Appendix 4

List of minable ore reserves for each ore block in the Rakah deposit

Rakah : 650 m
Cut-off grade : 0.35 Cu

No	X(E)	Y(N)	Volume (m3)	S.G. (t/m3)	Tonnage (ton)	Cu grade (%)	Cu content (ton)	Zn grade (%)	Zn content (ton)	Au grade (g/t)	Au content (kg)	Ag grade (g/t)	Ag content (kg)
1	457270	2618690	2000	2.86	5719	.77	44.04	.12	6.86	1.32	7.55	6.00	34.31
2	457270	2618710	2800	2.88	8060	.88	70.93	.08	6.45	1.25	10.07	4.86	39.17
3	457270	2618730	152	2.82	429	.49	2.10	.04	.17	.62	.27	4.95	2.12
4	457290	2618670	2000	2.85	5700	.67	38.19	.19	10.83	.92	5.24	4.47	25.48
5	457290	2618690	4000	2.88	11514	.90	103.63	.22	25.33	.92	10.59	3.52	40.53
6	457290	2618710	4000	2.88	11514	.90	103.63	.12	13.82	.99	11.40	2.62	30.17
7	457290	2618730	628	2.94	1849	1.35	24.97	.02	.37	1.83	3.38	2.18	4.03
8	457310	2618670	3000	2.89	8664	.92	79.71	.27	23.39	.86	7.45	3.11	26.95
9	457310	2618690	3204	2.93	9375	1.21	113.44	.40	37.50	.84	7.87	2.44	22.87
10	457310	2618710	4000	2.83	11324	.55	62.28	.02	2.26	.62	7.02	2.06	23.33
11	457310	2618730	400	2.89	1155	.97	11.21	.02	.23	1.28	1.48	2.62	3.03
12	457330	2618670	3000	2.94	8807	1.25	110.08	.31	27.30	.82	7.22	2.49	21.93
13	457330	2618690	4000	2.90	11590	1.00	115.90	.25	28.97	.77	8.92	2.30	26.66
14	457330	2618710	2800	2.87	8033	.82	65.87	.10	8.03	.81	6.51	2.30	18.48
15	457350	2618670	3000	3.01	9035	1.88	169.85	.23	20.78	.84	7.59	2.25	20.33
16	457350	2618690	2400	2.97	7136	1.59	113.47	.19	13.56	.82	5.85	2.27	16.20
17	457350	2618710	1000	2.94	2945	1.38	40.64	.13	3.83	.97	2.86	2.53	7.45
18	457370	2618630	1000	3.15	3154	2.91	91.78	.15	4.73	.96	3.03	2.48	7.82
19	457370	2618650	2400	3.15	7570	2.91	220.28	.17	12.87	.94	7.12	2.34	17.71
20	457370	2618670	2000	3.13	6251	2.65	165.65	.18	11.25	.91	5.69	2.24	14.00
21	457390	2618570	1600	2.84	4545	.65	29.54	.06	2.73	.96	4.36	2.46	11.18
22	457390	2618630	2800	3.18	8911	3.13	278.91	.13	11.58	.98	8.73	2.45	21.83
23	457390	2618650	1600	3.24	5183	3.53	182.97	.15	7.77	.97	5.03	2.38	12.34
24	457410	2618630	2400	3.17	7615	3.07	233.79	.13	9.90	.97	7.39	2.45	18.66
			56184		166078		2472.86		290.51		152.62		466.58

