COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

RECORDS.

MINOR METALLIFEROUS INVESTIGATIONS

NORTHERN TERRITORY RESIDENT GEOLOGICAL SECTION

JULY - SEPTEMBER, 1962

004833

MINOR METALLIFEROUS INVESTIGATIONS

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RECORDS 1963/32.

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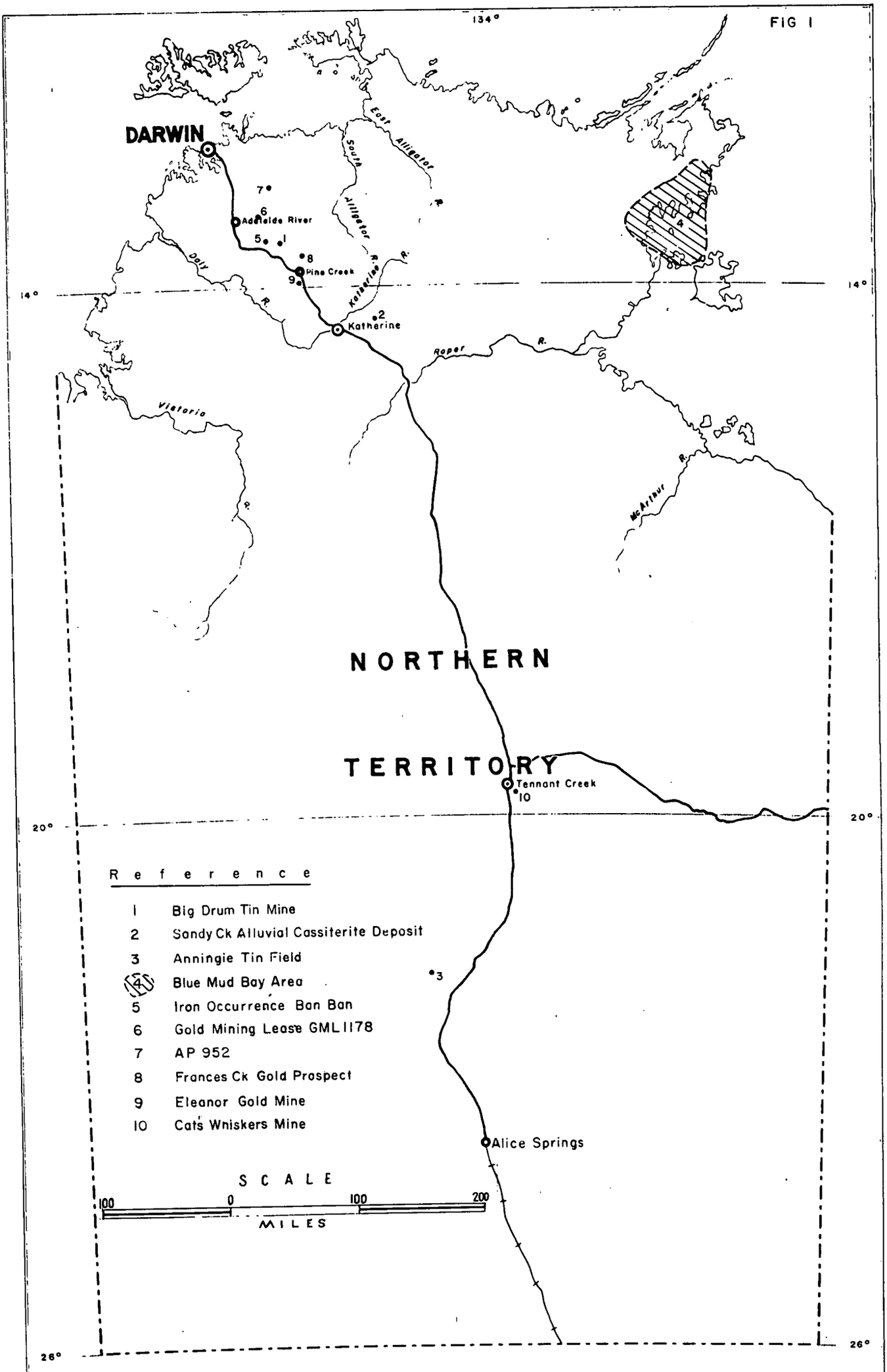
FIG 1



SKETCH MAP SHOWING LOCATIONS OF MINOR METALLIFEROUS INVESTIGATIONS NORTHERN TERRITORY

Department of Mines and Energy Resources, Geology & Geophysics, Feb 1963

To accompany Record No 1963/32

NT/21 G.M

MINOR METALLIFEROUS INVESTIGATIONS JULY - SEPTEMBER, 1962

NORTHERN TERRITORY RESIDENT GEOLOGICAL SECTION

SUMMARY

This Record contains ten reports on minor metalliferous investigations carried out by the Northern Territory Resident Geological Section during the period from July to September, 1962.

Three of these reports are on tin deposits - the Big Drum and Sandy Creek in the Katherine-Darwin region, and the Anningie in the Alice Springs area. Assay results on samples from the Big Drum and Sandy Creek are too low to warrant any further work on these deposits. No assay results are available for the 3,000 square feet of tin-bearing pegmatite exposed at Anningie.

One report deals with an unsuccessful search by helicopter for possible major deposits of ore-grade manganese in the Blue Mud Bay area; however, some minor occurrences of manganese were discovered.

A low-grade ironstone deposit in shales of the Lower Proterozoic Golden Dyke Formation near Ban Ban Homestead was investigated; this deposit cannot be economically exploited for iron ore.

Three gold prospects were investigated: G.M.L.117B, 25 miles east of Adelaide River township; A.P.952, 60 miles south-east of Darwin; and A.P.10005 in the Frances Creek area. Selective mining of the gold lode at Frances Creek could yield ore containing about 10 dwt per ton.

A magnetic anomaly at the Cat's Whiskers Mine, Tennant Creek, was tested by two diamond drill holes. Fifty feet (maximum true width) of ironstone were intersected, and in one hole assay results over 25 feet (average true width) of ironstone averaged 2.6 percent copper.

THE BIG DRUM TIN MINE, MOUNT HARRIS TIN FIELD

by

P.W. Crohn

SUMMARY

Treatment and assay of nineteen samples of tin ore from the Big Drum Tin Mine, near Mount Masson, in the Katherine-Darwin area, indicated that the exposed parts of the lode could not produce ore better than 0.5 percent metallic tin.

INTRODUCTION

The Big Drum tin mine was inspected on several occasions between April and September, 1961, by P.W. Crohn and J. Hays, in order to report on an application for assistance by the lease-holders under the Mining Development Ordinance.

The mine is situated about one mile south-south-west of the Mount Masson mine, and is accessible by graded bush road from Burrundie and Mount Wells.

Workings at the time of the earlier visits consisted of a shaft, 29 feet deep, and an adit to the south of this. At the time of the final visit, this adit had been advanced to a total length of 105 feet, and had been connected to the shaft.

GENERAL GEOLOGY

The formation on which these workings are situated consists of a zone of ferruginous quartz reefs and leaders, trending about 020 degrees. Within this zone, the individual reefs average between nine inches and one foot six inches wide with a few bulges to about three feet; the width of the zone as a whole ranges from about one foot six inches to more than five feet. Apart from the reefs themselves, this zone contains sheared, iron-impregnated and silicified sediments, pug seams, and minor bands of breccia.

The larger reefs generally strike parallel to the zone, and dip steeply to the east, but many of the smaller leaders dip and strike at various angles and directions. Most of the reefs and some of the sediments show box-works due to the solution of sulphide minerals, mainly pyrite, and a few specimens still contain unaltered sulphides.

SAMPLING AND PRODUCTION

The initial estimates of grade were made by the leaseholders on the basis of dish samples which suggested that the lode material exposed near the shaft collar and in part of the adit contained at least 2 percent tin. This was apparently confirmed by an assay of a channel sample taken on July 20 from the face of the adit, 94 feet from the portal, at a height of 18 inches above the floor (No.199526), which assayed 2.75 percent tin.

Subsequently the lease-holders treated a parcel of about seven tons of development ore from the adit, about 85 feet from the portal, at an old battery in the Mount Todd area, and recovered about one hundredweight of concentrate assaying 39 percent metallic tin. This would correspond to a head grade of about 0.3 percent tin, without taking into consideration the tin contents of the tailings. The lease-holders claimed that this low return was due largely to dilution of the ore with low-grade wall rock and to tailings losses during treatment. It was apparent that further systematic sampling of the lode was required, and so an additional nineteen samples were taken for assay in August and September - fourteen underground and five from the surface.

With two exceptions, these were all channel samples: one, No.199520, was a chip sample taken from the surface immediately north of the shaft to test a 12-foot wide zone of jointed and indurated country rock with numerous stringers of lode material; and the other, No.199523, consisted of three hand-specimens selected by one of the lease-holders from the fact of the adit as at 12th September, 1961, and stated by him to be representative of the richest stone occurring in the mine.

The average of these nineteen samples was 0.085 percent metallic tin, and only four of the samples assayed over 0.1 percent tin. This is in marked contrast with the results of the earlier sampling, and with estimates of grade made by the lease-holders, in spite of the fact that one of the later samples (No,199501), was taken less than three feet from the position of sample No.199526.

Most of the underground samples extended over the full width of the roof, and therefore included some wall rock, but this would not account for the great difference in the results. The probable explanation of the difference that most of the earlier estimates of grade were based on visual estimates of dish concentrates, which a microscopic examination (Appendix 2) has since shown to consist at least in part of iron oxides and subordinate sulphides, and not of cassiterite. The high value of sample No.199526 must be entirely fortuitous.

In August, 1962, a parcel of 39.5 tons from this mine was treated at the Mount Wells Government Battery. This parcel consisted in part of development ore from the adit and in part of ore selected by the lease-holders as being of above average grade. However, this yielded only 2 hundredweight of concentrates assaying 52 percent tin, equivalent to a recovery grade of 0.13 percent. With an estimated tailings loss of 0.2 percent, this indicates a head grade of 0.3 percent tin, and this agrees with check assays carried out at the Battery during the crushing.

RECOMMENDATIONS

The sampling and crushing results indicate that the distribution of tin within the lode formation is very erratic, but there is no evidence to suggest that any of the exposed parts of the lode are capable of producing ore of better than 0.5 percent metallic tin content.

No further work on this mine can therefore be recommended.

APPENDIX I.

ASSAY RESULTS

SAMPLE NO.	POSITION	COMMENTS	WIDTH	ASSAY
199526	Face of Adit, at 20/7/61, 94' from portal, at 1'6" height	Full width of face	40"	2.75 % Sn
199501	Face of Adit, at 1/8/61, 95' from portal, at 5' height	Full width of face	40"	0.023 % Sn
199502	Roof of Adit, 75' from portal	W. portion of roof	30"	0.016% Sn
199503	Roof of Adit, 75' from portal	E. portion of roof	20"	0.005 % Sn
199504	Roof of Adit, 55' from portal	Full width of roof	48"	0.188 % Sn
199505	Roof of Adit, 15' from portal	Full width of roof	48"	0.46 % Sn
199506	Roof of Adit, 35' from portal	Full width of roof	54"	0.033 % Sn
199507	Roof of Adit, 85' from portal	Full width of roof	48"	0.054 % Sn
199508	Roof of Adit, 65' from portal	Full width of roof	48"	0.016 % Sn
199509	Roof of Adit, 25' from portal	Full width of roof	42"	0.007 % Sn
199510	Roof of Adit, 45' from portal	W. portion of roof	30"	0.014 % Sn
199511	Roof of Adit, 45' from portal	E. portion of roof	36"	0.038 % Sn
199512	Surface, 52' south of shaft	Full width of formation	60"	0.061 % Sn
199513	Surface, 30' south of shaft	E. portion of formation	18"	0.024 % Sn
199514	Surface, 30' south of shaft	W. portion of formation	12"	0.025 % Sn
199515	Surface, 15' north of shaft	Full width of exposed formation	24"	0.016% Sn
199520	Surface, immediately north of shaft	Jointed country rock with stringers of lode material	150"	0.024% Sn
199521	Face of adit at 12/9/61, 105' from portal at 1'6" height	E.portion of face	36"	0.012 % Sn
199522	Face of adit at 12/9/61, 105' from portal at 1'6" height	W.portion of face	36"	0.38% Sn
199523	Face of adit at 12/9/61, 105' from portal	Specimens selected by lease-holder	-	0.22 % Sn

APPENDIX 2

HEAVY MINERALS IN SAMPLES FROM THE BIG DRUM TIN MINE, MT. HARRIS

by

G. J. G. Greaves

INTRODUCTION

Two chip samples from the Big Drum Tin Mine, Mt. Harris, were submitted by P.W. Crohn, Senior Resident Geologist, Darwin, for identification of heavy minerals and determination of their abundance.

