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RECORDS.

PRELIMINARY GEOPHYSICAL REPORT OF THE FRAZER RADIOMETRIC PROSPECT, NORTHERN TERRITORY.

by

I.A.Mumme.

DARWIN, N.T.

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C O N T E N T S.

PLANS.

Plate No.		Scale.
3	Survey grid, Radiometric Contours and Surface Geology Scale.	1 inch - 100 feet.
4	Magnetometer Profiles	1 inch - 100 feet.
5	Self-potential Profiles.	1 inch - 100 feet.

SUMMARY.

The Frazer radioactive prospect was located by the Geophysical Section of the Bureau of Mineral Resources during Airborne Scintillometer and magnetometer surveys carried out during 1952 in a Dakota, VH-BUR, over country surrounding Rum Jungle.

Radiometric Investigations showed that the radioactivity is confined to the ferruginous surface rocks which may represent a lateritic deposit. To the east of the costean occurs a few low ridges comprising a hematite quartz quartzite breccia and a white quartz breccia.

The hematite quartz quartzite breccia appears to overlie the white siliceous breccia.

The ferruginous breccia exhibits some radioactivity and this may explain the occurrence of the radioactive laterite.

No radioactive mineral can be identified.

INTRODUCTION.

The Frazer radioactive Prospect was located in the ground in May 1953 by D.E. Catley and C.S. Robertson and in June an area surrounding a radiometric high was mapped and radiometrically contoured by K. Crank, using a portable ratemeter unit type 1011C. The survey grid on which this was based consisted of 4 traverses 800 feet long and 100 feet apart running in a magnetic north south direction.

Additional traverses were laid out in September by the geophysical section of the Brodribb camp. The northern end of the four initial traverses were lengthened and further radiometric work as well as test magnetic and self-potential traversing run. This programme of geophysical prospecting was carried out by I.A. Mumme, assisted by D. Pritchard (geophysical assistant) and E.T. Hadley (field assistant).

The radiometric work showed that a large area was radioactive to an extent of two, three and four times normal background count as obtained at the radiometric base station in a radioactively low area.

This explains the initial assessment of the airborne anomaly as a first order classification.

RADIOMETRIC INVESTIGATIONS.

A costean was bulldozed in the neighbourhood of the highest radiometric count. This showed that the radioactivity rapidly decreased once the ferruginous material at the surface was removed exposing clay.

Several radiometric assays were done at Brodribb. The results are as follows:

1. Radiometric assay of white clay.

A radiometric assay of white clay exposed in a hole dug with a post hole digger in the base of the costean gave the following result - Equivalent U_3O_8 - .004%

2. Radiometric Assay of the Ferruginous Rock exposed in the costean.

This occurs in the upper parts of the costean and may represent laterite. - Equivalent U_3O_8 - 0.01%

3. Radiometric Assay of Soil.

A radiometric assay of soil on the surface above the ferruginous horizon gave the following result.- Equivalent U_3O_8 - 0.002%.

From these results, and radiometric work using the portable ratemeter type 1011C, it can be observed that the radioactivity occurs in the ferruginous layer and has not migrated downward to the clay formation or up into the soil, to any extent.

The ferruginous layer exposed in the costean may have resulted from -

1. Dissection of a laterite mass, transportation and redeposition. The limonitic grains are generally well rounded and often show a pisolitic texture. It is possible that the ferruginous material may represent redistributed fragments of a broken up ferruginous mass which may have covered the plain.

2. It may represent a product of chemical and physical alteration of the adjacent hematite quartz quartzite breccia.

   The limonitic pebbles are generally about an inch in diameter. On examination of some of the pebbles, a white fibrous mineral was found enclosed in the limonite. This mineral has fibres which are often curved, and somewhat brittle and are easily separated. They are similar to decomposed tremolite but this mineral is hardly likely to occur in the area. However it may represent silica pseudomorphic after some pre-existing easily replaceable mineral.

   Microscopic work would be of use in identifying this mineral as its identity may have some bearing on the origin of the radioactivity as its only associated with the radioactive ferruginous matter.