Rakah : 640 m
Cut-off grade : 0.35 Cu

No	X(E)	Y(N)	Volume (m3)	S.G. (t/m3)	Tonnage (ton)	Cu grade (%)	Cu content (ton)	Zn grade (%)	Zn content (ton)	Au grade (g/t)	Au content (kg)	Ag grade (g/t)	Ag content (kg)
1	457270	2618690	1000	2.84	2841	.66	18.75	.28	7.95	.83	2.36	6.05	17.19
2	457270	2618710	1136	2.83	3216	.56	18.01	.13	4.18	.46	1.48	6.25	20.10
3	457270	2618730	1688	2.88	4859	.89	43.24	.06	2.92	.62	3.01	6.44	31.29
4	457290	2618670	500	2.84	1420	.65	9.23	.55	7.81	.84	1.19	4.45	6.32
5	457290	2618690	4000	2.84	11362	.60	68.17	.47	53.40	.74	8.41	4.45	50.56
6	457290	2618710	4000	2.83	11324	.57	64.55	.28	31.71	.71	8.04	4.94	55.94
7	457310	2618670	800	2.85	2280	.70	15.96	.61	13.91	.84	1.92	3.26	7.43
8	457310	2618690	4000	2.85	11400	.69	78.66	.72	82.08	.99	11.29	3.09	35.23
9	457310	2618710	4000	2.86	11438	.76	86.93	.40	45.75	.71	8.12	3.66	41.86
10	457310	2618730	2800	2.89	8086	.96	77.63	.18	14.56	.73	5.90	5.32	43.02
11	457310	2618750	36	2.99	108	1.68	1.81	.11	.12	.31	.03	7.94	.86
12	457330	2618670	1600	2.89	4621	.94	43.44	.49	22.64	.69	3.19	2.38	11.00
13	457330	2618690	4000	2.84	11362	.65	73.85	.44	49.99	.61	6.93	1.90	21.59
14	457330	2618710	4000	2.85	11400	.71	80.94	.31	35.34	.50	5.70	2.14	24.40
15	457330	2618730	800	2.90	2318	1.01	23.41	.20	4.64	.38	.88	3.40	7.88
16	457350	2618670	2400	2.96	7114	1.51	107.42	.29	20.63	.49	3.49	1.93	13.73
17	457350	2618690	4000	2.84	11362	.61	69.31	.25	28.40	.32	3.64	1.38	15.68
18	457350	2618710	2120	2.82	5982	.48	28.71	.16	9.57	.17	1.02	1.08	6.46
19	457350	2618730	800	2.87	2295	.79	18.13	.17	3.90	.40	.92	2.35	5.39
20	457370	2618630	1000	3.49	3487	4.73	164.91	.21	7.32	.78	2.72	3.37	11.75
21	457370	2618650	2000	3.23	6460	3.42	220.93	.16	10.34	.65	4.20	2.92	18.86
22	457370	2618670	4000	2.94	11780	1.39	163.74	.14	16.49	.49	5.77	2.24	26.39
23	457370	2618690	4000	2.83	11324	.54	61.15	.18	20.38	.22	2.49	1.37	15.51
24	457370	2618710	2000	2.82	5643	.48	27.09	.20	11.29	.20	1.13	1.45	8.18
25	457370	2618730	500	2.84	1420	.59	8.38	.18	2.56	.33	.47	2.09	2.97
26	457390	2618630	1000	3.64	3639	5.71	207.76	.20	7.28	.80	2.91	3.67	13.35
27	457390	2618650	4000	3.26	13034	3.60	469.22	.19	24.76	.72	9.38	3.29	42.88
28	457390	2618670	924	2.88	2660	.89	23.67	.07	1.86	.50	1.33	2.53	6.73
29	457390	2618690	1200	2.82	3386	.48	16.25	.23	7.79	.34	1.15	1.99	6.74
30	457410	2618630	3500	3.38	11837	4.53	536.22	.26	30.78	.77	9.11	3.57	42.26

