

THE CLARK COPPER MINE, MOUNT DOREEN, NORTHERN TERRITORY

- by -

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SUMMARY

This report describes the results of an investigation at the Clark Copper Mine, Northern Territory.

The main purpose of the investigation has been to get information about the secondary copper ore available at the prospect.

The Clark Copper Mine is one of several copper prospects in the Mount Doreen - Mount Hardy - Yuendumu mineral field; previous work was carried out in the 1950's but the mine was later abandoned.

The mine is located in metamorphic rocks, of the Arunta Complex; mineralization is in some quartz veins and also in the walls of country rock. The ore consists of copper carbonates, malachite and azurite, plus minor chalcocite in the oxidized zone. Chalcopyrite, together with pyrite, sometimes occurs in the sulphide zone.

Six diamond drill holes, totalling 927 feet, were drilled. 30 samples from ore dumps, workings and drill cores were assayed. The results show that there has been surface enrichment.

It is estimated that there are at least 8,500 tons of oxidized ore available for extraction. The average grade is about 3.5% Cu.

INTRODUCTION

The Clark Copper Mine is located about 235 miles N.W. of Alice Springs (see fig. 1). Besides copper, tungsten has been worked at Wolfram Hill near the abandoned Mount Doreen homestead 18 miles from the Clark Copper Mine.

The Mine is situated 1 mile north of Mount Singleton track. A bush track leading to Clark Mine is located approximately 2 miles from Cox's Bore, on the road from Mount Doreen homestead.

PREVIOUS INVESTIGATIONS AND MINING

A programme of trenching and pitting was completed in the 1950's and some ore was stockpiled at the mine. Activity at the mine ceased after an apparently short period of exploitation.

The Clark Copper Mine consists of three prospects within half a mile of each other.

D. J. Grainger, Resident Geologist, Alice Springs, began a rough geological survey of the abandoned mine in June 1968. Between October and December, 1968 Grainger carried out a more detailed survey.

The mine area is ^{currently} covered by Reserve No. 304.

GENERAL GEOLOGY

The country rocks of the Clark Copper Mine area are phyllites, gneisses and granite gneisses of the Precambrian-Aranta Complex which possibly has been intruded by the Mount Doreen granites. Quartz veins are common in phyllite.

METAMORPHIC ROCKS

The phyllite is a lustrous, fine-grained, foliated and fissile rock. At the surface because of weathering it appears rusty brown but fresh rock is grey; its lustre is due to the presence of sericite and chlorite.

Gneisses include mica-gneiss with granoblastic and equigranular texture, coarse-grained banded-gneiss, locally garnetiferous, quartzofeldspathic gneiss and granite-gneiss. Some augen-gneisses are considered to be sheared granite.

IGNEOUS ROCKS

Porphyritic biotite granite, with slightly gneissic texture, outcrops on the track to Cox's Bore and in the southern part of the area. It also occurs in DDH 1 core at a downhole depth of 180 feet.

Pegmatitic granite outcropping around No. 3 workings and on the south side of the hills, is separated from the porphyritic granite by a zone of shearing. This granite was intersected by the first drillhole.

STRUCTURE:

The general strike of the metamorphic rocks is 65° to 80° magnetic, the foliation dips steeply to north west. The major quartz veins are probably fault infillings. The largest veins are usually concordant with the foliation of the phyllites, the minor ones are normally discordant.

A shear zone, with an approximate strike ENE-WNW divides the pegmatitic leucocratic granite from a porphyritic biotite granite in the southern part of the area.

A large regional fault immediately south of Clark Mine, striking about 114° is identifiable on the aerial photograph covering the area (Mt. Doreen, Run 1, Photo No. 5180).

ECONOMIC GEOLOGY

The Clark Mine is one of several small copper prospects which occur in a belt between the Mt. Doreen and Mt. Benison homesteads. Copper is present in quartz veins and in pegmatites. Minor chalcocite is also present in the oxidized zone. No evidence of sulphides is apparent at the surface, but in the cores minor occurrences of chalcopyrite and bornite, together with some pyrite were identified.

It is of interest that in copper prospecting a shrub of the family Geodeniaceae, sometimes known as "the copper plant" is often seen. These plants are to be seen flowering in the

Mt. Hardy area too.

The copper mineralization is associated with quartz and some pegmatite veins, but is rarely present in phyllites and gneisses. Copper mineralization is richer above the water table, occurring as malachite and azurite. A little primary mineralization is apparent in the drill cores but no concentrations were intersected. Chalcopyrite, pyrite and bornite mineralization is visible in the form of small clots and grains sparsely disseminated in thin quartz veins. Chalcocite is present within the oxidized zone and is considered to be secondary sulphide enrichment.

DIAMOND DRILLING

Six diamond drill holes, totalling 927 feet were drilled by Mines & Water Resources Branch at the Clark Copper Mine (see Appendix 1 and figs. 2, 3) Drill hole 1 located about 95 yards NNW of the middle of the open cut of No. 3 workings, was drilled with a 45° depression and a bearing of 157° magnetic to obtain information about primary sulphide mineralization beneath the prospect, but the main quartz vein was not intersected and only very small amounts of chalcopyrite and pyrite were logged in the core. DDH2, sited 85 yards NW of the northern end of No. 1 workings, was drilled at a depression of 45° on a bearing of 125° magnetic to investigate the section below the main trench of No. 1 workings. No significant mineralization was intersected. Drillhole 3, planned to test secondary ore was drilled at 10 feet N of the NW corner of No. 1 workings with a depression of 65° and a magnetic direction of 173½°. Copper carbonate minerals occur in the core to approximately 37 feet, down hole depth. Drillholes 4 and 5, were drilled at about 10 feet SE of the middle of the open cut with depressions of 50° and 60°, on a bearing of 335° magnetic. The first drillhole intersected oxidized copper mineralization at between 10 feet and 37 feet, the steeper hole intersected the mineralized vein at between 35 feet and 55 feet. Mineralization consists of malachite, together with a little azurite intersected in the second hole. Drillhole DDH6 was put down about 1 foot S of the main vein and 10 feet W of the valley track: the angle of depression was 75° on a bearing of 350° magnetic. Here copper mineralization consisting of malachite, azurite and a little native copper (probably due to oxidation of sulphide minerals) extends to a downhole depth of 93 feet.

ASSAY RESULTS:

Fifteen surface samples from ore dumps and workings were assayed for copper, and 15 split core samples usually in one foot lengths, were assayed for copper, lead, zinc, nickel and silver. (see appendix II). The copper content for the chip samples taken from the main ore dumps is probably upgraded by handpicking and therefore the high values have little significance; copper assay values for samples from No. 1 and No. 3 workings, ranging up to 7.5% are believed to represent a true average grade. There is a marked difference between copper values for surface samples or oxidized zone core samples, and sulphide zone core samples, the mineralization in the sulphide zone being much lower grade.

TONNAGE:

The best areas for exploitation of oxidized ore are below the open cut of No. 3 workings and at No. 2 workings, in the middle of the valley, where the deepest copper carbonate mineralization was found and the presence of native copper indicates secondary enrichment. Ore reserves estimated at 8,500 tons are made up as follows:

1. Broken 2,800 tons of 7% Cu.
(of which 470 at No. 1.
130 at No. 2.
2,200 at No. 3.
workings.)
2. Probable to depth 35 ft. at No. 1 workings: -1,100 tons of 2% Cu.
3. Probable to depth 90 ft. at No. 2 workings: -1,700 tons of 3% Cu.
4. Probable to depth 40-50 ft. at No. 3 workings: -2,900 tons of 2% Cu.

