COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS.

RECORDS.

PRELIMINARY GEOLOGICAL REPORT ON WATERHOUSE URANIUM PROSPECT NO. I - NORTHERN TERRITORY.

by

P.B. Rosenhain.

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PRELIMINARY GEOPHYSICAL REPORT ON WATERHOUSE URANIUM PROSPECT NO. I - NORTHERN TERRITORY.

by

A. F. Alle.

DARWIN, N.T.

PRELIMINARY GEOLOGICAL REPORT

ON

WATERHOUSE URANIUM PROSPECT No.1.

by P.B. Rosenhain.

RECORDS

C O N T E N T S.

PLANS AND SECTIONS.

Plate No.	Plans.	Scale.
1.	Geological Plan - Waterhouse Uranium Prospect No. 1	100 ft. - 1 inch.
2	Geological Cross Section & Radiometric Profile 340's - Waterhouse Uranium Prospect No. 1.	100 ft. - 1 inch.
3.	Geochemical Plan - Waterhouse Uranium Prospect No. 1.	100 ft. - 1 inch.

SUMMARY.

The Waterhouse Uranium Prospect No. 1 is situated in a sequence of siltstone, quartzite and shales of Lower Proterozoic Age, occurring on the south east flank of the Rum Jungle domal structure. Detailed geological and radiometric surveying were done, and these show a small but significant radiometric high in the siltstone.

Mineralization is indicated in the area by two zones of limonitic casts disseminated through favourable beds, one in the shale and the other in the siltstone in the vicinity of the anomaly. Weak copper mineralization is indicated in the north east sector of the area in silicified shale. Sampling was done for 100 feet over the area of greatest radioactivity.

Further work by diamond drilling has been recommended to determine the effects of leaching, and as a guide to the interpretation of other anomalies of similar type in the area.

INTRODUCTION.

The Waterhouse Uranium Prospect No. 1 is a second order anomally discovered by the aerial scintillometer survey conducted by the Bureau of Mineral Resources in 1952. It is one of a series of anomalies which are distributed along a line trending north north east. This line extends for a distance of five miles.

The Prospect is situated 1.7 miles on a true bearing of 105 degrees from the south end of Gould Airfield. The military co-ordinates are - Batchelor Sheet 072311? Aerial photographic coverage is obtained in Aerial Survey 1375 Pine Creek, Run 16, photographs 5062,5063. Access is by an old track east south east from Gould Airfield. The track extends to the Stuart Highway in the vicinity of Predictor Hill, and passes the Prospect two miles from the Airfield. The track is suitable for light motor transport (up to 3 tons) in the dry season, and during the wet season vehicles could be driven to within a half mile of the Prospect. The remainder of the track is on river flats and would be impassable for vehicles during the summer months.

Preliminary inspection of the area was carried out by R.S.Matheson and D. Dyson in November 1952. Detailed geological and radiometric work was recommended and this was commenced in May 1953 and was completed in June 1953. Mapping was done on a scale of one hundred feet to one inch by the author, assisted by J.D. Wyatt.

TOPOGRAPHY.

The Prospect is on a ridge line which consists of a resistant quartzite band associated slates, shales and sandstones. The ridge has been dissected by the drainage and steep gullies have been formed within it.

On the eastern side the ridge line gives way to alluvial flats and on the western side to gently undulating country. Initial drainage from the ridge is both to the east and west. The streams flow only in the wet season.

Within the main ridge line the Prospect is on a subsidiary north south spur, which slopes down to streams on its north, east and west sides. The difference in elevation down to the streams is 95 feet and the average slope is of the order of 12 degrees.

GEOLOGY.

REGIONAL GEOLOGY.

The Prospect lies five miles east of a granite mass - now being referred to as the Waterhouse Granite - and is on the south eastern flank of the Rum Jungle domal structure (Matheson 1953). It is situated on a north north east trending line of sandstone, quartzite, shales and slates which dip approximately 70 degrees easterly. these sediments are thought to be members of the Brock's Creek Group of Lower Proterozoic Age (Noakes 1949). Three miles north of the Prospect they are folded to the east in a south east plunging syncline, after which they are folded back to resume the north north east strike. Two miles south they are folded west through Mt. Minza, in a south east plunging anticline. The beds may thus be considered as part of a regional south plunging anticline. This conforms to the domal structure.

In several places the beds have been displaced by cross faults striking east, of which the horizontal direction of movement is variable. The maximum displacement is 300 feet.

DETAILED GEOLOGY.

