COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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Minor Metalliferous Investigations, Northern Territory Resident Geological Investigations

MINOR METALLIFEROUS INVESTIGATIONS,
NORTHERN TERRITORY RESIDENT GEOLOGICAL SECTION

RECORD 1969/92

Contents

DIAMOND DRILLING AT WHITE POINT, YUENDUMU, N.T.

by

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SUMMARY

Minor copper and lead mineralization occurs in the Cambrian Walbiri Dolomite in the Walbiri Ranges on the northern margin of the Ngalia Basin. Secondary copper minerals are present in intraformational breccias, and irregular veins of barytes contain galena. Wells et al (1968) correlate the Walbiri Dolomite with part of the Pertaoorrta Group in the north-eastern part of the Amadeus Basin.

Induced Polarization surveys by Australian Geophysical Pty. Ltd. outlined a number of weak anomalies of which the strongest occurred on the plain north of White Point.

Diamond drilling of the anomaly took place in 1967. The only mineralization visible in the core is minor disseminated galena, pyrite and (?) chalcopyrite in dolomite rocks of the Walbiri Dolomite. Galena is also associated with irregular barytes veins. Assay values are low. A feature of the mineralization in the core is the common association of pyrite with thin bands and laminae of dark-coloured silty material.

It is suggested that the pyrite was formed during diagenesis from the reduction of iron salts by organic compounds. The barytes-lead mineralization may have been introduced by hydrothermal solutions travelling through the nearby White Point fault zone and forming replacement structures.

INTRODUCTION

General

Minor copper and lead mineralization occurs in dolomite sediments in the White Point area of the Walbiri Ranges south-west of Yuendumu Settlement. Water bore cuttings from similar rocks in the same general area assayed up to 1080 ppm Zn and 820 ppm Pb.

A weak Induced Polarisation anomaly was outlined by Australian Geophysical Pty. Ltd. (AGPL) in 1965, and the anomaly was drilled by a Mines & Water Resources Branch diamond drilling rig in 1967.

This report describes the investigations in the White Point area and gives the results of the diamond drilling programme.

Location

Yuendumu Settlement is 180 miles by road north-west of Alice Springs (see Plate 1). The mineralized sediments occur in the Yuendumu Aboriginal Reserve which covers an area of 850 square miles. The Walbiri Ranges lie two miles south of the Settlement and extend to the east and west over a total length of 20 miles. Two diamond drill holes were put down approximately three-quarters of a mile north-west of White Point, six and a half miles south-west of Yuendumu.

Access

A graded road connects Yuendumu with the Stuart Highway about 12 miles north of Alice Springs. Access to the mineralized area and drilling sites is by a bush track west from Penhalls Bore, four miles south of the Settlement on the track to Keridi Waterhole.

Physiography

The Walbiri Ranges form the northern margin of the Ngalia Basin and consist of cuestas which, in the White Point area, strike in a westerly direction and generally show dip slopes facing south. Mt. Eclipse is the highest point in these ranges and rises to a height of about 400 feet above the plains. The larger valleys between the ridges have a deep soil cover. The northern edge of the hills is a well-defined fault-scarp but the southern boundary is more irregular.

The drainage forms a trellised pattern, but streams flow only after heavy rain. Consequent streams drain towards the south and subsequent streams occupy strike valleys. The largest creek in the White Point area is South Keridi Creek which drains into Keridi Waterhole on the southern margin of the Walbiri Ranges.

North of the Walbiri Ranges there is an area of low relief extending east and west of Yuendumu Settlement. The area is about five and a half miles wide and is bounded to the north by ridges of metamorphic rocks.

South of the Walbiri Ranges there is a sand-covered area of low relief, with few rock exposures and no drainage.

Water Supply

Keridi Waterhole, seven miles south-south-west of White Point, is the only permanent surface water in the Walbiri Ranges.

There are two water bores in the White Point area. White Point Bore is a stock route bore two miles east of White Point and supplied water for drilling and domestic purposes. Penhalls Bore is situated four miles east of White Point.

Previous Investigations

Cook (1963) mapped the Yuendumu Reserve at a scale of one inch to two miles in 1962.

Early in 1965, aboriginals from Yuendumu Settlement discovered copper minerals in the low hills north of White Point. The copper is in fracture zones in dolomite. Youles, of the Resident Geologist's Office, Alice Springs, visited the area and on his advice AP 1324 of 35 square miles was taken out by T. Jabanardi on behalf of Yuendumu Village Council. (AP 1324 is now AP 1831 held by the Council). Aboriginals later discovered baryte-galena veins in dolomite a quarter of a mile north-west of White Point, and minor copper mineralization in laminated siltstone immediately north of White Point.

In 1965, Australian Geophysical Pty. Ltd. (AGPL) took out an option to explore AP 1324. An Induced Polarization survey and detailed geological mapping were undertaken in the White Point area. Regional geological and geochemical surveys were made of an area of 500 square miles between Yuendumu and Vaughan Springs. Cuttings from two unsuccessful water bores near the eastern boundary of AP 1324 were obtained by AGPL from Mines Branch in October 1965 and were analysed at Australian Mineral Development Laboratories.

The results of this work were presented in a report by AGPL in 1966.

In 1964, Cook carried out a geological reconnaissance in the Ngalia Basin, and thin sections of rocks collected by him were described by Scott (Cook and Scott, 1966).

A photo-interpretation of the Basin was made by Rivereau, in 1965 (Rivereau, 1965).

The copper and lead localities in the White Point area were visited by Grainger in May 1967. Grab samples taken from one of the copper shows assayed 6.3% Cu, 0.01% Pb and 0.003% Zn (Grainger, 1967).

In 1967, a Bureau of Mineral Resources field party led by A.T. Wells commenced geological mapping of the Ngalia Basin at a scale of 1:250,000 (Wells et al, 1968).

Present Investigation

AGPL recommended a vertical hole 800 feet deep to test a geophysical anomaly. After the lapse of the AGPL option, Yuendumu Village Council requested drilling assistance from Mines & Water Resources Branch and two holes were drilled on the anomaly: DDH1 to 803 feet and DDH2 to 301 feet.

GENERAL GEOLOGY

General

The Walbiri Ranges are composed of near-shore deposits of Upper Proterozoic and Lower Palaeozoic age and form the northern margin of the Ngalia Basin (see Plate 1). To the north of the Ranges are isolated outcrops and ridges of igneous and metamorphic rocks of the Arunta Complex.

Metamorphic and Igneous Rocks

The Arunta Complex in the Yuendumu Reserve was mapped by Cook in 1963. The most common metamorphic rock is mica schist. Gneisses of variable lithology are also widespread.

Contacts between the gneisses and schists are gradational. The metamorphic rocks have been intruded by granites, quartz veins and lamprophyre dykes. Amphibolites may represent pre-metamorphism dykes.

Sedimentary Rocks

Cook (1963) estimated the total thickness of the sedimentary sequence in the Ngalia Basin to be about 11,000 feet, with the uppermost unit accounting for the major part of the thickness. AGPL estimated a total thickness in excess of 13,000 feet.

The sediments consist of rudite, arenite, dolomite and limestone. The rocks generally dip southwards. Exposure is good in the northern part of the area.

The following is the stratigraphic sequence described by Wells et al (1968):-

Mt. Eclipse Sandstone: (Maximum thickness 7,000 ± ft.)

Carboniferous. Pebbly sandstone and conglomerate.
Plant fossils.

- unconformity -

Kerridy Sandstone: (maximum thickness 2,300 feet)
? Ordovician. Purple-brown, micaceous, cross-bedded sandstone.

Djagamara Formation: (maximum thickness 1,050+ feet).
?Ordovician. Silicified sandstone with abundant clasts of clay pellets, and interbedded friable sandstone.

Bloodwood Formation: (maximum thickness 650+ feet)
Cambrian. Red siltstone and minor sandstone. Cambrian fossils.

Walbiri Dolomite: (maximum thickness 1,420+ feet)
Cambrian. Sandy dolomite, dolomite and interbedded sandstone and siltstone. Shelly fossils.

Yuendumu Sandstone: (maximum thickness 2,310+ feet).
Upper Proterozoic. Red-brown sandstone.

- unconformity -

Mt. Doreen Formation: (maximum thickness 370+ feet)
Upper Proterozoic. Glacial sediments.

- unconformity -

Vaughan Springs Quartzite: (maximum thickness 5,700± feet from air photos). Upper Proterozoic. Basal quartzite with minor conglomerate and arkosic sandstone.

- unconformity -

Granite and Metamorphic Rocks

The Walbiri Dolomite of Cambrian age has been mapped by Wells et al (1968) as dark grey dolomite, green and blue siltstone, pink stromatolitic dolomite, and minor sandstone. In the White Point area, brachiopods and trilobites were discovered in grey-green mudstone near the base of the formation. The Walbiri Dolomite and the overlying Bloodwood Formation have been correlated by Wells et al (1968) with the Todd River Dolomite, Giles Creek Dolomite, and Shannon Formation of the Pertaoorrta Group in the north-eastern part of the Amadeus Basin (see Plate 2).

Structure of the White Point Area

The strata generally have an easterly strike and moderate southerly dips. Unconformities within and between formations, as well as faulting, disturbs this general pattern.

Near White Point, a major thrust (Wells et al, 1968) separates the Cambrian Walbiri Dolomite and Bloodwood Formation from the Djagamara Formation and Kerridy Sandstone (see Plate 4). A smaller thrust to the south of this has pushed the Djagamara Formation over the Kerridy Sandstone, whilst the larger thrust has caused tight folding in the Djagamara Formation where it occurs in a narrow thrust slice (Wells et al, 1968). Cambrian formations in the northern block were only slightly tilted by the thrust movement. Wells estimates a vertical displacement between the major fault blocks of at least 1,000 feet.

The Mount Eclipse Sandstone rests with angular unconformity on all the older formations in the region of the fault zone, but there is about 200 feet difference in elevation between the base of the Sandstone on either side of the main thrust. Wells suggests that this difference in elevation is due to a small normal fault with a down-throw to the north, representing a reversal in the direction of movement relative to the original thrust.

In the low hills north of White Point, Walbiri Dolomite dips south at a moderate angle. There are no exposures on the soil covered plain between these hills and White Point, except for a small outcrop of gently folded dolomite a quarter of a mile north-west of White Point.

ECONOMIC GEOLOGY

General

Minor copper mineralization is known from a number of localities in the metamorphic rocks north of the Ngalia Basin (Madigan, 1937; Kiek, 1941; Grainger, 1968). The principal mineralized areas are in the hills north of Yuendumu and in the Mt. Hardy area to the north-west. Galena has also been found at a number of these localities.

In 1965, aboriginals from Yuendumu Settlement discovered malachite and chalcocite near the base of the Walbiri Dolomite. The copper mineralization occurs as veinlets within locally developed intraformational breccias. Copper occurrences have been found over a strike length of five miles, but according to AGPL (1966) they are most abundant over a distance of 4,000 feet. Within this distance the bulk of the occurrences are restricted to a fairly narrow stratigraphic zone (10 to 30 feet thick) near the base of the dolomite sequence (eg. Photo reference Mt. Doreen Run 5. Photo 5008. Quadrant D. y = 1.6", x=1.59").