CONCLUSIONS AND RECOMMENDATIONS

There are three main ore zones at the Clark Copper Mine. Copper mineralization consisting of malachite and azurite is concentrated near the surface, and is always in association with quartz veins. No massive concentrations of copper sulphides were found at depth. Chalcocite is present in the secondary mineralization zone as a replacement of chalcopyrite. Ore reserves are estimated of about 8,500 tons averaging 3.5% Cu. No further diamond drilling is recommended at this stage.

ACKNOWLEDGEMENT

My thanks are due to the superintendent and staff of Yuendumu Settlement for the help and kindness shown to me during the investigations.

REFERENCES

- Grainger, D. J. 1968 The Mount Hardy Copper Mine, Northern Territory, Bur. Miner. Resour. Aust/ REC. 1968/100.
- Grainger, D. J. 1968 Preliminary Report on the Clark Copper Mine, Mt. Doreen, N.T. Unpubl. Rep. Res. Geol. office, N.T.A., Alice Springs, N.T.
- Grainger, D. J. 1968 Notes on the Clark Mine, Mt. Doreen, Res. Geol. Office, N.T.A., Alice Springs, N.T.
- Madigan, G. T. 1937 Report on a Reconnaissance in the Mt. Doreen Mineral Field, Central Aust. Unpubl. Rep. Res. Geol. Office, N.T.A., Alice Springs, N.T.

APPENDIX II

Assay Results*

TABLE 1.

<u>Sample No.</u>	<u>LOCATION.</u>	<u>Results, Cu%</u>
F52/12-12	(1) Ore dumps at No. 3 workings	13.0
	(2) " " " " " "	11.8
	(3) " " " " " "	13.7
	(4) " " " " " "	14.5
	(5) Channel Samples at No. 3 workings	3.6
	(6) " " " " " "	7.5
	(7) " " " " " "	4.6
	(8) " " " " " "	3.8
	(9) Ore dumps at No. 3 workings	6.4
	(10) " " " " " "	8.7
	(11) Ore dumps at No. 1 workings	17.0
	(12) Across width of No. 1 workings	5.6
	(13) " " " " " "	3.2
	(14) " " " " " "	8.4 (contaminated with No. 15)
	(15) Ore dump at No. 1 workings	8.8

* Assays by Mines Branch Laboratory, DARWIN.

ORIGINAL

CERTIFICATE OF ANALYSIS

No 544

ATTN. MR. O. FRUZZETTI

EAST POINT LABORATORY,
DARWIN

9 / 6 / 1969

I hereby certify that the results for the analysis of material submitted by Resident Geologist

of Alice Springs

are as follows:— D.D.H. Cores, Clark Mine, Mt. Doreen.

Client's Reference Number	Assay Register Number	Analysed for						Result
Samples received 17.4.69								
DDH 2		Au	Ag	Cu	Pb	Zn	Ni	
		Oz/ton	%	%	%	%	%	
152-153 (20)	69/68	<0.2	0.03	0.01	0.01	<0.01		
249-250 (20)	69/69	<0.2	1.34	0.02	0.03	<0.01		
285-286 (22)	69/70	<0.2	0.05	0.01	0.01	<0.01		
DDH 3								
23-24 (23)	69/71	Sample lost						
33'9"-34'9" (24)	69/72	<0.2	0.83	0.01	0.05	0.02		
DDH 6								
18'-19' (25)	69/73	1.1	3.60	0.14	0.60	<0.01		
85'6"-86'6" (26)	69/74	0.2	0.66	0.05	0.03	<0.01		
DDH 4								
17'6"-18'6" (27)	69/75	<0.2	0.24	0.01	0.01	<0.01		
31-32 (28)	69/76	<0.2	2.10	0.01	0.01	<0.01		
DDH 5								
15'-16' (29)	69/77	<0.2	0.19	0.01	0.02	<0.01		
40'3"-41'3" (30)	69/78	Sample Lost						

Note: Re samples, Assay Nos. 69/68 - 69/78.

I regret that the above results cannot be guaranteed due to an error in sample preparation which resulted in the loss of 2 samples and the possibility of the individual sample numbers becoming mixed.

It would be highly desirable for repeat determinations to be made on fresh samples, if these cores are available. We could treat these repeats as "urgent".

John Leadley
Chemist in Charge

D

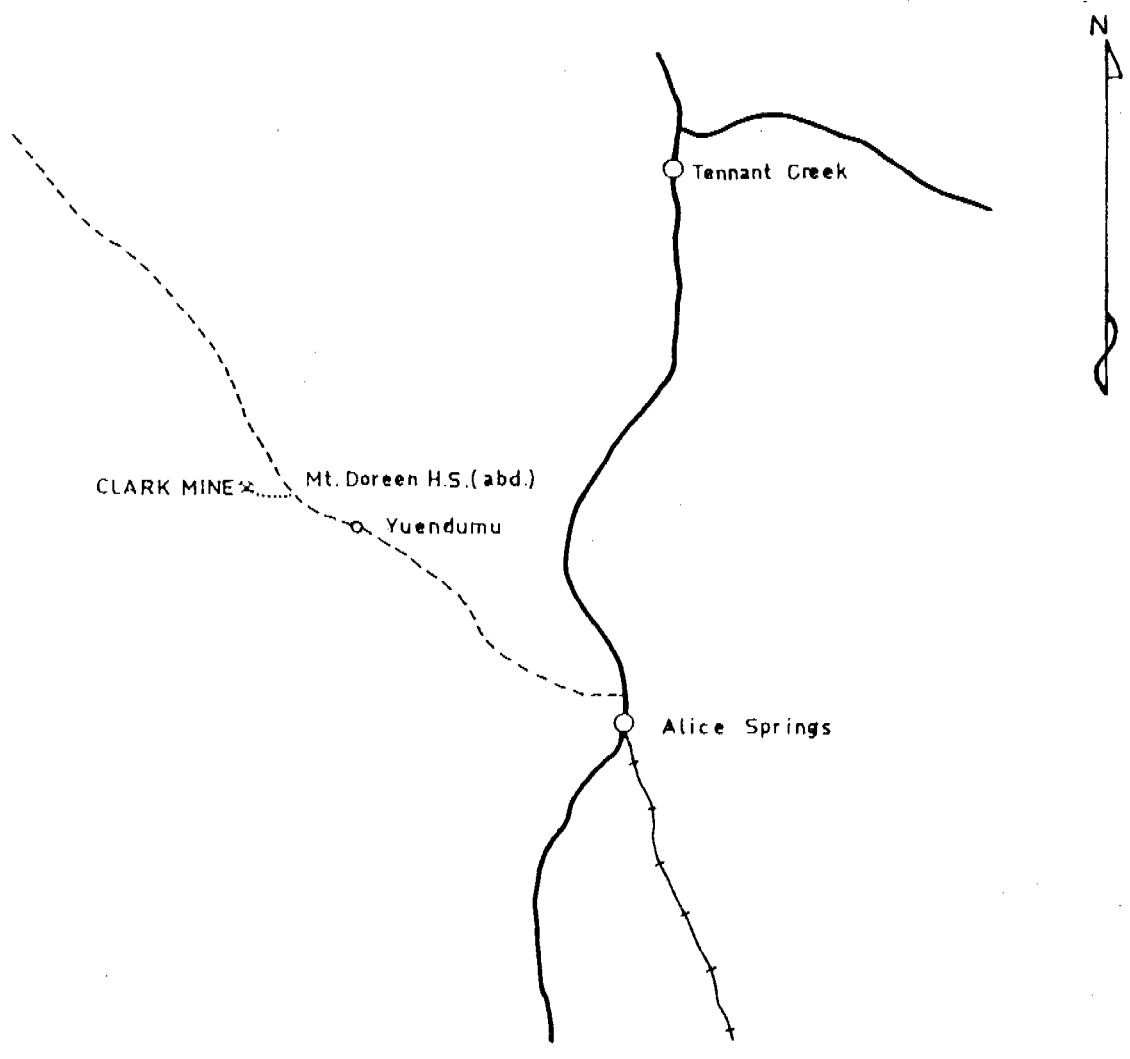
Assay Results*

Sample No.
F52/12-12

TABLE 2.

