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MINOR METALLIFEROUS INVESTIGATIONS - TENNANT CREEK  
GOLDFIELD - NORTHERN TERRITORY

by

P.G. Dunn and W.S. Yeaman

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BARKLY HIGHWAY

To Orlando

BMR AREA No 1

# LOCALITY MAP

## GEOCHEMICAL PROSPECTING AREAS

### TENNANT CREEK - 1963

SCALE  
Miles 5 4 3 2 1 0 5 10 Miles

+ EXPLORER 18

+ RED BLUFF

+ EXPLORER 9 & 13

MARYLANE

+ C  
+ A  
+ B

NEW BLOOD

+ LONE STAR

+ PETERPAN

TENNANT CREEK

+ EXPLORER 6

+ COPPER  
SKIPPER

+ CATS WHISKERS

+ GOLDEN FORTY

+ EXPLORER 15

+ EMBEE & JAYDEE

+ EXPLORER 16



STUART HIGHWAY

GEOCHEMICAL PROSPECTING RESULTS AND FURTHER SUGGESTED  
WORK: TENNANT CREEK, NORTHERN TERRITORY, 1963.

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by

P.G. Dunn

SUMMARY

From February to May 1963 a programme of geochemical sampling was undertaken at Tennant Creek, using the Gemco auger drill of the Bureau of Mineral Resources. Eleven separate areas were drilled; the total footage was 16,843 feet. Samples were taken at depths ranging from 20 to 52 feet. All samples were of weathered rock, and were analysed spectrographically by A.D. Haldane of the Bureau of Mineral Resources for nickel, cobalt, copper, vanadium, molybdenum, and lead.

Two areas, in the vicinity of Explorer 9 and 13 and at the Golden Forty, were known from previous diamond drilling to be mineralised, and the results for orientation surveys in these areas showed that for some metals a concentration of more than 10 parts per million is probably significant. Copper and lead were the most useful elements; nickel and cobalt appear sporadically and interpretation is more difficult. Molybdenum is generally absent, while vanadium content is too variable to be useful.

Of all the previously untested areas only the Mary Lane 'B' - New Blood area gave results higher than 10 parts per million. This area is along the Mary Lane shear and consists of well-cleaved metasediments with bands of chloritic phyllite, ironstone, and porphyry. Three diamond drill holes have been proposed from the present results; one of these will commence almost immediately, but the others will probably await the results of further geochemical sampling in the area.

In addition to further sampling in the Mary Lane area, eight other areas have been chosen for sampling by the Bureau Gemco auger drill. This programme has been so arranged that it can be varied, depending upon the early results and the availability of the auger drill.

This sampling should be combined with a study of the optimum depth of the sample, the size fraction of the sample, and the best metals to be used as indicators of mineralisation. In addition to determining copper, lead, nickel, cobalt and molybdenum, it would be desirable to determine the concentrations of bismuth, arsenic, antimony, and zinc; and also mercury if suitable apparatus is available.

INTRODUCTION

In February, 1963, a programme of geochemical sampling in the area of the Mary Lane shear zone was undertaken at the request of Australian Development No Liability. Three areas along the shear zone were selected on the basis of an Induced Polarization geophysical survey that had been carried out under contract to Australian Development. The geochemical programme was extended to cover the Golden Forty lease where Australian Development intended to do some deep drilling.

The programme was extended to obtain orientation samples in the soils overlying the Explorer 9 and Explorer 13 anomalies which were diamond drilled by Peko Mines N.L. Explorer 9 was of particular interest because of extensive bulldust cover and the deep seated orebody (Ivanhoe) proved by diamond drilling. The locations of Mary Lane, Golden Forty and other mines and prospects referred to in the text are shown on Plate 1.

Subsequently four areas for Peko, two additional areas for Australian Development, and two other small areas were drilled.

Sampling was done by the Bureau Gemco auger drill except for three samples inaccessible in the Mary Lane 'B' area and 13 core samples from a diamond drill hole in the Red Bluff area which were taken to determine any variation in metal content with depth. The auger holes ranged from 22 feet to 52 feet. The sample was taken from the top of the weathered rock to the bottom of the hole. The top six feet of all holes were discarded to ensure that no surface contamination had taken place. Two deep holes were drilled, one at Mary Lane area "A" and one at Explorer 9, and several samples were taken to determine if deep drilling would be warranted in the area. Samples were sent to Canberra for spectrographic analysis, and the results were usually available within three weeks.

The holes along the lines were normally spaced 100 feet apart. In the Golden Forty area, the spacing was 50 feet, and in part of the Mary Lane area "A" the spacing was 400 feet. Fifty foot spacing was also used near the centre of magnetometer anomalies in the Explorer magnetic anomaly areas.

The programme was completed on 16th May, 1963 and 16,843 feet was drilled.

#### ACKNOWLEDGEMENTS

The planning of this programme was assisted by the co-operation of J. Elliston and R. McNeill of Geopeko Limited, and C.F. Wegener of Australian Development N.L.; A.D. Haldane and A. Mather of the Bureau of Mineral Resources assisted with interpretation of the data and in organising later programmes.

#### REGIONAL GEOLOGY

The areas samples lie within the Warramunga Geosyncline, except possibly the three Explorer areas to the west. (Explorer 6, 15 and 18), where cuttings did not provide sufficient information to determine the nature of the underlying rocks.

In several areas, particularly Explorer 9 and 13, the auger penetrated approximately 20 feet of bulldust followed by a nearly impenetrable quartz band up to six feet thick; this directly overlies the weathered rock and is probably the result of silicification. Thick vegetation occurs in areas underlain by the silicified layer which acts as a partial aquiclude and produces a perched water table in the bulldust.

In the Mary Lane - New Blood area (Plate 4) metasediments are highly cleaved, the cleavage striking approximately east. One set of photolinear features is parallel to the cleavage; another set strikes between  $45^{\circ}$  and  $60^{\circ}$ . These photolinear features are thought to be shears. Several bands of chloritic schist, several small ironstone bodies, and several small porphyry lenses are sub-parallel to the cleavage in the area.

The Golden Forty area has been mapped in detail by Australian Development N.L. Most of the outcrops are to the east and north of the area which has been sampled (Plates 2 3). The mapping has shown a large anticline pitching to the west, with shearing and mineralisation related to the axis of the fold (C. Wegener, pers. com.).

Although there are no outcrops in the area of the Explorer 9 and 13, drilling by Peko Mines N.L. proved a thin nearly vertical orebody at Explorer 9 (J. Elliston, pers. com. the Ivanhoe). This orebody may have been emplaced in an extension of the Mary Lane shear in an area completely soil covered. The area at Explorer 13 is covered also with soil.

## GEOCHEMICAL RESULTS

The only areas where geochemical results showed a concentration of the four metals greater than 10 parts per million are Explorer 9 and 13 (Plate 2), Golden Forty (Plates 3 and 4), and the Mary Lane 'B' - New Blood area (Plate 5). Samples containing greater than 10 parts per million copper are recorded in order to emphasise the anomalous areas. Only the Golden Forty area was contoured, because in other areas sampled anomalous results were distributed sporadically.

### Explorer 9 and 13

The orientation results from this area (shown on Plate 2) provide useful information on what might constitute a significant geochemical anomaly in the Tennant Creek Goldfield. Copper assays over the copper orebody (Explorer 9) are low, and values greater than 10 parts per million are found only within 100 feet of the projected vertical extension of the lode, except for one sample 300 feet south of the lode. The lead values are also low, although slightly higher than copper, and are restricted to within 100 feet of the lode. Nickel and cobalt did not assay greater than 10 parts per million.

Interpretation of these results, however, is complicated by the results from Explorer 13, 1,200 feet west of the Explorer 9 lode. Diamond drilling suggested this to be an uneconomic deposit, but geochemical sampling has shown copper assays greater than 10 parts per million over 800 feet, and one sample had a value of 100 parts per million copper - twice as high as the highest copper value over Explorer 9. Lead was noticeably lower, and only two samples showed greater than 10 parts per million. Nickel and cobalt reached a concentration as high as 70 parts per million in some samples.

From the results over these two anomalies it was concluded that any copper or lead values greater than 10 parts per million are possibly significant and indicates some mineralisation. High nickel and cobalt concentrations have not yet been explained, but since cobalt is known in the Peko ore body it is possible that these two elements may also indicate mineralisation.

One of the other areas sampled (Copper Skipper) had also been diamond drilled, but showed less than one percent copper in the lode, and samples taken over the lode showed 10 or less parts per million in all the elements sought.

### Golden Forty

Copper geochemical anomalies (Plate 3) broadly coincide with areas of known copper mineralisation intersected by diamond drill holes Nos. 3,4,9 and 12. Lead anomalies appear to be more specific and are closely related to the copper mineralisation in the drill cores and could be a useful indicator metal. The lead anomaly extends as far west as grid line 10 west, and then narrows. Samples from Lines, 16 and 20 west analysed less than 10 parts per million which may indicate that the lode lenses or deepens to the west. The geology of the area shows a west-pitching anticline, and this may account for the shape of the geochemical anomaly.