Lithology: The largest radiometric anomaly is in a bed of sheared argillaceous and ferruginous quartz siltstone. This is the oldest bed of the sequence to be mapped in detail. It is overlain by "quartzite" in the north and south of the area and by shales in the central part. The shales overlie the "quartzite" in the north and south, they have been silicified in part.

The average strike of the beds is north 5 degrees east and the dip 70 degrees east. There are minor variations of strike and dip, particularly in the shales which have been locally folded.

The quartz siltstone has been strongly sheared and in most places bedding has been obliterated. The minerals composing the rock have a pronounced directional structure. The cleavage produced by the shearing strike north 15 degrees west and dips 75 degrees easterly.

The quartzite is very fine grained. Hematite occurs with it along some pre existing bedding planes, in joints and as a cementing agent in areas of brecciation. The author considers that the quartzite is not a true quartzite, but a hydrothermal replacement by quartz of certain sections of the shale beds along their contact with the siltstone. The reasons for this belief are :

(1) The texture of the quartzite in which remnant shale structure can be seen.

(2) The discontinuous nature of the feature. The hematite is thought to have been introduced after the quartz. The latter has been brecciated in several places by transverse shears and the hematite has cemented the breccia.

The shales are a well bedded series and were the youngest rocks in the sequence mapped. They show well developed parting along the bedding planes and in places shearing has taken place at a wide angle to the bedding. This is shown one hundred feet east of the 200 south base line peg. This feature produces rectangular columns of shale. In other parts of the area the shales have been silicified and some of these outcrops show the relict bedding well preserved.

STRUCTURE: No major structures are apparent in the area mapped. At the extreme north end, the regional mapping shows a probable fault which follows the creek bed striking west north west. This has displaced the beds south of it approximately 300 feet to the west. There is also a shear zone parallel to this fault, which passes through 200 south on the base line giving a resultant superimposed shearing. In three places in the shales minor folding is present. The folds indicate an average plunge to the south of 55 degrees.

MINERALIZATION: There are two zones indicating sulphide mineralization. One of these is in the siltstone and one in the shales. In neither case is the quantity abundant. The relict sulphide is shown by limonitic casts averaging .02 inches in diameter, which are disseminated throughout the rock. The occurrence of sulphides seems to be controlled by the bedding and follows favourable bands in the rocks. In a general way they correspond to the higher radioactive zones.

Weak copper mineralization is evident in the north east sector of the area in silicified shale. It is observed as malachite stains in joint planes.

THE ANOMALY.

The anomaly is one of a series of second order anomalies associated with the bedded sequence of the area in lithologically similar members apparently forming a stratigraphical unit. This suggests that there is a stratigraphical control over the location of uranium mineralization in this region, and that the beds constitute a favourable stratigraphic horizon. Field work beyond the mapped area has suggested that many of the anomalies are due only to the consistently high background radioactivity of the shales which outcrop along the eastern side of the ridge. There is however, at least one other area in this sequence where further detailed mapping has been justified owing to local higher radioactivity (Waterhouse Uranium Prospect No. 2.).

The zone of greatest radioactivity at this Prospect occurs in the sheared siltstone 350 feet south and 90 feet west of the 00 base line peg, Shearing is well developed and strikes North 35 degrees west and dips 80 degrees easterly. The siltstone is pitted with limonitic casts indicating primary sulphide mineralization.

No visible uranium minerals have been found to date in this deposit and on examination of the high count area with the ultra violet light failed to reveal any fluorescing minerals. However, this may be due to leaching, the effects of which are not fully understood at present.

SAMPLING.

A sampling trench was dug across the most intensive anomalous zone in the siltstone. Sampling was commenced at 352 feet south and 40 feet west of the 00 peg, and samples were taken over 5 feet intervals. The quantity of rock taken in this initial sampling was approximately one pound per foot of channel. Results are shown in table 1.

TABLE I.

Distance	% - U_3O_8	Distance	% - U_3O_8
0 - 5'	0.01	50 - 55	0.01
5 - 10	0.01	55 - 60	0.01
10 - 15	0.01	60 - 65	0.01
15 - 20	0.01	65 - 70	0.01
20 - 25	0.01	70 - 75	0.01
25 - 30	0.01	75 - 80	0.017
30 - 35	0.014	80 - 85	0.01
35 - 40	0.032	85 - 90	0.013
40 - 45	0.017	90 - 95	0.01
45 - 50	0.01	95 - 100	0.01

A "spot" sample from the highest reading area assayed 0.069% equivalent U_3O_8.

GEOPHYSICAL RESULTS.

RADIOMETRIC SURVEY.

The radiometric survey shows that the whole area is slightly high averaging 1½ time the background count. This has been found to be the case in the southern extension of these beds. This may constitute a higher radioactive horizon.