Representative portions of the samples were crushed to pass through a 60-mess sieve, and the following fractions were collected:

(a) -60 + 100 mesh

(b) -100 mesh.

The heavy minerals in both fractions were concentrated on a Haultain superpanner, and both thin and polished sections of the final concentrates were prepared for examination.

IDENTITY AND ABUNDANCE OF THE HEAVY MINERALS

Sample No.199525: Dish concentrate from a composite sample of the lode, in the adit and on the surface.

The approximate weight percentage heavy mineral content of the sample was determined as cassiterite, 0.05; colloform hydrated iron oxides, 35; and pyrite, 1.

Sample No.199526: Part of a channel sample collected from the face of the adit 94 feet from the portal and 18 inches above the floor.

The approximate weight percentage heavy mineral content of the sample was found to be: cassiterite, 3.5; colloform hydrated iron oxides, 15; and pyrite,1. The cassiterite is buff-coloured, and its identity was confirmed by X-Ray diffraction. A few composite grains of cassiterite and hydrated iron oxide were present in the cassiterite concentrate. Minor amounts of tourmaline and traces of cassiterite were noted as separate grains in the concentrate of hydrated iron oxide.

PLATE 1

BIG DRUM TIN MINE

MT. HARRIS AREA, N.T.

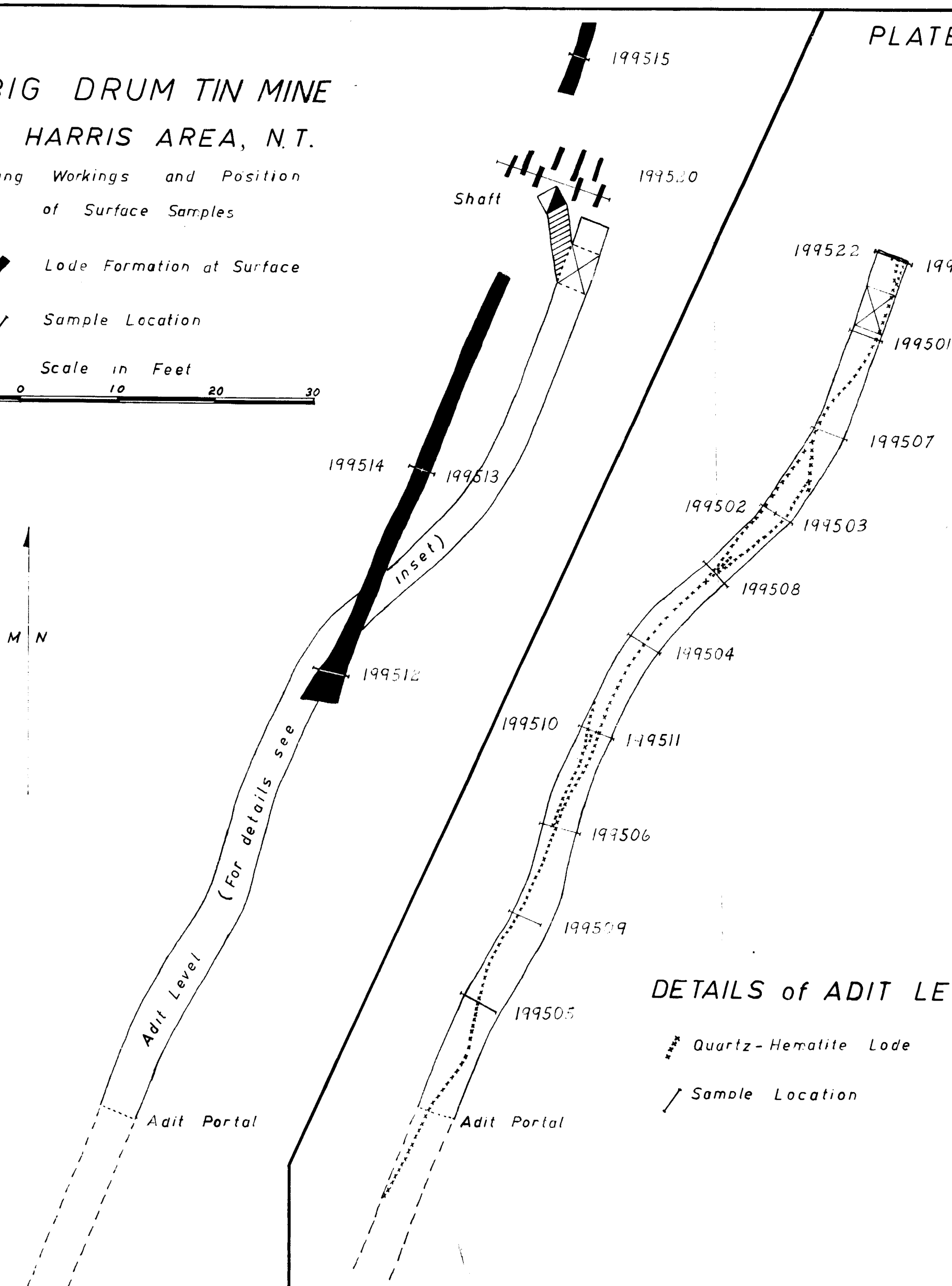
Showing Workings and Position of Surface Samples

Lode Formation at Surface

Sample Location

Scale in Feet

10 0 10 20 30



DETAILS of ADIT LEVEL

Quartz-Hematite Lode

Sample Location

D52/8, 38

Bureau of Mineral Resources, Geology & Geophysics

To accompany Record 1963/32

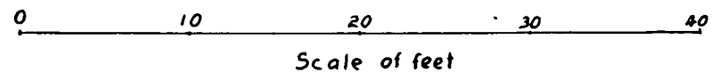
Resident Geologist's Office,
Darwin, N.T. October, 1961.

Plate 2

LONGITUDINAL PROJECTION

BIG DRUM TIN MINE as at 12/9/61

SHOWING POSITION, WIDTH,
AND ASSAY of SAMPLES



Surface Gougings

SOUTH

NORTH

199515
24"-0·016%

199520
150"-0·024%

199513
18"-0·024%

199514
12"-0·025%

199512
60"-0·061%

199505
48" - 0·46%

199509
42"-0·007%

199506
54"-0·033%

199511
36"-0·038%

199510
30"-0·014%

199504
48"-0·188%

199508
48"-0·016%

199502
30"-0·016%

199503
20"-0·005%

199507
48"-0·054%

199501
40" - 0·023%

199521
36"-0·012%

199522
36" - 0·38%

Bureau of Mineral Resources, Geology & Geophysics | To accompany Record 1963/32 | D52/8/39 | Resident Geologist's Office, Darwin, N.T. October 1961.

SANDY CREEK ALLUVIAL CASSITERITE DEPOSIT YEURALBA DISTRICT

by

J. Hays

SUMMARY

Alluvial cassiterite deposits occur in the Sandy Creek area in the Yeuralba District. Although the area could be adopted to dredging by construction of a dam across Sandy Creek, the volume and grade of the deposits are too small to warrant further work. Some production may result from stream concentration during the wet season, and from working small rich pockets in the creek bed.

INTRODUCTION

The Sandy Creek alluvial cassiterite deposits occur in the headwaters area of Sandy Creek in the Yeuralba District, 35 miles east-north-east of Katherine. Access is by the Stuart Highway for 30 miles south-east from Katherine, 13 miles north-east by graded all-weather road to Maranboy, 24 miles by graded track to Eva Valley Station, and 5 miles by bush track to Sandy Creek.

An Authority to Prospect in the area was given to E. Underwood and partners in February, 1959, and renewed in 1960 and 1961. The area was visited several times in 1960 and 1961 by the writer, to assist in sampling and exploration, after the partners had estimated that the deposit contains 35 million cubic yards of alluvial gravel, having an average depth of more than 6 feet and an average grade of 3 lb of cassiterite per cubic yard. This estimate was based upon pan assays, by the prospectors, of material from a large number of post-holes, supplemented by a few chemical assays. The depths of these post-holes ranged from about 6 feet to 10 feet, and the estimated area of the deposit was about 5 square miles.

GEOLOGY

Sandy Creek joins Emu Creek, a tributary of the Katherine River, and drains an area of Cretaceous rocks that rest unconformably upon granite intruded into slate of the Agicondian System. Part of the headwater area of Sandy Creek is a panplain, about 1½ miles wide and 4 miles long, covered by alluvial sand and gravel to a maximum depth of about 10 feet. The flat valley floor is broken by scattered hillocks of granite that project about 5 feet above the surface of the alluvium.

Small quantities of gold, tin, and wolfram have been produced from lodes on the west side of the panplain.

PRESENT WORK

The area was first visited in 1960 at the request of the Director of Mines, Northern Territory Administration, to assist Dowsett Engineering (Aust.) Ltd. to collect a bulk sample of low grade material needed for testing a new concentrator being produced by the parent company in England.

The grade of this sample was reported as being 0.9 lb. of cassiterite per cubic yard. The difference between this and the estimated grade of 3lb. of cassiterite per cubic yard was so great that a second visit was made to check-sample the deposit.

One large pit of about 5 cubic yards, having vertical sides, was dug to bed rock. The bottom of the pit was brushed and the sweepings were added to the spoil heap. The spoil was screened through ¼ inch mesh, and the oversize material discarded after examination. The screened material was concentrated over a single table at the Government Battery at Maranboy. The feed and tailings were compared, and recovery was estimated to be between 50 and 60 percent of all heavy minerals.

The sides of the pit exposed a bed of coarse gravel resting upon bedrock, and overlain by a bed of sand, an upper bed of gravel, and an upper bed of sand. A sample of about 50 lb. was collected from each bed and assayed.

Because of the high cost of airfreight and the lack of a local assay office, the 50 lb. samples were treated locally before being sent away for assay. Each sample was dried, weighed, and screened. The screened fractions were all examined microscopically, and the plus 12 mesh and plus 25 mesh fractions, which contained no cassiterite, were discarded. The minus 25 mesh fractions were concentrated over a small Wilfley table, and the concentrates were dried weighed, and forwarded for assay. This practice was adopted throughout the investigation. If only a few samples had to be treated, the material was recirculated over the table until recovery was 100 percent. If many samples had to be treated, recovery was estimated by comparing feed and tailings, and a composite tailing sample was prepared for assay. All assays were done by Australian Mineral Development Laboratories, and the results are listed in Appendix 3.

The assay of the bulk sample concentrate indicated a recovery grade of 0.75lb. of cassiterite per cubic yard, and an original grade of 1.5 lb. The weighted mean of the grade of the four 50-lb. samples was also 1.5 lb. of cassiterite per cubic yard. The difference between these results and the grade of the Dowsett sample suggests that most of the cassiterite occurs in the basal gravel bed, and that the Dowsett sample did not include the full thickness of this bed. The bulk sample concentrate was assayed for other minerals. The only minerals present in notable quantity were ilmenite (1.5 lb. per cubic yard) and zircon (0.5 lb. per cubic yard). These, added to the cassiterite content of 1.5 lb. per cubic yard, give a total heavy mineral content of 3.5 lb. per cubic yard, suggesting that the lessees' original estimates had not allowed for minerals other than cassiterite. If this were so, the estimated grade could be reduced to between 1.0 lb. and 1.5 lb. of cassiterite per cubic yard. This is near or below the minimum economic grade for treatment in a static plant, but is well above the minimum (from 4 oz. to 8 oz. per cubic yard) for treatment by bucket dredge.

The alluvial deposit ends downstream at a gorge in Sandy Creek, and could be flooded by a dam built in the gorge. This would make the use of a bucket dredge feasible, and the indicated grade appeared to be high enough for profitable

extraction. The partners were therefore given financial aid by the Mines Branch, Northern Territory Administration, to carry out systematic exploration to prove the volume and grade of the deposit. The exploration was in two stages. The first stage involved digging 16 pits at about 1 mile intervals on a rectangular grid. The second stage involved 16 supplementary pits.