3. The ferruginous surface material may represent a ferruginous river gravel which has been transported to this plain and may have consolidated in part to form the more massive blocks of limonite which occur.

   The limonitic pebbles exposed in the costean have often a thin coating of clay covering them similar to the clay mass underlying this formation.

   On fracturing some of the limonitic pebbles, patches of a black mineral were visible -

   The mineral may be one of the following -

   (a) An hydrated manganese dioxide;
   (b) black limonite or hematite; or
   (c) a uranium mineral.

   An attempt was made to separate the radioactive mineral by adding hydrochloric acid to a specimen of the ferruginous material and to test the liquid with a geiger tube suitable for assaying liquids. However owing to a breakage of the tube, this has not yet been completed.

EXTENT OF THE RADIOACTIVE ANOMALY.

The radioactive anomaly as measured within the twice background contour line occupies an area of 5750,000 square feet. The areas of highest radioactive intensity readings occur over ferruginous outcrops which may represent laterite.

The highest activity occurs in a small area adjacent to the costean.

A series of low ridges occur to the east of the costean and consist of hematite quartz quartzite breccia as well as white quartz breccia. Radiometric measurements on the white siliceous breccia show normal background readings but on the hematite quartz quartzite breccia readings of almost twice background occur but no higher readings were recorded.

Marginal to these ridges are exposures of ferruginous material possibly laterite which give in patches two and three times normal background counts with the ratsmeter portable unit 1011C and exhibit increased radioactive properties over the hematite quartz quartzite breccia.

The hematite quartz quartzite breccia appears to overlie the white quartz breccia.

There are a few outcrops of quartzite in the area, these exhibit no radioactive properties.

MAGNETOMETER PROSPECTING.

Magnetic observations were carried out along four traverses in the neighbourgood of the costean with a Watts vertical force magnetometer. Magnetic anomalies occur which appear to be due to the variations in the polarity and magnetic susceptibility of the ferruginous surface laterite. On testing specimens with the magnetometer, they showed inherent magnetism. See plate 4 for magnetic profiles.

SELF POTENTIAL ELECTRICAL PROSPECTING.

Two traverses have been completed so far. One along the base line and the other along traverse O. See plate 5. No results of interest were observed except that a small potential difference was found to exist between the soil and the ferruginous horizon in the costean, but little or no potential difference between the ferruginous horizon and the clay substratum in the costean .

CONCLUSIONS.

A large number of radioactive anomalies similar to this type but much smaller in surface extent occur in the Hundred of Waterhouse and Goyder, and in the Brodribb area and often occur in flood plain areas or in areas in which the underlying rocks appear to be leached.

A large area of granite is exposed in the Rum Jungle area which gives counts of twice and three times background, and from geological evidence a large amount of granite has been transported away from this as secondary products and deposited in flood plains and rivers.

Soils in the Rum Jungle area resulting from the decomposition of granite often give similar counts as the granite itself with a ratemeter and suggest that either uranium or radioactive potassium is concentrated in the products of weathering. There are probably two types of products of alteration of the Rum Jungle granite.

1. A clay rich product.

2. A ferruginous product.

These are formed under different types of weathering conditions.

It is possible that the radioactivity of the products of weathering is due to radioactive potassium as the kaolin minerals have a great affinity for potassium as they are absorbed to the surfaces of the alumino silicic acid molecules.

The ferruginous material may behave in a similar manner to uranium minerals.

Apart from the granite masses, there are two other sources of radioactivity in the Rum Jungle area, namely - (1) Radioactive grit beds and (2) Radioactive graphitic slates. These occur as stratigraphic units in the embayment area and skirt around the Rum Jungle Granite Mass.

Scintillometer gridding carried out by IA. Mumme in the Rum Jungle area in 1952 showed that the soil above the graphitic slate horizon were more radioactive than those above the hematite quartz quartzite breccia, the limestone and the pyritic quartzite horizons.

The graphitic slates generally had a higher equivalent U_3O_8 percentage, than the other stratigraphic units, uniformly throughout them apart from concentrations in or neighbouring the main shear plane (in which the uranium ore bodies are located. Weathering processes took place such that the activity remained in the soil and where there were low flat areas greater concentrations of uranium minerals occurred in the soil, e.g. north east of Dyson's prospect, east of White's extended, and on the alluvial flats on the opposite side of the East Finnis River to White's Prospect.