<u>INTERVAL</u>		<u>RESULTS</u>				
	<u>DEPTH</u>	<u>Ag.</u> <u>oz/ton.</u>	<u>Cu.</u> <u>%</u>	<u>Pb.</u> <u>%</u>	<u>Zn.</u> <u>%</u>	<u>Ni.</u> <u>%</u>
(16)	39' - 40'	< 0.2	0.01	0.02	0.01	< 0.01
(17)	45' - 46'	< 0.2	0.01	0.03	0.01	< 0.01
(18)	334' - 335'	< 0.2	0.07	0.02	0.01	< 0.01
(19)	337' - 338'	< 0.2	0.01	0.14	0.02	< 0.01
DDH2						
(20)	152' - 153'	< 0.2	0.03	0.01	0.01	< 0.01
(21)	249' - 250'	< 0.2	1.34	0.02	0.03	< 0.01
(22)	285' - 286'	< 0.2	0.05	0.01	0.01	< 0.01
DDH3						
(23)	23' - 24'	Sample lost				
(24)	33'9" - 34'9"	< 0.2	0.83	0.01	0.03	0.02
DDH6						
(25)	18' - 19'	1.1	3.60	0.14	0.60	< 0.01
(26)	85'6" - 86'6"	0.2	0.66	0.03	0.03	< 0.01
DDH4						
(27)	17'6" - 18'6"	< 0.2	0.24	0.01	0.01	< 0.01
(28)	31' - 32'	< 0.2	2.10	0.01	0.01	< 0.01
DDH5						
(29)	15' - 16'	< 0.2	0.19	0.01	0.02	< 0.01
(30)	40'3" - 41'3"	Sample lost				

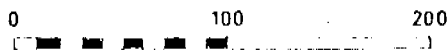
* Assays by Mines Branch Laboratory, DARWIN.

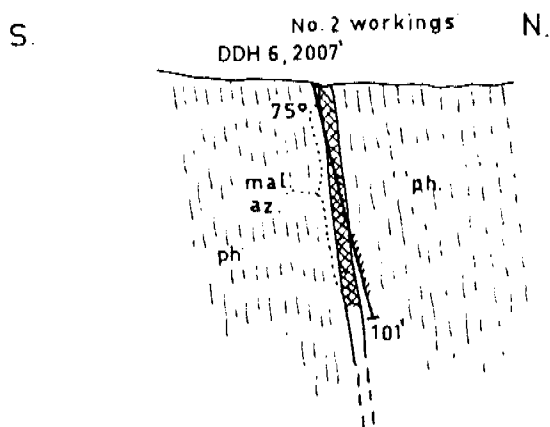
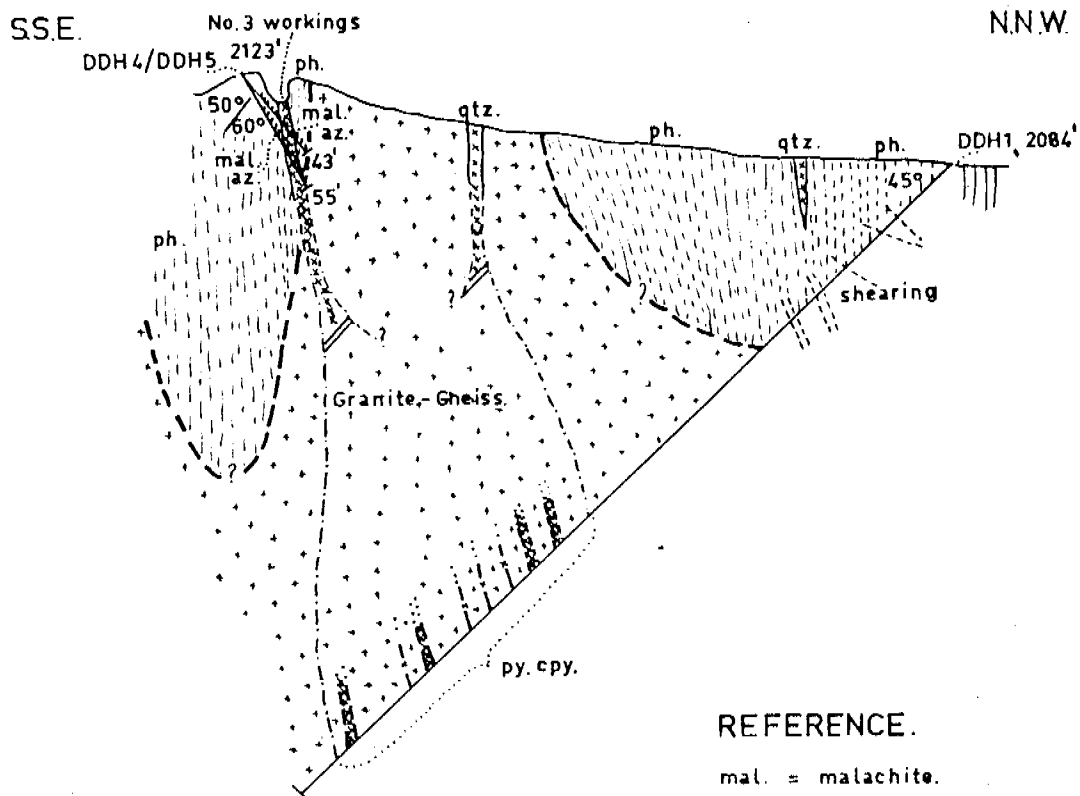


CLARK MINE

LOCALITY MAP - NORTHERN TERRITORY

SCALE - MILES





REFERENCE.

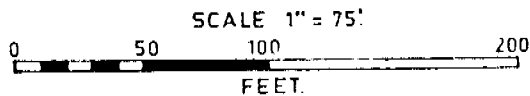
- mal. = malachite.
- az. = azurite.
- cpy. = chalcopyrite.
- py. = pyrite.
- ph. = phyllites.
- qtz. = quartz.

ASSAYS.

