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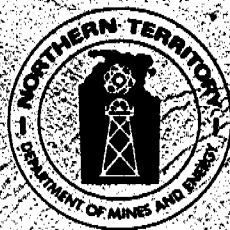
NORTHERN TERRITORY GEOLOGICAL SURVEY

TECHNICAL REPORT

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DIAMOND DRILLING INVESTIGATIONS
by A.W. NEWTON



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Department of Mines and Energy

DIAMOND DRILLING INVESTIGATIONS,
LEWIS' MANGANESE PROSPECT.

by

A.W. NEWTON

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1. SUMMARY

Following a request for drilling assistance, Mines Branch, Department of the Northern Territory drilled one diamond drill hole totalling 80 metres, on MC85A. The drilling was carried out in October, 1976.

The drilling tested, at depth, an extensive outcrop of iron-manganese material, with combined values of iron-manganese ranging from 39.5% Fe - 3.9% Mn to 24% Fe - 31.2% Mn in surface samples.

Only minor intersections of iron-manganese material were encountered at depth, indicating that the rich iron-manganese material is a surface capping of very limited dimensions at depth.

2. INTRODUCTION

In September, 1976 an application was made by Mr. J.A. Lewis, one of the tenement holders, for drilling assistance from Mines Branch, Department of the Northern Territory on MC85A and MC86A.

Following inspection, plane table mapping and sampling of surface outcrops of iron-manganese material on the mineral claims, a drill site was planned to test an extensive outcrop of iron-manganese material on MC85A. Approval for one diamond drill hole was subsequently given.

The drilling programme was commenced and completed during October, 1976.

3. LOCATION AND ACCESS

Map: McKinlay River 1:100 000 Topographic Sheet 5271 Series R621
Co-ordinates: Lat. 13° 25' 00"
 Long. 131° 47' 00"
Universal Grid Reference: HL012150

Vehicle access from Darwin is by the Stuart Highway to the Fountain-head turn-off and then by gravel road via Mt. Wells. The turn-off to the prospect is about 15 kilometres from Mt. Wells on the Mt. Harris road. A track leading south-east and then south from the turn-off and passing by the Rosemary tin mine reaches the prospect at about 5 kilometres. The McKinlay River crossing, 13 kilometres from Mt. Wells is impassable for much of the "wet" season.

4. GEOLOGY

The area under investigation is underlain by sediments of the Lower Proterozoic Golden Dyke and Masson Formations and Lower Proterozoic dolerite sills and dykes. The sediments consist predominantly of siltstones and greywackes, they have a general north-north-west strike and measured dip angles vary between 45° and vertical.

Outcropping iron-manganese material seems to be confined to a single horizon within the Golden Dyke Formation. (This horizon may be that which is mapped as a pyritic, carbonaceous dolomitic marl with chert lenses and nodules, on the Ban Ban 1 Mile Geological Series Sheet.)

Two main zones of iron-manganese enrichment were noted in the area and although somewhat dissimilar in nature they probably lie within the same horizon on opposite limbs of a synclinal structure.

The first iron-manganese occurrence on the western limb of the syncline forms a low hill consisting of very dark brown hematite and black, massive and crystalline pyrolusite. The outcrop extends over a strike length of 90 metres in a north-north-westerly direction and is recorded discontinuously over a width of about 30 metres. Some 100 metres to the north of this outcrop a further limited outcrop of similar material has been recorded. (Plate 2)

The second occurrence again striking north-north-westerly outcrops discontinuously over a length in excess of 500 metres, with an estimated average width of at least 5 metres. Surface outcrops consist predominantly of hematite^{and} limonite with some pyrolusite.

5. SAMPLING

A series of random samples of outcrop were collected from both occurrences. For the first iron-manganese occurrence sample points are indicated by letters A-G and P as shown on plate 2. For the second occurrence, marked pegs were sited at each sample point to facilitate relocation. (Samples H-0)

All samples were analysed for Fe_2O_3 , Mn and impurities and also for traces of the base metals Cu, Pb and Zn.