No	X (E)	Y (N)	Volume	S. G.	Tonnage	Cu		Zn		Au		Ag	
						grade	content	grade	content	grade	content	grade	content
			(m3)	(t/m3)	(ton)	(%)	(ton)	(%)	(ton)	(g/t)	(kg)	(g/t)	(kg)
31	457410	2618650	4000	3.27	13072	3.72	486.28	.35	45.75	.69	9.02	3.33	43.53
32	457410	2618670	2800	2.98	8352	1.66	138.65	.29	24.22	.56	4.68	2.85	23.80
33	457430	2618630	2500	3.22	8051	3.39	272.94	.28	22.54	.70	5.64	3.48	28.02
34	457430	2618650	4000	3.14	12578	2.82	354.70	.32	40.25	.64	8.05	3.25	40.88
35	457430	2618670	2200	3.01	6625	1.84	121.91	.34	22.53	.49	3.25	2.99	19.81
36	457450	2618630	1000	3.09	3087	2.37	73.17	.26	8.03	.67	2.07	3.36	10.37
37	457450	2618650	4000	3.06	12236	2.23	272.86	.29	35.48	.59	7.22	3.22	39.40
38	457450	2618670	56	3.02	169	1.92	3.25	.28	.47	.47	.08	3.07	.52
39	457470	2618650	3400	3.02	10271	1.94	199.27	.28	28.76	.49	5.03	3.14	32.25
40	457470	2618670	400	3.01	1205	1.82	21.92	.28	3.37	.56	.67	3.10	3.73
			92160		275104		4772.42		811.75		163.89		853.86

Rakah : 630 m
Cut-off grade : 0.35 Cu

No	X (E)	Y (N)	Volume	S. G.	Tonnage	Cu		Zn		Au		Ag	
						grade	content	grade	content	grade	content	grade	content
			(m3)	(t/m3)	(ton)	(%)	(ton)	(%)	(ton)	(g/t)	(kg)	(g/t)	(kg)
1	457250	2618730	500	3.00	1501	1.80	27.02	.09	1.35	1.78	2.67	3.65	5.48
2	457250	2618750	1600	3.04	4864	2.01	97.77	.11	5.35	2.29	11.14	4.22	20.53
3	457250	2618770	4000	3.03	12122	1.96	237.59	.11	13.33	2.87	34.79	4.38	53.09
4	457270	2618710	1000	2.92	2916	1.14	33.25	.08	2.33	1.15	3.35	3.01	8.78
5	457270	2618730	3500	2.97	10407	1.59	165.48	.08	8.33	1.31	13.63	3.28	34.14
6	457270	2618750	4000	3.13	12540	2.71	339.83	.08	10.03	1.82	22.82	3.90	48.91
7	457270	2618770	4000	3.00	12008	1.72	206.54	.23	27.62	2.73	32.78	4.90	58.84
8	457290	2618690	1600	2.87	4590	.83	38.10	.10	4.59	1.03	4.73	2.46	11.29
9	457290	2618710	4000	2.88	11514	.90	103.63	.09	10.36	.85	9.79	2.66	30.63
10	457290	2618730	4000	2.82	11286	.49	55.30	.08	9.03	.59	6.66	2.80	31.60
11	457290	2618750	4000	2.97	11894	1.55	184.36	.15	17.84	1.20	14.27	3.69	43.89
12	457290	2618770	4000	2.96	11856	1.47	174.28	.29	34.38	1.88	22.29	4.98	59.04