DDH	INTERVAL	%CU.
1	39' - 40'	0.01
1	45' - 46'	0.01
1	334' - 335'	0.07
1	337' - 338'	0.01
4	176' - 186'	0.24
4	31' - 32'	2.10
5	15' - 16'	0.19
6	18' - 19'	3.60
6	856' - 866'	0.66

CLARK MINE
(NORTHERN TERRITORY)

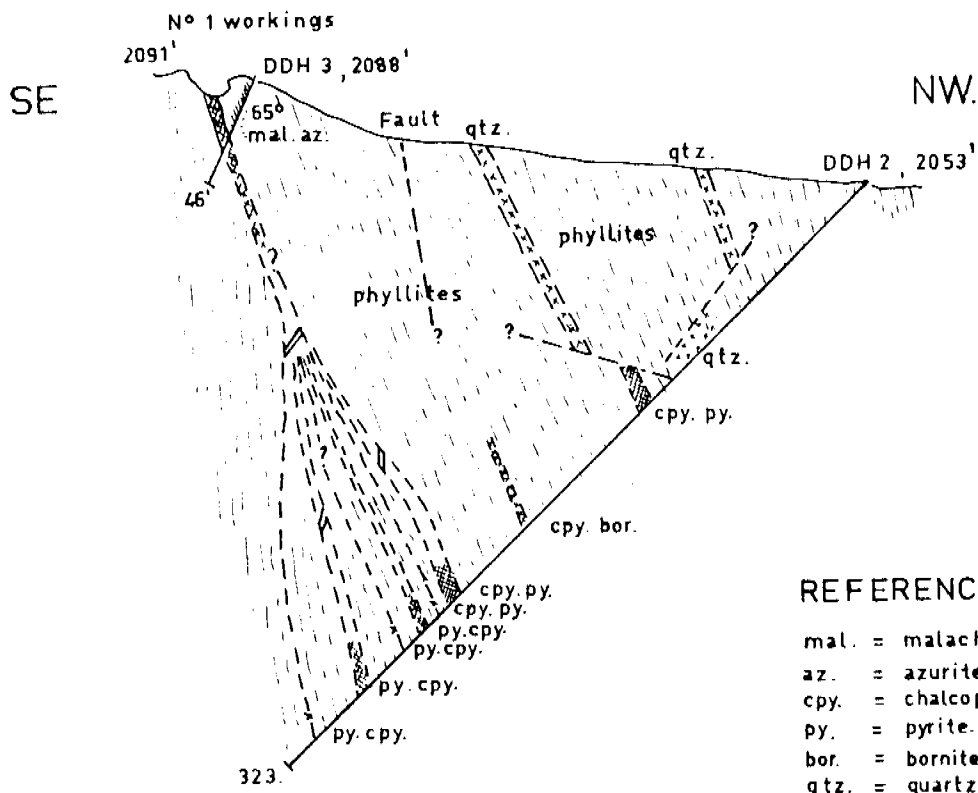
SECTIONS OF DIAMOND DRILL HOLES N^o 1, 4, 5 & 6.



COMPILED BY RESIDENT GEOLOGICAL SECTION,
DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, DECEMBER, 1970.

G71/11E.

FIG. 3.



REFERENCE

- mal. = malachite.
- az. = azurite.
- cpy. = chalcopyrite.
- py. = pyrite.
- bor. = bornite.
- qtz. = quartz.

ASSAYS.

DDH	INTERVAL	% CU.
2	152 - 153	0.03
2	249 - 250	1.34
2	285 - 286	0.05
3	339 - 349	0.83

CLARK MINE

(NORTHERN TERRITORY)

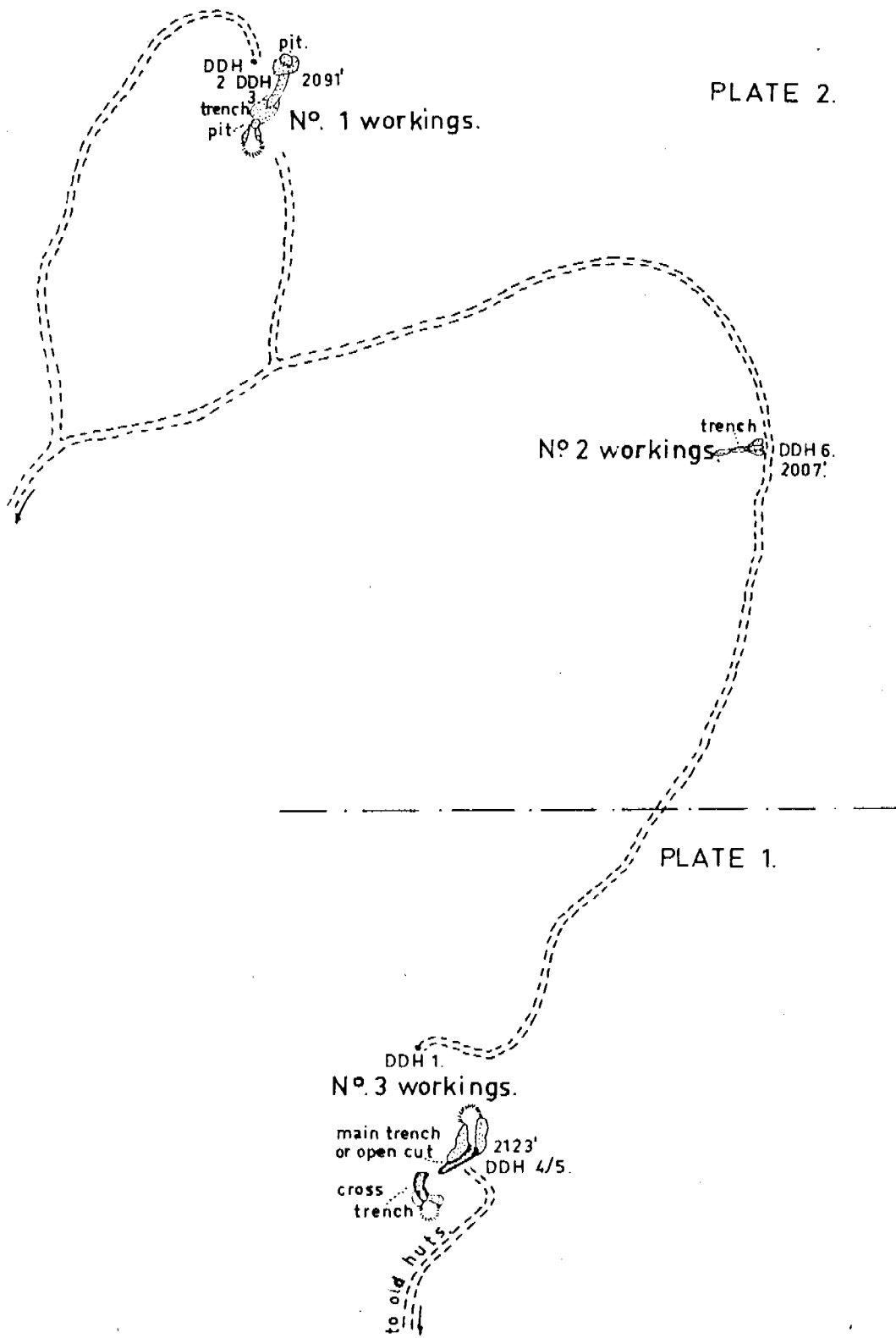
SECTIONS OF DIAMOND DRILL HOLES N° 2 & 3.

SCALE 1" = 75'



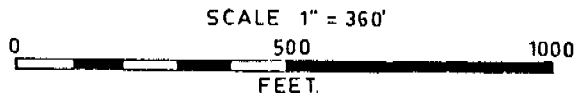
COMPILED BY RESIDENT GEOLOGICAL SECTION,
DRAWN BY MINES BRANCH DRAUGHTING OFFICE, DARWIN, DECEMBER, 1970.