### Mary Lane 'B' and New Blood Area

This area was chosen from the results of the I.P. survey carried out by Australian Development N.L. along the Mary Lane shear on the recommendation of P. Crohn and Dr. B.P. Walpole, Bureau of Mineral Resources. Auger drilling in the Mary Lane area was done on the same grid used during the geophysical survey; at the New Blood prospect holes were drilled at 100 foot intervals along and also across the centre of a discontinuous line of ironstone boulders.

Copper and lead analyses greater than 10 parts per million lie in six groups with a few isolated higher values. One of these groups broadly corresponds to the I.P. anomaly that was found in the area (see Plate 4).

On the basis of these preliminary geochemical results three diamond drill holes were proposed. Subsequent wagon drilling by Australian Development N.L. has shown copper values as high as 2,500 parts per million in the area of proposed diamond drill hole 3 and the anomaly between 6N and 8N on the 170E line. Another wagon drill hole put down near proposed diamond drill hole 2 gave results suggesting a narrow band of malachite-bearing phyllite.

One isolated sample (150E/10S) gave the highest copper and lead values found during the entire programme. The hole is adjacent to a small outcrop of chloritic-tremolitic phyllite with traces of malachite. The high values (Cu - 300 p.p.m.; Pb - 700 p.p.m.) are probably related to this small outcrop; ten shallow auger holes were put down around this hole at a 50 foot spacing to determine whether this mineralisation extends for any distance along strike. The results are not yet available.

#### DISCUSSION

The results of this survey show that the best indicators of possible ore occurrences are copper, lead, nickel, and cobalt; vanadium was too dispersed to be useful; and molybdenum is commonly absent, although it may be useful where it does occur. Bismuth could be important because it is closely associated with Tennant Creek ore deposits, and bismuth analyses from surveys made by Australian Development N.L. have shown a significant pattern over areas of known mineralisation (Golden Forty area). A. Mather has also suggested (personal communication) that arsenic, antimony, and zinc should be determined, and also mercury if the necessary apparatus is available. The presence of arsenic and antimony is indicated by the recent identification of enargite in core from the Northern Star DDH 15 (Whittle, 1963).

It also seems desirable to determine the optimum depth of sampling and the optimum size fraction to be taken for the sampling. For this purpose, 72 samples from the Golden Forty were sent to Canberra to determine any variation in metal content with depth, and another six samples from the Golden Forty were sent to determine any differences in the various size fractions. These results are not yet available.

Analyses of core samples from diamond drill holes that have intersected copper bodies should give some idea of the size of a geochemical anomaly which a known copper orebody will produce. To date, samples from only one drill hole Cat's Whiskers DDH 5 have been analysed, but cores sampled in the Explorer 9 and 13 areas are being collected. The results from the Cat's Whiskers DDH 5, are given below. This drill hole intersected a small ironstone body containing a narrow copper shoot assaying approximately 2.5 percent (Dunn, 1963). The ironstone was intersected between 396 and 424 feet.

Depth (ft.)	Ni ppm	Co ppm	Cu ppm	V ppm	Mo ppm	Pb ppm
196	5-	5-	5-	10	a	a
206	5-	5-	5-	30	a	a
216	5-	5-	5-	20	a	a
226	5-	5-	5-	10	a	a
236	5-	5-	5-	20	a	a
246	5-	5-	5-	20	a	a
256	5-	5-	5-	20	a	a
266	5-	5-	10	20	a	a
276	5-	5-	10	10	a	a
286	5	10	5	30	a	a
296	5-	5	5	20	a	a
306	5	5	20	20	a	a
316	5	20	50	5-	2	a
326	10	20	200	20	a	a
336	10	15	70	20	a	a
346	5	10	70	20	a	a
356	20	20	500	10	2	a
366	10	20	200	10	2	a
376	10	20	70	10	a	a
386	5	15	200	30	a	a
396	10	150	500	5-	2	a
425	5-	80	200	5-	-	a
435	5-	60	50	5-	5	a
448	5	30	200	10	a	a

5- less than 5 p.p.m.

'a' not detected (Pb - 10 p.p.m.; Mo-1 p.p.m.)

These results combined with data from other drill holes may give some idea of the size of a geochemical halo around a copper ore body of known size and grade.

#### PROPOSED PROGRAMME

##### Mary Lane 'B' Area

The Gemodrill of the Bureau of Mineral Resources will be used to carry out, auger drilling programmes in the Mary Lane's Auger drilling programme, Quart-Bowl, Last Hope, Ivanhoe, Explorer 15 and 2 and 18 Red Bluff, and Nobles Knob west areas.

This area is of considerable interest, and an additional eight lines have been laid out parallel to the original three lines. These lines are 250 feet apart and are between 147.5E and 172.5E. and extend from 10N to 15S, with the exception of the 147.5E line, the northern portion of which extends into another lease. The spacing of sample points on these lines is 100 feet, with the alternate lines offset 50 feet, so that the effective spacing will be 250' x 50'. This will allow contouring of the area, which, with the results from the

first diamond drill hole and the wagon drill results, may assist in the siting of further diamond drill holes. This geochemical programme will involve a total of 190 holes and approximately 4,000 feet of drilling, and will probably take about two weeks to carry out. If this programme is to be of assistance in laying out further diamond drill holes in this area, it should be completed by February 1964.

#### Quart Bowl Area

The Quart Bowl area was chosen because it contains a large aeromagnetic anomaly and a pronounced set of shears.

It was hoped that a ground magnetometer survey would show this anomaly to be composed of several smaller shallower anomalies, as is the case with the Ivanhoe anomaly. A ground survey, however, has shown it to be a single deep-seated (3010 feet) body (Douglas, 1963).

The depth may be too great to allow the body to become economic, but it is significant that the long axis of the anomaly is exactly parallel to the shear, which is known to be mineralised 15 miles to the north-west.

It is proposed to put two lines of holes across the magnetic anomaly and several shorter lines across the shears before the area is abandoned as a possible site for exploration. Approximately 40 holes, probably 40 feet deep, should be sufficient as an initial test of the area, but any promising results from these samples would naturally call for further work. This initial work would involve 1,600 feet of drilling and approximately 10 days' work.

#### Last Hope Area

This and the following five areas are all on ground held by Peko Mines N.L.

In the Last Hope area, it is desired to test a small limonitic outcrop 3 miles north-west of the Last Hope Mine. One traverse along strike and two across the body should be sufficient, - a total of 35 holes, probably only about 20 feet deep. A grid has been laid out and the 700 feet of drilling could probably be done in about three days. Similar limonite bodies to the west should be sampled if these results are favourable.

#### Ivanhoe Area

It is proposed to sample the area between the Explorer 9 and 13 anomalies (see Plate 2) and one line west of Explorer 13. This would involve 36 holes, 40 feet deep, and would take approximately one week. Three diamond drill holes have been put down into the Explorer 13 anomaly, but the possibility of an economic ore body has not yet been eliminated.

In addition, a third magnetic anomaly (Explorer 17) lies to the south-east of Explorer 9. Four lines, containing a total of 44 holes and involving 1,760 feet of drilling, would cover the area, and would require approximately an additional week's work.

#### Explorer 15

Explorer 15 is another magnetic anomaly that was partially drilled during the recent programme. Three more traverses, totalling 36 holes, averaging 30 feet deep, would complete the area. This should take about two weeks.

Explorer 2

This is also a magnetic anomaly. Two traverses involving 22 holes, averaging 30 feet deep, would cover the area. This should take a week.

Explorer 18

Explorer 18 was also drilled in a past programme with no positive results. Since then, further ground magnetometer surveys have been carried out and several more magnetic anomalies have been delineated. One of these is scheduled to be diamond drilled early in 1964, and any geochemical sampling should be guided by the results of this drill hole. It is possible that some or all of the magnetic anomalies, like the anomalies in the BMR 3 area, are due to bodies in the Archaean basement.

Red Bluff Area

This area and the Nobles Nob West area held by Australian Development N.L. The Red Bluff area consists of several aero-magnetic anomalies, some of which have been divided into several smaller anomalies by ground traverses (Douglas, 1962). One of these is presently being diamond drilled (Red Bluff II). It was sampled during the recent geochemical programme without any positive results.

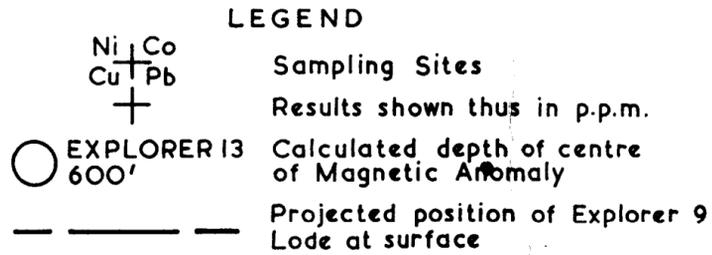
The Red Bluff 7 anomaly consists of four separate anomalies that are aligned parallel to a photolinear feature which may be an extension of the Mary Lane shear. Geochemical sampling could be done in one of two ways, depending upon the time available. The entire area could be drilled, which would involve parallel lines 400 feet apart, with 50 holes spaced at 100 feet intervals on each line. This would be the most useful method of sampling because the geochemical results could then be contoured, and it could be seen how any geochemical anomalies are spatially related to the magnetometer anomalies. This approach could also be used in the Explorer 18 area. *Alternatively a number of short lines could be laid out at right angles to the Nobles Nob West axes of the individual anomalies.*

This area is immediately west of Nobles Knob extending to the photolinear feature that trends north-east from Cabbage Gum. One line has already been drilled by Australian Development, and although the results are interesting the interpretation is difficult. Any programme in this area would be difficult, since the depth of bulldust is as great as 60 feet in some places. The total area involved is approximately 7,000 feet by 4,000 feet, but it would be possible to drill several short lines across the photo-linear feature.