STAGE 1

Samples of about 50 lb. weight were taken from each of the first sixteen pits, and treated as detailed above. Recovery by the small Wilfley table was estimated to be 60 percent from a comparison of feed and tailings. The mean recovery grade of all samples was 0.42 lb. of cassiterite per cubic yard, corresponding to an original grade of 0.77 lb. of cassiterite per cubic yard. A composite tailing sample assayed 0.31 lb. of cassiterite per cubic yard, indicating an original grade of 0.73 lb. per cubic yard. This confirmed the accuracy of the recovery estimates.

Two of the samples, from pits 9 and 12, were of particularly high grade: the sample from pit 9 (1.5 lb. per cubic yard) is from a bulk sample that could represent a rich pocket on the creek bed, and so it was ignored; the other was No.12 (3.2 lb. per cubic yard), and it was ignored pending a check on the sample. The amended recovery grade is 0.2 lb of cassiterite per cubic yard, and the original grade is reduced to 0.3 lb.

STAGE 2.

The second stage pits were intended for exploration in areas of indicated high grade. Because of the time needed to prepare the first stage samples for assay, the pits were sited without assay data in areas of apparently deep alluvium. Samples from all the pits, and a check sample from pit 12, were treated in the same way as the first stage samples. The samples weighed about 20 lb. each, and the recovery from the small samples was estimated to be 85 percent. The means recovery gradewas 0.57 lb. of cassiterite per cubic yard, and the estimated original grade was 0.68 lb. The check assay on the high-grade first stage pit was only 0.12 lb. of cassiterite per cubic yard, and it was decided to ignore all high values in both the first and second stages. Consequently, pit No.22 (5.43 lb. per cubic yard) was ignored. The amended second stage grades are 0.25 lb. cassiterite per cubic yard, recovered from an original grade of 0.3 lb.

CONCLUSIONS

The overall grade of the deposit, ignoring rich pockets, is only 0.3 lb. of cassiterite per cubic yard. During the siting and sampling of the pits it was observed that outcrops amounted to about 55 percent of the total area, as opposed to an original estimate of 20 percent. Furthermore, the average depth of alluvium from all pits was only 3 feet. The original estimate of 6 feet or more of alluvium was attributed to the ease with which the post-hole digger penetrated the decomposed granite beneath the alluvium. The volume of the deposit was thus reduced to about 6 million cubic yards instead of 35 million. It is estremely doubtful whether such a small volume of marginal grade material could be worked at a profit. Further exploration of the area is not warranted.

Some production might be obtained from existing rich pockets and from pockets produced by seasonal concentration in the creek beds during the wet season.

APPENDIX 3

SAMPLING DATA : SANDY CREEK ALLUVIAL CASSITERITE DEPOSITS

(A) BULK SAMPLE

Sample No.	Lithology	Mean Thickness	Weight or Volume	Size Distribution +12,	12-25,	-25	Weight of Concs. oz.	% Recovery	Grade of Concs. % Sn	Recovery Grade lb. Sn/yd^3	Original Grade lb.Sn/yd^3
305	Sand	1' 6"	53 lb.	10%	5%	85%	4½	100	1.1	0.175	0.175
306	Gravel	2' 1"	60 lb.	70%	10%	20%	4¼	100	8.2	1.1	1.1
307	Sand	10"	48 lb.	29%	13%	58%	3½	100	4.3	0.63	0.63
308	Gravel	1' 3"	64 lb.	75.5%	12%	12.5%	2¼	100	36.7	2.4	2.4
Y1	Mixed	5' 8"	5 yd^3	40% + ¼"		60% - ¼"		50	3.17	0.5	1.0

Samples 305,-6,-7,-8, : Mean Grade 1.07 lb. Sn/yd^3 or 1.57 lb. cassiterite/yd^3

Sample Y1 : Mean Grade 1.0 lb. Sn/yd^3 or 1.50 lb. cassiterite/yd^3

(B) FIRST STAGE : PIT SAMPLES

Pit No.	Sample No.	Lithology	Mean Thickness	Weight lb.	Size Distribution + 25	-25	Weight of Concs. oz.	% Recovery	Grade of Concs % Sn	Recovery Grade lb. Sn/yd^3	Original Grade lb. Sn/yd^3
1	9924	Mixed	3' 4"	58.0	57%	43%	5.5	60	1.03	0.18	0.3
2	9925	"	2' 6"	57.0	47%	53%	3.7	60	0.48	0.06	0.1
3	9926	"	3' 6"	60.0	50%	50%	7.7	60	0.36	0.085	0.14
4	9927	"	2' 3"	54.0	50%	50%	6.9	60	0.30	0.073	0.12
5	9928	"	1' 6"	64.5	42%	58%	3.7	60	1.09	0.12	0.2
6	9929	"	2' 0"	51.0	27%	73%	7.1	60	0.43	0.12	0.2
7	9930	"	1! 9"	55.5	65%	35%	3.0	60	0.68	0.072	0.12
8	9931	"	1' 6"	63.0	59%	41%	4.35	60	0.375	0.05	0.08
10	9932	"	2' 6"	47.0	68%	32%	1.9	60	2.45	0.19	0.03
11	9933	"	4' 0"	60.0	47%	53%	11.0	60	0.93	0.34	0.57
13	9934	"	3' 0"	71.0	53%	47%	5.0	60	0.45	0.06	0.10
17	9935	"	1' 0"	53.0	58%	42%	5.95	60	0.25	0.05	0.09
14	9936	"	2' 3"	58.0	42%	58%	6.2	60	0.89	0.19	0.31
15	9937	"	3' 0"	57.0	65%	35%	4.65	60	0.27	0.04	0.07
16	9938	"	3' 2"	62.0	67%	33%	4.35	60	1.67	0.22	0.37
12	9939	"	3' 0"	62.0	76%	24%	8.4	60	12.7	3.20	5.3
9	Y1	"	5' 8"	-	-	-	3.17	-	-	-	-

Mean recovery grade all samples : 0.330 lb. Sn/yd^3 or 0.462 lb. cassiterite/yd^3

Mean original grade all samples : 0.55 lb. Sn/yd^3 or 0.3 lb. Cassiterite/yd^3

Mean original grade less 9939 and Y1 : 0.2 lb. Sn/yd^3 or 0.3 lb. cassiterite/yd^3

(C) COMPOSITE TAILING SAMPLE

Sample No.9940 Weight 40 lb. Wt. of Concentrate 1.8 oz. Grade of Concs. 2.83% Sn Recovery 100%
Recovery Grade 0.24 lb. Sn/yd^3

Grade of composite tailing sample : 0.31 lb. of cassiterite/yd^3

Grade corrected for high grade of No.9939 = 0.16 lb of cassiterite/yd^3

(D) SECOND STAGE : PIT SAMPLES AND CHECK SAMPLE

Pit No.	Sample No.	Lithology	Mean Thickness	Weight of Sample lb.	Weight of Concs Oz.	% Recovery	Grade of Concs. % Sn	Recovery Grade lb. Sn/yd^3	Original Grade lb. Sn/yd^3
18	199546	Mixed	3' 0"	20.75	7.56	85	0.15	0.43	0.52
19	199547	"	5' 6"	19	4.19	85	0.475	0.19	0.23
20	199535 & 6	"	7' 6"	47.25	13.01	85	0.190	0.10	0.12
21	199537	"	4' 9"	29.5	3.0	85	0.042	0.01	0.01
22	199540	"	3' 0"	21.25	6.74	85	7.9	4.64	5.43
23	199539	"	5'10"	31	6.58	85	0.44	0.18	0.22
24	199538	"	3' 0"	20.75	7.56	85	0.225	0.15	0.175
25	199541	"	1' 0"	26.75	3.14	85	0.545	0.12	0.14
26	199542	"	1' 6"	18.5	4.11	85	0.109	.05	0.059
27	199544	"	2' 0"	14.5	7.34	85	0.035	.03	0.035
28	199543	"	2' 6"	20.5	7.10	85	0.077	.05	0.059
29	199545	"	5' 0"	33.5	13.43	85	0.81	0.61	0.72
30	199550	"	2' 6"	20.25	7.58	85	0.077	.05	0.059
31	199549	"	3' 4"	27.0	6.44	85	0.150	.07	0.083
32	199548	"	3' 2"	21.25	7.50	85	0.049	.03	0.035

Mean Thickness 3' 7"

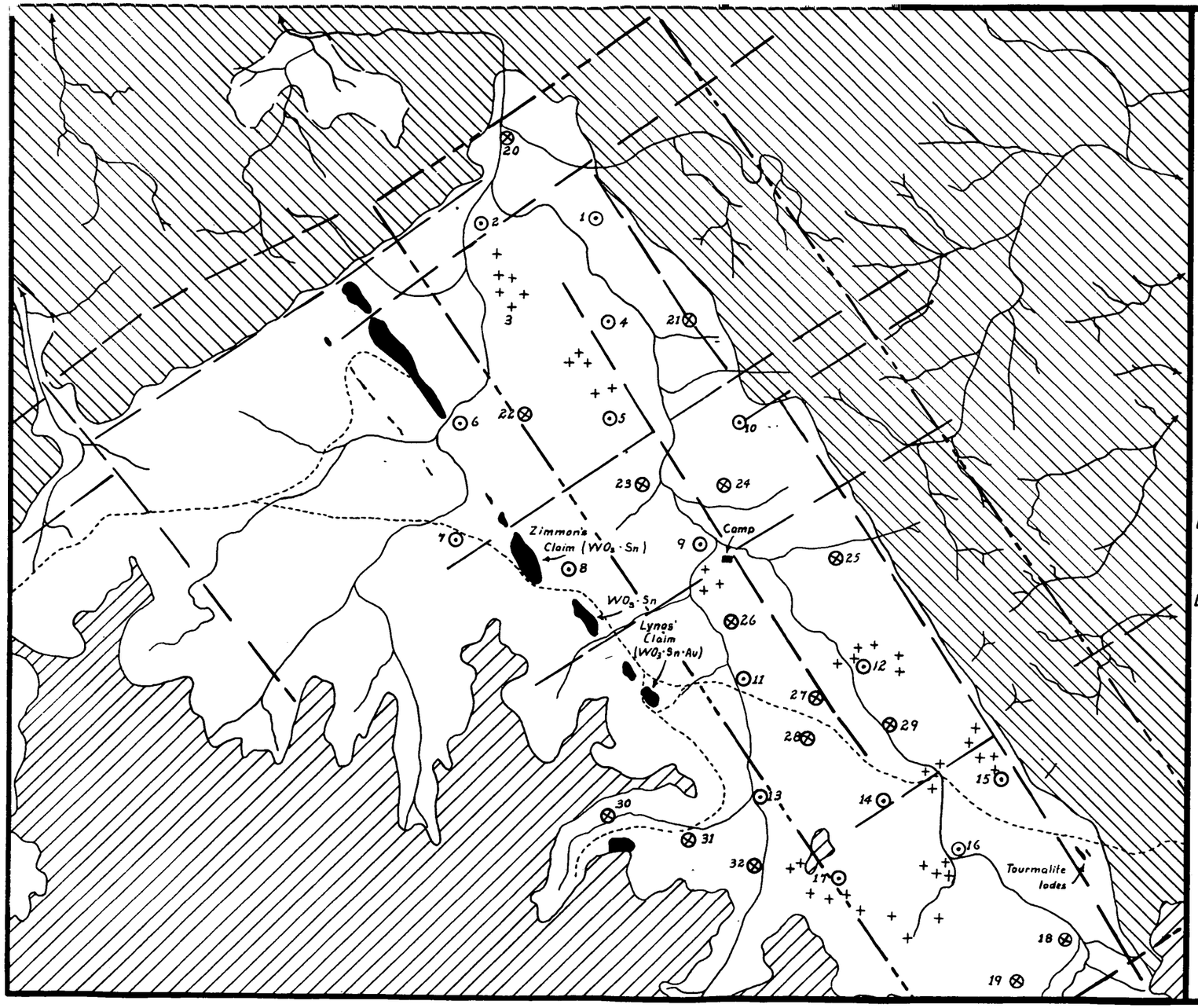
Mean Original Grade all samples = 0.49 lb. Sn/yd^3 or 0.68 lb. cassiterite/yd^3

Mean Original Grade less 199540 = 0.2 lb. Sn/yd^3 or 0.3 lb. cassiterite/yd^3

12	199551	Check on Y12	3' 0"	31.75	4.68	85	0.325	.07	0.08

Plate 3

GEOLOGICAL SKETCH MAP AND SITES OF TEST PITS, SANDY CREEK ALLUVIAL CASSITERITE DEPOSITS, YEURALBA, N.T..