13	457290	2618790	1348	2.86	3855	.71	27.37	.48	18.50	1.77	6.82	5.60	21.59
14	457310	2618670	668	2.85	1904	.66	12.57	.11	2.09	.99	1.88	2.00	3.81
15	457310	2618690	4000	2.85	11400	.65	74.10	.10	11.40	1.13	12.88	2.10	23.94
16	457310	2618710	4000	2.92	11666	1.17	136.49	.12	14.00	.62	7.23	2.28	26.60
17	457310	2618730	4000	2.91	11628	1.10	127.91	.12	13.95	.62	7.21	2.73	31.74
18	457310	2618750	2400	2.98	7159	1.62	115.98	.15	10.74	.70	5.01	3.38	24.20
19	457310	2618770	2000	2.94	5871	1.25	73.39	.29	17.03	1.14	6.69	4.21	24.72
20	457310	2618790	668	2.88	1923	.88	16.92	.43	8.27	1.63	3.13	5.02	9.65
21	457330	2618670	2000	2.85	5700	.64	36.48	.13	7.41	.73	4.16	1.70	9.69
22	457330	2618690	4000	2.86	11438	.76	86.93	.14	16.01	.64	7.32	1.69	19.33
23	457330	2618710	4000	2.88	11514	.86	99.02	.14	16.12	.49	5.64	1.81	20.84
24	457330	2618730	2800	2.90	8113	1.03	83.56	.15	12.17	.48	3.89	2.23	18.09
25	457350	2618670	3332	2.85	9496	.67	63.62	.16	15.19	.45	4.27	1.49	14.15
26	457350	2618690	4000	2.85	11400	.69	78.66	.16	18.24	.30	3.42	1.43	16.30
27	457350	2618710	4000	2.84	11362	.59	67.04	.18	20.45	.16	1.82	1.37	15.57
28	457350	2618730	2000	2.83	5662	.57	32.27	.16	9.06	.36	2.04	1.80	10.19
29	457370	2618650	2000	2.83	5662	.59	33.41	.17	9.63	.39	2.21	1.37	7.76
30	457370	2618670	4000	2.87	11476	.88	100.99	.17	19.51	.29	3.33	1.35	15.49
31	457370	2618690	4000	2.86	11438	.69	78.92	.16	18.30	.17	1.94	1.35	15.44
32	457370	2618710	4000	2.81	11248	.41	46.12	.15	16.87	.19	2.14	1.46	16.42
33	457390	2618650	2400	2.88	6908	1.59	109.84	.16	11.05	.28	1.93	1.27	8.77
34	457390	2618670	4000	2.91	11628	1.11	129.07	.17	19.77	.22	2.56	1.31	15.23
35	457390	2618690	4000	2.85	11400	.72	82.08	.12	13.68	.16	1.82	1.38	15.73
36	457410	2618630	600	2.86	1716	1.73	29.68	.14	2.40	.23	.39	1.11	1.90
37	457410	2618650	4000	3.02	12084	4.35	525.65	.14	16.92	.21	2.54	1.20	14.50
38	457410	2618670	4000	2.92	11666	1.88	219.32	.13	15.17	.16	1.87	1.27	14.82
39	457410	2618690	1440	2.82	4063	.46	18.69	.05	2.03	.16	.65	1.36	5.53
40	457410	2618710	1200	2.81	3374	.35	11.81	.10	3.37	.22	.74	1.56	5.26

