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COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

RECORDS.

1963/15

MINOR METALLIFEROUS INVESTIGATIONS
NORTHERN TERRITORY RESIDENT GEOLOGICAL SECTION
JANUARY - JUNE 1962

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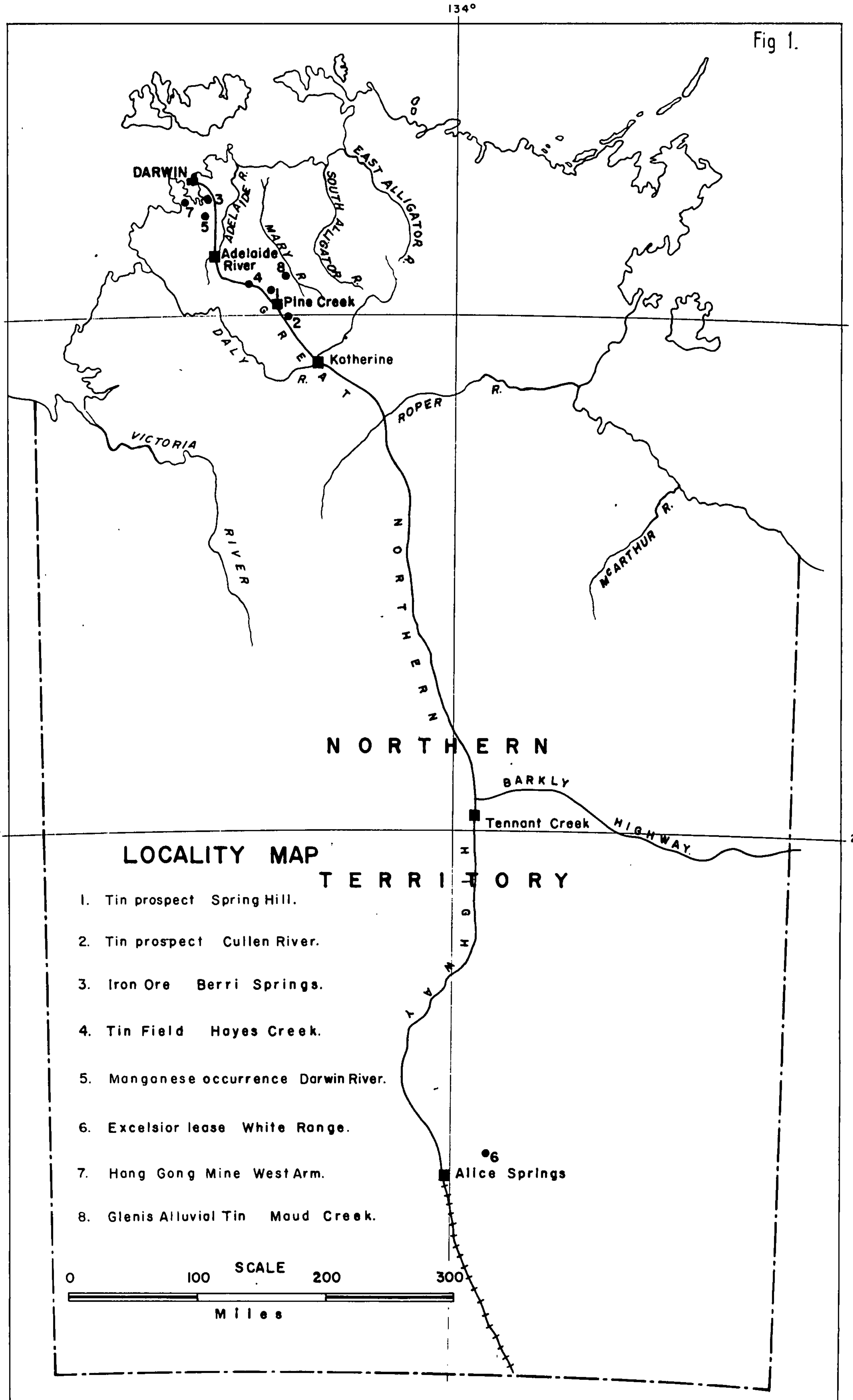

Bureau of Mineral Resources, Geology & Geophysics Dec 1962 To accompany Record 1963/15 NT/23 G.M.

MINOR METALLIFEROUS INVESTIGATIONS

N.T. RESIDENT GEOLOGICAL SECTION

JANUARY-JUNE 1962

SUMMARY

This Record is the first of a series which will be issued from time to time, on minor metalliferous investigations carried out by the Northern Territory Resident Geological Section. It contains nine reports, five of which are on tin occurrences (Glenis, Hang Gong, Hayes Creek, Spring Hill and Cullen River) in the Katherine-Darwin area, and the others are on iron (Berry Springs), manganese (Darwin River), copper-gold (Tennant Creek), and gold (Alice Springs) occurrences.

At the Glenis Mine, near Maud Creek in the Burrundie area, about 80 lb. of cassiterite has been produced from eluvium averaging 5.3 lb. per cubic yard. Reserves may be about 10,000 cubic yards of gravel with a grade ranging from 5 to 15 lb. of cassiterite per cubic yard. Upgrading of this ore for treatment at the Mount Wells Battery is prevented by the lack of water in the Glenis area.

At the Hang Gong Mine, West Arm Tin Field, about 1000 cubic yards of old tailings are being treated; the grade is between 3 and 4 lb. of cassiterite per cubic yard; and a small part of the tailings contains about 1 lb. tantalite per yard. Other materials in the vicinity, which may be suitable for treatment are: about 2000 cubic yards of eluvial material; 2-3000 cubic yards of alluvial deposits containing about ½ to 2 lb. of tin per cubic yard; and an unknown amount of weathered schist (bedrock).

The old Hayes Creek tin field about 120 miles south-east of Darwin, was re-examined on a request by Mr. A. McDonald, who wishes to re-open the field. There are prospects for obtaining some alluvial tin in Hayes Creek, and the northern end of the field warrants exploration for lode tin.

A minimum of about 2 tons of concentrates are expected from 12 tons of lode tin ore, which were obtained from a quartz vein in the McKinley Granite near its intrusive contact with the Burrell Creek Formation in the Spring Hill area. The ore reserves are not known.

At the Cullen River tin prospect about 2,000 cubic yards of alluvium containing 7 lb. of cassiterite per cubic yard are being prepared for treatment.

The Berry Springs iron occurrence consists of hematite fragments scattered from a lode a few square feet in area.

At Darwin River low-grade (average 20 percent Mn and 30 percent Fe) manganese ore is exposed in a costean dug in an area of 60,000 square feet of possible manganese-bearing material.

At the Lone Star Mine, Tennant Creek, a vertical diamond drill hole tested a magnetic anomaly at a depth of about650 feet. A 16-foot drill intersection of quartz - jasper ironstone containing chalcopyrite stringers assayed 5.4 percent copper. A second intersection of this mineralized zone in a deflected part of the hole suggests that the true width is about 6 feet. The highest gold value obtained was 0.8 dwt. Au per ton over a 3-foot interval. One inclined hole is recommended to test the copper mineralization.

At the Excelsior Lease, White Range Gold Field, Alice Springs, McIntyres adit intersected a barren lode 35 feet below the old surface workings; a quartz-filled shear carrying 1.5 dwt. Au/ton of gold, and a zone of quartz veins running about 0.5 dwt. Au/ton.

GLENIS MINE ELUVIAL TIN DEPOSITS
MAUD CREEK, BURRUNDIE DISTRICT.

by

J. Hays

INTRODUCTION

The Glenis tin leases, on Maud Creek in the Burrundie District, are held by Messrs Furminger and Stabelberg, of Batchelor, and were examined by the writer on the 9th and 10th of April, 1962. A pace and compass survey of part of the area was subsequently made by P. Crohn (Plate 2).

Access to the leases is by the Stuart Highway for 123 miles from Darwin, thence northerly for 10 miles by all-weather track to Grove Hill, easterly for 14 miles by all-weather track to Mount Wells, and easterly for 10 miles by bush track to Maud Creek. The leases cover 80 acres of alluvial flat and gently sloping hill-side, 5 miles south-east of the Mount George Mine, and immediately south of Lucy's Diggings.

The examination was prompted by reports of several similar deposits in the Burrundie District, some of which have been worked in the past. The main problem in working the deposits has been the shortage of water during the dry season, and the Glenis leases are no exception.

GEOLOGY

The leases are in cassiterite-bearing eluvial material covering part of the contact between the Cullen Granite and the Masson Formation. The Masson Formation crops out along a south-east trending ridge north of the leases. Several small tin lodes are known to crop out on the ridge. These range from about 3 feet to 20 feet long, and are mostly from half an inch to 2 inches thick; the maximum observed thickness is about 6 inches. The lodes consist of quartz, muscovite, and subordinate amounts of tourmaline and cassiterite, and are probably the source of most of the cassiterite in the eluvium.

The eluvial material is a poorly-sorted gravel, about 1 foot thick, containing sub-angular fragments of granite and greywacke, ranging in size from medium - grained sand to cobbles six inches in diameter, and fragments of lode material less than one inch in diameter.

SAMPLING

During the visit on April 9th and 10th, one bulk sample was taken from the workings and one from the foot of the ridge of Masson Formation.

These samples were screened to determine size distribution, and the various screen, fractions were crushed, concentrated, and assayed to determine the cassiterite distribution. The fractions were examined before crushing to determine the extent to which the cassiterite was attached to the material; free cassiterite was panned off where necessary. The Australian Mineral Development Laboratories, Adelaide assayed all samples. Detailed results are given in Table 1. The grade of the sample taken from the present workings was 4.9 lb. of cassiterite per cubic yard, including 0.5 lb. attached to lode material. The grade of the sample from the foot of the ridge was 9.9 lb. of cassiterite per cubic yard, including 1.72 lb. attached to lode material. At the time of the inspection, about 80 lb. of cassiterite had been produced from 15 cubic yards of gravel, which represents a grade of about 5.3 lb. of cassiterite per cubic yard.

The distribution of cassiterite between the screened fractions was irregular, but it was noted that most of the material greater than one inch in diameter consisted of barren granite and greywacke, and could be screened out without loss. Most of the test pits shown on Plate 2 were dug by United Uranium N.L. under an option agreement with the lease-holders between the time of the original visit and the time of Crohn's survey. They were examined for thickness of gravel and nature of the bed-rock; samples from these test pits were taken by the company's geologist.

WATER SUPPLY

Water holes in the local creeks are the only source of water, but all of them dry up in the dry season. The creeks are not suitable for the construction of dams or weirs and underground-water supplies could probably not be developed unless sites are selected with the help of geophysical surveys.

RECOMMENDATIONS

If the results of the two bulk samples are representative, the immediate vicinity of the present workings could contain about 10,000 cubic yards of gravel with a range of grade between 5 lb. and 15 lb. of cassiterite per cubic yard; this volume could be increased if gravel on the remaining parts of the leases also proved to be cassiterite-bearing. However, the water supply is inadequate to allow regular production of concentrates by sluicing, and the grade is too low for direct treatment at the Mount Wells Government Battery. If the results of current testing by United Uranium are encouraging, it is suggested that a preliminary enquiry be made from C.S.I.R.O. or A.M.D.L. for suggestions on methods of producing concentrates using little or no water. A major investigation is not warranted for the Glenis leases alone, but the results might be applicable to several other deposits in the same area.

Upgrading should aim at producing a concentrate capable of treatment at a central plant, for which the minimum economic grade would be about 1.5% Sn. In the case of the Glenis leases, this would involve upgrading by a factor of about six. Deposits of this type would be a useful addition to the reserves available to the Mount Wells Battery, if a suitable method of upgrading and treatment could be found.

Table 1

SAMPLING AND ASSAY DATA : GLENIS TIN LEASES

Screen Size	+ 1/4 In.	+ 5 Mesh	+ 12 Mesh	+ 25 Mesh	- 25 Mesh	Total Cassi-terite.	Free Cassi-terite.	Mean Recoverable Grade Total Cassiterite	Mean Recoverable Grade Free Cassiterite
SAMPLE NO. 1 : FROM WORKINGS									
Wt. of Fraction	20.75 lbs.	7.5 lb.	30.25 lb.	14.75 lb.	43.5 lb.				
Wt. of Concentrates	18.7 oz.	35 oz.	46 oz.	50 oz.	25 oz.				
Grade % Sn	0.88	0.205	1.23	1.41	2.65	2.61 oz.	2.39 oz.	4.9 lb/yd^3	4.4 lb/yd^3
Cassiterite Content	0.2 oz.	0.08 oz.	0.68 oz.	0.85 oz.	0.8 oz.				
Free Cassiterite	0.0 oz.	0.06 oz.	0.68 oz.	0.85 oz.	0.8 oz(?)				
SAMPLE NO. 2 : FROM FOOT OF HILL									
Wt. of Fraction	47.5 lb.	13.5 lb.	16.0 lb.	9.75 lb.	29.25 lb.				
Wt. of Concentrates	4.1 oz.	8.8 oz.	18.7 oz.	31.2 oz.	17.0 oz.				
Grade % Sn	16.9	12.9	7.04	2.10	3.46	5.28 oz.	4.37 oz.	9.9 lb/yd^3	8.18 lb/yd^3
Cassiterite Content	0.85 oz.	1.36 oz.	1.58 oz.	0.78 oz.	0.71 oz.				
Free Cassiterite	0.5 oz.	0.8 oz.	1.58 oz.	0.78 oz.	0.71 oz(?)				