The large area of twice background surrounding the anomaly has its long extension parallel to the bedding, and not the shearing, which would indicate a bedding control. This fact pertains throughout the area.

The anomaly itself covers a very small area, but leaching may have been responsible for the small distribution of high radioactivity.

MAGNETOMETER SURVEY.

The magnetometer survey shows two high anomalies of 3500 gamma and 5000 gamma. These exist 350 feet and 650 feet west of the base line respectively. It is thought that these anomalies are due to a deep sealed major magnetic body, but more work would be required to determine its true nature.

GEOCHEMICAL RESULTS.

The geochemical results show a 'very high' copper zone in the north east of the area. This is in the proximity of the copper staining in the silicified shale. It should be noted that no copper mineralization could be traced in the siltstone.

CONCLUSIONS.

Although the radioactive zone is small, it is considered that some testing by diamond drilling is warranted. The possibility exists that uranium minerals could have been leached out, and as a result, indications at the surface are only weak. Furthermore, this host rock is very similar to that at Coronation Hill where uranium mineralization has been found. It is felt that the Prospect should be tested to a limited extent for guidance to determine if leaching has occurred, and also for assistance in the interpretation of other anomalies of this type occurring in the area. Two drill holes are recommended, the first to intersect the possible channel one hundred feet below the highest count and another two hundred feet south to allow for the possibility of a south plunge of the mineralized zone. The proposed sites are indicated on Plate 1.

REFERENCES.

Wood F.W. and McCarthy E. 1952: Airborne Surveys over the Rum Jungle Area and other pations of the Northern Territory. Bur. Min. Res. Geophys. Records Rept. 79/1952.

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

Noakes L. 1949: A Geological Reconnaissance of the Katherine - Darwin Region, Northern Territory. Bur. Min. Res. Bulletin No. 16.

APPENDIX.

Report by W.B. Dallwitz on host rock from airborne scintillometer anomaly. Near south boundary Hundred of Goyder. Tuffaceous Rock. Forwarded by P. Rosenhain.

SAMPLE NO. A9810.

There is some similarity between this rock and No. 9809 (Coronation Hill). Directional structure is pronounced, and is marked by closely spaced streaks of hematite, sericite, limonite and chlorite. The sericite and Chlorite are uniformly stained light brown by limonite. These minerals may represent original clayey matrix or slate fragments. The grain size of the quartz is about double that in 9809 the average being 0.05 m.m. The original shape of the quartz grains has been destroyed, probably at the time of shearing. Quartz is much more abundant than in No. 9809 and sericite correspondingly less plentiful. The rock was probably an argillaceous siltstone or sandstone, which has been considerably altered by shearing stress. The possibility that the original rock was a very acid tuff cannot however be entirely dismissed at this stage.

Granular hematite, black iron ore, fine grained sphere and leucoxene are the secondary minerals. This sphere is associated especially with granular hematite and black iron ore.

Rock name: Sheared, argillaceous, ferruginous quartz siltstone or sandstone.

Limonite and hematite in this rock probably owe their origin very largely to hematitic and/or pyritic mineralization, and subsequent alteration of these minerals by weathering. The association of sphere with granular iron ores suggests that ilmenite was one of the original constituents.

PRELIMINARY GEOPHYSICAL REPORT

ON

WATERHOUSE URANIUM PROSPECT NO.1.

by

A. F. Alle.

C O N T E N T S.

SUMMARY.

The Waterhouse Uranium Prospect No. 1 occurs in a siltstone bed in a sequence of quartzite, siltstone and shales.

A radiometric survey indicated several small areas of two times background. The only important area contains two high spots, one of twelve times background and the other six times.

A magnetometer survey over the same area indicated two series of magnetic highs on the west of the radioactive highs. The first is in the order of 2,500 gamma and the second 4,000 gamma above normal background for the area. These do not seem to be corrected with the radio-active anomaly and could be related to a large magnetic body at depth.

The self-potential work gave negative results.

Further magnetic work is recommended and testing of the radioactive anomaly by drilling.

INTRODUCTION.

The Prospect was discovered by the airborne scintillometer survey of 1952 and is a second order anomaly.

It is situated 1.7 miles on a true bearing of 105° from the south end of Gould airfield.

The military co-ordinates on Batchelor sheet are 072311.

A survey grid had previously been laid down in the area to serve both the geological and geophysical work.

The detailed radioactive coverage constituted the main survey. This was supplemented with a detailed magnetic survey and also trial self-potential traverses.

The work commenced in June and was completed by the 14th July, 1953.

GEOLOGY.

This is fully described in the Geological Report on this area.

