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Records 1958/12

PRELIMINARY REPORT ON THE MOUNT HARRIS TINFIELD, NORTHERN TERRITORY.

by

J. Hays

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SUMMARY.

In the Mount Harris tinfield, there is an association between faulting and mineralisation. Jessop's lode demonstrates this association in a simple manner, and it is proposed that the continuity of the lode at depth be tested by a series of short, cored boreholes. These boreholes would confirm the structural association as well as the grade of the orebody.

INTRODUCTION.

Cassiterite has been known to occur around the northern margin of the eastern arm of the Cullen Granite (see plate 1) since 1926. Mount George mine produced 1 ton of concentrates during the year ending 30th June, 1927 and 8 tons during the period 1st July, 1950 to 30th June, 1954. Mount Masson mine produced 3 hundredweights in 1942 and 12 tons during the period 1st July, 1947 to 30th June, 1951. It is possible that lack of capital caused the closure of Mount Masson in 1951, as a favourable report (Macdonald, 1951) suggested that £25,000 capital was needed in order to operate the mine successfully.

Interest in the area was revived in June, 1956, when prospector R. Harris found cassiterite in gullies six miles north of Mount George mine. Careful investigation of the slopes led to the discovery of cassiterite-bearing lodes. Subsequently, an Authority to Prospect was granted to Messrs. R. Harris and K. Jessop and, as a result of detailed prospecting, 4 mineral leases were taken out in the area now known as Mount Harris leases. From these leases, 18 tons of ore of an average grade of 17.5% Sn were hand picked and sold as concentrates. Further prospecting led to the discovery of Jessop's lode, near Mount Masson, in July, 1957. Most of the ore produced recently has been from Jessop's lode, where more than 10 tons of concentrates have been produced from the milling of approximately 150 tons of ore.

The area was surveyed by a field party in 1954, during the preparation of the 1 mile Ban Ban map, but a detailed account of the geology is not available. W. McQueen, of the Resident Geologists' Office, Darwin, submitted a preliminary report on the Mount Harris leases in November 1956. During September and October 1957, W. McQueen, J. Ward, and P. Dunn, all of the Resident Geologists' Office, worked on the Mount Harris leases for short periods, producing a contour map of the surface geology on a scale of 1 inch to 100 feet. Plate 2 is a reduction of the map to a scale of 1 inch to 200 feet. J. Hays produced a contour map of Jessop's lode t on a scale of 1 inch to 100 feet (plate 3), sampled Jessop's lode and the Mount Harris deposits, and carried out general reconnaissance of the area. The samples were assayed by the Government Assayer, N.T.A., Alice Springs and the results are quoted on pages 4 and 5.

The prominence given to the Mount Harris leases has led to the adoption of the name "Mount Harris tinfield" for the area, despite the fact that the Mount Masson and Mount George deposits were known before 1956. In order to avoid confusion, it is proposed to continue using that name in describing the field.

LOCALITY AND ACCESS.

The Mount Harris tinfield (see plate 1) is situated in the Agicondi Goldfield between the Mary and McKinley Rivers, 20 to 25 miles north-east of Grove Hill (85 miles directly south-east of Darwin, on the railway line).

Access is by the Stuart Highway to the 110 mile mark, by bitumen road to Fountain Head, and thence by bush track to Grove Hill, Mount Masson and Mount Harris. The area is inaccessible during the wet season as the bush track becomes impassable.

GEOLOGY.

According to the 1 inch Ban Ban map, the area is underlain by sandstone, siltstone, and banded ironstone, of the Masson Formation. On the west, the Masson Formation is overlain by siltstone and chert of the Golden Dyke Formation (associated with dolerite). Both formations are part of the lower Proterozoic sequence. The regional strike varies from north to north-west and dips range from 45° east to 45° west. On the east, the Masson Formation is intruded by the eastern arm of the Cullen Granite. Although the granite contact is associated with faults and shear zones, the existence of spotted slates and hornfels indicates that the granite is intrusive.

North of the granite the regional strike is north-west, indicating compression from the north-east or south-west. West of the granite the strike is arcuate and parallel to the granite margin. Within the granite is a well developed rectilinear system of north-north-east and east-north-east photo linear features. These could be the result of compression from the north-east or south-west of a type similar to that which was responsible for the regional folding.