Wells et al, (1968), recorded that secondary copper mineralization in the form of azurite, malachite and chrysocolla occurs in shale interbedded with dolomite, fine-grained sandstone and mudstone near the base of the Walbiri Dolomite.

Traces of copper are recorded from the Djagamara Formation near White Point (AGPL, 1966).

Following the original discovery of copper mineralization in the Walbiri Ranges, barytes-galena veins were found by aboriginals in an isolated outcrop of Walbiri Dolomite a quarter of a mile north-west of White Point (Photo reference: Mt. Doreen Run 5. Photo 5008. Quadrant B. y=0.8", x=0.04"). Barytes veins up to two feet wide appear to occupy joints, and large irregular masses of barytes may be replacement structures. The barytes contains small amounts of galena.

The copper and lead occurrences are too small to be of any economic importance in themselves, but they pointed to the possibility of economic mineralization in the area. AGPL geologists considered that the extensive soil-covered plain to the south of the areas of copper discoveries may have concealed copper-bearing shales and thought that the stratigraphy of the area resembled that of the Zambian copper belt. They suggested that possible stratified deposits in the shales may have provided the source of the copper which was transported (either in solution after weathering or by mobilization during earth-movements) into the brecciated zone of the dolomite. They were encouraged in their prospecting of the Ngalia Basin by the presence of known copper mineralization (although sub-economic) in the Pertaoorrta Group of the Amadeus Basin (Ivanac, 1953; Woolley and Rochow, 1965).

Samples of cuttings from two unsuccessful water bores YM1 and YM2 drilled into Walbiri Dolomite in the extreme east of AP 1324 were obtained by AGPL from Mines Branch in October, 1965. The samples gave values of up to 1080 ppm Zn and 820 ppm Pb when analysed spectrographically (see Appendix III). Additional work by Australian Mineral Development Laboratories showed no sulphides present in the samples, but suggested the presence of coronadite, a hydrated manganese oxide containing lead. The analyses suggest that the lead and copper are residually concentrated with manganese close to the surface. Zinc in values do not change markedly with depth.

Black pyritic siltstone was intersected in Keridi Bore (unsuccessful) sited to penetrate the Djagamara Formation (see Appendix III). The pyritic horizon was not found in outcrops by AGPL and the bore may have intersected a fault (AGPL, 1966).

Prospecting

Methods: Australian Geophysical Pty. Ltd. carried out an Induced Polarization (I.P.) survey with a 400 foot dipole spread, over the area of AP 1324 underlain by carbonate facies. Detailed surveys using 200 foot dipole spacings were made over the most strongly anomalous areas. I.P. traverses were also made at selected points to the west of AP 1324.

Geological mapping at a scale of 1 inch to 800 feet was carried out over the area covered by I.P. traverses, and at a scale of 1 inch to 4 miles over an area of 500 square miles between Yuendumu and Vaughan Springs to investigate the possibility of the Yuendumu sequence being repeated. Two hundred stream sediment samples from the Yuendumu-Vaughan Springs area were collected for geochemical analyses, but none were collected from the I.P. survey area because of the deep soil cover.

Results: The effectiveness of the I.P. survey was reduced by the thick soil cover in the White Point area.

Three anomalies were delineated by I.P. but all were of low magnitude. AGPL stated that a higher response would have been expected if the anomalies were due to buried sulphide deposits, but they were unable to assess the effect of the soil deep cover on the I.P. results. The strongest anomaly is Zone A, located north of White Point. Detailed I.P. surveys showed the anomaly "to be fairly shallow and to have a low southerly dip. This dip is consistent with the prevailing attitude of the dolomite sequence and the anomaly is probably due to conformable layers of polarizable material within the dolomite unit" (AGPL, 1966). The anomaly increases in intensity towards the west until lost beneath the overlying Bloodwood Formation. AGPL suggested that the high zinc and lead values obtained from the cutting of water bores YM1 and Ym2 east of Penhalls Bore, are due to primary dispersion associated with a sulphide zone indicated by anomalous zone A. The company concluded that the anomaly could be tested by a vertical diamond drill hole to a depth of 800 feet, located at the western end of the anomaly (line 240 W. 20 S; AGPL I.P. grid).

Diamond Drilling

From July to November 1967, a Mines and Water Resources Branch drilling rig completed two vertical diamond drill holes at White Point. The total footage was 1,104 feet. DDH1 was drilled to a depth of 803 feet at the site proposed by AGPL (Photo reference: Mt. Doreen Run 5. Photo 5008. Quadrant B. y=1.25", x=0.45"). DDH2 was drilled to 301 feet at a site 400 feet north of DDH1 (see Appendix I for drill hole logs, and fig. 5). Overall core recovery was only moderate (75% in DDH1, and 65% in DDH2). Caving was common in the carbonate rocks and much of the core is fragmented.

Both holes were drilled through a sequence of siltstone, silty dolomite, dolomite, with minor intervals of sandstone and mudstone. Bedding planes are either horizontal or inclined at small angles towards the south. The low southerly dip is masked by cross-bedding in the siltstone in the upper 150 to 200 feet in both holes. The boundary between the argillaceous Bloodwood Formation and the dominantly carbonate Walbiri Dolomite has been placed at the appearance of massive dolomite; at a depth of 235 feet in DDH1 and at 175 feet in DDH2.

The siltstone is generally micaceous and often strongly laminated with dark streaks and bands. Current laminations, slumping and some graded bedding are evident. The siltstone varies in colour from blue-grey to green, purple, red and brown. Minor mudstones are grey and grey-green or rarely yellow.

The dolomite is usually massive, fine-grained and grey, blue or light brown. Some intervals have numerous cavities which may be up to one inch in diameter. The cavities are often partly infilled with crystals of dolomite or, more rarely, calcite. Silty dolomite is common. There are minor intervals of quartzose dolomite composed of rounded sand-sized grains of quartz in fine-grained dolomite.

Intraformational brecciation of siltstone, silty dolomite and dolomite appears to be the result of dessication of partly indurated sediments and emphasises the shallow-water environment in which these rocks were deposited.

The sandstone bands commonly grade into the contiguous beds. They are usually pink or light brown and medium grained, although there are horizons of fine-grained micaceous sandstone and a few coarse-grained intervals. The sandstones have a calcareous cement and are composed of a mosaic of poorly sorted sub-rounded and angular quartz grains with very minor amounts of feldspar grains, biotite flakes and rock fragments.

Dark streaky material in the siltstone and carbonate rocks gave chemical reactions for carbon and manganese. The streaks and bands are mostly less than a quarter of an inch thick. They are usually concordant, but sometimes cross-cut bedding planes and form what appear to be replacement structures. Iron staining is often associated with the dark-coloured material.

Mineralization

Minor disseminated galena, pyrite and some ?chalcopyrite are present in the silty dolomite and dolomite in both drill holes. Galena is also present in irregular barytes veins in the carbonate rocks. Although the pyrite is disseminated it tends to be concentrated stratigraphically, especially in and near the dark-coloured silty bands.

The main mineralized intervals are 230 to 273 feet and 366 to 444 feet in DDH1, and 181 to 229 feet in DDH2.

Veinlets and small irregular masses of barytes are present in dolomite from both drill holes (235 to 250 feet in DDH1 and 194 to 219 feet in DDH2) and contain minor amounts of galena. A few specks of pyrite were observed in barytes from DDH2. The barytes mineralization appears to be stratigraphically controlled.

The proximity of much of the disseminated pyrite to laminations and bands of dark-coloured silty material suggests that the pyrite was formed by the reduction of iron salts by organic compounds (Hatch and Rastall, 1938).

The significance of the White Point Fault zone in relation to the mineralization of the area is not known. No mineralization has been observed, or has been reported, along the fault zone itself, but it may have provided access for hydrothermal solutions which deposited the barytes-galena veins present in dolomite outcrops near White Point, and in both drill holes. Alternatively, the barytes could be of secondary origin and have been derived from elsewhere in the sequence.

Assay Results

Forty five samples of split diamond drill core and four sludge samples were assayed by Mines and Water Resources Branch Laboratory, Darwin, for copper, lead and zinc. In addition, some of the samples were assayed for silver and nickel. Assay results are given in Appendix II.

Assay values for the sampled intervals of DDH1 (230 to 272 feet, and 365 to 444 feet) are very low; the highest values are 156 ppm Cu, 1375 ppm Pb, and 2700 ppm Zn. The high lead value is in an interval of silty dolomite.

The interval 190 to 229 feet in DDH 2 is in part brecciated and contains irregular veins and pods of barytes. Copper and lead assay results are higher than in the corresponding interval, 248 to 272 feet, in DDH1. Several values exceed 1000 ppm Pb and the interval 219 to 229 feet assays 1900 ppm Pb. The assay values of sludge samples 195 to 219 feet and 219 to 229 feet are 2.4% and 0.73% Pb respectively and check samples gave 2.6% and 1.3% ppm Pb. Samples of the sludge were panned and specks of galena and pyrite and fragments of barytes were obtained. Core recovery from the interval from which the sludge samples were taken was extremely poor.

The sludge samples are not considered to be representative of the interval. The driller was not equipped to collect proper sludge samples and the conditions under which they were collected is not known. The galena may have been concentrated by fractionation and by the washing away of less dense material.

CONCLUSIONS

Diamond drilling has shown that minor galena, pyrite and ?chalcopyrite occur within the area which gave rise to an Induced Polarisation anomaly north of White Point. Disseminated sulphides are restricted to dolomite and silty dolomite and to barytes veins within the carbonate rocks. Assay values are low, and the investigation did not indicate any economic mineralization in the area.

The origin of the lead mineralization is not known, but it could be the result of hydrothermal solutions travelling through the White Point fault zone and depositing barytes-galena veins as replacement structures.

The relative concentration of much of the disseminated pyrite in and near dark-coloured silty bands suggests that the pyrite may have been formed by the reduction of iron salts during diagenesis.

The sensitivity of the I.P. method is shown by an anomaly having been produced by minor amounts of disseminated sulphides.

RECOMMENDATIONS

No further drilling is recommended in the White Point area.

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APPENDIX I

DIAMOND DRILL HOLE LOGS

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT. WHITE POINT GEOPHYSICAL ANOMALY ..... REMARKS. T.D. 803 ft.

HOLE No. DDH 1 ..... CO-ORDINATES 4795. 2180 ; 22°17'45" 131°41'00" ..... R.L. GROUND ....

LOCATION 7m/s WSW YUENDUMU SETTLEMENT. ¾ m/. NW. WHITE POINT ..... ANGLE FROM HORIZONTAL 90° ..... DIRECTION .....