TOPOGRAPHY.

The anomaly is situated on the western side of a ridge comprising slates, quartzites and siltstones. Steep gullies have been formed but on the eastern side the ridges fall away to alluvial flats and on the west to semi-undulating country.

The streams flow only during the wet season from November to April.

GEOPHYSICAL RESULTS.

RADIOMETRIC SURVEY.

The traverse lines, placed 100 feet apart, were read at 25 foot intervals and closer where necessary. Further readings were taken over the area to detail clearly the surface extent of the radioactive highs.

Several small areas of two times background exist on the eastern side of the base line but no high spots could be detected within these areas.

One major area of twice background exists on the western side. This contains two high spots the most important being twelve times background over an area of eight square feet. The second high spot is six times background over a smaller area.

The total area of twice background is approximately 30,000 square feet on the western side and 17,000 square feet on the eastern side of the base line.

A small costean was cut over the highest spot extending about 40 feet east and 80 feet west of this spot. The values were not appreciably altered but at both ends the readings showed a rise from three to four times background.

A radiometric contour plan (Plate IV) of the area has been drawn and is attached to this report.

MAGNETOMETER SURVEY.

The variations in vertical magnetic intensity over the selected area are shown on the accompanying plan (Plate V). There is a general rise of 2400 gamma over the area, from the base line to 400 feet west of the line. At this point which is west of the radioactive highs are several isolated magnetic highs approximately 2500 gamma above the normal intensity of the area. Parallel to this and further west about 650 feet from the base line, another series of highs occurs, rising to 4,000 gamma above normal intensity.

At present these do not seem to be connected with the radioactive highs but they occur in the same siltstone beds. They could be associated with varying magnetite concentrations in these beds or could be due to a larger magnetic body at depth.

SELF-POTENTIAL WORK.

Two traverses were attempted crossing the two radioactive highs. Both these were unsuccessful. This was probably due to the bad contacts caused by the barren and rocky nature of the ground and the sparseness of any soil cover. The holes had been previously wetted.

CONCLUSION.

Further magnetic profiles should be surveyed to delineate more clearly the nature and extent of the magnetic anomaly.

As suggested also from the geological evidence, the area on the western side could be further tested by drilling to determine whether the radioactive high area is continuous at depth.

REFERENCE.

Wood F.W. and McCarthy E. 1952: Airborne Surveys over the Rum Jungle Area and other Portions of the Northern Territory. Bur. Min. Res. Geophys. Records Rept. 79/1952.

PLATE I

Geological Plan
WATERHOUSE URANIUM PROSPECT
Nº 1
RUM JUNGLE AREA
NORTHERN TERRITORY, AUSTRALIA.

100' 50' 0 100' 200' 300'

SCALE

Reference

QUATERNARY.

Alluvium.

PRE-CAMBRIAN

Brocks Ck Gp

Shales

Quartzite [silicified shale ?]

Siltstone

Limonite pseudomorphs after pyrites.

Geological boundaries [approx]

Strike and dip.

45° bedding
45 Cleavage
45 Joints

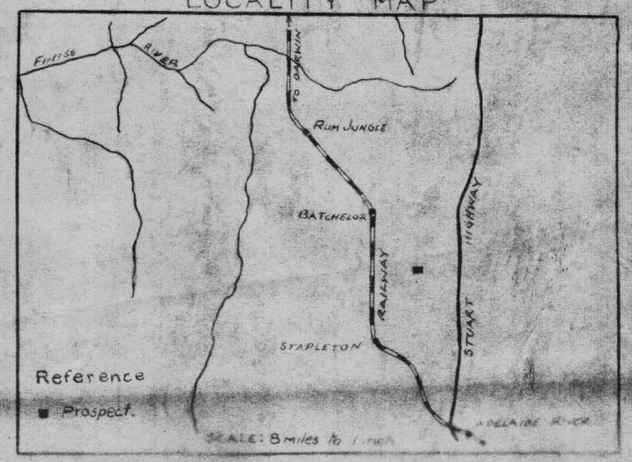
Drainage

300' Contours at 10 feet intervals

2x Radiometric contours

4° 30' MAG

LOCALITY MAP



Plane table and telescopic alidade survey and geology
by P.B. Rosenhain and J.D. Wyatt.
May June 1953