For the first occurrence values of Fe_2O_3 ranged between 41.0% and 67.6% and values of Mn ranged between 3.9% and 31.2%. Sample D gave the best combined value of 54.6% Fe_2O_3 and 26.6% Mn. Sample values for the second occurrence ranged from 39.0-80.0% Fe_2O_3 and from 0.3-27.4% Mn. Most significantly average Mn content was markedly higher for samples taken from the first occurrence compared with samples taken from the second occurrence.

As a result of the higher Mn values obtained from the first occurrence it was decided to test this occurrence at depth with a diamond drill hole despite the larger inferred dimensions of the second occurrence.

6. DRILLING INVESTIGATIONS

One diamond drill hole was sited (Plate 2), to test at depth outcrop samples of iron-manganese material with combined values ranging from 39.5% Fe - 3.9% Mn to 24% Fe - 31.2% Mn. The drill hole had an azimuth of 250° magnetic and was inclined at 45° to the west.

The principal rock types intersected were interbedded shales and siltstones. Below the level of oxidation (approximately 40 metres along the hole direction), these sediments were usually chloritized and slightly silicified. Bedding planes measured in core samples indicated the sediments dip from about 70° to vertical. The sediments showed evidence of fracturing over the length of the drill hole and in particular above the level of oxidation the sediments were broken, contained iron-filled fractures and veinlets and were fairly friable.

A zone of alteration (probably a replacement zone) was intersected between 26.35 and 34.30 metres and two bands of iron-manganese material were intersected within this zone.

The first iron-manganese intersection between 28.00 and 29.05 metres consisted of broken quartz, brown clay, hematite and black manganese material (pyrolusite) and assayed 31.5% Fe₂O₃ and 13.5% Mn over the interval. The second wider iron-manganese intersection was between 31.20 and 34.30 metres. This consisted of massive hematite with crystalline and powdery grey-black manganese material (pyrolusite). Some fawn shale material was mixed with this between 33.80 and 34.30 metres. Average assay values over the 3.10 metre interval were 33.5% Fe₂O₃ and 17% Mn.

Cove recovery within the above zone was poor and two deeper sections where no core recovery was obtained between 50.50 and 53.55 metres and between 60.00 and 65.00 metres may also have been soft clayey alteration zones. Had any massive iron-manganese material been associated with these zones it is unlikely that none of this material would have been recovered in the core barrel.

7. CONCLUSIONS AND RECOMMENDATIONS

Surface outcrops of iron-manganese material of sub-economic grade and of moderate inferred size dimensions have been located and sampled on MCB5A and MCB6A.

A diamond drill hole sited to test the more manganese-rich outcrop (located on MCB5A) intersected only two narrow bands of iron-manganese material, again of sub-economic grade.

Drilling results suggest that certain narrow beds within a single horizon have been altered and replaced in the near surface oxidized zone by iron-manganese material. Little or no alteration seems to have taken place below the oxidised zone.

The moderate inferred width of about 30 metres of the iron-manganese outcrop (on MCB5A) is most likely made up of several narrow bands of iron-manganese material with scree and rubble in between the bands suggesting one continuous zone. This and the fact that little iron-manganese material is present below the oxidised zone severely limits the possible dimensions of any deposit.

No further drilling or geological investigations are recommended on this prospect.

8. REFERENCES

- | | | |
|--|------|---|
| Freisen B., | 1972 | Annual Report - Mt. Wells Policy Reserve Area. <u>Frances Creek Iron Mining Co. Company Report CR72/6</u> |
| Shields, J.W., | 1966 | Frances Creek North, Iron and Iron-Manganese Prospects <u>N.T. Geol. Surv. Rept. GS66/4</u> |
| 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

ASSAY RESULTS

LEWIS' MANGANESE PROSPECT

Split core and rock samples were analyzed using the Atomic Absorption Spectrophotometer at the East Point Laboratory, Department of the Northern Territory, Darwin. Assay results are given as a percentage or in parts per million (ppm) as indicated.

