RB 38/90

DEPARTMENT OF MINES D.M. 776/52

SOUTH AUSTRALIA

WAGON DRILLING PROGRAMME, KATUNGA HILLS, MIDDLEBACK RANGES

FINAL REPORT

DRILLING

The wagon drilling programme designed to test the Katunga Hills banded iron formations has been concluded. In all 35 holes were put down, a total of 2106.5 feet of drilling being completed. This represents the boring at a total of 22 sites, in some cases up to four attempts having been made to complete a hole at or near a selected site.

In some localities deep, rubble-filled fissures were encountered and no solid rock was reached, in other cases drilling mishaps caused a hole to be abandoned. Two of the proposed bores were not attempted, i.e. Bore Line 5C and Bore Line 6B. The average final depth explored at the 22 sites was 78.9 feet.

The locations of the bore sites are shown on the accompanying topographical map of the Katunga Hills region. Bore Line 3 was drilled on the lower southern hills and the remainder were bored on the main northern area of high land.

The lines of bores averaged about 1800 feet apart and distances between the bores on each line ranged from 300 feet to nearly 1000 feet and averaged about 750 feet. The deepest wagon drill hole reached a depth of 133 feet and the average depth for all holes drilled was only 60.2 feet. It is clear, therefore, that the testing was only in the nature of a reconnaissance carried to a shallow depth and can only give a broad indication of the grade and nature of the banded iron formations within the upper zone of oxidation.

BORE LOGGING.

All the samples collected from the bores were logged at the Works Depot, Thebarton.

The fragmentary nature and fine grain size of the powder samples from the wagon drilling prevented specific identification of the

mineral components and also obscured the physical characteristics of the rock. It was found practical merely to state the general identification of the rock type, the magnetic susceptibility as tested with a small magnet and occasionally indicate the general iron content.

ASSAY RESULTS.

The original samples were collected at two feet or four feet intervals and these were forwarded after logging to the Metallurgical Branch where they were bulked into groups representing 10 feet or 12 feet of drilling. Representative samples of these groups were assayed at the departmental laboratories for insolubles and total iron. Following the assaying the samples were passed through a Davis Tube Magnetic Separator to determine the percentage of magnetic mineral present.

The geological logs, together with the results of the assays and the magnetic separation tests are tabulated below.

ASSOCIATED PLANES 54-177
54-178
54-169

Bore Line 1A (1) Bore Serial No. W.D. 205/53.

Drilling Commenced 27/3/53. Completed 30/3/53. Drillers: Elsley & Mitchell.

Abandoned at 21 ft.

Bore Line 1A (2) Bore Serial No. W.D. 206/53.

Drilling Commenced 30/3/53. Completed 2/4/53. Drillers: Elsley & Mitchell.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 7'6"	Travertine soil, rubble	0 - 9'6"	51.1	6.3	0.3
7'6"-21'6"	Limonitic siliceous quartzite	9'6"-19'	63.5	11.3	0.8
21'6"-30'	" hematite quartzite	19'-27'	34.8	31.4	1.2
30'-37'	Hematite quartzites (B.I.F.)[x] with some magnetite-martite.	37'-46'	41.5	29.8	17.5
37'-54'	B.I.F. - moderately magnetic	46'-56'	41.5	29.7	28.6
54'-56'	" - strongly "	56'-66'	37.0	35.1	16.2
56'-72'	" - weakly to mod. magnetic	66'-72	30.1	36.8	5.5
	End of Bore at 72 ft.				

[x]Banded Iron Formation

In addition a number of samples of the more ferruginous portions of this bore were submitted to the departmental petrologist for optical determination of the mineral components, with the following results:-

Depth	Magnetite	Hematite and Limonite	Gangue
24' - 27'	19.0%	39%	42%
34'6" - 37'	21%	23%	56%
42' - 44'	19%	20%	61%
52' - 54'	21"	30%	49%
64' - 66'	21%	30%	49%

Bore Line 1B. Bore Serial No. W.D. 207/53.

Drilling Commenced 5/4/53. Completed 14/4/53. Drillers: Elsley & Mitchell.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 7'	B.I.F. and travertine - weakly magnetic	3' - 13'	21.9	44.1	2.5
7' - 11'	Red B.I.F. - mod. weakly magnetic.	13' - 22'	24.8	46.8	1.9
11' - 13'	Mainly red schist	22' - 32'	44.1	34.4	3.7
13'-18'	Red B.I.F. - mod. magnetic	32' - 42'	38.7	39.0	19.5
18'-22'	B.I.F. and schist - low iron	42' - 52'	39.9	37.8	10.6
22' - 24'	Pale schist	52' - 62'	46.2	34.1	6.2
24' - 32'	B.I.F. - weakly magnetic	62' - 72'	46.0	34.5	16.2
32' - 52'	" - weak-mod. magnetic	72' - 82'	46.7	34.1	12.1
52'-60'	" - moderately magnetic	82' - 86'	46.5	33.9	14.6
60'-68'	" - mod. strongly magnetic				
68' - 78'	" - moderately magnetic				
78' - 82'	" - fairly low iron mod. magnetic				
82'-86'	" - mod. iron mod. magnetic				
	End of Bore at 86 ft.				

Bore Line 1C. Bore Serial No. W.D. 208/53.

Drilling commenced 18/4/53. Completed 23/4/53. Drillers: Elsley & Mitchell.

1st Hole -

0 - 5 ft. Mod. magnetic B.I.F. and travertine

at 6 ft. Loose gravel reported, hole abandoned.

2nd Hole (10' North of 1st hole)

0 - 21 ft. Yellow limonitic clay (decomposed schist).

21 - 33 " Pale yellow decomposed schist or amphibolite.

33 " Bit unscrewed - hole abandoned.

Bore Line 1 Cx. Bore Serial No. W.D. 209/53.

