

NORTHERN TERRITORY GEOLOGICAL SURVEY

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Diamond Drilling Investigations
1975-77; Mt Wells Tin Mine, NT

A.W. Newton

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NORTHERN TERRITORY GEOLOGICAL SURVEY REPORT G.S. 78/13

DIAMOND DRILLING INVESTIGATIONS, 1975 - 77

MT. WELLS TIN MINE, N.T.

by

A.W. NEWTON

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Not available →



1. SUMMARY

Following an application by Jingellic Minerals N.L. for additional diamond drilling assistance at the Mt. Wells tin mine and environs, Mines Branch, Department of Northern Territory, drilled three diamond drill holes, totalling 782 metres between 1975 and 1977.

DDH 12 located in the mine area confirmed the strike and depth continuity of the Main and East lode but did not substantially increase indicated reserves.

DDH's 13 and 14 were designed to locate further sources of tin mineralization in the Mt. Wells lode system to the south of the Mt. Wells tin mine. Neither hole intersected any significant mineralization.

No further diamond drilling is recommended at this time.

2. INTRODUCTION

The history and previous exploration up till December, 1974 have been summarized elsewhere (Mookhey, 1971, Newton, 1975) and will not be further discussed.

In 1975, Jingellic Minerals N.L. applied for further drilling assistance from Mines Branch, Department of Northern Territory to further assess possible reserves and to locate any southern extensions to the lode system.

Subsequently three diamond drill holes totalling 782.6 metres were completed by the Mines Branch Drilling Section in the period 1975-77.

3. LOCATION AND ACCESS

Map: Burrundie 1 Mile Geological Series Sheet D52-8-70.

Co-ordinates: 13° 30' 20" Lat.
131° 42' 40" Long.

The Mount Wells Tin Mine is 225 kilometres by road from Darwin. Access is via the Stuart Highway to the Fountainhead turnoff near the 110 mile peg and thence past Fountainhead and Grove Hill. The unsealed section of road between Fountainhead and Mount Wells is sometimes inaccessible during the wet season.

4. GEOLOGY

The geology of the Mt. Wells Tin Mine has been described in detail by Smith (1958) and Mookhey (1971).

Richards (1975) extended investigations beyond the immediate mine area to obtain an overview of the entire Mt. Wells lode system. His observations are summarized as follows:

The Mt. Wells lodes lie within a large arcuate, mineralized quartz-vein system, some 4 kilometres in length. The system strikes more or less parallel to the margin of the Prices Springs Granite (45°) and dips steeply east at $75-80^{\circ}$. In the south the system appears to be truncated by a system of barren quartz veins striking 180° (approx.), the northern extensions of the system have not been fully traced out. The southern part of the system consists of a single vein-averaging about 10 metres in width; to the north this splays out into several veins, some of which form the various lodes at the Mt. Wells Tin Mine.

Trace mineralization is in evidence along the entire system and a vaguely defined zonal pattern of surface mineralization, roughly centred on Mt. Wells, has developed.

Apart from the mine area, Richards defined two sections of the system which warrant further investigation. The first of these is a 600 metre length of the southern, single vein which contains sulphide boxworks in surface samples (Appendix 5). A vertical shaft at least 30 metres deep has been sunk on the vein in this area. The second section is south of the mine area where the lode system outcrops poorly over a distance of 400-500 metres along the crest of a steep hill. Cassiterite can be readily panned from soil on the southern and eastern flanks of the hill

5. DIAMOND DRILLING RESULTS

Three diamond drill holes totalling 782 metres were completed by the Mines Branch between 1975 and 1977. Good drilling conditions were encountered and apart from some poor recovery in highly weathered near surface sediments, core recovery was effectively 100%. All core was geologically logged and 120 split core samples were forwarded to the East Point Laboratories, Department of the Northern Territory. The samples were assayed for copper, lead, zinc and tin.

D.D.H. 12 was positioned midway between DDH 9 and DDH 4 (previously drilled by I.M.C. Development Corporation) in order to test the continuity of the East and Main lodes between these holes. The hole was depressed at 45° on a bearing of 285° magnetic and had a total depth of 201 metres. Siltstone was the principal rock type encountered in the hole, and a complete lithological description is given in Appendix II.

Several mineralized zones of marginal value were intersected in this hole. The interval 58.5 - 59.0 metres assayed 1.3% Cu within a wider quartz-breccia zone. The interval 74.5 - 76.5 metres assayed 1.9% Cu and can probably be correlated with the East lode, the interval comprised a quartz vein with chalcopryrite between 75.1 and 76.0 flanked by minor quartz veins with chalcopryrite within silicified sediments. The interval 87.9 - 88.9 metres assayed 0.2% Cu and may correspond to the No. 1 copper lode, while quartz breccia and quartz vein material assaying 0.44% Cu and 0.6% Sn between 133 and 133.5 metres may correspond to the No. 2 copper lode. The Main lode is probably represented by a quartz breccia zone between 146.0 and 147.1 metres with an assay value of 0.68% Sn between 146.5 and 147.1 metres, but mineralization assaying 0.46% Cu, 0.51% Sn between 150.5 and 151 metres, and 0.44% Sn between 155 and 155.5 metres may form a wider Main "lode system".

D.D.H. 13 was positioned west of the upper dam and was designed to determine the nature of the poorly outcropping lode system south of the Mine area where tin is readily panned on the hillslopes. The hole was depressed 55° on a bearing of 290° M and had a depth of 460 metres. Siltstone was the principal sediment encountered up to the sharp contact with the grey Prices Springs Granite at a depth of 294 metres. A complete lithological description is given in Appendix II.

(Note: Drill core in the interval 218.6 and 230.9 metres was mislaid in transit between the drill site and the Winnellie core store. While the absence of this core precludes a complete assessment of the lode system, no significant mineralized zone was noted in this interval during a brief field inspection.)

Mineralization was sparse in this hole, with only minor copper values over-narrow intervals being recorded in assay results. While many very narrow quartz veins were noted these were generally barren and less altered than veins in the mine area. A system of quartz veins between 193.85 and 196.6 metres is the only quartz zone of significant dimensions, but no high tin or copper values were obtained within the interval. The poor definition of the lode system on the surface, the area of DDH 13 has been reflected at depth in this hole.

D.D.H. 14 was positioned towards the southern end of the single vein where iron boxworks within the vein are relatively common. Richards, considering the zoned nature of Mt. Wells mineralization suggested the vein should be intersected at a vertical depth of at least 150 metres, to ensure being in the zone of greatest tin values. This hole however was drilled at a shallow angle to determine the nature of the vein at moderate depth before preceding with any deeper hole. The hole was depressed 45° on a bearing of 300° M with a total depth of 121 metres. Siltstone was the main rock type encountered in the hole. A complete lithological description is given in Appendix II.

No mineralization of significance was intersected. The highest assay value was 2.68% Cu over the interval 51.8 - 52 metres within a quartz vein. The series of quartz veins which appears to correlate with the surface quartz vein of interest lies in the intersection 84.5 - 85.9 metres. The vein is not only barren but it has narrowed considerably with depth. As a result a drill hole to intersect this vein at greater depth is not justified.

6. CONCLUSIONS AND RECOMMENDATIONS

Diamond drilling investigations carried out at Mt. Wells between 1975 and 1977 have failed to substantially increase indicated reserves or to locate additional sources of tin mineralization.

D.D.H. 12 confirmed the continuity of the Main and East lodes over a strike length of 200 metres between DDH 4 and DDH 9 and indicated a depth continuity in excess of 80 metres vertically below the Adit 3 level for both lodes.