DESCRIPTION OF CORE	R.L. / CASING	DEPTH / SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
No core		46		Overall recovery TS – 80%			
Intraformational brecciation of siltstones. Red and chocolate-brown micaceous current laminated siltstones. Minor mudstone intervals.		50 NX 100		60%			
Grey-green mudstones – some intraformational breccia. Minor siltstones and sandstones. Red and chocolate-brown current laminated siltstones. Occ. black streaks. Minor fine-grained sandstones.		108		60%		Bedding planes 10° from horizontal.	Bloodwood Formation
Light brown, red-brown, green micaceous siltstones. Contorted current laminations. Dark shale streaks. Minor brown sandstones.		131		90%			
Clayey material and brown siltstones. Green and red-purple micaceous siltstones.		173 176 BX 193		100%		Mud and core fragments only. Bedding planes 0° – 8° from horizontal.	
Massive fine-grained micaceous silty sandstones. Micaceous buff siltstones with minor grey-green fine-grained sandstones. Some graded bedding and contorted current laminations.		197		53%		Core broken. Bedding planes approx. 12° from horizontal.	
Finely laminated green and grey-blue siltstones. Minor dark grey silty dolomite.		214		66%		Core broken. Bedding planes 22° from horizontal.	
Fine-grained laminated grey-blue dolomite. Intraformational brecciation. Minor dol. siltstone and silty dolomite. Veinlets and pods of barytes.		235		57%	FS2/12-30 ⑫ ⑬	Galena in core 239-248'	230'-236' 1875 ppm Pb.
Fine-grained current laminated micaceous dark grey siltstone. Grey-blue fine-grained dolomite and silty dolomite. Laminated and with intervals of intraformational brecciation (esp. 269-273'). Minor grey-green siltstone and buff fine-grained sandstone. Minor pink ? recrystal. dolomite 288-302' interbedded with grey dolomite.		250 256		75%	FS2/12-30 ① to ⑪	Core often fragmentary. 272' minor disseminated pyrite	257'-264' av. 2000 ppm Zn.
Purple and green calc. siltstones. Minor calc. sandstones and silty dolomites. Current laminations in siltstone. Some graded bedding. Minor brecciation.		302		100%			Walbiri Dolomite
Grey silty dolomites with minor dolomite, green and purple siltstones, and sandstones. Some intraformational brecciation in silty dolomites.		316		100%		334' – 346' minor finely dissem. py and ? cpy	
Purple micaceous siltstone and purple sandstone. Minor green siltstone and silty dolomite.		355		100%			
Grey silty dolomite and dolomite. Minor brown dolomite, silty dolomite, quartz dolomite and sandstone. Carbonate rocks often with small cavities which may be drusy. Black streaky material especially in silty dolomites. Fe. staining associated with dark streaks, which usually conformable with bedding and current laminations but also cross-cutting.		366 AX		81%	FS2/12-30 ⑬ to FS2/12-30 ⑭	Minor py and ? cpy finely disseminated throughout interval but esp. where black streaky material abundant	
Brown dolomite. Minor sandstone and sandy dolomite.		444		100%		Minor py. dissem. in sandy dolomite.	
Fine to medium-grained brown sandstone, poorly sorted. Calcareous cement. Minor sandy dolomite.		458		100%			
Brown sandy dolomite. Minor sandstone and siltstone. Intraformational brecciation 471 – 477'		471					
Purple and grey siltstone with minor sandstone.		481 492					

DRILL NO. .....
TYPE .....

DRILLER S. BERGER .....
COMMENCED JULY 1967 .....
COMPLETED OCT. 1967 ....

EXPLANATION

CASING IN HOLE DURING DRILLING

1" = 50 ft

HEAD OFFICE

LOGGED BY D.J. GRAINGER
DRAWN BY D.J. GRAINGER
CHECKED BY .....

SHEET 1 ..... OF 2 .....
DRAWING NO. .....

GD130

To accompany Record 1969/92

F52/A 12/38 (5)

EJ

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT. WHITE POINT ..... REMARKS .....

HOLE No. DDH 1 (continued) ..... CO-ORDINATES ..... R.L. GROUND .....

LOCATION ..... ANGLE FROM HORIZONTAL ..... DIRECTION .....

DESCRIPTION OF CORE	R.L. CASING	DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
Massive grey dolomite with intervals of granular quartz dolomite and some silty bands. Irregular quartz veinlets and irregular pods of barytes. Streaks of black material. Some minor intraformational brecciation.				77%		Core fragmented. Caving at about 523'. Minor dissem. py at about 534' and near 560'	
Fine-grained brown dolomite with minor grey silty dolomite. Some black streaky material.		561		100%		Minor dissem. py	
Pink and brown medium-grained sandstone. Some coarse-grained intervals. At top of interval minor siltstone and dolomite. Poorly developed graded bedding.		573		100%			
Massive fine-grained pale brown dolomite becoming pink below 620'. Minor intervals of medium-grained dolomite, silty dolomite, and quartz dolomite. Occasional dark streaks and manganese dendrites.		602		66%			
Massive fine to medium-grained brown quartz dolomite.		650		80%			
Massive fine-grained pale brown dolomite. Minor silty horizons and quartz dolomite intervals. Some black streaky material and manganese dendrites.		670		78%		Core often fragmentary.	
		803				T. D.	

DRILL NO. .....
TYPE .....
DRILLER S. BERGER
COMMENCED JULY 1967
COMPLETED OCT. 1967

EXPLANATION

CASING IN HOLE DURING DRILLING

1" = 50ft.

HEAD OFFICE

LOGGED BY D.J. GRAINGER
DRAWN BY D.J. GRAINGER
CHECKED BY .....

SHEET 2 OF 2
DRAWING NO. .....

D130

To accompany Record 1969/92

EJ

F52/A12/38(6)

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT WHITE POINT GEOPHYSICAL ANOMALY REMARKS T.D. 301 ft.

HOLE No. DDH2 CO-ORDINATES 4795 2185; 22°17'30" 131°41'00" R.L. GROUND —

LOCATION 400 ft. NORTH OF DDH 1 ANGLE FROM HORIZONTAL 90° DIRECTION

DESCRIPTION OF CORE	R.L. CASING	DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
No core		41		Overall recovery approx. 65%			
Red-purple siltstone current laminated and with intraformational brecciation. Minor yellow mudstone		NX		17%		Core fragmented.	
Yellow and grey mudstones. Minor red-brown fine-grained micaceous sandstones.		59		50%		Core fragmented. Bedding planes 20° from horiz.	
Red-brown micaceous siltstones, current laminated and streaked with dark silty material. Some massive siltstone intervals. Minor fine-grained sandstone and intraformational breccias.		72		64%		Bedding planes: at 72' 30° from horizontal. at 80' 20° from horizontal.	Bloodwood Formation
				17%		at 110' 0°–10° from horiz.	
				100%		at 120' 0°	
Grey calc. mica. siltstone and grey siltstone		141		100%		Bedding approx. horizontal	
Purple and green siltstones. Dark streaky laminations.		146		100%		Bedding approx. horizontal	
Red-brown massive fine-grained sandstone		163					
Grey and red-brown micaceous siltstones. Minor green siltstone and fine-grained red-brown sandstone.		166		100%		Bedding planes approx. 5° from horiz. Slumping, graded bedding.	
Grey massive fine-grained silty dolomite. Silty dolomite closely laminated with dark grey and black streaks. Intraform. brecciation		175		100%		Py on joint at 176'. At 184' Pb and ? Cpy dissem. in black sooty material. Minor py at 188'	187'–190' 1250 ppm Zn.
Massive grey fine-grained dolomite. Barytes 194–195'		190				Minor py in dolomite + barytes	195'–197' av. 1350 ppm Pb.
Silty grey dolomite		196		100%	FS2/12-30	Core fragmented.	
Brown dolomite veined with barytes. ? intraform. breccia		201		80%	FS2/12-30 to 42	Core fragmented.	
Brown dolomite with dark grey streaks. Mottled grey and brown dolomite.		219		22%		Core fragmented.	219'–229' av. 1900 ppm Pb.
Brown dolomite with minor yellow clayey and black sooty material. Minor brown dolomite with harder massive grey dolomite. (brown dolomite very reactive with acid). Minor grey siltstone and red fine-grained sandstone towards 268'		234 BX		33%		Core fragmented and clayey.	Walbiri Dolomite
Red medium-grained poorly sorted sandstone. Red and brown calc. siltstones. Minor pink and brown dolomite		268		75%		Sandstone has calcareous cement.	
Red calc. siltstone. Red siltstone with minor red med. grained poorly sorted sandstone (calc cement)		278		100%			
Silty grey dolomite finely laminated with dark streaks and bands. Minor brown dolomite, and minor fine to medium-grained sandstone. Some slumping.		287		85%			
		301		57%		T.D.	

DRILL NO. ....
TYPE ....

DRILLER S. BERGER
COMMENCED OCT. 1967
COMPLETED NOV. 1967

EXPLANATION

CASING IN HOLE DURING DRILLING

1" = 50 ft.

HEAD OFFICE

LOGGED BY D.J. GRAINGER
DRAWN BY D.J. GRAINGER
CHECKED BY ....

SHEET 1 OF 1
DRAWING NO. ....

To accompany Record 1969/93

F52/A12/38(4) EJ

APPENDIX II

ASSAY RESULTS

Samples assayed by Mines Branch, Laboratory, Darwin

DDH 1

Samples number	Depth	Cu	Ni	Pb	Zn
		Results in Parts per Million			
F52/12 - 30 (41)	230 - 236'	65	70	1375	70
(42)	236 - 239'	40	142	195	142
(43)	239 - 248'	25	260	335	260
			Ag		
(1)	248 - 251'	20	Nil	10	290
(2)	251 - 255'	10	Nil	10	90
(3)	255 - 257'	80	Nil	10	190
(4)	257 - 259'	10	Nil	10	2700
(5)	259 - 264'	50	Nil	80	1300
(6)	264 - 269'	30	Nil	30	580
(7)	269 - 272'	30	Nil	10	580
F52/12 - 30 (25)	365 - 370.5'	112	1	75	37
(26)	370.5 - 376'	56	1	62	40
(27)	376 - 381'	100	1	62	44
(28)	381 - 387.5'	81	1	62	41
(29)	387.3 - 393.6'	87	1	150	45
(30)	393.6 - 398'	44	1	100	47
(31)	398 - 408'	156	1	75	39
(32)	402 - 406.5'	62	1	62	36
(33)	406.5 - 411.25'	50	1	75	48
(34)	411.25 - 414'	50	1	62	31
(35)	414 - 419'	37	1	62	31
(36)	419 - 424'	50	1	62	22
(37)	424 - 430.5'	37	1	62	40
(38)	430.5 - 435'	56	1	62	36
(39)	435 - 439.5'	37	1	75	47
(40)	439.5 - 444.25'	25	1	62	44

DDH 2

Sample number	Depth	Parts per Million Cu	Pb	Zn	Ni
F52/12 - 30 (44)	181 - 184'	335	70	200	70
(45)	184 - 187'	100	120	650	60
(46)	187 - 190'	70	160	1250	105
F52/12 - 30 (8)	190 - 191'	210	270	600	
(9)	191 - 192'	200	670	790	
(10)	192 - 193'	25	400	50	
(11)	193 - 194'	40	330	75	
(12)	194 - 195'	10	130	10	
(13)	195 - 196'	75	1650	60	
(14)	196 - 197'	25	1100	60	
(15)	197 - 198'	10	400	35	
(16)	198 - 201.5'	110	1000	160	
(17)	201.5 - 206.5'	10	400	50	
(18)	206.5 - 211'	25	370	20	
(19)	211 - 215'	50	1650	25	
(20)	215 - 219'	70	480	20	
(21)	219 - 224'	225	1850	50	
(22)	224 - 229'	110	1950	450	
F52/12 - 30(47)	229 - 234'	15	175	92	130
F52/12 - 30(23)	Sludge 195-219'	70	24,000*	90	
(24)	Sludge 219-229'	55	7,300	180	
(48)	Sludge 195-219' (Check sample)	60	26,000	470	70
(49)	Sludge 219-229'	75	13,000	380	30

(* i.e. 2.4%)

APPENDIX III

WATER BORE LOGS AND SPECTROGRAPHIC ANALYSES OF BORE CUTTINGS

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT YM.1. WATERBORE REMARKS

HOLE No. F52/12-172 CO-ORDINATES 22°18'15" 131°46'40" 4880.2175 R.L. GROUND

LOCATION 4 MILES S. OF YUENDUMU SETTLEMENT ANGLE FROM HORIZONTAL 90 DIRECTION

DESCRIPTION OF CORE	R.L. CASING	DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS Cu	Pb	Zn
Rock fragments						10'	16	29	22
						30'	31	128	320
Sandy dolomitic limestone, and silky dol.		35'				40'	23	123	280
		45'				50'	27	111	460
Sandy dolomite						60'	23	116	410
						70'	12	120	360
		75'				80'	16	85	330
Fine-grained crystalline dolomite minor sandy dolomite						100'	16	89	500
						110'	25	131	730
						120'	20	104	330
						130'	9	120	230
						140'	9	111	240
		150'				150'	9	123	230
(Not logged)						180'	11	89	360
						190'	11	65	770
						200'	4	57	400
						210'	6	65	980
Crystalline dolomite		220'							
Sandy dolomite		225'				230'	4	65	200
		235'				240'	6	61	200
Crystalline dolomite						260'	7	74	154
						270'	6	57	250
						280'	9	79	200
						300'	6	65	130
		301'				T.D.			