The Mount Harris cassiterite deposits are situated near a well-defined photo-linear feature 10 miles long, with a north-east trend, thought to be a fault. Jessop's lode consists of fault-breccia in a ridge which forms part of a curving, generally north trending feature more than 16 miles long, passing near Mount Masson mine. The Mount Masson lode may form part of the Jessop's feature but has not been located on aerial photographs. Linear features trend north near Mount George mine where the lode is reported to be brecciated. All the lodes examined are brecciated, the cassiterite occurring in the ferruginous matrix of the breccia. A specimen of breccia from Jessop's lode has been examined microscopically at the Bureau of Mineral Resources laboratory in Canberra by W.M.B. Roberts, who states ".... the fractured appearance of the cassiterite suggests that it was possibly deposited with or before the vein quartz and was shattered during the same period of brecciation as this mineral.". Field observations indicate that some faulting preceded mineralisation. It is possible that the sequence of events includes faulting, mineralisation, renewed faulting, ferruginisation and lateritisation. It would appear that there is an association between faulting and mineralisation and the main object of future work should be to ascertain the nature of this association.

Superficial deposits include laterite, alluvium, and ferricrete. The ferricrete occurs in two forms. In valleys, it appears to be a stream gravel cemented by ferruginous material derived from the ferruginous zone of lateritisation. On hills, it is a residual deposit consisting of talus cemented by ferruginous material derived from adjacent hematite lodes.

Detailed geomorphological observations have not been made, but several features near Mount Harris are worthy of mention. Broad U valleys, filled with superficial deposits, and valley-invalley forms may indicate exhumation

of an earlier topography and rejuvenation. The valley ferricrete deposits were formed before rejuvenation. Accordant summits on the low hills in which the cassiterite deposits occur, accompanied by evidence of lateritisation on the tops of the hills, indicate that the hills are relics of a peneplain now dissected. The age of this peneplain cannot be estimated until such time as erosion cycles of known age can be traced into the area.

MOUNT HARRIS LEASES.

The following leases (see plate 2) were granted to Messrs. R. Harris and K. Jessop on 28th August, 1956:

Buffalo	M.L. 106A
Charlie	M.L. 107A
Margaret	M.L. 108A
Bessie	M.L. 109A

Cassiterite occurs in hematite, quartz hematite, and quartz-kaolin hematite lodes, all of which are brecciated. The lodes are in sandstone, siltstone and greywacke, of the Masson Formation. The country rocks have been folded, jointed, and contorted by drag folding along the sides and nose of north trending anticline pitching to the north. The occurrence is on or near a major north-north-east fault which is an extension of the north boundary of the Cullen granite. Photo-interpretation indicates that other faults occur near, and parallel to, the major fault. The more continuous lodes are thought to occupy accommodation faults and the smaller, less continuous ones are thought to occupy joints associated with the faulting. The main lode on Buffalo lease appears to follow a fault line and the open cuts on Margaret and Charlie leases have exposed networks of veinlets ranging in thickness from 1 inch to 9 inches and having no predominant direction.

Cassiterite can be panned from all the exposures of vein material but detailed sampling has not been done. A grab sample from the excavated lode material on Charlie lease assayed only 0.047%Sn whereas chip samples of the face exposed in an open cut on Margaret lease assayed 22.491% Sn for the lode material over a total width of 18 inches and 0.13% Sn over a total of 54 inches of country rock (quartz greywacke).

Production from the leases has been restricted to 18 tons of hand picked ore averaging 17.5% Sn (Buyers assay). Little development work has been done and all work ceased in July, 1957 to allow more time to be spent on Jessop's lode. The leases are sufficiently promising to warrant further investigation but no appraisal can be made until much more development work has been done.

JESSOP'S LODE.