Drilling commenced 26/4/53. Completed 12/5/53. Drillers: Elsley & Mitchell.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 9	B.I.F. - mod. magnetic	0 - 9'	48.5	33.3	20.8
9'-15'	" - strongly magnetic	9'-18'	50.6	23.5	16.3
15'-18'	" - brown-mod. "	18'-29'	49.6	31.5	14.0
18'-21'	" - weak-mod. "	29'-40'	48.4	33.3	20.0
21'-40"	" - moderately "	40'-52'	64.2	18.6	5.0
40'-48'	" - limonitic highly magnetic fraction	64'-76'	70.2	14.4	0.3
48'-52'	Pale buff decomposed schist.	76'-88'	75.7	12.3	1.0
52'-72'	Pale yellow schist and quartzites, low iron, almost non-magnetic	88'-100'	58.2	25.6	1.1
72'-84'	Cream quartzite - low iron, non-magnetic.	100'-112'	61.7	12.9	0.7
84'-96'	Pale siliceous B.I.F.-mod, iron	112'-120'	66.5	14.9	2.7
96'-100'	Yellow schist	120'-129'	71.1	15.0	5.0
100'-104'	Quartzites - low iron	129'-133'	67.6	16.4	2.7
104'-112'	Yellow schist				
112'-120'	" " and quartzite-low iron				
120'-133'	Quartzite-low iron				
	End of Bore at 133 ft.				

Bore Line 1 D Bore Serial No. W.D. 249/53

Drilling commenced 19/10/53. Drilling completed 21/10/53.

Drillers: Elsley & Blackburn.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 8'	Loose gravel and dust				
8 -10'	Deep yellow-brown gravelly weathered rock				

Hole carried to 22 ft. without striking solid rock. Abandoned.

Bore Line 1 Dx

Rods broke at 9 ft. Moved 10 ft to new site.

Bore Line 1 Dx (1) Bore Serial No. W.D. 250/53

Drilling commenced 26/10/53. Drilling completed 26/10/53.

Drillers: Elsley & Blackburn.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 11'	Kaolinised soil with quartz and little Fe. Mod. magnetic	0 - 11'	48.2	11.8	2.6
		11'-21'	57.9	26.4	1.3
11'- 13'	Light yellow-brown rock with Q and Fe. Weakly magnetic.				
13'-15'	Gravelly B.I.F. Mod. magnetic				
15'- 17'	Light yellow-brown rock with pieces B.I.F. weakly magnetic.				
17'- 19'	Brown-yellow B.I.F. weakly magnetic.				
19'- 21'	Yellow-brown quartz and Fe. weakly magnetic.				
	Abondoned at 22 ft.				

Bore Line 1 Dx (2) Bore Serial No. W.D. 251/53

Drilling commenced 27/10/53. Drilling completed 29/10/53.

Drillers: Elsley & Blackburn.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0- 18'	Duplicated in Bore Dx (1)				
18'-20'	Yellow-light brown decomp. rock. Weakly magnetic.	18'-26'	69.3	17.9	2.6
20'-24'	Brown-yellow decomp. rock, Q. present. Weakly magnetic				
24'-26'	Decomp. rock, dark brown tinged yellow. Mod. magnetic.				
	Bore ends 30 ft. No dust return.				

Bore Line 2A — Bore Serial No. W.D. 213/53.

Drilling commenced 14/5/53. Completed 18/5/53. Drillers: Elsley & Tape.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0- 9'	No sample	9'-18'	46.8	28.0	0.7
9'-30'	Yellow limonitic with pieces B.I.F.	18'-30'	45.5	31.1	1.2
30'-35'	Yellow B.I.F. - Mod. magnetic	30'-39'	42.0	35.1	1.0
35'-53'	" " - weakly "	39'-50'	31.2	38.1	0.3
53'-73'	Yellow limonitic schist - non magnetic	50'-61'	56.6	23.8	0.3
73'-81'	Yellow schist - ? decomp. amphib.	61'-73'	55.6	24.8	0.3
		73'-85'	63.8	21.9	0.3
81'-90'	Yellow schist and decomp. B.I.F. weak-non magnetic	85'-90'	52.1	27.4	0.3
	End of Bore at 92 ft.				

Bore Line 2B — Bore Serial No. W.D. 218/53

Drilling commenced 19/5/53. Completed 25/5/53. Drillers: Elsley & Tape.

Log		Assays			
Depth	Description	section	% Insol.	% Fe	% Magnetic conc.
0 - 3'	Travertine and broken rock	0 - 12'	78.0	7.9	0.13
3' - 10'	White quartzite leached B.I.F.	12'-24'	52.3	29.3	0.13
10' - 22'	Brown B.I.F. - weakly magnetic	24'-35'	84.9	9.1	0.13
22' - 24'	Yellow schist and B.I.F.-non magnetic.	35'-46'	65.1	20.8	0.39
24'- 33'	White and cream quartzite,- low iron	46'-58'	49.6	30.2	0.79
33' - 42'	Brown B.I.F.-weakly magnetic	58'-68'	56.8	26.8	0.26
42' - 46'	Yellow limonitic schist	68'-75'	82.1	9.8	0.20
46' - 54'	Yellow B.I.F.- weakly magnetic				
54' - 68'	Yellow brown B.I.F.				
68'- 75'	Yellow limonitic schist-non magnetic				
	End of Bore at 75 ft.				

Bore Line 2C — Bore Serial No. W.D. 219/53.

Drilling commenced 26/5/53/ — Completed 29/5/53. Drillers: Elsley & Tape.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 13'	Cream yellow quartzite - low iron				
13' - 17'	Brown limonitic B.I.F. - weakly magnetic				
17' - 21'	Yellow quartzite				
21' - 32'	Dark B.I.F. - strongly magnetic.		(Abandoned)		

Bore Line 2Cx — Bore Serial No. W.D. 220/53.

Drilling commenced 1/6/53. Completed 10/6/53. Drillers: Elsley & McLachlan.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 6'	No sample	6' - 18'	56.2	23.6	4.8
6' - 14'	Yellow limonitic B.I.F.	18' - 28'	57.4	24.9	6.7
14' - 51'	Brown B.I.F. - mod. magnetic	28' - 40'	50.8	31.8	8.7
51' - 53'	Yellow buff B.I.F. - mod. weakly magnetic	40' - 51'	49.6	32.9	7.0
53' - 71'	Brown B.I.F. - mod. magnetic	51' - 61'	52.4	31.5	13.4
71' - 79'	Pale leached B.I.F. almost non magnetic	61' - 71'	54.0	30.2	4.7
		71' - 79'	89.3	6.5	0.3
	End of Bore at 79 ft.				