Detection limits are as follows :

Fe ₂ O ₃	0. 1%	Cu	5 ppm
Mn	0.01%	Pb	10 ppm
SiO ₂	0. 5%	Zn	2 ppm
SO ₃	0. 1%	Ni	10 ppm
P ₂ O ₅	0.01%	Au	0.1 ppm
		Ag	2 ppm

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

SPLIT CORE - D.D.H. 1

<u>Interval</u>	<u>Fe₂O₃%</u>	<u>Mn%</u>	<u>SiO₂%</u>	<u>SO₃%</u>	<u>P₂O₅%</u>
28.00-24.45	31.0	15.4	34.4		0.03
28.45-29.05	32.0	12.0	36.8		0.03
31.20-31.70	13.5	16.0	57.0		0.97
31.70-33.35	46.0	18.6	9.0		0.02
33.35-33.55	39.0	24.6	5.0		0.01
33.55-34.30	18.0	12.0	54.0		0.27

<u>Interval</u> (metres)	<u>Cu</u> ppm	<u>Pb</u> ppm	<u>Zn</u> ppm	<u>Ag</u> ppm	<u>Au</u> ppm	<u>Ni</u> ppm
28.00-28.45	50	430	1550	2	-0.1	75
28.45-29.05	65	610	2850	2	-0.1	120
31.20-31.70	50	150	1400	2	-0.1	40
31.70-33.35	25	120	1850	2	-0.1	75
33.35-33.55	30	30	1600	2	-0.1	55
33.55-34.30	20	85	1200	-2	-0.1	60

ROCK SAMPLES (see Plate 2)

<u>Sample</u>	<u>Fe₂O₃%</u>	<u>Mn%</u>	<u>SiO₂%</u>	<u>SO₃%</u>	<u>P₂O₅%</u>	<u>Cu</u> (ppm)	<u>Pb</u> (ppm)	<u>Zn</u> (ppm)
A	56.0	28.0	8.6	-0.1	0.02	12	210	1910
B	66.0	3.9	11.6	-0.1	0.63	12	60	2700
C	52.0	28.8	3.0	-0.1	0.47	8	35	1770
D	54.6	26.6	4.6	-0.1	0.04	6	35	1370
E	55.4	8.0	21.6	-0.1	0.58	16	25	1960
F	41.0	31.2	5.6	-0.1	0.03	12	25	1390
G	49.0	23.4	9.0	-0.1	0.03	18	40	1500
H*	67.4	5.7	13.0	-0.1	0.03	8	50	1270
I*	69.4	5.9	8.0	-0.1	0.03	190	50	1000
J*	46.2	23.6	12.0	-0.1	0.02	240	100	1250
K*	39.0	27.4	13.0	-0.1	0.01	25	95	1170
L*	67.0	3.0	14.0	-0.1	0.03	170	80	1760
M*	59.6	15.0	12.0	-0.1	-0.01	16	40	620
N*	74.6	0.3	9.6	-0.1	0.52	25	35	1640
O*	80.0	0.4	1.4	-0.1	0.02	20	40	1310
P	67.6	4.8	7.8	-0.1	1.15	14	60	1730

* Not shown on plate 2.

