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DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS.

RECORDS.

1953/14.5

GEOLOGICAL REPORT ON MT. SHOOBRIDGE URANIUM PROSPECT NORTHERN TERRITORY.

by

P.B. Rosenhain.

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PRELIMINARY GEOPHYSICAL REPORT MOUNT SHOOBRIDGE URANIUM PROSPECT, NORTHERN TERRITORY.

by

I.A. Mumme.

DARWIN, N.T.

GEOLOGICAL REPORT ON MT. SHOOBRIDGE URANIUM PROSPECT NORTHERN TERRITORY.

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P.B. Rosenhain.

Records

C O N T E N T S.

PLAN.

PLATE NO.		SCALE.
1	Geological Plan Mt. Shoobridge Uranium Prospect.	1 inch - 100 feet.

SUMMARY.

The Mt. Shoobridge anomaly proved to be of very limited extent and of insignificant radioactivity. At present it does not warrant any extensive work by the Bureau of Mineral Resources.

INTRODUCTION.

The Mt. Shoobridge Uranium Prospect is located approximately half a mile on a bearing of 235 degrees true from Mt. Shoobridge, which is 103 miles from Darwin on the Stuart Highway. Access to the deposit is provided by a track west from the Stuart Highway approximately 102 miles from Darwin.

The prospect is in an existing copper lease (M.L.69B) held by Messrs. J.W. Watson and K. Cooper who carried out some mining in the area in 1950.

The area was fist visited in 1953 by I.A. Mumme whose interest was aroused by the pre-existing copper prospects and the close proximity of the Shoobridge granite. Further examination was carried out by Mumme and the writer early in November, and detailed mapping was done on a scale of 100 feet to the inch by the writer and D.N. Smith.

TOPOGRAPHY.

The prospect is located on the top of a small hill in an area of fairly high relief. The difference in elevation from the main drainage channel to the top of the hill is 65 feet, dissection is fairly vigorous and moderately steep gullies have been formed. A half mile to the east Mt.Shoobridge rises to 1040 feet above sea level and high hills exist to the east and south of the prospect.

GEOLOGY.

REGIONAL GEOLOGY.

The prospect is located in ~~meta~~-sediments of the Brock's Creek Group, of Lower Proterozoic Age (Noakes, 1949). In this area the sediments are on the south flank of the Shoobridge granite and strike generally easterly and dip approximately 75 degrees south. The Shoobridge granite is exposed over a small area in the order of one square mile, and probably has been only little exposed by erosion. The sediments in the vicinity of the prospect are micaceous sandstone and pink mica schist.

The tops of most of the mesas and hills in the area are covered by Lower Cretaceous sandstone of the Mullaman Group (Noakes, 1949). These beds have a horizontal attitude and rest unconformably on the Brock's Creek Group.

DETAILED GEOLOGY.

Lithology.

Immediately south of the granite is a micaceous sandstone. The grain size is variable and in places the rock may be considered a micaceous shale. The beds generally strike easterly and dip 75 degrees south.

Overlying these beds is a pink mica schist in which the signs of bedding have been largely destroyed. One ~~attitude~~ dip was obtained in a creek bed and the strike was easterly and the dip 70 degrees south. The rock has been well sheared and the planes of schistosity are very variable in attitude. In all cases however the dip is steep.

West of the base line the boundary between these two rock types is indefinite and gradational.

Structure.

Between the two rock types is a zone of faulting and intense shearing, averaging a width of approximately 10 feet. In this zone graphitic slates occur which are strongly contorted. The strike of the zone as a whole is 70 degrees true and the dip 80 degrees south. This band can be traced 400 feet to the east of the base line, but only 65 feet to the west. On the western end a shaft has been sunk to 20 feet. A fault can be observed in this shaft dipping 70 degrees south and striking 50 degrees true. The graphitic zone is not apparent in the shaft below this fault, nor west of the fault on the surface. Thus the fault appears to cut off the graphitic zone.

In the vicinity of the graphitic zone the micaceous shales and sandstone have also been strongly sheared, and the effect decreases away from the sheared zone.

At the southern end of the area mapped there is a quartzose reef sub-parallel to the graphitic zone. It is thought that this fills another shear.

Mineralization.

Copper is the chief mineralization of the area. The graphitic zone has been invaded by copper bearing solutions and the zone may be thought of as a low grade copper deposit. Other minerals to accompany the copper were quartz, which contains minor coarse grained disseminated galena. Some carbonates may also be present. The primary copper ore appears to be chalcopyrite which has been oxidised to malachite and azurite.

Two shafts have been sunk in the graphitic zone, one at the western end to 20 feet and 180 feet east of this another has been sunk to 50 feet. Numerous pits and small trenches have traced the zone along the strike. The graphitic zone is low in radioactivity and in no place rises above times three. Geiger counters were taken down the shafts, but this caused no increase in count.

The other mineralization is in the micaceous sandstone 300 feet north and 120 feet west of the 00 peg. Again it is predominantly copper and appears to be controlled by faulting. The fault visible forms the foot wall of the deposit and strikes northerly dipping steeply east. This ore has been open cut

to 15 feet plus and is rich azurite and malachite. In this stope and on the dump three specimens of torbernite have been found. Radioactivity in this area is higher than elsewhere.

GEOPHYSICAL RESULTS.

RADIOMETRIC WORK.

Radiometric traversing was carried out on the adjacent granite and 125 counts per minute recorded. It is possible that the small anomaly may be related to the granite by leaching.