Bore Line 2D. Bore Serial No. W.D. 225/53.

Drilling commenced 11/6/53. Completed 17/6/53. Driller: Elsley.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 5'	Broken B.I.F. and travertine	0 - 12'	43.3	24.3	Nil
5' - 12'	Red brown B.I.F. - weakly magnetic	12' - 24'	83.7	4.8	Nil
12' - 24'	Yellow-white quartzite	24' - 33'	70.7	15.9	2.7
24' - 31'	Yellow brown-buff BIF - mod. magnetic	33' - 44'	70.9	15.6	0.7
1' - 41'	White-yellow quartzite	44' - 55'	62.1	24.5	4.7
41'- 44'	Yellow brown B.I.F. - weakly magnetic	55' - 67'	51.9	32.7	11.3
44'-47'	Cream schist and quartzite	67' - 79'	48.5	34.5	5.3
47'-51'	Pale red-yellow B.I.F - mod. magnetic	83' - 88'	48.6	34.4	0.9
51'- 55'	Chocolate brown B.I.F. weakly magnetic				
55'- 59'	Brown B.I.F. - mod. magnetic				
59'- 63'	Yellow brown B.I.F. - weakly magnetic				
63'- 75'	Pale red-brown B.I.F weakly magnetic				
75'- 79'	Siliceous " B.I.F. - strongly magnetic				
79'- 83'	No sample				
83'- 88'	Deep brown B.I.F. - fairly strongly magnetic				
	End of Bore at 88 ft.				

Bore Line 2E Bore Serial No. W.D. 226/53

Drilling commenced 18/6/53. Completed 23/6/53. Driller: Elsley.

Abandoned hole at 30 ft. - No rock encountered.

Bore Line 2E [x] Bore Serial No. W.D. 235/53.

Drilling commenced 26/6/53. Completed 2/7/53. Driller: Elsley.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 10'	Angular pebbles	0 - 10'	43.3	18.1	0.2
10' - 14'	Yellow quartzite & schist, low iron	10'- 22'	56.6	22.5	0.1
14' - 22'	Yellow brown quartzite & clay schist low iron	22'- 34'	60.6	19.0	0.7
22' - 26'	Light brown BIF, quartz and clay weakly magnetic	34'- 44'	68.2	16.0	0.7
26' - 30'	Light brown-yellow quartzite - weakly magnetic	44'- 51'	78.9	9.0	2.0
30' - 34'	Yellow BIF and quartz - low iron				
34' - 42'	Light yellow-brown quartzite - low iron				
42' - 44'	Pale brown quartz sand-weakly magnetic				
44' - 46'	Pink-brown quartzite - low iron				
46' - 51'	Yellow-brown quartz and sand- low iron				
	End of Bore at 51 ft.				

Bore Line 3A Bore Serial No. W.D. 241/53.

Drilling commenced 6/8/53. Completed 13/8/53. Drillers: Elsley & Mitchell.

Logs		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 6'	Travertine rubble & decomposed B.I.F	0 - 10'	74	16.1	4.0
6 - 8	Ferruginous quartzite-mod iron	10 - 20'	40.7	20.0	12.7
8 - 14	Quartzite - low iron	20 - 32'	50.7	30.9	22.0
14 - 20	" - mod. low iron	32 - 43'	58.3	26.0	7.3
20 - 28	B.I.F.mod iron and magnetic	43 - 55'	55.4	28.5	15.3
28 - 32	" " " some limonite	55' - 66'	53.0	30.0	16.0
32 - 34	Limonitic B.I.F.	66 -74'6"	53.4	30.2	15.3
34 - 43	B.I.F. mod. low iron some limonite				

Logs		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
Continued from page 10.					
43 - 47	Quartzite - low iron				
47 - 74'6"	B.I.F. mod. iron, mod. Magnetic				
	End of Bore at 74'6"				

Bore Line 3B — Bore Serial No. W.D. 240/53.

Drilling commenced 31/7/53. Completed 6/8/53. Driller: Elsley.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 9'	Purple brown B.I.F. - mod. Magnetic	0 - 9'	50.0	31.2	8.3
9 - 13'	Brown B.I.F.- mod. magnetic	9 -17'	50.2	28.9	2.1.
13 -15	Yellow brown B.I.F.& schist weakly magnetic	21 -31'	57.1	23.9	6.2
15 -17	Brown B.I.F.- mod. mag.	31 -43	59.2	23.9	7.0
17 -21	No sample	43 -53	59.8	23.1	2.0
21 -27	Yellow brown quartzite & schist weakly magnetic	53 -63	59.5	24.1	6.2
27 -29	Yellow brown schist & B.I.F. weakly magnetic				
29 -33	Dark brown B.I.F.- mod. strongly magnetic.				
33 -41	Yellow brown B.I.F. & schist weak - mod. magnetic.				
41 -45	Brown B.I.F. weak-mod. magnetic				
45 -51	Yellow brown B.I.F. weakly-moderately magnetic.				
51 - 63	Yellow do. & schist weakly magnetic				
	End of Bore at 63 ft.				

Bore Line 3C — Bore Serial No. W.D. 239/53.

Drilling commenced 23/6/53. Completed 30/7/53. Driller: Elsley.

Log		Assay			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 8'	Brown sand & pebbles	0 - 12	59.4	15.2	3.0
8 - 20	Yellow decomp. schist & B.I.F. weakly magnetic	12 - 23	64.4	12.8	1.0
20 - 31	Purple brown B.I.F. weakly-moderately magnetic	23 - 35	54.2	29.7	3.7
31 - 37	- do - mod. magnetic	35 - 47	52.8	31.0	2.3
37 - 41	- do - mod.strongly magnetic	47 - 59	47.7	31.1	2.3
41 - 53	- do - weak-mod. mag	59 - 71	49.2	22.6	0.1
53 - 55	- do - mod. magnetic	71 - 83	61.0	15.2	0.1
55 - 57	Brown B.I.F. & schist, weakly magnetic.	83 - 95	56.5	14.7	0.3
57 - 87	Yellow decomp. amphibolite schist, low iron, non-mag.				
87 - 95	- do - low iron v. weakly magnetic.				
	End of Bore at 95 ft.				

Bore Line 3D — Bore Serial No. W.D. 236/53.