SCALE

½ 0 ½ 1 1½ 2 Miles

REFERENCE

Recent	Alluvium with scattered granite outcrops
Lower Cretaceous	Sandstone and porcellanite of the Mullaman group
Lower Proterozoic	Metamorphic rocks of the Agicondian group
	Prospect pit stage 1
	Prospect pit stage 2
	Greisen tourmalite etc.
	Boundary of A.P. 856
	Air photo lineaments
	Vehicle track

T N

D53/9/13

From B.M.R. geological map of the Yeuralba Mineral Field '52

To accompany Record 1963/32

REPORT ON A TIN-BEARING PEGMATITE IN THE ANNINGIE TIN FIELD

by

K. A. Rochow.

SUMMARY

The Anningie Tin Field is 160 miles north of Alice Springs. Tin mineralisation is in pegmatite veins which intrude metasediments and amphibolite dykes and sills. The investigated pegmatite intrudes amphibolite and is 250 feet long and 12 feet wide. Cassiterite is present in an irregular hanging wall zone between 6 inches and 2 feet wide. However, the patchy distribution of cassiterite in previously worked pegmatites in the Field suggests that no large quantity of tin is present.

LOCATION AND ACCESS

The Anningie Tin Field is situated 160 miles north of Alice Springs. It covers an area of about 16 square miles, and access is by 30 miles of good graded road which branches westward from the Stuart Highway 130 miles north of Alice Springs.

The pegmatite described in this report is in the northern part of the field near a track leading due west from the Saddle Hole Dam (Plate 4). The air-photo reference for the pegmatite is: Mount Peake Sheet (F53-5), run 10, photo number 5024, 4.85 inches east and 3.1 inches north of the south-west corner.

HISTORY OF FIELD.

Alluvial tin was discovered in September, 1935, on the site of the Reward Lease which, by the end of February, 1936, had yielded 2 tons of tin oxide. Values of up to 40 lb. of tin oxide per cubic yard were reported, although the average was about 13 lb. per cubic yard. Because of the shallow depth and limited extent of the alluvium, the area was soon worked out, and regular mining ceased in 1944. Since that year there has been only small and sporadic production.

Several shallow shafts and costeans in the Reward Pegmatite showed that high grade ore at the surface does not persist at depth.

GENERAL GEOLOGY (Plates 4 and 5)

The country rock of the Anningie Tin Field consist of schist, quartzite, and other metasediments intruded by amphibolite sills and dykes. Pegmatite dykes, 3 feet to 50 feet wide and 100 feet to 500 feet long, intrude both metasediment and amphibolite; they are mostly barren, but some contain cassiterite, some tantalite, and some both. Tourmaline is a common accessory in the dykes.

The metamorphism appears to be the result of strong contact and regional influences. Granite crops out about 1 mile to the north and to the east.

STRUCTURE (Plate 4)

The tightly folded metamorphic rocks are wedged between two convergent quartz-filled shears. Air-photo interpretation of the soil patterns suggests that the metamorphics are surrounded by granite, and are an in-faulted segment of the roof-rocks of the granite body.

MINERALISATION (Plate 5)

The tin-bearing pegmatite is about 12 feet wide and 250 feet long, and is intruded into an amphibolite sill, which is in turn intruded into the north limb of an anticline in schist, quartzite, and other metasediments. It dips 60° west along a strike of 250°. An irregular hangingwall zone, 6 inches to 2 feet thick, is composed of quartz, feldspar, and muscovite, in ½ - 1 inch grains, with some cassiterite; a sample of this rock was collected for assay. The main mass of the pegmatite has a similar composition except that cassiterite is absent, and the average grainsize is smaller. Several xenoliths of amphibolite up to 1 foot across are present in the hangingwall zone. As far as can be determined from the limited outcrop, no zoning occurs near the footwall.

A similar pegmatite crops out 80 feet to the east, but no cassiterite was observed either in the pegmatite or in the alluvium.

Several hundred feet to the west, alluvial tin was found near several small quartz veins.

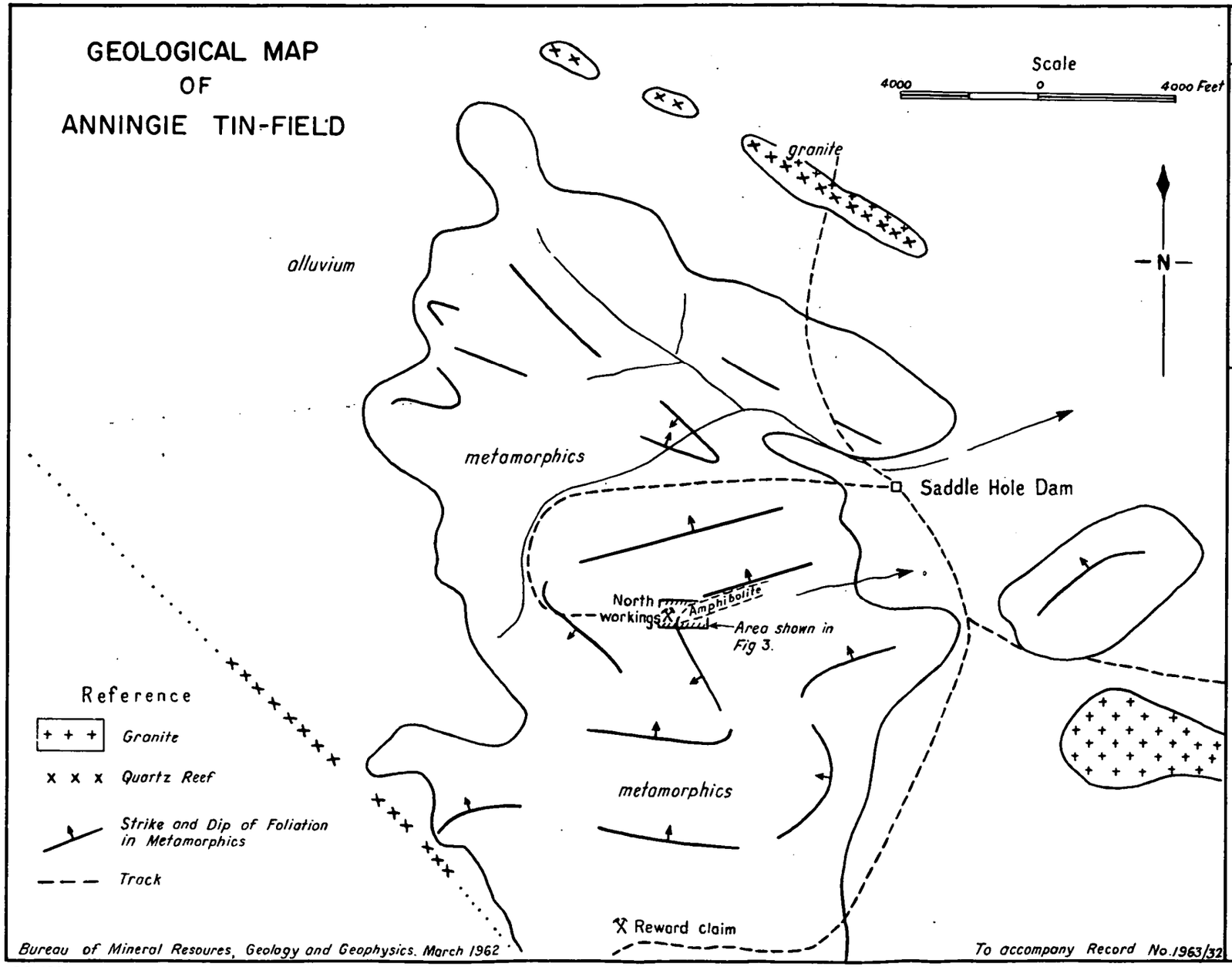
CONCLUSIONS

Previous experience on the Anningie Field was shown that cassiterite occurs as high-grade patches randomly distributed in the hangingwall zone of pegmatite veins. Ore reserves and average grade cannot be accurately estimated.

Before the field can be appraised, all the pegmatites and possibly tin-bearing quartz veins need to be systematically mapped and sampled, but it is doubtful if the field will ever be a large tin producer.