No	X (E)	Y (N)	Volume	S.G.	Tonnage	Cu		Zn		Au		Ag	
						grade	content	grade	content	grade	content	grade	content
			(m3)	(t/m3)	(ton)	(%)	(ton)	(%)	(ton)	(g/t)	(kg)	(g/t)	(kg)
41	457430	2618630	500	2.85	1425	1.64	23.37	.12	1.71	.17	.24	1.04	1.48
42	457430	2618650	4000	2.93	11704	2.28	266.85	.15	17.56	.16	1.87	1.14	13.34
43	457430	2618670	4000	2.92	11666	1.80	209.99	.14	16.33	.13	1.52	1.23	14.35
44	457430	2618690	4000	2.85	11400	.77	87.78	.12	13.68	.13	1.48	1.33	15.16
45	457450	2618650	3500	2.88	10075	1.29	129.96	.16	16.12	.10	1.01	1.08	10.88
46	457450	2618670	4000	2.92	11666	1.17	136.49	.22	25.67	.08	.93	1.16	13.53
47	457450	2618690	1600	2.86	4575	.78	35.69	.15	6.86	.07	.32	1.25	5.72
48	457470	2618650	2500	2.84	7101	.71	50.42	.15	10.65	.01	.07	.99	7.03
49	457470	2618670	4000	2.87	11476	.82	94.10	.16	18.36	.00	.00	1.05	12.05
50	457470	2618690	1200	2.84	3409	.61	20.79	.13	4.43	.00	.00	1.15	3.92
51	457490	2618670	2668	2.81	7502	.43	32.26	.11	8.25	.00	.00	.85	6.38
			149024		432251		5268.74		643.49		291.89		937.32