Drilling commenced 6/7/53. Completed 8/7/53. Driller: Elsley.

Log		Assay			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 11	Angular pebbles & sand	0 - 11	59.7	11.0	4.3
11 - 17	Dark brown B.I.F. mod. mag.	11 - 21	67.5	18.7	10.0
17 - 25	Yellow quartzite, some iron, strongly magnetic.	21 - 31	89.9	5.4	1.7
25 - 27	Yellow quartzite	31 - 39	67.2	21.2	9.7
27 - 31	Pale brown B.I.F. mod. magnetic				
31 - 39	Dark brown B.I.F. mod. strongly magnetic.				
	Bore Abandoned at 39 ft.				

Bore Line 3DX Bore Serial No. W.D. 237/53.

Drilling Commenced 8/7/53. Completed 13/7/53. Driller: Elsley.

Log		Assay			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 12'	Light brown sand	0 - 12	74.1	2.8	0.7
12 - 16	No Sample	12 - 24	60.9	24.1	5.7
16 - 17'6"	Deep brown B.I.F. mod strongly magnetic	24 - 34	80.2	10.8	0.5
17'6" -20	Yellow schist & quartzite v. weakly magnetic	34 - 46	64.5	10.8	3.3
20 - 24	Purple brown B.I.F. moderately magnetic	46 - 58	93.8	2.9	0.3
24 - 31	Brown B.I.F. weak-moderately magnetic	58 - 68	66.6	22.0	6.4
31 - 34	Yellow quartzite non-magnetic	68 - 80	68.2	21.1	7.3
34 - 42	Brown B.I.F. weak-moderately magnetic	80 - 84	92.0	3.8	0.8
42 - 46	Light brown B.I.F. - weak - mod. magnetic.				
46 - 60	Light quartzite - weakly to non-magnetic.				
60 - 68	Dark brown B.I.F. mod. strongly magnetic.				
68 - 76	Pale red brown B.I.F. mod. strongly magnetic.				
76 - 80	Light brown B.I.F. - weak- mod. magnetic.				
80 - 84	Pale brown quartzite and schist. - mod. magnetic.				
	End of Bore at 84 ft.				

Bore Line 3E — Bore Serial No. W.D. 238/53.

Drilling commenced 14/7/53. Completed 21/7/53. Driller: Elsley.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 6'	Brown sand & B.I.F. - strongly magnetic	0 - 10'	47.0	29.9	8.7
6 - 10	Pale brown B.I.F. - moderately magnetic	10 - 22	51.2	31.7	12.7
10 - 18	Brown B.I.F. - moderately strongly magnetic	22 - 34	63.7	22.0	4.0
18 - 26	Yellow brown B.I.F. - weak-mod. magnetic	34 - 46	53.3	29.5	3.3
26 - 34	Light brown B.I.F. - weak-mod. magnetic	46 - 58	68.8	12.4	Nil
34 - 46	Dark brown B.I.F. - weak-mod. magnetic	58 - 70	51.1	20.3	"
46 - 58	Yellow schist - non-mag.	70 - 82	59.6	15.3	"
58 - 62	Light brown schist & B.I.F. v. weakly mag.	82 - 94	62.7	13.7	"
62 -110	Yellow brown decomposed amphibole schists - non-magnetic.	94 -106	51.6	18.0	"
		106 -110	55.5	14.0	"
	End of Bore at 110 ft.				

Bore Line 4A (1) — Bore Serial No. W.D. 246/53.

Drilling commenced 22/9/53. Drilling completed 22/9/53.

Driller: Elsley.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 14'	Leached(white) quartzite.low iron				
14'- 30'	Cream-white quartzite. low iron				
	Abandoned at 30 ft.				

Bore Line 4A (2) Bore Serial No. W.D. 247/53.

Drilling commenced 23/9/53. Drilling completed 23/9/53.

Driller: Elsley.

Drilled to 25 ft. and abandoned.

Bore Line 4A x Bore Serial No. W.D. 248/53.

Drilling commenced 24/9/53. Drilling completed 14/10/53.

Driller: Elsley.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 7'	Rubble (no sample)				
7'- 9'	Limonitic B.I.F.	7'-17'	40.4	37.4	Trace
9'-23'	Dark brown B.I.F. (high Fe)	17'-27'	46.6	35.1	11.3
23'-27'	Yellow brown B.I.F.	27'-37'	39.7	38.5	4.0
27'-35'	Yellow to yellow-brown B.I.F.	37'-49'	43.5	36.5	16.0
35'-45'	Dark brown to red-brown B.I.F. (high Fe)	49'-60'	52.2	29.7	7.0
45'-57'	Dark brown B.I.F.				
57'-60'	Yellow brown sandy B.I.F. (moderate Fe)				
	End of bore at 60 ft.				

Bore Line 4B Bore Serial No. 245/53.

Drilling commenced 9/9/53. Drilling completed 21/9/53.

Drillers: Elsley & Mitchell.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 6'	Pink-grey haematite-quartzite Mod. magnetite.	0-10'	80.3	7.8	6.6
6'-10'	Pink & brown B.I.F. Mod. Mag.	10'-22'	58.0	25.1	6.3
10'-22'	Dark brown B.I.F. Mod. Mag.	22'-32'	56.9	26.3	13.7
22'-30'	" Brown B.I.F. Strongly "	32'-45'	56.7	26.9	11.3
30'-45'	Purple-brown B.I.F. strongly magnetic. Bit stuck at 51'6". Abandoned.				

Bore Line 4C — Bore Serial No. W.D. 242/53.

Drilling commenced 18/8/53. Completed 25/8/53. Drillers: Elsley & Mitchell.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 32'	B.I.F. mod. magnetic	0 - 12	55.8	26.6	14.0
32 - 56	-do- mod-strongly magnetic	12 - 24	48.4	32.9	9.3
56 - 60	-do- limonitic mod.- weakly magnetic.	24 - 36	51.0	31.5	10.7
60 - 79	-do- mod.-strongly mag.	36 - 48	52.8	31.5	8.7
79 - 95	-do- limonitic mod. mag.	48 - 60	49.8	34.6	15.3
95 -100	Ferruginous schist weakly magnetic	60 - 71	49.7	32.7	6.7
		71 - 83	35.4	41.4	5.0
		83 - 95	19.6	48.9	0.7
	End of Bore at 100 ft.				