The highest anomaly recorded gave a reading of 400 counts per minute 50 feet due north of 00 peg (Geophysical Base line) where specimens of torbernite were obtained.

SELF-POTENTIAL WORK.

This work showed a line of negative anomalies corresponding to the zone of carbonaceous rocks.

The anomaly can possibly be attributed to oxidation of the carbon and possibly sulphides.

MAGNETOMETER WORK.

Three traverses were made and force variations of a very small magnetude recorded. This would indicate no large masses of magnetite, hematite or pyrrohtite in the vicinity.

CONCLUSIONS.

The Mt. Shoobridge anomaly is a small area containing insignificant radioactivity. The occurrence of torbernite is however encouraging and further radiometric work in the area could be warranted accompanied by some post holing.

Extensive work in the form of diamond drilling is definitely not encouraged.

PRELIMINARY GEOPHYSICAL REPORT MOUNT SHOOBRIDGE URANIUM PROSPECT, N.T.

by

I.A.Mumme.

C O N T E N T S.

PLANS & SECTIONS.

Plate No.		Scale.
1	Survey plan of Mt. Shoobridge Uranium Prospect showing grid and radiometric contours.	1 inch - 100 feet.
2	Plan showing mineralized areas in Brocks Creek District.	1 inch - 1 mile.
3	Self-potential profiles - Horizontal scale	1 inch - 100 feet.
	S.P.Scale	1 inch - 200 Millivolts.
4	Magnetometer Profiles - Horizontal scale	1 inch - 100 feet.
	Magnetic Intensity	1 inch - 200 Gammas.
5	Self-potential contour plan - Horizontal scale	1 inch - 100 feet.
	S.P. Scale	1 inch - 50 Millivolts.

INTRODUCTION.

This prospect has been named the Mount Shoobridge Uranium prospect as Mount Shoobridge forms the most prominent adjacent topographical feature.

Radioactive rocks and the secondary uranium mineral torbernite were discovered at this prospect, which is a copper mine, on October 25th 1953 by I.A.Mumme.

This prospect is situated about half a mile from Mount Shoobridge and bears 38 degrees west of south from this mount.

Radioactive intensity up to seven times background was obtained on copper carbonate heaps on the eastern side of two adjacent stopes. The dump on the western side gave an average reading of four times background with a maximum of eight times background using a portable ratemeter type 1011C.

Radioactive specimens were obtained from these dumps containing torbernite.

Within the main stope, the walls gave radiometric intensity values of three to four times background count. Due to a collapse of the eastern wall of the main stope the bottom is hidden by debris from the wall and the dump.

The debris in the main stope gave radiometric intensity values of four to five times background count and radioactive specimens containing torbernite occur.

The secondary uranium mineral torbernite was apparently exposed in the deeper portions of the main stope in chloritic zones in the sericitic mica phyllites as shown by the surface rocks of the dump.

Some torbernite in crushed sericitic mica-phyllites was obtained in situ by I.A. Mumme, from a shear zone controlling the position of the copper ore body which was removed during mining operations.

The radioactivity and radioactive minerals are only associated with these stopes and their associated dumps.

Two shafts, and a number of costeans and pits were sunk along a prominent carbonaceous quartz crush zone containing traces of malachite and azurite with local injections of quartz-galena rocks. (See Plate No. 1) Only the lead mineral galena was obtained in appreciable quantities.

No uranium minerals were identified along this mineralized zone and no radioactive rocks located. This zone of copper and lead minerals has been referred to as line of mineralization No. 1 (See Plate No. 1.)

A survey plan of the mine shafts, pits and costeans and lines of mineralization was prepared by I.A. Mumme on the 5th and 6th of November so that a suitable base line could be chosen for magnetic and self-potential test traversing.

Three magnetometer traverses were completed.

P. Rosenhain visited the area on the 5th of November and inspected the shafts, stopes and costeans and carried out geological mapping from the 16th November to the 19th November.

Further magnetic and self-potential traversing and some reconnaissance radiometric field work was carried out during the two periods 16th November to 20th November, and 24th November to 28th November.

The magnetometer profile showed that no large magnetic ore bodies (containing magnetite, hematite and/or pyrrhotite) occur at depth in the mineralized area adjacent to the traverse.

The self-potential traverses showed a line of negative anomalies coinciding with the carbonaceous quartz shear and the south western termination of the carbonaceous zone can be determined from the self-potential profiles.

The stopes, shafts, costeans and pits were inspected at night with an ultra-violet lamp but no fluorescent uranium mineral could be observed.

Reconnaissance radiometric work was carried out in neighbouring mineralized areas and feebly radioactive rocks were located at the Mount Ellison Copper Mines and at Philp Greet's Copper Mines. (See Plate No. 2.)

RADIOMETRIC INVESTIGATIONS OF THE GRANITE.

The uranium prospect occurs in folded, sheared and faulted meta-morphosed sediments marginal to the Mount Shoobridge granite mass.

The granite gives readings on the portable ratemeter (Type 1011C) of approximately twice to two and a half times background.

Inspection of the granite showed that it is composed essentially of feldspar, biotite, actimolite and quartz.

In places the granite is seen to contain zenolithic matter and adjacent to the Mount Shoobridge Uranium Prospect it is medium grained and possesses a very uniform mineralogical composition.

In the central portions of the exposed granite mass, it is coarse grained.