G71/12E.



CLARK MINE
(NORTHERN TERRITORY)

RELATIONSHIP BETWEEN N° 1, 2 & 3 WORKINGS



GEOLOGICAL LOG OF DRILL HOLE

PROJECT **CLARK COPPER MINE, MT. DOREEN, N.T.** REMARKS **Mining Reserve No. 304**
 HOLE No **DDH 2** CO-ORDINATES **Grid Ref. 404,500 E; 2,249,000 N** R.L. GROUND **2053 ft. (arbitrary dat.)**
 LOCATION **85 yds. NW of the northern end of No. 1 workings** ANGLE FROM HORIZONTAL **45°** DIRECTION **125° mag.**

DESCRIPTION OF CORE	R.L.	DEPTH	LOG	CORR. RECOVER. %	SAMPLES	REMARKS	ASSAYS	
	CASING	SIZE OF CORE						
0' - Weathered quartz-sericite-chlorite phyllite. Foliation: vertical.		8.3	NX					
10' - Phyllite as above with MnO ₂ dendrites.		31.6						
Chlorite-rich phyllite.		25						
20' - Phyllite with occasional garnet.		100						
Phyllite as for 10'-15'.		100						
Weathered phyllite.		100						
30' - Phyllite limonitic in places.		100						
40' - Phyllite as above with several quartz veins.		100						
50' - Chlorite-sericite-biotite-garnet phyllite with quartz veins.		100		NM				
As before.		100						
As before.		100						
As before.		83						
70' - Quartz-veined phyllite with manganese dendrites.		79						
As above.		100						
As above.		100						
80' - As above.		87						
Chlorite-rich quartz-veined phyllite.		100						
As before with quartz veins up to 4 1/2" thick.		75	BXM		999			
As above.		100		999				

DRILL NO **6**
 TYPE **EDECO MK 6/3**
 DRILLER **S. BERGER**
 COMMENCED **Dec. 1968**
 COMPLETED **20.2.1969**

EXPLANATION
 CASING IN HOLE DURING DRILLING **X**
 ▲ Chalcopyrite
 ■ Pyrite
 ● Bornite
 ▨ Phyllite
 ♀ Quartz

HEAD OFFICE
 LOGGED BY **O. FRUZZETTI**
 DRAWN BY **O.F.**
 CHECKED BY
 SHEET **1** OF **4**
 DRAWING NO. **F52/12-27A**

GEOLOGICAL LOG OF DRILL HOLE

PROJECT **CLARK COPPER MINE, MT. DOREEN, N.T.** REMARKS
 HOLE No **DDH 2** CO-ORDINATES R L GROUND
 LOCATION ANGLE FROM HORIZONTAL DIRECTION

DESCRIPTION OF CORE	R L CASING	DEPTH SIZE OF CORE	LOG	PER CENT CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
See sheet No. 1							
Quartz-veined phyllite with limonite				100			
Quartz-veined phyllite with copper mineralization confined to some quartz veins.				100			
Barren phyllite				100			
Barren quartz-veined phyllite with some limonitic patches.				52			152'-153' = 0.03% Cu
As above				100			
As above plus minor copper occurrences.				100			

BXM

DRILL NO. TYPE	EXPLANATION CASING IN HOLE DURING DRILLING	HEAD OFFICE LOGGED BY O.F. DRAWN BY O.F. CHECKED BY
DRILLER COMMENCED COMPLETED	REFERENCES	SHEET 2 OF 4 DRAWING NO F52/12-28A

50130

G71.15E.

GEOLOGICAL LOG OF DRILL HOLE

PROJECT **CLARK COPPER MINE, MT. DOREEN, N.T.** REMARKS
 HOLE NO. **DDH 2** COORDINATES
 LOCATION R L GROUND
 ANGLE FROM HORIZONTAL DIRECTION

DEPTH	DESCRIPTION OF CORE	R.L.	DEPTH	LOG	CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
		CASING	SIZE OF CORE					
200'	See sheet No. 2 Phyllite as before.		100					
210'	As above.		100					
220'	Mineralized quartz-veined phyllite.		66					
230'	As before.		100					
240'	Biotite-rich phyllite mineralized as above.		100					
250'	Phyllite as before with minor copper mineralization in quartz veins.		100					
260'	Barren phyllite.		100					
270'	Quartz-veined phyllite with a little mineralization.		100					249'-250' = 1.34% Cu
280'	Phyllite with thin barren quartz veins.		100					
290'	Chlorite-rich phyllite.		90					
300'	Chlorite-rich phyllite as above with some copper mineralization.		100					
310'	Barren phyllite.		100					285'-286' = 0.05% Cu
320'	As before.		91					

BXM

DRILL NO. TYPE	CASING IN HOLE DURING DRILLING	EXPLANATION	HEAD OFFICE
DRILLER		REFERENCES	LOGGED BY O.F.
COMMENCED			DRAWN BY O.F.
COMPLETED			CHECKED BY
			SHEET 3 OF 4
			DRAWING NO. F52/12-29A

GEOLOGICAL LOG OF DRILL HOLE

PROJECT **CLARK COPPER MINE, MT. DOREEN, N.T.** REMARKS
 HOLE No **DDH 2** CO-ORDINATES R L GROUND
 LOCATION ANGLE FROM HORIZONTAL DIRECTION

DESCRIPTION OF CORE	R L	DEPTH	LOG	CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
	CASING	SIZE OF CORE					
300' See sheet No. 3							
310' Phyllite with disseminated minor mineralization.			BXM				
320'			91				
323'			100				
END OF HOLE							

NOTES:
 Samples for assay were split and half was retained.
 The core is stored in the Mines Branch core shed in Alice Springs, N.T.

DRILL NO	EXPLANATION	HEAD OFFICE	
TYPE	CASING IN HOLE DURING DRILLING	LOGGED BY	O.F.
DRILLER	DATE OF LOGGING	DRAWN BY	O.F.
COMMENCED		CHECKED BY	
COMPLETED		SHEET	4 OF 4
		DRAWING NO	F52/12-30A

GEOLOGICAL LOG OF DRILL HOLE

PROJECT CLARK COPPER MINE, MT. DOREEN, N.T. REMARKS Mining Reserve No. 304
 HOLE No. DDH 3 CO-ORDINATES Grid Ref. 404,500 E; 2,249,000 N R.L. GROUND 2088 ft. (arbitrary datum)
 LOCATION 10 ft. N of the NW corner of No. 1 workings ANGLE FROM HORIZONTAL 65° DIRECTION 173 1/2 m.

DEPTH	DESCRIPTION OF CORE	R.L.	DEPTH	LOG	CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
		CASING	SIZE OF CORE					
0'	Quartz-feldspar-mica pegmatite with minor copper mineralization			△ □	26			
	Pegmatite as above.			△ □ ◆	16			
10'	As above.			△	83			
	Quartz-feldspar-mica-chlorite pegmatite, limonitic in places.			△ □	100		Very weathered rock.	
	Pegmatite as above with disseminated copper mineralization.			△	90			
	As above.			△ △	56			
20'	As above plus some ? Chrysocolla.			△	100			
	Pegmatite with copper mineralization			△ △	100			
	As above.			△	71			
	As above.			△ △	57			
30'	As above.			□	100			
	As above.			□ △	100			
	As above.			△	100			
	As above.			△	100			
	As above.			△ △	100			
40'	Barren coarse quartz-pegmatite which passes to phyllite.				100			
	Chlorite-sericite-mica quartz-veined phyllite.				100			
46'	END OF HOLE							

33'9" - 34'9" : 0.83% Cu

NOTES :
 Samples for assay were split and half was retained.
 The core is stored in the Mines Branch core shed in Alice Springs, N.T.