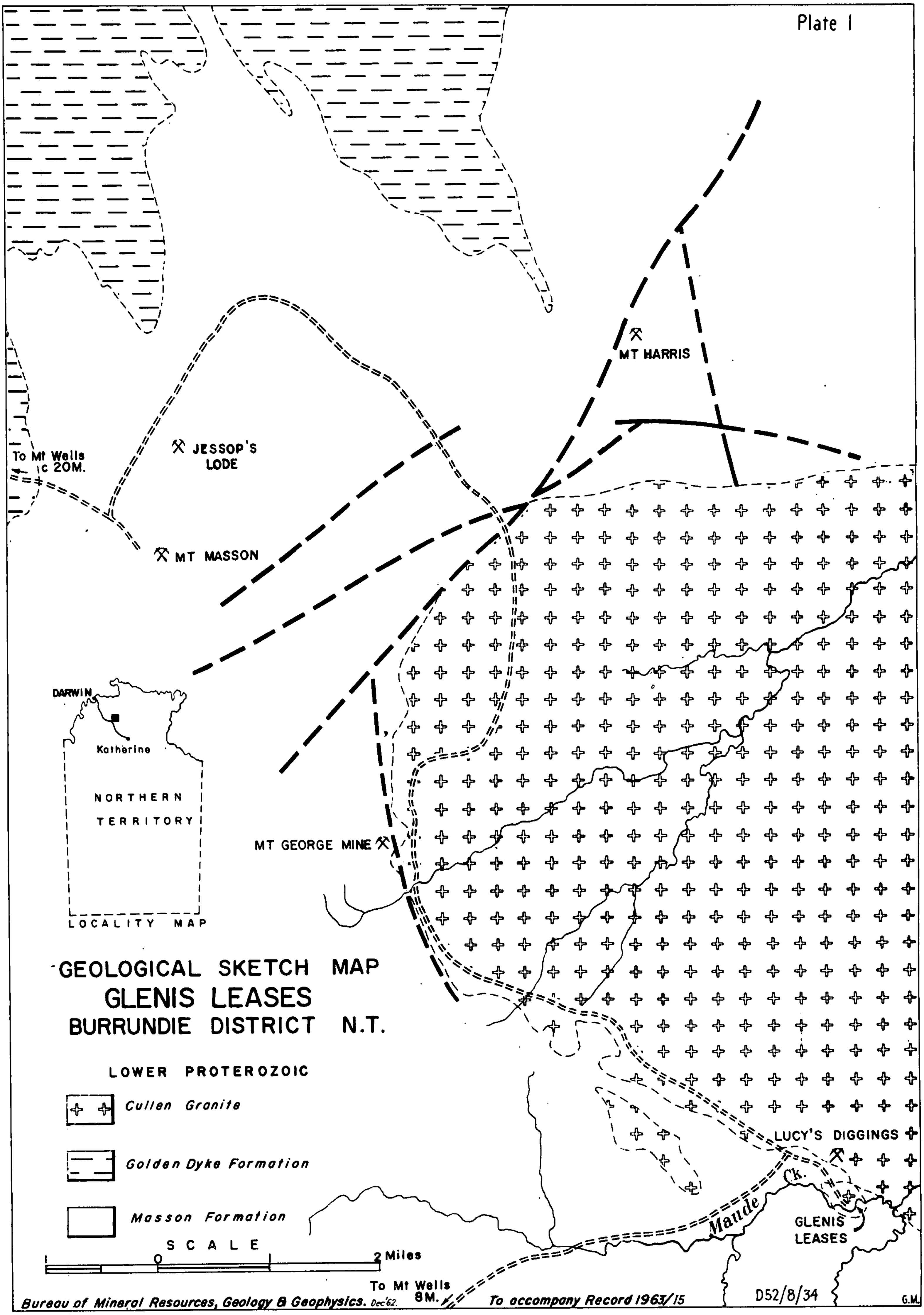
Plate I
MT HARRIS
JESSOP'S LODE
To Mt Wells c 20M.
MT MASSON
DARWIN
Katherine
NORTHERN TERRITORY
LOCALITY MAP
MT GEORGE MINE
GEOLOGICAL SKETCH MAP
GLENIS LEASES
BURRUNDIE DISTRICT N.T.
LOWER PROTEROZOIC
Cullen Granite
Golden Dyke Formation
Masson Formation
SCALE
0
2 Miles
LUCY'S DIGGINGS
Maude Ck.
GLENIS LEASES
To Mt Wells 8M.
Bureau of Mineral Resources, Geology & Geophysics. Dec '62.
To accompany Record 1963/15
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G.M.

GLENIS LEASES
MAUD CREEK

BASED ON COMPASS AND PACE SURVEY

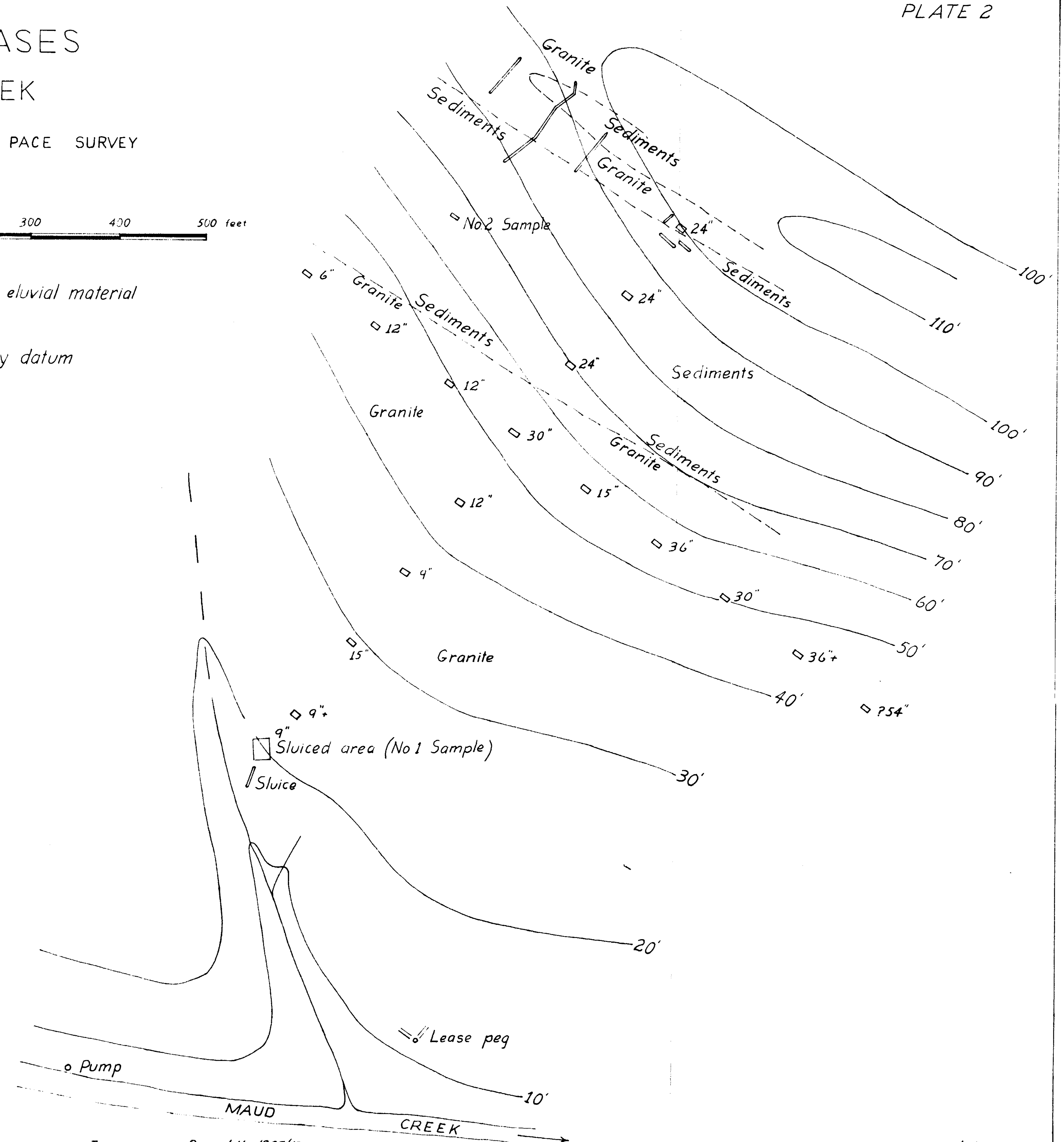
SCALE

100 0 100 200 300 400 500 feet

9" Prospecting pit showing depth of eluvial material

Costean

—20— Form lines - height above arbitrary datum



HANG GONG MINE : WEST ARM TIN FIELD

by

P.W. Crohn

INTRODUCTION

The Hang Gong Mine, West Arm Tin Field, was visited on May 16th, 1962. The area is held as Mineral Lease 246B by Messrs W., W,H. and H.N. Farlow. The mine was extensively worked in the early years of this century by means of open cuts up to about 18 feet deep. There are shallow workings and prospecting pits over an area of some 200 by 400 feet, mainly on the eastern and north-eastern slopes of a gentle hill, which rises to a height of about 25 feet above the surrounding country.

A map of the area prepared by Summers (1957), shows a composite pegmatite intrusion occupying the central part of the area covered by those workings, but much of the surface within this area is now covered by tailings dumps and spoil heaps, and some of this material has been moved two or three times by different operators. For this reason, no further geological mapping is proposed at present, and only some general comments are offered.

ORE RESERVES

At the present Messrs Farlow are treating old tailings dumps, which were bull-dozed from their original position in the creek bed to a site on the slope of the hill. Material from these dumps is passed through a trommel into a 40-foot sluice box. Water for this process is obtained from a dam, which is expected to provide another three months' supply.

The total volume of old tailings in the area is estimated to be about 1000 cubic yards, but some of this was used in the construction of the dam, and is therefore not readily available for re-treatment. The greater part of these tailings was estimated, from dish samples taken by Messrs. Farlow, to contain between 3 and 4 lb. of cassiterite per cubic yard. This agrees well with the results of treatment carried out to date. In the three days preceding the visit, about 30 lb. of high-grade concentrate were recovered from some 15 cubic yards of material, and a recovery of the order of 50 percent probably was being obtained.

A smaller portion of the tailings, in the northern part of the area contains tantalite, but almost no tin. The grade of at least some of these tailings is estimated by Messrs. Farlow from dish samples, to be about 1lb. of tantalite per cubic yard; some of the tantalite is these dumps occurs as crystals up to one inch long. Messrs. Farlow propose to treat some of this material by jig in the near future.

In addition to the tailings, eluvial material carrying economic quantities of tin and/or tantalite may total another 1000 cubic yards in the immediate vicinity of the present plant.

Beyond this, material suitable for treatment in the existing plant may be available from three additional sources:

(a) Eluvial material on the west and south-west flanks of the hill. Between 1000 and 2000 cubic yards of material may be present in this area, but a large proportion of this occurs as a layer only a few inches thick, and it would be necessary to treat a few trial parcels of, say, 10 cubic yards each, to find whether this material can be treated economically.

(b) Alluvial deposits in the valley floor, both upstream and downstream from the present dam. Messrs Farlow have reported values ranging from about 1/2 to 2lb. of tin per cubic yard from irregularly spaced dish samples taken over an area of about one acre. A costean downstream from the dam has exposed an average thickness of 18 inches of tin-bearing sand overlying barren ferruginous gravel; sand of this thickness covers the whole area, some 2000 to 3000 cubic yards of tin-bearing alluvial material may be present in the immediate vicinity of the mine. However, some bulk samples of at least 10 cubic yards should be treated before any of this is regarded as payable material.