Plate 4

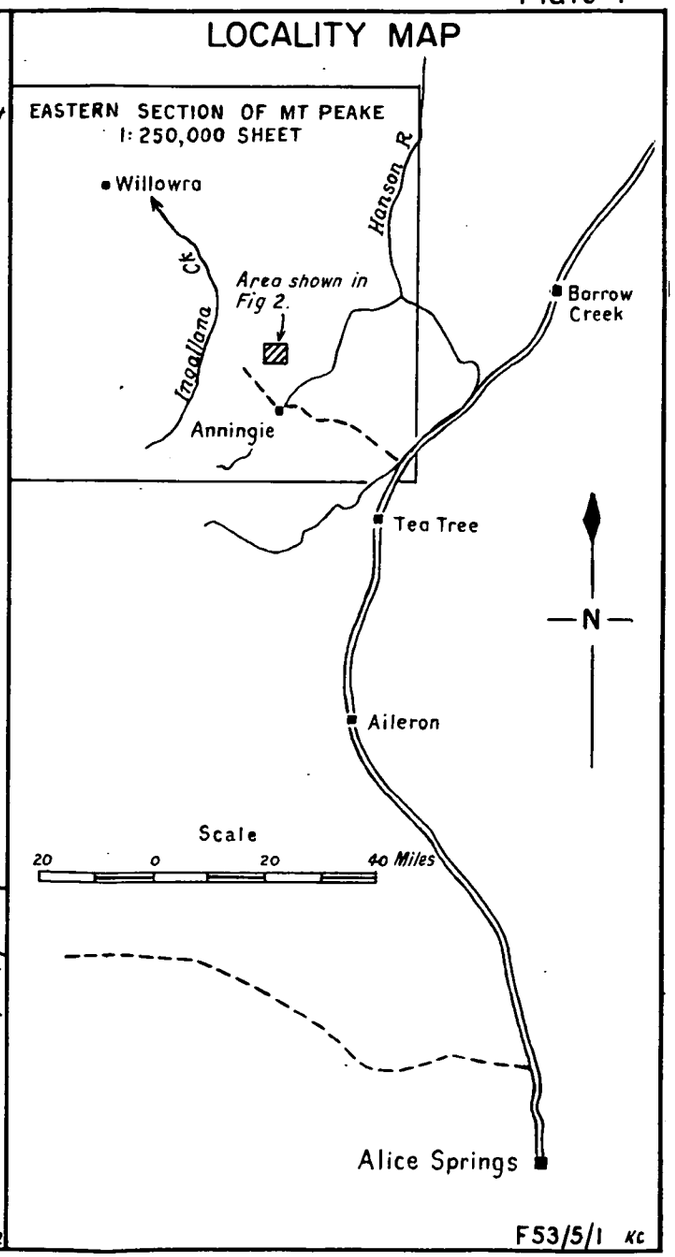
GEOLOGICAL MAP OF ANNINGIE TIN-FIELD



Bureau of Mineral Resources, Geology and Geophysics. March 1962

To accompany Record No. 1963/32

LOCALITY MAP

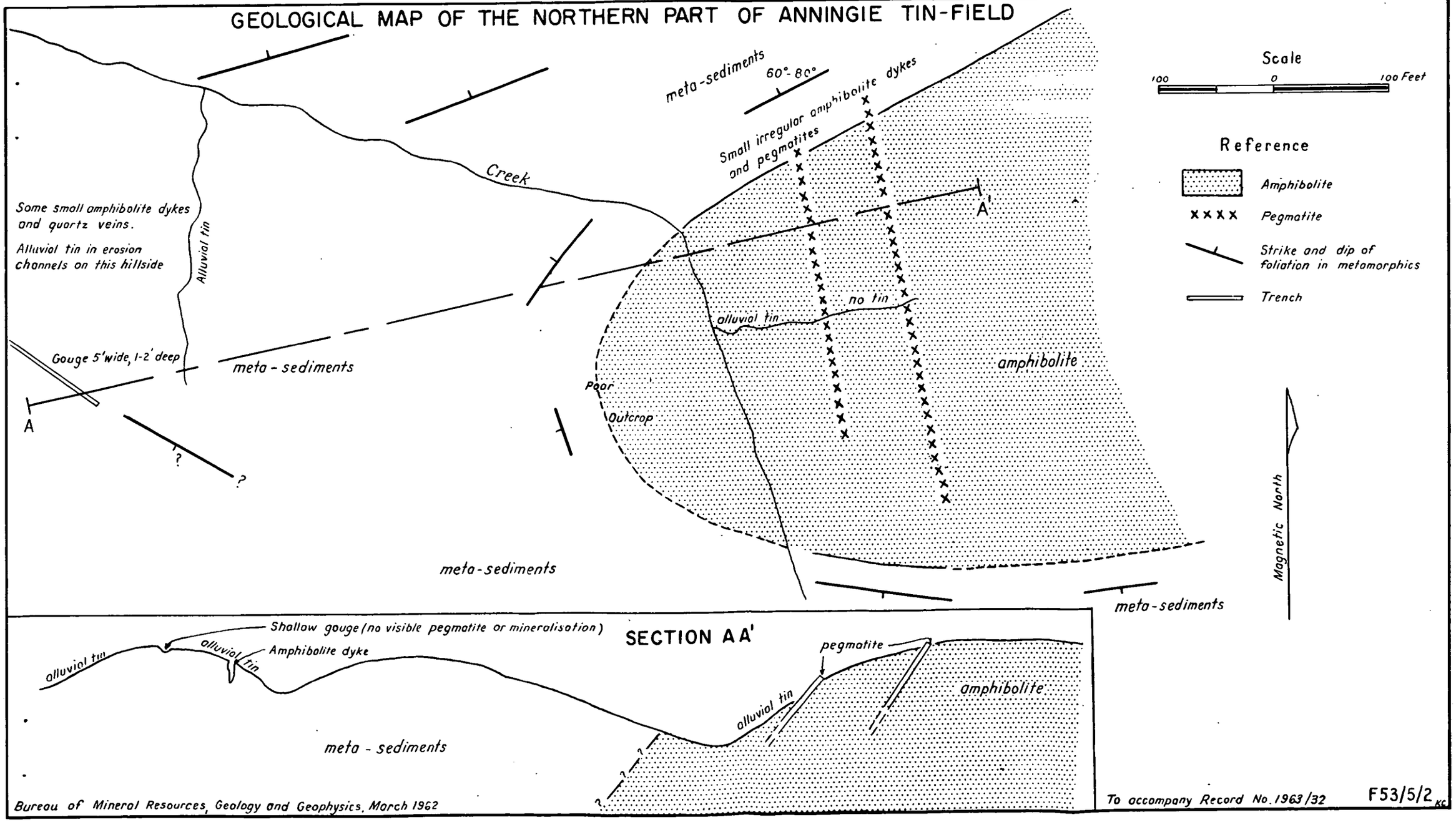


F53/5/1 KC

GD. 133

Plate 5

GEOLOGICAL MAP OF THE NORTHERN PART OF ANNINGIE TIN-FIELD



Bureau of Mineral Resources, Geology and Geophysics, March 1962

To accompany Record No. 1963/32

F53/5/2 KC

GD 134

photo 5092, 6.7 inches east, 3.5 inches north of south-west corner, the porphyry is strongly sheared, and on Run 12, photo 5094, 3.8 inches east, 1.0 inches north of south-west corner, it has weathered to a ferruginous laterite.

Ferruginous and manganiferous sandstone and grit were noted on Run 11, photo 5034, 3.6 inches east, 5.0 inches north of south-west corner, and on Run 12, photo 5092, 3.6 inches east, 0.9 inches north of south-west corner. Lateritic material with concretions and cobbles of manganese was noted on Run 11, photo 5032, 4.8 inches east, 5.4 inches north of south-west corner, and on Run 11, photo 5034, 2.4 inches east, 3.9 inches north of south-west corner. Some ore-grade material may be present at the former locality.

III. On the mainland north of the Walker River, a succession was examined to the west of a point on Run 8, photo 5107, 2.8 inches east, 3.0 inches north of south-west corner. Here a prominent north-trending ridge consists of a gently west-dipping white sandstone with a strongly developed basal conglomerate. This conglomerate contains a higher proportion of pebbles than the conglomerates on Groote and Bickerton Islands, but the proportion of quartz pebbles is less, and many of the pebbles are angular or irregular in shape. After a gap, possibly due to the presence of less resistant shale or siltstone in the succession, this is followed by thinly laminated, ferruginous sandstone and then by massive, slightly ferruginous sandstone containing ?siderite. The total thickness of the exposed succession is of the order of 200 feet, and corresponds to the Younger Blue Mud Bay Formation of B.H.P. (Summary report on prospecting activities in Arnhem Land, B.H.P., 1954). Their correlation with the sedimentary succession on Groote and Bickerton Islands is at present regarded as uncertain.

East of this sandstone succession, scattered outcrops of gneissic granite were observed. Their contact with the sandstones is not exposed, but is thought to be most probably an unconformity, and the granite is tentatively grouped with the Older Blue Mud Bay Formation (meta-sediments) of B.H.P. No manganiferous material was noted in this area.

IV. On Round Hill Island, off the north tip of Isle Woodah, the dominant rock type is a granite with sedimentary xenoliths, probably to be correlated with the gneissic granite described above. On Run 4, photo 5062, 5.3 inches east, 0.5 inches north of south-west corner, this is overlain by about three feet of lateritic gravel with scattered fragments and concretions of high-grade manganese, and this in turn is overlain by several feet of well consolidated shell sand.

It appears probable that the main rock types on Isle Woodah and on the mainland immediately to the north are similar to this, but spot checks on Isle Woodah (Run 6, photo 5033, 4.5 inches east, 4.1 inches north of south-west corner), and on the mainland (Run 4, photo 5062, 2.0 inches east, 2.3 inches north of south-west corner; Run 5, photo 5013, 7.8 inches east, 1.1 inches north of south-west corner; and Run 7, photo 5052, 5.4 inches east, 5.4 inches north of south-west corner) revealed only ferruginous laterite.

HELICOPTER RECONNAISSANCE : BLUE MUD BAY AREA

by

P. W. Crohn

SUMMARY

An unsuccessful search for possible major deposits of ore-grade manganese was made by helicopter in the Blue Mud Bay area in colloboration with the Broken Hill Pty. Co. Ltd. However, only minor occurrences of manganiferous material were located at four of the areas visited. Some further prospecting in the general area is recommended.

INTRODUCTION

I was invited by the Broken Hill Pty. Co. Ltd. to accompany Mr. W.C. Smith on a helicopter reconnaissance of the Blue Mud Bay area between July 11th and July 16th, 1962.

A base camp had previously been established by Mr. Smith at Cape Barrow, on the south-east coast of Blue Mud Bay, and six flights were made from this camp. Touch-downs were made at eight points on Bickerton Island; three points on Winchelsea Island; one on Isle Woodah; one on Round Hill Island; four on the mainland north of the Walker River; and one on the north shore of Caledon Bay.

I. GEOLOGY

On Winchelsea Island, the bed-rock is a generally flat-dipping white quartz sandstone succession similar to that occurring on Groote Eylandt. In the upper part of this succession, quartz-pebble conglomerates become dominant (Blue Mud Bay, Runn 11, Photo 5025, 4.8 inches east, 6.8 inches north of south-west corner), and are overlain ?unconformably by manganiferous sandstone and grit. Ferruginous pisolitic material with scattered small patches of ?ore-grade manganese, from a few inches to a few feet in diameter, occur in the central and southern parts of the island (Blue Mud Bay, Run 11, photo 5025, 4.6 inches east, 4.6 inches north, and 3.9 inches east, 4.0 inches north of south-west corner).

II. On Bickerton Island, the most prominent outcrops again consist of a sandstone succession similar to that of Groote Eylandt, but the quartz pebble conglomerates on this island are more abundant, and are not restricted to the upper part of the succession (B.M.B., Run 11, photo 5034, 3.7 inches east, 5.0 inches north of south-west corner; photo 5032, 4.3 inches east, 5.8 inches north of south-west corner; Run 10, photo 5170, 7.0 inches east, 3.6 inches north of south-west corner). On the northern tip of the island a succession of massive shales or fine-grained siltstones appears to be faulted against these sandstones along a line trending east-north-east through the last of these points.

In the central and southern parts of the island, large areas are occupied by feldspar porphyry. On Run 11, photo 5034, 6.4 inches east, 2.5 inches north of south-west corner, the distribution of the outcrops suggests that this may be a flow or sill overlying the sandstone. On Run 12,

V. On the north coast of Caledon Bay, about 60 miles north of Groote Eylandt, a ?charnockitic gneiss, probably again equivalent to the Older Blue Mud Bay Formation, is overlain by several feet of ferruginous and manganiferous grit containing scattered pods of ore-grade manganese near the top, and this in turn is overlain by several feet of ferruginous laterite.

CONCLUSIONS

No major outcropping occurrences of ore-grade manganese, comparable with those on Groote Eylandt, were found during this survey, but minor occurrences of manganiferous material associated with ferruginous lateritic gravels were noted on Winchelsea, Bickerton and Round Hill Islands, and on the north coast of Caledon Bay. Some further prospecting in the area therefore appears to be warranted.

IRONSTONE OCCURRENCES SOUTH-WEST OF BAN BAN HOMESTEAD, BROCK'S CREEK DISTRICT

by

P.W. CROHN

A group of small ironstone occurrences in the Brock's Creek area was examined on August 23rd, 1962, in company with Mr. H. Farrar, who had requested assistance in assessing their possible economic value.

The occurrences are situated about three miles south-west of Ban Ban Homestead, and form part of a line of ferruginous deposits which extend intermittently from the vicinity of Howley Siding to the Mount Ellison copper mine. They have previously been described by Sullivan & Iten (1952).

At the particular localities of interest to Mr. Farrar, the occurrences consist of bands and lenses of hematite- and limonite-rich material in slate, chert, and chert pebble conglomerate of the Lower Proterozoic Golden Dyke Formation. Remnants of boxworks are visible in some specimens, but generally only in very small amounts. The largest individual body of iron-rich material in this area was a lens with maximum dimensions of about 30 to 250 feet, and even this included some low-grade earthy material and some patches of only partly replaced shale. There appears to be no possibility, therefore, that these occurrences could be exploited as economic sources of iron ore in the foreseeable future.

REFERENCE

Sullivan, C.J. and Iten, K.W.B., 1952 - The geology and mineral resources of the Broek's Creek district, Northern Territory. Bur.Min. Resour. Aust. Bull. 12.

GOLD MINING LEASE GML 117B

by

J. Hays

INTRODUCTION

Gold Mining Lease GML 117B held by K.C. Waters, L. Harmanis and W. Mackie, was visited on the 16th July, 1962. Access is by the Stuart Highway for 72 miles to Adelaide River township, east-north-east along the old Mount Bundey road for 12 miles, and thence easterly by bush track for 13 miles. Access is impossible during most of the wet season and the early part of the dry season.

GEOLOGY

The lease is located in an area of tightly folded slate, greywacke, dolerite, and cherty slate of the Lower Proterozoic Burrell Creek Formation (Batchelor 1 mile field sheet. A low rise of deeply weathered slate and greywacke is traversed by a series of en echelon quartz veins along bedding planes, striking at 10° (Magnetic) and dipping at about 70° west. The veins are stepped north and west. Exposures of country rock are restricted to costeans, open cuts, and shafts that have been excavated in the past.

PRESENT WORK

Present work was restricted to cleaning out an old shaft reputedly 32 feet deep, on the south end of the vein system, and re-opening rubble-filled workings north and south from the shaft at a depth of 25 feet.

Re-excavation had progressed to about 25 feet in the shaft and about 15 feet north and south in old stopes or open cuts. A quartz reef ranging from 2 to 3 feet thick was exposed underfoot. Full width channel samples of this material were collected in duplicate at three places: on the floor of the workings at a depth of 20 feet, 12 feet from the shaft on the north side; at a depth of 24 feet, 8 feet from the shaft on the north side; and at a depth of 25 feet on the south wall of the shaft. One set of samples was assayed by Australian Mineral Development Laboratories and the duplicates were given to Mr. Waters. The samples assayed by Australian Mineral Development Laboratories all contained less than 1 dwt. of gold per ton. This was confirmed by panning of part of the material, and by panning a large sample of the spoil heap. No trace of gold could be detected.