Results in ppm.

DRILL NO. .....
TYPE .....

EXPLANATION

CASING IN HOLE DURING DRILLING

HEAD OFFICE

LOGGED BY .....
DRAWN BY .....
CHECKED BY .....

DRILLER .....
COMMENCED .....
COMPLETED .....

REFERENCES

SHEET 1 OF 1
DRAWING NO. .....

GD130

To accompany Record 1969/92

EJ

F52/A12/38 (3)

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

~~PROJECT~~ YM 2. WATERBORE ..... REMARKS .....

HOLE No. FD2/12-173 ..... CO-ORDINATES 22°18'6" 131°46'57" 4885. 2175 ..... R.L. GROUND .....

LOCATION 4 MILES S. YUENDUMU SETTLEMENT ..... ANGLE FROM HORIZONTAL ... 90° ..... DIRECTION .....

DESCRIPTION OF CORE	R.L. CASING	DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS Cu	Pb	Zn
Soil		10'				8'	46	139	390
						28'	35	163	340
						38'	80	167	1060
						48'	25	139	250
						68'	82	820	1080
						78'	55	322	600
						88'	99	400	560
						98'	60	248	280
						108'	27	111	200
Crystalline dolomite, minor siltstone and claystone						118'	20	100	189
						128'	27	150	220
						138'	21	155	225
						148'	21	96	240
						158'	16	89	210
						168'	23	115	360
						178'	25	74	280
						198'	33	104	340
						208'	35	74	340
						218'	20	79	240
						228'	35	85	370
						238'	29	100	370
						248'	31	93	370
						258'	25	74	350
						268'	35	82	840
						278'	33	123	910
						288'	31	150	560
		300'				T.D. 300'	45	123	800

Results in ppm.

DRILL NO .....
TYPE .....

DRILLER .....
COMMENCED .....
COMPLETED .....

EXPLANATION

CASING IN HOLE DURING DRILLING

REFERENCES

HEAD OFFICE

LOGGED BY .....
DRAWN BY .....
CHECKED BY .....
SHEET ... 1 ... OF ... 1 .....
DRAWING NO .....

GD130

To accompany Record 1969/92

EJ

F52/A12/38

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

~~PROJECT~~ WATER BORE NEAR KERIDI WATERHOLE ..... REMARKS .....

HOLE No. F52/12-144 ..... CO-ORDINATES 22° 24' 6" 131° 44' 36" 4840.2050 R.L. GROUND .....

LOCATION ½ MILE W. KERIDI WATERHOLE ..... ANGLE FROM HORIZONTAL 90° ..... DIRECTION .....

DESCRIPTION OF CORE	R.L. CASING	DEPTH SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
Sand, clay and gravel		40'					
Light-coloured siltstone		70'					
Black laminated friable micaceous pyritic siltstone		130'					
Black fine-grained pyritic greywacke (pyrite in part a matrix enclosing fine quartz sand grains)		165'					
Medium-grained part silicified sandstone Some soft black siltstone.		180'					
Black pyritic siltstone and clay		190'					
Fine-grained silicified sandstone		215'					
Black pyritic siltstone		225'					
Silicified sandstone		230'				T.D.	

ASSAYS (ppm)

Depth	Cu	Pb	Co	Ni	P	Mn
70-80'	30	50	4	8	150	50
80-90'	20	40	1	4	800	15
90-100'	20	30	12	12	500	250
* 100-110'	15	100	15	10		
110-120'	25	20	8	15	700	300
120-130'	20	20	7	12	500	400
* 130-140'	15	100	15	15		
160'	30	8	6	40	600	100
170'	25	5	2	20	100	25
175'	30	10	2	50	150	40
180'	30	60	25	80	100	260
* 180-185'	20	200	15	15		
185-190'	25	30	8	10	200	250
190-195'	8	8	2	4	150	10
200'	8	10	2	4	150	10
205'	40	10	3	80	150	100
210'	10	10	2	5	200	10
216'	20	10	12	50	150	80
220'	15	40	10	8	200	100
225'	12	12	7	7	150	25

* Spectrographic analyses by B.M.R.

Remainder by AMDL

DRILL NO .....
TYPE .....

DRILLER .....
COMMENCED .....
COMPLETED .....

EXPLANATION

CASING IN HOLE DURING DRILLING

REFERENCES

HEAD OFFICE

LOGGED BY .....
DRAWN BY .....
CHECKED BY .....
SHEET 1 OF 1
DRAWING NO .....

GD130

To accompany Record 1969/92

EJ

F52/A12/38(2)

PLATE 1

GEOLOGY OF THE WHITEPOINT AREA

TO OLD MT. DOREEN HOMESTEAD

TO MT. DENISON H.S.

TO ALICE SPRINGS

Approximate

YUENDUMU ABORIGINAL SETTLEMENT

LANDING GROUND

WHITE POINT

Whitepoint Bore

Penhalls Bore

DDH 1, 2

YM 1, YM 2

131° 40'

131° 45'

131° 50'

22° 15'

22° 20'

GEOLOGY AFTER A.T. WELLS

CAINOZOIC

- QUARTERNARY
  - Qa ALLUVIUM
  - Qs AEOLIAN SAND
  - Qr RESIDUAL SOIL

PALEOZOIC

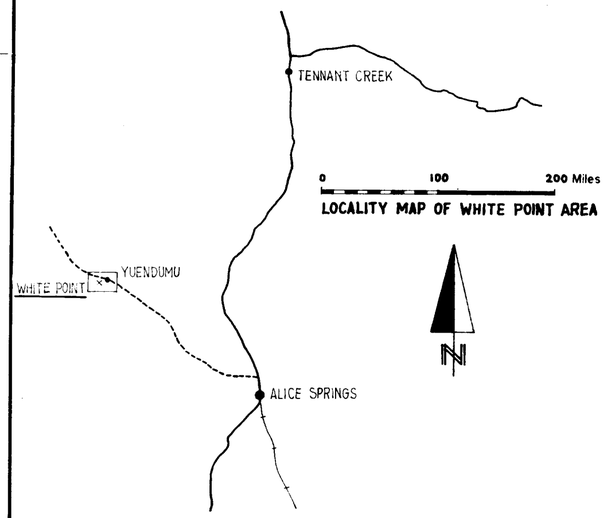
- CARBONIFEROUS
  - MOUNT ECLIPSE SANDSTONE — Pzt
- ORDOVICIAN ?
  - KERRIDY SANDSTONE — Pzy
  - DJAGMARA FORMATION — Pzd
- CAMBRIAN
  - BLOODWOOD FORMATION — €b
  - WALBIRI DOLOMITE — €w

PRECAMBRIAN

- PROTEROZOIC
  - YUENDUMU SANDSTONE — Puy
  - VAUGHAN SPRINGS QUARTZTITE — Puv
  - pεg GNEISSIC GRANITE, GRANITE, GNEISS, SCHIST,
  - pεm SCHIST, QUARTZITE AND AMPHIBOLITE

- GEOLOGICAL BOUNDARY
- STRIKE AND DIP OF BEDDING; VERTICAL STRATA (125)
- STRIKE AND DIP OF OVERTURNED BEDS (75)
- DIP OF BEDDING < 5°
- " 5°-15°
- " 15°-45°
- " > 45°
- TREND OF BEDDING
- STRIKE AND DIP OF METAMORPHIC FOLIATION (70)
- FAULT
- QUARTZ VEIN
- SYNCLINE
- ANTICLINE
- STREAM COURSE
- GRADED ROAD
- VEHICLE TRACK
- WATER BORE
- UNSUCCESSFUL WATER BORE (CUTTINGS ASSAYED)
- TRIANGULATION POINT
- DIAMOND DRILL HOLE
- MINERALIZED LOCALITY
  - Cu COPPER
  - PB LEAD
  - Ba BARYTES
- A — B LINE OF SECTION