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- WHITTLE, A.W.G., 1963 - Preliminary examination of the lode intersection in DDH 15, Northern Star Mine, Tennant Creek, (unpublished report).

# GEOCHEMICAL SAMPLING RESULTS EXPLORER 9 AND 13



NOTE: SAMPLES TAKEN FROM WEATHERED ROCK  
DOWN TO DEPTHS OF 40' - BARREN SAMPLES  
SHOWED 10 OR LESS p.p.m.

24 W  
30+

20+

20+

50+20

50+ EXPLORER 13  
600'

70+30  
100+

50+50  
30+

70+70  
20+20

+

12 W  
+

+

+

+

+

50+

+200

20+70

+

+

30+

8 W  
+

+

+

+

+

+

+

+

+

20+

50+

+

+

+

+

4 W  
+12 N

+11 N

+10 N

+9 N

30+8 N

50+

+7 N

+

+6 N

+5 N

+4 N

EXPLORER 9  
700'

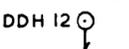
COPPER

# GEOCHEMICAL SAMPLING RESULTS

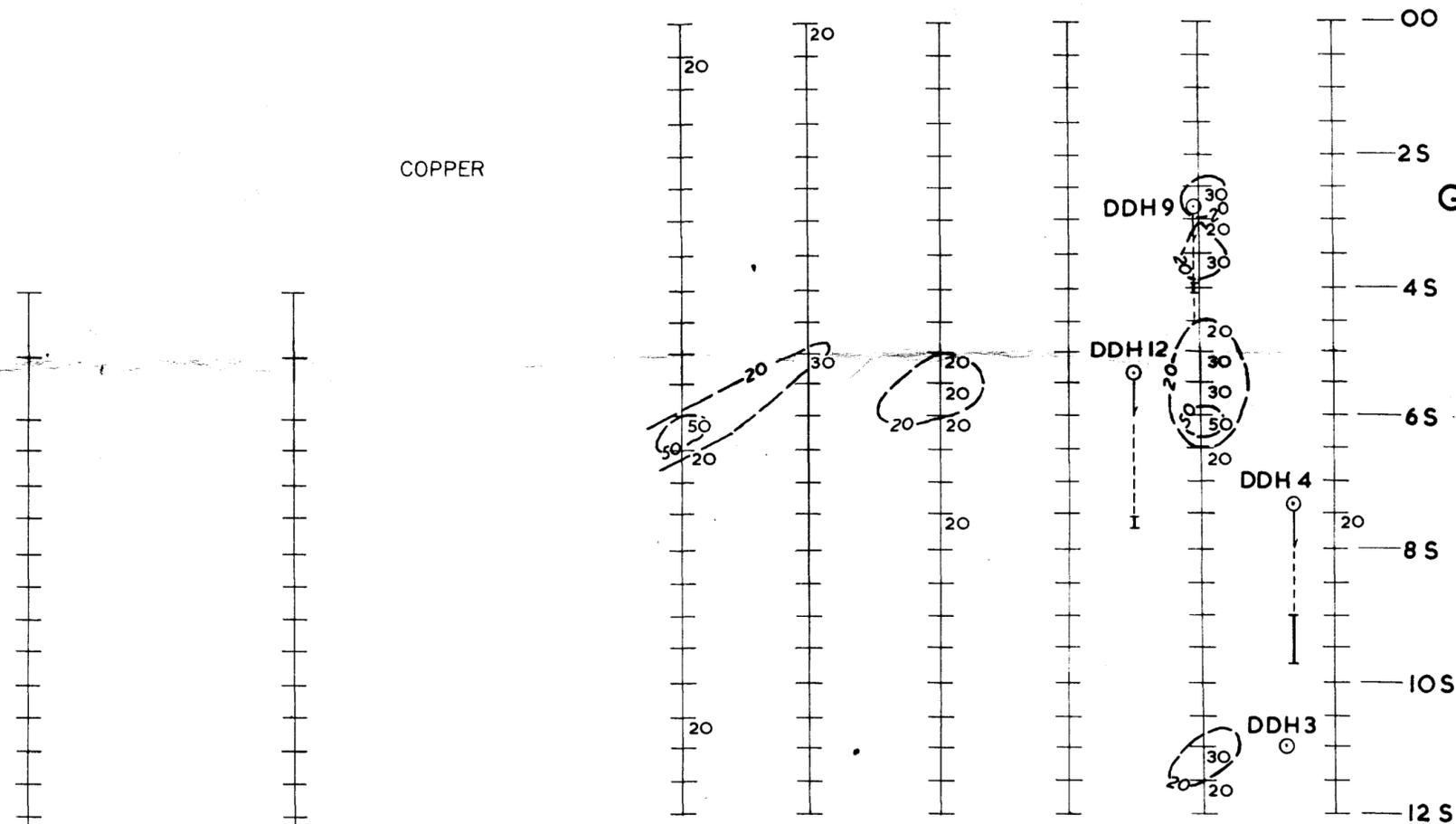
GOLDEN FORTY AREA  
COPPER & LEAD IN p.p.m.

SCALE  
0 100 200 400 Ft.

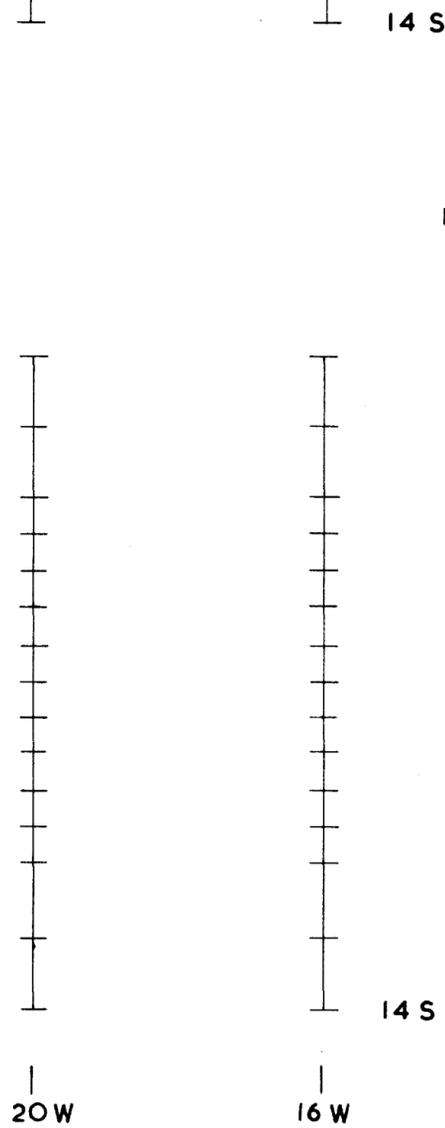
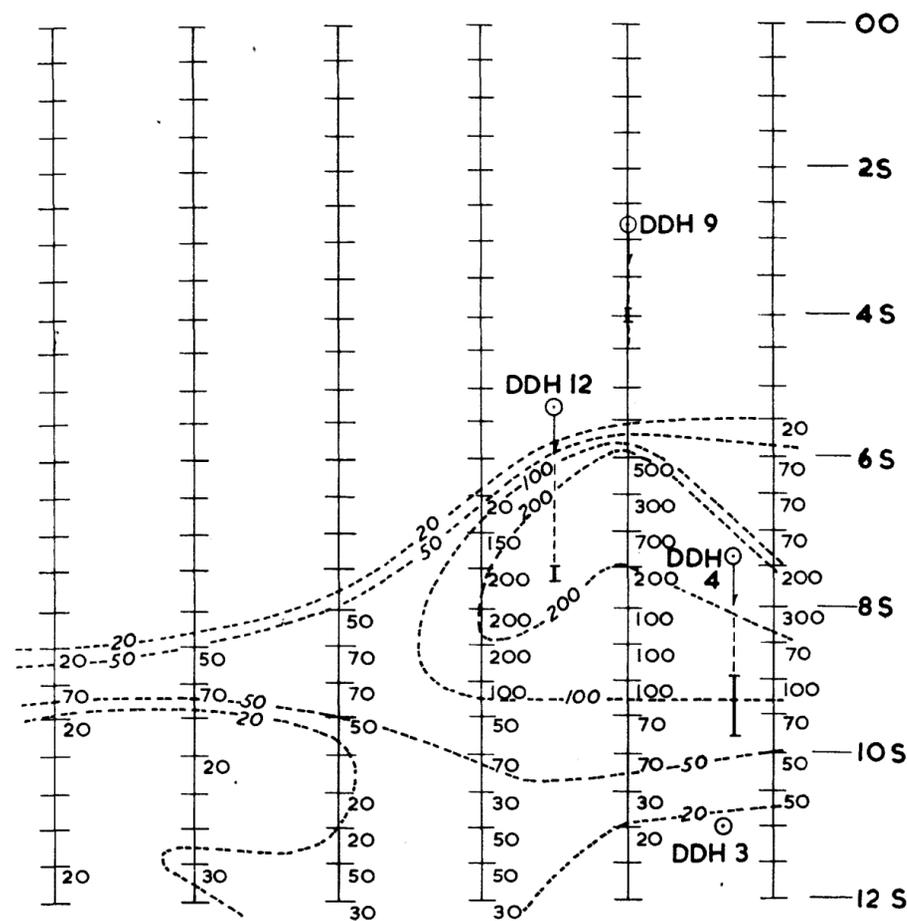
LEGEND

-  Sampling site with values in p.p.m.
-  Copper Geochemical Contour
-  Lead Geochemical Contour
-  Collar of diamond drill hole with projection of hole
-  Mineralized part of drill hole

NOTE: Samples taken from weathered rock down to depths of 52' - Barren samples showed 10 or less p.p.m.