D.D.H. 13 and 14 were designed to locate lateral extensions of the mineralized Mt. Wells mine lodes. Both failed to locate any significant mineralized zones.

No further diamond drilling to prove up additional reserves or to locate other sources of tin mineralization at Mt. Wells can be justified at this time. An extensive underground exploration programme, rather than further drilling, should be undertaken to properly ascertain the viability of mining the complex lode system at the Mt. Wells Tin Mine.

7. REFERENCES

- | | | |
|---|------|--|
| Beattie, G.A. | 1970 | Report on Diamond Drilling Results (IMCDC) Summary, <u>Jingellic Minerals N.L. Company Report</u> (Unpubl.) |
| Mookhey, R.C. | 1971 | Completion Report, Assessment of Probable Size and Grade of Mount Wells Tin-Wolfram Copper Deposit, Northern Territory. <u>Jingellic Minerals N.L. Report CR71/102</u> (Unpubl.) |
| Newton, A.W. | 1975 | Diamond Drilling Investigations, 1974 <u>N.T. Geol. Surv. Rept. GS75/6</u> (Unpubl.) |
| Smith, W.C. | 1958 | Report on the Mt. Wells Tin Mine, Northern Territory, <u>Broken Hill Pty. Co. Ltd. Report CR58/7</u> (Unpubl.) |
| Richards, D.N.G. | 1975 | Report on the Mt. Wells Tin Prospect <u>Jingellic Minerals N.L. Report CR75/148</u> (Unpubl.) |
| Taylor, R.G. | 1971 | Geological Notes on Recent Work at the Mt. Wells Tin Mine, Northern Territory <u>Jingellic Minerals N.L. Company report</u> (Unpubl.) |
| Walpole, B.P., Crohn, P.W.,
Dunn, P.R., and Randal, M.A. | 1968 | Geology of the Katherine-Darwin Region, Northern Territory, <u>Bur. Min. Resour. Aust. Bull. 82</u> |

APPENDIX I

DIAMOND DRILL HOLE ASSAYS

Mt. Wells Tin Mine N.T.

D.D.H.'s 12, 13 and 14.

Split core samples were analyzed using the Atomic Absorption Spectrophotometer at the East Point Laboratory, Darwin. All the results are expressed in parts per million (ppm).

Detection limits are as follows:-

Cu	5ppm
Pb	10ppm
Zn	2ppm
Sn	50ppm

A minus sign (-) in front of a number means the value is less than the detection limit.

MT. WELLS D.D.H. 12

Interval (metres)	<u>Cu</u> (p.p.m.)	<u>Pb</u> (p.p.m.)	<u>Zn</u> (p.p.m.)	<u>Sn</u> (p.p.m.)
25.00 - 25.50	660	90	95	130
26.45 - 26.80	210	10	60	-50
33.00 - 33.50	400	-10	35	-50
37.50 - 38.00	3830	20	50	-50
38.00 - 38.70	75	-10	50	-50
43.50 - 44.00	95	10	90	-50
44.35 - 44.85	100	-10	55	-50
46.90 - 47.40	400	25	50	200
52.40 - 52.90	280	25	50	-50
52.90 - 53.40	220	10	40	-50
56.50 - 57.00	170	10	40	-50
57.00 - 57.50	560	40	50	430
57.50 - 58.00	1000	95	50	-50
58.50 - 59.00	13000	50	75	-50
59.50 - 60.00	170	15	55	-50
62.10 - 62.60	3400	20	60	-50
62.60 - 63.10	1480	50	80	-50
63.10 - 63.60	1250	95	120	-50
63.60 - 64.10	870	100	85	-50
64.50 - 65.00	4200	190	95	100
65.00 - 65.50	6000	530	80	-50
72.00 - 72.50	2150	-10	70	70
73.50 - 74.00	360	-10	35	-50
74.50 - 75.00	11000	-10	30	-50
75.00 - 75.50	17000	60	55	80
75.50 - 76.00	31000	210	60	140
76.00 - 76.50	17500	20	50	-50
76.50 - 77.00	630	15	65	-50
84.10 - 84.60	4300	20	40	-50
85.90 - 86.40	4250	25	55	-50
87.90 - 88.40	1500	-10	20	-50
88.40 - 88.90	2350	-10	35	-50
88.90 - 89.40	140	-10	35	-50
89.40 - 90.00	100	-10	50	-50
94.60 - 95.30	750	20	50	-50
95.30 - 95.80	520	10	90	-50
95.80 - 96.30	280	15	50	-50

Interval (metres)	<u>Cu</u> (p.p.m.)	<u>Pb</u> (p.p.m.)	<u>Zn</u> (p.p.m.)	<u>Sn</u> (p.p.m.)
97.70 - 98.00	290	25	45	-50
102.35 - 102.85	210	40	40	-50
105.30 - 105.80	330	25	60	-50
116.00 - 116.50	530	18	70	310
116.50 - 117.00	160	12	170	-100
119.20 - 119.70	650	25	450	350
126.30 - 126.80	980	30	120	-100
127.30 - 127.80	80	25	300	-100
129.10 - 129.60	1200	16	20	400
129.60 - 130.10	100	8	25	-100
133.00 - 133.50	4400	12	40	6000
135.20 - 135.70	600	10	30	-100
135.70 - 136.20	700	14	30	-100
138.50 - 139.00	200	25	25	-100
146.00 - 146.50	450	10	16	-100
146.50 - 147.10	390	100	45	6800
149.50 - 150.00	600	18	35	650
150.00 - 150.50	2900	16	35	-100
150.50 - 151.00	4600	16	35	5100
155.00 - 155.50	210	16	120	4400
159.90 - 160.40	130	16	35	800
162.00 - 162.50	35	14	35	-100
168.00 - 168.50	45	14	35	-100
169.35 - 169.85	30	14	45	-100
171.20 - 171.70	8	6	16	-100
171.70 - 172.20	25	8	20	-100
172.20 - 172.70	600	40	50	-100
172.70 - 173.20	55	6	35	-100
173.20 - 173.70	120	12	45	-100
173.70 - 174.20	45	8	35	-100
174.20 - 174.70	75	6	35	-100
174.70 - 175.20	200	6	30	-100
175.20 - 175.70	50	8	30	-100
176.90 - 177.40	220	12	35	-100
177.40 - 177.90	130	12	35	-100

<u>Interval</u> (metres)	<u>Cu</u> (p.p.m.)	<u>Pb</u> (p.p.m.)	<u>Zn</u> (p.p.m.)	<u>Sn</u> (p.p.m.)
177.90 - 178.40	30	16	60	-100
191.10 - 191.60	50	14	45	-100
196.00 - 196.50	30	16	35	-100
198.00 - 198.50	12	12	35	-100
198.50 - 199.00	35	16	50	-100
199.00 - 199.50	490	16	50	-100
199.50 - 200.00	270	16	20	-100
200.00 - 200.50	700	12	25	-100
200.50 - 201.00	600	14	30	-100

MT. WELLS D.D.H. 13

<u>Interval</u> (metres)	<u>Sn</u> (p.p.m.)	<u>Cu</u> (p.p.m.)
19.3 - 20.4	- 100	45
30.0 - 30.5	- 100	110
39.45 - 39.55	- 100	1920
44.4 - 44.8	- 100	16
45.35 - 45.50	- 100	20
48.5 - 49.2	- 100	40
116.5 - 116.65	- 100	3280
129.75 - 129.85	- 100	1960
143.75 - 143.82	- 100	170
144.4 - 145.1	- 100	250
182.2 - 182.7	- 100	170
162.7 - 162.85	- 100	6400
171.3 - 171.6	- 100	340
172.5 - 172.6	- 100	2.32%
194 - 194.5	- 100	140
194.5 - 195	- 100	340
195 - 195.5	100	70
195.5 - 196	- 100	720
196 - 196.5	100	1200
209.4 - 209.65	- 100	60
254.2 - 254.4	- 100	210
261.9 - 262.2	- 100	50