Bore Line 4D — Bore Serial No. W.D. 243/53

Drilling commenced 2/9/53. Completed 3/9/53. Drillers: Elsley & Mitchell.

Log		
Depth	Description	
0 - 7	Travertine	Not Assayed.
7 - 11	" schist and leached quartzite	
11 - 23	Cream-yellow schist, v. low iron	
23 - 27	Yellow schist and B.I.F. low iron	
27 - 43	B.I.F. moderate iron	
43 - 47	B.I.F. & schist - mod. low iron	
	Bore abandoned at 47 ft.	

Bore Line 4 DX — Bore Serial No. W.D. 244/53.

Drilling commenced 4/9/53. Completed 8/9/53. Drillers: Elsley & Mitchell.

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 8'	White quartzite and travertine	0-12'	78.3	1.9	0.3
8 - 16'	Leached B.I.F. and some clay	12-24	73.4	4. 0	0.1
16 -24	Cream schist-v. low iron	24-36	56.8	20.4	3.2
24 -28	Schist and B.I.F. weakly magnetic.	36-48	49.9	32.6	8.7
28 -48	B.I.F. mod. iron mod. magnetic	48-60	53.9	29.3	12.0
48 -52	B.I.F. somewhat limonitic	60-71	47.6	26.5	0.3
52 -60	B.I.F. mod. magnetic	71-83	64.8	21.8	1.0
60 -71	B.I.F. limonitic, mod.weakly magnetic.	83-85	77.9	8.8	0.1
71 -85	Leached schist - low iron				
	End of Bore at 85 ft.				

Bore Line 4E — Bore Serial No. W.D. 252/53.

Drilling commenced 2/11/53. Drilling completed 4/11/53. Drillers: Elsley & Blackburn

Log		Assays			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 17'	Weathered B.I.F. some clay strongly magnetic.	0-17'	38.4	36.8	15.7
17'- 21'	Weathered B.I.F. clay throughout Gravel at 18'6".Mod. magnetic.	17'-27'	52.9	26.6	7.3
21'- 31'	Weathered B.I.F. loose gravel at 31'. Mod. magnetic.	27'-31'	52.0	28.1	6 .3
31'- 44'	Gravelly weathered B.I.F.very weakly magnetic.	31'-44'	55.6	22.2	Trace
44'- 54'	Light orange-brown weathered B.I.F. very weakly magnetic.	44'-54'	57.6	19.7	Trace
54'- 63'	Khaki-brown weathered B.I.F. with clay. V. weakly magnetic.	54'-63'	57.5	22.4	Trace
63'- 75'	Yellow-brown weathered B.I.F. with clay. Weakly magnetic.	63'-75'	66.3	20.5	1.0
	Bore ended at 80 ft.				

Bore Line 5A — Bore Serial No. W.D. 253/53.

Drilling commenced 6/11/53. Drilling completed 16/11/53.

Driller: Elsley.

Log		Assay			
Depth	Description	Section	% Insol.	@ Fe	% Magnetic conc.
0 - 15'	No sample				
15'- 23'	Red-brown weathered B.I.F. very weakly magnetic.	15'-25'	52.1	30.8	Trace
23'- 33'	Red-brown weathered B.I.F. Moderately magnetic.	25'-35'	49.0	33.8	8.6
33'- 47'	Red-brown weathered B.I.F. Moderately magnetic.	35'-47'	52.8	31.2	8.3
47'- 57'	Red-brown weathered B.I.F. Weakly magnetic. Some coarse fragments of magnetite.	47'-59'	53.2	30.1	2.0
		59'-69'	66.0	22.3	Trace
57'- 63'	Red-brown weathered B.I.F. Very weakly magnetic.	69'-80'	89.6	5.1	Trace
63'-65'	Light-brown quartzite. some calcareous fragments.				
65'-69'	Red-brown weathered B.I.F. Very weakly magnetic.				
69'-73'	Pink-brown weathered B.I.F. Very weakly magnetic.				
73'-80'	Light yellow-brown quartzite and jasper. V. weakly magnetic.				
	Bore ends at 80 ft.				

Bore Line 5B (1) — Bore Serial No. W.D. 254/53.

Drilling commenced 20/11/53. Drilling completed 24/11/53.

Driller: Blackburn.

Log		Assay			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 8'	No sample				
8'- 14'	Light-brown weathered B.I.F. weakly magnetic.	8'-12'	70.2	16.1	2.0
14'- 16'	Light-grey sand with fragments of B.I.F. V. weakly magnetic.	12'-22'	51.9	26.5	8.6
16'- 20'	Light-brown weathered B.I.F. Weakly magnetic.	22'-32'	71.1	14.5	3.3.

Log		Assay			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
Continued from page 18.					
20'-24'	Grey-brown weathered B.I.F. Strongly magnetic.	32'-42'	57.8	27.5	16.0
24'-30'	Light-grey haematite quartzite Weakly magnetic.	42'-54'	62.5	23.8	10.6
30'-34'	Grey haematite. ~~=~~ quartzite Weakly magnetic.				
34'-40'	Red-brown weathered B.I.F. Strongly magnetic.				
40'-54'	Grey-brown weathered B.I.F. Strongly magnetic.				
	Bore ends at 54 ft.				

Bore Line 5B (2) Bore Serial No. W.D. 256/53.

Drilling commenced 3/12/53. Drilling completed 9/12/53. Driller: Blackburn.

Log		Assay			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 12'	No samples				
12'- 16'	Red-brown weathered B.I.F. Moderately magnetic.	12'-18'	70.2	16.1	2.0
16'-20'	Brown weathered B.I.F. Moderately magnetic.	18'-30'	66.4	18.3	2.0
20'-24'	Pinkish-brown B.I.F.moderately magnetic.	30'-42'	65.9	20.6	3.0
24'-28'	Pinkish-brown B.I.F. weakly magnetic.	42'-54'	61.4	24.1	12.0
28'-62'	Grey-brown weathered B.I.F. Moderately to strongly mag.	54'-62'	60.3	19.7	5.0
62'-64'	No samples				
64'-68'	Grey-brown weathered B.I.F. Moderately magnetic.	64'-74'	58.1	20.8	6.6
68'-72'	Pinkish-brown B.I.F.Moderately magnetic.				
72'-74'	Grey-brown weathered B.I.F. Moderately magnetic.				
	Bore ends at 74 ft.				