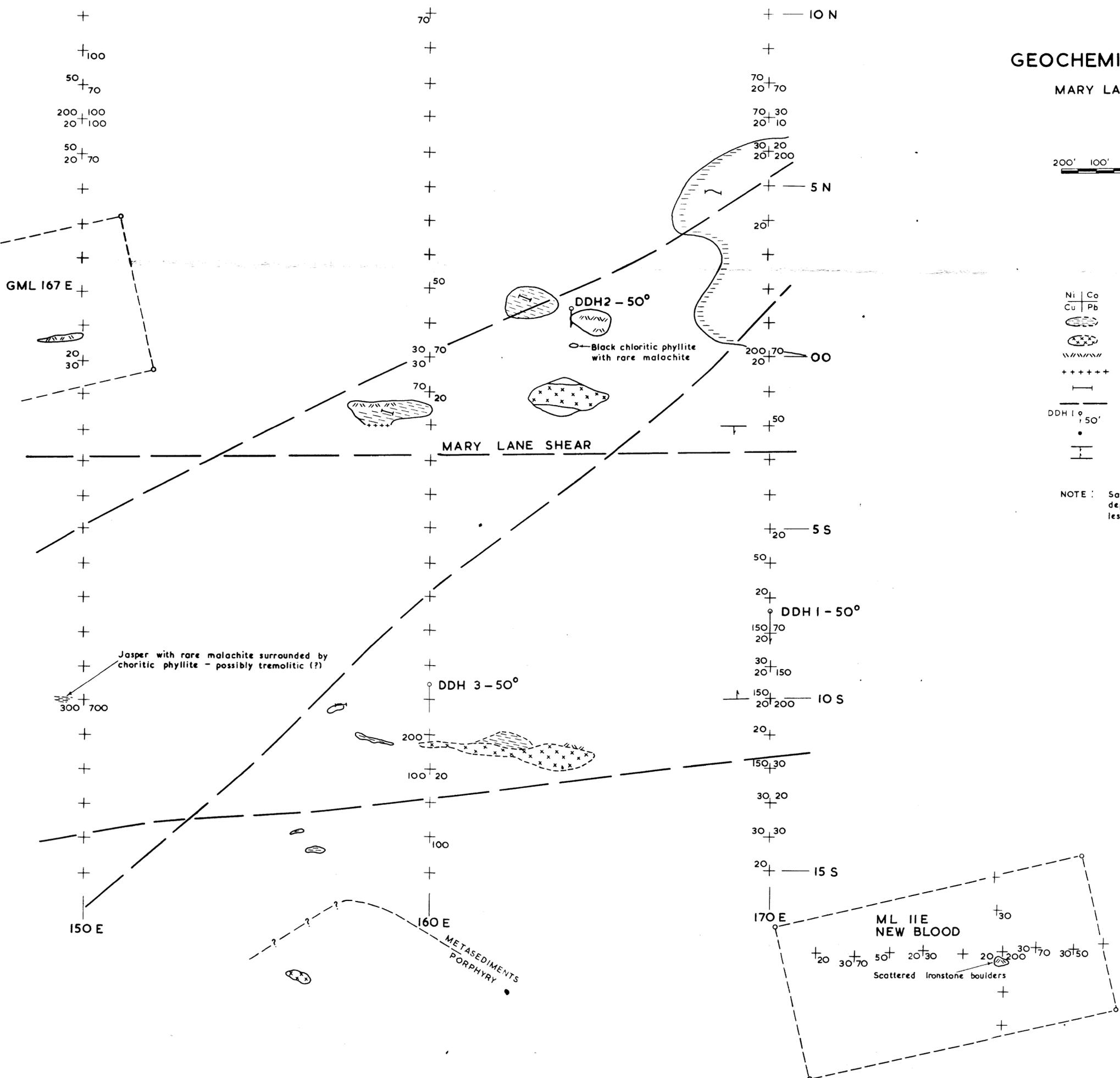


LEAD



# GEOCHEMICAL SAMPLING RESULTS

MARY LANE 'B' AND NEW BLOOD AREAS



- LEGEND**
- Ni | Co  
Cu | Pb
  - Geochemical results shown thus in p.p.m
  - Metasediments
  - Porphyry
  - Ironstone
  - Quartz Veins
  - Vertical Cleavage
  - Phalinear Features — thought to be Shears
  - Proposed Diamond Drill Holes
  - Lease Peg
  - Induced Polarization Anomaly

NOTE: Samples taken from weathered rock down to depths of 22' — Barren samples showed 10 or less p.p.m

DIAMOND DRILL HOLE 2 - LONE STAR PROSPECT

by

P.G. Dunn

Diamond drill hole 2 was planned to intersect the same ironstone body as diamond drill hole 1, a vertical hole that intersected copper mineralisation from 509 to 525 feet. The second drill hole was sited 100 feet east and 200 feet north of the first, and was planned to have a depression of 69° and intersect the ironstone body between 520 and 550 feet.

The second drill hole lifted badly, however, and only 12 feet of hematite was intersected from 591 feet to 603 feet - measured down the hole. This ironstone consisted almost entirely of hematite with rare sulphides - principally pyrite. This section was split and assayed; the geological log and assay results accompany this report. The highest values were 0.3 dwts. Au from 591 to 595 feet and 0.1 percent Cu from 599 to 603 feet.

The hematite intersection was made at a vertical depth of from 520 to 535 feet, and it seems likely that this ironstone body is the same as the first drill hole intersected. The drill may have lifted enough so that it intersected only the top of the ironstone body, and that any copper mineralisation would be expected deeper. If this possibility is to be explored a vertical hole 100 feet east of diamond drill hole 1 should be drilled.

However, in view of the depth of the intersection, and the apparent size of the body causing the magnetic anomaly, diamond drilling is probably not justified, until further exploration from the 160 and 200 feet levels of the Lone Star Mine has been completed.

---

DRILL LOG AND ASSAY RESULTS OF DIAMOND DRILL HOLE NO.2  
LONE STAR PROSPECT

Collar Co-ordinates: 91CN; 400 E (AGCSNA Grid)

Bearing: 180°

Depression: 69°

Surveys:	Depth	Acid (corrected)	Tro-Pari Azimuth	Dip
	70'	68°	182½°	66½°
	200'	66½°	182½°	66½°
	340'	59°	180°	59°
	380'	58°		
	440'	58°		
	500'	58°		
	600'	57°		

Assay Results:

Sample Interval	Gold (dwts)	Copper %	Description
591'-595'	0.3	0.05	hematite
595'-599'	nil	0.05	hematite
599'-603'	trace	0.1	hematite

Footage	Recovery	Description
0'-30'	3'6"	Fine-grained thin-bedded red mudstone - cleavage parallel to bedding - bedding/core angle = 15°.
30'-80'	11'11"	interbedded mudstone and fine-grained red greywacke.
80'-100'	16'1"	Alternating mudstone and greywacke as above with few thin bands of black chlorite - bedding/core angle = 25°.
100'-130'	24'4"	Alternating mudstone and greywacke as above - rare thin quartz stringers parallel to bedding - bedding/core angle = 25° at 110' = 5° at 130'
130'-161'3"	27'5"	alternating mudstone and greywacke bedding/core angle = 20° - greywacke turns to green-grey below 138'
161'-199'0"	23'10"	alternating reddish-brown mudstone and fine-grained green-grey greywacke cross bedding at 165' - rare quartz stringers - bedding/core angle = 45°.
199'0"- 216' 3"	14'1"	fine greywacke interbedded with black phyllitic mudstone - rare quartz stringer bedding/core angle 30° at 202'; 40° at 215'
216'3"- 255'0"	25'6"	interbedded greywacke and mudstone as above -irregular bedding contacts in some places - probably load casting - bedding/core angles 40°