MT. WELLS D.D.H. 14

<u>Interval</u> (metres)	<u>Sn</u> (p.p.m.)	<u>Cu</u> (p.p.m.)
6.0 - 6.2	- 100	35
14.7 - 15.6	- 100	20
16.0 - 16.3	- 100	120
38.5 - 38.7	- 100	340
39.2 - 39.4	- 100	220
51.3 - 51.8	- 100	960
51.8 - 52.0	- 100	2.68%
52.0 - 52.5	- 100	1440
52.5 - 53.0	- 100	40
84.5 - 84.8	- 100	6
84.8 - 85.2	- 100	2
85.5 - 85.9	- 100	20
86.2 - 86.7	- 100	12
86.7 - 87.2	- 100	90
87.2 - 87.7	- 100	100
87.7 - 88.2	- 100	330
88.2 - 88.7	- 130	5200

APPENDIX II

GEOLOGICAL DRILL LOG SUMMARIES

Mt. Wells Tin Mine N.T.

D.D.H's 12,13,14

MT. WELLS D.D.H. 12

<u>Interval</u> (metres)	
0 - 5.6	Highly leached and oxidised iron-rich <u>siltstone</u> (Rec. 10%)
5.6 - 7.8	<u>Quartz Vein</u> with veinlets of sericite and some limonite staining along fractures. (Rec. 20%)
7.8 - 7.9	Fawn, oxidised bedded <u>siltstone</u> with iron stained fractures (Rec. 50%)
7.9 - 8.1	<u>Quartz vein</u> with minor limonite staining (Rec. 30%)
8.1 - 8.8	Fawn, oxidised bedded <u>siltstone</u> , some limonite staining along fractures. (Rec. 60%)
8.8 - 9.1	<u>Quartz vein</u> with minor limonite staining (Rec. 20%)
9.1 - 12.0	Mid fawn-grey bedded <u>siltstone</u> , many iron-stained fractures, some narrow (<2 cm. thick) sandy beds. Narrow quartz veins (<3 cm. thick) with much hematite and limonite at 9.6 and 9.9 m. (Rec. 95%). Note: Boundary at 12 m. is fairly arbitrary as weathering is gradational with depth.
12.0 - 25.0	Mid grey bedded <u>siltstone</u> , fairly fractured, contains some sericite, several minor quartz veins (<1.5 cm. thick) some with minor pyrite below 20 m. One narrow quartz vein at 19 m. contains minor pink feldspar. Pyrite noted along fractures below 22 m. Trace chalcopyrite noted in narrow quartz vein and in pyrite veins between 23.7 and 24.0 m.
25.0 - 25.7	Several <u>quartz veins</u> with pyrite and some chalcopyrite in bedded siltstone. Band of massive pyrite with chalcopyrite and trace cassiterite between 25.15 and 25.25m. (Rec. 85%)
25.7 - 56.8	Mid-grey bedded <u>siltstone</u> , partly silicified and fairly fractured. Below 40 m. the siltstone is more silicified and most fractures show pyrite and trace chalcopyrite (Rec. 95%). Note: Veins <5 cm. thick have not been described. 26.45 - 26.55 m. Quartz vein with pyrite and trace chalcopyrite. 30.75 - 30.85 m. Barren quartz vein. 33.25 - 33.45 m. Quartz vein with pyrite, trace chalcopyrite and dark mineral - possibly tourmaline. 34.5 - 34.6 m. Brecciated quartz vein, some pyrite, trace chalcopyrite 37.5 - 38.7 m. Quartz breccia, some pyrite, trace chalcopyrite, arsenopyrite. 43.65 - 43.8 m. Quartz vein with abundant pyrite and some fine grained hematite. 44.35 - 44.7 m. Quartz veins with some pink feldspar, minor pyrite. 46.9 - 47.7 m. Quartz veins, some pyrite, trace chalcopyrite and one pink granitic stringer. 49.15 - 49.2 m, 51.95 - 52, 52.15 - 52.2m. Barren quartz veins.

Interval
(metres)

2.

- 52.45 - 53.3 m. Pink granitic material and quartz in breccia zone, some disseminated chalcopyrite.
- 53.7 - 53.95 m. Pink granitic stringer, minor pyrite.
- 54.2 - 54.25 m. Barren quartz vein.
- 54.7 - 54.85 m. Pink granitic stringer.
- 55.3 - 55.4 m. Quartz breccia, some pink granitic material.
- 56 - 56.1 m. Breccia with pink granitic material and minor pyrite.
- 56.3 - 56.45 m. As above.
- 56.80 - 60.15 Quartz breccia zone with bands of siltstone to 50 cm. thick.
- 56.8 - 58.0 m. Mainly quartz with some pyrite, trace chalcopyrite.
- 58 - 58.3 m. Grey-green bedded siltstone, pyrite and trace chalcopyrite along fractures.
- 58.3 - 58.45 m. Quartz breccia with pyrite, trace chalcopyrite.
- 58.55 - 59.25 m. Quartz breccia zone, sheared graphite and shale material (abundant pyrite and some chalcopyrite between 58.55 and 58.8 m.)
- 59.25 - 60.05 m. Barren quartz breccia, fragments of mottled siltstone.
- 60.05 - 60.15 m. Mid grey-green mottled siltstone, partly silicified, some disseminated pyrite.
- 61.5 - 65.6 Light grey-green silicified siltstone (hornfels?), with narrow quartz veins and some disseminated pyrite.
- 62.1 - 62.35 m. Quartz veins with pyrite, chalcopyrite and mica.
- 62.5 - 62.6 m. Quartz vein with chalcopyrite and mica.
- 63.9 - 64 m. Barren quartz vein.
- 64.1 - 64.5 m. Quartz vein with pyrite.
- 64.6 - 65.6 m. Quartz veins with chalcopyrite, pyrite, trace cassiterite.
- 65.6 - 75.1 Mid grey silicified siltstone, mottled in part. (May be spotted hornfels rock near granite contact ??) Pyrite abundant along fractures.
- 65.7 - 65.85 m. Quartz vein with abundant pyrite and chalcopyrite, some bornite and copper carbonate.
- 66.85 - 66.95 m. Pink granitic stringer.
- 72.4 - 72.5 m. Quartz vein with pyrite and chalcopyrite.
- 73.6 - 73.7 m. Quartz vein with trace chalcopyrite and tourmaline.
- 74.8 - 74.9 m. Quartz vein with chalcopyrite.
- 75.1 - 76 Quartz vein with veinlets and aggregations of chalcopyrite and dark mineral-tourmaline? May be trace cassiterite.
- 76 - 76.45 Highly silicified shale with disseminated pyrite and veins of pyrite, chalcopyrite and dark mineral-tourmaline?
- 76.4 - 76.45 m. Quartz vein with pyrite, chalcopyrite and tourmaline.
- 76.45 - 87.9 Mid grey-green silicified and partly mottled siltstone.
- 84.45 - 84.5 m. Quartz vein with pyrite and some chalcopyrite.
- 85.9 - 86.1 m. Quartz vein with vein of massive pyrite and some chalcopyrite.
- 86.4 - 86.5 m. Quartz vein with trace pyrite and chalcopyrite.