About a quarter of a mile from the Mount Shoobridge Uranium Prospect is another copper prospect. No radioactive minerals could be detected at this prospect. Here secondary copper minerals, malachite and azurite occur in a shear zone in the granite associated with quartz injections.

The quartz vein injections appear very similar to those in the sericitic mica-phyllites in the Mount Shoobridge Uranium Prospect, and are probably of the same age and type. They consist of crystalline quartz which has grown from both sides of the open shear or joint plane they occupy and the terminal faces of each mass of crystalline quartz growing normally to the surface are separated by a small space.

Such growths occur on the granite mass apart from the two mineral prospects.

In the coarser phases of the Mount Shoobridge granite between the Stuart Highway and the prospects shear zones were located containing appreciable quantities of calcite. The calcite in the shear zones exhibits well developed rhombohedral cleavages.

The calcite and quartz probably represent late phase magmatic intrusions along shear and joint planes.

Large quartz veins occur in the metamorphosed sedimentary rocks on Mount Shoobridge and on the adjacent hills but no radioactive properties could be detected.

Large variations in the strike and dip of the sedimentary rocks occur adjacent to the quartz injections.

The percentage of U_3O_8 (equivalent) of the granite corresponds to 0.002 to 0.004 approximately.

The activity of the granite may be due to:-

(1) Allanite.
(2) Monazite.
(3) Thorite.
(4) Thorianite.
(5) Uraninite.
(6) Radioactive Zircon, or
(7) Radioactive Potassium in the Feldspars.

RADIOMETRIC INVESTIGATION OF THE STOPES.

Specimens on the dump on the Western side of the stopes show that at depth in the main stope thin veins of pegmatitic material were injected into the mica-phyllites and quartzites.

The pegmatitic injections have a width of approximately half an inch and often contain malachite and azurite.

The pegmatites contain a high percentage of pink feldspar (probably orthoclase or microcline) and subsiduary amounts of quartz and muscovite. No radioactive mineral could be detected in these minor pegmatitic intrusions.

Some cupriferous pyrite occurs in quartz vein material which represents the primary copper mineral.

The pegmatitic injections probably represent differentiates from the main granitic mass and were injected at the same time as the quartz veins, the copper sulphides and the uranium minerals.

The Mount Shoobridge granite outcrops at a distance of 300 feet to the north of the main stope.

The granite-sediment contact may be such that:-

1. The granite is located several hundred feet beneath the mineralized area or at a shallow depth.

2. The contact between the mineralized sediments and the granite may be approximately a vertical one and no granite is located beneath the mineralized areas.

Refraction seismic work would delineate the granite-metasediment contact rapidly.

If granite is located at a shallow depth from the surface of the main stope then it is unlikely that uranium or copper mineralization extends downward very far as it is unlikely that uranium minerals will occur in the granite to any appreciable extent.

It is possible however that intra-formational pegmatites may occur in the granite beneath the mineralized areas (as evident from the small pegmatitic injections in the mica-phyllite rock removed from the bottom of the main stope,) and may contain primary uranium minerals.

Radiometric work was carried out in the stopes and some torbernite located in the shear plane at the northern end of the main stope associated with kaolinized and chloritized sericitic mica-phyllites and quartzites.

The torbernite appears to be localized on the chloritic surfaces of the sericitic mica-phyllites although some occurs with sericite.

The amount of torbernite in these specimens is small and unless much higher grades of secondary and primary uranium minerals are found this would not be an economical mining proposition.

However the occurrence of uranium marginal to the Mount Shoobridge granite suggests that the granite is uraniferous and other uranium deposits may be located in the neighbourhood.

No autunite or other fluorescent uranium mineral has been detected although a search with an ultra-violet lamp was conducted for fluorescent minerals.

It is possible a secondary uranium mineral other than torbernite occurs, as a specimen of quartz was found near the dump which represented crystalline vein quartz and possessed a radioactive surface. The radioactivity was weak and equivalent to approximately three times normal background count. On inspection the surface was found to be covered with malachite and azurite and an orange powder. This powder may represent :-

1. A non-fluorescent secondary uranium oxide.

2. Limonite resulting from alteration of cupriferous iron pyrite.

Apart from malachite and azurite a third secondary copper mineral was located which is developed in rather equidimensional crystals, deep green in clour and vitreous in appearance. The mineral is soft and easily scratched with a knife.

RADIOMETRIC INVESTIGATION OF THE CARBONACEOUS QUARTZ ZONE.

A carbonaceous shear zone striking approximately 35 degrees east occurs in the sericitic mica-phyllites and can be traced for a distance of 550 feet.

The zone exhibits in places intense shearing and contains appreciable amounts of quartz. Some quartz exhibits a flazer structure.

Malachite and azurite occur in the carbonaceous zone as well as yellow mica.

The mica is usually associated with quartz and is similar to the mica of the quartz mica injections outcropping about 550 feet in a direction of 28 degrees °E of true north of shaft No. 1.

Similar mica quartz injections occur at Jackson's tin mines, the old Coy tin mines, Barrett's tin mines and in other tin bearing greissen zones in the Brock's Creek area.

This suggests that the mineralization at the Mount Shoobridge uranium prospect occurred at a similar time as the introduction of tin in the tin bearing greissens of the Brock's Creek area.

Tourmaline occurs in floaters of quartz between shaft No. 1 and the prospecting pit No. 2 but no radioactive mineral could be found associated with the quartz tourmaline rocks.