Footage	Recovery	Description
255'0"-280'0"	24'6"	interbedded greywacke and mudstone as above - rare quartz stringers - 4" jasper band - thin bands of chlorite on partings - bedding/core angle - 30°
280'0"-306'4"	17'10"	thin-bedded hematite shale from 280' - 288' - some quartz - chlorite bands - greywacke with abundant chlorite and quartz stringers - limonite on joint and cleavage planes - apparently a shear zone.
306'4"-342'0"	26'11"	greywacke and mudstone - quartz stringers common - bedding/core angle = 60°
342'0"-368'0"	22'3"	fine-bedded mudstone and greywacke - gash(?) veins filled with quartz chlorite - irregular bedding contact - bedding/core angle ranges from 35° to 60°.
368'0"-384'0"	11'5"	fine-bedded mudstone and greywacke as above - quartz and chlorite stringers common.
384'0"-394'3"	7'6"	thin-bedded hematite shale - laminae badly contorted - common quartz stringers and chlorite partings.
394'3"-425'9"	27'2"	interbedded mudstone and greywacke - rare very small pyrite crystals at 396' - quartz veins - bedding/core angle = 30°
425'9"-435'0"	6'5"	interbedded mudstone and greywacke as above - 2 feet of hematite shale from 426'-428' some quartz stringers
435'0"-445'9"	6'5"	Greywacke with some mudstone - rare quartz stringers
445'9"-475'0"	17'2"	grey green chloritic mudstone - rare quartz stringers
475'0"-500'0"	17'1"	mudstone as above
500'0"-518'9"	15'2"	mudstone as above - rare pyrite at 502' and 510' - rare specularite at 505'
518'9"-531'6"	10'10"	mudstone as above with thin bands of hematite shale - slightly contorted - bedding/core angle = 30° - two thin bands of quartz-hematite with rare pyrite between 523' and 528'
531'6"-555'3"	18'6"	chloritic mudstone with some fine-grained chloritic greywacke
555'3"-577'0"	16'2"	thin-bedded greywacke - rare pyrite crystals at 560'
577'0"-586'0"	7'2"	fine-grained greywacke - in places slickensided - 4" band of specularite at 577'.
586'0"-603'0"	10'0"	greywacke with abundant specularite - specularite with rare pyrite from 590'
603'0"-628'0"	21'2"	greywacke and black mudstone - rare quartz stringers - slickensides common
628'0"-650'0"	15'5"	greywacke and mudstone as above - slickensides and quartz stringers common - bedding/core angle = 50°

END OF HOLE

DIAMOND DRILL HOLE 3 - Cat's Whiskers Prospect

by

P.G. Dunn

Diamond drill hole 3 was planned to intersect the same ironstone body as drill holes 1 and 2, but at a vertical depth of approximately 500 feet to test any downward extension of the body. It was drilled in the same vertical plane as the first two drill holes, and from the same site as drill hole 2, but at a depression of 75°.

This drill hole, however, lifted badly, and it intersected the ironstone body at a vertical depth of 370 feet. The total vertical extent of the ironstone body between drill holes 2 and 3 is therefore about 160 feet.

Drill hole 3 intersected ironstone at 402 feet (measured down the hole). This quartz-hematite body extended from 402 feet to 422 feet is badly leached and contains only traces of copper carbonates.

Between 425 feet and 451 feet the drill intersected phyllite and greywacke with rare pyrite and magnetite.

From 451 feet to 472 feet the drill intersected massive magnetite with abundant sulphides. Chalcopyrite is visible from 460'8" to 472 feet, and some bornite was seen. Chlorite is common in the last foot of magnetite. Below 472 feet fine sandstone, greywacke, and phyllite was encountered.

The only economic mineralization is in the section from 460'8" to 472 feet. This section gave an average assay of 3.58% copper and 0.73 dwts/ton gold. If this is related to the economic section in drill hole 2 (336' to 367') the ore shoot within the ironstone body dips to the south opposite to the dip of the ironstone body. This possible oreshoot, as intersected by drill holes 2 and 3, has a vertical extent of 150 feet, and an horizontal extent of 16 feet in drill hole 2 of 8 feet in drill hole 3.

The first, badly leached, ironstone body intersected in DDH 3 may be part of the main ironstone body or it may be the top of a separate ironstone body. The intense leaching suggests that the latter may be the case, and the rare copper carbonates found in this leached zone suggest that further copper mineralisation may be found at depth.

Further exploration is planned to determine the lateral extent of the possible ore body. Drill hole 4 is being drilled at present. The collar of this hole is 100 feet west of drill hole 3. It is being drilled at a bearing of 180° and a depression of 60°.

Diamond Drill Hole No.3 - Geological Log and Assay ResultsCat's Whiskers Prospect

Collar Co-ordinates: 2830E, 1950S (B.M.R. Bull.44, Plate 3, Sheet 3)

Bearing: 180° Magnetic Depression: 75°

## Acid Surveys

Depth	Angle (corrected)	Size of Hole
150'	73°	0 - 75' NX
250'	70°	75' - 165' BX
350'	64°	165' - 505' AX

<u>Drill Run</u>	<u>Recovery</u>	<u>Description of Core</u>
0-15'	6"	fine-grained red ferruginous sandstone
15-20'	8"	as above - green clay partings
20'-30'	1' 7"	as above
30'-35'6"	2' 3"	as above - bands up to 6" thick of claystone - bedding/core angle 30°
35'6"-45'0"	2' 7"	fine-grained sandstone as above
45'0"-55'0"	2' 5"	as above - thin claystone fragments
55'0"-65'0"	2' 8"	as above 6" claystone band-bedding/core angle-65°
65'0"-101'9"	19' 9"	sandstone as above - limonite and clay partings
101'9"-105'0"	1' 11"	sandstone and claystone - bedding/core angle 45°
105'0"-108'6"	2' 3"	sandstone as above
108'6"-116'0"	6' 3"	6" sandstone as above 5'9" bleached mudstone
116'0"-120'9"	4' 9"	3" bleached mudstone 1'9" sandstone as above
120'9"-135'0"	9' 3"	interbedded sandstone and mudstone
135'0"-141'0"	2' 11"	fine-grained bleached siltstone - some bands of fine sandstone - limonite and clay partings.
141'0"-144'3"	2' 4"	red sandstone and mudstone
144'3"-146'6"	1' 9"	red sandstone and mudstone bedding/core angle - 35° - load casting or slumping
146'6"-149'6"	3' 0"	red sandstone and mudstone
149'6"-155'0"	5' 6"	as above - 3" chert band
155'0"-158'6"	3' 1"	red sandstone
158'6"-161'0"	2' 2"	red sandstone and mudstone
161'0"-165'0"	3' 2"	grey sandstone - rare mudstone bands
165'0"-171'0"	3' 3"	grey sandstone - rare quartz stringers

<u>Drill Run</u>	<u>Recovery</u>	<u>Description of Core</u>
171'0"-175'0"	2' 0"	grey sandstone - pale red mudstone
175'0"-182'0"	7' 0"	red sandstone and mudstone - bedding/core angle - 70° - bleaching along joints
182'0"-188'0"	5' 6"	mostly red sandstone and mudstone - some parts bleached - some cherty bands
188'0"-237'0"	43'10"	red sandstone and mudstone - rare quartz stringers, minor manganese? staining; 230' bedding/core angle 50°
237'0"-238'0"	1' 0"	red sandstone with chert band
238'0"-245'0"	6' 2"	red sandstone and mudstone - bedding/core angle - 55° - Manganese staining
245'0"-247'3"	2' 3"	red mudstone with rare sandstone
247'3"-256'0"	7' 6"	thin-bedded red and grey sandstone and mudstone - bedding slightly contorted - bedding/core angle 50°
256'0"-265'0"	7' 1"	as above
265'0"-268'6"	3'6"	reddish-grey thin-bedded mudstone and sandstone - bedding/core angle - 50°
268'6"-273'0"	3' 9"	reddish sandstone and mudstone - bedding/core angle - 40° - manganese staining
273'0"-281'0"	8' 0"	reddish and grey sandstone and mudstone - bedding/core angle - 50° - load casting
281'0"-283'0"	5"	dark grey cherty mudstone
283'0"-284'6"	1' 6"	grey sandstone and mudstone - some reddish bands
284'6"-288'9"	1'10"	dark grey mudstone
288'9"-194'0"	5' 0"	grey and reddish sandstone and mudstone bedding/core angle - 50°

## Bottom of Oxidation

294'0"-302'0"	7' 0"	grey sandstone and mudstone
302'0"-310'6"	6' 6"	as above - load casting
310'6"-315'0"	4' 6"	as above
315'0"-318'9"	3' 4"	as above
318'9"-325'0"	3'2"	very fine-grained silicified (?) greywacke and dark grey phyllite with some chlorite
325'0"-330'6"	4' 8"	dark grey cherty mudstone and thin bands of fine sandstone
330'6"-335'0"	2' 9"	as above - bedding slightly distorted - bedding/core angle - 60°
335'0"- <del>338</del> <sup>3</sup> 38'0"	2' 5"	as above
<del>338</del> <sup>3</sup> 38'0"-344'0"	2' 7"	as above
344'0"-347'0"	2' 6"	grey sandstone with rare bands of mudstone
347'0"-350'6"	2' 7"	as above - bedding/core angle 45°
350'6"-354'6"	2' 4"	as above - rare mudstone - manganese staining
354'6"-357'6"	2' 0"	as above
357'6"-360'6"	2' 6"	as above bedding/core angle 50°
360'6"-365'0"	3' 4"	as above