APPENDIX II

GEOLOGICAL DRILL LOG SUMMARY

LEWIS' MANGANESE PROSPECT

D.D.H.1, azimuth 250M., inclination 45°

<u>Interval</u> (metres)	
0- 3. 0	No core recovery.
3. 0-12. 0	Fawn <u>argillaceous siltstone/shale</u> , very broken and friable, highly oxidised, some iron-filled fractures and veins. Hematite and limonite material between 5.6 and 6.3m and between 7.4 and 7.7m. Narrow iron-rich quartz vein at 10.7m. Bedding at 20° to drill hole direction at 11.1m.
12. 0-12. 2	Silicified vein enriched in hematite and limonite.
12. 2-25. 3	Fawn-light brown interbedded <u>siltstone</u> and <u>shale</u> , some iron-filled fractures and iron-enriched silicified veins up to 5cm thick. Many fractures along bedding planes. Bedding 40° to drill hole direction at 13.6m, 45° to drill hole direction at 16.2m, and 40° to drill hole direction at 19.5m. Fairly broken between 17.6 and 21.3m, and between 23.7 and 25.1m (19.55 - 19.85m. No core recovery).
25. 3-26.35	Fawn <u>argillaceous siltstone</u> with narrow veinlets (to 1.5cm thick) of hematite and crystalline manganese material. Very broken between 25.8 and 26.35m.
26.35-27.55	Light red-brown <u>clay material</u> .
27.55-28. 0	Fawn <u>shale</u> , fairly fractured.
28. 0-29.05	Broken <u>quartz</u> , brown <u>clay</u> , <u>hematite</u> and black <u>manganese material</u> (pyrolusite).
29.05-30.35	Brown, orange and grey <u>clay material</u> , some quartz and iron fragments.
30.35-31. 2	No core recovery.
31. 2-34. 3	Massive <u>hematite</u> with crystalline and powdery grey-black manganese material (pyrolusite), also limonite and some iridescent iron, minor quartz. Some fawn shale material between 33.8 and 34.3m.
34. 3-36. 5	Fawn <u>shale</u> with iron-stained fractures and veins.
36. 5-40. 0	Grey-green interbedded <u>siltstone</u> and <u>shale</u> , iron-filled fractures and iron material along bedding planes, some quartz material between 36.55 and 37.3m. Bedding 60° to drill hole direction at 37.4m. Some green-yellow clay material along fractures below 38.0m.

D.D.H.1, azimuth 250^o., inclination 45^o (cont.)

<u>Interval</u> (metres)	
40. 0-50. 1	Light-mid grey <u>shale</u> with some <u>siltstone</u> bands, chloritized and slightly silicified, many iron-stained fractures. Some yellow-green clay material between 42.35 and 43.5m. Bedding 40 ^o to drill hole direction at 50m.
50. 1-50. 5	Brown oxidised <u>siltstone</u> , with limonite and some orange clay material, minor sericite.
50. 5-53.55	No core recovery.
53.55-60. 0	Light-mid grey <u>shale</u> with a few <u>siltstone</u> bands, chloritized and slightly silicified, many iron-stained fractures, bedding 50 ^o to drill hole direction at 57m.
60. 0-65. 0	No core recovery.
65. 0-80. 0	Mid grey <u>shale</u> , partly chloritized, slightly silicified with some interbeds of mid grey <u>siltstone</u> , mid brown siltstone band between 66.2 and 66.45m. Bedding 70 ^o to drill hole direction at 71m. Moderately silicified below 70.0m.