Mineral lease 117A (see plate 3) was granted on 18th July, 1957 to K. Jessop and R. Harris. The lode is a fault breccia striking at 350° and dipping 75° west, parallel to the bedding of the country rock, which here is quartzite and ironstone of the Masson Formation. It forms a small scarp, facing west, almost 1000 feet long and 30 feet high. The breccia consists of angular fragments of vein quartz and quartz siltstone, in a ferruginous matrix which contains finely disseminated cassiterite. Ferricrete has been formed at the surface of the breccia and the true width of the orebody is obscured but is of the order of 5 feet over the full length of the outcrop. Reliable samples of lode could not be collected because of this ferricrete cap, which closely resembles the lode. Samples were taken by the writer in the ferricrete

at the north end of the outcrop, from trenches in the middle of the outcrop, and from the ferricrete at the south end. The following assays were obtained:-

SOUTH END OF OUTCROP - channel sample across lode from east to west.

Sample No.	Width	Assay Value
No. 2001	0 - 12 inches west	0.366 % Sn
No. 2002	12 - 30 inches west	0.993 % Sn
No. 2003	30 - 48 inches west	0.854 % Sn
No. 2004	48 - 60 inches west	0.260 % Sn

CENTRE OF OUTCROP - grab samples from excavated material from trenches.

No. 2007	1.478 % Sn
No. 2008	2.589 % Sn
No. 2009	12.534 % Sn
No. 2010	2.636 % Sn

NORTH END OF OUTCROP - grab sample from broken material

No. 2005	10.600 % Sn

FLOAT OF COUNTRY ROCK

No. 2006	0.189 % Sn

Production to date is more than 10 tons of concentrates averaging 55% Sn (buyers payment assays) from approximately 150 tons of ore (estimated by the writer from the tailings), equivalent to an available tin content of approximately 4%. This probably corresponds to a milling grade of 6% or even more, as the treatment plant is very inefficient. A sample of the tailings, when panned, yielded a concentrate which appeared to be equal to the original concentrate in both quality and quantity.

The estimated grade is in marked contrast to the grade of the outcrop. There are two possible explanations. Either the distribution of cassiterite is erratic or else repeated and prolonged weathering has adulterated the outcrop. Although the former is thought to be the case, it is pointed out that the lode outcrop has experienced several cycles of erosion and that it is difficult to decide whether the outcropping material above the lode at the south end is lode material (in which case the assays are truly representative) or ferricrete (in which case adulteration has taken place). The lessees have been advised to sample the orebody by several deep trenches across the full width, to avoid being misled by outcrop assays of doubtful worth. An adit, driven from the south end of the outcrop along the orebody, 50 feet below outcrop level, has been recommended as a suitable means of proving grade and continuity without stopping ore production.

The trench from which ore is being extracted has reached a maximum depth of 20 feet below outcrop level. The association between fault breccia and mineralisation persists to that depth and the average width of lode is approximately 5 feet. If this width persists throughout the orebody, ore reserves must be of the order of 400 tons per vertical foot. The hanging wall and foot wall are clearly defined in rocks which will need little support during mining and the lode appears to be ideal for mining by a small company with limited capital. Because of the simplicity of the structure, proof of continuity at depth ought to be easy, and proposals for drilling are submitted.

PROPOSED DRILLING PROGRAMME.

It is proposed that attempts be made to test the continuity of Jessop's lode, to a depth of approximately 100 feet down dip, by three shallow core-drill holes, inclined 45 degrees east, sited along a line 110 feet west of the outcrop and parallel to it. Each hole would be approximately 150 feet long (see plates 3 and 4). The first hole would be due west of the middle of the outcrop and the other two would be three hundred feet on either side of the first. Such a series of holes would serve not only to test the continuity but also to confirm the relationship between faulting and mineralisation. If the results justify further drilling, a second series of holes, parallel to the first, could be sited. Two 45 degree inclined holes, 400 feet apart, 300 feet in from the ends of the main outcrop and distant 200 feet from it, would be adequate to indicate continuity to 200 feet down dip. Each hole would be between 250 feet and 300 feet long. The sites selected should be regarded as provisional. If trenching by the Lessees indicates a high grade for the full length of the orebody, it might be reasonable to omit the first drill hole and drill only the second and third. The two 300 feet holes of the second stage could be replaced by one 500 foot hole to indicate mineralisation at a depth of approximately 350 feet. The attached plans (see plates 3 and 4) show the proposed drill sites. Details of the bore holes are listed in the table below:

Borehole No.	Magnetic Bearing (degrees)	Inclination (Degrees East)	Estimated Vertical depth to lode intersection (feet)	Distance to lode intersection (feet)	Total length (feet)
1	78	45	100	120	150
2	78	45	100	140	150
3	78	45	100	130	150
4	78	45	200	240	250-300
5	78	45	200	250	240-300

Water needed during drilling operations will have to be transported but permanent water occurs in the Mary and McKinley rivers, within six miles of the proposed drill-sites, and temporary supplies can be found even nearer during the early part of the dry season.

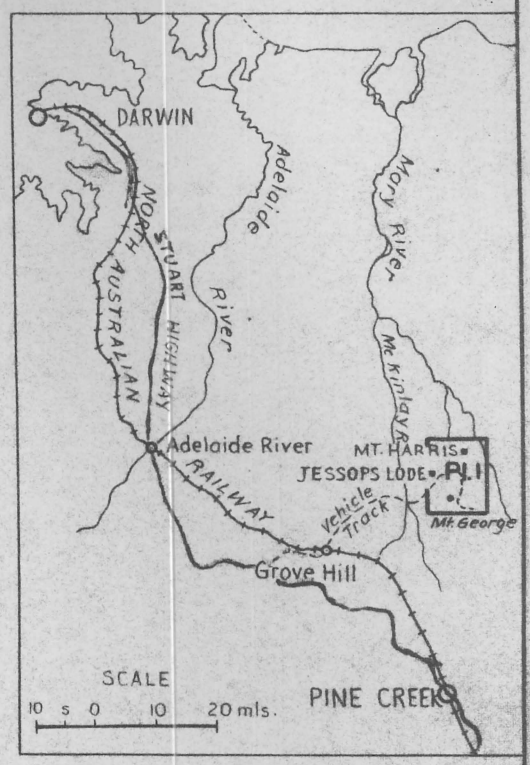
REFERENCES.

MACDONALD, E.H., 1951 - Preliminary Report on Tin Mine, Mount Masson: N.T. Mines Branch N.T. (Unpublished).

McQUEEN, W.F., 1956 - Geological Report on an Examination of a New Tin Find at Mount Harris, Northern Territory: Bur.Min.Resour. Aust. Rec. 1956/133.