AIRPHOTO INTERPRETATION



Scale 1 : 46,500

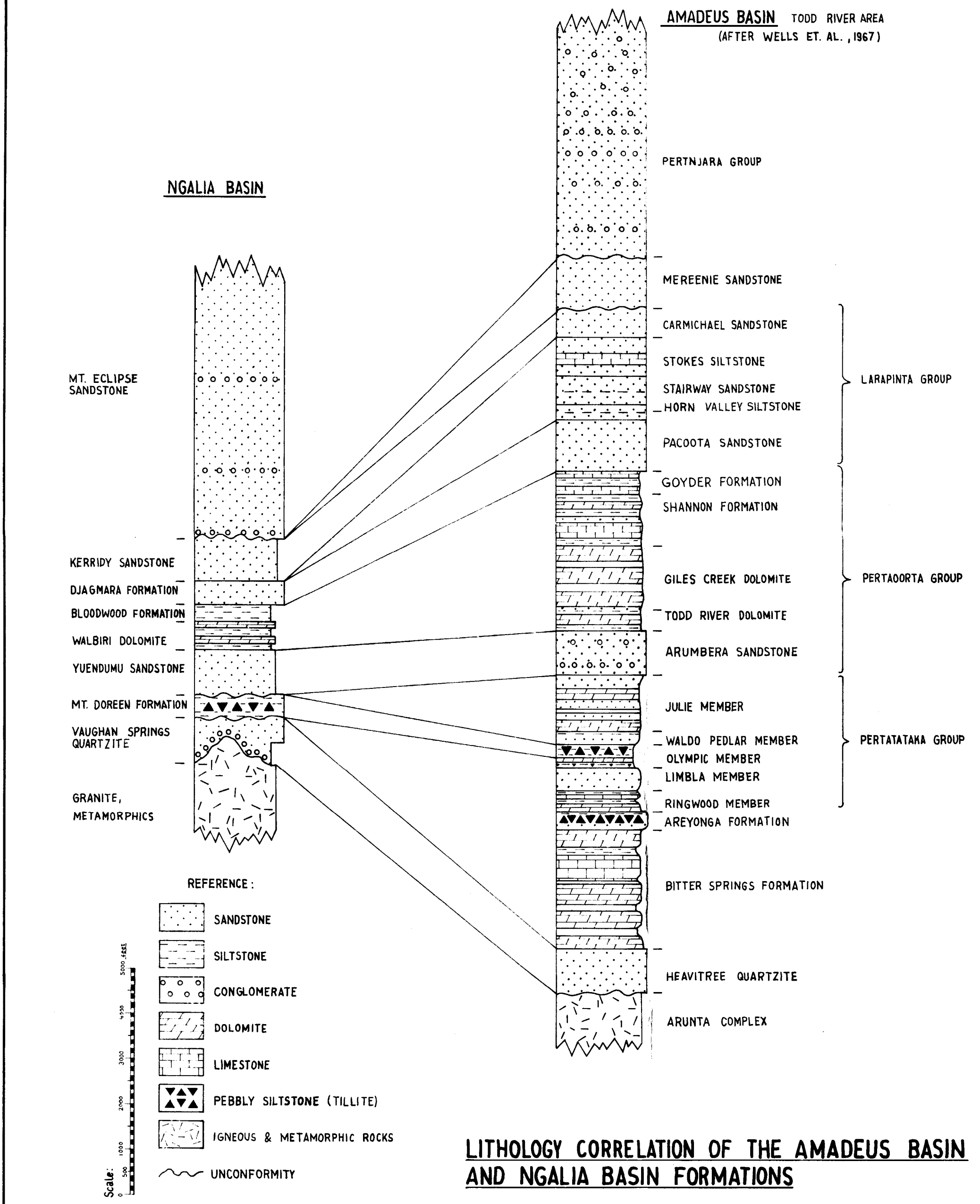
1 0 1 2 3 4 5 Miles

1 0.5 0 1 2 3 4 5 6 7 8 Kilometres

To accompany Record 1969/92

F52/A12/34

PLATE 2

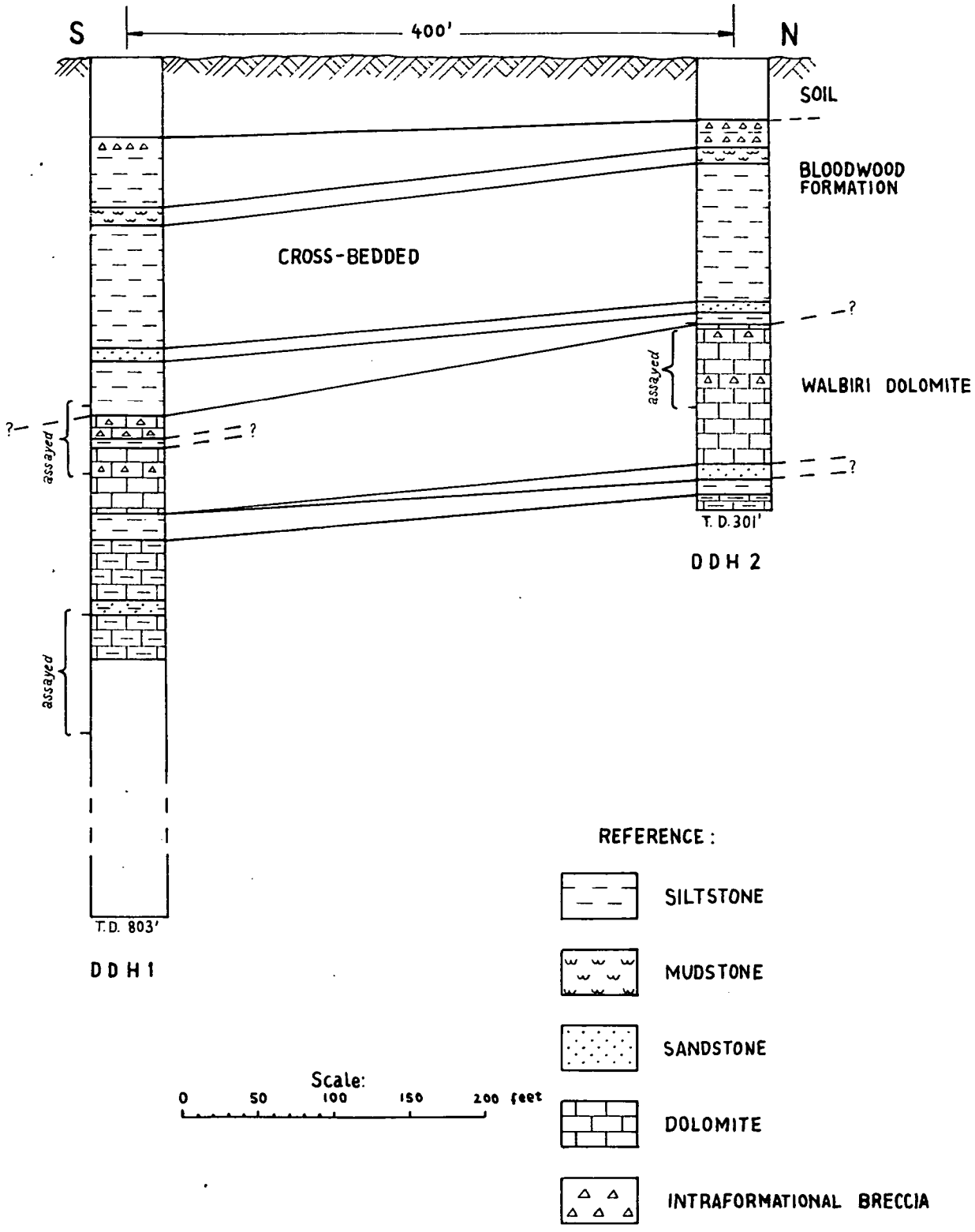


LITHOLOGY CORRELATION OF THE AMADEUS BASIN AND NGALIA BASIN FORMATIONS

To accompany Record 1969/92

F52/A12/35

PLATE 3

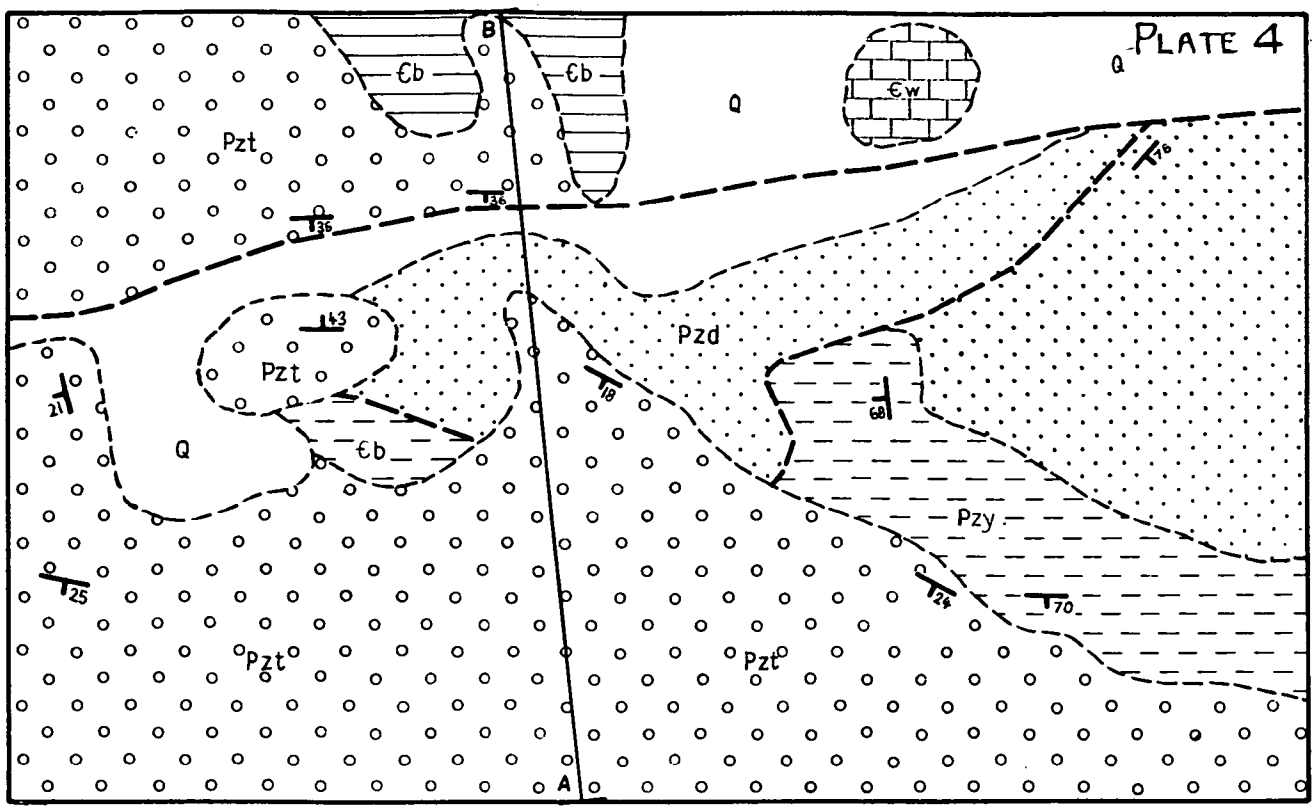


LITHOLOGY CORRELATION OF DDH1 AND DDH2

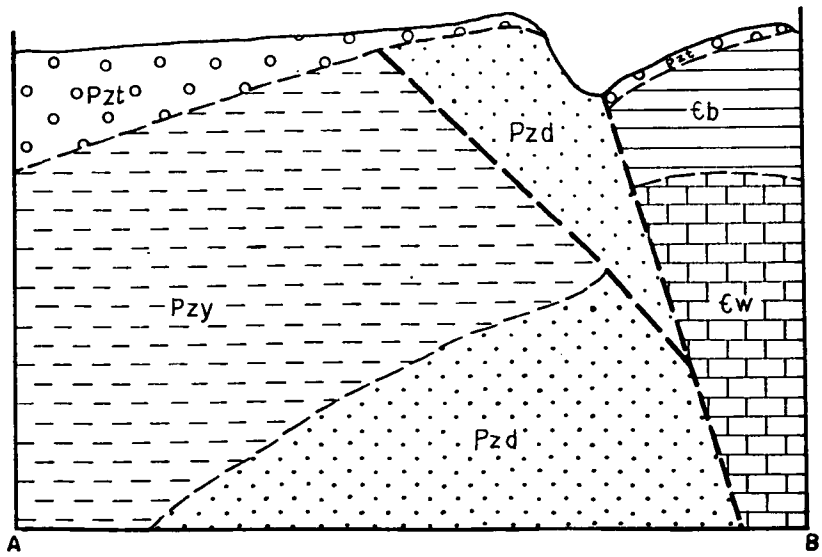
To accompany Record 1969/92

F52/12/36

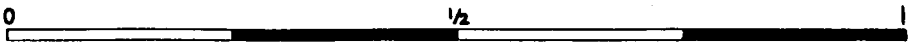
PLATE 4



SCETCH MAP AND CROSS-SECTION OF THE WHITE POINT FAULT ZONE



CROSS-SECTION "A"-"B"



Q QUARTERNARY COVER

Pzto MT. ECLIPSE SANDSTONE

Pzy KERRIDY SANDSTONE

Pzd DJAGMARA FORMATION

€b BLOODWOOD FORMATION

€w WALBIRI DOLOMITE

GEOLOGICAL BOUNDARY

FAULT POS. APPROX.