(c) From the weathered zone of the bedrock. This is difficult to assess, as most of the sampling to-date has not distinguished between eluvial material and weathered rock in situ. However, from recent work done by Messrs Farlow, it seems that at least some tin and tantalite occur within the schist close to the contact of the main pegmatite mass, either as disseminated crystals or in small quartz and pegmatite veins. Such occurrences would probably have been missed by earlier prospectors, as nearly all previous testing was concentrated on the larger pegmatite bodies. The weathered schist would have the advantage that, to a depth of several feet, at least it could be treated in the existing plant with almost no crushing. Dish samples should be taken from the weathered rock as each part of the area is cleared of old dumps and eluvial material, and bulk samples of, say, five cubic yards from any areas, which give encouraging results should be treated in the existing plant. If this is done, the prospects of economically treating the weathered bed-rock on a large scale could be assessed before the treatment of the current reserves of old dumps and eluvial material is completed.

TREATMENT

The sluice box in use at present contains baffles three inches deep, set at intervals of about three inches; and it seems likely that recoveries could be improved by wider spacing of baffles. However, some losses are due to the presence in the feed of composite particles, generally containing cassiterite and quartz. Most of this cassiterite could be liberated by crushing to about 1/32 inch, (-20 mesh), but the gain in recovery must be balanced against the capital cost and running cost of a crusher. A trial parcel of, say, three cubic yards of tailings from the present plant should be crushed at the Mount Wells Government Battery and re-treated in the sluice box to determine the gain which is likely to result from using a crusher.

At the present time, the concentrates from the sluice box are cleaned by panning; this will not be an economic process when regular production is being obtained. However, unless production of concentrates is expected to exceed, say, five tons per month, it will probably be more economical to take this concentrate to the Mount Wells Government Battery for treatment rather than to purchase a Wilfley Table or comparable unit for use at the mine.

RECOMMENDATIONS

Having regard to the comments made above, the present methods of prospecting and treatment appear to be well suited to the prevailing conditions at the mine. However, it is suggested that in future the concentrates obtained from dish samples be weighed and recorded to assist in a systematic evaluation of different parts of the area. Also, a representative sample of the tantalite concentrate should be sent for assay as soon as possible after treatment of this material is begun, as the presence of columbite may affect the value of the concentrate, and hence the grade of material that can be economically worked.

It is tentatively suggested that another geological inspection might be carried out in two to three months, and if a sufficient area of bedrock has been exposed by that time, by the removal of old dumps and eluvial material, a geological survey might then assist in delineating those parts of the area in which further prospecting is warranted.

REFERENCES

SUMMERS, K.W.A., 1957 - The mineral deposits of the West Arm, Bynoe Harbour and Bamboo Creek field, N.T. *Bur.Min.Resour.Aust. Rec.*, 1957/68 (unpubl.)

GEOLOGY OF THE SOUTHERN PART OF HAYES CREEK TIN FIELD

by

P.G. Dunn

SUMMARY

The Hayes Creek Tin Field is about 118 miles from Darwin, and about 200 yards north of the Stuart Highway.

The field is in an area of tightly folded and metamorphosed Lower Proterozoic rocks. The southern part of the field consists of a ridge formed by a plunging anticline. Cassiterite-bearing quartz veins intruded the axial region of the anticline, probably along tension cracks formed during folding.

The southern end of the ridge has been worked out, but the northern end warrants further exploration.

An unknown amount of cassiterite-bearing alluvium has been deposited in Hayes Creek.

INTRODUCTION

The Hayes Creek Tin Field is located about 200 yards north of the Stuart Highway along both banks of Hayes Creek. The Stuart Highway crosses Hayes Creek about 118 miles south of Darwin. The area can be reached by conventional vehicles throughout the year, except immediately after heavy rains when the crossing at Hayes Creek may be impassable.

The southern part of the Tin Field was mapped (Plate 3) during November and December of 1961 after A. McDonald, the lessee, had applied to the Mines Branch, Northern Territory Administration, for financial assistance to re-open the field. This part, which he hopes to work first, is a steepsided ridge about 250 feet high, and was the site of most of the early mining. Only this southern area has been mapped to-date, because the request was made late in the field season; if further prospecting results are encouraging, the rest of the area may be mapped during the next field season. Mapping was done by plane table and alidade.

GENERAL GEOLOGY

The rocks in the area are sediments ranging from quartzite and greywacke to red and black slates that have undergone low-grade metamorphism. The only rock type [illegible] indicated separately on the map is a black slate as it can probably be used as a structural marker bed. In some places the black slate contains small knots, about 1/16 of an inch in diameter, which are probably chiastolite or cordierite crystals. Small pseudomorphs of hematite after pyrite are sparsely scattered through the black slates.

The rocks have been folded into a tight anticline that plunges to the north. The strike of the bedding ranges from 330° to 030° in most places it is to the east of north.

The beds dip steeply on both sides of the anticline, and in many places are vertical and possibly overturned. Some minor folds are approximately parallel to the main fold. The axes of these strike 030°, and their plunge ranges from 20°N to 45°N. Faulting is apparently not important in this area, although some shearing and brecciation are noticeable, and may have been related to the emplacement of the quartz veins. One small fault with a displacement of about five feet was noticed at the north end of the ridge.

ECONOMIC GEOLOGY

History

The Hayes Creek Tin Field was discovered in 1914, and was worked mainly by Chinese tributers until 1934. There is no record of any work's being done since that time. Recorded production from the field was 74 tons of cassiterite concentrates, although the records may not be complete. In the southern part of the field mine workings consist of two adits, drives along the veins, and numerous surface workings. The adits and one of the drives are accessible; the rest of the drives are not safe. The surface workings are accessible although many of them are narrow; they extend steeply down the dip, and are connected to the underground workings.

Quartz-Cassiterite Veins

The tin occurs as cassiterite in quartz veins. Most of the veins are parallel to the bedding; others have the same strike as the country rock, but a different dip; and a few minor ones are cross-cutting. They range from a few inches to six feet thick. The veins are concentrated near the axial plane of the anticline; the majority of them are on the western side. They were probably emplaced along tension cracks that formed in the axial region during folding. Shearing and brecciation of some of the veins suggest that emplacement took place during folding. The source of the quartz veins was probably the Cullen Granite which crops out less than a mile east of Hayes Creek.

Alluvial Tin

A considerable amount of cassiterite-bearing sand and gravel has been deposited along Hayes Creek and the tributary that flows from the western side of the ridge. Some of it was derived from outcrops on the ridge, and some probably from dumps on the western slope below the various workings. The extent and the thickness of the cassiterite-bearing alluvium are not known.

RECOMMENDATIONS

The alluvial material provides the most easily obtainable cassiterite. Although the total amount is not known, it could be worked at a profit, and might produce a considerable amount of tin.

The veins on the ridge in this part of the field are unlikely to produce much more tin, although some exploration is warranted. The veins south of 550N seem to be worked out, although the drives at the end of the upper adit (portal at 560N/210E) should be examined. At present, however, they are not safe because the Chinese worked down the vein and left it open.

The north end of the ridge, however, has not been worked, some tin-bearing veins might be discovered there. As the veins seem to be related to the axial region of the fold, which nearly coincides with the crest of the ridge, a few costeans dug just west of the crest would probably expose any veins that may be present. The location of the suggested costeans is shown on the accompanying map. The long quartz vein at plane table station 8 (670N/285E) is barren. Any financial assistance should be restricted to this work at the north end of the ridge.

More work seems to have been done on this ridge than on any other in the field. Some mine workings occur on the ridges north of this one, and the entire area north of this ridge warrants thorough prospecting. If the results of this prospecting are encouraging the rest of the area should be mapped to determine any geological control of the ore deposits, and to aid the search for new veins.

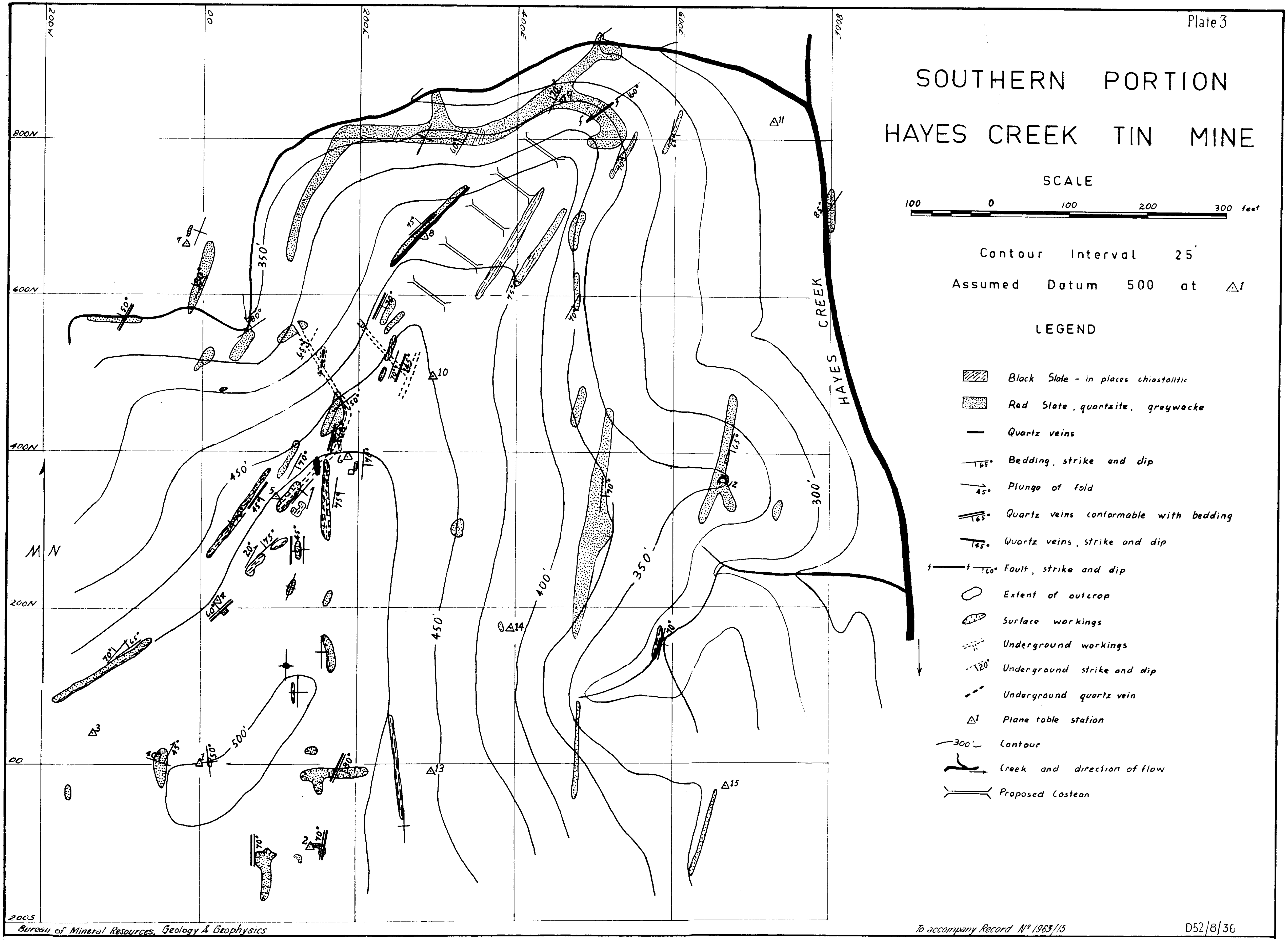


Plate 3
SOUTHERN PORTION
HAYES CREEK TIN MINE
SCALE
100 0 100 200 300 feet
Contour Interval 25'
Assumed Datum 500 at △1
LEGEND
Black Slate - in places chiastolitic
Red Slate, quartzite, greywacke
Quartz veins
Bedding, strike and dip
Plunge of fold
Quartz veins conformable with bedding
Quartz veins, strike and dip
Fault, strike and dip
Extent of outcrop
Surface workings
Underground workings
Underground strike and dip
Underground quartz vein
Plane table station
Contour
Creek and direction of flow
Proposed Costean
HAYES CREEK
M N
200W
00
200E
400E
600E
800E
800N
600N
400N
200N
00
200S
350'
450'
400'
300'
500'
Bureau of Mineral Resources, Geology & Geophysics
To accompany Record Nº 1963/15
D52/8/36

TIN PROSPECT SOUTH-EAST OF SPRING HILL

by

P. Rix

LOCATION

The prospect, worked by Mr. Teague and partners, is situated about 3 miles south-east of Spring Hill Siding. Access to the site is by way of the Spring Hill track that turns off east from the Stuart Highway about 140 miles south of Darwin. After travelling for 9 miles along this track another track turns east just before the creek crossing two miles south of Spring Hill Siding. The tin prospect is situated about 2½ miles from the beginning of this branch track.