Rakah : 620 m
Cut-off grade : 0.35 Cu

No	X (E)	Y (N)	Volume	S.G.	Tonnage	Cu		Zn		Au		Ag	
						grade	content	grade	content	grade	content	grade	content
			(m3)	(t/m3)	(ton)	(%)	(ton)	(%)	(ton)	(g/t)	(kg)	(g/t)	(kg)
1	457270	2618750	3000	2.82	8465	.48	40.63	.23	19.47	.63	5.33	6.65	56.29
2	457270	2618770	600	2.88	1727	.87	15.03	.20	3.45	1.41	2.44	6.38	11.02
3	457270	2618790	4000	2.93	11704	1.22	142.79	.20	23.41	1.85	21.65	6.14	71.86
4	457290	2618750	4000	2.85	11400	.66	75.24	.16	18.24	.58	6.61	4.49	51.19
5	457290	2618770	4000	2.89	11552	.94	108.59	.21	24.26	.76	8.78	4.00	46.21
6	457290	2618790	4000	2.94	11742	1.29	151.47	.26	30.53	1.10	12.92	3.49	40.98
7	457310	2618730	4000	2.82	11286	.47	53.04	.12	13.54	.47	5.30	3.33	37.58
8	457310	2618750	4000	2.92	11666	1.13	131.83	.13	15.17	.31	3.62	3.38	39.43
9	457310	2618770	3500	2.85	9975	.69	68.83	.20	19.95	.59	5.89	3.26	32.52
10	457310	2618790	2500	2.84	7101	.63	44.74	.24	17.04	.77	5.47	3.37	23.93
11	457330	2618690	1500	2.84	4261	.62	26.42	.12	5.11	.44	1.87	2.28	9.71
12	457330	2618710	4000	2.84	11362	.63	71.58	.14	15.91	.46	5.23	2.36	26.81
13	457330	2618730	4000	2.83	11324	.57	64.55	.15	16.99	.44	4.98	2.52	28.54
14	457350	2618670	332	2.91	965	1.11	10.71	.20	1.93	.34	.33	1.79	1.73
15	457350	2618690	2000	2.91	5814	1.11	64.54	.17	9.88	.43	2.50	1.98	11.51
16	457350	2618710	4000	2.92	11666	1.17	136.49	.18	21.00	.44	5.13	2.14	24.97
17	457350	2618730	4000	2.83	11324	.56	63.41	.17	19.25	.53	6.00	2.28	25.82
18	457370	2618670	2668	2.98	7959	1.64	130.52	.24	19.10	.28	2.23	1.45	11.54
19	457370	2618690	4000	2.96	11856	1.52	180.21	.20	23.71	.37	4.39	1.76	20.87
20	457370	2618710	4000	2.89	11552	.97	112.05	.17	19.64	.52	6.01	2.00	23.10
21	457370	2618730	3332	2.82	9401	.48	45.13	.16	15.04	.69	6.49	2.16	20.31
22	457390	2618650	1000	2.89	2888	.93	26.86	.24	6.93	.17	.49	.99	2.86
23	457390	2618670	4000	3.08	12312	2.32	285.64	.26	32.01	.24	2.95	1.28	15.76
24	457390	2618690	4000	2.95	11818	1.45	171.36	.19	22.45	.32	3.78	1.51	17.85
25	457390	2618710	4000	2.88	11514	.89	102.47	.15	17.27	.46	5.30	1.74	20.03
26	457390	2618730	2000	2.83	5662	.55	31.14	.15	8.49	.60	3.40	1.93	10.93
27	457410	2618670	4000	2.90	11590	1.02	118.22	.18	20.86	.21	2.43	1.22	14.14
28	457410	2618690	4000	2.90	11590	1.02	118.22	.13	15.07	.24	2.78	1.36	15.76
29	457410	2618710	4000	2.87	11476	.81	92.96	.13	14.92	.36	4.13	1.54	17.67
30	457410	2618730	668	2.83	1891	.56	10.59	.13	2.46	.49	.93	1.78	3.37
31	457430	2618650	1000	2.81	2812	.43	12.09	.21	5.91	.17	.48	1.02	2.87
32	457430	2618670	4000	2.84	11362	.64	72.72	.20	22.72	.22	2.50	1.25	14.20
33	457430	2618690	4000	2.86	11438	.78	89.22	.16	18.30	.27	3.09	1.38	15.78
34	457430	2618710	2800	2.83	7927	.58	45.98	.10	7.93	.32	2.54	1.49	11.81
35	457450	2618650	1000	2.83	2831	.57	16.14	.25	7.08	.18	.51	1.07	3.03
36	457450	2618670	4000	2.86	11438	.76	86.93	.30	34.31	.22	2.52	1.23	14.07
37	457450	2618690	4000	2.85	11400	.67	76.38	.18	20.52	.27	3.08	1.39	15.85
38	457450	2618710	2000	2.84	5681	.61	34.65	.12	6.82	.34	1.93	1.49	8.46
39	457470	2618650	600	2.83	1699	.57	9.68	.24	4.08	.19	.32	1.12	1.90
40	457470	2618670	4000	2.84	11362	.63	71.58	.22	25.00	.23	2.61	1.23	13.98