PLATE I

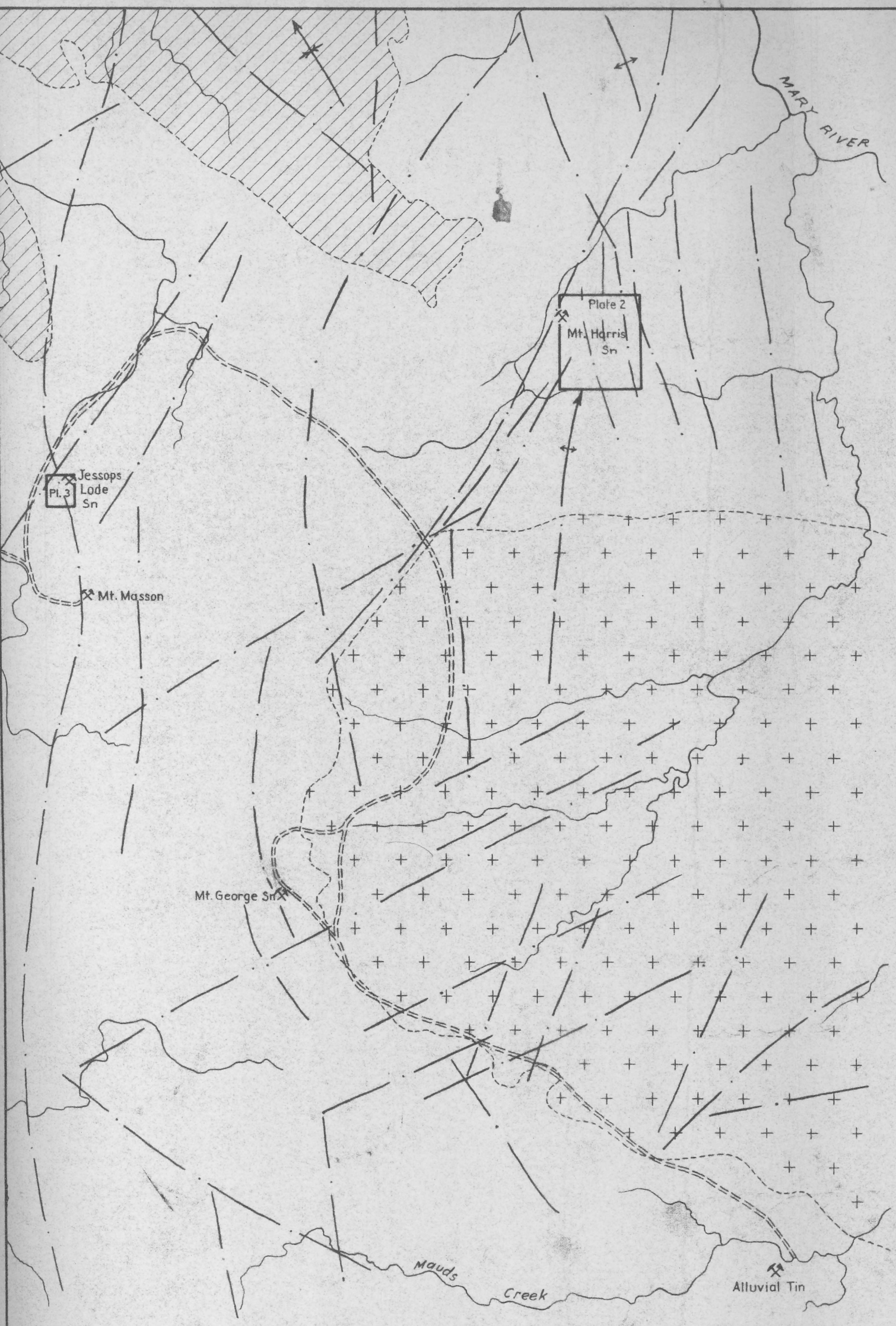
LOCALITY MAP



REFERENCE

- Cullen Granite
- Golden Dyke Formation
- Masson Formation
- Photo-linear features, probably faults & joints
- fold axis
- track
- Mineral Occurence

N.



SCALE

1 0 1 2 MILES

GEOLOGICAL SKETCH MAP
MOUNT HARRIS TINFIELD

PLATE 2

REFERENCE

- Siltstone
- Quartz-greywacke } Masson Formation
- Quartz greywacke outcrop
- Siltstone outcrop
- Geological boundary, position approx.
- Fault, inferred from air photos
- Joint directions, inferred from air photos
- Shear zone
- Vein material (quartz, hematite or quartz - hematite)
- Mine working
- L.P. Lease Peg
- 300' Topographical contour
- Track

SURFACE GEOLOGY
MOUNT HARRIS, N.T.

MINERAL LEASES Nos. 106A, 107A, 108A, 109A.

REDUCTION FROM PLANE TABLE SURVEY
SCALE 1" : 100'