Interval (metres)	
87.9 - 89.5	<u>Quartz vein</u> with pyrite, some chalcopyrite, dark green mineral - tourmaline, and grey-pink mica. Sulphides decrease with depth while dark green mineral increases with depth.
89.5 - 90	<u>Quartz breccia</u> with shattered siltstone material, some mica and trace pyrite and chalcopyrite.
90 - 93.05	Mid grey-green <u>mottled, partly silicified siltstone</u> , some disseminated pyrite and pyrite along fractures.
93.05 - 95.8	Light-mid grey-green <u>partly silicified siltstone</u> with a series of <u>quartz veins</u> and veinlets throughout which contain pyrite and some chalcopyrite. Pyrite along fracture planes. Occasional thin band of softer, chloritic siltstone.
95.8 - 146	Mid grey-green <u>silicified (greywacke) siltstone</u> , mottled in part. Fracture planes contain some pyrite, chalcopyrite and arsenopyrite. Note: All the silicified, mottled siltstone contains some soft, green chloritic material.
96.2	m.Vein of chalcopyrite and quartz.
97.85 - 98	m.Highly silicified siltstone with pyrite, chalcopyrite and arsenopyrite.
102.35 - 102.45	m.Quartz vein with pyrite, chalcopyrite and arsenopyrite.
105.4 - 105.6	m.Highly silicified siltstone with pyrite, chalcopyrite and trace arsenopyrite.
106.5 - 106.6	As above.
106.6 - 116.35	Several narrow quartz veins, and one pyrite vein, all < 2 cm. thick.
117.9 - 117.95	Quartz vein with sericite and minor pyrite.
119.25 - 119.55	Several quartz veins up to 5 cm. thick with pyrite, chalcopyrite, sericite and minor bornite.
120.5	Granitic vein with pink feldspar and quartz, 2 cm thick.
120.7	As above but 1 cm. thick.
121.4	As above
122.5	Quartz vein, 2 cm. thick, with brown clayey material.
123.8 - 124	Quartz veinlets with coarse feldspar and minor chalcopyrite and pyrite.
126.5 - 126.63	Quartz vein with much pyrite, some chalcopyrite trace brown cassiterite .
127.5	Quartz vein, 2 cm. thick with some pyrite.
129.1 - 129.2	Quartz vein with pyrite, chalcopyrite and coarse brown cassiterite.
129.3 - 129.5	Quartz vein with coarse mica, some chalcopyrite and pyrite, trace bornite and coarse dark brown mineral.
131.45	Granitic vein with pink feldspar and quartz, 2 cm. thick
132.6	Barren quartz vein, 5 cm. thick.
133	Quartz breccia, 2 cm. thick, with chalcopyrite and bornite along fractures.

Interval (metres)	4.	
	133.35 - 133.5 m.	Quartz veinlets with coarse mica, pyrite, chalcopyrite, some arsenopyrite and several coarse grains of cassiterite.
	135.7 - 136.3 m.	Several veins of quartz with pyrite, trace chalcopyrite.
	137.3	Granitic vein with pink feldspar and quartz, 2 cm. thick.
	138.7 - 139 m.	Quartz veins with pyrite, minor chalcopyrite.
146.	- 147.1	<u>Quartz breccia</u> with black graphitic shale fragments and minor pyrite and chalcopyrite.
147.1	- 171.2	Mid-dark green <u>mottled silicified siltstone</u> with pyrite along fracture planes. Some siltstone, chloritised, and much sericite in places.
	148.8 - 150.3 m.	Pyritic zone, as veins and along fractures.
	150.3 - 150.8 m.	Quartz veins with pyrite, chalcopyrite and some cassiterite.
	153.5 - 153.9 m.	Quartz veins, minor pyrite and chalcopyrite, some sericite and light yellow clayey material.
	155.1	Quartz vein, <2 cm. thick with crystals of cassiterite, minor pyrite and chalcopyrite.
	159.5 - 160.15	Quartz veins with trace pyrite.
	160.5 - 160.6	Quartz vein with trace pyrite.
	162.25	Pyrite vein about 5 cm. thick.
	166.55 - 166.65	Barren quartz vein.
	166.85 - 167.05	Quartz vein, trace galena or arsenopyrite.
	168.2 - 168.5	Quartz vein with dark green tourmaline and minor pink K-feldspar.
	169.45	Quartz vein with dark green tourmaline, 5 cm. thick.
	169.85	Quartz vein with dark green tourmaline and yellow clayey mineral, 8 cm. thick.
	170.6 - 170.65 , 171 - 171.05 m.	Barren quartz veins.
171.2	- 175.75	<u>Quartz breccia</u> zone with narrow bands of dark green silicified siltstone, some sericite and some pyrite.
	171.7 - 172.4, 172.9 - 173.2 m.	Much K-feldspar rich, pink "granitic" material.
175.75	- 177.45	Mid-dark green <u>silicified siltstone</u> with some pyrite and minor chalcopyrite in veins and veinlets.
177.45	- 178.2	<u>Quartz breccia</u> with dark green mineral - tourmaline ?, minor sericite, pink K-feldspar and some pyrite and chalcopyrite.
178.2	- 204.65	Mid-dark green <u>silicified siltstone</u> often mottled by mica and chlorite minerals.
	180.15 - 180.6	Quartz vein with minor pyrite, 2 cm. thick, running in same direction as drill hole.
	182.7 - 182.9	Quartz veinlets with minor pyrite and siltstone.
	183.9	Barren quartz vein, 2 cm. thick.
	185.45 - 185.55	Quartz veinlets with yellow clayey mineral and dark green siltstone.
	189.1 - 189.2, 192 - 192.3, 193.9 - 194m.	Barren quartz vein.

- 194 - 194.4 m. Mid green coarse grained greywacke.
196.1 - 196.4 m. Quartz veins and veinlets with black graphitic material, some pyrite and minor chalcopyrite, some sericite, some pink K-feldspar.
198.1 - 198.9 m. Quartz veins with pyrite, trace chalcopyrite and dark green tourmaline.
199.4 - 199.5 m. As for 196.1 - 196.4m.
199.75 Quartz vein, 2 cm. thick, with abundant pyrite, some chalcopyrite.
.200.1 - 200.9 m. As for 196.1 - 196.4 m.

Interval
(metres)

- 0 - 3.4 No core recovery.
- 3.4 - 19.3 Fawn, oxidised bedded siltstone, some shale bands, moderately fractured with some limonite staining along fractures, minor sericite, some narrow bands of mottled siltstone. An occasional narrow quartz vein (<1cm thick.) Bedding approx. 70° to drill hole direction.
- 19.3 - 20.4 Quartz vein, with some orange clay and limonitic material, fairly broken, some greenish micaceous material.
- 20.4 - 26.0 As for 3.4 - 19.3m. but fewer fractures. Crystalline quartz vein 2 - 3 cm. thick at 23.70m.
- 26.0 - 29.5 Fawn with grey partly oxidised, partially silicified, siltstone some narrow bands of fawn, oxidised, siltstone. Some narrow quartz veins, to 2 cm. thick with pale green chlorite with some limonite.
- 29.5 - 193.85 Mid grey-green, partially silicified siltstone, some mottled siltstone sections, some sandy bands with some shale bands, some narrow veins with veinlets of quartz with sericite, trace pyrite with trace chalcopyrite. Below 50m. the siltstone is fairly silicified; mottled siltstone sections contain some soft green chloritic material.
- 30.40 - 30.43m. Narrow quartz veins, with black mineral (tourmaline / cassiterite?)
- 39.45 - 39.55m. Quartz vein with green-black mafic material, pyrite, chalcopyrite with pink K-feldspar.
- 44.40 - 44.80m. Several quartz veins in siltstone, veins contain minor pink K-feldspar, sericite and dark green-black mafic/shale? material.
- 45.35 - 45.55m. As for 44.40 - 44.80m.
- 48.50 - 49.20m. Quartz vein, some green siltstone, minor pink K-feldspar, minor pyrite, trace chalcopyrite.
- 49.6 - 50.3 m. Quartz-siltstone breccia, (mainly siltstone) some crystalline quartz, pyrite, sericite and minor chalcopyrite.
- 53.5 - 53.55m. Quartz vein, minor pyrite, trace chalcopyrite.
- 60.45 - 60.5 m. " " " " " "
- 67.55 - 67.60m. Quartz vein with pyrite and chalcopyrite.
- 75.75 - 75.85m. Quartz vein with minor pyrite and chalcopyrite.
- 83.1 - 83.7 m. Quartz breccia zone. Quartz, green siltstone, sericite, minor pyrite and pink K-feldspar.
- 89.1 - 89.15m. Quartz vein with some pale yellow-green chlorite material.
- 104 - 104.3 m. Quartz vein with pale yellow chloritic material.
- 105.3 - 106.5 m. Some pale - mid green "hornfelsic" sections.
- 107.7 6 cm thick quartz vein with dark green mafic / shale? material.