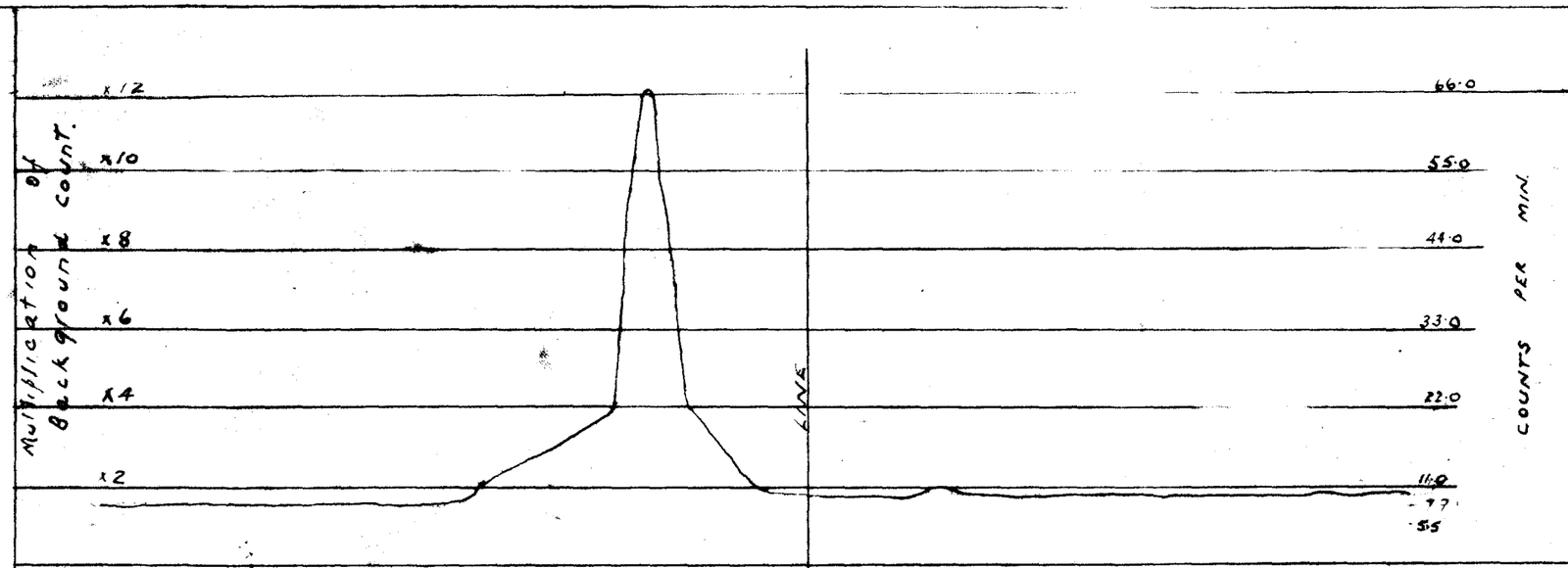
PLATE II.

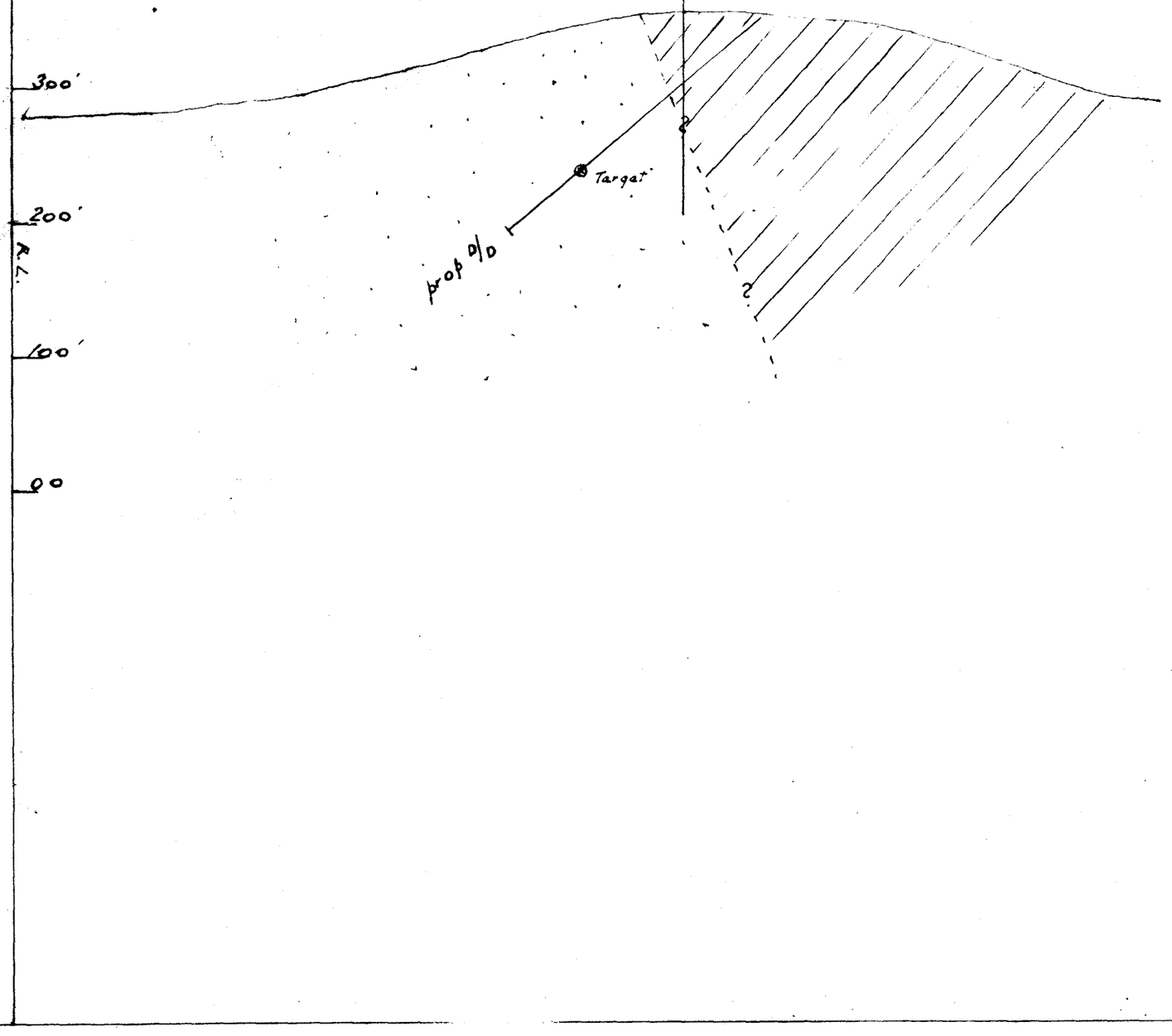
Geological Cross Section and Radiometric Profile 340'S