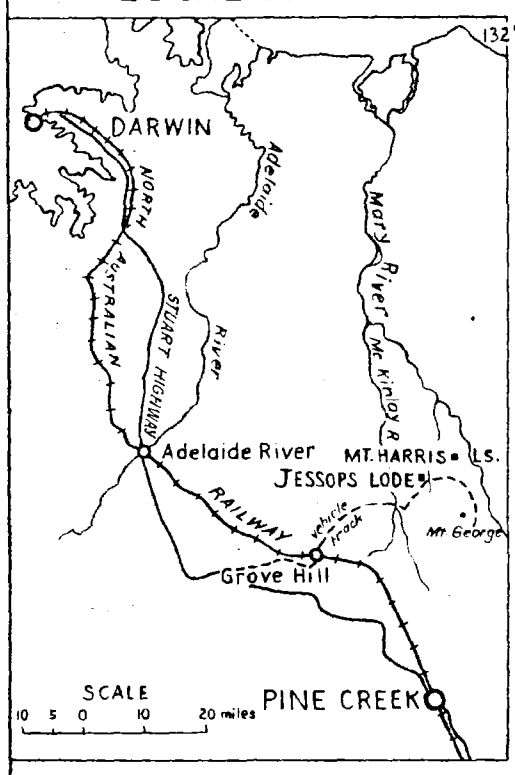
SCALE

200 0 200 400 FEET

Bureau of Mineral Resources, Resident Geologist's Office, Darwin, February 1958

PLATE 3

LOCALITY MAP



⊕ Peg 62

⊕ Peg 99

Massive outcrop of quartzite etc.

Area of float and numerous small outcrops of quartzite.

Gully

Low outcrop of quartzite etc

Slopes covered with rubble from fault breccia

Assay Result No 2005 10.600% Sn

Assay Results
No 2007 1·478% Sn
No 2008 2·589% Sn
No 2009 12·534% Sn
No 2010 2·636% Sn

Outcrop of quartzite siltstone ironstone & breccia

Float of quartzite with breccia and ironstone

Assay Result 0·159% Sn

Assay Results

No 2004	1 ft.	0·260% Sn	Total width 5 ft
No 2005	1 ft 6 ins.	0·854% Sn	
No 2006	1 ft 6 ins.	0·993% Sn	
No 2007	1 ft.	0·366% Sn	

Arbitrary Height 100'

road

78° M -45 150 ft. — No 1
78° M -45 150 ft. — No 2
78° M -45 250 ft. — No 4
78° M -45 250 ft. — No 5
78° M -45 150 ft. — No 3

A, B, C, D, E, F, G, H

⊕ Peg 39

⊕ Peg 57

MAG. NORTH

REFERENCE

- Outcrop
- Topographic contour
- Fault, breccia filled
- Fault, inferred
- Proposed drill holes
- Vehicle track
- ⊕ Lease peg
- A — Section line