- 112.15 - 112.20m. Quartz vein, dark green mafic/shale? material
minor pyrite.
- 116.5 - 116.55m. Quartz vein, much dark green mafic/shale?
material, some chalcopyrite and bornite
- 119.90 - 120.15m. Series of minor quartz veins
- 120.25 - 120.60m. Quartz vein, yellow chlorite material,
some mafic/shale? material, a few pyrite
and chalcopyrite crystals, 1 or 2 crystalline
cassiterite fragments
- 121.0 - 131.0 m. Mainly green-grey mottled siltstone.
- 129.75 - 129.85 m. Quartz vein, some green siltstone, much
pyrite and chalcopyrite in bottom half of
vein.
- 143.75 - 143.82 m. Quartz vein with pyrite, trace chalcopyrite.
- 144.40 - 145.1 m. Quartz breccia, siltstone fragments, some
yellow-green chlorite, pyrite, trace
chalcopyrite
- 151.13 - 151.25 m. Quartz vein with yellow-green chlorite.
- 151.91 - 151.97 m. Quartz vein with minor siltstone material
- 160.65 - 160.70 m. Quartz vein, crystalline quartz.
- 161.30 - 161.40 m. Quartz vein, with yellow-green chlorite.
- 182.20 - 182.90 m. Zone of narrow quartz veins, and siltstone;
with yellow chlorite and veinlets of
pyrite and chalcopyrite.
- 183.25 - 183.45 m. Zone of narrow quartz veins and siltstone;
with yellow chlorite.
- 184.0 - 184.1 m. Quartz vein, siltstone fragments, veinlets
of chalcopyrite.
- 184.5 - 184.6 m. Barren quartz vein
- 184.9 - 185.0 m. " " "
- 185.50 - 189.00 m. Siltstone is fairly broken and fractured.
- 162.70 - 162.85 m. Quartz breccia with much pyrite, some
chalcopyrite, siltstone fragments.
- 171.3 - 171.6 m. Quartz-rich zone, some pyrite and minor
chalcopyrite
- 172.5 - 172.6 m. Siltstone with quartz veinlets with
abundant pyrite and chalcopyrite.
- 190.8 - 191.1 m. Quartz veins with siltstone and some pyrite
- 191.55 - 191.65 m. "
- 192.2 - 192.3 m. "
- 192.55 - 192.8 m. Quartz vein with smooth, black graphite along
fractures.
- 193.85 - 196.60 System of quartz veins with minor bands of siltstone and
shale. Quartz contains pale yellow chlorite, minor pyrite,
minor chalcopyrite minor dark green mafic material.
- 194.4 m. Some dark brown crystalline material -
too soft for cassiterite? (approx. 0.05 m.
thick)
- 196.60 - 199.25 Section of broken silicified siltstone, some mottled, with
several small veins of quartz with minor pyrite and
chalcopyrite.

(metres)

- 199.25 - 203.20 Mid-grey-green silicified siltstone
- 203.20 - 203.45 Quartz vein - fairly barren
- 203.45 - 205.65 Mid - grey - green silicified siltstone
- 205.65 - 208.20 Mid grey - green strongly mottled, silicified siltstone
some quartz rich sections with sericite and some yellowish chlorite
- 208.20 - 216.20 Mid grey-green silicified siltstone, some mottled sections
209.4 - 209.65m. Quartz vein with black shaley fragments, some yellow chlorite and one or two grains of chalcopyrite.
- 216.20 - 217.0 Series of quartz veins in silicified siltstone, quartz contains some pale yellow-green chlorite, dark green mafic material and some pyrite along fractures.
- 217.0 - 218.6 Mid grey-green silicified siltstone
- 218.6 - 230.90 Core is missing
- 230.90 - 239.60 Mid-grey-green silicified siltstone
231.35 - 231.40m. Quartz vein with sericite and a little pink K-feldspar
233.73 - 233.80 Barren quartz vein some shale fragments
- 239.6 - 240.8 Light grey vein of feldspar porphyry (pegmatite?)
Principally grey-white feldspar, quartz, some sericite and minor green hornblende.
- 240.8 - 294.2 Mid grey-green silicified siltstone, with an occasional narrow mottled section. Yellow-green chlorite along fractures.
Note: Mottled sections and minor quartz veins more frequent below 267m.
254 - 254.4m. Narrow 1cm. quartz vein along drill hole direction, with dark green and light green chlorite and a few grains of pyrite.
261.90 - 262.2m. Quartz vein with green-black mafic/shale? material and pyrite.
262.2 - 262.4m. Pyrite-rich mottled siltstone, fairly chloritized.
266.4 - 267.7m. Mottled siltstone, some quartz veining, sericite common
267.7 - 267.9m. Barren quartz vein.
270.4 - 270.5m. Granitic vein with pink K-feldspar and quartz.
270.1 - 270.3m. Vein of quartz, yellow chlorite and sericite
279.5 - 279.6m. Breccia; quartz and angular siltstone.
282.45 - 282.55m. Quartz vein with green-black mafic material.
285.0 - 285.1 Quartz vein " " " " "
292.70 Quartz vein. (at about 15° to drill direction) approx. 5cm thick with much pyrite and minor chalcopyrite
- 294.2 - 460.60 Grey granite, containing muscovite and minor pyrite, hornblende has been altered to brownish-yellow chlorite. Note: Variation in grain size and % composition occur throughout the granite but are not detailed in this log.
Granite/sediment contact is very sharp.
346.95 - 347.25m. Quartz vein with pyrite and chalcopyrite.
357.5 - 359.5m Gradational increase than decrease in % mafic minerals.
Sample between 357.8 and 357.9 contains large percentage of altered mafic minerals.
418.1 - 418.7m Series of barren quartz veins.