GEOLOGY

The prospect is located in a cassiterite-bearing quartz vein, striking N10°E and dipping 30° to the west, near the southern intrusive contact of the McKinley Granite with the Burrell Creek Formation. The vein is one-foot thick, and crops out for about 100 feet to the north and a similar distance to the south of the open cut, but it appears to be barren on the surface away from the workings.

Granite boulders surround the prospect and suggest that the vein is within the granite. However, the ground between the boulders consists of decomposed ferruginous material and a few outcrops of vein quartz. Specimens from the workings show that the country rock is probably a ferruginous sedimentary rock, which is decomposed near the surface. The vein was probably emplaced along a bedding plane in the sediments.

The cassiterite is contained both in the quartz and the decomposed sediments. The quartz vein may have disintegrated within the decomposed zone, resulting in the concentration of cassiterite crystals in an ochreous matrix. Some grey clay was seen in the bottom of the shaft.

WORKINGS

The initial working was an open cut that followed the dip of the vein. The dimensions of the open cut are 19 feet by 14 feet; its maximum depth is 10 feet. A shaft was later sunk to a depth of 14 feet, a few yards south-west of the open cut.

RECOMMENDATIONS

The present shaft, which has encountered, but has not penetrated the lode, should be deepened to expose the vein fully; at most this would entail only a few more feet of shaft sinking. Another shaft has been sited 50 feet west of the present one, and this should encounter the vein at a depth of 35 to 40 feet. If the vein is not found at a total depth of 50 feet, it must be assumed to have lensed out or to have been displaced by faulting between the two shafts.

Drives of 15 to 20 feet should be put in from the present shaft to confirm the lateral extent of the ore-bearing vein.

ORE RESERVES

About 12 tons of ore have been stockpiled, some of which is very rich in cassiterite. It is estimated that a minimum of 2 tons of concentrates will be obtained from this ore.

The reserves of ore still to be mined will not be known until further shaft sinking has been carried out.

L. G. WALKER TIN PROSPECT, CULLEN RIVER

by

P. Rix

The site of this prospect is on the north bank of the Cullen River about 1/4 mile east of the Stuart Highway and 300 yards east of Cullen railway bridge. It was visited on the 15th January, 1962.

Mr. Walker plans to work alluvial material at this site, washing alluvium that is situated above the present flood level of the river when the river is high, and working in the bed of the river during the dry season. The new site was occupied for about one week, during which time three pits were sunk in the bed of the Cullen River to a depth of 3'6". These pits were submerged at the time of the visit, and so no confirmation of their depth was obtained. Mr. Walker is awaiting timber supplies for the manufacture of a large wooden race to replace a small one that he was using.

The alluvial material available in the vicinity was roughly estimated as being not less than 2000 cubic yards. No estimate was made of the amount of cassiterite in the alluvium, but the prospector's own estimate is 7 lb./cu.yard.

BERRY SPRINGS IRON ORE

MINERAL CLAIM NO. 79B

by

P. Rix.

The deposit is situated immediately north of the Berry Springs track about 1½ miles east of Berry Springs and ½ mile west of the bridge over Hardy Creek. It was visited on the 22nd February, 1962.

Indicators of the presence of hematite lode are "float" fragments of hematite scattered over a low ridge, and an exposure of hematite in the entrance of a small cave near the crest of the ridge. Other "float" comprises sandstone and quartz fragments, and ironstone gravel derived from the ferruginous surface deposits here.

The cave entrance is situated in a small hollow in the ferruginous deposits, the hematite being restricted to an outcrop of a few square feet in area just inside the entrance. There is no indication of the strike of the lode. The exposed ore is high-grade and a number of samples were taken; some of the samples show the effects of shearing, so a fault or shear -zone may be present in this area. The cave may have been formed by solution along a fault or shear, but it may be partly by collapse of the country rock.

The claimants were advised to put in costeans in two directions at right angles, to determine the trend and extent of the lode. These operations will be concentrated along the crest of the ridge, where hematite is most likely to be found in situ.

MANGANESE OCCURRENCE : DARWIN RIVER AREA.

by

P.G. Dunn

Early in 1962, Mr. B.D. Brown, of Nevsam Mining Company Pty.Ltd., found a small lens-shaped area of manganiferous material about 4½ miles south of the R.A.A.F. Quarry on the Darwin River, and about half a mile west of the railroad. A roughly lens-shaped area, 300 feet by 200 feet, of stunted vegetation seems to coincide with the area of manganiferous material. Outcrops within the area are rare.

A costean 62 feet long and 10 feet deep had been dug approximately at right angles to the long axis of the area. It has exposed deeply weathered material, that consists mostly of clay containing varying amounts of iron and manganese oxides.

A channel sample 12 feet long was taken along one wall of the costean where the material seemed to be richest in manganese. The assay of that sample gave the following result:

Mn - 22.8%; Fe - 25.9%

A chip sample on the surface along the long axis of the area gave the following assay result:

Mn - 18.5%; Fe - 33.2%

From these results, it is clear that the grade of the material is too low for it to be used as manganese ore.

LONE STAR DIAMOND DRILLING
TENNANT CREEK

by

J. Barclay

SUMMARY

A vertical diamond drill hole was drilled to a depth of 648 feet to test a magnetic anomaly situated about 900 feet north-west of the Lone Star Mine, Tennant Creek. One hundred and twelve feet of massive quartz-jasper ironstone were intersected between 472 and 584 feet in this hole, and a second intersection of part of the ironstone mass was made by wedging and re-drilling the lode from 472 to 536 feet.

Chalcopyrite blebs and stringers are associated with the ironstone, and the 16-foot section from 509 to 525 feet contained 5.4 per cent copper. In the deflected hole, the 6.5-foot drill intersection between 518 and 524 feet contained 6.2 per cent copper. The 6.5 foot intersection is possibly the true width of the mineralised zone.

Low gold values were obtained in the mineralized zone. The highest value, in the interval from 522 to 525 feet, was determined by Peko Mines N.L. as 0.8 dwt. per ton or 1.4 dwt. per ton according to the Government Battery.

The extent of this copper occurrence should be tested by further diamond drilling. The prospect should be re-assessed when another hole is completed.

INTRODUCTION

The diamond drill hole was drilled under a subsidy agreement between the lessee, Mr. J. Prindiville, and the Mines Branch, Northern Territory Administration, to test the Lone Star magnetic anomaly. The drilling contractor was Associated Diamond Drillers Pty.Ltd.

By analogy with other examples on the Tennant Creek field it was thought that this magnetic anomaly might be due to a buried ironstone body, and that gold or copper mineralisation might be associated with it.

GEOPHYSICS

The anomaly is situated about 900 feet north-west of the Lone Star Mine shaft. Daly (1957) described the anomaly as being best fitted by a spherical ironstone mass with a radius of 110 feet, centred at a depth of 545 feet. The surface co-ordinates, directly over the centre of the mass were given as 300E,710N (A.G.G.S.N.A. Grid). This point falls on the floor of an almost flat-bottomed valley, about 600 feet wide.

The anomaly has now been tested by a vertical diamond drill hole sited on the above co-ordinates. It was impossible to find a suitable site for an inclined drill hole because of the presence of east-west trending ridges, lying to the north and south.

GEOLOGY

In the vicinity of the anomaly the ground is covered with bulldust and rock detritus.

At a distance of 300 feet to the south, ironstone is exposed on the eastern part of a razorback ridge which contains the original Lone Star open-cut workings. On its western part a vertical shear-zone flanked by mudstone and fine-grained greywacke of the Warramunga Group is exposed. Surveys by Ivanac (1954), indicate that this ridge rises to a height of about 150 feet above the valley floor.

A steep-sided ridge to the north of the anomaly rises to a height of about 200 feet above the surrounding plain. The ridge consists largely of Warramunga sediments, including hematite shale, which are intersected by generally east-west trending shear-zones, accompanied by a few quartz-hematite blows.

Geological mapping of an area of about 5000 to 4000 feet in the vicinity of the Mine and the anomaly has shown that the Mine is situated on the steep south limb of an east-plunging anticline. The axis of the anticline lies about 2500 feet north of the Mine, and trends north-west. The sediments forming the anticline are interbedded greywacke and mudstone, the average thickness of the greywacke beds is about 1 foot, and of the mudstone beds, about 6 inches. Individual greywacke beds range up to 6 feet, and mudstone up to 20 feet thick.

Near the Lone Star valley, the bedding strikes at 280° magnetic and dips 80° south; the cleavage generally has a similar strike but dips northwards at 75°. Drag folding is present, especially on the hill to the south of the Mine and on the hills to the west, and in each place the limbs are shallow dipping to the north and steep to the south.

The ironstone bodies worked in the old Lone Star open cuts and from the present main shaft dip northwards at an average of about 40°, and appear to pitch to the north-east. They lie within a zone which has the Minogue Fault as its lower boundary, and this zone, projected downwards to the north, may also control the limits of the ironstone body intersected in the recent drill hole.

The northward projection of the vertical fault which forms the western wall of the old open cut also passes through the ore shoot in the main shaft, and if it persists it would pass about 450 feet east of the anomaly centre. This fault may also have partly controlled the mineralisation in this area.

DETAILS OF DRILLING

Drilling was begun on 23.11.61, and completed on 13.3.62. The hole was begun vertically, but successive acid etch and Tro-Pari surveys showed a progressive deflection resulting in a maximum inclination of 8° from the vertical at the bottom of the hole.

At 530 feet, caving ground necessitated the insertion of 30 feet of EX casing, when cementing failed to retain the walls of the hole. From 546 feet the hole was completed with EX drilling.

Ironstone was intersected between 472 and 584 feet. A reconstruction of the drill hole, using details obtained from the surveys, shows that the centre of the ironstone mass, calculated by Daly (op.cit.) to be at a depth of 545 feet, may have been passed at a distance of 23 feet to the south-south-west.

The hole was wedged at 467 feet, and a second intersection of part of the ironstone was obtained in the deflected hole. Drilling of this deflected hole was terminated at 536 feet, as the critical part of the copper mineralization had been penetrated, and caving ground at 530 feet was again troublesome.

EXAMINATION OF CORE

Generally the rocks penetrated are mudstone, siltstone, and fine greywacke of the Warramunga Group. Several thin bodies of biotite-lamprophyre occur in the first 200 feet, and massive quartz-magnetite was intersected from 472 to 584 feet. Individual beds in the sedimentary group are usually less than 2 feet thick, and the maximum true thickness of lamprophyre is about 5 feet.

A mudstone-lamprophyre contact at 201 feet is inclined at 50° to the axis of the core, sub-parallel to the bedding, which suggests that the lamprophyres may occur as sill-like intrusions, although locally they may transgress the bedding.

Sections composed mainly of mudstone occur from 0 to 40 feet, 160 to 180 feet, 356 to 472 feet, and 600 to 648 feet. Greywacke predominates in the sections from 293 to 303 feet, and from 310 to 320 feet. Most of the remainder of the core consists of interbedded mudstone and greywacke, with the mudstone generally predominant. Mud pellets in greywacke, graded bedding, and slump structures are present in most sections.

The angle which the bedding makes with the axis of the core ranges between 5° and 55°, but the azimuth of dip cannot be determined. The regional geology suggests that the strike of the beds is east-west, and the dip is most probably to the south, unless some of the beds are overturned.

Vertical shear-zones occur between 285 and 305 feet, and slight faulting from 458 to 464 feet. At 352 feet a 2-inch zone of brecciated sediments is inclined at an angle of 20° to the axis of the core. Slickensides were noted at 447 feet, and from 303 to 308 feet, and contorted bedding, probably due to shearing, is found between 467½ and 472 feet.

Below a depth of about 190 feet, quartz, chlorite, and quartz-chlorite stringers are common, the thickest being some 4-inch veins at about 281 feet.

From 406 to 460 feet, the mudstone is strongly silicified.

Hematite shale and hematite-rich mudstone occur in the sections from 214 to 220 feet, and from 352 to 354 feet, respectively.

Sulphide specks are seen below 318 feet, initially on cleavage faces. With increasing depth, the sulphide also occurs as irregular stringers, as infillings of tension gashes, and in small quartz veins. The sulphide is almost entirely chalcopyrite.

From 472 to 584 feet massive ironstone was intersected. It consists predominantly of magnetite, though some specular hematite and various amounts of jasper, quartz, and chalcopyrite are present. The richest chalcopyrite concentration occurs within the jasper - and quartz - rich section of the ironstone between 509 and 525 feet.

No visible chalcopyrite is present in the core between 530 and 552 feet.

The second intersection of the ironstone revealed features similar to those of the first, with the addition of tongues and blebs of mudstone within the ironstone from 472 to 484 feet. The ironstone-mudstone contact at 472 feet is irregular, but roughly at right angles to the core length.

The rocks are strongly oxidised to 171 feet, and part oxidised to 353 feet.