Bore Line 6A — Bore Serial No. W.D. 201/54.

Drilling commenced 18/1/54. Drilling completed 22/1/54. Driller: Blackburn.

Log		Assay			
Depth	Description	Section	% Insol.	% Fe	% Magnetic conc.
0 - 4'	No sample				
4'-16'	Red-brown weathered B.I.F. Mod. - Strongly magnetic.	4'-12'	51.2	31.5	12.3
		12'-24'	45.7	35.8	15.3
16'-32'	Grey-brown weathered B.I.F. Mod. - Strongly magnetic.	24'-36'	48.7	34.7	16.0
		36'-48'	52.3	31.9	17.7
32'-67'6"	Red-brown weathered B.I.F. Mod. - Strongly magnetic.	48'-56'	52.1	31.8	17.2
		56'-67.5'	51.4	32.8	16.0
	Bore ends at 67 ft 6 inches.				

A N A L Y S I S O F W A G O N D R I L L I N G R E S U L T S.

Assumed Cut-off Grade 23.1% Fe (= 33% Haematite).

Line	Hole No.	Total Depth	Footage Assayed	Footage Not Assayed	Above Cut-off Grade					Below Cut-off Grade					Remarks.
					Depth From	Depth to	Length	Grade % Fe	Length x Grade	Depth From	Depth to	Length	Grade % Fe	Length x Grade	
Line 1	A(1)	21		21											Abandoned
"	A(2)	72	62	10	0(10)	72	62*	25.09	1555.4						27'-37' not assayed*
"	B	86	83	3	3	86	83	37.79	3136.8						0-3' No sample
"	C(1)	6		6											Abandoned
"	C(2)	33		33											Bit unscrewed. Abandoned.
"	CX	133	121	12	0	40	40	30.60	1224.0	40(12)	133	81*	16.36	1325.4	52'-64' schist, not assayed*
"	D	22		22											No solid rock. Abandoned.
"	DX	9		9											Rods broke. Abandoned
"	DX(1)	22	21	1						0	21	21	18.75	393.8	Duplicated in DX(2)
"	DX(2)	36	8	28						18	26	8	17.90	143.2	26'-36' no dust return.
TOTAL Line 1		440	295	145	13	198	185*	31.98	5916.2	70	180	110	16.93	1862.4	
Line 2	A	92	81	11	9	90	81	28.63	2319.4						0-9' No sample.
"	B	75	75							0	75	75	19.66	1474.3	
"	C	32		32											Abandoned.
"	CX	79	73	6	6	71	65	29.12	1892.7	71	79	8	6.50	52.0	0-6' No sample.
"	D	88	84	4						0(4)	88	84*	22.76	1911.8	79'-83' No sample.
"	E	30		30											No solid rock. Abandoned.
"	EX	51	51							0	51	51	17.69	902.0	
TOTAL Line 2		447	364	83	15	161	146	28.85	4212.1	75	293	218	19.91	4340.1	
Line 3	A	74.5	74.5		0	74.5	74.5	26.13	1946.5						
"	B	63	63		0	63	63	23.97	1509.8						
"	C	95	95		0	59	59	27.53	1624.0	59	95	36	17.50	630.0	
"	D	39	39							0	39	39	13.63	531.6	
"	DX	84	84							0	84	84	12.90	1083.6	
"	E	110	110		0	46	46	28.20	1297.4	46	110	64	15.82	1012.4	
TOTAL Line 3		465.5	465.5		0	242.5	242.5	26.30	6377.7	105	328	223	14.61	3257.6	
Line 4	A(1)	30		30											Abandoned.
"	A(2)	25		25											Abandoned.
"	AX	60	53	7	7	60	53	35.37	1874.7						
"	B	51.5	45	6.5						0	45	45	22.04	991.9	Bit stuck. Abandoned.
"	C	100	100		0	100	100	34.57	3456.5						
"	D	47		47											Abandoned.
"	DX	85	85							0	85	85	19.17	1629.1	
"	E	80	75	5	0	31	31	32.39	1004.0	31	75	44	21.21	933.2	
TOTAL Line 4		478.5	358	120.5	7	191	184	34.43	6335.2	31	205	174	20.43	3554.2	
Line 5	A	80	65	15	15	59	44	31.40	1381.6	59	80	21	13.28	279.1	0-15 No sample.
"	B(1)	54	46	8						8	54	46	22.50	1035.0	
"	B(2)	74	60	14						12(2)	74	60*	20.30	1218.2	0-12, 62-64 No sample*
TOTAL Line 5		208	171	37	15	59	44	31.40	1381.6	81	208	127	19.94	2532.3	
Line 6	A	67.5	63.5	4	4	67.5	63.5	33.27	2112.4						0-4 No sample.
TOTAL Line 6		67.5	63.5	4	4	67.5	63.5	33.27	2112.4						
GRAND TOTAL		2106.5	1717.0	389.5	54.0	919.0	865.0	30.45	26335.2	362.0	1214.0	852.0	18.25	15546.6	
			100.00%	18.49%			41.06%					40.45%			

ANALYSIS OF RESULTS.

The footage and assay results shown on the foregoing bore logs are summarized and analysed on the appended table. These figures show that 41.06% of the wagon drilling was in iron ore which averages 30.45% Fe while 40.45% of the drilling was in material averaging 18.25% Fe, the remaining 18.49% not having been assayed.

In addition to the figures shown on the tabulation the overall grade of the wagon-drill samples assayed was calculated and found to be 24.39% Fe, or 24.96% Fe if the assays of the upper 145.5 feet of core from Diamond Drill Hole No. 6 be included.

The results yielded by Diamond Drill Hole No. 6 are summarized as follows:-

From 0	to	125.0'	33.48% Fe)	Wholly oxidised.
" 125.0'	"	145.5'	20.10% ")	
" 145.5'	"	248.5'	Dolerite-amphibolite, not assayed.	
" 248.5'	"	348.7	19.48% Fe	Wholly magnetic

Weighted samples were taken from selected bores on each bore line, combined into bulk samples and assayed. The average iron content in each of these bulk samples was also calculated from the original assays of the corresponding sections used in the bulk samples.