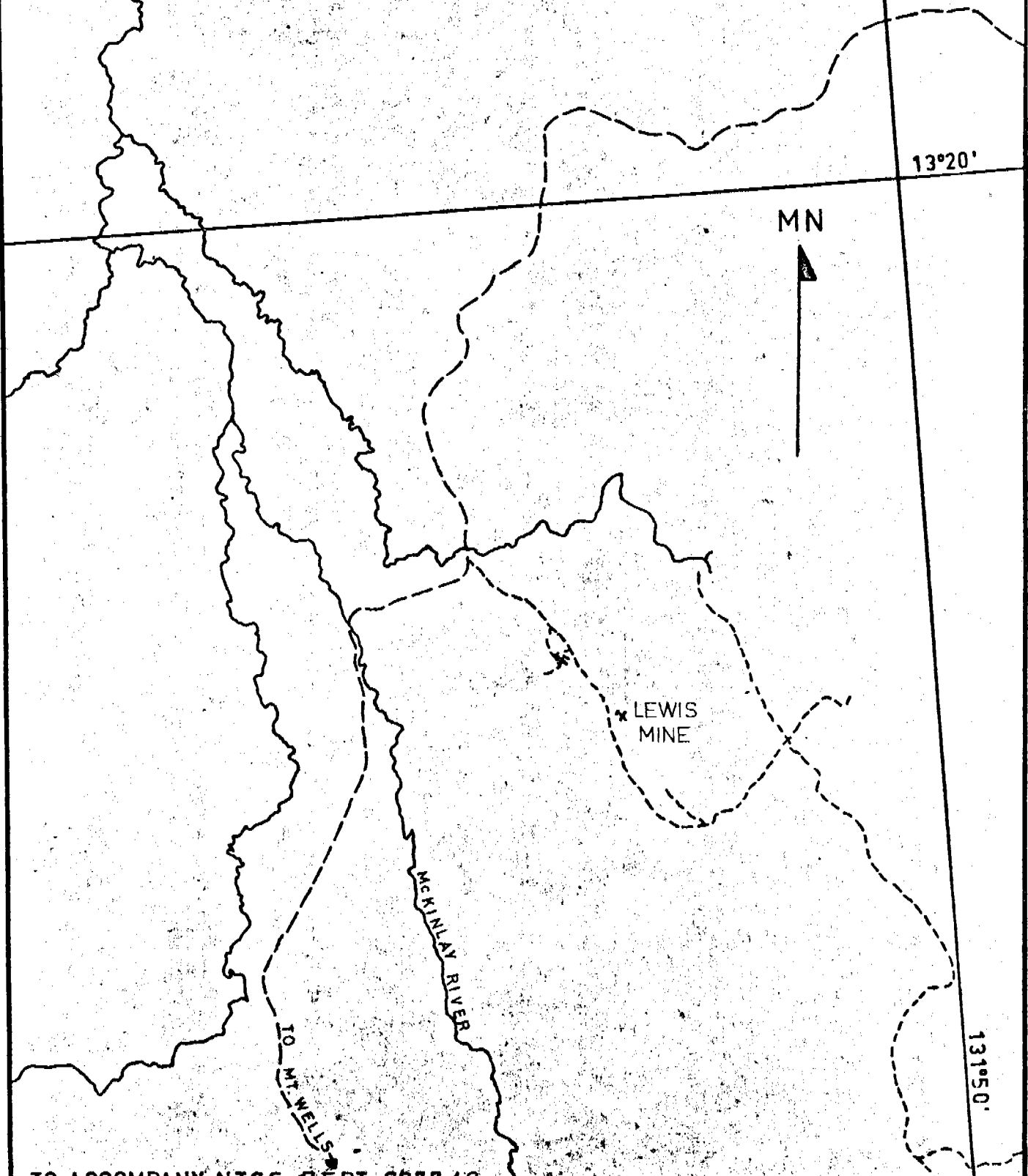
Acid tube test at 75 metres gave inclination of 50^o.

CORE RECOVERY

<u>Interval</u> (metres)	<u>Core</u> <u>Recovery %</u>	<u>Interval</u> (metres)	<u>Core</u> <u>Recovery %</u>	<u>Interval</u> (metres)	<u>Core</u> <u>Recovery %</u>
0- 3.00	0	30.30-31.20	0	55.20-56.80	30
3.00- 5.95	75	31.20-31.65	30	56.80-58.50	60
5.95- 7.75	55	31.65-33.35	20	58.50-59.65	50
7.75-10.05	70	33.35-33.55	95	59.65-60.00	85
10.05-12.00	65	33.55-34.20	60	60.00-65.00	0
12.00-13.55	95	34.20-34.90	98	65.00-65.50	99
13.55-14.80	90	34.90-34.45	65	65.50-66.40	30
14.80-16.30	85	35.45-36.50	45	66.40-67.30	80
16.30-19.55	95	36.50-37.30	65	67.30-68.10	75
19.55-19.85	0	37.30-39.70	80	68.10-69.25	99
19.85-20.60	50	39.70-41.50	75	69.25-70.10	95
20.60-23.95	95	41.50-41.85	70	70.10-72.50	85
23.95-24.90	65	41.85-42.40	60	72.50-73.80	98
24.90-25.40	98	42.40-43.90	35	73.80-74.65	75
25.40-25.90	85	43.90-44.50	85	74.65-75.60	50
25.90-26.35	50	44.50-46.75	40	75.60-77.60	75
26.35-27.35	60	46.75-47.85	80	77.60-78.70	65
27.35-28.00	40	47.85-50.50	40	78.70-79.80	80
28.00-29.05	75	50.50-53.55	0	79.80-80.00	100
29.05-30.30	30	53.55-55.20	5		