MT. WELLS - D.D.H. 14

Interval
(Metres)

- 0 - 6.0 No core recovery
- 6.0 - 35.0 Fawn, oxidised bedded siltstone, some shaley bands, some more sandy bands, moderately broken and fractured to about 18m. Less fracturing below this depth. Some limonite staining along fractures, some sericite present, occasional narrow quartz vein (<1cm. thick)
- 6.0 - 6.2m. (approx). Quartz vein with hematite, limonite and orange clay.
- 14.7 - 15.6m. Series of broken quartz veins with hematite, limonite and orange clay. (with siltstone interbeds)
- 16.0 - 16.3m. Minor quartz veins in siltstone, quartz is broken and has associated hematite, limonite and orange clay.
- 35.0 - 43.0 Fawn and grey-green, partly oxidised, partly silicified siltstone, with narrow bands of shale and greywacke. Some narrow quartz veins with limonite. Some limonite stained fractures. Bedding at 50° to drill hole direction at 35m.
- 38.5 - 38.7m. Quartz vein with limonite and green mafic? fragments.
- 39.2 - 39.4m. Quartz veinlets with green mafic material?, limonite and pyrite.
- 43.0 - 51.3 Grey-green interbedded siltstone, shale and greywacke. Siltstones predominate, siltstone and greywacke are partly silicified, shale is chloritized. Some narrow quartz veins (< 2cm thick)
- 51.3 - 53.0 Quartz vein, with green-black shale/altered mafic material?, light yellow-green chlorite, some brecciated sections. Minor pyrite and chalcopryrite.
- 51.75 - 51.95m. Section rich in pyrite and chalcopryrite and black sooty mineral-chalcocite? Also minor bornite.
- 53.0 - 84.5 Grey-green interbedded silicified siltstone and greywacke. Some quartz veins (to 3cm thick) with pyrite, trace chalcopryrite.
- 77.3 - 77.5m. Quartz vein with dark green mafic material, light yellow-green chlorite and some pyrite.
- 84.5 - 85.2 Quartz vein with white clay and yellow chlorite, some dark green-grey mafic/shale? material.
- 85.2 - 85.5 Dark grey-green silicified siltstone with many quartz veinlets.
- 85.5 - 85.9 Quartz vein with some white clay, light green talcose/chloritic? material, dark green mafic/shale? material.
- (Note: Interval 84.5 - 85.9m. is probably the Target lode system.)

- 85.9 - 86.2 Dark grey-green silicified siltstone.
- 86.2 - 88.7 Mid green silicified siltstone with abundant quartz veining throughout, some pyrite, trace chalcopyrite some light green hornfels. More pyrite and chalcopyrite in more quartz-rich section between 88.2 and 88.7m.
- 88.7 - 121.1 Dark grey-green silicified siltstone with occasional narrow quartz veins.
 - 93.4 - 93.5m Quartz vein with pyrite
 - 93.65 - 93.75m Quartz vein with pyrite
 - 108.90 - 109.15m Barren quartz vein.

Interval	Sample No.	Sample Description	Sample No.	Sample Description
85.9 - 86.2	100	Dark grey-green silicified siltstone	101	Dark grey-green silicified siltstone
86.2 - 88.7	102	Mid green silicified siltstone with abundant quartz veining	103	Mid green silicified siltstone with abundant quartz veining
88.7 - 121.1	104	Dark grey-green silicified siltstone with occasional narrow quartz veins	105	Dark grey-green silicified siltstone with occasional narrow quartz veins
	106	93.4 - 93.5m Quartz vein with pyrite	107	93.4 - 93.5m Quartz vein with pyrite
	108	93.65 - 93.75m Quartz vein with pyrite	109	93.65 - 93.75m Quartz vein with pyrite
	110	108.90 - 109.15m Barren quartz vein	111	108.90 - 109.15m Barren quartz vein

APPENDIX III

DIAMOND DRILL HOLE SPECIFICATIONS

MT. WELLS TIN MINE N.T.

<u>Hole</u>	<u>Total Length</u> <u>Metres</u>	<u>Survey Depth</u> <u>Metres</u>	<u>Inclination</u>	<u>Azimuth</u> <u>(Magnetic)</u>
<u>D.D.H. 12</u>	200.9	00	45°	285°
<u>D.D.H. 13</u>	460.6	00	55°	290°
<u>D.D.H. 14</u>	121.1	00	45°	300°
		60	47°	294.5°
		110	48°	296.5°

APPENDIX IV

GRANITIC ROCK SAMPLES - D.D.H. 13

MT. WELLS TIN MINE N.T.

<u>Sample Interval</u>	<u>240.5 m</u>	<u>357.8-357.9</u>	<u>452.7-452.9</u>
Pb	8 ug/g	85 ug/g	18 ug/g
Zn	12 "	70 "	25 "
Cu	<10 "	70 "	<10 "
Mo	<10 "	<10 "	<10 "
Bi	12 "	75 "	20 "
Ni	6 "	65 "	18 "
W	0.05%	0.07%	0.07%
Ta	<20 ug/g	<20 ug/g	<20 ug/g
Si O ₂	53.5%	26.2%	48.0%
Al ₂ O ₃	10.8%	17.5%	12.1%
Mg	0.63%	7.68%	1.14%
Ca	<0.1%	0.2%	0.2%
K	2.55%	0.9%	2.75%
Na	1.53%	0.04%	1.47%
Fe ₂ O ₃	1.76%	17.2%	3.30%
Ti	<0.1%	0.4%	0.2%
Mn	<0.01%	0.05%	0.02%
LOI	1.14%	7.85%	1.62%
Sn	<100 ug/g	<100 ug/g	<100 ug/g