Standing water level is at 210 feet.

ASSESSMENT OF RESULTS AND RECOMMENDATIONS

The drilling confirmed that the anomaly is due to a buried ironstone mass. The dimensions of the mass were less than calculated by Daly, but this may be due in part to the deflection of the drill-hole from the vertical.

A small intersection of high-grade copper mineralisation was obtained, but the gold content was very low. A 16-foot section assaying 5.4 per cent copper was obtained from 509 to 525 feet in the first intersection, and a 615- foot section assaying 6.2 per cent Cu from 518 to 524½ feet was found in the deflected hole. The highest gold value was 0.8 dwt. per ton (Peko assay), or 1.4 dwt. per ton (Government Battery assay), between 522 and 525 feet.

The hole has established the presence of a narrow, high-grade copper lode, unsupported by gold values, but further exploration is required to determine if a commercial deposit exists.

To prove the existence of a mineable ore-body whose minimum value would have to offset at least the cost of sinking a shaft to 500 feet, several diamond drill holes would be necessary.

However, because of the narrow intersection of high-grade ore obtained in the first hole, only one additional drill hole is recommended at this stage.

By analogy with the ironstone bodies in the Lone Star Mine workings, the ironstone body encountered in the existing drill hole may have a northerly dip and a north-easterly pitch, and this is supported by a re-examination of the relevant magnetic profiles recently carried out by J. Daly of the Geophysical Branch, Bureau of Mineral Resources (personal communication).

However, as the first hole was drilled vertically, there is no information as to the true width of this ironstone body.

It is, therefore recommended that the second drill hole should be sited about 100 feet to the east and 200 feet to the north of the first hole. It should be depressed at 69° to the south, and planned to be about 600 feet long. If it is drilled straight it would intersect the lode at a vertical depth of 520 feet. However, the hole may be deflected downward owing to a tendency for the drill to follow bedding, which will probably dip at 80° to the south, so that the lode may be intersected at a vertical depth between 520 and 550 feet.

If an inclined hole is not favoured because of possible difficulties in controlling the deflection, the alternative would be to drill a vertical hole 100 feet east of the existing hole. This should be planned to reach a depth of 650 feet.

ACKNOWLEDGEMENTS

The advice and assistance of Mr. J. Elliston and other Peko Mines' geologists, and the co-operation of the drill crew, are gratefully acknowledged.

REFERENCES

DALY, J., 1957 - Magnetic Prospecting at Tennant Creek N.T., 1935-1937. Bur.Min.Resour. Aust.Bull.44.

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APPENDIX 1

LOG OF DIAMOND DRILL HOLE

LOCATION	:	900 feet N.W. of Lone Star Mine.
COLLAR CO-ORDINATES	:	300E., 710N (A.G.G.S.N.A. Grid) (See Daly, op.cit., p.28, Section 6).
COURSE	:	Vertical
DEPTH	:	648 feet
REASON	:	To test magnetic anomaly centred at a depth of 545 feet (Daly, loc.cit.).
SURVEYS	:	

Depth	(Corrected)	Tro-Pari Azimuth	Tro-Pari Dip.
190 feet	$87\frac{1}{2}^{\circ}$		
200		262° / $258\frac{1}{2}^{\circ}$	87° / 86°
240	$87\frac{1}{2}^{\circ}$		
300	$87\frac{1}{2}^{\circ}$		
350		189° / $197\frac{1}{2}^{\circ}$	88° / 85°
400	$87\frac{1}{2}^{\circ}$		
450	86°		
500	86°		
550	$82\frac{1}{2}^{\circ}$		
600	$82\frac{1}{2}^{\circ}$		
647		206°	82°
648	83°		

DRILL RUN	CORE RECOVERY	DESCRIPTION OF CORE
0' - 10'	-	Bulldust, ironstone pebbles
10' - 40'	9'	Sediments of Warramunga Group, mainly sheared mudstone, some interbedded siltstone and fine grained greywacke. Bedding/core angles 10°-20°; cleavage /core angle 20° in opposite sense to bedding/core angle.
40' - 70'	$6\frac{1}{2}$	40' - 63' weathered lamprophyre (4 ft. of core). 63' - 66' cleaved siltstone 66' - 70' mudstone with interbedded fine greywacke; bedding/ core angle 5°.
70' - 79'	$3\frac{1}{2}$'	70' - 76' thin interbedded fine greywacke and mudstone; bedding/core angle 10°; cleavage/core angle 10° in same sense. 76' - 79' fine greywacke.

DRILL RUN	CORE RECOVERY	DESCRIPTION OF CORE
79' - 102'	7½	Mainly weathered lamprophyre, some mudstone 81' - 83' and 97½' - 102' with bedding/core angle 20°. Lamprophyre becomes darker in appearance from 94'.
102'- 112½'	6	Mudstone with very thin quartz stringers. 109½ - 112½' mudstone with fine greywacke; slight faulting evident.
112'6"-125'6"	11'3"	Mainly dark, weathered lamprophyre with fine-grained greywacke between 115'4" - 117'.
125'6"-150'	22'	Mainly mudstone with interbedded siltstone and some fine sandstone from 135½'. Bedding/core angle 10° - 20°. Cleavage/core angles 10° - 25°. 139'3" - 142'3", as above, and mud pellets in fine greywacke with minor slumping at 141' and 146'-150'.
150' - 159'	4½'	Weathered lamprophyre.
159' - 180'	10½'	Mainly mudstone, some fine greywacke; bedding/core angle 25° cleavage/core angle 30°. Sediments less oxidised from 171'
180' - 190'	4½'	Mainly less oxidised lamprophyre some mudstone.
190' - 199'	2½'	Mudstone with some interbedded siltstone; thin quartz stringers. Cleavage/core angles 25° - 30°.
199' - 208'	5'	199' - 203' lamprophyre 203' - 208' mudstone
208' - 214'	5'	Interbedded mudstone and fine greywacke. Bedding/core angle 20°; cleavage/core angle 20°. 1/2" quartz-chlorite vein at 212'.
214' - 220'	5½'	Hematite shale between 214' - 215½', 216½' - 217', and 218' - 219'; with interbedded mudstone and fine greywacke. Bedding/core angle 20°. Quartz and quartz-chlorite stringers.
220' - 242'	21'	Interbedded mudstone and fine greywacke, occasional slump features. Bedding/core angle 25°, cleavage/core angle 50°, slight faulting at 239½'.
242' - 275'	29'	Interbedded mudstone and fine greywacke. Bedding/core angle 25°. Thin quartz and chlorite stringers; slight faulting; slickensides; slump features.

DRILL RUN	CORE RECOVERY	DESCRIPTION OF CORE
275' - 295'	9½'	Interbedded mudstone and greywacke. Individual bands of mudstone and greywacke to 1' of core length. Bedding/core angle 40°, decreasing to 10° at 292'. Thin quartz veins. Chlorite veins up to 4" thick at 281'. Vertical shears.
295' - 303'	4½'	Mainly fine greywacke, some mudstone, quartz-chlorite stringers. Cleavage/core angle 10°.
303' - 308'	4½'	Mainly mudstones with interbedded fine greywacke. Slickensides pitching at 75° on cleavage face; cleavage/core angle 55°. Bedding/core angle 40°. Thin quartz-chlorite stringers.
308' - 318'	7½'	Mainly fine greywacke; graded bedding; some mudstone; bedding/core angle 45°; cleavage/core angles 0° - 20°; slickensides on cleavage planes pitch at 35°.
318' - 350½'	29½'	Interbedded mudstone and greywacke with depositional features. Thin quartz-chlorite stringers throughout with associated SULPHIDE spots at 329', 347', and 348' - 349'. Bedding/core angles 45° - 60°. Cleavage/core angles 20° - 40°. Hematite-rich from 345' - 346'; disturbed zones from 346'.
350'6"- 354'	2'	Mudstone, some greywacke. Breccia at 352½' shows contact with sediments at 20° to core. Bedding/core angle 55°, cleavage/core angles 0° - 15°, 40°. LOWER LIMIT OF OXIDATION AT 353'.
354' - 356½'	-	No core recovery.
356'6"- 406'3"	45½'	Mainly mudstone with subordinate greywacke; many small quartz lenticles at 90° to core; silicification increases with depth, bedding/core angles decreasing from 20° to 5° with depth; cleavage/core angles 5°, commonly coincident with bedding and at right angles to this. SULPHIDE particles in minor quartz stringers at 371'; 383' - 384', 392' - 401'. SULPHIDE particles on cleavage faces at 383' - 401', predominantly on cleavage/core angle of 90°. Minor quartz stringers throughout, with chlorite from 384' - 388'.

DRILL RUN	CORE RECOVERY	DESCRIPTION OF CORE
406'3" - 456'	44½'	Mainly massive, silicified mudstone, commonly banded. Silicifieation includes numerous thin lenticles, bands and blebs of quartz; lenticles and bands parallel, and at 90° to core. Bedding/core angles 5° - 15°, cleavage/core angles coincident with bedding, and 30° - 50°. At 447' slickensides on cleavage face pitch at 80°. SULPHIDE specks on cleavage faces and associated with quartz. Quartz-chlorite stringers.
456' - 457'8"	1'	Fragmented core. Dark, silicified, chloritic mudstone. SULPHIDE mineralization somewhat stronger.
457'8"-458'4"	3"	Fragmented core; mudstone as above. Small amount of SULPHIDE.
458'4"-464'	3'	Massive silicified mudstone. Lenticles, etc. of quartz disappear at 460'. Bedding/core angle 5°. Minor faulting at 5° to core. SULPHIDE with quartz stringers, on broken surfaces, on cleavages faces, and as segregations. Cleavage/core angles 5° and 55°. 461' - 464' 1' of fragmentary core, chloritic, silicified mudstone, some SULPHIDE.
464' - 470½'	5'	Dark mudstone, bedding/core angle 10°; cleavage/core angle 0°. Irregular quartz and quartz-chlorite stringers. SULPHIDE in quartz-chlorite stringer from 467½ - 468'8" Disturbed ground from 467½'.
470'6"-472'4"	1½'	Siliceous mudstone, irregular quartz stringers.
472'4"		LODE MATERIAL INTERSECTED
472'4"- 485'	11'	Lode material mainly quartz and magnetite in various proportions (Chloritic in part), with subordinate micaceous hematite and SULPHIDE. The sulphide is mainly chalcopyrite in irregular veins and clots, on cleavage faces, and in tension gashes at 40° to core.
485' - 522'3"	36'	485' - 490½' lode material as above. 490½'- 519' lode material as above, but now jasper-rich. 519 - 521½' lode material as above, very rich in CHALCOPYRITE. 521½ - 522'3" lode material, jasper iron -and quartz rich, with some SULPHIDE.

DRILL RUN	CORE RECOVERY	DESCRIPTION OF CORE
522'3" - 529'6"	6½'	522'3"- 526'3" As above, very little SULPHIDE 526'3"- 529'6" Massive ironstone, slightly siliceous.
529'6" - 530'7"	6"	Very fragmented core. Hole caved. Chloritic schist, very little SULPHIDE. 2" of jasper-rich core at end of run.
530'7" - 534'10"	3'	Iron and chlorite-rich, with some jasper and quartz. NO SULPHIDE.
534'10"- 538'3"	3'	Massive ironstone with occasional jasper and quartz-rich patches.
538'3" - 546'3"	7'	Quartz, jasper - and iron-rich in various degrees, with chloritic partings and irregular quartz veins. Slickensides in jasper-rich material pitch at 80° on cleavage planes at 40° to core length. Hole cemented around 530', owing to caving ground. 30' of EX casing were positioned from 516' - 546', when cment failed to retain the walls. The hole was completed with EX drilling.
546'3" - 552'8"	5'	Ironstone, quartz, and jasper in various proportions.
552'8" - 578'9"	23'7"	Ironstone as above with CHALCOPYRITE
578'9" - 593'3"	8'3"	Ironstone with jasper and quartz. Some interspersed green-black chloritic schist from 584'9 ".
593'3" - 606'10"	11'1"	Green-black chlorite schist with quartz stringers; bedding/core angle 20°. From 597' - 598' and 600'2" - 600'8" disseminated chalcopyrite in siliceous mudstone.
606'10"- 611'	3'2"	Siliceous mudstone with disseminated chalcopyrite; bedding/core angle 20°.
611' - 623'4"	11'3"	Banded siliceous mudstone. Thin vertical, quartz-filled shear from 615' - 617½'. Bedding/core angle 0°. Below shear, bedding/core angle 50°.
623'4" - 637'2"	9½'	Siliceous mudstone with thin, dark banding. Bedding/core angle 5°.
637'6" - 648'2"	4'6"	Dark green mudstone, somewhat siliceous, with banding/core angle 10°. Bedding/core angle 5°, increasing to 20°.
END OF HOLE	NB	Hole wedged at 472' for second run through lode.