It is recommended that the workings be abandoned.

A.P. 952

by

P.G. Dunn.

Authority to Prospect Number 952 was examined on August 27th, 1962, in the company of Mr. Mircea Ardelean, who holds the authority. The prespect is about 60 miles south-east of Darwin, along the east bank of the Mary River approximately 1½ miles north-west of Annabaroo Homestead. It is reached by the track that links Marrakai Homestead to Clarke's crossing, and then by a track south along the river.

The prospect is a low, horseshoe-shaped ridge of ferruginous slates that have a thin gossanous capping. The ridge is about 2,300 feet long, and the band of ferruginous slates is only about 20 feet wide. The gossanous capping shows well-formed boxworks and rare iron sulphate staining in some places. Bands of high-grade hematite occur in only a few places, and are rarely more than six inches thick.

Mr. Ardelean was advised to dolly some of the capping material to test for gold, but to do no further work on the prospect unless he found gold in his samples.

FRANCES CREEK GOLD MINING SYNDICATE

by

P.W. Crohn

The Frances Creek Gold Mining Syndicate Prospect was visited on September 3, 1962, in order to report on an application for financial assistance by the syndicate under the Mining Development Ordinance.

The prospect is situated on A.P. 1005, about three miles east of the Saddle Extended iron ore deposit, and is reached by a fair bush track from Mount Wells Government Battery, a distance of 14 miles.

Workings at the time of the visit consisted of two trenches and seven shallow pits on a north-trending zone of quartz reefs and leaders. The two trenches had exposed this zone for lengths of 20 feet and 35 feet, respectively, and the workings extended over about 300 feet. Over this distance, the average width of the zone is between 2 and 3 feet. In places, two mineralised zones, each about 1 foot wide, are separated by about 1 foot of barren country rock, consisting of sandstone and slate.

From the larger trench, a chute is being constructed to convey ore to the end of a bull-dozed road on the steep hillside below the workings, and it is proposed to truck the ore to the Mount Wells Government Battery for treatment.

Four samples of the mineralised zone were taken for assay with the following results:-

No.199586 ..	125 feet south of chute. 18" quartz reef and 15" sheared sediments with quartz leaders, omitting 12" of barren country rock between. ..	0.3 dwt. gold/ton Nil silver
No.199587 ..	20 feet south of chute. 36" zone of quartz reefs and leaders. ..	10.8 dwt. gold/ton Nil silver
No.199588 ..	15 feet north of chute 12" zone of quartz leaders (western part mineralized zone). ..	Nil gold or silver
No.199589 ..	15 feet north of chute. 9" quartz reef (eastern part of mineralized zone) ..	3.6 dwt. gold/ton Nil silver

In this sampling, no attempt was made to select high-grade parts of the lode, and these samples are thought to be representative of the exposed material.

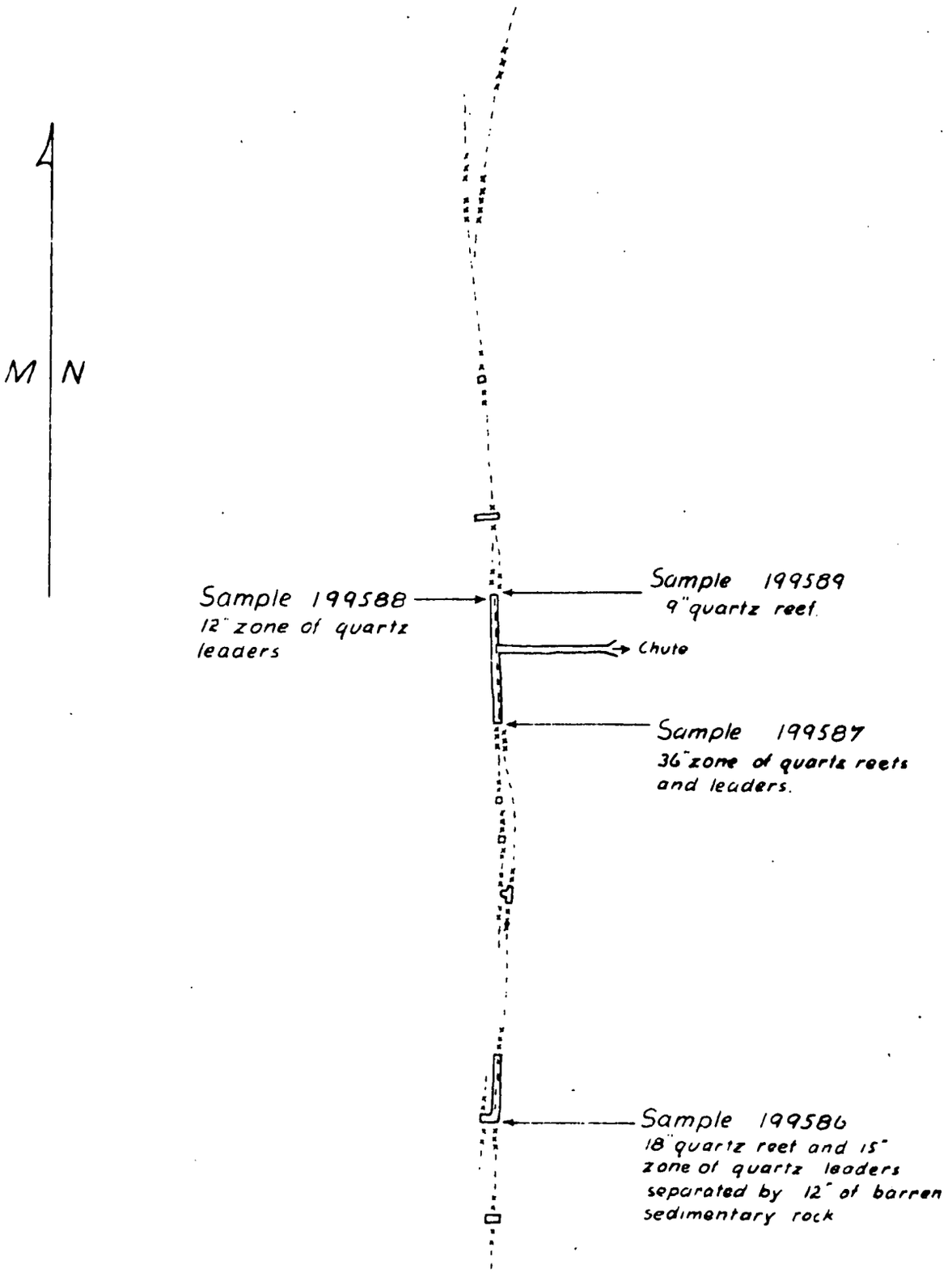
The variation in the results indicates that the distribution of gold within the mineralized zone is very erratic, and the number of samples is not sufficient to predict the over-all grade of the lode under actual mining conditions with any accuracy.

However, it appears likely that at least some parts of the lode would average not less than 5 dwt. per ton, and there appears to be a reasonable prospect that selective mining may enable some ore of 10 dwt. per ton to be produced.

It is, therefore, recommended that a trial parcel of, say, 10 tons from this lode be crushed at the Mount Wells Government Battery as soon as possible, and that further development work be based on the results of this trial crushing.

To make this parcel as representative as possible of the better-quality ore exposed in the present workings, three or four separate points in the more promising sections of the lode should be selected on the basis of the above assays and the syndicates dish-samples, and the parcel should be made up of equal portions of, say, three tons from each of these points.

If dish samples do not indicate that any particular parts of the lode can be regarded as more favourable than average, then the parcel should be made up of equal portions taken from three or four equally spaced points within the existing trench from 20 feet south of the chute to 15 feet north of the chute.



SKETCH PLAN OF WORKINGS
FRANCES CREEK GOLD MINING SYNDICATE
BURRUNDIE AREA. September 1962

SCALE

0 50 100 150 200 feet

ELEANOR GOLD MINE, PINE CREEK

by

P.W. Crohn

The Eleanor Mine, situated just west of the Stuart Highway, one mile south of Pine Creek, was visited briefly on September 3, 1962, in order to inspect some recent work by Messrs. M. Blake and A. Robertson.

Two shafts were in progress at the time of the visit. About 100 yards east of the old Eleanor Main Shaft, a vertical shaft had been put down to a depth of 70 feet in steeply west-dipping slate and sandstone containing occasional small quartz leaders. This shaft is intended to test a gold intersection reported to have been made at a depth of 160 feet in a wartime water bore, situated 20 feet north of the shaft.

The second shaft, situated about 150 feet north-east of this, is inclined at 70 degrees to the north-east, and had reached a depth of about 12 feet at the time of the visit. This shaft is following a 12-inch zone of quartz leaders in sheared and brecciated sedimentary rocks, and two samples were taken across this zone for assay.

Sample 199584, from the south wall of the shaft at 8 feet contained a trace of gold (less than 0.2 dwts per ton), and nil silver, and sample 199585 from the north wall at 10 feet assayed 1.7 dwt. of gold per ton and nil silver.

REPORT ON DIAMOND DRILLING AT THE CAT'S WHISKERS MINE, TENNANT CREEK

MAY - AUGUST 1962

by

J. BARCLAY

SUMMARY

During the period from May to August, 1962, two diamond drill holes, No. 1, and No.2, were drilled on the Cat's Whiskers Lease, Tennant Creek, to test a magnetic anomaly with a radius of 120 feet, and centred at a vertical depth of 485 feet, (Daly, 1957, p.17). The holes, were drilled to vertical depths of 520½ ft. and 348 ft., respectively. No.1 was drilled vertically, and No.2 was drilled at an inclination of 60 degrees to test the oxidised zone near the water table.

An ironstone body, believed to be responsible for the anomaly, was intersected in each hole, and copper mineralization was encountered in No. 2 hole from 336 ft. to 395½ ft.; the best assays were obtained between 336 ft. and 367 ft., these averaged 2.6 percent copper over a true width of 25 ft. A third diamond drill hole is recommended to test the ironstone body at a vertical depth of 485 ft.

GENERAL GEOLOGY

The Cat's Whiskers Mine is situated 4 miles south-south-east of Tennant Creek on a low-lying ridge which trends east.

Outcrops in the vicinity of the mine are limited to the top and upper flanks of the ridge. The lower flanks of the ridge are covered with talus, and the flat areas to the north and south are largely bulldust with only a few scattered outcrops.

Rocks of the Warramunga Group of sediments consisting of medium-grained sandstone, tuffaceous sandstone, mudstone, and hematite shale crop out on the ridge between the Mount and Dingo Prospects (Plate 7). Individual sandstone and mudstone beds have a maximum thickness of three feet. Some ellipsoidal concretions occur on the bedding planes of the sandstone.

The cores from the recent diamond drilling show that the sediments are strongly oxidized to a depth of 271 ft.. On the surface and to the base of the oxidized zone the sediments are reddish-brown, purple, and white, and, in the partly oxidized zone below the sediments are predominantly greenish-grey. Ivanac (1954, p.45) mentioned that the base of the oxidized zone may be described as a perched water-table level, which is probably a relic of a Tertiary water table. The core of No.1 diamond drill hole indicates that, in addition to this relict water table level at 271 ft., there are possibly three other releict levels, at depths of 281 ft., 283 ft., and 294 ft., corresponding to narrow bands of strongly oxidized sediments above the present water table level, which stands at a depth of 300 ft..

At the Cat's Whiskers Mine and at the Mount, Ellen, and Dingo prospects, the sediments contain lenticular ironstone masses which may have been formed by replacement of favourable sedimentary beds. The texture of the ironstone ranges from partly replaced sediments, probably mudstone, in which bedding is preserved, to completely replaced massive hematite bodies. Between these varieties are a granular replacement type and a porous vuggy, limonitic and hematitic form. Near the Ellen prospect a specimen of the latter type of ironstone was found to contain malachite.

STRUCTURAL GEOLOGY

The sediments between the Mount prospect and the Cat's Whiskers Mine were folded into an anticline, which trends east and plunges to the east at an angle of 20 degrees. The axis of the fold coincides with the top of the ridge.