No further work apart from two test self-potential traverses (as shown on plate 3) is recommended until more information is known about the radioactive laterites in the Brodribb area.

APPENDIX.

Note regarding - "Preliminary Geophysical Report of the Frazer Radiometric Prospect".

It is my opinion that the recommendations contained in the last paragraph of the above report, written by I.A. Mumme, are inadequate for the following reasons:-

1. R.S.Matheson, Supervising Geologist, has noted the possibility that the uranium poor white clay beneath the radioactive hematitic laterite may well be a leached zone above primary uranium ore. On the possibility that this is actually the case, considerable additional geophysics, directed towards outlining the geological structure, is warranted.

2. Mr. Matheson has recommended a drill hole to test the above hypothesis. Geophysics might well be of value in determining the best position for this hole.

3. Mr. Mumme states that no further geophysics is warranted until more is known about this type of deposit. However, geophysics is one method of doing just that: namely, obtaining additional information about this type of deposit. If detailed knowledge were available there would then be no need for geophysics.

4. Only one S.P. traverse has been run in each of two directions. This is by no means adequa te to prove or disprove the usefulness of the method or the presence of sulphides. It is not claimed that S.P. will prove of value - it is merely noted that nothing conclusive about its value can be drawn from the work done to date.

5. Very little is known of the geology of the area because of its alluvial cover, hence the application of geophysics becomes all the more desirable.

In view of the above, the following additional work should be completed at the earliest convenience of Mr. Mumme, in accordance with the "Memo re Geophysics at Brodribb and Waterhouse" dated 10th September:

1. Extend the radiometric grid to at least 600' east of the creek shown on Mumme's present radiometric plan thus covering the large hematite quartz breccia outcrop and some 300' of alluvial flat beyond. The hematitic quartz breccia, or any structures associated with it, are controlling factors in the localization of radioactive highs, there is no reason why such highs should not occur east of the breccia as well as west of it. Also, the radiometric pattern resulting from the extended survey may give indications of the cause of the Frazer anomaly.

2. Extend the N-S self-potential grid to 600' east of the creek and 700' west of 00. Extend the E.W self-potential grid to 500' south and 800' north of the present base line. These traverses can be 100' apart, with a maximum of 15' between stations. The S.P. should be the last work done in the hope that rain will fall before the work is begun, thus improving contacts.

3. Extend the magnetic grid likewise to 600' east of the creek. Traverses should be 25' apart with 15' between stations, and temperature, diurnal, base and drift corrections applied. Such detail and accuracy is desirable as we have no information on the magnitude or aerial extent of possible magnetic anomalies, hence small magnitude and extent should be assumed.