No	X(E)	Y(N)	Volume (m3)	S.G. (t/m3)	Tonnage (ton)	Cu grade (%)	Cu content (ton)	Zn grade (%)	Zn content (ton)	Au grade (g/t)	Au content (kg)	Ag grade (g/t)	Ag content (kg)
41	457470	2618690	4000	2.84	11362	.62	70.44	.15	17.04	.28	3.18	1.33	15.11
42	457470	2618710	1200	2.83	3397	.57	19.36	.08	2.72	.34	1.16	1.47	4.99
43	457490	2618670	1000	2.81	2812	.43	12.09	.15	4.22	.23	.65	1.18	3.32
44	457490	2618690	2584	2.81	7266	.40	29.06	.09	6.54	.28	2.03	1.30	9.45
45	457490	2618710	420	2.83	1189	.53	6.30	.04	.48	.33	.39	1.38	1.64
			131704		378819		3347.88		676.75		176.35		870.75

Rakah : 610 m
Cut-off grade : 0.35 Cu

No	X(E)	Y(N)	Volume (m3)	S.G. (t/m3)	Tonnage (ton)	Cu grade (%)	Cu content (ton)	Zn grade (%)	Zn content (ton)	Au grade (g/t)	Au content (kg)	Ag grade (g/t)	Ag content (kg)
1	457290	2618750	4000	3.06	12236	5.00	611.80	.98	119.91	6.06	74.15	15.29	187.09
2	457290	2618770	1200	2.81	3374	.39	13.16	.32	10.80	1.92	6.48	10.86	36.65
3	457290	2618790	1300	2.83	3680	.55	20.24	.33	12.14	.69	2.54	7.97	29.33
4	457310	2618770	4000	2.81	11248	.51	57.36	.22	24.75	1.42	15.97	5.79	65.13
5	457310	2618790	4000	2.81	11248	.37	41.62	.28	31.49	.76	8.55	4.19	47.13
6	457330	2618710	2000	3.00	6004	3.39	203.54	.73	43.83	3.18	19.09	6.95	41.73
7	457330	2618730	4000	2.94	11780	2.62	308.64	.53	62.43	3.08	36.28	6.68	78.69
8	457330	2618770	4000	2.81	11248	.41	46.12	.13	14.62	.10	1.12	1.40	15.75
9	457330	2618790	4000	2.81	11248	.38	42.74	.26	29.24	.69	7.76	2.63	29.58
10	457350	2618690	800	2.92	2333	1.46	34.06	.42	9.80	1.03	2.40	3.01	7.02
11	457350	2618710	4000	2.87	11476	.82	94.10	.42	48.20	.64	7.34	2.19	25.13
12	457350	2618730	4000	2.89	11552	1.15	132.85	.31	35.81	.81	9.36	2.50	28.88
13	457350	2618750	4000	2.84	11362	.72	81.81	.18	20.45	.45	5.11	1.73	19.66
14	457370	2618610	3356	2.93	9820	1.21	118.82	.14	13.75	.54	5.30	1.51	14.83
15	457370	2618630	500	2.93	1463	1.25	18.29	.12	1.76	.55	.80	1.15	1.68
16	457370	2618670	400	2.96	1186	1.47	17.43	.24	2.85	.74	.88	1.91	2.26
17	457370	2618690	4000	2.94	11780	1.32	155.50	.28	32.98	.50	5.89	1.78	20.97
18	457370	2618710	4000	2.92	11666	1.15	134.16	.28	32.66	.55	6.42	1.81	21.12
19	457370	2618730	4000	2.94	11742	1.33	156.17	.23	27.01	.62	7.28	1.59	18.67
20	457370	2618750	1600	2.87	4590	.82	37.64	.19	8.72	.50	2.30	1.28	5.88
21	457390	2618610	4000	2.90	11590	1.05	121.69	.11	12.75	.53	6.14	1.12	12.98
22	457390	2618630	3500	2.93	10241	1.27	130.06	.04	4.10	.57	5.84	.74	7.58
23	457390	2618650	500	2.94	1468	1.28	18.79	.14	2.05	.50	.73	1.05	1.54
24	457390	2618670	800	3.02	2417	1.89	45.68	.23	5.56	.46	1.11	1.38	3.34
25	457390	2618690	4000	2.97	11894	1.57	186.74	.19	22.60	.46	5.47	1.61	19.15
26	457390	2618710	4000	2.94	11742	1.33	156.17	.19	22.31	.50	5.87	1.69	19.84
27	457390	2618730	3800	2.91	11047	1.13	124.83	.20	22.09	.54	5.97	1.34	14.80
28	457390	2618750	332	2.87	953	.84	8.00	.18	1.71	.56	.53	1.03	.98
29	457410	2618630	2000	2.87	5738	.84	48.20	.09	5.16	.54	3.10	.88	5.05
30	457410	2618650	2000	2.86	5719	.74	42.32	.16	9.15	.50	2.86	1.07	6.12
31	457410	2618670	800	2.93	2341	1.26	29.49	.14	3.28	.44	1.03	1.38	3.23
32	457410	2618690	4000	2.98	11932	1.67	199.26	.09	10.74	.40	4.77	1.56	18.61
33	457410	2618710	4000	2.92	11666	1.18	137.66	.13	15.17	.45	5.25	1.60	18.67
34	457410	2618730	2400	2.88	6908	.91	62.87	.16	11.05	.53	3.66	1.41	9.74
35	457430	2618630	500	2.81	1406	.44	6.19	.09	1.27	.51	.72	.98	1.38
36	457430	2618650	1600	2.82	4514	.52	23.47	.09	4.06	.48	2.17	1.15	5.19
37	457430	2618670	800	2.85	2280	.68	15.50	.08	1.82	.43	.98	1.42	3.24
38	457430	2618690	4000	2.87	11476	.84	96.40	.08	9.18	.41	4.71	1.57	18.02
39	457430	2618710	4000	2.84	11362	.65	73.85	.12	13.63	.43	4.89	1.58	17.95
40	457430	2618730	800	2.85	2280	.74	16.87	.13	2.96	.51	1.16	1.42	3.24
41	457450	2618690	2000	2.80	5605	.38	21.30	.06	3.36	.44	2.47	1.54	8.63
42	457450	2618710	3500	2.82	9875	.51	50.36	.09	8.89	.47	4.64	1.55	15.31
			112488		325490		3941.75		776.09		299.09		911.77