To the east of the Cat's Whiskers Mine are other easterly plunging folds in which the crestal parts of the anticlines are characterised by severely folded and lightly sheared drag folds. This feature is noteworthy east of the Cat's Whiskers Mine and west of the Dingo prospect, where the sediments have also been partly metasomatised by iron within the lightly sheared middle limb of a drag fold.

An intermittent limonitic shear-zone, with a maximum width of about 10 ft., lies on the northern side of the ridge for a distance of 500 ft. on either side of the Ellen prospect. A major fault may be present, judging by the drag on the sediments, between the Mount and Ellen prospects.

Deformational forces have also resulted in impressing a strong fracture cleavage on the sedimentsl this cleavage generally trends east, and dips either vertically or steeply to the north or south.

ECONOMIC GEOLOGY

According to official records (Ivanac, 1944; p.16) production at the Cat's Whiskers Mine to June, 1952, was:

Ore Mined	Gold Won	Tailings Grade
381.37 tons	99.16 oz.	0.7 dwt./ton

There has been no production in recent years.

The Mine workings (Plate 7) consist mainly of a small open-cut around the main shaft, which is 32 ft. deep, and an adit driven 110 feet southwards from the northern side of the ridge. At a depth of 24 ft. the adit penetrates the shaft to the southern side of the ironstone mineralization, and, at a distance of 85 ft. from the portal, a 20 ft. high chamber has been opened by stoping. To the west of the stope a 23 ft. drive ends in sediments.

In addition to the gold associated with ironstone at the Cat's Whiskers Mine, geochemical prospecting revealed the presence of a copper anomaly with values ranging up to 1200 parts per million, in the ironstone near the Mine (McMillan and Debnam, 1961).

DIAMOND DRILLING. The purpose of the diamond drilling at the Cat's Whiskers Mine was to test a magnetic anomaly estimated to occur to the east of the mine and centred at a vertical depth of 485 ft., according to Daly (op.cit., P.17).

The two holes were drilled; No.1 vertically, and No.2 at an inclination of 60 degrees (Plate 8). The two holes, intersected an ironstone mass at vertical depths from 113 ft. - 212 ft. and 286 ft. - 335 ft., respectively. The true widths of the body are 20 ft. and 50 ft., respectively, indicating that the body widens with depth; the north-south cross-section (Plate 8) shows that the ironstone mass dips steeply to the north. The ironstone which crops out on the surface, and was found to be anomalously high in copper, is probably the same as the ironstone mass intersected by drilling of the magnetic anomaly. If this is found to be true, the ironstone body could be at least 350 ft. long, and it may plunge to the east at an angle of about 20 degrees.

The ironstone body intersected by No.1 drill-hole is porous and vuggy and consists mainly of hematite with limonitic and slightly magnetic parts. There was no associated gold or copper mineralization, and it is likely that this oxidized part of the ironstone mass has been leached of these minerals.

The second diamond drill hole was drilled at an inclination of 60 degrees to the south to test for possible secondary enrichment and underlying primary sulphide mineralization near the water table, and inspection of the core revealed the presence of these features. The upper part of the ironstone mass was again leached to a vertical depth of 283 ft.. Below this depth the ironstone was partly leached, and consisted mainly of quartz-magnetite and hematite, limonite, kaolin, and, rarely, jasper, in addition to various copper minerals and iron pyrite.

Copper mineralization was found between drill depths of 336 ft. and 295½ ft. (average true width of 50 ft.) in the ironstone; its average grade was 2.6 percent copper in the 31-ft. drill section (true width of 25 ft.) from 336 ft. to 367 ft.. The highest gold assay was only 1.1 dwt. per ton, and most of the gold assays were trace to nil. A zone of secondary enrichment is indicated by the presence of sooty chalcocite between drill intersections of 352½ ft to 353½ ft.. Although the ironstone with copper mineralization ended at a vertical depth of 332 ft. in No.2 hole, the chloritic schist of the footwall was found to contain some chalcopyrite. In addition, small spots of iron pyrites were present in the underlying sediments to the end of the hole at 347 ft. vertically.

RECOMMENDATIONS

Results obtained to-date, suggest that further testing of this ironstone body should be carried out by diamond drilling.

A third hole should be drilled from No.2 site to test the ironstone body at a vertical depth of about 485 ft. The hole should be depressed to the south at 75 degrees to allow for drift, which may be of the order of one degree per hundred feet, and 600 ft. of drilling should intersect the ironstone body at vertical depths of 410 to 560 feet.

Alternatively, the third hole could be sited 390 feet to the north of No.1 hole; it should be depressed at 60 degrees to the south to intersect the ironstone body at

vertical depths of 440 to 540 feet. This would involve about 650 feet of drilling.

The proposal to drill the third hole from No. 2 site is preferred, in spite of its initial shallower angle of depression, since the greater intersection of ironstone would give more information on mineralisation then that obtainable from the alternative site. Furthermore, the cost of 50 feet of drilling would be saved.

REFERENCES

DALY, J., 1957 : Magnetic Prospecting at Tennant Creek, 1935-37. Bur.Min.Resour. Aust., Bull.44

IVANAC, J.F. 1954 : Geology and mineral deposits of the Tennant Creek Gold Field, Northern Territory. Bur.Min.Resour. Aust. Bull. 22.

McMILLAN, N.J. & DEBNAM, A.H., 1961 - Geochemical prospecting for copper in the Tennant Creek Gold Field, Northern Territory. Bur.Min. Resour. Aust. Rec. 1961/101 (Unpubl.)

APPENDIX 4

LOG OF DIAMOND DRILL HOLE NO.1

AT THE CAT'S WHISKERS MINE

DRILLED MAY - JULY, 1962.

Location : 365 ft. east of shaft

Collar - Co-ordinates : 2830E, 2172S, (see Daly op.cit., Plate 3, Sheet 3).

Course : Vertical

Depth : 520½ ft.

Reason : To test magnetic anomaly No.4, centred at a depth of 485 ft. (Daly, op. cit., p.17).

Surveys :

Depth	Angle (corrected)
100 ft.	89°
250 ft.	90°
350 ft.	89°
450 ft.	89°

DRILL RUN	CORE RECOVERY	DESCRIPTION OF CORE
0' - 14'	5'	Pale reddish mudstone, bedding/core angle 30°, cleavage/core angle 0°.
14' - 71'	26'	Dark chocolate mudstone, becoming pale from 55' to 60'; occasional fine-grained micaceous greywacke. Vertical shears from 15' to 24'; cleavage/core angle 0°; bedding/core angle not evident.
71' - 80'	3'	QUARTZ-HEMATITE, mainly leached, limonitic and slightly magnetic in part.
80' - 85	2'	80' - 81' QUARTZ-HEMATITE, as above. 81' - 85' Mudstone, some greywacke; bedding/core angle 30°.
85' - 113'	14'	85' - 86'6" QUARTZ-HEMATITE 86'6"-113' Mudstone, occasional greywacke; two 6" quartz-sericite stringers from 96' to 105'.
113' - 212'	58½'	QUARTZ-HEMATITE, mainly leached, limonitic and magnetic in part.
212' - 213'	3"	Bleached, quartz- and kaolin-rich sediments.
213' - 234'	19'	Mudstone, mainly massive, some thin-bedded greywacke; bedding/core angle 25°; cleavage/core angle 0°.

APPENDIX 4 (Contd)

DRILL RUN	CORE RECOVERY	DESCRIPTION OF CORE
234' - 271'	25'	Mainly mudstone; some greywacke; quartz stringers and manganiferous stains in shears and cleavage at 45° to core length; other cleavage/core angles at 0°; bedding/core angles 80° (from 241'-246'), 60° (from 246'-253), and 50° (from 253'-261'). Base of strongly oxidized zone at 271'.
271' - 283½'	7'	Mainly fine greywacke, some mudstone in alternating, partly oxidized and strongly oxidized zones; some brecciated greywacke in mudstone; tension gashes occasionally infilled with quartz and hematite stringers.
283½- 306'	19'	Mudstone, some greywacke; occasional slumping and mud pellets; bedding/core angle 30°; cleavage/core angle 0° ?segregation banding/core angle 20°; faulting from 304' - 304½', with faulted quartz stringers.
306' - 384'	66'	Mainly fine greywacke, some mudstone. MALACHITE on cleavages from 330'-334'; slightly faulting; some quartz stringers; bedding/core angle 50° (from 364' - 384')
384' - 394'	6'	Mainly mudstone, some greywacke.
394' - 399'	5'	Mainly greywacke, some mudstone; graded bedding.
399' - 419'	18½'	Interbedded mudstone and greywacke, beds 1' and 3' thick, respectively. MALACHITE on cleavages at 398', 407' 408'.
419' - 457'	36½'	Mainly mudstone, some greywacke; bedding/core angle 55°. MALACHITE on cleavages at 425'-426'; 439', 445', 445'-456'.
457' - 460'	3'	Mudstone and greywacke.
460' - 490'	26½'	Mainly fine greywacke with ⅛" porphyroblastic feldspars, some mudstone; occasional quartz stringers and veins up to 3" thick; some slumping and faulting; bedding/core angle 55°; cleavage/core angle 0°; ?segregation banding/core angle 20°.
490' - 520½"	24'	Interbedded greywacke and mudstone; some slumping and faulting; irregular quartz stringers. Bedding/core angle 55°; cleavage/core angle 0° - 10°.
END OF HOLE		STANDING WATER LEVEL AT 300'

APPENDIX 5.

ASSAY RESULTS : CAT'S WHISKERS D.D.H. 1.

All quartz - hematite core between 71'-81'; 85'-85'6"; and 113'-212' was split, and samples obtained for gold assaying. The largest sample was over 5' of drill run, the smallest 6", with an average of from 2' to 3'.

All assay results showed NIL GOLD

The core showed that the ironstone was strongly leached, and there were no visible copper minerals. It was decided, therefore, that it was not worthwhile to assay the samples for copper. However, selected samples were despatched to the Bureau of Mineral Resources Laboratory, Canberra, to be geochemically assayed for copper, and the results of this work are not yet available.

APPENDIX 6

LOG OF DIAMOND DRILL HOLE NO.2

AT THE CAT'S WHISKERS MINE

DRILLED JULY - AUGUST, 1962

Location : 450' N.E. of Mine Shaft

Collar-Co-Ordinates : 2830E, 1950S (See Daly, op. cit., Plate 3 Sheet 3).

Course : 180° Magnetic

Angle : - 60°

Depth : 410 feet

Reason : To test dip and width of ironstone body and possible zone of secondary enrichment near water table (Log of DDH No.1 refers).

Depth	Angle (Corrected)
150 ft.	58°
250 ft.	58°
350 ft.	56°

DRILL RUN	CORE RECOVERY	DESCRIPTION OF CORE
0' - 30'	4'	Pale mudstone, subordinate fine greywacke; bedding/core angle 20°.
30' - 111'	49'	Fine-grained greywacke, subordinate mudstone; graded bedding, slump structures, bedding/core angles 20° (from 30' - 60'), 5 (from 60' - 70') 75° (from 80'-97'), 45°-65° (from 97' - 111'). Cleavage/core angle 25° at 90' in same direction as bedding.
111' - 160'	39'	Mudstone, subordinate greywacke; graded bedding, some slumping, mud pellets; mudstone highly cleaved from 113' - 115'; bedding/core angles 70°, decreasing to 40° with depth; cleavage/core angles 0°, 10°, 50°.
160' - 186'	23½'	Greywacke, subordinate mudstone; graded bedding; bedding/core angles 35°-40°; cleavage/core angle 35° in opposite direction to bedding.
186' - 241'	46'	Mudstone, subordinate greywacke; graded bedding, slump structures, mud pellets; highly cleaved mudstone from 196' - 200' and 211' - 213'; dominant cleavage/core angle 40°; bedding/core angles 35°-40°.