WATERHOUSE URANIUM PROSPECT N° 1

RUM JUNGLE AREA

NORTHERN TERRITORY AUSTRALIA





100 50 0 100 200 300

SCALE

Looking North
showing proposed D/D hole

Reference

PRE-CAMBRIAN

Shales

Siltstone

PLATE III

Geochemical Plan

WATERHOUSE URANIUM PROSPECT

Nº 1

RUM JUNGLE AREA

NORTHERN TERRITORY AUSTRALIA.

100' 50' 0 100' 200' 300'

SCALE

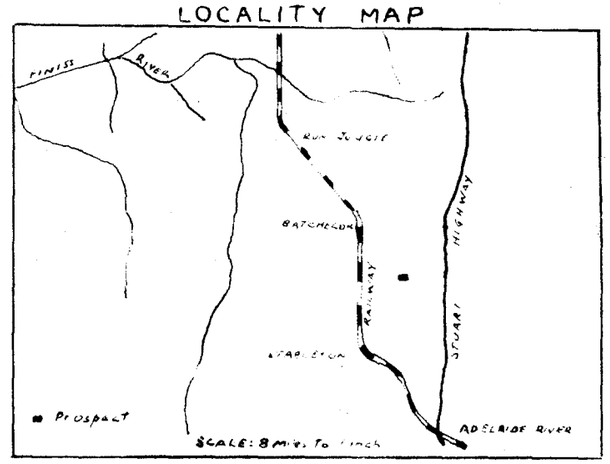
Reference

COPPER RESULTS

- O O NEGATIVE
- L LOW
