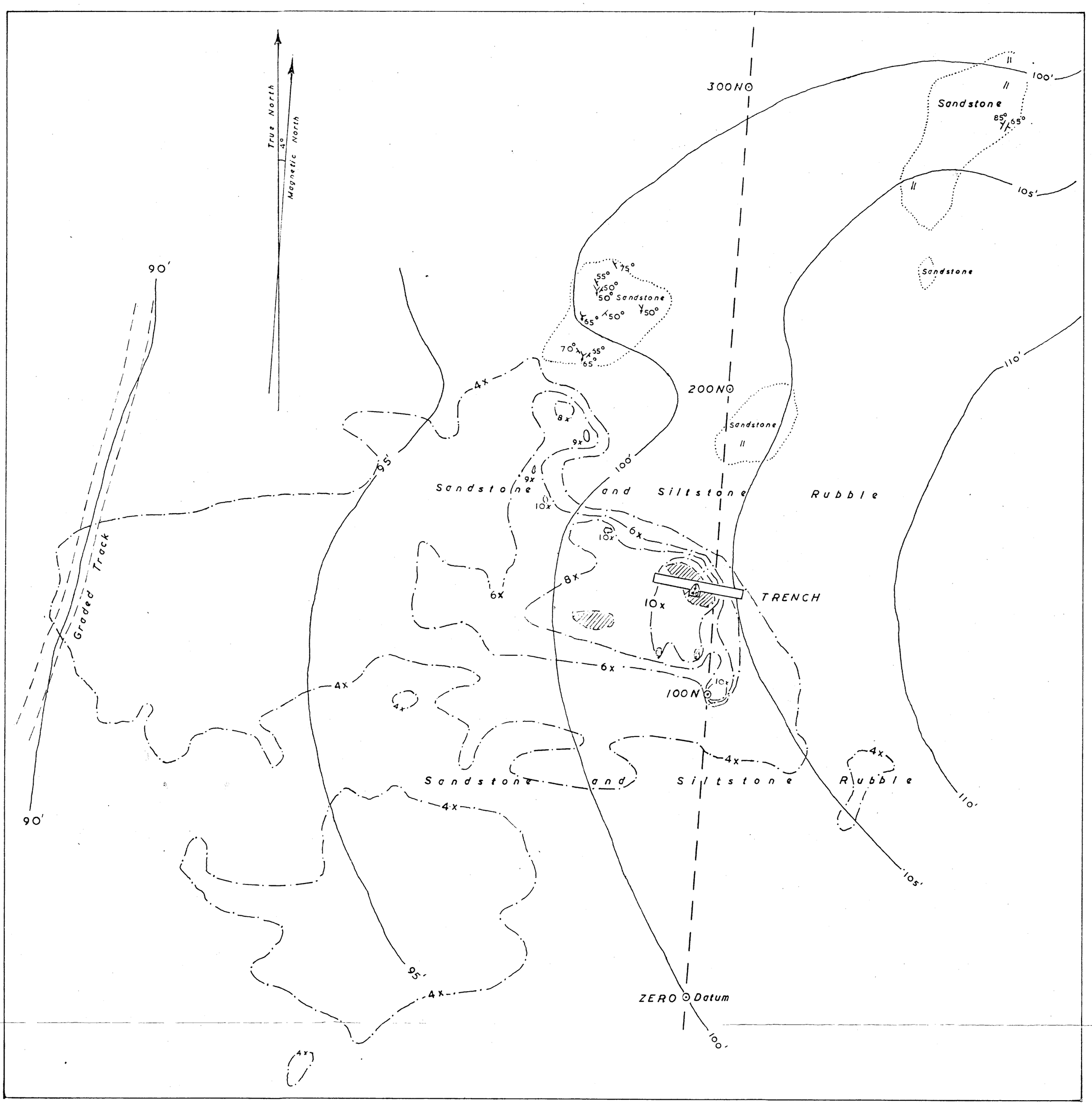
GEOLOGICAL PLAN
of

CHARLOTTE RIVER RESERVE N.T.

Scale
500 0 500 1000
Feet

D.B.Dow. Dec.1955

PLATE 3



LEGEND

- 100N ⊙ — Geophysical Baseline
- 100' — Topographical Contour
- 4x — Radiometric Contour
- Radiometric Contour >20x Background
- Outcrop Boundary
- Y 50° Pitching Anticline
- Measured Strike and Dip
- II Measured Strike
- Pitching Syncline
- ⊙ Datum: Assumed level 100 Feet

