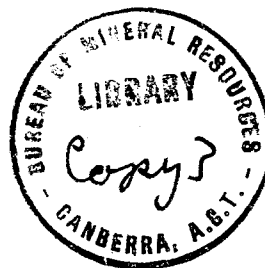


COMMONWEALTH OF AUSTRALIA.

MINISTRY OF NATIONAL DEVELOPMENT.
BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS.

RECORDS.

1953/42



NOTE ON RADIOACTIVE DEPOSITS CARCOAR-DUBBO REGION
NEW SOUTH WALES, TOGETHER WITH OBSERVATIONS ON
THE USE OF HELICOPTERS FOR PROSPECTING FOR
RADIOACTIVE MINERALS.

by

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FILE REF	84N/2
DATE REF	23/2/54

NOTE ON RADIOACTIVE DEPOSITS CARCOAR-DUBBO REGION,
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INTRODUCTION.

Part of 4th March, as well as 5th March, were spent at Carcoar, New South Wales, in inspecting the radioactive deposits in that locality and in observing the use of a helicopter, loaned by the R.A.A.F., as a means of prospecting for radioactive minerals.

The writer was accompanied by R. S. Matheson of the Geological Section of the Bureau, and J. Daly and a party of geophysicists were also present at Carcoar at the time of this inspection.

The present note is supplementary to the report by R. S. Matheson (1952/65) which includes plans of the Carcoar area and of the radioactive deposits, and should be read in conjunction with that report.

GEOLOGY.

Matheson's plans and reports describe the general geology of the area which will not be repeated here.

As Matheson notes the copper-cobalt-nickel-uranium deposits are closely associated with rocks which have been called diorites but many of which may be considered more basic and may approximate to diabase or gabbro.

In the present writer's opinion the ore deposits are probably genetically associated with these basic rocks as was thought to be the case by the earlier investigators cited by Matheson, for example David (1889). This association of basic rocks with uranium deposits is not at all unique and is of very widespread occurrence in Sault St. Marie region of Ontario (Lang, 1952) where numerous small veinlets carrying uraninite occur in diabase dykes. The deposits occur so frequently in, or near the wall of, basic dykes that Canadian geologists assume that there is a genetic relationship between the two. None of these deposits has proved to be of economic importance.

In the Carcoar region it was found that a radioactive anomaly occurs over Hospital Hill, which is composed largely of "diorite" but is mainly obscured by soil. Traverses over this hill indicated that radioactivity readings generally range from 1.25 to 1.5 times background, although, as already stated, a large proportion of this hill is obscured by heavy soil cover.

An area of granite occurring near the cemetery at Carcoar gives radioactivity readings of twice background but this granite is entirely bare of soil and stands up as a knob considerably above the level of the surrounding country.

Although it is certain that the granite at Carcoar is radioactive it is believed that very probably it is no more radioactive than is the basic rock and that the effects observed are due to the complete exposure of the granite and to the fact that it was comparatively close to the aircraft which flew over it. This appears to be borne out by the

fact that a low-lying, soil covered granitic area, which was traversed both in the aircraft and on the ground, does not show radioactive anomalies and also that a further anomalous area was discovered on the western side of the granite, in country which consists essentially of sheared basic rock.

It is possible, therefore, that indiscriminate scintillometer flying over the granitic areas of the region may not give the correct results if a due account is not taken of the presence or otherwise of the basic rock. It is considered quite possible that the basic rock may be the source of the uranium although the granitic rock, which has invaded the basic rock, may have absorbed considerable quantity of uranium.

While the helicopter was in the Carcoar region it made a traverse over Plens Deposit near Dubbo and a very large anomaly was obtained and was confirmed by the subsequent run. It is reported that the radioactivity in this area is due to the presence of a trachyte, but the minerals which are responsible for the great amount of activity noted have not been identified.

On the flight back from Dubbo the geophysicists reported a similar anomaly which they assume may be due to the presence of another trachyte mass. Similar radioactive masses of trachyte have been noted from Mt. Coolon, Queensland, and from the vicinity of Mt. Macedon, Victoria. These rocks are reported by Daly (personal communication) to give rise to radioactivity which, if due to the presence of uranium, would be equivalent to a uranium content of 0.01 to 0.03 per cent U_{308} . The rocks warrant careful investigation to determine the minerals which give rise to the activity; this would be of great importance in deciding their possible economic value. However, in the present context, the apparent presence of uranium in these types of rocks shows that uranium can occur in igneous rocks apart from granite and it is of interest that Shand (1947) considers that trachytes are essentially derivatives of olivine basalts. The common association Co-Cu-U may indicate that U, although lithophile in the sense that it can be concentrated most effectively by granitic activity, nevertheless has affiliations of a chalcophile and siderophile nature which may give it a certain family relationship to basic rocks. However, basic rocks are virtually incapable of concentrating the uranium which they may contain as also, it appears, are rocks of the trachytic type.