DRILL NO. 6	EXPLANATION	HEAD OFFICE
TYPE EDECO MK 6/3	CASING IN HOLE DURING DRILLING	LOGGED BY O. FRUZZETTI
DRILLER S. BERGER	△ Malachite	DRAWN BY O. F.
COMMENCED March 1969	□ Azurite	CHECKED BY
COMPLETED 7.3.1969	◆ Chalcocite	SHEET 1 OF 1
	□ Pegmatite	DRAWING NO F52/12-31A
	▨ Phyllite	

GEOLOGICAL LOG OF DRILL HOLE

PROJECT CLARK COPPER MINE, MT. DOREEN, N.T. REMARKS Mining Reserve No. 304
 HOLE No. DDH 4 CO-ORDINATES Grid Ref. 404,500 E; 2,249,000 N R.L. GROUND 2123 ft. (arbitrary datum)
 LOCATION 10 ft. SE of the middle of the open cut No. 3 workings ANGLE FROM HORIZONTAL 50° DIRECTION 335° mag

DEPTH	DESCRIPTION OF CORE	R.L.	DEPTH	LOG	CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
		CASING	SIZE OF CORE					
0'	Quartz-feldspar-mica pegmatite with minor copper mineralization.			Δ				
				Δ		22		
				Δ				
				Δ				
10'	Quartzomilaceous pegmatite which passes to quartz-veined sericite-rich phyllite with disseminated copper ore.			Δ		100		
				Δ				
				Δ				
	Quartz-veined phyllite with sericite and chlorite; some copper staining.			Δ		100		
	Phyllite as above.			Δ		100		17'6"-18'6" = 0.24% Cu
20'	Barren quartz-veined phyllite.			Δ		100		
	As above up to 27'; follows a quartz vein 6'6" thick with copper mineralization.			Δ		100		
	As above.			♀ Δ ♀		100		
30'	As above.			♀ Δ ♀		100		
				♀ Δ ♀		100		31'-32' = 2.10% Cu
	Quartz-veined phyllite with minor copper mineralization.			Δ		72		
				Δ				
40'	Barren phyllite.			Δ		100		
43'	END OF HOLE							

NOTES:
 Samples for assay were split and half was retained.
 The core is stored in the Mines Branch core shed in Alice Springs, N.T.

DRILL NO. 6	EXPLANATION	HEAD OFFICE
TYPE EDECO MK 6/3	CASING IN HOLE DURING DRILLING: <input checked="" type="checkbox"/>	LOGGED BY O. FRUZZETTI
DRILLER S. BERGER	REFERENCES	DRAWN BY O. F.
COMMENCED March 1969	<input type="checkbox"/> Pegmatite	CHECKED BY
COMPLETED 21.3.1969	<input type="checkbox"/> Phyllite	SHEET 1 of 1
	Δ Malachite ♀ Quartz	DRAWING NO. F52/12-32 A

GEOLOGICAL LOG OF DRILL HOLE

PROJECT **CLARK COPPER MINE, MT. DOREEN, N.T.** REMARKS **Mining Reserve No. 304**
 HOLE No **DDH 6** CO-ORDINATES **Grid Ref. 404,500 E; 2,249,000 N** R.L. GROUND **2007 ft. (arbitrary datum)**
 LOCATION **10 ft. W of the valley track, 1 ft. S of the main vein No. 2** ANGLE FROM HORIZONTAL **75°** WORKINGS **2007 ft. (arbitrary datum)** DIRECTION **350° mag.**

DEPTH	DESCRIPTION OF CORE	R.L.	DEPTH	LOG	CORE RECOVERY %	SAMPLES	REMARKS	ASSAYS
		CASING	SIZE OF CORE					
0'	Coarse quartz pegmatite which passes to weathered phyllite.		30	NX				
	Weathered phyllite.		41.6					
10'	As before.		45					
	Quartz pegmatite which passes again to phyllite; minor copper mineralization.		100	Δ				
20'	Weathered quartz-veined phyllite with some copper staining. Foliation 75° N.		87	Δ-Δ				18'-19' = 3.60% Cu 0.60% Zn 0.14% Pb 1.1 oz/ton Ag
	Phyllite as above.		100	Δ				
30'	Weathered phyllite as above.		68	Δ				
40'	Quartz-veined phyllite with feldspar, pyroxene and mica, some copper mineralization.		100	Δ Δ				
	As before.		100	Δ				
50'	As before.		100	Δ				
	As above up to 53', follows a quartz vein 6' thick with disseminated copper.		100	q Δ q				
60'	As above up to 59', follows veined phyllite with minor mineralization. Foliation 75° N.		87	Δ q Δ				
	Quartz-veined phyllite as before.		58	Δ				
70'	As above.		92	Δ				
80'	Phyllite with copper mineralization; a little native copper probably due to oxidation of sulphide minerals.		100	Δ-Δ				
	Phyllite as before but copper mineralization decreases with depth.		100	Δ				85'6"-86'6" = 0.66% Cu
90'	As above.		100	Δ				
100'	Barren phyllite.		100	Δ				
101'	END OF HOLE ↓							

NOTES:
 Samples for assay were split and half was retained.
 The core is stored in the Mines Branch core shed in Alice Springs, N.T.

DRILL NO. 6	TYPE EDECO MK 6/3	CASING IN HOLE DURING DRILLING	EXPLANATION	HEAD OFFICE
DRILLER S. BERGER	COMMENCED March 1969	COMPLETED 21.3.1969	REFERENCES	LOGGED BY O. FRUZZETTI
			Δ Malachite	DRAWN BY O. F.
			Cu = native copper	CHECKED BY
			□ Azurite	SHEET 1 OF 1
			q Quartz	DRAWING NO F 52/12-34A
			□ Pegmatite	
			▨ Phyllite	

APPENDIX I

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT **CLARK COPPER MINE, MT. DOREEN, N.T.** REMARKS **Mining Reserve No. 304**
 HOLE No **DDH 1** CO-ORDINATES **Grid Ref. 404,500 E; 2,249,000 N** R.L. GROUND **2084 ft. (arbitrary dat)**
 LOCATION **95 yds. NNW of the middle of the open cut No. 3 workings** ANGLE FROM HORIZONTAL **45°** DIRECTION **157° mag.**

DEPTH	DESCRIPTION OF CORE	R.L.	DEPTH	LOG	CORE RECOVER %	SAMPLES	REMARKS	ASSAYS
		CASING	SIZE OF CORE					
0'	Quartz-sericite-chlorite phyllite -				63		Very weathered rock	
	Phyllite as before		NX		28			
	Quartz-veined phyllite -				64			
10'	Phyllite as above -				100			
	Chlorite-rich phyllite -				100			
20'	Phyllite with quartz-rich and chlorite-rich seams.				100			
	As above -				80			
30'	Biotite phyllite -				100			
	Some slate intervals in phyllite -				97			
	Quartz-biotite-sericite phyllite -				100			39'-40' = 0.01% Cu
40'	Quartz-biotite-chlorite phyllite -				100			
	Phyllite with narrow chlorite-biotite seams -				100			45'-46' = 0.01% Cu
50'	Quartz-veined phyllite -				100			
60'	Quartz-mica-chlorite phyllite with alternating mica-rich and quartz-rich veins -		NM		100			
70'	Quartz-veined phyllite -				100			
	As before -				69			
80'	Weathered phyllite -				100			
	As above -				84			
90'	Quartz-veined phyllite; quartz veins up to 2' thick -			♀ ♀	100			
				♀ ♀ ♀				
				♀ ♀				
100'	Phyllite up to 102' 8"; follows micaceous gneiss -				100			