SURVEY OF SHAFTS AND PROSPECTING PITS ALONG LINE OF MINERALIZATION NO. 1.

(a) Survey of shaft No. 1.

Shaft No.1 was sunk in sheared carbonaceous rock and quartz veins were exposed containing galena. Similar quartz galena rocks occur on the side of the track into Barrett's tin mine from the Stuart Highway near the turn off to the old Coy tin mines (See Plate No. 2.)

The depth of the shaft is 19 feet and the shaft is vertical. The northern face follows the contact of the decomposed sericite mica-phyllites and the southern face is in carbonaceous rock.

A partial collapse near the top of the southern face of the shaft has exposed decomposed mica-phyllites so that the width of the carbonaceous zone can be observed.

No uranium minerals or radioactive rocks could be identified near or in this shaft.

(b) Survey of shaft No. 2.

This shaft is vertical for a depth of 19 feet 10 inches and the southern wall follows the contact of the carbonaceous quartz zone and the decomposed sericitic mica phyllites.

The northern wall is in carbonaceous quartz rock. The shaft at a depth of 19 feet 10 inches dips to the south east at approximately 20 degrees to the vertical and follows the contact for another 32 feet.

Traces of malachite and azurite occur in the sheared carbonaceous quartz rocks but the amounts are very small.

No primary copper minerals are visible and no radioactive mineral could be detected in the shaft or in the neighbourhood.

Some graphite was located in the amorphous carbon associated with quartz.

The zones of carbonaceous quartz rocks should form a favourable zone for uranium mineralization and the lack of uranium minerals in this zone suggests that the potential for uranium minerals occurring at depth in this are small and may only occur as accessory minerals formed during copper mineralization of the sericite mica phyllites and quartzites.

The carbonaceous quartz zone appears to be the remnants of a carbonaceous sedimentary rock caught up in a severely sheared and faulted zone accompanying the intrusion of the Mount Shoobridge granite into the meta-sediments.

(c) Survey of shaft No. 3.

This shaft was sunk in meta-sediments to a depth of approximately six feet. Some malachite and azurite stainings occur on the surface of the shaft but no radioactive mineral could be detected. The country rock is mica phyllites.

(d) Survey of Prospecting Pit No. 3.

A secondary lead mineral, lead carbonate, has been extracted from this pit which is only about four feet deep. A heap of lead carbonate, (cerussite) is situated on the side of the pit.

No copper minerals or radioactive minerals have been found associated with the secondary lead mineral cerussite. The cerussite contains some primary galena.

Galena may occur at depth beneath this pit as quartz galena injections.

SELF POTENTIAL TRAVERSING.

A number of self-potential traverses have been completed which cross the mineralized area (see Plate No. 3.)

A line of negative anomalies occurs along the carbonaceous quartz shear zone due to the oxidation of the carbon above the water table, which is located approximately 60 feet neneath the ground surface.

The self-potential traverses show that the carbonaceous quartz shear zone does not extend beyond its visible termination to the south west at shallow depth.

It is possible that it may continue at depth of several hundred feet, due to faulting, beyond the visible point of termination.

The self-potential anomaly continues beyond the eastern visible extension of the carbonaceous zone.

MAGNETOMETER TRAVERSING.

Three magnetometer traverses have been completed namely traverses 50E, 100E and 150E across the line of mineralization No. 1 and one short traverse AB across the line of mineralization No. 2.

The vertical force variations in the earth's magnetic field along these traverse lines are of small magnitude.

An anomaly occurs on traverse 50E at a position of 80 feet south of the base line but this is due to surface scrap iron.

A small magnetometer anomaly occurs across the line of mineralization No. 2.

The absence of large magnetic anomalies shows that no large masses of magnetic material i.e. hematite, magnetite or pyrrhotite occur at depth in the vicinity of the traverses.

GEOPHYSICAL PROSPECTING.

Prospecting has been carried out in a number of places in the area for uranium mineralization and the following results obtained:-

1. No surface radioactive rocks occur in the vicinity of the Iron Blow Mine.

2. Radioactive copper stained graphitic rocks occur at Mt. Ellison. Three times normal background count was obtained in some areas and one small area gave a reading of four times background on the portable ratemeter 1011C.

   No radioactive rocks were observed on the sulphide dumps.

3. No radioactive rocks are associated with the copper mine situated 1¾ miles from Mount Osborne and about 2¾ miles from the Yam Creek Smelters.

4. No radioactive rocks are associated with the tin mines - Barrett's Creek and the old Coy.

5. Slight radioactivity (amounting to three times background) was observed on several dumps of malachite and azurite at Philp Greet's Copper Mine. Prospecting in the area failed to show any uranium minerals or areas of higher surface radioactivity.

6. No radioactive rocks occur at the copper mine about four miles south of the Mount Shoobridge Uranium Prospect.

CONCLUSIONS.

Low grade secondary torbernite occurs associated with copper minerals malachite, azurite and an unidentified copper mineral at the Mount Shoobridge Uranium Prospect.

The torbernite may be only an accessory mineral and only a small quantity of primary uranium mineral may occur at depth as surface indications are not encouraging.

A seismic refraction traverse across the area should give interesting results as it would delineate the granite-metasediment contact.

If this contact appears to be located at several hundred feet beneath the mineralized area then the area warrants drilling to intersect the shear plane which controlled the copper mineralization, or cleaning out and deepening of the main stope.

As the main stope is in a poor state of preservation, diamond drilling may be the best method of testing the area.