<u>Drill Run</u>	<u>Recovery</u>	<u>Description of Core</u>
365'0"-371'6"	6' 6"	as above - some mudstone and rare quartz stringers
371'6"-377'6"	6' 0"	mudstone with some sandstone bands -bedding/core angle - 60°
377'6"-383'0"	4' 7"	mudstone and sandstone as above
383'0"-387'0"	4' 0"	as above
387'0"-391'6"	3' 9"	as above
391'6"-396'6"	3' 0"	2'0" phyllitic mudstone 1'0" chloritic quartz lode - some mudstone
396'6"-398'0"	3"	chloritic rock? veined by quartz
398'0"-400'0"	5"	as above
400'0"-402'0"	8"	as above
402'0"-403'0"	1' 0"	very badly leached quartz-hematite
403'0"-404'6"	1' 3"	as above
404'6"-406'6"	1' 3"	as above
406'6"-410'0"	3' 0"	hematite with rare quartz-rare traces of copper (Malachite) at 409'
410'0"-411'3"	1' 3"	as above - some carbonates
411'3"-413'6"	2' 0"	as above - no visible copper
413'6"-414'6"	1' 0"	as above no visible copper
414'6"-416'3"	1' 9"	as above - rare copper carbonates
416'3"-421'0"	2' 6"	as above - rare copper carbonates
421'0"-422'0"		NO CORE
422'0"-427'0"	3' 0"	2'6" as above 6" chloritic phyllite
427'0"-432'6"	3' 6"	chloritic phyllite - bands of talc (?) - possibly a shear zone - rare chalcopyrite at 432'6"
432'6"-435'0"	2'10"	chlorite phyllite - pyrite and magnetite common- quartz and chalcopyrite rare
435'0"-437'0"	2' 0"	chloritic phyllite - rare sulphides.
437'0"-440'0"		NO CORE
440'9"-444'6"	4' 6"	greywacke and chloritic phyllite - impregnated with iron - rare sulphides.
444'6"-446'0"	1' 6"	tuffaceous? greywacke
446'0"-454'6"	7' 0"	tuffaceous? greywacke - rare pyrite - abundant chlorite - magnetite after 451' with abundant pyrite - rare chalcopyrite
454'6"-464'0"	9' 6"	massive magnetite with abundant pyrite - rare quartz and chalcopyrite, chloritic-quartz rock after 456' - rare pyrite - chalcopyrite common after 460'8", rare bornite and quartz
464'0"-471'0"	3' 9"	magnetite with quartz - chalcopyrite still common- abundant in some patches
471'0"-472'0"	0' 6"	as above - chlorite common - sulphides appear to be parallel to some original planar structure, possibly bedding.
472'0"-475'0"	1' 9"	interbedded fine sandstone and chloritic phyllite - bedding/core angle - 45° - no visible sulfides
475'0"-479'6"	3' 3"	as above - bedding very contorted, hematite on cleavage surfaces

<u>Drill Run</u>	<u>Recovery</u>	<u>Description of Core</u>
479'6"-481'0"	1' 5"	fine-bedded chloritic hematite shale
481'0"-490'	9' 0"	fine-grained greywacke and mudstone
490'0"-493'0"	3' 0"	black fine mudstone
493'0"-505'0"	11' 3"	mudstone and greywacke

END OF HOLE

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Assay Results - Cat's Whiskers DDH 3

<u>Sample Interval</u>	<u>Gold</u> (dwts)	<u>Copper</u> %	<u>Description</u>
394'-402'	0.3	0.55	quartz veined chloritic phyllite
402'-412'	trace	0.45	badly leached quartz-hematite
412'-422'	trace	0.25	hematite as above
422'-426'6"	nil	0.95	hematite as above
426'6"-432'6"	trace	0.25	chloritic phyllite
432'6"-442'	nil	0.15	chloritic phyllite and greywacke
442'-452'	nil	0.1	greywacke
452'-460'8"	0.4	0.25	massive hematite - abundant pyrite
460'8"-466'	0.3	3.75	hematite as above, visible chalcopryrite rare bornite
466'-472'	1.1	3.45	as above

REPORT ON DIAMOND DRILL HOLE NO. 3, LONE STAR PROSPECT

by

W.S. YeamanINTRODUCTION

D.D.H. 3 at the Lone Star Prospect, (Plate 1) Tennant Creek, was drilled vertically 75 feet W.N.W. of D.D.H. 1 (Barclay, 1962) to determine if there was any westerly extension of the copper-bearing ironstone intersected in D.D.H.1. D.D.H.2 had been drilled at an inclination of  $68^{\circ}$  on an azimuth of  $180^{\circ}$  to investigate the easterly extension of the ironstone (Dunn, 1963), but only two thin ironstone bands with a very low copper content were intersected in this hole.

The hole was drilled on contract by Associated Diamond Drillers (Pty.) Ltd. under a subsidy agreement between Mines Branch, Northern Territory Administration, and the leaseholder, Mr. J. Prindeville.

LEVELS

The collar of D.D.H.2 is 10.6 feet higher than that of D.D.H.1 and that of D.D.H.3 is 4 feet higher than that of D.D.H.1.

DRILLING

The hole was drilled to 653 feet and core recovery averaged 99 per cent throughout the zone of interest. No sludge samples were collected.

The hole was surveyed periodically by the acid etch method and the deviation from the vertical amounted to  $5.5^{\circ}$  at 643 feet. No Tro-Pari surveys were carried out.

Examination of the Core

The core may be conveniently divided into two sections:-  
(1) Warramunga Group above 421 feet, and (2) Ironstone lode material below 421 feet.

(1) Warramunga Group

The Warramunga Group is represented largely by fine-grained phyllite and mudstone with subordinate greywacke which occasionally displays current-bedding and graded-bedding. Some of the mudstone beds display slumping, e.g. between 332 feet and 340 feet.

Greywacke beds and hematite shale beds are well developed between 340 feet and 370 feet, where both these sedimentary types are interbedded.

The bedding of the Warramunga rocks dips at angles of  $20^{\circ}$  to  $65^{\circ}$ .

Pyritic shale at 372 feet in D.D.H.3 has been correlated with a similar pyritic bed at 345 feet in D.D.H.1 and at 396 feet in D.D.H.2. Similarly, contorted hematite shale at 355 feet in D.D.H.3 has been correlated with contorted hematite shale at about 390 feet in D.D.H.2, and graded greywacke at 340 feet in D.D.H.3, and has been correlated with a similar bed at about 315 feet in D.D.H.1. From the intersections of the pyritic shale in D.D.H.'s. 1 and 3, which show a bedding-core angle of  $60^{\circ}$ , it may be deduced that this bed either strikes at about  $74^{\circ}$  true and dips north at about  $30^{\circ}$ , or that it strikes at about  $135^{\circ}$  true and dips to the south-west. From a consideration of the regional structure, the former is thought to be the more likely.

(2) Lode

The first lode intersection was obtained between 421 feet and 430 feet and consisted of brecciated ironstone partially replaced by chalcopyrite and pyrite.

Brecciated greywacke with quartz veining from 436 feet to 455 feet was followed by a second intersection of ironstone from 455 feet to 485 feet and includes a jasper section between 466 feet and 482 feet.

Relict bedding can be recognised in portions of this ironstone, which is probably a result of total replacement of a fine-grained sedimentary rock, such as siltstone or hematite shale by iron metasomatism. This "bedding" lies at an angle of about 40° to the core axis, indicating a dip of about 50°.

Both the ironstone and the jasper have been brecciated and the breccia matrix consists principally of quartz with disseminated chalcopyrite and pyrite.

From 485 feet to the bottom of the hole the rocks are mainly chloritic magnetite schists and phyllites. The magnetite in these rocks is commonly concentrated along cleavage planes, which are usually vertical, but occasionally replacement is more nearly complete and massive ironstone results. Intermittent veins of brecciated jasper also occur among these chlorite magnetite schists and both rock types carry weak, disseminated sulphide mineralization.

Shearing appears to be particularly strongly developed between 590 feet and 610 feet with a minor zone between 560 feet and 570 feet. At 626 feet, fault gouge associated with crushed and brecciated chlorite schist was observed. It will be noted that copper values are slightly higher in these sheared and crushed sections.

ASSAY RESULTS

Copper assay results are consistently low, and gold values are negligible.

RECOMMENDATIONS

The low tenor of copper and the absence of gold indicates that further exploration west of D.D.H.1 is not warranted at the present time, and if further exploration is to be undertaken, it is recommended that a vertical drill hole should be sited 60 feet north of D.D.H.1 at 315E/77ON (A.G.G.S.N.A. Grid). Since the ironstone body at the Lone Star Mine itself has a northerly dip (Ivanac, 1954), as do many of the known ironstone bodies on the field, this hole is expected to test the possible down-dip extension of the small, high grade, copper shoot intersected at 520 feet in D.D.H.1. The total depth of the proposed hole would not exceed 800 feet.

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- |               |  |
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LONE STAR - LOG OF D.D.H.3 PROSPECT

Collar Co-ordinates: 225E/730N (A.G.G.S.N.A. Grid)  
Course: Vertical  
Dates: December 1963 to February 1964  
Depth: 653 feet  
Purpose: To determine the limits of copper mineralization and ironstone intersected in D.D.H. 1.  
Surveys: at 400' inclination 87° (corrected acid etch)  
 at 500' inclination 86° " " "  
 at 643' inclination 84.5° " " "

Logged and marked by: P.G. Dunn (to 306 feet) and W.S. Yeaman.