The following is a comparison of results:-

Bore	Line	1	Assay	27.5% Fe	Calculated	26.1% Fe.
"	"	2	"	24.4% "	"	23.8% "
"	"	3	"	21.6% "	"	21.7% "
"	"	4	"	31.4% "	"	31.3% "
"	"	5 & 6	"	26.2% "	"	25.8% "

The actual assays agree with the calculated values very closely excepting in the case of Bore Line 1. This line was the first line bored and the drillers had not developed efficiency in recovering samples. The result was that the amount of dust recovered at each sampling varied widely and it was not possible, therefore, to prepare a properly weighted bulk sample from the samples received. The bulk samples mentioned are now in the process of undergoing metallurgical treatment tests.

No attempt was made to analyse an summarize the results of the Davis Tube magnetic separation. The concentration of magnetic mineral in the samples is mainly low, but it is so erratic in distribution as to have no real significance.

EVALUATION OF RESULTS.

A close study of the assay results shows that a large proportion of the bores enter lower grade material with depth. How much this is due to the attitude of the beds or to the frequency of occurrence of schists is not known since the finely powdered samples do not admit of a positive detailed identification of rock types.

However, the occurrence is sufficiently frequent to indicate an upper - zone enrichment in iron rather than leaching. If this is so it indicates that a generally lower grade of material will be encountered in the sulphide zone than that revealed in the oxidised zone. This idea is strengthened by the results obtained from diamond drill hole No. 6. The evidence is not conclusive, however, since several bores show fairly uniformly high values throughout their depth, and diamond drill hole No. 1 revealed values in the Upper Middleback Quartzite in the sulphide zone comparable with the best values obtained by wagon drilling.

The results, therefore, are inconclusive and indicate that the balance of the diamond drilling programme already approved should be completed before final conclusions concerning the area are reached. Three diamond drill holes remain to be drilled to complete the proposed programme. In the original proposal No. 8 diamond drill hole was sited in the southern area in the Lower Middleback Quartzites, but these have yielded fairly consistently low values from both the wagon drill samples and the diamond drill cores. It is therefore suggested that all three diamond drill holes be sited in the main northern area in the Upper Middleback Quartzites.

The wagon drilling has roughly defined an area of potential interest and this is outlined in blue on the accompanying topographical map (54-169). The assays of samples taken by drilling in this area

(including DD No.6) average 32.3% Fe to an average depth of 72.9 feet, involving a volume of some 26,500,000 cubic yards. This represents over 8,500,000 tons of metallic iron and the possibility of working this deposit to provide a small, regular percentage of the ore treated should be seriously considered with the object of prolonging the life of the present limited ore reserves.

Alan Gibson

A.A. Gibson,
GEOLOGIST.

ENGINEERING GEOLOGY & MINERAL RESOURCES SECTION.

LEGEND

DIAMOND DRILL HOLES

PROPOSED DIAMOND DRILL HOLES

'WAGON' DRILL HOLES

PROPOSED PERCUSSION HOLES P.H.

FORM LINES

SCALE

900 FT TO 1 IN. (approx.)

M.L. 2647 M.L. 2238 M.L. 2239 M.L. 2240

P.H.1 DUNE SAND

P.H.2 A 10004 P.H.5

Regional Trend of Faulting

P.H.3 20004 P.H.6

Direction of Area of potential interest averaging 32·3% Fe.

30004 P.H.4 P.H.7

Fault in Railway Cutting.

RUBBLE

Taconite Sample

Vide Enlargement Plan No. S 1127

No. 1

40004

Line 1

50004

DD 7

Line 4

60004

KATUNGA TRIG. No. 6

Line 2

70004

No. 2

SAND

80004

ALLUVIAL FLAT

90004

RUBBLE

Line 3

10,0004

SAND

DAM

11,0004

12,0004

SOIL BUBBLE

13,0004

6000 W 5000 W 4000 W 3000 W 2000 W 1000 W 00 1000 E 2000 E

S. A. DEPT. OF MINES

IRON KNOB AREA
KATUNGA HILL
FORM LINES

No.	Amendment	Exd.	Date

Approved

Director

Passed

Drn.

Tcd.

Ckd.

Exd.

Scale: 900' to 1"

54·169 DE

Date 2·9·54

LEGEND

CAINOZOIC — TERTIARY-RECENT

- DUNE SAND
- SAND AND ALLUVIUM
- TALUS SLOPES
- LATERITIC GRAVEL

MIDDLE PRE-CAMBRIAN — MIDDLEBACK GROUP

- UPPER MIDDLEBACK QUARTZITE
  BANDED HEMATITE AND MAGNETITE QUARTZITE AND INTERBEDDED SCHISTS
- LOWER MIDDLEBACK QUARTZITE
  BANDED HEMATITE AND MAGNETITE QUARTZITE AND INTERBEDDED SCHISTS
- MIDDLEBACK NORTH DOLOMITE
  CHERTY DOLOMITIC MARBLE
- GNEISSIC COMPLEX
  SEDIMENTARY SCHISTS, QUARTZITES, PHYLLITE, MIGMATITE, LIT-PAR-LIT GNEISS, GRANITIC GNEISS & GNEISSIC GRANITE

IGNEOUS ROCKS

- YOUNGER DOLERITE
- DOLERITE-AMPHIBOLITE

REEF & ORE DEPOSITS

- HEMATITE ORE

REFERENCE TO SIGNS

- SYNCLINE — SHOWING DIRECTION OF PLUNGE
- ANTICLINE
- BEDDING — STRIKE AND DIP
- BEDDING — VERTICAL
- MINOR DRAG FOLD SHOWING PITCH
- PITCH
- GNEISSOSITY SCHISTOSITY
- ROAD OR TRACK
- BEDDING

M.L. 1659 'C' QUARRY IRON KNOB
'B' QUARRY
'D' QUARRY
M.L. 1660
M.L. 1661
M.L. 2612
M.L. 2613
M.L. 2670
M.L. 2672
M.L. 2673
M.L. 2614
M.L. 2384
M.L. 1662
M.L. 1663
M.L. 1664
M.L. 2671
'F' QUARRY
'E' QUARRY
'A' QUARRY
M.L. 2700
M.L. 2383
M.L. 1665
M.L. 1666
M.L. 1667
IRON MONARCH
M.L. 2647
M.L. 2238
M.L. 2239
M.L. 2240
M.L. 2241
M.L. 2242
LINE 6
LINE 5
LINE 1
LINE 4
LINE 3
LINE 2
KATUNGA HILL
DAM
DAM
DAM
T. N.
10000 S
20000 S
30000 S
40000 S
50000 S
60000 S
70000 S
80000 S
90000 S
100000 S
110000 S
120000 S
130000 S
5000 W
4000 W
3000 W
1000 W
0
4000 E
2000 E

GEOLOGY BY DR. V. R. MILES
STRUCTURAL INTERPRETATION BY A.A. GIBSON.