RECOMMENDATIONS.

Geological mapping and radiometric prospecting around the contacts of the Mount Shoobridge granite with the meta sediments may locate other radioactive deposits.

PLATE 1.

Geological Plan

Mt SHOEBRIDGE URANIUM PROSPECT

NORTHERN TERRITORY AUSTRALIA

100 50 0 100 200 300

SCALE

TRUE NORTH

Reference

QUATERNARY

- Alluvium

PRE-CAMBRIAN

- Micaceous sandstone
- Pink mica schist
- Graphitic schist

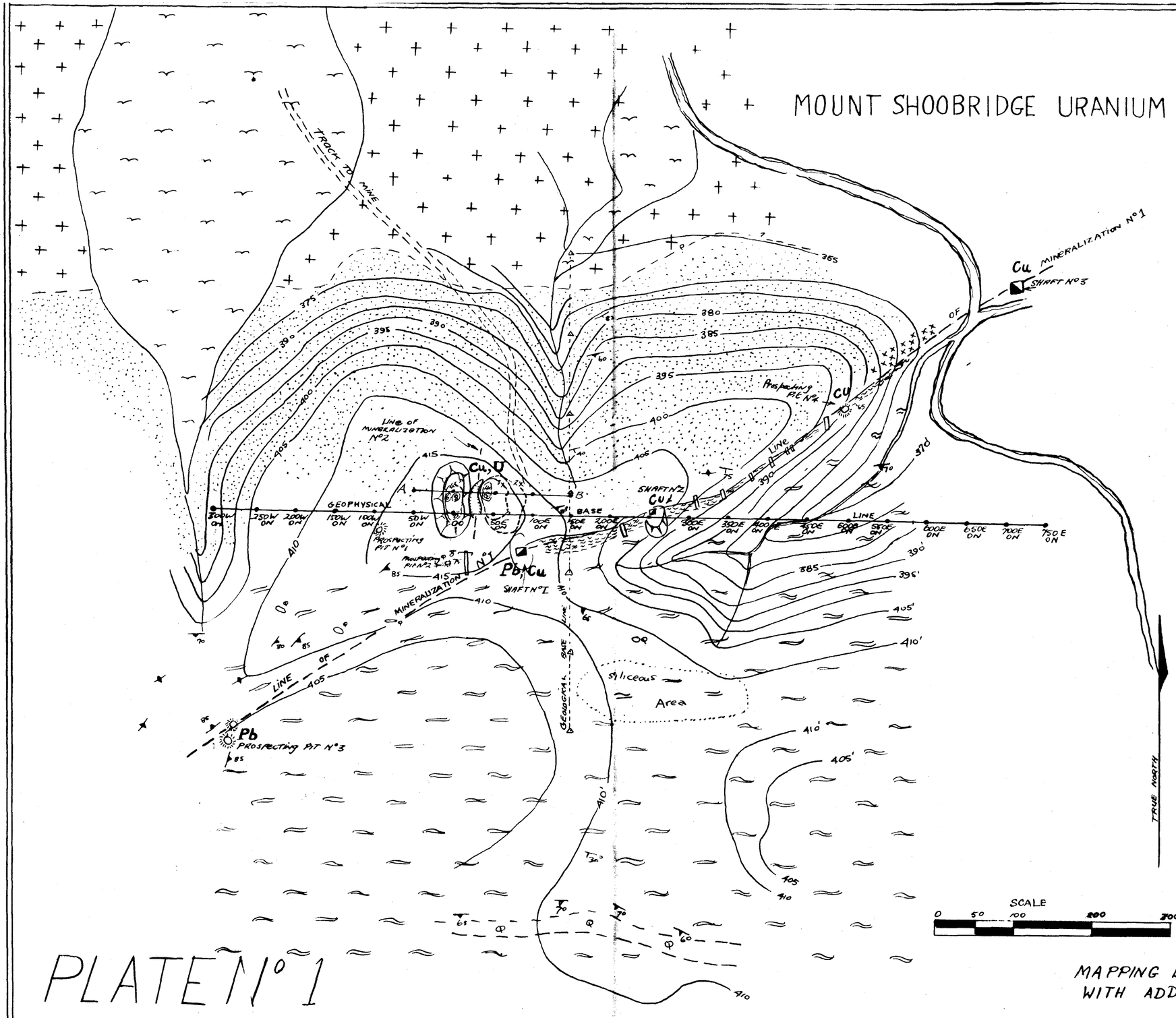
INTRUSIVES

- Granite
- Q — Quartz
- Geological boundaries (approx)
- Strike and dip: bedding, cleavage, shearing
- Dumps
- Shafts
- 3x — Radiometric Contours
- 410' — Contours

Siliceous Area

Datum Peg.