Split and sampled by: I. Tuxworth.

Bedding -core/<sup>axis</sup> angle shown by  $\theta$

<u>FOOTAGE</u>	<u>RECOVERY</u> (feet)	<u>SIZE</u>	<u>DESCRIPTION OF CORE</u>
0 - 76	8	NX	Pale purple phyllite (badly weathered).
76 - 80	2.67	NX	Biotite rich lamprophyre (weathered).
80 - 81	1.0	BX	Biotite rich lamprophyre (weathered).
81 - 90	0	BX	No core
90 - 96	.63	BX	Purple phyllite. $\theta = 0^\circ$
96 - 101	3.67	BX	Lamprophyre
101 - 103	.42	BX	Phyllite
103 - 112	1.75	BX	Phyllite (as above)
112 - 117.75	.17	BX	Phyllite (as above)
117.75- 120	Complete	BX	Pale phyllite, lamprophyre.
120 - 123	3.17	BX	Pale phyllite
123 - 126	0	BX	No core
126 - 137	8.0	BX	Phyllite as above. $\theta = 30^\circ$ , thin quartz stringers at 136' to 137'.
137 - 150	8.58	BX	As above with quartz stringers.
150 - 154	1.08	AX	Medium to fine grained greywacke with quartz stringers.
154 - 160	3.0	AX	Interbedded greywacke and phyllite, quartz stringers.
160 - 172	5.67	AX	Dark grey and purple phyllite, slightly contorted, thin greywacke beds at 167' to 169'.
172 - 174	2.0	AX	Weathered biotitic lamprophyre.
174 - 177	1.83	AX	Fine-grained quartz porphyry.
177 - 185	Complete	AX	Fine-grained quartz greywacke, thin quartz stringers at 185'.
185 - 190	3.5	AX	3' Biotite lamprophyre, 6" greywacke.
190 - 194.5	3.25	AX	Fine-grained siliceous greywacke, $\theta = 65^\circ$

<u>FOOTAGE</u>	<u>RECOVERY</u> (feet)	<u>SIZE</u>	<u>DESCRIPTION OF CORE</u>
194.5 - 196	1.5	AX	Biotite lamprophyre
196 - 224	Complete	AX	Black chloritic slate with quartz/chlorite stringers. Cleavage parallel to axis. Fine-grained greywacke beds between 215' and 224'. $\theta = 65^\circ$ .
224 - 252	Complete	AX	Black slate with quartz/chlorite stringers, $\theta = 65^\circ$ .
252 - 279	Complete	AX	Fine-grained greywacke, $\theta = 30^\circ$ , slightly sheared near 279' and with quartz/chlorite stringers.
279 - 292	7.0	AX	Black phyllite with quartz/chlorite veins and thin greywacke bands.
292 - 306	Complete	AX	Chloritic phyllite with quartz stringers $\theta = 60^\circ$ .
306 - 315	Complete	AX	As above, $\theta = 55^\circ$ .
315 - 320	Complete	AX	As above $\theta = 50^\circ$ ; quartz veins cease at 321'.
320 - 332	Complete	AX	Chloritic silty slate, showing cross bedding and slump structures.
332 - 340	Complete	AX	As above, with widespread pre-consolidation slumping.
340 - 343	Complete	AX	Graded greywacke, (turbidite?).
343 - 344	Complete	AX	Hematite shale.
344 - 346	Complete	AX	Greywacke, $\theta = 35^\circ$ .
346 - 348.5	Complete	AX	Contorted hematite shale.
348.5 - 349	Complete	AX	Greywacke.
349 - 370	Complete	AX	Hematite shale, contorted in parts, $\theta = 60^\circ$ to $65^\circ$ .
370 - 374	Complete	AX	Chloritic/hematite shale with minor pyrite.
374 - 395.75	Complete	AX	Chloritic phyllite with quartz stringers.
395.75 - 421	Complete	AX	Siltstone. At 403' $\theta = 20^\circ$ . At 415' $\theta = 45^\circ$ .
421 - 430	7.58	AX	Lode. Chalcopyrite and pyrite replacing brecciated ironstone.
430 - 432	Complete	AX	Greywacke.
432 - 435.5	Complete	AX	Chlorite sericite slate.
435.5 - 455	11.5	AX	Brecciated greywacke partly replaced by quartz.
455 - 457	Complete	AX	Lode, Brecciated ironstone with quartz, chalcopyrite and pyrite replacements and disseminations. More intensely brecciated at 456' to 456'6".
457 - 466	Complete	AX	As above, pyritic at 464' to 465'. Relict bedding recognisable, $\theta = 40^\circ$ .
466 - 475	Complete	AX	Jasper quartz breccia, with disseminated chalcopyrite and pyrite.
475 - 476	Complete	AX	Jasper.
476 - 482	Complete	AX	Jasper with minor chalcopyrite.

<u>FOOTAGE</u>	<u>RECOVERY</u> (feet)	<u>SIZE</u>	<u>DESCRIPTION OF CORE</u>
482 - 485	Complete	AX	Mudstone, extensively replaced by hematite and magnetite.
485 - 493.5	Complete	AX	Chloritic hematitic phyllite, replaced partially or wholly by iron oxides. $\theta = 40^\circ$ . Weak disseminated pyrite/chalcopyrite and thin brecciated jasper bands. Varying amounts of iron oxides along cleavage planes. Jasper vein at 489' to 489'8".
493.5 - 504	Complete	AX	Quartz and sulphide in jasper breccia matrix.
504 - 511	Complete	AX	Brecciated hematitic phyllite with thin jasper bands. Minor pyrite.
511 - 530	Complete	AX	Brecciated jasper partly replaced by hematite, quartz and sulphides.
530 - 532.83	Complete	AX	Chloritic magnetite-schist with disseminated magnetite along cleavage planes. Some quartz stringers.
532.83- 534.83	Complete	AX	Jasper.
534.83- 544.5	Complete	AX	Brecciated chloritic magnetite-schists with occasional ironstone and jasper bands. Fault gauge between 538.5 and 539.
544.5 - 556	Complete	AX	Brecciated chloritic magnetite-schists, jasper, fine-grained brecciated ironstone with later sulphide and quartz replacement along cleavage planes.
556 - 577.25	Complete	AX	Brecciated chlorite schist, partially replaced by ironstone with later pyrite and quartz fillings (shear zone?).
577.25 - 586.75	Complete	AX	Magnetite-quartz rock with rare pyrite. Fault zone at 586'.
586.75- 601	Complete	AX	Brecciated chlorite schist with quartz, hematite and magnetite filling. Large percentage of iron minerals replacing schist on vertical cleavage planes. Strongly sheared.
601 - 602	0	AX	Sludge only. No core.
602 - 605	Complete	AX	Brecciated chlorite schist with quartz-hematite-magnetite filling (shear zone?).
605 - 610	Complete	AX	As above.
610 - 617	Complete	AX	Jasper with pyrite and chalcopyrite streaks and knots.
617 - 631.5	Complete	AX	Crushed and brecciated chlorite schist with thin jasper bands. Chalcopyrite and pyrite disseminations in magnetite and hematite which appear to partially replace the schist. Fault gouge at 626'.
631.5 - 633	Complete	AX	As above, more pyritic.
633 - 653.25	Complete	AX	Brecciated hematite and magnetite replacing chlorite schist. Numerous thin jasper bands. Slight pyrite/chalcopyrite mineralization. Much more hematite between 640.5' and 650'.

653.25 feet - HOLE ENDS

NOTE:  $\theta$  = Bedding/core axis angle.

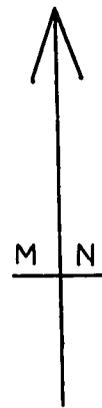
D.D.H.3 - LONE STAR PROSPECTASSAY RESULTS

<u>FOOTAGE</u>	<u>PEKO</u> <u>Cu%</u>	<u>NO.3 GOVT.</u> <u>BATTERY Cu%</u>	<u>PEKO</u> <u>Au dwts/ton</u>	<u>NO. 3 GOVT.</u> <u>BATTERY</u> <u>Au dwts/ton</u>
419' - 424'		0.4		
424' - 429'		0.3		
429' - 432'		0.55		
432' - 437'		0.1		
455' - 460'	1.45		0.1	Tr.
460' - 465'	0.4		0.1	Tr.
465' - 470'	0.35		0.2	Tr.
470' - 475'	0.25		1.5	0.7
475' - 479'		0.45		Nil
479' - 482'		0.80		Nil
482' - 485'	0.75		0.2	Tr.
485' - 489'	0.45		0.3	Tr.
489' - 493'6"	0.5		0.2	Tr.
493'6" - 494'	0.25		0.2	Tr.
494' - 497'	0.25		0.2	Tr.
497' - 500'	0.6		0.1	Tr.
500' - 504'	0.25		0.2	Tr.
504' - 507'	1.1		0.2	Tr.
507' - 511'	0.25		0.2	Nil
511' - 513'3"	0.2		0.2	"
513'3" - 519'	0.15		0.1	"
519' - 524'	0.3		0.1	Nil
524' - 529'	Nil		0.1	"
529' - 534'10"	Nil		0.2	"
534'10" - 539'10"	Nil		0.2	Nil
539'10" - 544'6"	0.4		0.2	"
548' - 553'	0.3		0.1	"
553' - 558'	0.4		0.2	"
558' - 563'	0.55		0.1	"
563' - 568'	1.05		0.1	"
568' - 573'	0.2		0.2	"
573' - 574'4"	0.2		0.1	"
574'4" - 580'	0.3		0.2	"
580' - 586'	0.35		0.1	Nil
586' - 591'	0.45		0.1	"
591' - 596'	0.9		0.2	"
596' - 601'	1.0		0.1	"
601' - 606'	1.3		0.1	Nil
606' - 611'	0.8		0.1	"