To accompany Record 1969/92

F52/A12/37

AN APPRAISAL OF CLEO'S GIFT GOLD MINE, BISHOP CREEK AREA,

by

J. Watts

Contents

AN APPRAISAL OF CLEO'S GIFT GOLD MINE, BISHOP CREEK AREA, NORTHERN TERRITORY.

by

J. Watts

SUMMARY

At the request of the lessee, Mr. J. Clark, Cleo's Gift Gold Mine was briefly inspected. The prospect is a quartz-hematite lode in red shale-siltstone country rock. Previous work done in the area showed moderate geochemical anomalies for copper, associated with the hematite lodes. Assays of samples showed that the lode contained traces of gold. Further work on the prospect is recommended.

INTRODUCTION

Cleo's Gift is situated in the headwaters of Bishop Creek, approximately 1½ miles to the north-west of Mount Argo. Access to the prospect from Tennant Creek is by the Stuart Highway to the Old Telegraph Station at the 7-mile peg; then north-west along the Quartz Hil Road for 10 miles. An old track to the east is then taken, the turnoff being marked by a red 44 gallon drum - the origin of the Bishop Creek Geochemical Grid. This track is followed for approximately 1½ miles. The lode is then reached by travelling approximately ¼ mile across country. Access from the Quartz Hill Road is made difficult by small creek beds which dissect the country in the vicinity of the lode.

GEOLOGY

The host rocks are a thinly interbedded red shale-siltstone sequence which stratigraphically overlies the Bernborough Formation of the Warramunga Group (A. Taube, 1967). The lode consists mainly of quartz and hematite. In parts it is wholly hematite, elsewhere a quartz-hematite breccia.

The lode lies along a north-south trending photo-linear feature manifested on the surface by a series of discontinuous quartz veins, believed to be fault infillings. At Cleo's Gift, rounded contorted fragments of country rock are contained in the lode, indicating that it lies along a fault zone. Maximum exposed lode width was estimated to be 12-14 feet, and the attitude of the lode is believed to be vertical.

Aeromagnetic work (Bureau of Mineral Resources Map G110-30) shows that there is no significant regional magnetic anomaly in the area. Work done by A. Taube in 1967, proved a significant copper anomaly over the lode, also a very weak zinc anomaly. The area was also tested for lead and bismuth, but no anomalies for these elements were found. Traces of gold were found in samples taken from the country rock and from the lode, but none of these assayed more than 0.2 dwts/ton Au.

CONCLUSIONS AND RECOMMENDATIONS

In view of the reported quantity of gold mined from the lode, systematic sampling of the ore around the shaft is recommended. If samples from the lode yield significant quantities of gold, further work, including wagon drilling or diamond drilling, may be warranted.

REFERENCE

TAUBE, A., 1967 - Interim Report, 1967 Geochemical Survey of the Bishop Creek Area. Bur. Miner. Resour. Aust.Rec. 1968/101 (unpubl.).

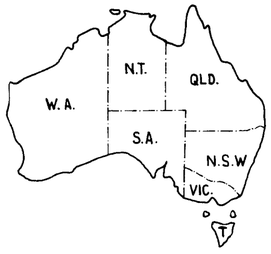
LOCALITY MAP OF CLEO'S GIFT MINE (BISHOP CREEK)

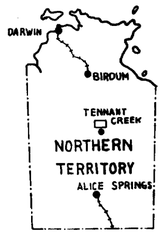
TENNANT CREEK AREA N.T.

22'
25'
19° 30'
05'
10'
134° 00'
134° 15'

BUTCHERS W.H.
GOLDEN SLIPPER
QUEEN OF SHEBA
BERNBOROUGH
MARION ROSS
HAVELOCK
OLIVE WOOD
ORLANDO
BISHOP'S BORE
Bishop Creek
FLINN'S MONUMENT
"THREEWAYS" ROAD HOUSE
Barkly Highway
Stuart Highway
TO WARREGO (POSITION APPROX.)
GREAT WESTERN GEOCHEMICAL GRID
TO TENNANT CREEK 12 MILES
TO TENNANT CREEK 11 MILES
80N
60N
40N
20N
00
00
20E
40E
60E
80E
CLEO'S GIFT
BISHOP CREEK GEOCHEMICAL GRID
Mt. Argo

MARION ROSS | MT. WOODCOCK
RED BLUFF | TENNANT CREEK





INDEX OF MAP SHEETS

MARION ROSS	MOUNT WOODCOCK		
RED BLUFF	TENNANT CREEK		
	TENNANT CREEK SE 53-14		ALROY SE 53-15
	BONNEY WELL SE 53-2		FREE RIVER SE 53-3

SCALE: 1" = 1 MILE

1 0 1 2 3 MILES

To accompany Record 1969/92

E53/A14/184

PRELIMINARY GEOLOGICAL SURVEY, PETER PAN GOLDMINE

TENNANT CREEK, N.T.

by

B.A. Tapp

Contents

SUMMARY

At the request of the lessee, Mr. J.J. Johnson, a preliminary geological survey was made of the Peter Pan Goldmine, Tennant Creek, N.T.

Recorded production shows that 73 ounces of gold have been won from 231.78 long tons of ore.

The mineralised lodes consist of highly silicious quartz hematite lenses which strike approximately parallel to a contact between sediments and quartz feldspar porphyry exposed just north of the mine. Gold has also been won from phyllitic sediments which dip steeply to the north.

Geochemical surveys carried out in 1964, revealed the presence of anomalous concentrations of copper, lead and cobalt. Geophysical surveys (1937-1939) did not reveal any magnetically anomalous areas.

A diamond drill hole designed to probe copper mineralisation in the vicinity of the porphyry/sediment contact, intersected a lamprophyre dyke about 200' beneath the contact, but no copper or gold mineralisation was found.

On the basis of the mapping and geochemical results, the drillage of nineteen wagon-drill holes is recommended on the lease.

INTRODUCTION

Following a request received from the lessee, Mr. J.J. Johnson, a preliminary geological survey was made of the Peter Pan Goldmine.

The mine is situated one mile west of the township, and is located on a westerly trending shear zone extending from the Wheal Doria to the Big Ben Goldmines.

Recorded production up to 1952 (Ivanac, 1954) shows that 231.78 long tons of ore have been won, assaying 7.04 dwts/ton. The last parcel of ore crushed was in 1948, when 24 tons of ore assayed 9.04 dwts/ton; gold fineness in this case was 826.

Most of the gold has come from sheared and brecciated sediments impregnated with varying amounts of iron oxide, and with minor copper.

The mine had previously been examined by P.G. Dunn and W.S. Yeaman, Resident Geologist at Tennant Creek, in 1964, and a geochemical survey and one diamond drill hole had been completed.

The ground magnetic survey carried out by the A.G.G.S.N.A. in 1937-39 did not reveal the presence of any anomalous areas. (Daly, 1957).

GEOLOGY

Lithology

The surface geology within the gridded area is shown on plate 2.

Quartz feldspar porphyry outcrops in the northern part of the lease. The southern boundary of the porphyry is sheared, and this shear zone, trending generally easterly to north-easterly, dips to the north at angles between 60° and 70°.

The sediments in the southern part of the lease consist of highly cleaved and sheared chloritic phyllites, which are locally brecciated. Regional dip is northerly at a high angle, 70° to 90°. About one hundred feet from the porphyryr contact, the sediments consist of greywacke and shale, dipping northerly at 60°. The shale members are very ferruginous, and occasionally banded. The greywackes are generally fine grained.

Several hematite lodes occurs within the lease; these lodes contain quartz and jasper, both as irregular inclusions and as ramifying veinlets.

Structures

The sediments form part of the north-dipping limb of a westerly pitching anticline. The angle of pitch is about 10°. The dip of the sediments steepens adjacent to the porphyry contact; core of the existing diamond drill hole (DDH 1) shows a series of vertically dipping shears in the sediments close to this contact, and the porphyry is also sheared in places.

The relationship of the porphyry to the lamprophyre intersected in D.D.H. 1 is obscure. The lamprophyre is a dyke-like body intruded along a vertical shear zone, and appears to be unmineralised. As copper mineralisation is present in the porphyry, the quartz-hematite lodes and the sedimentary rocks, it is concluded that the quartz-hematite and associated mineralisation are related to the porphyry, but that the lamprophyre is a later intrusion.

GEOCHEMICAL SURVEY

P.G. Dunn and W.S. Yeaman made a geochemical survey of the lease in February 1964. This showed three anomalous zones of copper, lead and cobalt values. These zones parallel the strike of the sheared porphyry/sediment contact, one occurring along it and one on either side of it, i.e. in both sediments and porphyry.

The results cannot be considered conclusive, owing to the wide spacing of the sample lines and the small number of samples collected, (total 44), but a possible mineral concentration along the porphyry/sediment contact appears to be indicated.

GEOPHYSICAL SURVEYS

Between 1937 and 1939, the A.G.G.S.N.A. carried out a ground magnetic survey over the area (Daly, 1957, p. 26 and pl. 5 sheet 1).

Within the area of the lease, no magnetic anomalies were outlined, although a major anomaly (No. 1) was revealed just northwest of the goldmine. This anomaly was drilled, but the hole was stopped short of the target depth (Daly, 1957, p. 26).

PREVIOUS DRILLING

In February 1964, D.D.H.1 was drilled to investigate the rocks close to the porphyry sediment contact at a point where visible malachite stains are present along the shear planes (see plate 2). The drill log is presented in Appendix A, and summarised in plate 3. Due to caving, the hole was terminated at a depth of 262'; the drill hole passed through lamprophyre but did not intersect the sheared contact.

Assays of the lamprophyre and metasomatised sediments showed nil values of gold, (Dunn and Yeaman, 1964).

CONCLUSIONS & RECOMMENDATIONS

Previous geological mapping and geochemical surveys have revealed copper mineralisation at the sheared porphyry/sediment contact.

It is recommended that a programme of wagon drilling be carried out. Nineteen sites have been selected (see plate 2) to test the mineralised porphyry/sediment contact. The drill holes should be vertical and put down to a depth of 250 feet.

Consideration should also be given to supplementing the previous geochemical survey by sampling along lines at 50 to 100 feet spacings.

Depending upon the results obtained by the wagon drilling and geochemical survey, consideration might be given to carrying out further exploratory diamond drilling within the lease area.

REFERENCES

CROHN, P.W. & OLDERSHAW, W., 1965 - The Geology of the Tennant Creek One Mile Sheet Area, N.T. Bur. Min. Resour. Report. No. 83.

IVANAC, J.F., 1954 - The Geology and Mineral Deposits of the Tennant Creek Goldfield, Northern Territory. Bur. Min. Resour. Bull. No. 22.

DALY, J., 1957 - Magnetic Prospecting at Tennant Creek, Northern Territory 1935-37. Bur. Min. Resour. Bull. No. 44.

DUNN, P.G., and YEAMAN, W.S., 1964 - Minor Metalliferous Investigations, Tennant Creek Goldfield, N.T. Bur. Miner. Resour. Aust. Rec. 1964/186 (unpubl.).