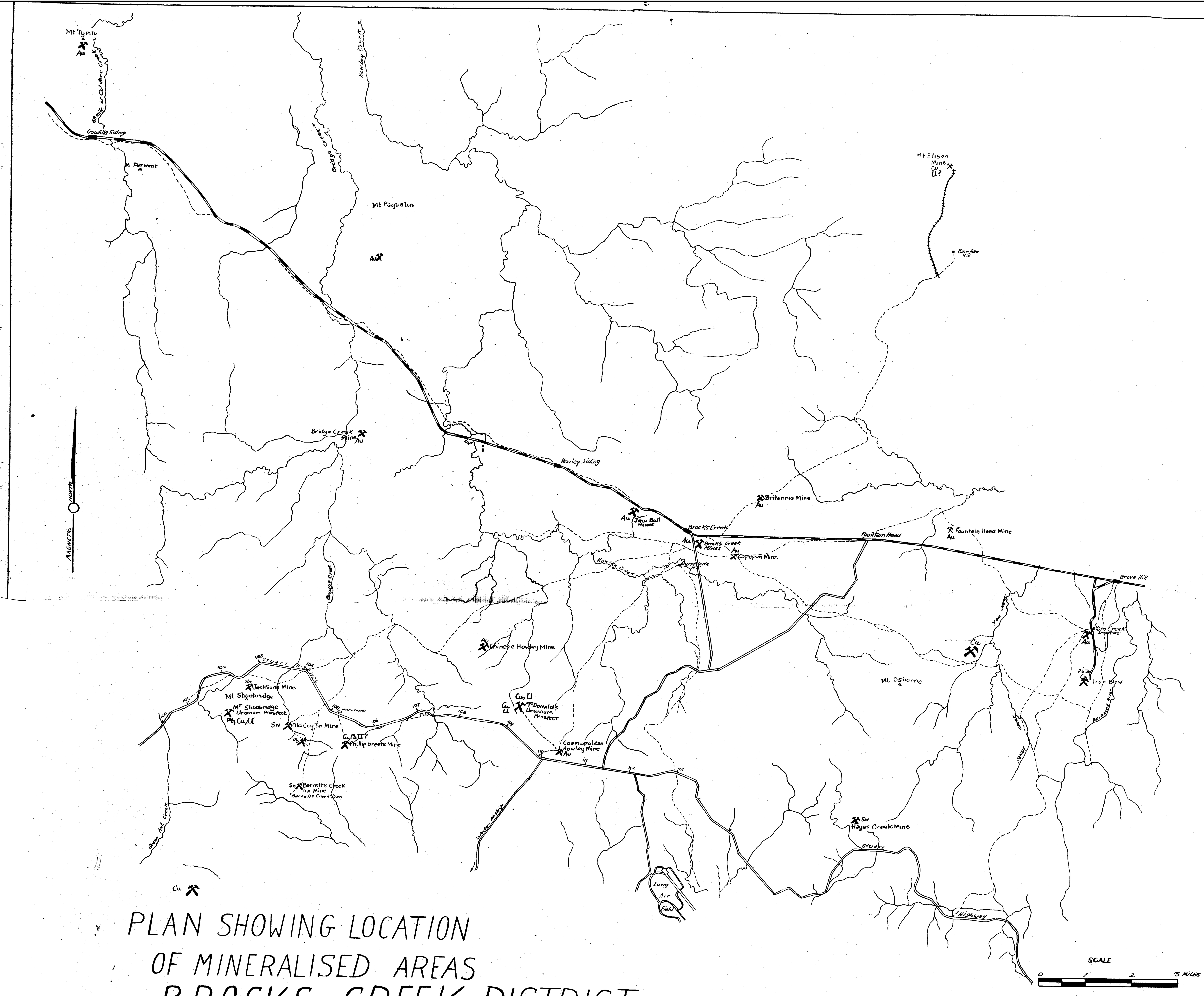
MOUNT SHOOBRIDGE URANIUM PROSPECT



- Alluvium
- Micaceous sandstone
- Pink mica schist
- Carbonaceous Schist with Quartz and some graphite
- Granite
- Quartz Mica Injections
- Quartz
- Cu — Mine working or prospecting pit with metal worked
- Dumps
- Shafts
- Prospecting Pits
- bedding, cleavage, shearing } Strike and Dip
- Radiometric contours
- Contours

