COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

1953/28

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RECORDS.

1953/28

CRATER PROSPECT (1951), RUM JUNGLE, N.T.

by

N. J. Mackay.

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PLANS

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INTRODUCTION:

The Crater Prospect is situated about 4 miles south-south-east of White's workings and 1 mile north-east of the junction of Batchelor Road and the Darwin-Birdum railway line. It is the name assigned to a type area of an extensive radioactive bed of conglomerate.

Low grade nut wide-spread radioactivity was discovered by R. S. Matheson and D. F. Dyson (geophysicists) in June 1951, while prospecting along the sedimentary beds outcropping immediately south of the Rum Jungle granite on the south-side of Giant's Reef fault, and on the south side of another major parallel fault. Geiger-Muller traverses along the strike of a grit-conglomerate horizon away from the Crater Prospect revealed that the radioactivity extends westwards for 1½ miles and for half a mile to the east. The radioactivity, which was confined to the conglomerate, was low-grade and discontinuous over this distance of 2 miles.

The Crater Prospect, which can be regarded as a type locality, was geologically mapped by the writer on a scale of 200 feet to one inch after the area had been radiometrical ly contoured, and the plan accompanies this report (Plate 1).

GEOLOGY:

The rocks of the area consist of interbedded quartzites, grits, conglomerates, and hematised quartz-breccia, all ofwhich have been granitised by the Rum Jungle granite. The hematised quartz-breccia is the lateral extension of the hematised breccia conglomerate shown on the regional plan of the Rum Jungle area. (Matheson, 1953). The beds strike N60°W with a dip of 40° to the south.

The highest radiometric contours closely follow the "northern" bed of the conglomerate which has a maximum thickness of 50 feet. The pebbles in this bed are quarzitic and up to 6 inches in length. The elongation of these pebbles is probably due to shearing movements within the bed during the regional folding of the strata. Radiometric counts along this conglomerate are generally 3 to 4 times background. A shallow costean, 4 ft. long and 2 ft. deep, revealed radioactivity of 9 times background and samples from here assayed approximately 0.044% equivalent U_3O_8.

The "middle" conglomerate bed is 5 feet thick and the "southern" ned of conglomerate, which contains hematite, has a maximum thickness of 8 feet. Radiometric counts along these two beds are generally low (2 times background), but in places they rise as high as 3½ times background.

Tourmaline is present in most of the quartz veins in the area. Alongside the quartz veins, which mark the position of fault lines, the sediments have been tourmalinised to a considerable extent.

STRUCTURE:

Faults trending in a northerly direction occur in the area, and horizontal displacements of the south-dipping beds range from 150 feet to 450 feet. Geological work has shown that the radiometric "highs" follow the conglomerate beds which have been dragged and displaced by these faults. The faults are considered to be post-mineralisation in age, irrespective of whether the radioactivity is due to hydrothermal mineralisation or to detrital minerals within the conglomerate.

NATURE OF THE RADIOACTIVITY:

Samples from the "northern" bed of conglomerate were submitted to W. B. Dallwitz for mineralogical examination. His tentative conclusion is that the radioactivity is due to detrital radioactive minerals such as zircon, xenotine and monazite but also, that it could possibly be caused by a uranium mineral, e.g. an ochre, not found in his examination. If the radioactivity is due to residual uranium minerals, not discovered yet, and not necessarily absent, then a higher uranium content may be found in the conglomerate beds at depth.

Specimens have been sent to the Geophysical Section for chemical and radiometric assays for uranium and thorium and to Dr. F. L. Stillwell of C.S.I.R.O. for mineragraphic examination.

PROSPECTING RECOMMENDATIONS:

At the present time it is not known definitely whether the radioactivity is due to detrital minerals present in the conglomerates or to hydrothermal mineralisation of these favourable beds. If hydrothermal mineralisation has occurred, sub-surface exploration may reveal good sources of primary uranium ore. Such a great length of surface radioactivity makes these low-grade, radioactive conglomerates worthy of further investigation.

It is recommended that the deposit be tested at depths of 100 and 200 feet by diamond drilling. A good site for preliminary drill-holes would be somewhere in the gully to the south of the hill on top of which the "northern" conglomerate bed outcrops. The drill-holes should be put down on a bearing to pass under the radiometric "high" in the sample costean. If the results from this drilling are encouraging, further work will be necessary along the extension of this conglomerate bed to the west, and to the east, and the other conglomerate beds in the Crater area may also warrant testing.