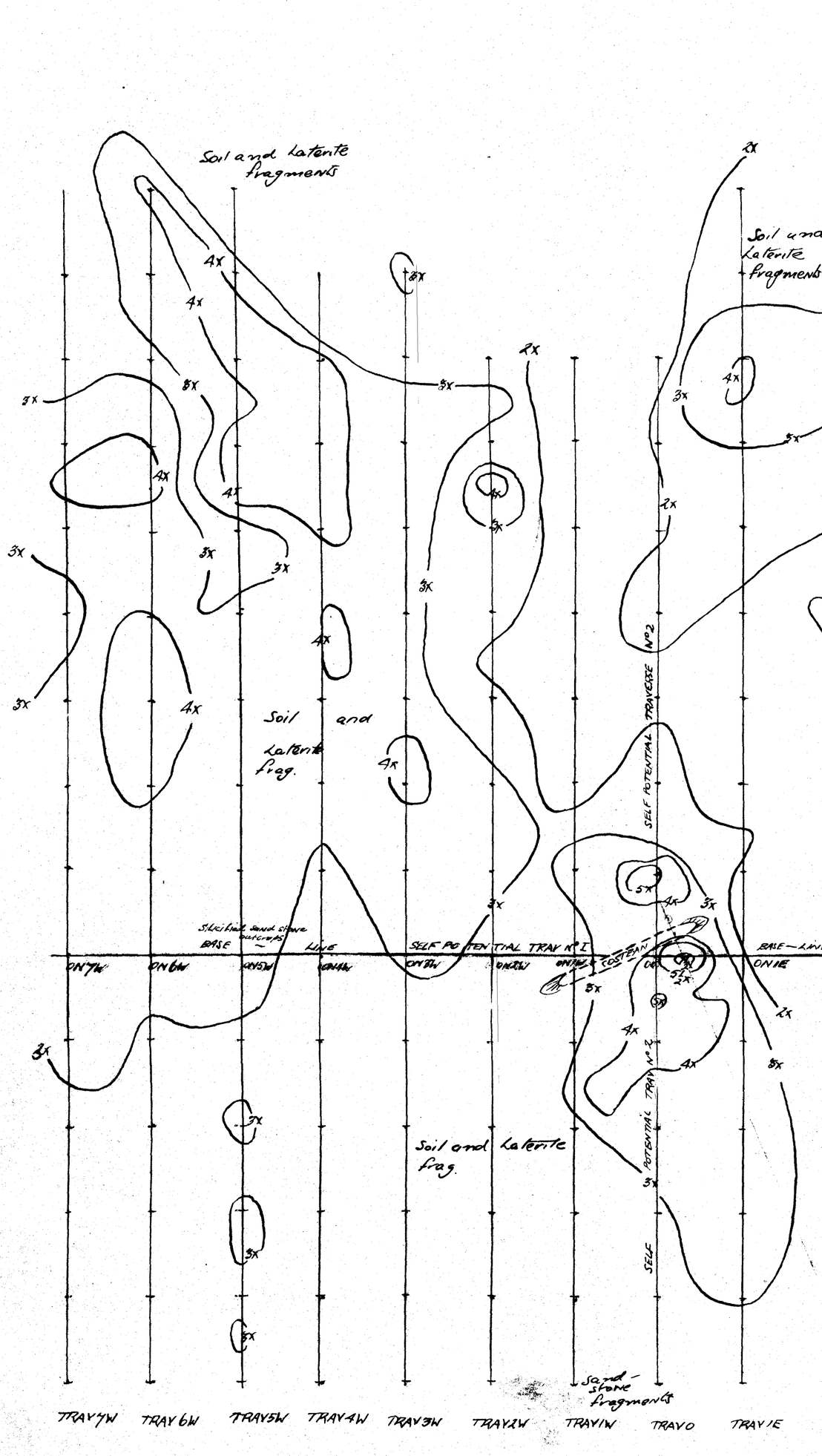
AP ENDIX CONT.

The above is regarded as a minimum programme, and its results may well indicate the desirability of further work. There is no assurance that useful results will be obtained, but, if not, it can at least be stated that an exhaustive attempt was made to secure such results and no doubts will exist that anomalies might have been secured with a more careful and extensive procedure. Also, we will have a guide to work on other prospects of a similar nature; something we do not now possess as no such detailed investigation has as yet been made.

J.B. Misz.