DRILL NO 6	EXPLANATION	HEAD OFFICE
TYPE EDECO MK 6/3	CASING IN HOLE DURING DRILLING ♀	LOGGED BY O. FRUZZETTI
DRILLER S. BERGER	▲ Chalcopyrite	DRAWN BY O. F.
COMMENCED Nov. 1968	◆ Chalcocite	CHECKED BY
COMPLETED 23-12-1968	● Pyrite	SHEET 1 OF 4
	♀ Quartz	DRAWING NO F 52/12-23A
	☒ Phyllite	
	☒ Gneiss	
	☒ Granite	

GEOLOGICAL LOG OF DRILL HOLE

PROJECT **CLARK COPPER MINE, MT. DOREEN, N.T.** REMARKS
 HOLE No **DDH 1** CO-ORDINATES R L GROUND
 LOCATION ANGLE FROM HORIZONTAL DIRECTION

DEPTH	DESCRIPTION OF CORE	R.L.	DEPTH	LOG	CODE OF COVERBY %	SAMPLES	REMARKS	ASSAYS
		CASING	SIZE OF CORE					
200'	See sheet No. 2			x x x				
	gneiss; some dark veins are biotite rich.			x x x				
				x x x				
210'	Biotite - hornblende - feldspar - quartz - muscovite gneiss with some copper mineralization.			x x x				
				x x x				
				x x x				
220'				x x x				
				x x x				
				x x x				
230'	Barren gneiss.			x x x				
	gneiss as above.			x x x				
				x x x				
240'	from 241' granite - gneiss with minor disseminated mineralization.			x x x				
				x x x				
				x x x				
250'	Granite - gneiss as before.			x x x				
				x x x				
				x x x				
260'	As above.			x x x				
				x x x				
				x x x				
270'				x x x				
				x x x				
				x x x				
280'	Granite - gneiss with feldspar and biotite.			x x x				
				x x x				
				x x x				
290'	Granite - gneiss which looks like an « augen - gneiss »; minor copper occurrence.			x x x				
				x x x				
				x x x				
300'	feldspar-rich granite - gneiss with minor mineralization.			x x x				

BXM

DRILL NO	EXPLANATION	HEAD OFFICE	
TYPE	CASING IN HOLE DURING DRILLING	LOGGED BY	O.F.
DRILLER	REFERENCES	DRAWN BY	O.F.
COMMENCED		CHECKED BY	
COMPLETED		SHEET	3 OF 4
		DRAWING NO	F52/12-25A

GEOLOGICAL LOG OF DRILL HOLE

PROJECT **CLARK COPPER MINE, MT. DOREEN, N.T.** REMARKS
 HOLE No **DDH 1** CO-ORDINATES R L GROUND
 LOCATION ANGLE FROM HORIZONTAL DIRECTION

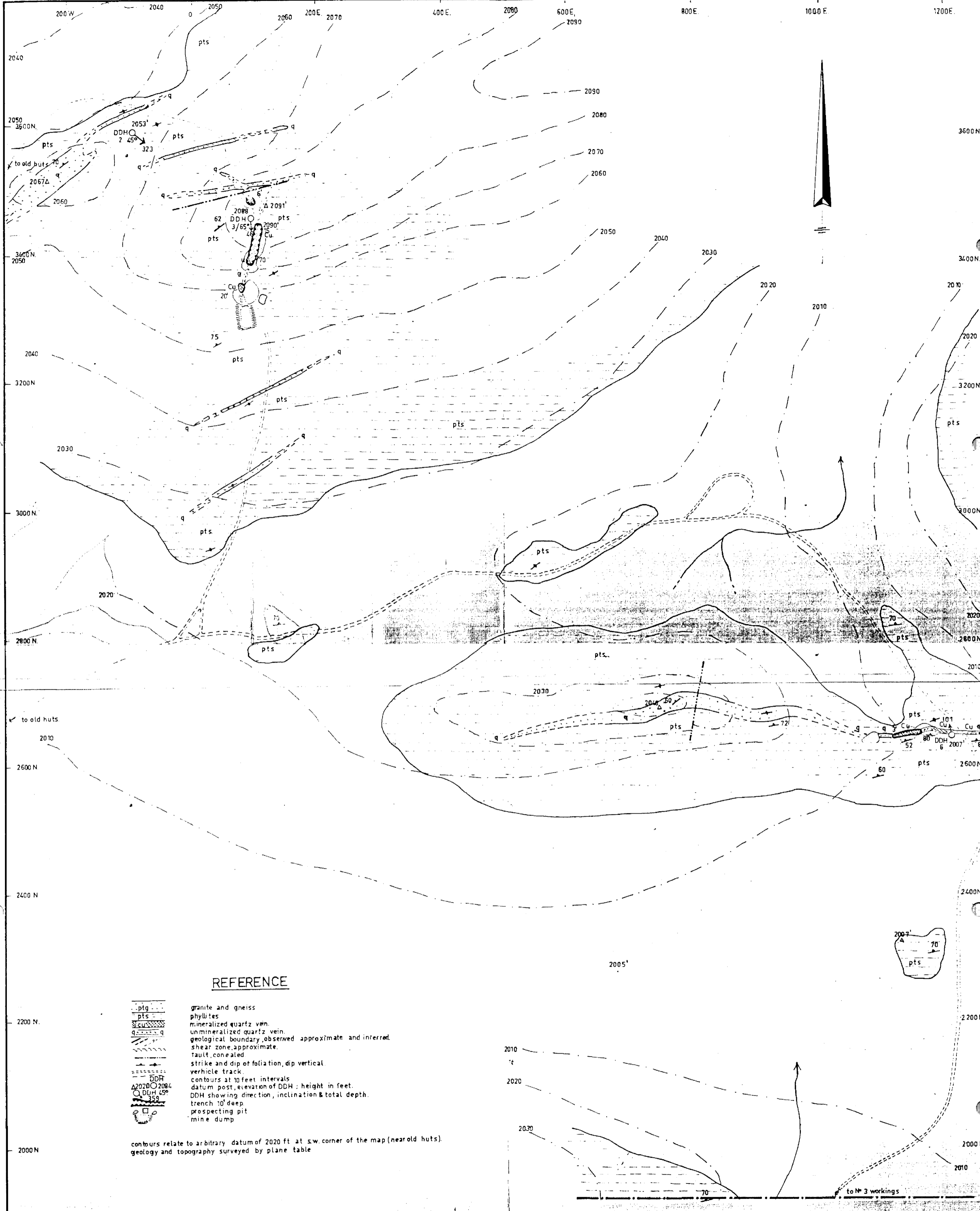
DEPTH	DESCRIPTION OF CORE	R.L.	DEPTH	LOG	CORE OF CORE %	SAMPLES	REMARKS	ASSAYS
		CASING	SIZE OF CORE					
300'	See sheet NO. 3				100			
300'	Feldspar rich gneiss with muscovite and pyroxene.			x x x	100			
310'	Gneiss as above.			x x x	100			
320'	Gneiss with very minor mineralization.			x x x	100			
330'	As before.			x x x	100			
340'	Barton Gneiss.			x x x	91			334'-335' = 0.07% Cu 337'-338' = 0.01% Cu 0.14% Pb
350'	Gneiss with a little disseminated mineralization.			x x x	92			
359'	END OF HOLE							

BXM

NOTES :

Samples for assay were split and half was retained.
 The core is stored in the Mines Branch core shed in Alice Springs, N.T.