LONE STAR

Diagrammatic Section and Assay Results Through D.D.H.s 1, 3 and 2 (projected)



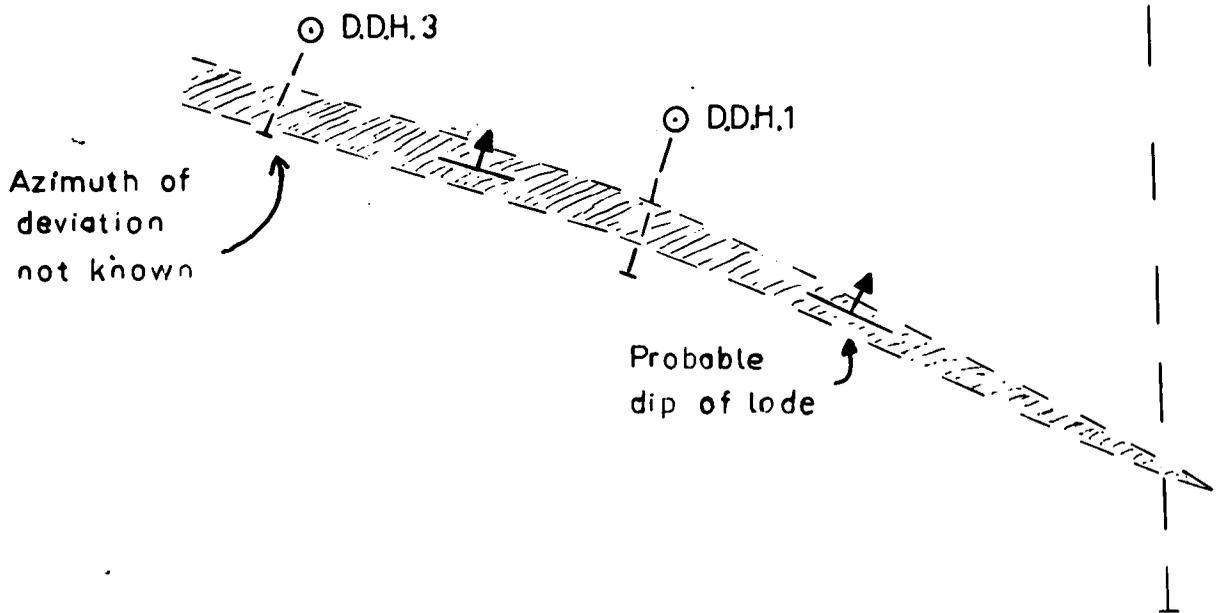


# LONE STAR PROSPECT TENNANT CREEK

Lay out of DDHs 1,2,3,  
And Proposed D.D.H.4

DDH 2  
○  
-68°

○ DDH. 4.  
(proposed)  
Vertical



SCALE OF FEET

<u>FOOTAGE</u>		<u>PEKO</u> <u>Cu%</u>	<u>NO.3 GOVT.</u> <u>BATTERY Cu%</u>	<u>PEKO</u> <u>Au dwts/ton</u>	<u>NO. 3 GOVT.</u> <u>BATTERY</u> <u>Au dwts/ton</u>
611'	- 618'	0.95		0.1	Nil
620'	- 625'	0.9		0.1	"
625'	- 630'	1.5		0.1	"
630'	- 635'6"	0.3		Tr.	"
635'6"	- 640'6"	1.25		Tr.	"
640'6"	- 645'	0.75		0.1	Nil
645'	- 650'	0.25		0.1	"
650'	- 653'	0.7		0.1	"

NOTE: No.3 Government Battery results reporting less than 0.2 dwts/ton = Trace.

B.M.R. AREA NO.1 (WEST) ON FLYNN'S MONUMENT AREAREPORT ON D.D.H. 1 (A)

by

W.S. Yeaman

A diamond drill hole (Plate 1) was drilled to test the magnetic anomaly at a depth of 340 feet below 24,200W/5900S (O'Connor and Daly, 1962). The hole was originally sited at 24,200/5740S on an azimuth of 180° with a depression of 65°.

The first hole encountered coarse sand to 30 feet and white kaolin clay to 60 feet, where the hole was abandoned due to drilling difficulties.

D.D.H.1(A) was sited vertically over the anomaly and intersected sheared porphyry above and below the ironstone lode, which was encountered between 319 feet and 335 feet. Core recovery was exceptionally poor through the ironstone (7 per cent).

ASSAY RESULTS

Assay results for both sludge and core indicated nil gold and only trace copper through the zone of interest.

RECOMMENDATIONS

No further exploration in the area appears to be warranted.

REFERENCES

O'CONNOR, M.J., and DALY, J. 1962 - "Tennant Creek Ground Magnetic Survey".  
Bur.Min.Resour.Aust.,Rec. (unpubl.).

B.M.R. AREA NO.1 (WEST) ON FLYNN'S MONUMENT AREALOG OF D.D.H. 1 (A)Collar Co-ordinates: 24, 200S/5900S (B.M.R. 1958 Grid).Course: VerticalDates: February to 10th April, 1964.Depth: 360 feetPurpose: To investigate the magnetic anomaly 340 feet below collar. (O'Connor and Daly, 1962).Surveys: At 250 feet - 87° (corrected acid etch)  
360 feet - 85° (corrected acid etch)Logged and marked by: W.S. YeamanSplit and sampled by: I. Tuxworth.

Sludge samples were collected throughout.

<u>FOOTAGE</u>	<u>CORE RECOVERY (feet)</u>	<u>SIZE</u>	<u>DESCRIPTION OF CORE</u>
0 - 10	0	BX	No core, Brown sand.
10 - 15	0.5	BX	Sheared porphyry, cleavage parallel to core axis.
15 -105	0	BX	No core. coarse sand and gravel.
105 -120	1.0	BX	Coarse-grained sheared porphyry and quartz.
120 -125	0	BX	No core. Sand.
125 -271	20.5	AX (after 235')	Medium-grained schistose rock, containing quartz, feldspar and chlorite;- Probably sheared porphyry. Schistosity/core angle 10°.
271 -273	1.5	AX	Sheared rock, containing large pink feldspars and quartz. Probably a sheared pegmatite.
273 -319	11	AX	Schistose rock containing quartz chlorite and feldspar:- Probably sheared porphyry.
319 -335	1.5	AX	Massive ironstone. Nearer 335 feet it contains chlorite, and is brecciated and partially replaced by quartz, jasper and hematite.
335 -360	3	EK	Schistose rock containing quartz, chlorite and feldspar schist:- Probably sheared porphyry.

360 feet - HOLE ENDS.

PETER PAN (PLATE 1)LOG OF D.D.H.1

Collar location: 440 feet west and 230 feet south of Peter Pan main shaft.

Course: Azimuth 340° (true); inclination 60°.

Length: 262 feet.

Purpose: To investigate ground vertically below a sheared zone carrying malachite and located near a porphyry/Warramunga contact.

Logged by: P.G. Dunn (to 222 feet) and W.S. Yeaman.

Split and sampled by: I. Tuxworth

Surveying: It was not possible to survey the target zone owing to the rods jamming at the end of drilling.

<u>FOOTAGE</u>	<u>RECOVERY</u>	<u>DESCRIPTION OF CORE</u>
0 - 5.5	0	No core.
5.5 - 39.4	30.4	Interbedded slate and greywacke. Sedimentary structures indicate drilling stratigraphically downwards. Bedding/core angle 30°.
39.4 - 83.8	33.9	As above, more ferruginous sediments. Mn staining at 83'. Bedding/core angle 40°.
83.8 - 133.5	47.9	Interbedded fine-grained greywacke. Bedding/core angle 30°. Cleavage/core angle 0° at 124 feet.
133.5 - 137		Greywacke.
137 - 145	1.25	Black shale.
145 - 163.7	18.2	Biotite lamprophyre.
163.7 - 172.1	8	Black chlorite slate with thin greywacke beds.
172.1 - 224.3	54.75	Biotite lamprophyre; quartz stringers at 220 feet.
224.3 - 239.5	13.75	Slate and greywacke.
239.5 - 243	3.7	Black chloritic slate, badly sheared.
243 - 247	0	No core. Black chloritic sludge. Hole caving badly.
247 - 262	2	Black chloritic slate.

262 feet - HOLE ENDS

Assays: Nil Gold throughout  
Copper not assayed. None visible in panned sludge or core.