RADIOMETRIC CONTOUR PLAN

FRAZER AREA



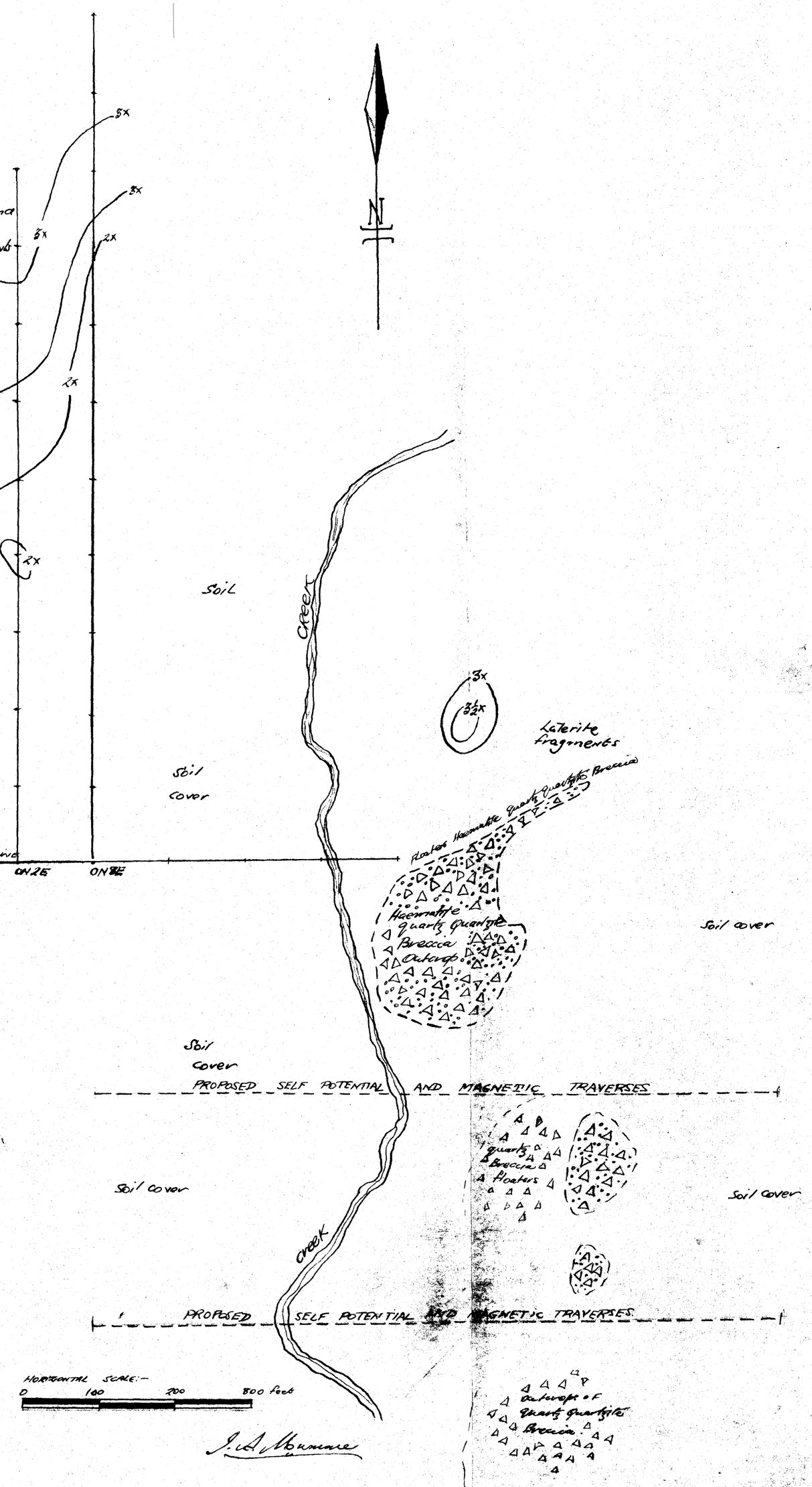


PLATE 3

MAGNETOMETER PROFILES

FRAZER AREA

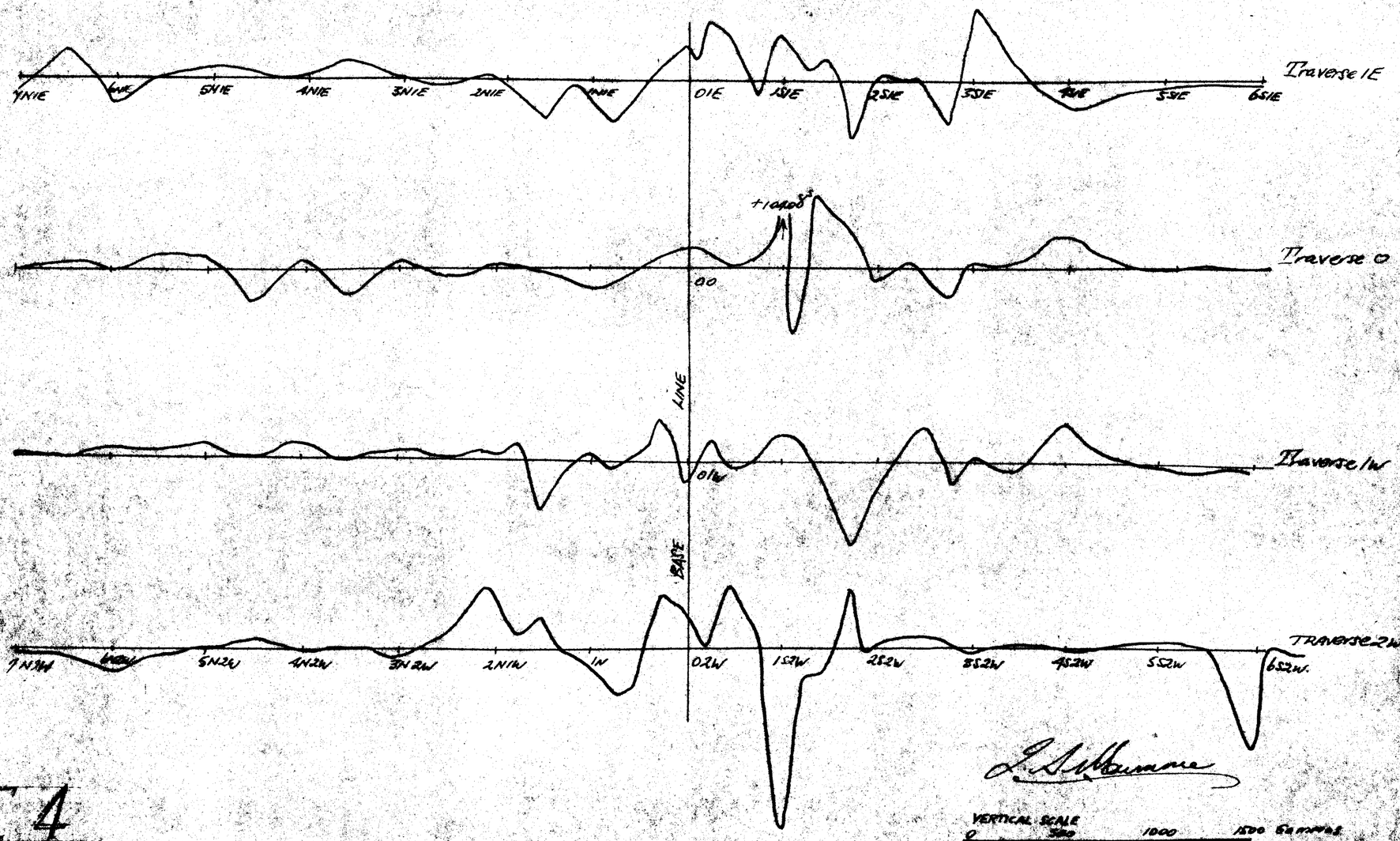
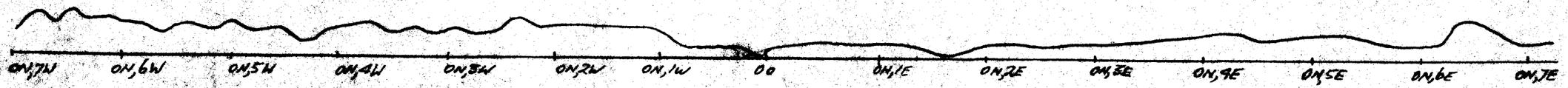


PLATE 4

SELF POTENTIAL TRAVERSES

FRAZER AREA

S.P. TRAVERSE NO 1



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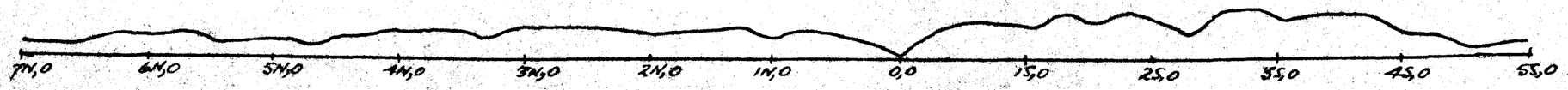

PLATE 5

J. A. Mackenzie