LEWIS MANGANESE PROSPECT N.T.
LOCATION PLAN

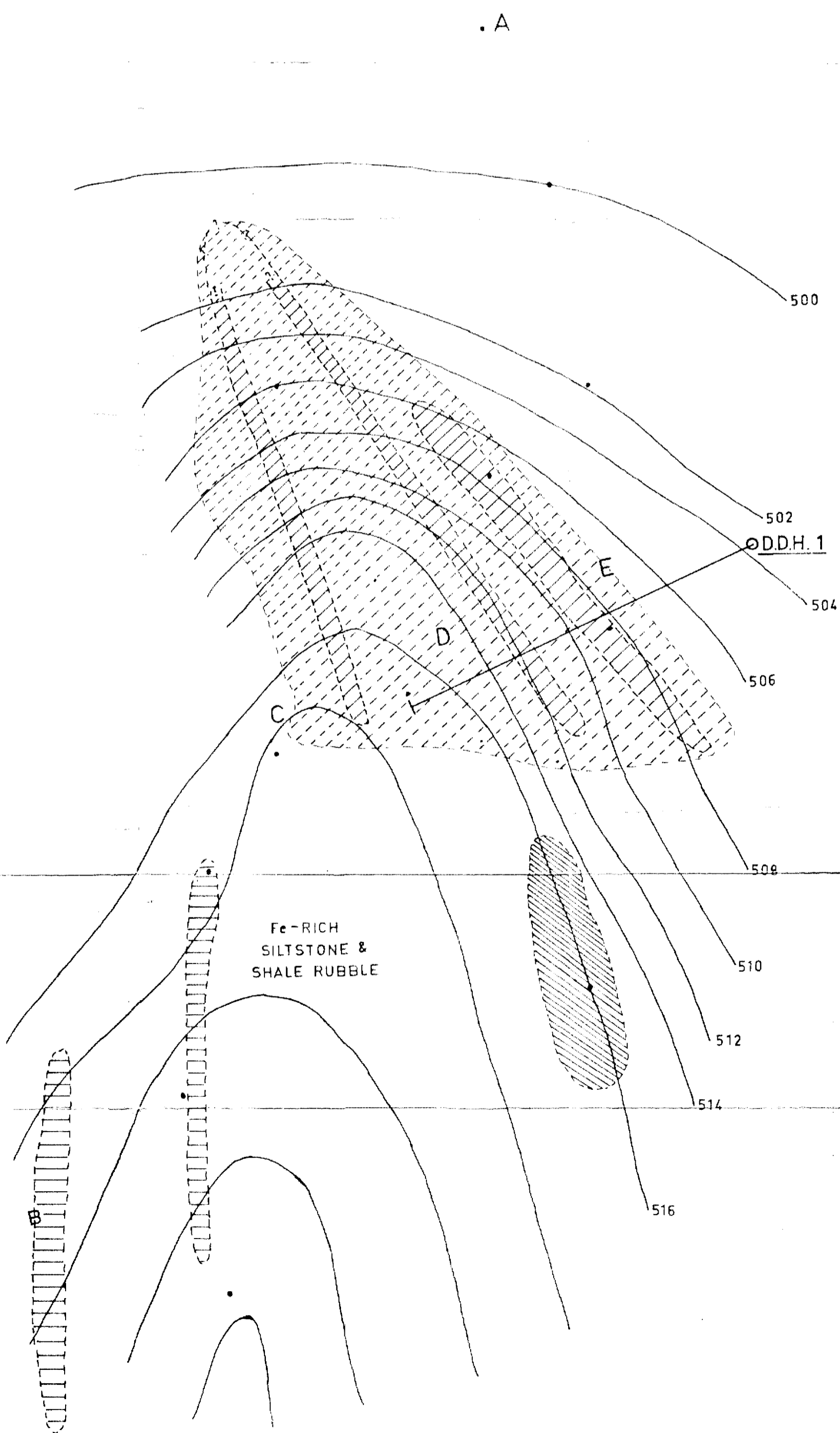
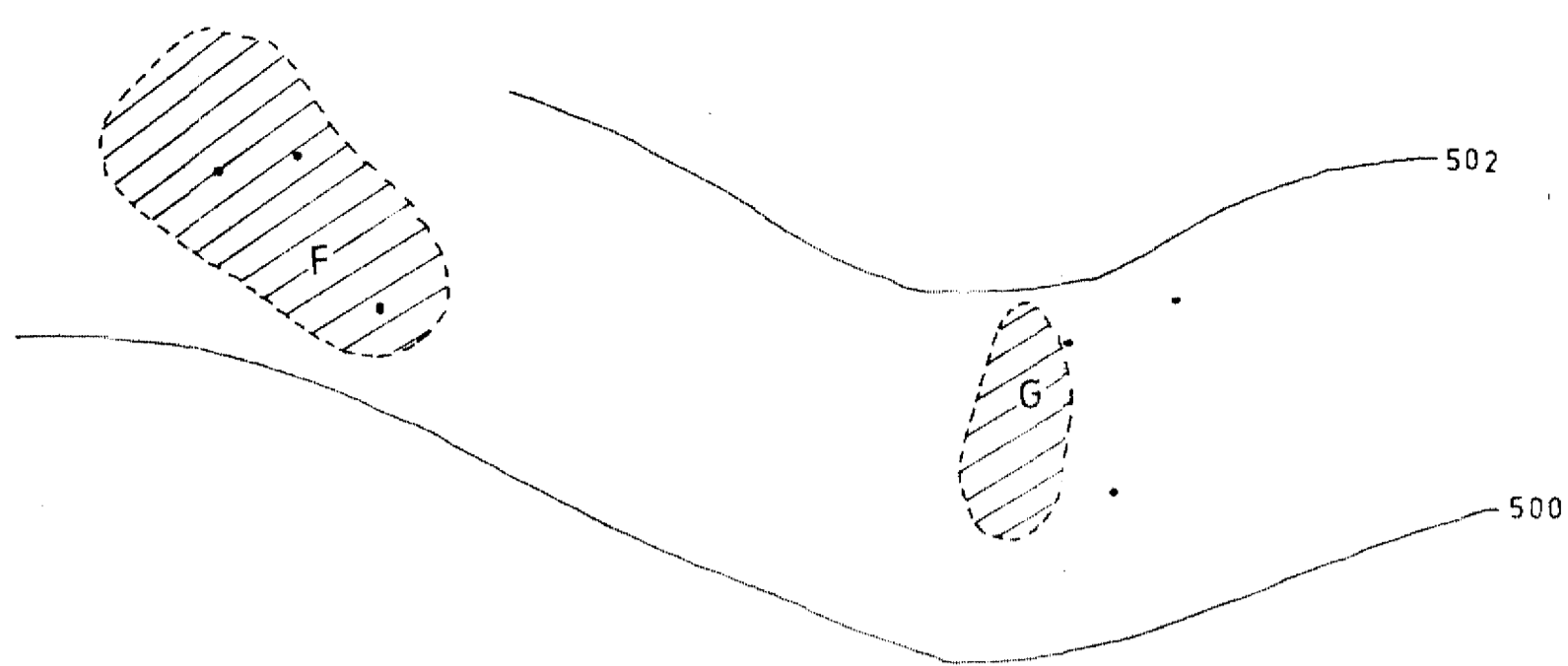
SCALE 1:100 000



LEWIS' MANGANESE PROSPECT N.T.

SURFACE PLAN

SCALE 1:500



REFERENCE

- SURVEY POINT
- E SAMPLE LOCATION
- OUTCROP BOUNDARY (APPROX.)
- 502 TOPOGRAPHIC CONTOUR
REL. ELEVATION IN METRES
- ▨ MASSIVE FE-MN
- ▩ FE-MN RUBBLE
- ▬ QUARTZ-HEMATITE
- ▧ FE-RICH SHALE