APPENDIX.

Mineralogical Reports.

by W. B. Dallwitz.

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No.1. Locality: Small costean in conglomerate bed at Crater Prospect.

Radioactivity: 9 times background.

Specimen No.: R23/1

From the nature of the sample, a secondary uranium mineral was expected, but tests with the ultra-violet lamp failed to reveal the presence of any fluorescing mineral. Separation by panning was also unsuccessful; the heavy and light fractions were both radioactive. The activity must, therefore, be due to some relatively light, non-fluorescing mineral, possibly a uranium ochre, but it was not possible to distinguish such a mineral by microscopic examination. Monazite is absent as far as could be determined from the examination of numerous mounts in R.I. liquids.

No.2. Locality: Conglomerate bed, 1/2 mile S.E. of the 58 mile siding (Fettler's Camp).

Radioactivity: 10 times background.

Specimen No.: R11/1

Only that portion of the sample (as received) which passed through a 10-mesh sieve was examined. 500 gm. of this material was panned, and, where possible, the radioactivity of

20 gm. of each of the fractions obtained by subsequent sieving was recorded. The results are tabulated below:

Light Fraction from Panning.

Fraction.	Weight in gm.	Weight %age	Activity shown by 20 gm. on most sensitive scale of ratemeter.
+ 20	130	26.0	3
+ 40	110	22.0	4(?)
+ 60	31	6.2	4.5
- 60	179	35.8	4.5

Heavy Residue from Panning.

Fraction	Weight in gm.	Weight %age	Activity shown by 20 gm. on most sensitive scale of ratemeter.	Remarks.
+ 60	24.2	4.8	6(?)	Magnetic
- 60	23.8	4.8	2	Magnetic
+ 60	0.4	0.1)	5	Non-magnetic
- 60	1.4	0.3)	(1.8 gm.)	Non-magnetic.

(The non-magnetic heavy residue from panning was further cleaned by heavy liquid separation).

The minerals present in the -60 fractions of the heavy residue were as follows:

A. Non-magnetic portion:

Black opaque mineral or minerals.

Iron-stained quartz.

Zircon.

Hematite.

Accessory tourmaline, cassiterite, xenotime, and monazite (rare).

B. Magnetic Portion.

Probably ilmenite stained with hematite.

Examination of the heavy minerals by ultra-violet light revealed no fluorescing mineral. However, thin, scattered, pinkish-white flakes of a yellow-green fluorescing mineral are present in every fraction of the light material separated by panning; fluorescence takes place with the short-wave light only. On microscopic examination these flakes proved to be an iron-stained opaline substance, but they contain so little uranium that the characteristic fluorescence is not imparted to the sodium fluoride bead; the intensity does not pass beyond yellowish white.

It is very doubtful whether the observed radioactivity of the sample would have been satisfactorily accounted for even if the flaky mineral had turned out to be a uranium mica. It is clear, therefore, that the radioactivity must be due to some non-fluorescing mineral, either a uranium ochre or to detrital radioactive minerals. No uranium ochre was found, but absence of a mineral of this type was not proved.

It is significant that all fractions of the light portion from panning show a similar degree of activity; the conclusion to be drawn is that, if the fractions had been ground more finely to free the radioactive minerals and the panning carried out very carefully, a much greater quantity of heavy residue would have been obtained. It will have been noted from the table that the activity of 1.8 gm. of non-magnetic concentrate was similar to that of 20 gm. of the light fractions.

The conclusion tentatively, drawn from the observed data is that the radioactivity of the sample is due to the presence of detrital radioactive minerals. Zircon, xenotime, and monazite have been observed, and thorite, thorianite and/or one or more of the complex tantalo-columbates could be present. All of these minerals can contain both uranium and thorium.

The non-magnetic heavy fraction of the sample from the "Crater" find (R23/1) consists of zircon, a black opaque mineral, rutile, and cassiterite. The zircon fluoresces orange-yellow in short-wave U.V. light. As no fluorescing uranium mica was observed it is possible that the radioactivity in this sample also is due to detrital minerals.

-REFERENCES-

Matheson, R. S. 1953: Rum Jungle Investigations 1951 and 1952. Bur.Min.Res. Geol.Records Rept. 1953/24

Plate I

— CRATER — PROSPECT —
RUM JUNGLE

SCALE: 1 INCH = 200 FEET

August – September, 1951 – Geology by N.J. MACKAY – Plane Table and Telescopic Alidade