On the above considerations it is recommended that before airborne scintillometer operations are undertaken in the Carcoar-Dubbo region further geological and mineralogical work should be undertaken and that in particular the nature of these trachytic beds should be investigated to a considerably greater extent. If they contain 0.02 per cent. extractable uranium they may, in the future, be important sources of that metal. Much investigation is being applied in America to rocks containing about 0.01 per cent U_{308} .

CARCOAR DEPOSITS.

The Carcoar deposits have been mapped by Matheson and they are shown on his Plate 2.

An inspection of the workings indicates that vein-like deposits have been open cut generally over lengths of 20-30 ft. and to depths of 5-10 ft. One or two shafts, which judging from the size of the dumps, may extend to 20-30 ft. in depth, have also been sunk, but general prospects at depth could not have been considered encouraging.

The present writer's judgment of the deposits is that in the G-workings and in the H-workings, uranium-copper-cobalt ore occurs over lengths of 20-30 ft., these dimensions being indicated by the radioactivity which may at present be found on the dumps on the sides of the open cuts. From specimens which were found by the use of the Geiger counter, it appears that some of this ore may be quite rich in uranium, but the number of specimens of this type which were found was comparatively small. It is guessed (partly with the aid of descriptions by observers who saw the original workings) that the ore occurs as rather discontinuous lenses and stringers, and from the nature of the structures, it is not believed by me that extensive ore deposits are likely to occur; for example it is unlikely that sufficient ore would be found in or around the present workings to sustain the operation of a treatment plant; in these circumstances the value of drilling or of opening up the workings is considered to be doubtful. If some independent prospector could be persuaded to clean out the old open cuts so that the lodes would be available for sampling this would be of considerable value and at the time of our visit, a mining engineer was inspecting the area and said that he was interested in the possible production of copper and cobalt. It is believed that should he apply for a lease it should be granted, one reason being that it is not considered by the writer that extensive Government expenditure is warranted. Drilling of this deposit, would, it is believed, yield rather inconclusive results.

SUMMARY AND RECOMMENDATIONS.

It is considered doubtful whether the Carcoar deposits as at present known are likely to be of sufficient size to warrant the erection of a treatment plant and that expenditure in testing them by drilling or mining may be of doubtful value.

The area is one of considerable geological interest for the occurrence of uranium especially if it is made to include Plens Deposit near Dubbo and the deposit which was discovered between Dubbo and Carcoar by the recent airborne reconnaissance. However, the granitic rocks are not necessarily the key to the search of the region and it is recommended that further laboratory studies of the radioactive trachytes should be undertaken and that the region should be geologically investigated.

A large sample of the trachyte should be subjected to concentration tests, or should be experimentally leached with sulphuric acid. Even if these deposits are not at present of economic importance, the results could be of great scientific interest.

This geological work could conveniently be carried out by K.A. Townley in addition to performing duties as Editor.

HELICOPTER SURVEYS.

The writer had an opportunity on 4th March to see the helicopter-borne scintillometer in operation at Carcoar. The ease with which radioactivity could be detected was impressive and there is no doubt also that the helicopter supplies a wonderfully rapid means of surveying possibly radioactive areas.

It is believed that this type of investigation would have great application in locating accurately the radioactive areas within regions which have been shown to be generally radioactive by the scintillometer mounted in the DC3.

There would certainly be a great saving of time and personnel and it appears to be a question for the geophysical staff to decide as to whether the savings in these categories are sufficient to offset the very considerable cost of buying and operating a helicopter. There would be a considerable advantage to be gained in persuading the R.A.A.F. to loan or hire their machine together with the air and ground staff.

Much of the assessment of the value of this type of investigation is naturally the province of the geophysical staff, but, from the general point of view of the exploration of the Rum Jungle uranium province, there is certainly much to be said for having a rapid means of pin-pointing the areas of intensive activity. The advance radiometric knowledge which could be gained in this way would be of great assistance for the geological and drilling programmes and should considerably increase the tempo of the whole uranium-search programme.

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