DRILL NO	EXPLANATION	HEAD OFFICE	
TYPE	CASING IN HOLE DURING DRILLING	LOGGED BY	O.F.
DRILLER	REFERENCES	DRAWN BY	O.F.
COMMENCED		CHECKED BY	
COMPLETED		SHEET	4 of 4
		DRAWING NO	F52/12-26 A



REFERENCE

- ptg granite and gneiss
- pts phyllites
- cu mineralized quartz ven.
- q unmineralized quartz vein.
- geological boundary, observed approximate and inferred.
- shear zone, approximate.
- fault, concealed.
- strike and dip of foliation, dip vertical.
- vehicle track.
- DDH contours at 10 feet intervals
- datum post, elevation of DDH: height in feet.
- DDH showing direction, inclination & total depth.
- trench 10' deep.
- prospecting pit.
- mine dump.

contours relate to arbitrary datum of 2020 ft at sw. corner of the map (near old huts).
 geology and topography surveyed by plane table

CLARK MINE
 (NORTHERN TERRITORY)

No 1 and 2 WORKINGS
GEOLOGY & TOPOGRAPHY

SCALE 1 : 1200

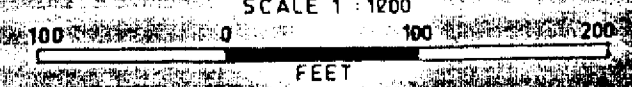


PLATE No 2

200 W 0 200 E 400 E 600 E 800 E 1000 E 1200 E

2040 2030 2020

to N° 2 and 1 workings.

1800 N

1800 N

1600 N

1600 N

1400 N

1400 N

1200 N

1200 N

1000 N

1000 N

800 N

800 N

600 N

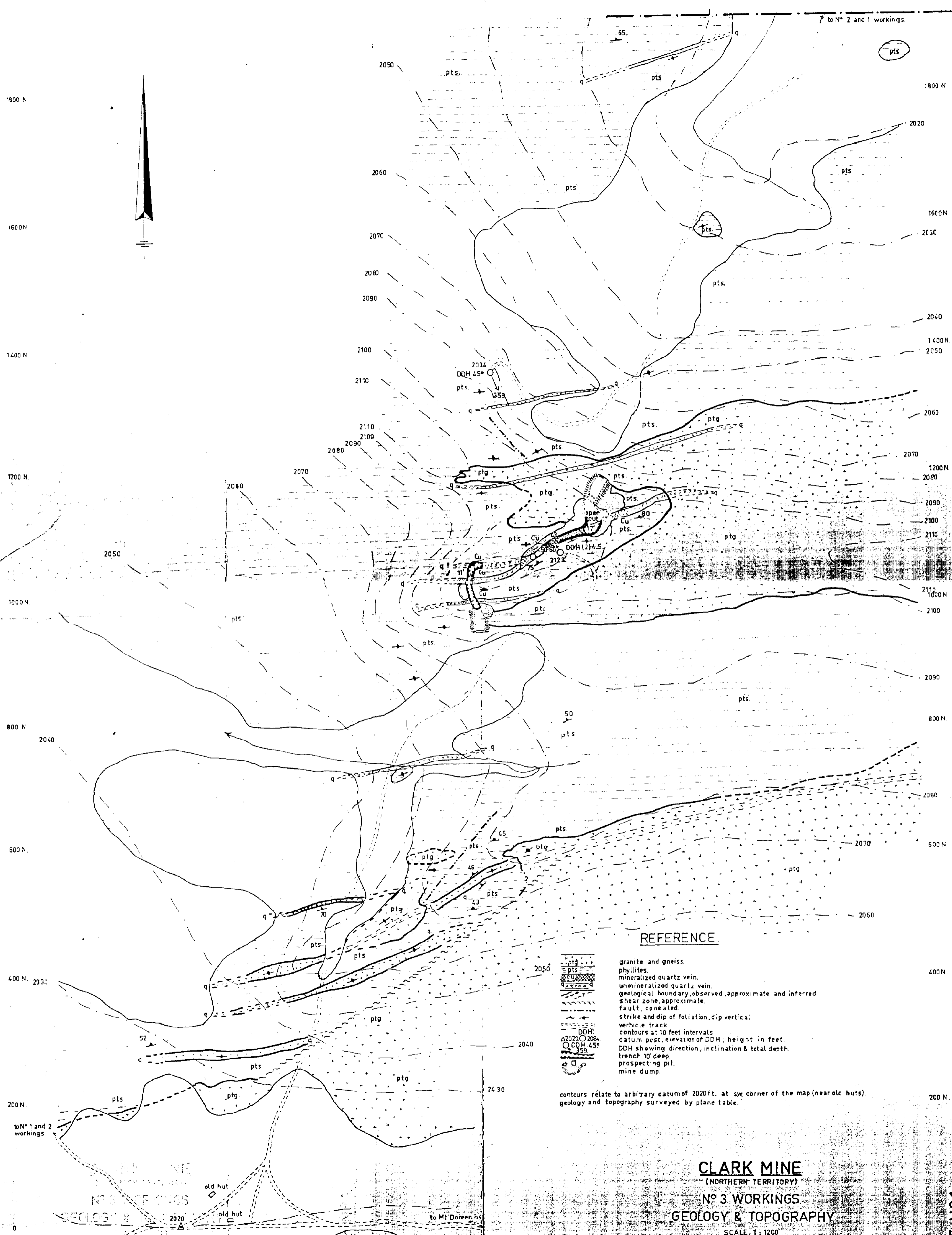
600 N

400 N

400 N

200 N

200 N



REFERENCE.

- ptg granite and gneiss.
- pts phyllites.
- mineralized quartz vein.
- unmineralized quartz vein.
- geological boundary, observed, approximate and inferred.
- shear zone, approximate.
- fault, concealed.
- strike and dip of foliation, dip vertical.
- vehicle track.
- contours at 10 feet intervals.
- datum post, elevation of DDH; height in feet.
- DDH showing direction, inclination & total depth.
- trench 10' deep.
- prospecting pit.
- mine dump.

contours relate to arbitrary datum of 2020ft. at sw corner of the map (near old huts). geology and topography surveyed by plane table.

CLARK MINE
No. 3 WORKINGS
GEOLOGY & TOPOGRAPHY

CLARK MINE
(NORTHERN TERRITORY)
No. 3 WORKINGS
GEOLOGY & TOPOGRAPHY

SCALE 1:1200

COMPILED BY RESIDENT GEOLOGICAL SECTION
DRAWN BY MINES BRANCH DRAUGHTING OFFICE DARWIN DECEMBER 1970

SURVEYED BY O. FRUZZETTI APRIL 1969
RESIDENT GEOLOGIST ALICE COBBING MAY 1969

G71/1C

PLATE No. 1