APPENDIX 2.

LONE STAR MINE

DIAMOND DRILL HOLE
900 FT. NORTH-WEST OF MINE

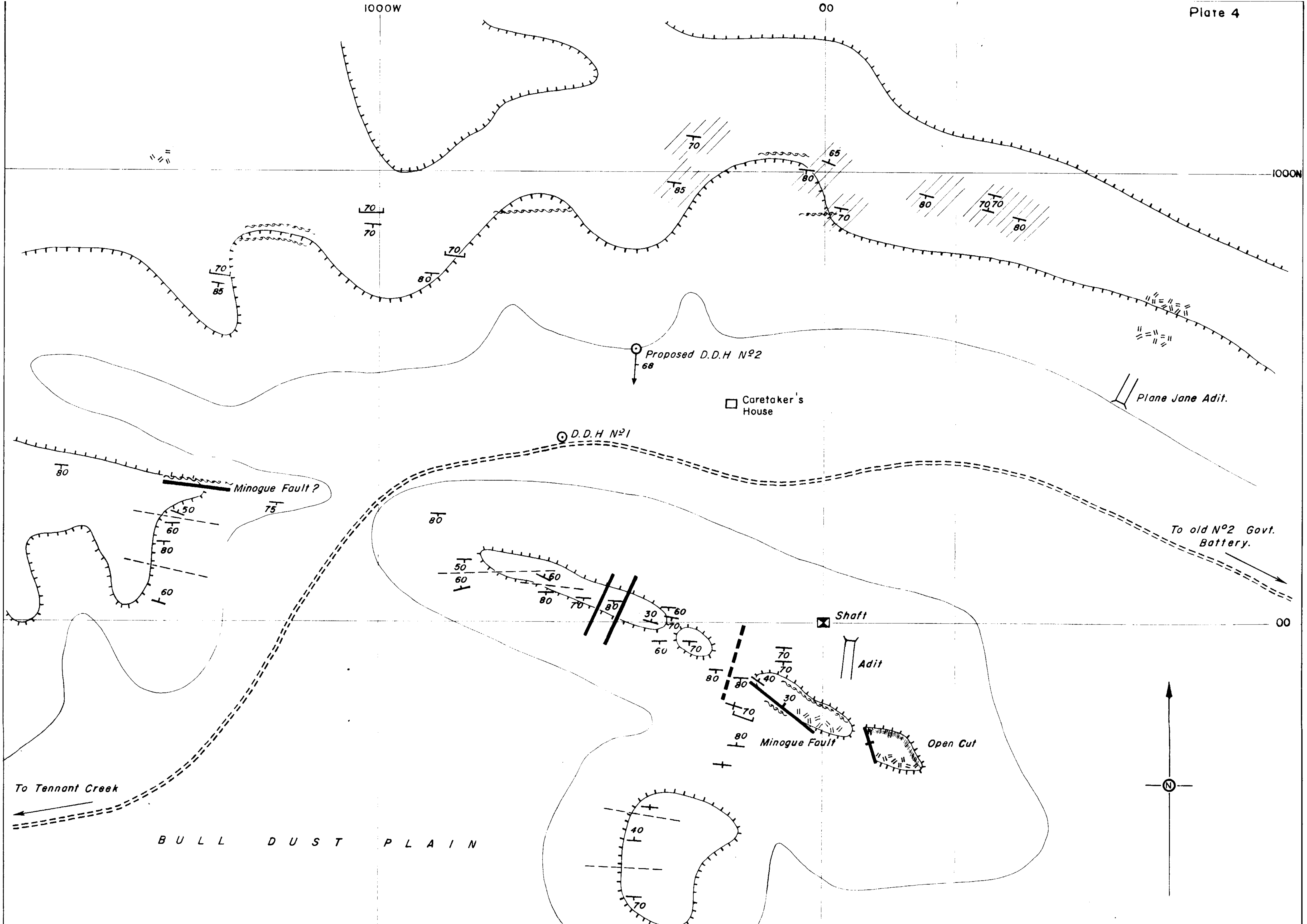
ASSAY RESULTS

	Assays at Peko Mines N.L.		Assays at No.3 Govt. Battery	
DEPTH	%Cu	Au dwt./ton	% Cu.	Au.dwt./ton
472' - 476'6"	0.65	0.2		
476'6" - 480'4"	0.25	Tr.		
480'4" - 483'4"	0.42	0.2		
483'4" - 485'	0.25	0.2		
485' - 488'	0.55	0.4		0.3
488' - 491'	0.70	0.4		
491' - 494'	0.27	0.2		
494' - 497'	0.27	0.2		
497' - 500'	1.1	0.2		
500' - 503'	0.67	0.2		0.4
503' - 506'	0.27	Tr.		
506' - 509'	0.25	0.4		
509' - 512'	4.0	0.6		
512' - 515'	2.35	0.4		
515' - 517'6"	3.15	0.8		1.4
517'6" - 520'	12.15	0.6		
520' - 522'	11.45	0.4		
522' - 525'	2.00	0.8		
525' - 530'	0.2	0.4		
530' - 535'	0.17	0.4		
535' - 540'	NIL	0.4		
540' - 546'3"	0.07	0.2		
546'3" - 550'	0.1	0.4		
550' - 555'	0.3	0.2		
555' - 560'	0.2	0.2		
560' - 565'	0.5	0.2		
565' - 570'	0.8	0.6		
570' - 575'	0.45	0.6		
575' - 578'9"	1.07	0.2		

LONE STAR DIAMOND DRILL HOLE
DEFLECTED SECTION
ASSAY RESULTS

		Assays at Peko Mines N.L.		Assays at No. 3 Govt.Battery	
DEPTH		%Cu	Au.dwt./ton	%Cu	Au.dwt./ton
471'	-475'	0.1	Tr.		
475'	-480'	0.2	0.2		
480'	-485'	0.5	0.2		
485'	-490'	0.52	0.4		
490'	-495'	0.55	0.4		
495'	-500'	0.55	Tr.		
500'	-505'	0.37	Tr.		
505'	-510'	1.25	Tr.		
510'	-515'	0.52	Tr.		
515'	-518'	0.6	Tr.		
518'	-521'	11.25	Tr.		
521'	-524'6"	1.8	0.2		
524'6"	-530'	0.3	0.2		
530'	-536'2"	0.17	Tr.		

Plate 4



GEOLOGICAL SKETCH MAP LONE STAR AREA TENNANT CREEK SHOWING PROPOSED DRILL HOLE No2

N.B. *Major anticlinal axis lies about 3/4 mile north of mine.*

Bureau of Mineral Resources Geology & Geophysics Dec 1962

To accompany Record 1963/15

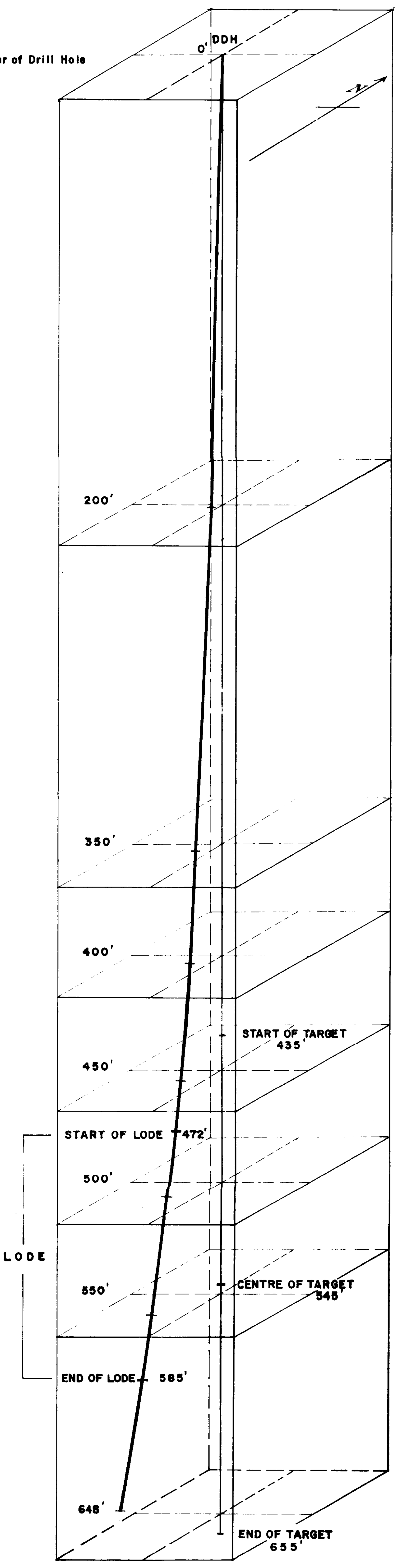
E53/14/7 GM

LONE STAR DIAMOND DRILL HOLE

Course of hole plotted from survey data

DDH – Collar of Drill Hole

ISOMETRIC VIEW



PLAN VIEW

Shows position of hole at the different survey points.

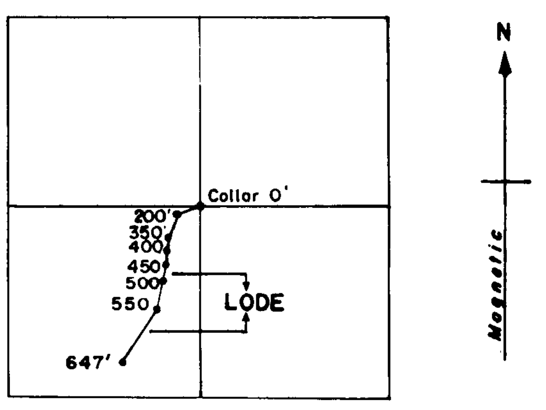
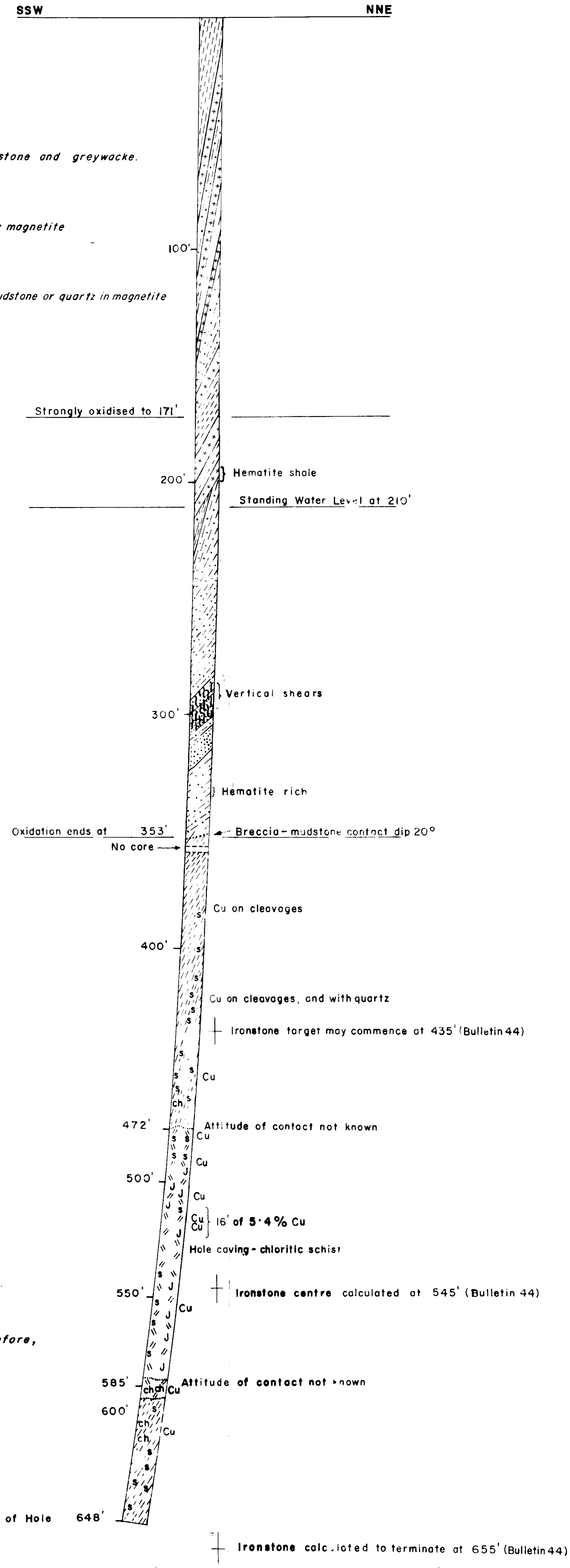


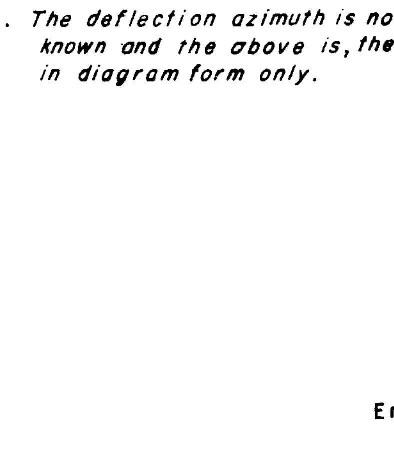
Diagram of geological detail

LEGEND

- *Mudstone*
- *Greywacke*
- *Interbedded mudstone and greywacke.*
- *Lamprophyre*
- *Ironstone, usually magnetite*
- J *Jasper*
- s *Silicification in mudstone or quartz in magnetite*
- ch *Chloritic schist*
- Cu *Chalcopyrite*



DEFLECTED SECTION from 467'



N.B. *The deflection azimuth is not known and the above is, therefore, in diagram form only.*

N.B. It is not known if the beds dip North or South, and the above southerly dip is only an assumption based on the south dipping beds in the main shaft.