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

APPENDIX A

PROJECT PETER PAN GOLDMINE — REMARKS 1" = 20'

HOLE No D.D.H. 1. — COORDINATES 70 N/ 1160 E — BEARING

LOCATION TENNANT CREEK, N.T. — ANGLE FROM HORIZONTAL - 60° — GRID BEARING 340° T.

DESCRIPTION OF CORE	RL CASING	DEPTH SIZE OF CORE	LOG	% RECOVERY	SAMPLES	REMARKS	ASSAYS
NO CORE				NIL			
5'6"							
Interbedded greywacke and shale. Sedimentary structures indicate drilling stratigraphically downwards.				LIFT 30'5" RECOVERY 99.7%		Bedding / Core Axis = 30°.	
39'5"							
As above. Sediments generally more ferruginous. Manganese staining at 83'.				LIFT 33'11" RECOVERY 91.9 %		Bedding / Core Axis = 40°	
83'10"			Mn.				
Interbedded shale and fine grained greywacke.		BX		LIFT 47'10" RECOVERY 96.5 %		Bedding / Core Axis = 30°	
						Cleavage / Core Axis = 0° at 124'	
133'6"							
Greywacke 137'0"						No information on recovery	
Black Shale				LIFT 1'3"			
145'0"							
Biotite Lamprophyre				LIFT 18'2"			
163'7"							
Black Chloritic slate with thin greywacke bands				LIFT 8'			
172'1"							
Biotite Lamprophyre with quartz stringers at 220'				LIFT 54'9"			

DRILL NO EDICO Mk II, TYPE

DRILLER J. GREEN

COMMENCED 1964 (Feb)

COMPLETED 1964 (Feb).

EXPLANATION

CASING IN HOLE DURING DRILLING

REFERENCES

Hole sited to investigate ground vertically beneath sheared zone near porphyry/sediment contact.

HEAD OFFICE

LOGGED BY P.G. DUNN

DRAWN BY B.A. TAPP

CHECKED BY B.A. TAPP

SHEET 1 OF 2

DRAWING NO 5

GD130 To accompany Record 1969/92.

E53/A14/188(1) ~~G68/83E~~

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

APPENDIX A

PROJECT: PETER PAN GOLDMINE. REMARKS: 1" = 20'

HOLE NO: DDH 1 CO-ORDINATES: 70 N / 1160 E BEARING:

LOCATION: TENNANT CREEK, N.T ANGLE FROM HORIZONTAL: -60 DIRECTION: 340° T

DESCRIPTION OF CORE	R.L. CASING	DEPTH / SIZE OF CORE	LOG	% CORE RECOVERY	SAMPLES	REMARKS	GOLD ASSAYS DWTS/TON
Lamprophyre (described above)							
220							NIL
224'3"							NIL
Slate and greywacke.		B x		LIFT 13'9" RECOVERY 95.0%			NIL
240							NIL
239'6" Black Slate				3'7"		Badly Sheared Black Chloritic Sludge.	NIL
243'0" No Core				NIL			NIL
247'0"							NIL
Black Chloritic Slate.		E x		LIFT 2'		Hole surveyed only in top section. Caved badly at 243'	NIL
260							NIL
262'						END of HOLE	

DRILL NO: EDICO
TYPE: MARK II.

DRILLER: J. GREEN
COMMENCED: 1964. Feb.
COMPLETED: 1964 Feb.

EXPLANATION

CASING IN HOLE DURING DRILLING

REFERENCES

HEAD OFFICE

LOGGED BY: P.G. DUNN
DRAWN BY: B.A. TAPP
CHECKED BY: B.A. TAPP

SHEET 2 OF 2
DRAWING NO 5

GD130 To accompany Record 1969/92

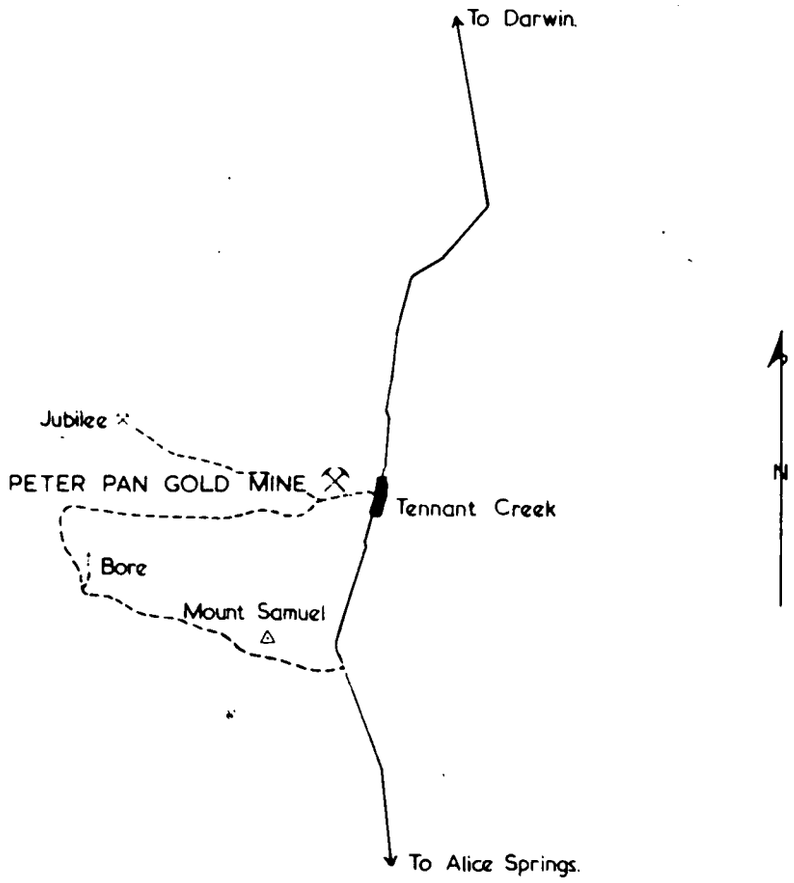
~~G68/84E~~ E53/A14/188(2)

APPENDIX B

GEOCHEMICAL RESULTS

All results are given in parts per million.
* indicate less than.

Grid Reference	Copper	Lead	Zinc	Cobalt	Bismuth	Molybdenum
00E/00N	6	6	20	3	2	1
50N	6	4	25	3	1	1
100N	3	5	25	3	2	2
150N	200	20	40	6	5	4
200N	40	7	30	10	5	5
250N	15	15	40	10	1	2
300N	12	4	30	4	1	*1
350N	40	7	30	7	1	2
400N	12	4	25	6	2	4
400E/00N	30	7	20	6	2	1
50N	120	5	50	7	5	3
100N	10	8	26	6	1	1
150N	40	25	25	8	2	2
200N	30	8	20	6	2	2
250N	10	8	20	5	3	4
300N	15	5	20	5	1	1
350N	12	8	20	5	2	1
400N	10	5	*20	6	1	1
800E/00N	8	4	20	1	30	1
50N	250	15	60	7	6	6
100N	50	4	40	6	5	2
150N	200	20	20	6	6	4
200N	200	6	40	20	2	2
250N	12	3	20	3	2	3
300N	15	4	20	4	3	3
350N	20	6	25	6	3	4
400N	30	5	20	4	2	1
1200E/00N	8	3	25	1	15	2
50N	12	3	500	12	4	*1
100N	100	250	30	4	2	3
150N	250	5	25	7	5	5
200N	150	8	20	10	3	3
250N	40	7	20	5	4	2
300N	250	8	30	7	4	2
350N	400	10	20	6	4	2
400N	120	4	50	10	2	*1
1600E/00N	40	3	20	1	1	2
50N	250	20	20	*1	1	2
100N	120	6	50	5	2	*1
150N	60	4	50	4	1	3
200N	200	4	50	150	3	2
250N	200	3	20	6	5	6
350N	40	12	25	2	2	1
400N	20	30	25	1	1	1



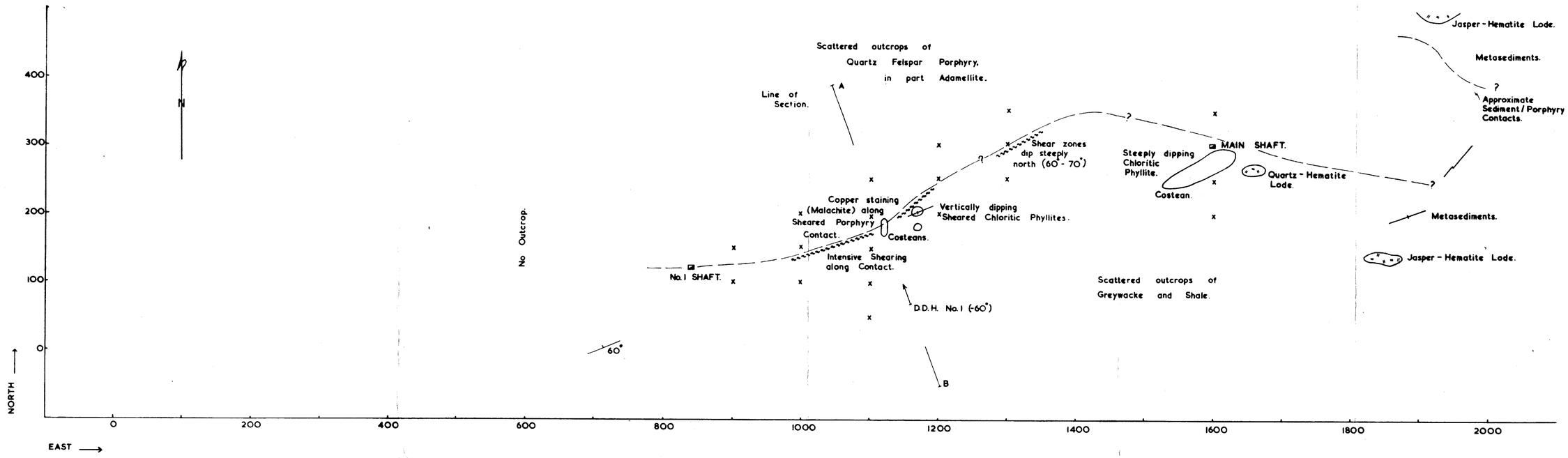
LOCALITY MAP
PETER PAN GOLD MINE
TENNANT CREEK

5 0 5

Scale 1:250,000

To accompany Record 1969/92
COMPILED BY RESIDENT GEOLOGICAL SECTION.
DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, OCTOBER, 1968