- M MEDIUM
- H HIGH
- VH. VERY HIGH

4° 30' MAG

LOCALITY MAP



Survey by: A. Debnam and D. White
June 1953

PLATE IV

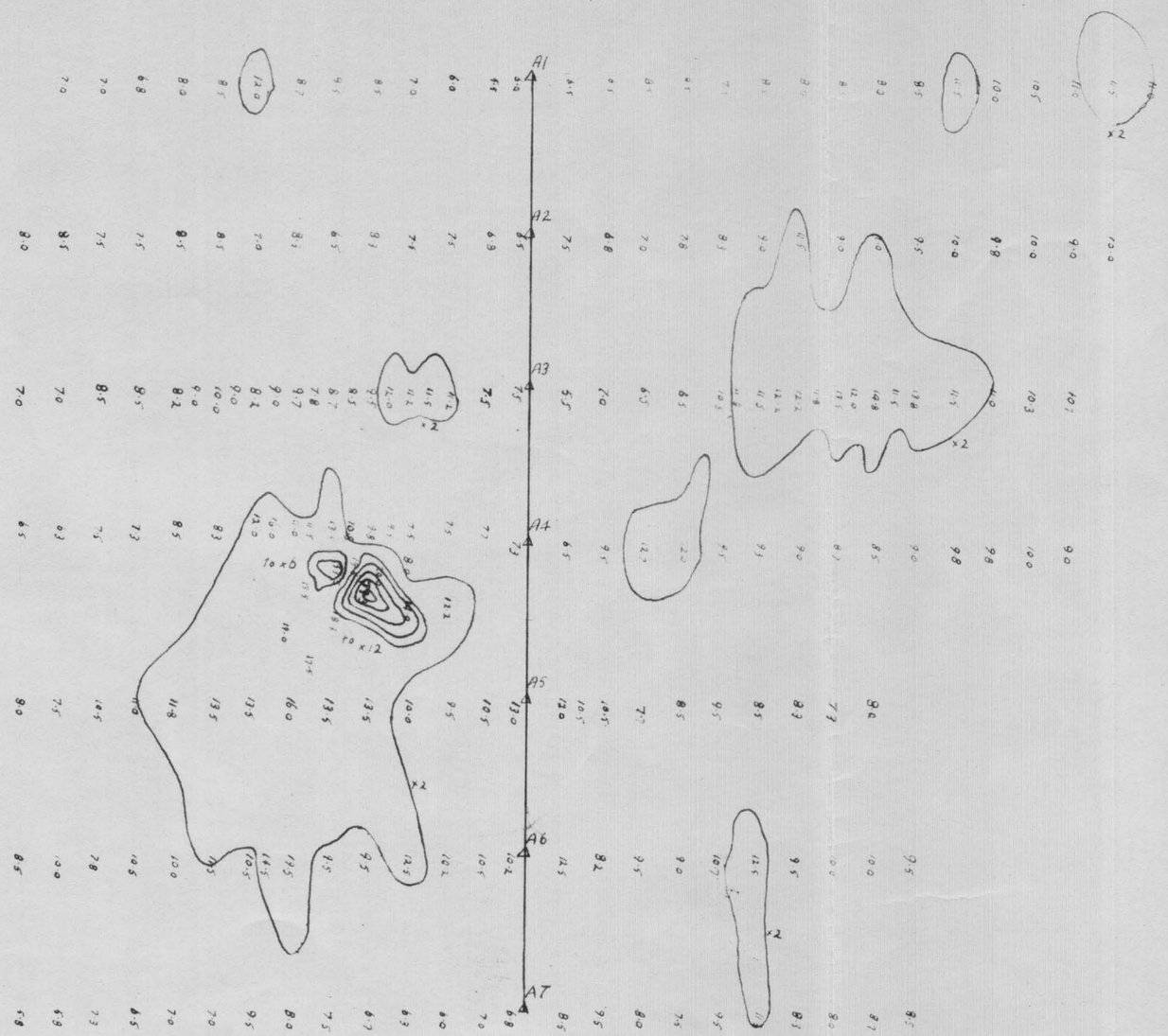
Radiometric Plan

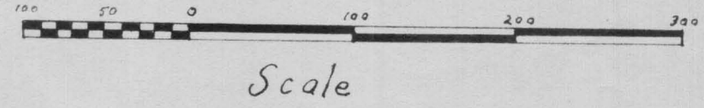
WATERHOUSE URANIUM PROSPECT

NO 1

RUM JUNGLE AREA

Northern Territory, Australia





Scale

Contour Interval

× 2

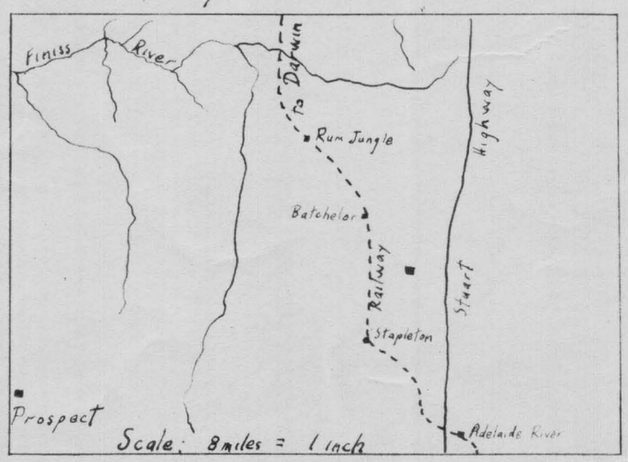
(Background = 5·5)

Instrument N° 1011C – S1

mag

4°30'