SCALE

40 0 40 80 120

FEET

PRELIMINARY EXAMINATION OF McINTYRE'S ADIT AND NEAR-BY WORKINGS, EXCELSIOR LEASE, WHITE RANGE GOLDFIELD

by

D.R. Woolley & K.A. Rochow.

SUMMARY

McIntyre's Adit, on the White Range Gold Field, was intended to intersect the downward extension of an orebody which had previously been mined from old surface and underground workings to a depth of about 25 feet. The orebody was intersected as intended, but was not recognised by the Lessee because at the adit level it contains very little gold. Some gold is also present in a quartz-filled shear and in another zone of quartz veins, neither of which is related to the orebody originally worked.

INTRODUCTION

An inspection of McIntyre's adit and some of the old workings in the vicinity was made by K. Rochow and D. Woolley in October, 1960. A subsequent visit to the area was made by P. Cook in January, 1962, and 12 samples were taken from the main workings for assay.

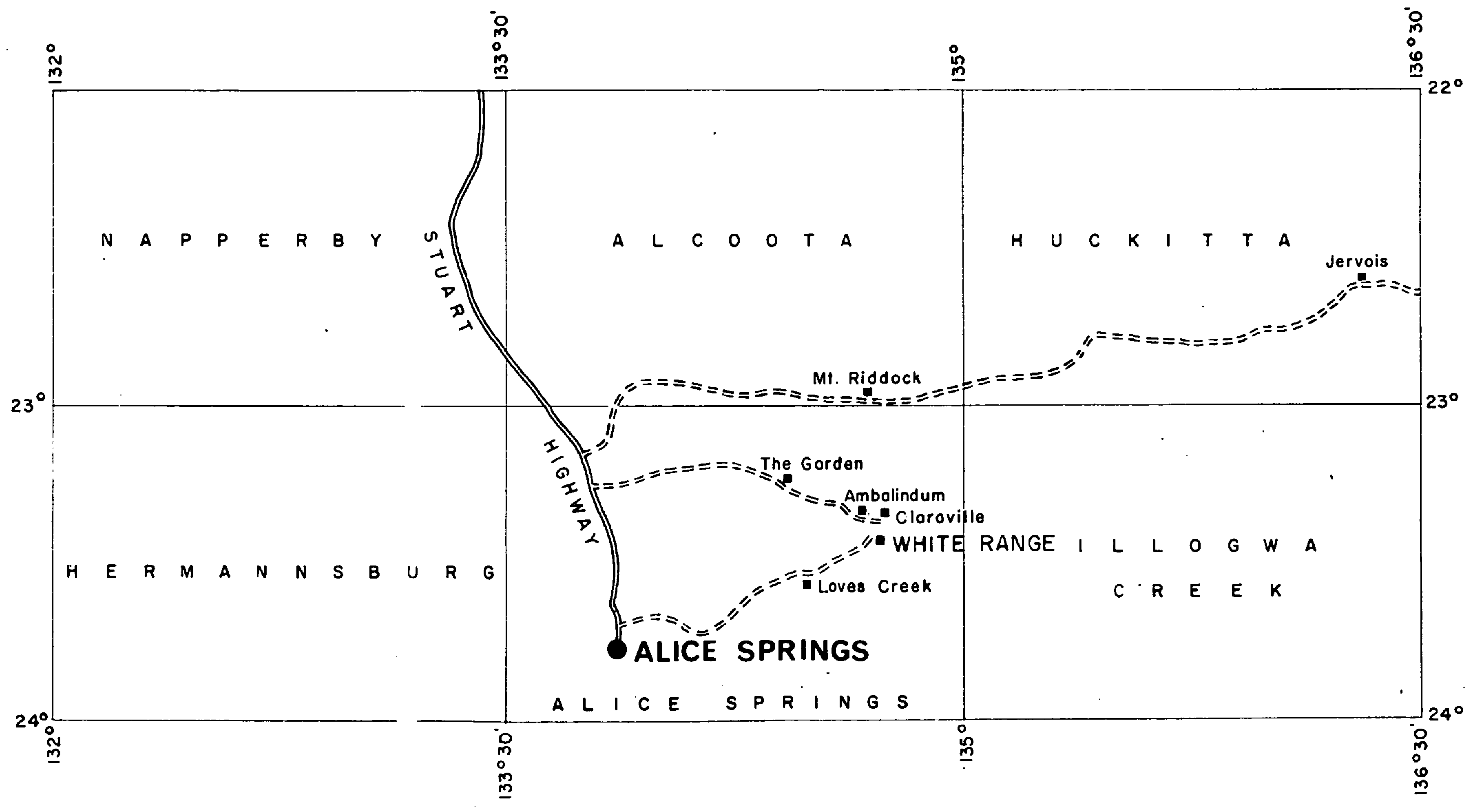
From 1956 until 1960 several leases on the White Range Gold Field were held by S. McIntyre. In late 1961 a syndicate of Alice Springs miners carried out a small amount of mining, and in early 1962 this syndicate came to an agreement with United Uranium N.L., who carried out a test drilling programme during February and March 1962 (this programme was still in grogress at the time of preparation of this report).

In 1959 McIntyre drove an adit 227 feet long to intersect the largest of the previously-worked orebodies about 35 feet below the old workings (working A1, Plate 7). A quartz-filled shear containing some gold was found at about 100 feet from the mouth of the adit, and a zone of quartz veining with copper mineralization at about 120 to 150 feet. McIntyre apparently considered that neither of these was the main orebody, as the adit was driven straight through both these zones.

Minor secondary copper mineralisation occurs sporadically in joint planes in the country rock along the length of the adit from 150 feet to 227 feet.

The purpose of the present investigation was to determine the position of the adit in relation to the orebody it was designed to intersect. The underground extent of the other workings (Plate 7) was not determined.

LOCALITY MAP AND REFERENCE TO 4 MILE SHEETS FIG 2



Bureau of Mineral Resources Geology & Geophysics Dec' 1962. *To accompany Record Nº 1963/15* NT/22 G.M.

GENERAL GEOLOGY

The workings described in this report are situated on the eastern slopes of the White Range, which is a prominent ridge of quartzite.

Joklik (1956) named the quartzite the 'White Range Quartzite', and considered it to be of Lower Proterozoic age, lying unconformably above the Arunta Comppex (Archaean gneisses, schists, etc.) and unconformably below the Upper Proterozoic Heavitree Quartzite. However, in the White Range the quartzite dips beneath schists of the Arunta Complex, and the contact appears to be conformable. The present authors therefore consider that, in the type area, the White Range Quartzite is probably part of the Arunta Complex, although this may not apply to all rocks included by Joklik in this Formation.

In the vicinity of McIntyre's leases, the quartzite is white and silicified, and dips east at 20 to 30 degrees. This quartzite was probably formed from a sequence of dominant sandstone and minor siltstone, although the intense silicification masks the original lithology and texture. Most of the quartzite weathers massively. Fine (?)sedimentary laminations have been observed in the adit and less commonly extend in outcrop.

The quartzite is strongly jointed. The complete pattern of jointing has not been determined, but there is one fairly persistent set of joints which has an easterly strike and a very steep dip to the south. Another set of joints which has been recorded only in the adit, strikes about 180 degrees, and dips east at about 40 degrees, i.e., it is sub-parallel to the bedding. Thin bands of friable siliceous material, in places micaceous, fill some of these joints; some of the bands appear to be thin interbeds.

Quartz veins are common throughout the quartzite, and range from a fraction of an inch up to about 4 feet wide.

The larger quartz veins are thought to fill openings caused by transverse faulting and shearing, but they probably extend only a short distance along the strike. Some of the veins contain gold, but whether or not the gold is restricted to the quartz veins has not been established.

The trend of the old workings indicates that the orebody, which was mined in the workings A1 to A4 (Plate 7), and which McIntyre wished to intersect, strikes at about 40degrees. The hangingwall of workings A1 ~~at~~ dips 40 degrees south-east at the eastern end, and 60 degrees south-east at the western end.

DESCRIPTION OF WORKINGS

Surface Workings:

The old workings in the vicinity of the adit were mapped with a plane table and alidade at a scale of 1 inch to 40 feet. Where accessible, underground workings were examined; but not mapped. Appendix 3 is a summary of the observations relating to these old workings. The adit itself was mapped in some detail, using tape and compass.

The surface contours were drawn using the prrtal of the adit as a datum.

The open cut at A1 is about 90 feet long, and its maximum width is about 20 feet. The depth ranges from 5 feet at the eastern end to 30 feet at the western end. The underground workings consist of several irregular underlay shafts, some of which are interconnected. These dip to the south-east at about 40 degrees to 60 degrees, and extend to a depth of about 25 feet below the floor of the open cut.

The only visible indications of mineralisation are isolated specks of pyrite and encrustations of copper sulphate. Boxworks, probably after pyrite, are very common in the numerous quartz veins, which are up to 2 feet thick.

McIntyre's Adit:

The adit portal is situated on an easterly slope, which is almost a dip slope of the White Range Quartzite. The first mineralisation was intersected in a quartz-filled shear about 100 feet from the entrance (Plate 6). The shear is vertical, strikes at 060 degrees, and has a true width of 2 feet. A chip sample was taken over the width of this shear where it is exposed in the south wall of the adit. This sample assayed 1.5 dwt. of gold per ton. Two other representative samples of the vein material gave assays of 2.1 dwt. and 2.7 dwt.

The next zone of mineralization begins at 119 feet on the north wall and at 134 feet on the south wall. Here a zone of quartz veins containing pyrite, chalcopyrite, and secondary copper minerals extends along the adit for 27 feet on the north wall and 17 feet on the south wall. The dip of this zone of quartz veins could not be measured accurately, but it appears to be generally to the south-east. The true width is about 10 feet. The strike is between 040 degrees and 060 degrees, as indicated by the limits of quartz veining on each wall. This is in close agreement with the strike of the orebody in the underground workings at A1. A representative sample from this zone assayed 1.4 dwt. of gold per ton, and a selected specimen of heavily mineralised material from the same place assayed 5.1 dwt. per ton. However, a chip sample over about four feet along the south wall assayed only 0.5 dwt. This sample represents a true width of about 3 feet of mineralised material.

At 182 feet the direction of the adit changes from 255 degrees to 308.5 degrees. The second leg of the adit is 45 feet long. From the end of the zone of quartz vein mineralisation at 150 feet to the end of the adit at 227 feet, there is sporadic minor secondary copper mineralisation along the joint planes in the country rock. This mineralisation appears to be due to redistribution by groundwater, as pyrite and copper minerals occur in the old workings above this section of the adit. At the time of the first inspection (October,1960) there was a small amount of quartz veining showing in the face at the end of the adit, but most of the secondary mineralisation appeared to be in the country rock.

At the time of the second visit (January, 1962) a small amount of rock had been removed from the face, and a zone of quartz veins occupied about half the area of the face. A representative sample of the vein quartz from this zone gave an assay of 31.9 dwt. of gold per ton, and a channel sample across the full width (about 5 feet) of the face gave 4.0 dwt.

Cross Section:

The cross section along the line AA' in Plate 7 is drawn perpendicular to the strike of the workings at A1 and through the zone of quartz vein mineralisation in the adit. The hanging wall in the eastern part of the workings at A1 dips east at 40 degrees, and mining has been carried out to a total depth of about 25 feet. The downdip projection of the hanging wall along the line of this section intersects the adit at 150 feet from its mouth.