Plate 2



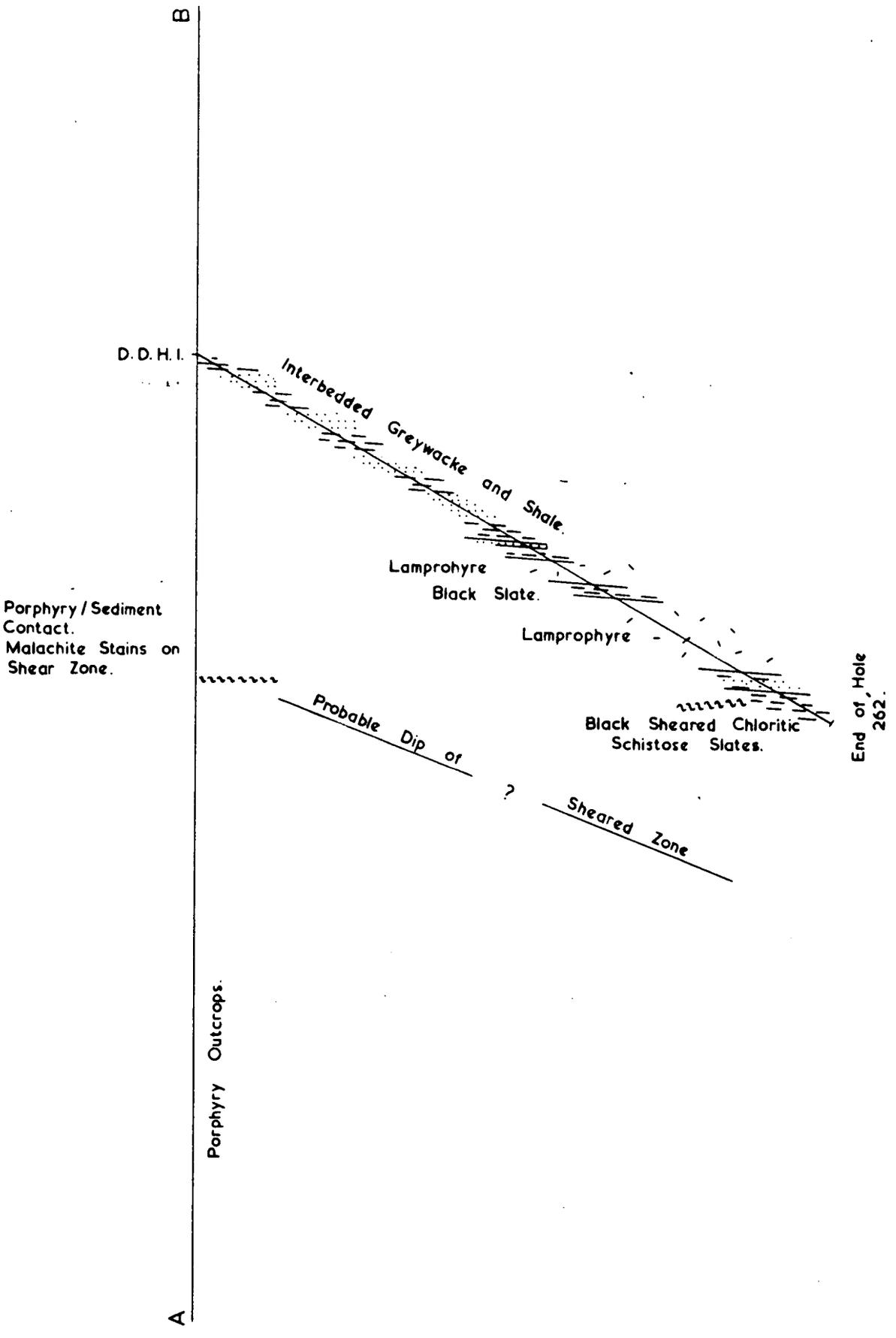
PETER PAN GOLD MINE
TENNANT CREEK
GEOLOGICAL MAP

SCALE
100 50 0 100 feet.

x Proposed wagon drill hole site

COMPILED BY RESIDENT GEOLOGICAL SECTION DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, SEPTEMBER, 1968. To accompany Record 1969/92

PLATE 3.



GEOLOGICAL CROSS SECTION

PETER PAN GOLD MINE

TENNANT CREEK

SCALE

50 0 50 feet.

V/H = 1

To accompany Record 1969/92

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DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, SEPTEMBER, 1968.

E53/A14/185

~~668/82E~~

PRELIMINARY INVESTIGATION - MAURETANIA GOLDMINE

TENNANT CREEK, N.T.

by

B.A. Tapp

Contents

Plates

SUMMARY

The Mauretania Goldmine is situated 11 miles east-north-east of Tennant Creek.

Gold occurs in a quartz-hematite lode, located in a major east-west trending brecciated crush zone in the crestal region of an easterly plunging anticline.

The A.G.G.S.N.A. ground magnetometer surveys of 1935-1937, revealed the presence of a small 200 gamma anomaly associated with the ironstone lode.

An exploratory magnetometer survey and drilling programme are recommended.

INTRODUCTION

The Mauretania Goldmine is situated about 11 miles east-north-east of Tennant Creek.

Access to the mine is by the "Pigeon Holes" track via the Lone Star and Black Cat goldmines.

The mine has been pegged previously as the Never-in-Doubt, Extension East and North Star.

The lease area was mapped by plane-table in January/February 1966. The underground workings were inaccessible.

GEOLOGY

The ore-body is located in the crestal region of an easterly pitching anticline in Proterozoic sediments of the Warramunga Group. The sediments are highly cleaved in an east-west direction, and consist of interbedded mudstones, shales and sandstones. Dips are generally steep, between 50 and 70 degrees.

The sandstones are predominantly fine grained, ferruginous and tuffaceous; outcrops are well weathered and crumbly. The mudstones and shales are ferruginous, with occasional bands of hematite shale.

The gold-bearing quartz-hematite lode is localised within a major brecciated crush zone. The hematite lode is hard, compact, massive, and slightly jaspery, while the breccia zone is characterised by kaolinised and sericitised sediments, with small hematite pebbles and ramifying limonite stringers. Bismuth carbonate is locally associated with the ironstone fragments.

Surface assays of the ironstone lode revealed only low gold values, up to 0.7 dwts/ton, whereas samples taken from the adjacent crush breccia assayed slightly higher, up to 2.7 dwts/ton.

PRODUCTION

Northern Territory Mines Branch records, (Ivanac, 1954, pp.3-4) show that 48.6 tons of ore have been mined yielding 210 fine ounces of gold, at an average recovery of 86.5 dwts/ton. This was one of the richest ore-grades worked on the goldfield.

However, the mine has not been worked since 1942.

GROUND MAGNETIC SURVEYS

During 1937, the A.G.G.S.N.A. made three ground magnetometer traverses across the lease area and partly outlined a small 200 gamma anomaly just east of the main shaft (Daly, 1957, Plate 14).

RECOMMENDATIONS

The following further exploratory work is recommended :-

1) A detailed ground magnetic survey should be made to determine the extent of the ironstone lode beyond the known occurrences.

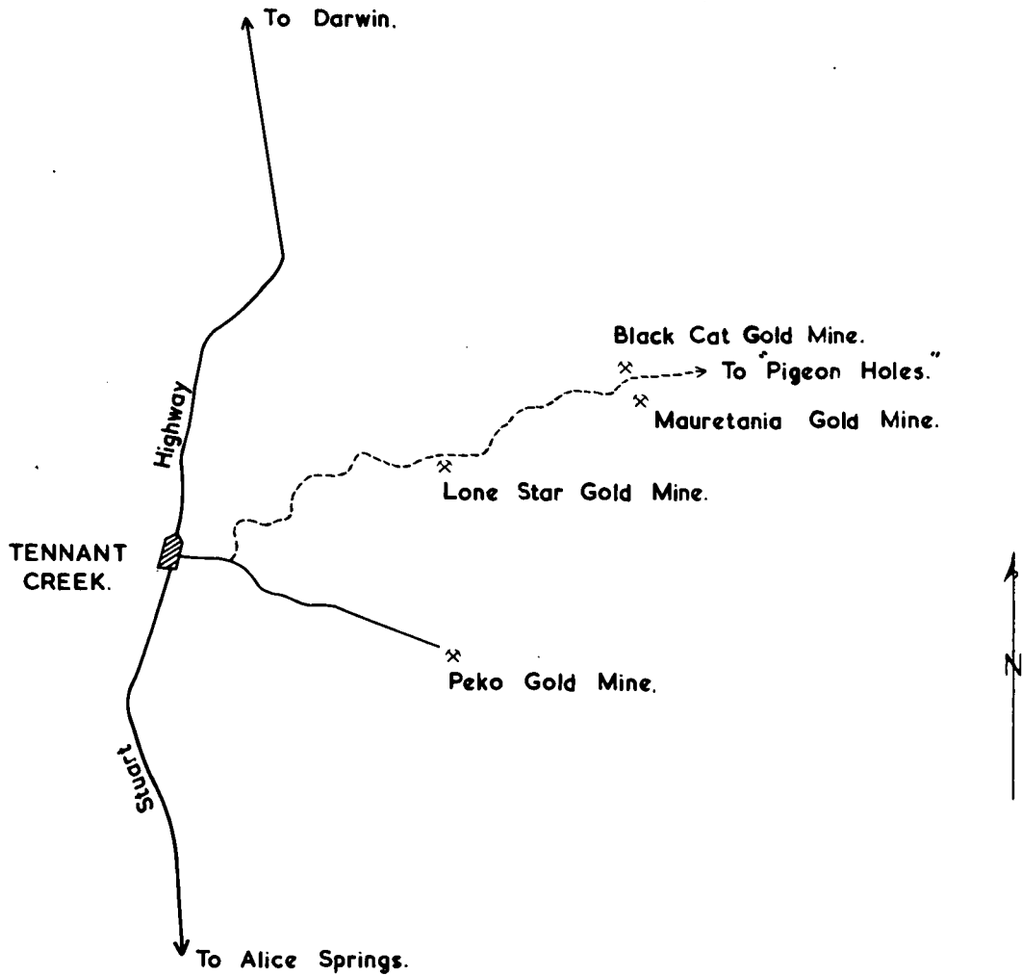
2) A wagon-drilling programme is suggested to intersect the ironstone lode at depths of between 100 and 150 feet, in order, to outline the extent of the ore-shoot originally worked from the main shaft.

REFERENCES

IVANAC, J., 1954 - The Geology and Mineral Deposits of the Tennant Creek Goldfield, N.T. Bur. Min. Resour. Aust. Bull. 22.

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

PLATE 1.



LOCALITY MAP
MAURETANIA GOLD MINE
TENNANT CREEK

5 0 5

Scale 1:250,000

To accompany Record 1969/92

E53/A14/182

COMPILED BY RESIDENT GEOLOGICAL SECTION,
DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, SEPTEMBER, 1968.

~~668/79E~~

MAURETANIA GOLD MINE
TENNANT CREEK
GEOLOGY – SURFACE OUTCROP

40 20 0 40 feet.

SCALE

Contour Interval 10'

To accompany Record 1969/92

Base station assumed, datum level 0.

Scree rubble predominantly sandy shale fragments.

Massive jasper – ironstone lens.

0·7 0·7 2·6

Haematitic shales and mudstones.

Highly cleaved, interbedded shales and mudstones.

Dump

Main shaft. (ironstone at 100' level)

Open cut.

2·7

Shear breccia Limonite, Haematite, with Kaolinised / sericitised sediment, exposed in open cut.

Major crush zone.

Scree rubble.

Well cleaved interbedded shales and siltstones. (cleavage 100°)

Approx. position of axis of tight anticlinal fold pitch 15° E

N

LEGEND

- Ironstones.
- Major shear zone.
- Dip and strike of strata.
- Sample locations (gold assays in dwts / ton.)

COMPILED BY RESIDENT GEOLOGICAL SECTION,
DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, SEPTEMBER, 1968.

E53/A14/183

G68/80E

PLATE 2.