PLOTTED FROM VERTICAL AERIAL PHOTOGRAPHS FLOWN BY R.A.A.F. 29·9·38.

REFERENCE TO DRILL HOLES

- DIAMOND DRILL HOLES — COMPLETED
- DIAMOND DRILL HOLES — PROPOSED
- WAGON DRILL HOLES

SCALE
900 FEET TO 1 INCH
FEET 1000 0 1000 2000 3000 4000 5000 6000 FEET

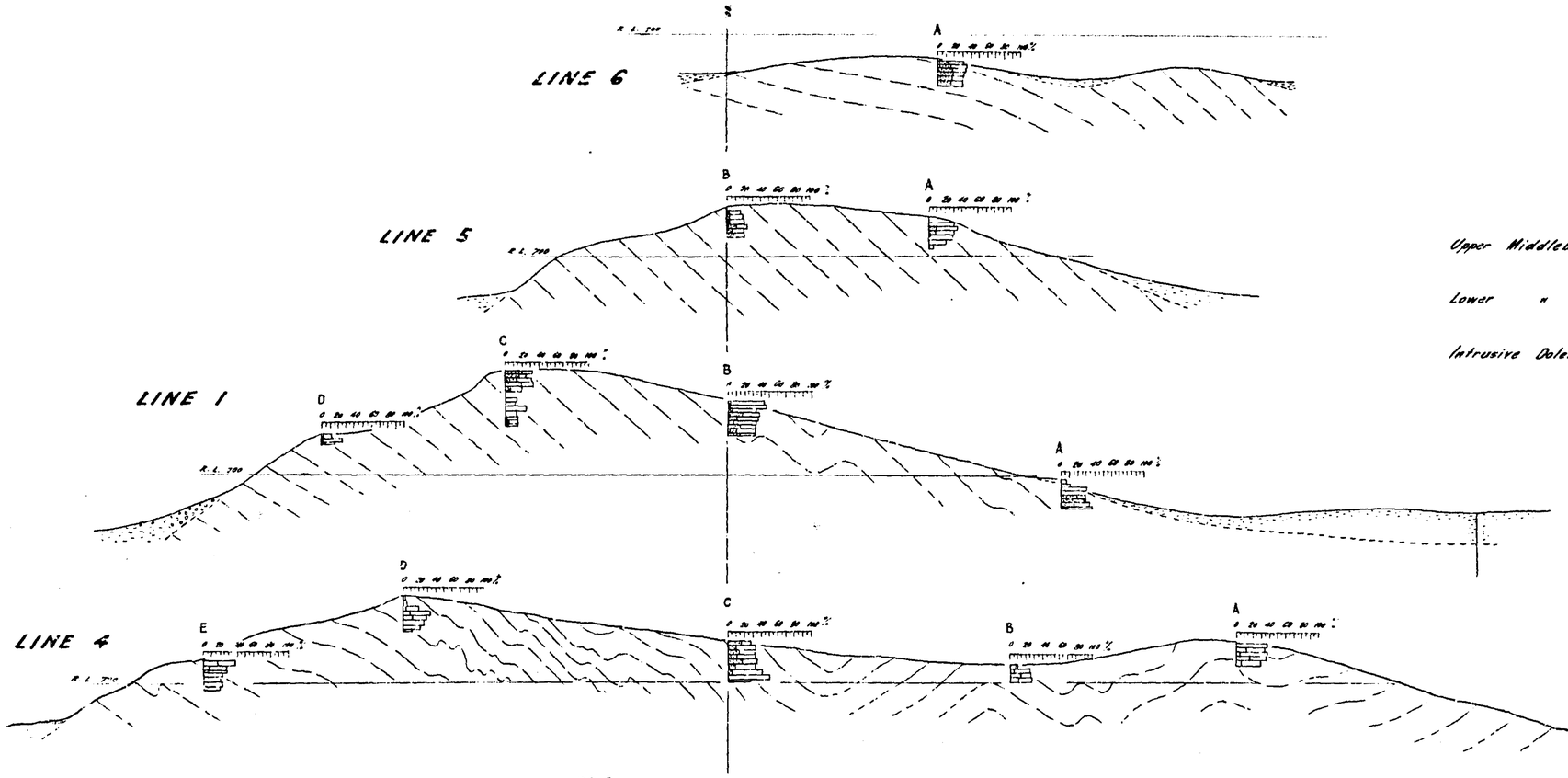
Associated Drawing | No. | Amendment | Ext. | Date

Req. No.
D.M.
Compiled from

S.A. DEPARTMENT OF MINES

IRON KNOB - KATUNGA HILL AREA
GEOLOGICAL AND STRUCTURAL MAP

Approved
Director of Mines
Passed
Dm.
Tcd.
Ckd. A.A.
E.d.
Scale: 900 FT TO 1 INCH
Date 8.9.54
54.177 DE



LEGEND

Upper Middleback Quartzite .....

Lower " " .....

Intrusive Dolerite - amphibolite .....

BORE

% Iron .....

% Magnetic Mineral content .....

To accompany report by A. A. Gibson, Geologist

S.A. DEPARTMENT OF MINES

Associated Drawing No.	No.	Amendment	Exd.	Date

Req. No.
D.M.
Compiled from original by A.A.G.

KATUNGA HILL AREA
SECTIONS ALONG LINES OF WAGON DRILL HOLES

Approved	Passed	
Director of Mines		Drn. / Tcd. / Ckd. / Exd.

Scale: 200 feet to 1 inch.

54 - 178
DE

Date: 15 - 9 - 54