Scale
0 10 20 30 40 50 60
Feet

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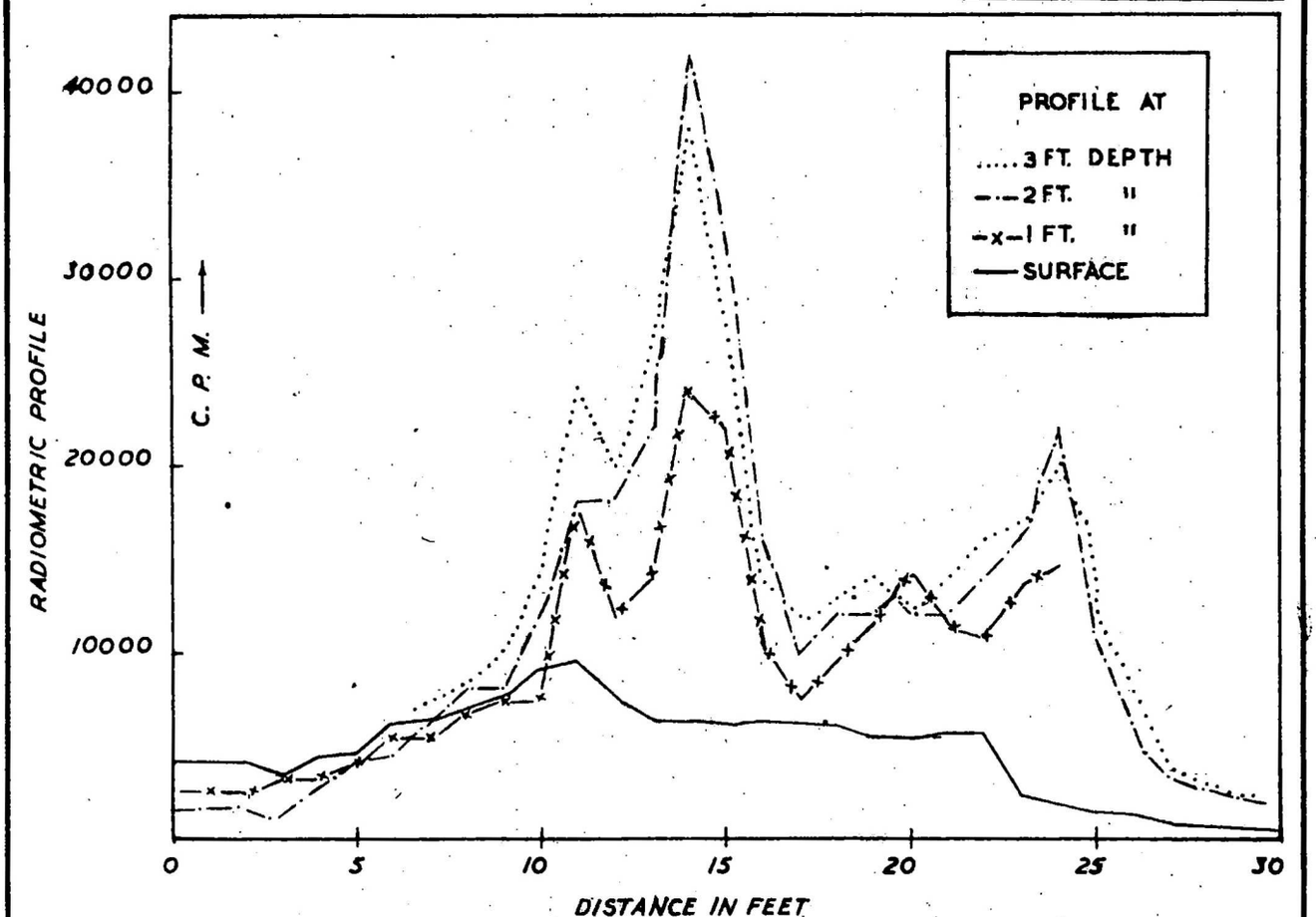
GEOLOGICAL and RADIOMETRIC PLAN
of

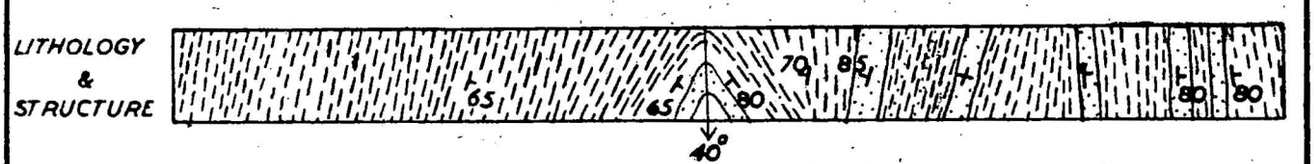
CHARLOTTE RIVER PROSPECT N.T.

G.F. Clarke
D.B. Dow.

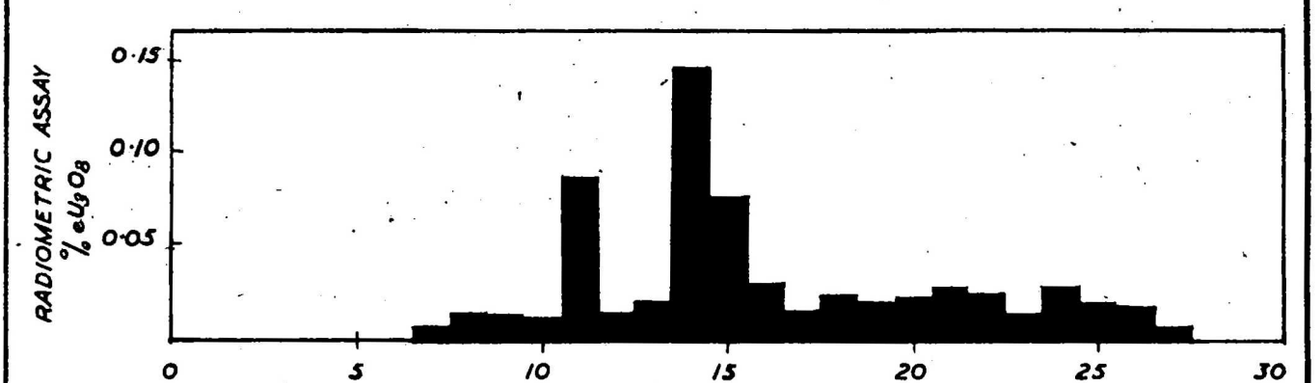
Dec. 1955

PLATE 4





PLAN OF BOTTOM OF TRENCH AT 3 FEET DEPTH



LEGEND

- SANDSTONE
- MICACEOUS SILTSTONE
- 60° MEASURED STRIKE & DIP
- BEDS DIPPING VERTICALLY
- 40° PITCHING SYNCLINE

Ratemeter: *Harwell 1277 B.*

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TRENCHING RESULTS
of

CHARLOTTE RIVER PROSPECT N.T.

Scale
0 1 2 3 4 5 10 15 20 25 30
Feet

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