CONCLUSIONS

It is concluded, on the basis of the section AA' in Plate 7, that the zone of quartz vein mineralisation exposed in the adit between about 120 and 150 feet from the entrance is the downward extension of the orebody which was mined in the old workings at A1. Subsequent operations in late 1961 suggest that another zone of gold mineralisation in quartz veins occurs at 227 feet from the mount of the adit, and that this zone warrants some further testing.

United Uranium No Liability are at present engaged in further investigations of the leases, but the results of their work are not yet available.

REFERENCE

JOKLIK, G.F., 1956 - Geology and Mica Deposits of the Harts Range, N.T. Bur.Min.Resour. Aust.Bull., 26.

APPENDIX 3

Description of old Workings (See Plate 7 for locations)

A1. Large open cut, with underground workings opening from the southern side of the open cut, to a maximum depth of about 25 feet. The underground workings strike at approximately 40 degrees, and dip at 40 degrees south-west, and consist of irregular tunnels and underlay shafts. Pyrite and copper sulphate are fairly common, and boxworks after pyrite are very common in irregular, ramifying quartz veins. The beds strike 150 degrees, and dip 17 degrees east. Two prominent sets of joints respectively strike 85 degrees with vertical dip, and 140 degrees with 50 degrees west.

A2. A shaft to underground workings connected to those at A1.

A3. A surface opening to underground workings connected to A1.

A4. The westerly extremity of the workings which are connected to A1. It is the surface opening of a small underlay shaft, and there is only a minor amount of quartz veining. Here the bedding strikes 160 degrees, and dips 18 degrees east. Two sets of joints strike 260 degrees, dip 80 degrees south, and strike 140 degrees, dip vertically.

B. A shallow underlay shaft about 15 feet deep, dipping to the south, with small "drives" tronding approximately east and west opening from the bottom. There is minor quartz veining with some pyrite.

C. Irregular underlay shaft dipping south at 55 degrees. The total depth is about 20 feet, and pyrite and copper sulphate are common.

D1, D2, Nearly vertical shafts, estimated to be about 25 feet deep. (Entry not practicable).

E. Open cut, dipping south at 70 degrees. The total depth is about 30 feet. There are stringers of quartz in the country rock, with fairly abundant pyrite.

F1, F2, F3, Irregular shafts with underground workings consisting of irregular tunnels and underlay shafts. Quartz veins with mineralisation follow a joint system which has a strike of 85 degrees and a vertical dip.

G1,G2. Irregular shafts about 15 to 20 feet deep.

G3. An open cut, with strike 95 degrees and dip 80 degrees south. Near the bottom, ramigying quartz veins contain abundant pyrite. It has been extensively worked to a depth of about 40 feet, and there is underground connection to G1 and G2. The beds strike at 20 degrees and dip 15 degrees east.

H. Irregular underlay shafts, pitching south-east, from which a fairly massive quartz vein about 2 to 3 feet thick has been worked. There are zones of ramifying quartz veins on each side of the main vein. The main joint system has a strike of 100 degrees, and dips 85 degrees south.

J. A small open cut, with quartz veins filling joints which strike 90 degrees and dip 85 degrees south.

K. Open cut up to 5 feet deep, with a zone of small, sub-parallel quartz veins containing abundant pyrite.

L. Small open cut with two small drives on the southern side. The workings strike at 110 degrees along an irregular quartz vein about 2 feet wide. Pyrite and copper sulphate are plentiful. The vein appears to lens out in the western drive. A prominent joint system strikes at 100 degrees, and dips 80 degrees south.

M. Small open cut about 6 feet deep, with an underlay shaft about 12 feet deep at the eastern end. The workings follow a quartz vein dipping 80 degrees south.

APPENDIX 4

ASSAY RESULTS

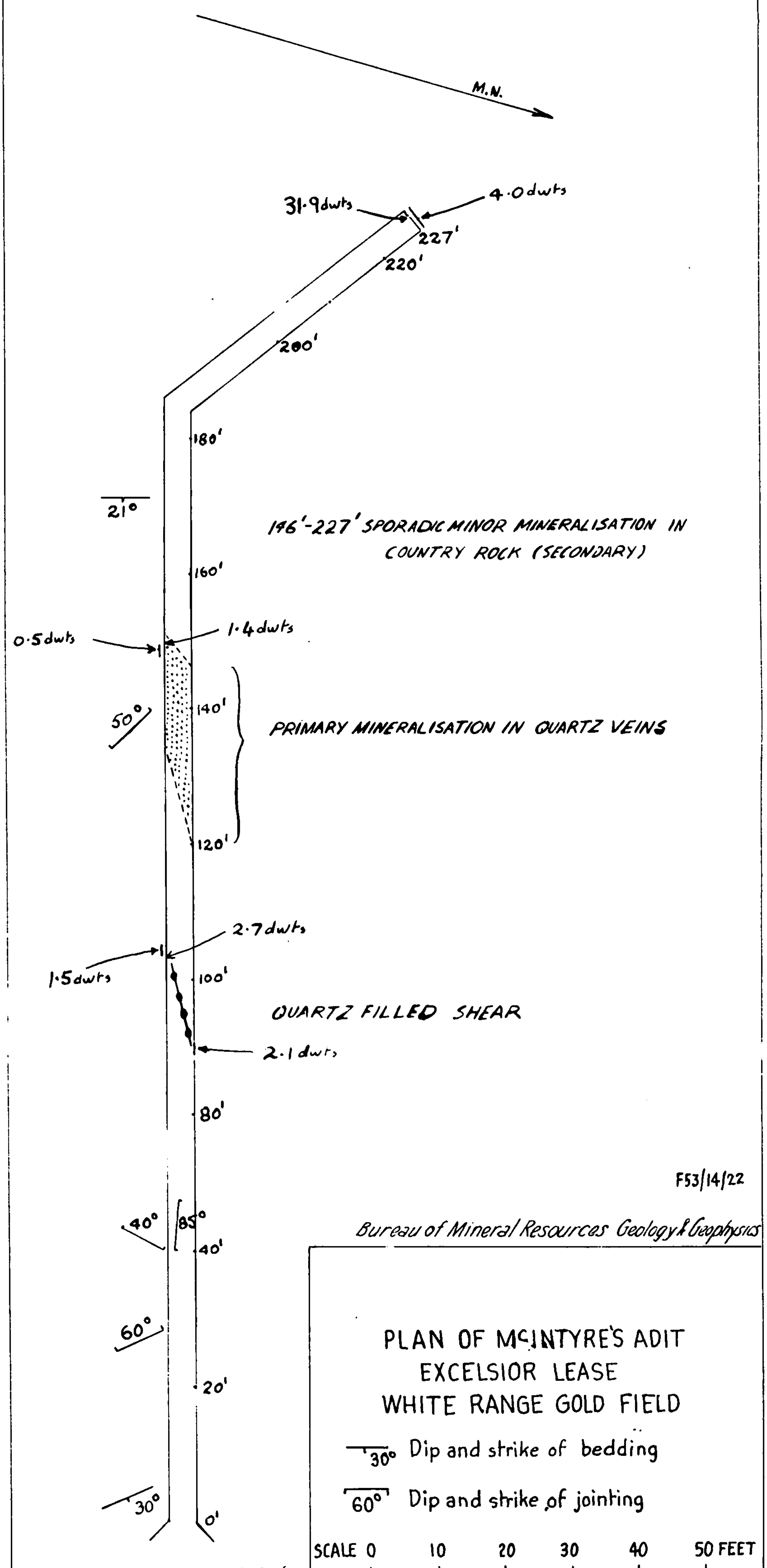
McIntyre's Adit

1.	Channel sample from end of main drive, width 4 feet	4.0 dwt.
2.	Representative sample of vein quartz from same locality as 1.	31.9 dwt.
4.	Representative material from quartz-filled shear, north wall of adit, at about 90 feet	2.1 dwt.
5.	Representative material from quartz-filled shear, south wall of adit, at about 104 feet	2.7 dwt.
7.	Chip sample from quartz-filled shear, 2 feet wide, from same locality as 5.	1.5 dwt.
8.	Representative material from disseminated zone of primary mineralisation, south wall of adit, at about 150 feet.	1.4 dwt.
8A.	Selected specimen from sample No.8, heavily mineralised, showing azurite.	5.1 dwt.
9.	Chip sample from disseminated zone of primary mineralisation, taken over width of 4 feet. Same locality as 8.	0.5 dwt.

Open Cut A1 of Plate 1

10.	Representative sample of vein material, western end of open cut.	Trace
11.	Chip sample from underground workings below open cut	Trace
12.	Representative sample of vein material, same locality as 10.	Trace
13.	Chip sample taken over width of 5 feet, western end of open cut.	0.3 dwt.

Plate 6



F53/14/22

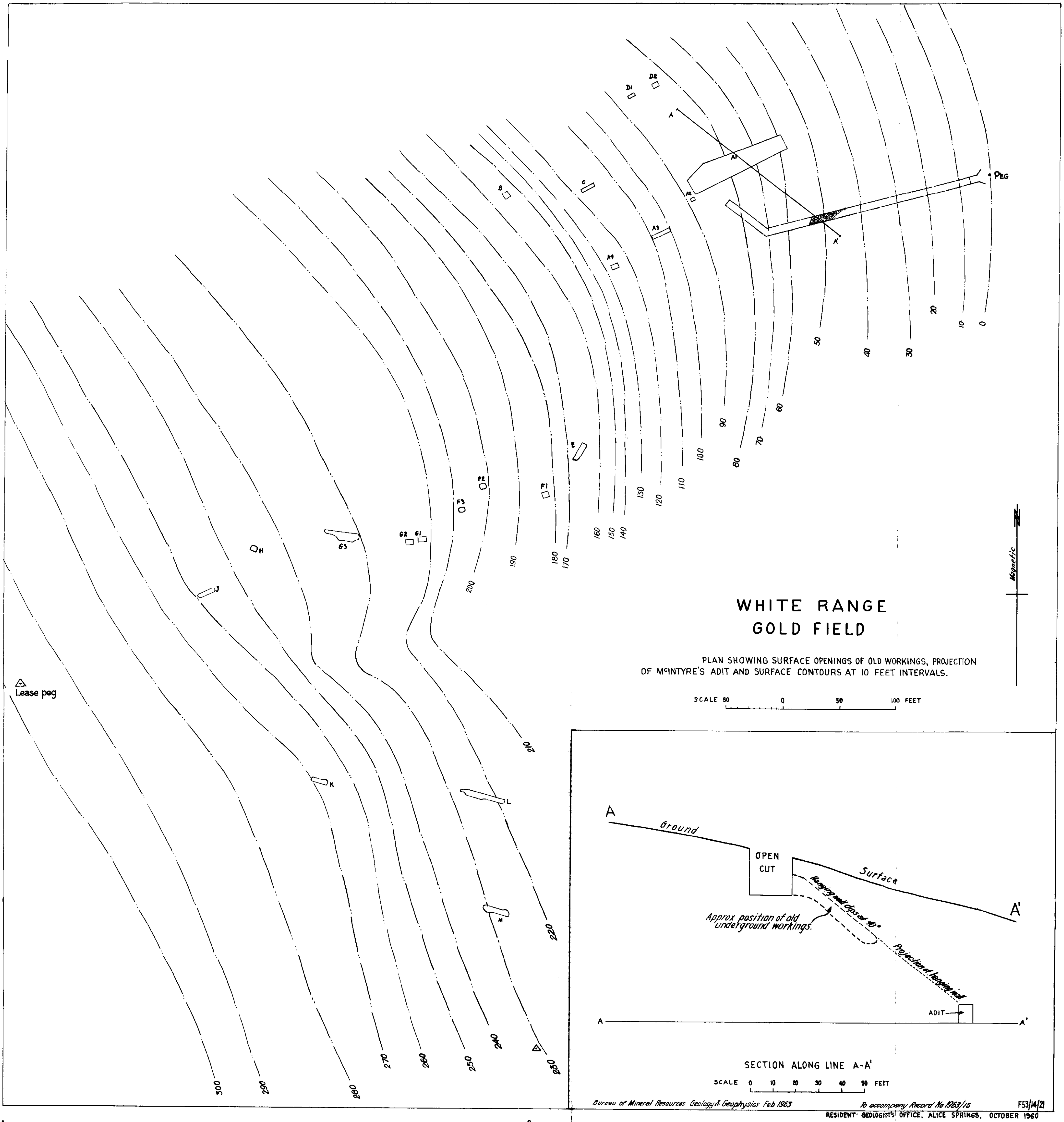
Bureau of Mineral Resources Geology & Geophysics

PLAN OF McINTYRE'S ADIT
EXCELSIOR LEASE
WHITE RANGE GOLD FIELD

To accompany Record 1963/15

RESIDENT GEOLOGIST'S OFFICE, ALICE SPRINGS, OCTOBER 1960
AMENDED MARCH 1962

PLATE 7



A C B

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