MAPPING BY P. ROSENHAIN AND D.N. SMITH
WITH ADDITIONS BY I.A. MUMME

PLATE No 1



PLAN SHOWING LOCATION OF MINERALISED AREAS

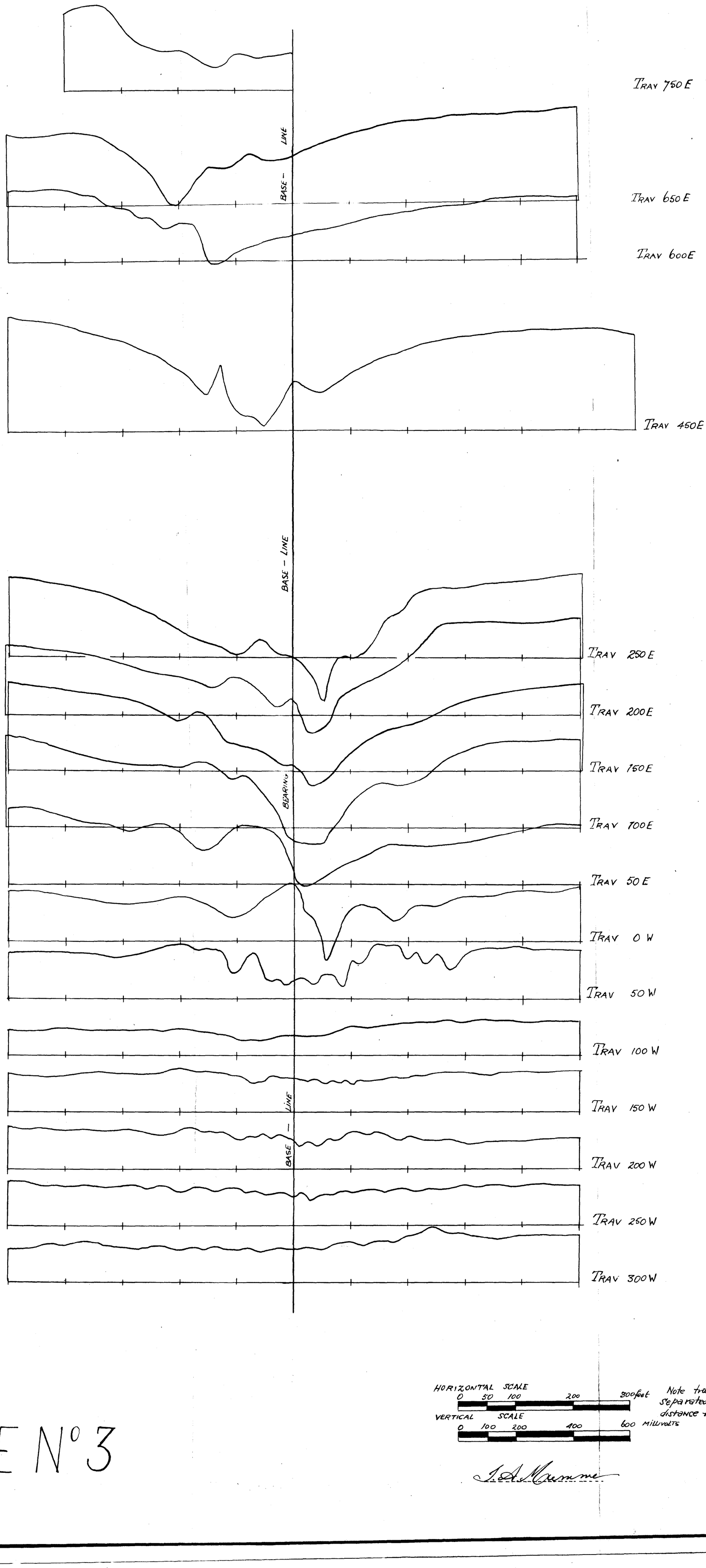
BROCKS CREEK DISTRICT

After Sullivan - 1952

J.A. Mumme

PLATE N°2

SELF POTENTIAL PROFILES
MOUNT SHOOBRIDGE URANIUM PROSPECT



HORIZONTAL SCALE
0 50 100 200 300 feet

VERTICAL SCALE
0 100 200 400 600 MILLIVOLTS

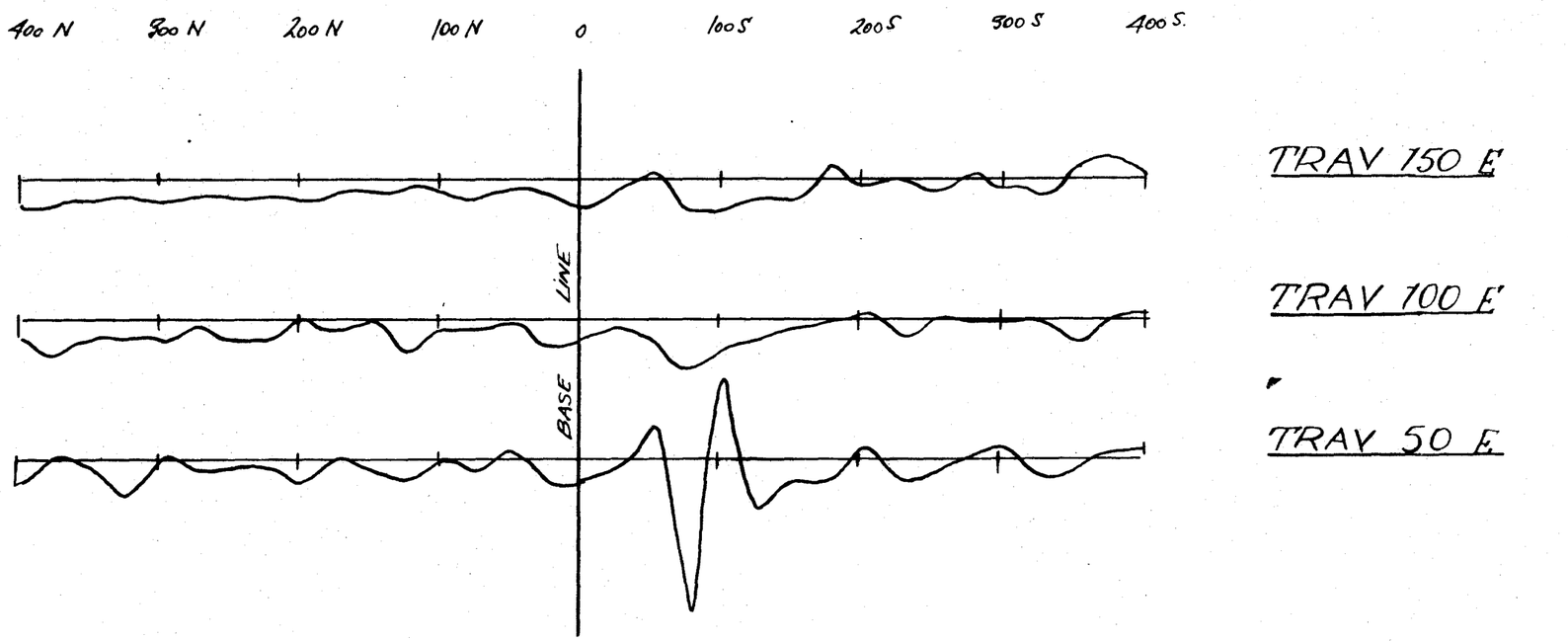
Note traverses are separated twice horizontal distance for clarity.