APPENDIX 6 (CONTD)

DRILL RUN	CORE RECOVERY	DESCRIPTION OF CORE
241' - 270'	26½'	Mudstone, subordinate greywacke; slight faulting at 264' and 270'; faulting/core angle 0°; cleavage/core angles 0°, 50°, with manganiferous dendrites; bedding/core angles 60°-70° (from 262'-270').
270' - 324'	43'	270' - 323' Mudstone, occasional thin-bedded greywacke; slight faulting at 15°, 30° to core length; irregular cleavage with manganiferous stringers and dendrites; bedding/core angles 60°-65°. 323' - 324' : 3" core QUARTZ-HEMATITE, leached, containing patches of kaolin.
324' - 401'	61'	324' —395½' QUARTZ-HEMATITE, strongly leached to 344', slightly leached to 395'. COPPER mineralization from 336' - 395½'. MALACHITE and some CHRYSOCOLLA from 336' - 348', and on cleavages to 351½'. CUPRITE at 350½'. NATIVE COPPER as stringers, blebs and crystals from 351'-351½'; 353½'-356': 357' - 359½'; 361'-362'; 366'-367'. ?CHALCOCITE of sooty appearance from 352½'-353½'. CHALCOPYRITE as grains, blebs, irregular stringers from 351½'-359½'; 361'-367': 371'-395½'. At 391' the chalcopyrite grains are thinly rimmed with a black alteration product. IRON PYRITE at 352', very abundant from 373½'-374½'. Limonite is a common constituent to 371', and kaolin is frequent throughout. Jasper is rare. Ironstone/sediment contact at 395½' is banded and at an angle of 30° to core length. 395½'-397½' Chloritic schist; schistosity/core angle 40°, some chalcopyrite grains. 397½'-401' Mudstone, somewhat oxidized from 400'-401' with red ?iron oxide spots. Where slightly oxidized the mudstone contains small grains of pyrite.
401' - 410'	8½	Mudstone, subordinate greywacke; sediments with pyrite and (?)iron oxide spots as above.
END OF HOLE		

APPENDIX 7

ASSAY RESULTS

CAT'S WHISKERS D.D.H. NO.2.

DRILL RUN	CORE RECOVERY	% CORE RECOVERY	Cu %	Au DWT./TON
323' - 324'	3"	25	0.75	Tr.
324' - 330'	3'	50	0.25	Tr.
330' - 333'	8"	22	0.1	Nil
333' - 336	1' 4"	45	0.3	Nil
336' - 341'	1' 6"	30	2.5	Nil
341' - 344½'	2'	57	4.05	Nil
344½' - 347'	2'	80	0.7	1.1
347' - 350'	2'	66	2.1	0.8
350' - 351½'	1' 6"	100	2.5	Nil
351½' — 354'	2'	80	5.8	0.5
354' - 355½'	1' 6"	100	2.55	Nil
355½' - 357½'	2'	100	1.25	Tr.
357½' - 359½'	2'	100	1.65	0.3
359½' - 361'	1. 6"	100	0.15	Nil
361' - 363'	1'10"	92	4.1	0.5
363' - 365'	1' 8"	83	1.65	0.2
365' - 367'	2'	100	3.05	0.3
367' - 371'	3'	75	0.2	Nil
371' - 374'	3'	100	0.35	Nil
374' - 377½'	3' 6"	100	0.25	Tr.
377½' - 381'	3' 6"	100	0.6	Nil
381' - 384¼'	3' 3"	100	1.2	Nil
384¼' - 387¾'	3' 6"	100	2.45	Nil
387¾' - 391'	3' 3"	100	0.7	Nil
391' - 393½'	2' 6"	100	1.05	0.3
393½' - 395½'	2'	100	0.25	0.3
407' - 410' in sediments with pyrite	3'	100	0.1	Nil

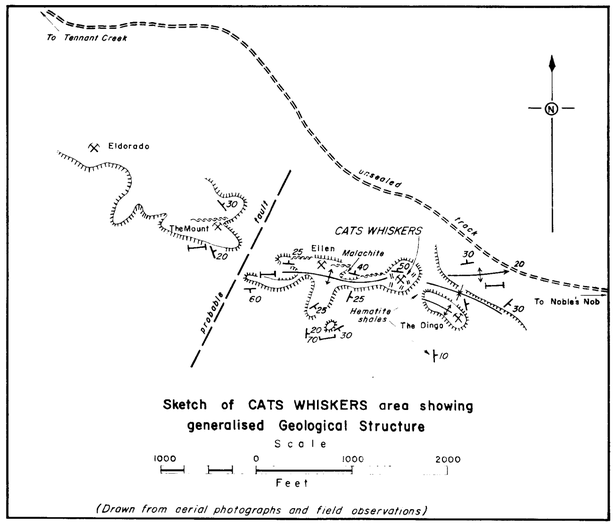
Total core recovery in ironstone was 56' from 72½' of drill run.

The average copper assay from 336' - 367', i.e. a drill width of 31', was 2.6% Cu.

GEOLOGICAL PLAN OF THE CATS WHISKERS MINE

TENNANT CREEK

(Tape and Compass Survey)



Sketch of CATS WHISKERS area showing generalised Geological Structure

(Drawn from aerial photographs and field observations)

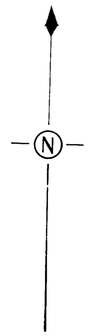
Scale

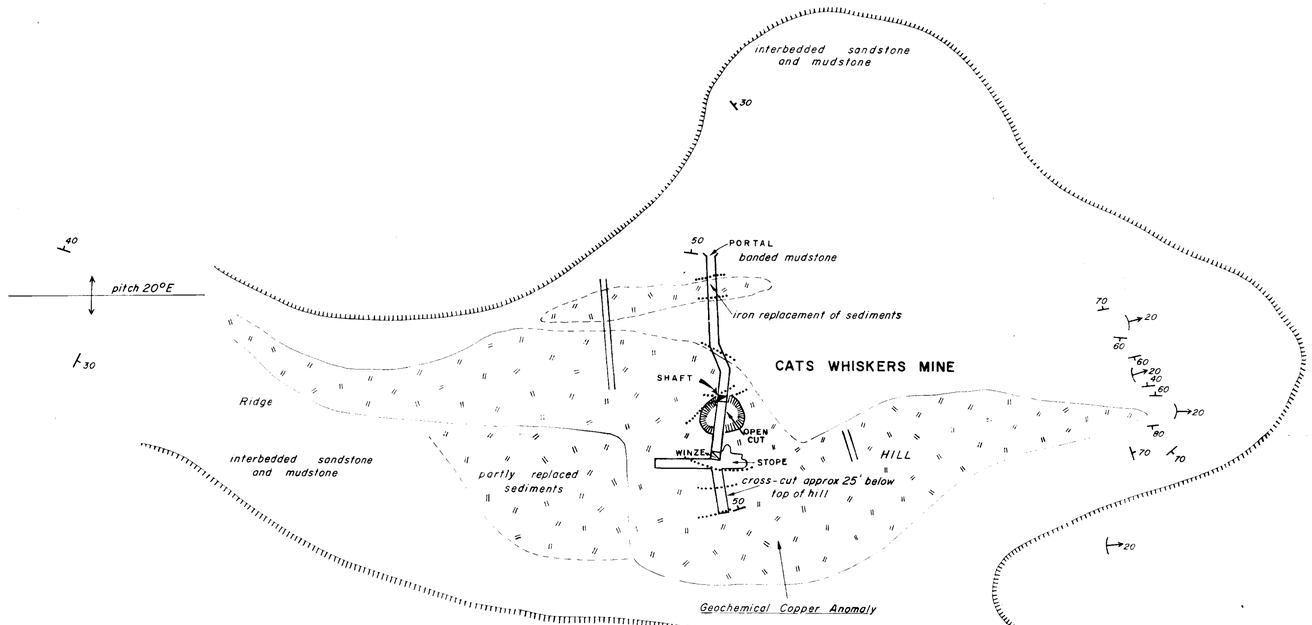
40 20 0 40 80 120

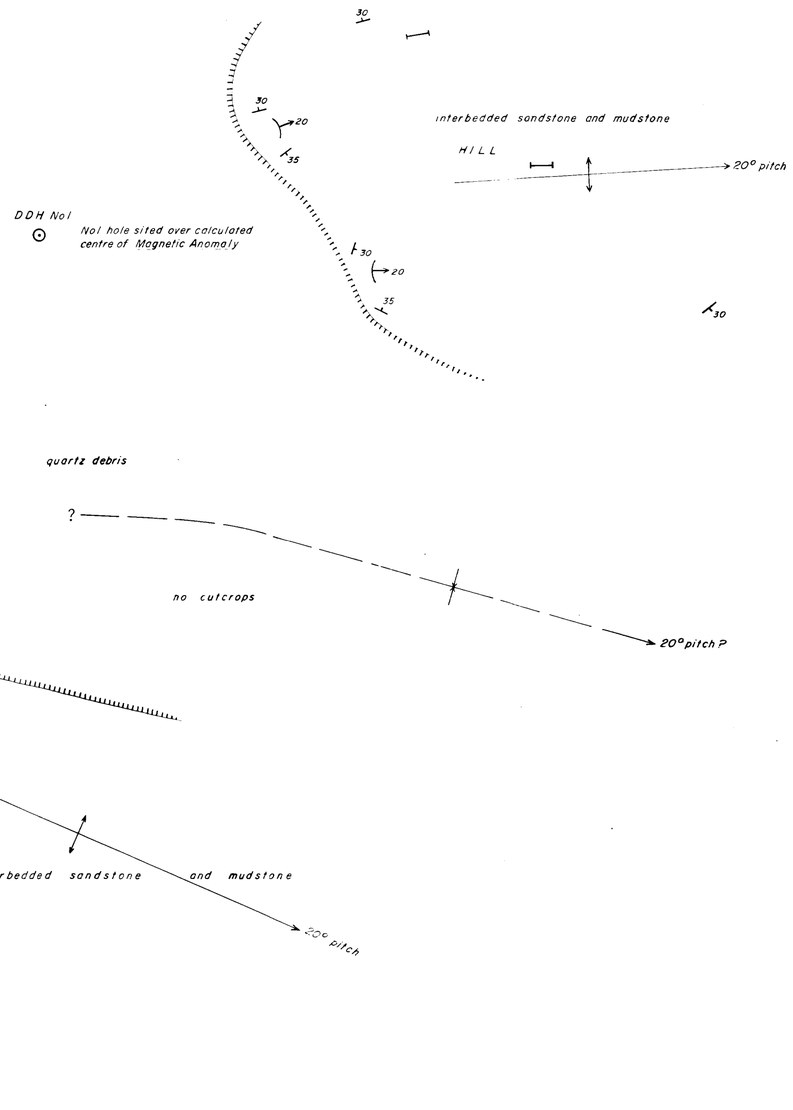
FEET

Alternative site for DDH No 3

DDH No2 (Also proposed site for DDH No3 -75°S)







Reference

- Anticlinal drag fold and pitch
- Synclinal drag fold and pitch
- Major anticlinal fold
- Major synclinal fold
- Strike and dip of bedding
- Strike and dip of cleavage
- Strike of vertical cleavage
- Mine or prospect
- Top of ridge (Approx)
- Shear zone
- Diamond drill hole
- Ironstone
- Ironstone/sediment contact in underground workings

SOUTH

NORTH

D.D.H No 1

D.D.H No 2

Alternative site for No3 D.D.H

60°

60°

15°

Proposed site for No3 D.D.H

100'

FOLDED AND DRAG - FOLDED SEDIMENTS

Slump zone

No2 D.D.H

Probable position of No3 D.D.H

Alternative No3 D.D.H

200'

Bleached, quartz and kaolin rich sediments at contact.

Dendritic manganese

Base of strongly oxidized zone 271'

Water table at 300'

300'

Cu mineralisation 336' to 395½'

Malachite on cleavage

Chloritic schist

Fine iron pyrites crystals in sediments

410'

Calculated Upper limit of Anomaly

365'

Slump zone

400'

PARTIALLY OXIDIZED ZONE

Calculated Centre of Anomaly

485'

PROBABLE CENTRE OF ANOMALY

500'

520½'

End of D.D.H No1

SEDIMENTS

650'

600'

Calculated Lower limit of Anomaly

605'

REFERENCE

Cu — Copper mineralization

Ironstone

Mudstone predominant, greywacke subordinate

Greywacke predominant, mudstone subordinate

} Interbedded greywacke and mudstone

Bedding - direction of dip doubtful

Cleavage

Faults and shears

Outline of magnetic anomaly, calculated by J. Daly (B.M.R. Bulletin 44, pl7 refers)

SECTION OF DIAMOND DRILLING HOLES

CATS WHISKERS MINE

TENNANT CREEK

SCALE

40 20 0 40 80 120

Feet

Bureau of Mineral Resources, Geology and Geophysics. March 1963

To accompany Record No 1963/32

E53/14/15