Locality Sketch



Radiometric Survey

by

A. F. Alle

June – July 1953

PLATE V

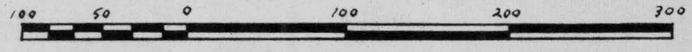
Magnetic Contour Plan

WATERHOUSE URANIUM PROSPECT

NO 1

RUM JUNGLE AREA

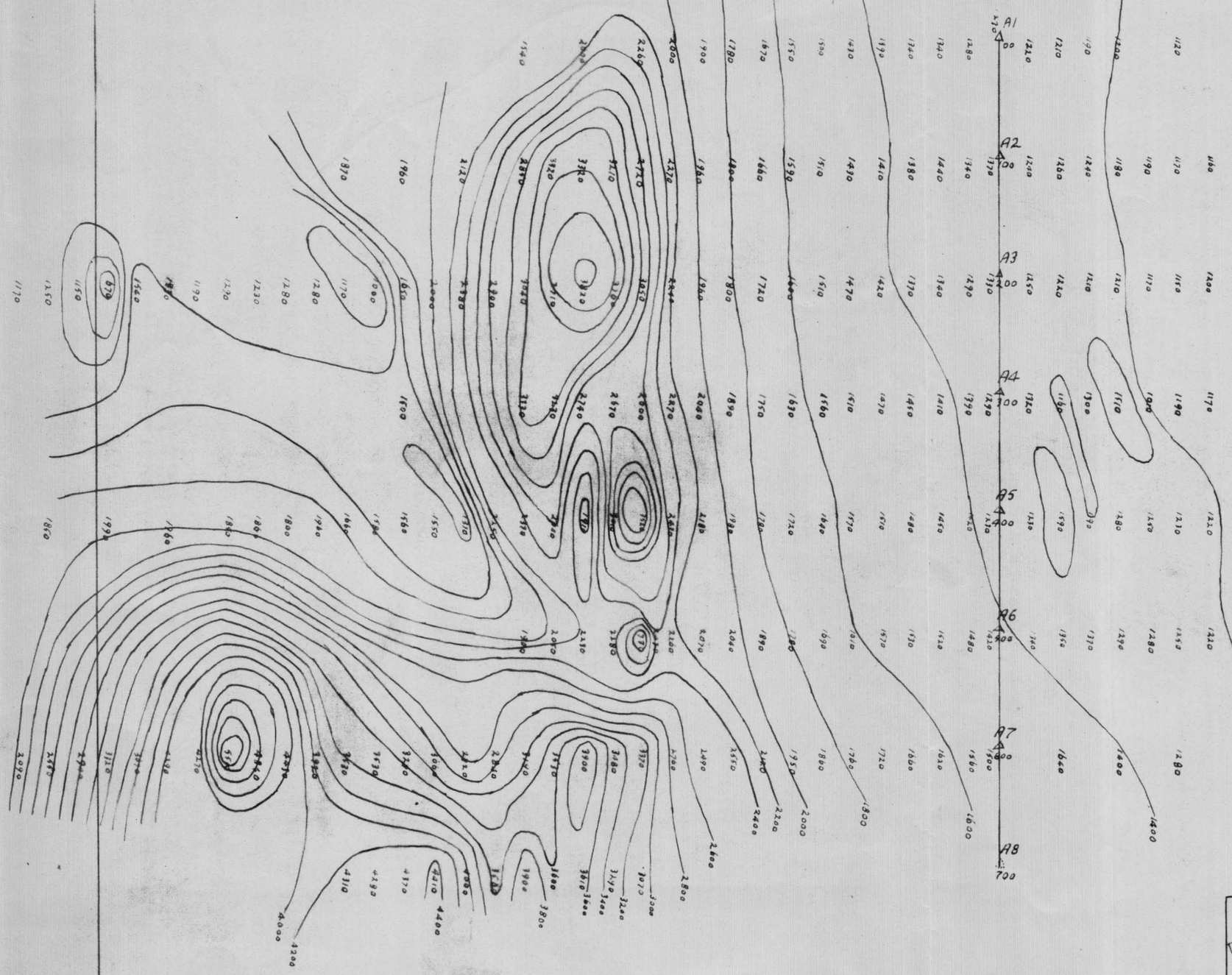
Northern Territory, Australia

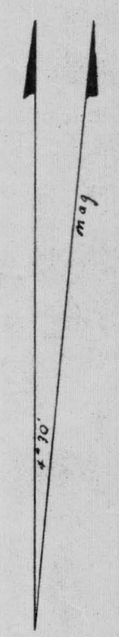


Scale

Contour Interval

200 γ





Magnetometer Survey

by

A.F. Alle

June - July 1953

Locality Sketch