J. A. Maxwell

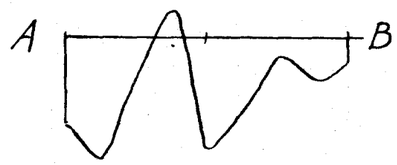
PLATE N° 3

MAGNETOMETER PROFILES

MOUNT SHOOBRIDGE URANIUM PROSPECT



TRAVERSE A-B



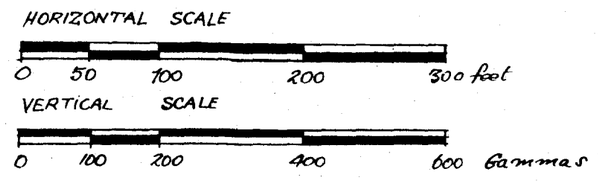
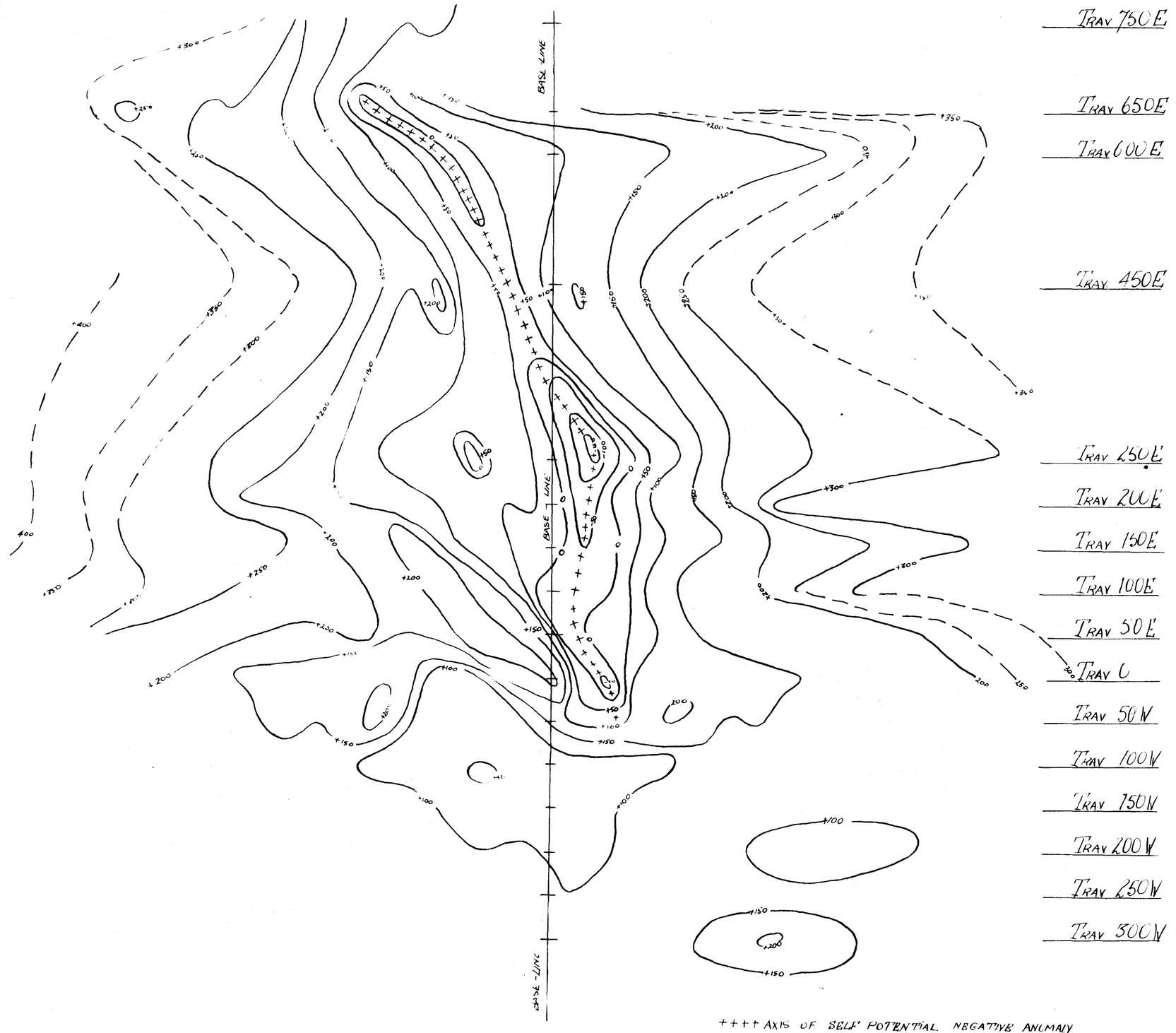


PLATE N° 4

SELF POTENTIAL CONTOUR PLAN
MOUNT SHOOBRIDGE URANIUM PROSPECT



++++ AXIS OF SELF POTENTIAL NEGATIVE ANOMALY

NOTE SELF POTENTIAL CONTOUR INTERVAL 50 MILLIVOLTS

HORIZONTAL SCALE

0 50 100 200 300 feet

L. L. Mumme

PLATE N°5