APPENDIX V

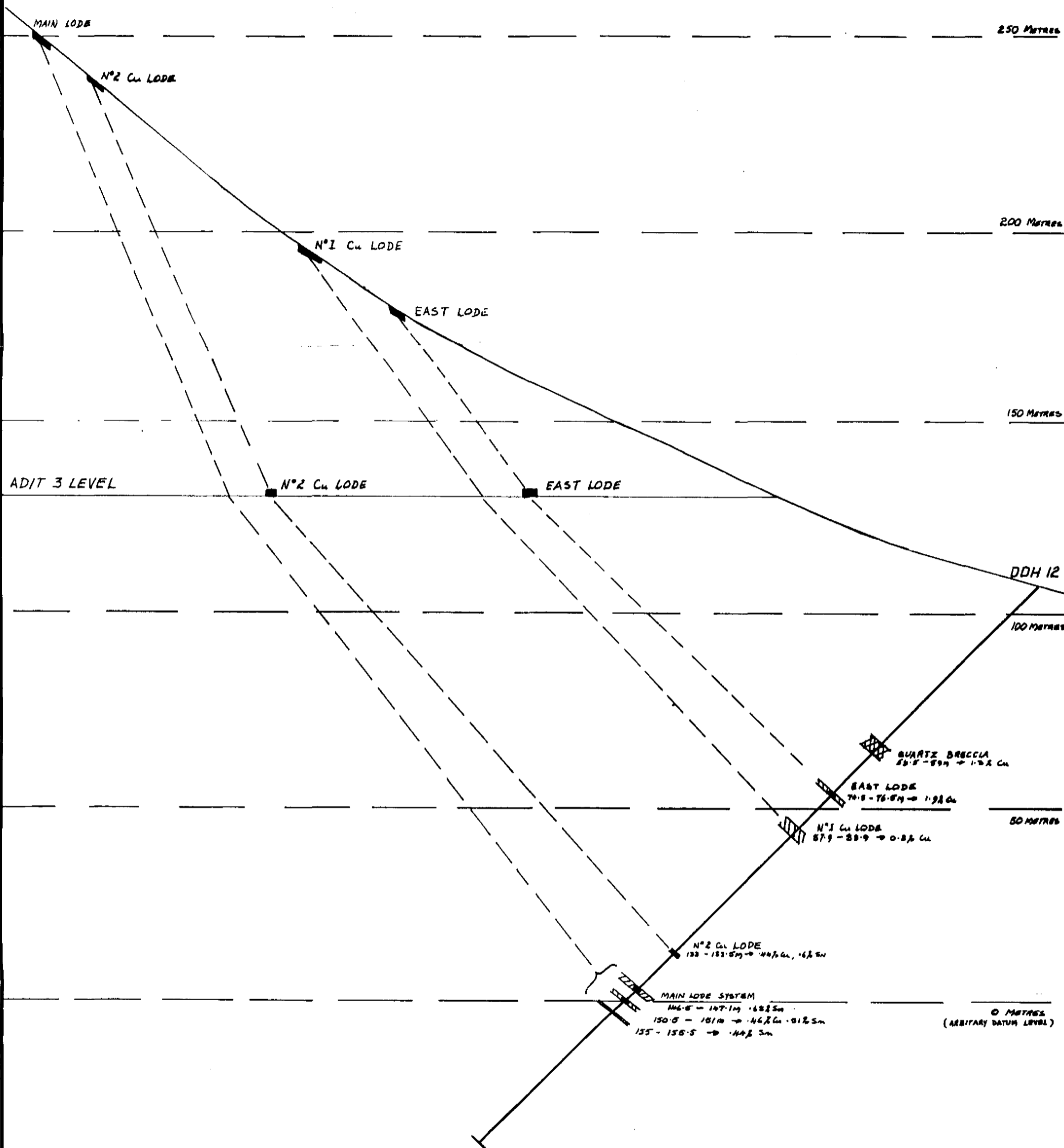
SAMPLE DESCRIPTIONS AND ASSAYS

SOUTHERN QUARTZ LODE

- Sample 1 Quartz vein with red-brown mica (sericite), minor hematite and some limonitic boxworks, fairly fractured.
- Sample 2 Brecciated quartz vein, with sericite, minor hematite and some replacement limonite.
- Sample 3 Limonitic boxworks with a little remnant quartz, fairly light sample (sample 3A from same area).
- Sample 3A Quartz breccia with extensive hematite (10-15%) and minor limonitic boxworks.
- Sample 4 Quartz vein, minor hematite, and some hematite boxworks, hematite and limonite staining.
- Sample 5 Extensive limonitic boxworks with remnant quartz.
- Sample 6 Quartz vein with limonitic boxworks, remnants of iron-rich silicified shale and limonite staining.
- Sample 7 Fractured quartz vein with extensive limonite and some hematite, minor boxworks.

<u>Sample</u>	<u>Au</u> ppm	<u>Ag</u> ppm	<u>Cu</u> ppm	<u>Sn</u> ppm
1	- 0.2	- 2	170	- 50
2	- 0.2	- 2	10	- 50
3	0.6	- 2	260	- 50
3A	- 0.2	- 2	95	- 50
4	- 0.2	- 2	350	- 50
5	0.3	2	390	- 50
6	- 0.2	- 2	80	- 50
7	- 0.2	- 2	110	- 50

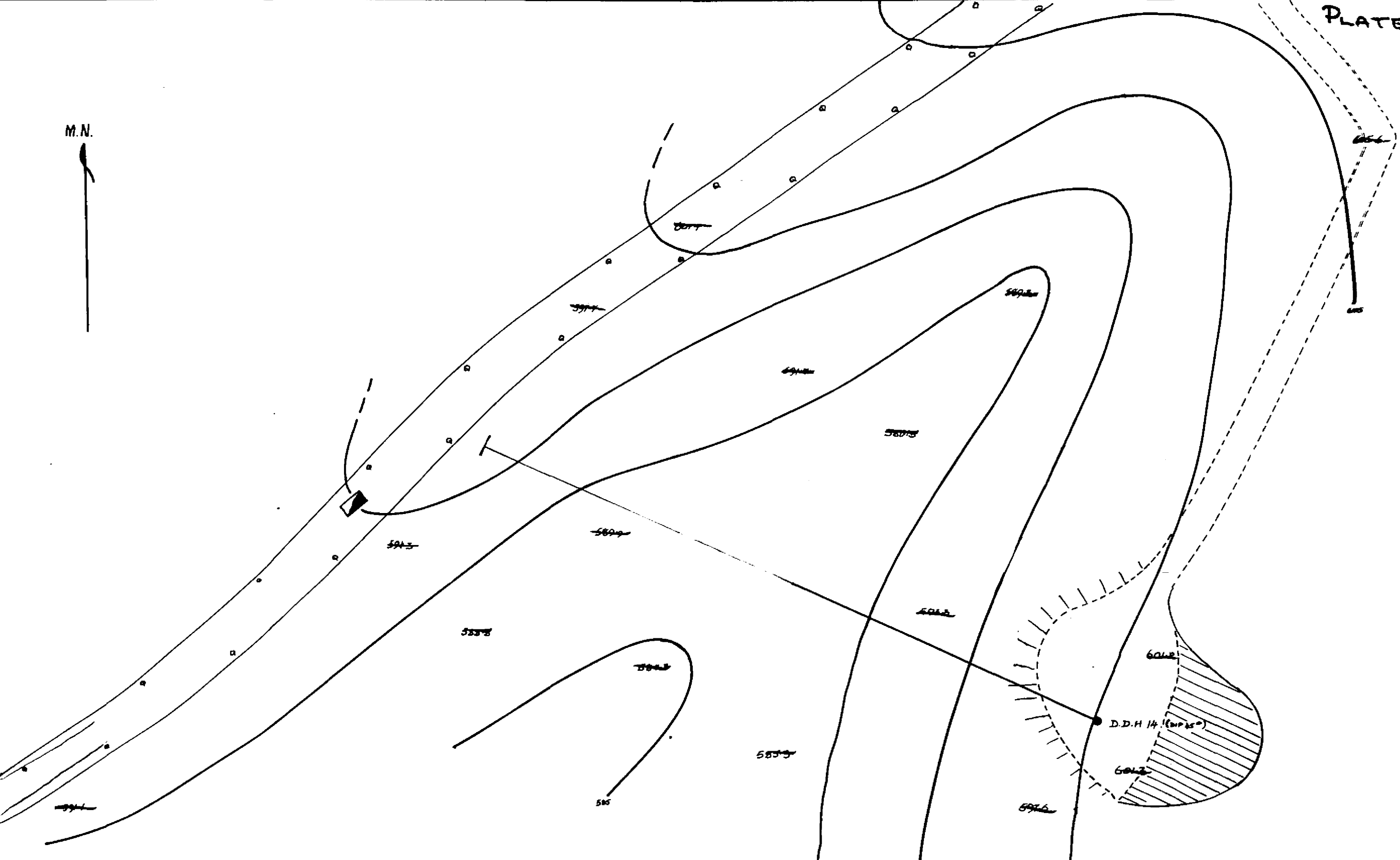
- denotes less than



MT WELLS 'TIN MINIE
DRILL SECTION-DD.H12
PROJECTED LODE SYSTEMS

SCALE 1:1000

M.N.