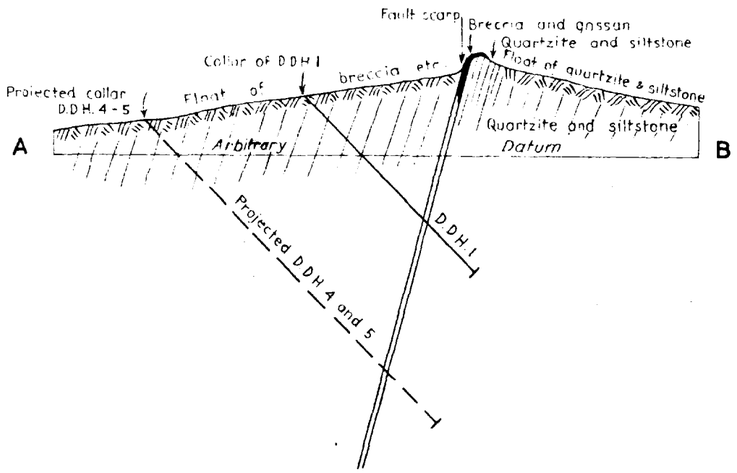
PROPOSED DRILL SITES
JESSOPS LODE
MINERAL LEASE 117A

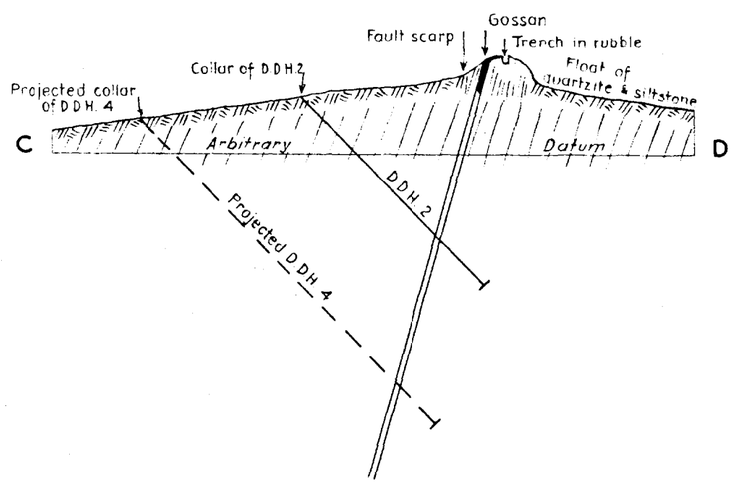
PLANE TABLE & ALIDADE SURVEY

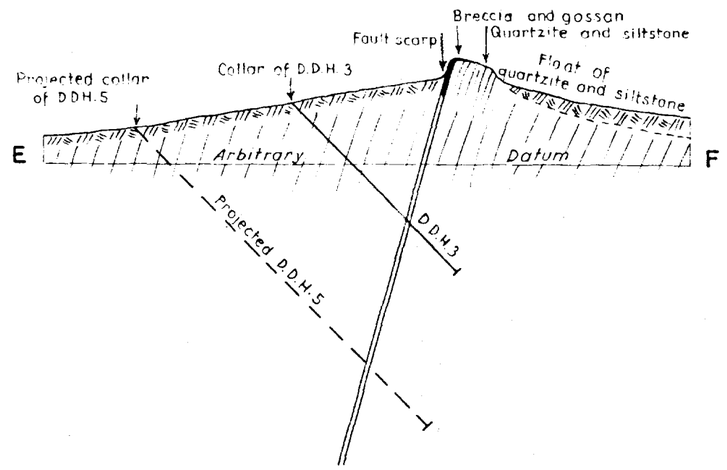
SCALE
100 0 100 200 FT

Bureau of Mineral Resources Resident Geologist's Office, Darwin Nov 1957

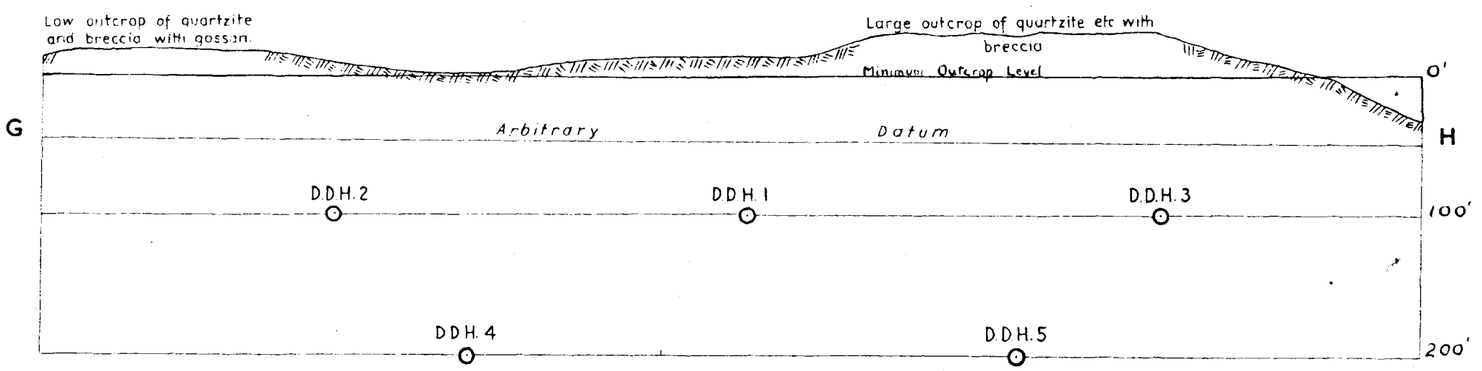
PLATE 4







SECTION IN PLANE OF OREBODY SHOWING ANTICIPATED DRILL HOLE INTERSECTIONS



REFERENCE

- Detritus and soil
- Breccia and gossan
- Extension of orebody
- Outcrop of quartzites and siltstone
- Presumed quartzites and siltstone
- Drill Hole Intersection

SCALE

100 0 100 200 FEET

CROSS SECTIONS AND LONGITUDINAL SECTION SHOWING PROPOSED DRILLING TARGETS.

JESSOPS LODE
MOUNT HARRIS TIN FIELD
N.T.

Bureau of Mineral Resources, Resident Geologist's Office, Darwin. Dec 1957