LEGEND

590 ~~TOPOGRAPHIC CONTOUR~~ ~~RELATIVE ELEVATION (METRES)~~
 RELATIVE ELEVATION IN METRES

SHaft

CONTACT
 QUARTZ VEIN (Boundary Approx)

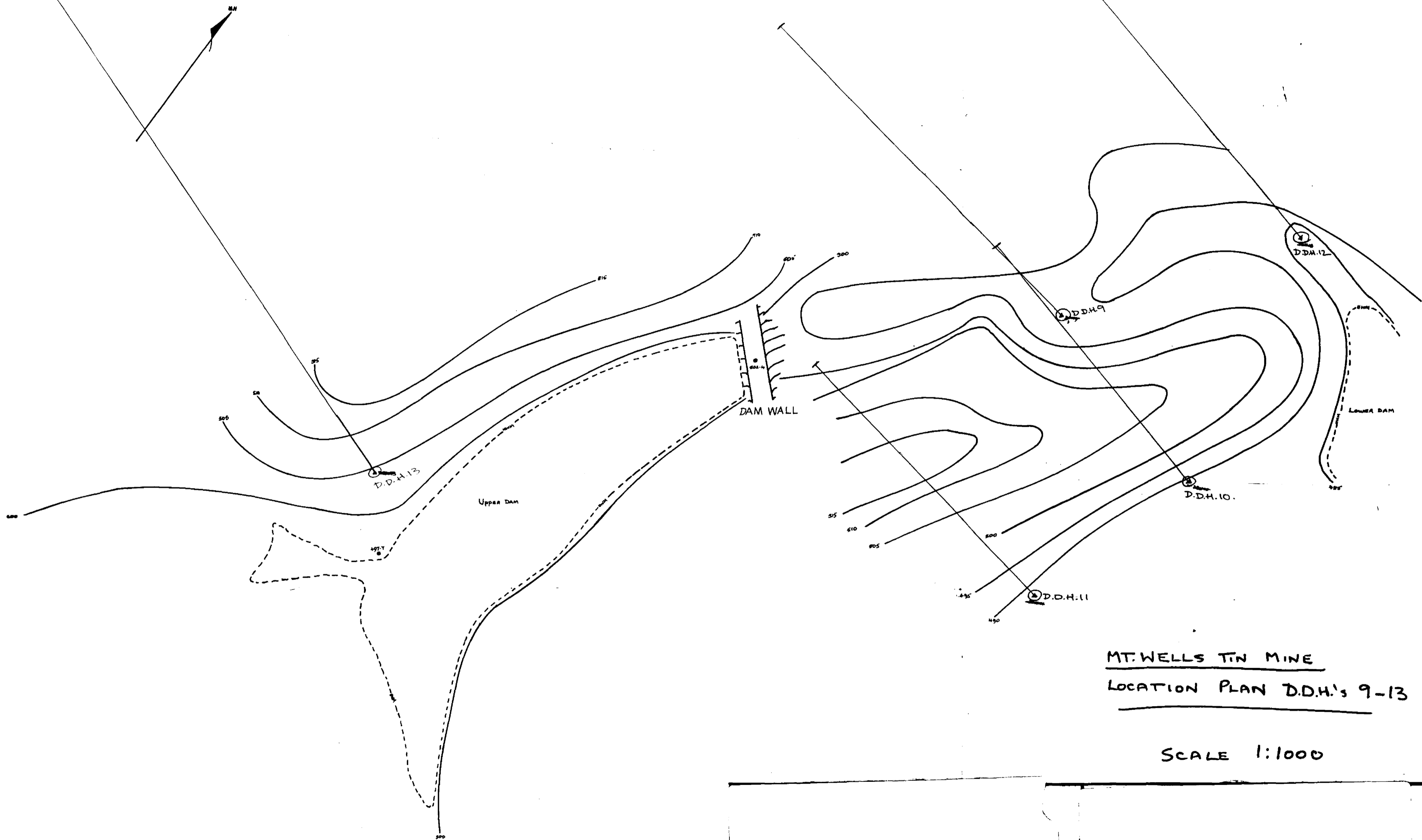
MOUNT WELLS TIN MINE
 LOCATION PLAN DDH 14

~~PLATE~~

SCALE 1:800

GS 78/13

Numbers crossed out with pencil to be deleted from final plan.



MT. WELLS TIN MINE
LOCATION PLAN D.D.H.'s 9-13

SCALE 1:1000

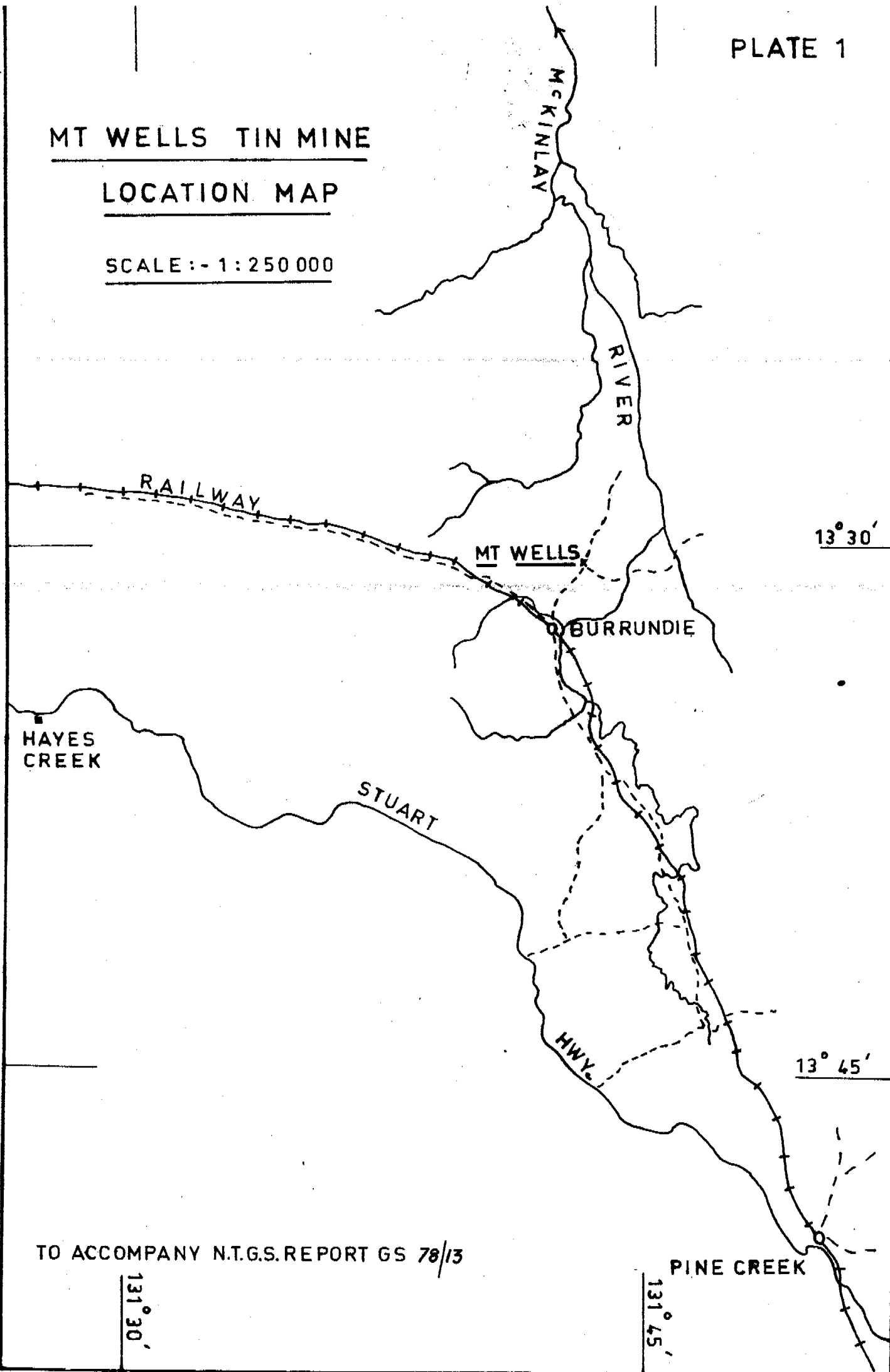
REFERENCE

- 500 TOPOGRAPHIC CONTOUR
RELATIVE ELEVATION IN METRES
- - - HWM HIGH WATER MARK

MT WELLS TIN MINE

LOCATION MAP

SCALE :- 1 : 250 000



TO ACCOMPANY N.T.G.S. REPORT GS 78/13

PINE CREEK

GS 78/13