Rakah : 600 m
Cut-off grade : 0.35 Cu

No	X(E)	Y(N)	Volume	S.G.	Tonnage	Cu		Zn		Au		Ag	
						grade	content	grade	content	grade	content	grade	content
			(m3)	(t/m3)	(ton)	(%)	(ton)	(%)	(ton)	(g/t)	(kg)	(g/t)	(kg)
1	457310	2618770	3500	2.87	10042	.84	84.35	.15	15.06	.72	7.23	3.56	35.75
2	457310	2618790	2500	2.89	7220	.94	67.87	.22	15.88	.98	7.08	2.62	18.92
3	457330	2618730	2000	2.84	5681	.62	35.22	.25	14.20	.51	2.90	2.04	11.59
4	457330	2618750	4000	2.84	11362	.62	70.44	.08	9.09	.31	3.52	2.26	25.68
5	457330	2618770	4000	3.01	12046	1.82	219.24	.19	22.89	.39	4.70	2.45	29.51
6	457330	2618790	4000	2.90	11590	.99	114.74	.21	24.34	.74	8.58	2.25	26.08
7	457350	2618710	1000	2.88	2879	.88	25.33	.44	12.67	.67	1.93	1.24	3.57
8	457350	2618730	4000	2.88	11514	.87	100.17	.40	46.06	.50	5.76	1.55	17.85
9	457350	2618750	4000	2.87	11476	.79	90.66	.30	34.43	.39	4.48	2.07	23.76
10	457350	2618790	2000	2.86	5719	.73	41.75	.22	12.58	.66	3.77	2.25	12.87
11	457370	2618690	500	2.85	1425	.72	10.26	.31	4.42	.44	.63	.95	1.35
12	457370	2618710	3500	2.90	10141	1.06	107.50	.45	45.64	.52	5.27	1.18	11.97
13	457370	2618730	4000	2.92	11666	1.18	137.66	.63	73.50	.50	5.83	1.43	16.68
14	457370	2618750	4000	2.86	11438	.77	88.07	.44	50.33	.43	4.92	1.69	19.33
15	457370	2618770	1332	2.83	3771	.51	19.23	.29	10.94	.48	1.81	1.93	7.28
16	457390	2618650	668	2.80	1872	.40	7.49	.10	1.87	.15	.28	.42	.79
17	457390	2618690	1400	2.89	4043	.97	39.22	.20	8.09	.25	1.01	.75	3.03
18	457390	2618710	4000	2.96	11856	1.52	180.21	.33	39.12	.34	4.03	.98	11.62
19	457390	2618730	4000	2.95	11818	1.46	172.54	.47	55.54	.38	4.49	1.22	14.42
20	457390	2618750	2000	2.93	5852	1.22	71.39	.43	25.16	.43	2.52	1.38	8.08
21	457410	2618630	3200	2.81	8998	.46	41.39	.04	3.60	.12	1.08	.33	2.97
22	457410	2618650	2500	2.86	7149	.78	55.76	.05	3.57	.12	.86	.43	3.07
23	457410	2618690	1800	2.97	5352	1.60	85.64	.06	3.21	.10	.54	.60	3.21
24	457410	2618710	2400	3.07	7364	2.24	164.96	.19	13.99	.20	1.47	.79	5.82
25	457410	2618730	4000	3.09	12350	2.38	293.93	.29	35.81	.32	3.95	1.06	13.09
26	457410	2618750	600	3.02	1813	1.93	34.98	.30	5.44	.41	.74	1.24	2.25
27	457430	2618650	2800	2.80	7847	.44	34.53	.04	3.14	.10	.78	.45	3.53
28	457430	2618690	1000	2.99	2993	1.75	52.37	.07	2.09	.11	.33	.64	1.92
29	457430	2618710	3180	3.26	10362	3.61	374.07	.11	11.40	.16	1.66	.74	7.67
30	457430	2618730	4000	3.16	12654	2.95	373.29	.16	20.25	.26	3.29	.93	11.77
31	457450	2618710	4000	3.06	12236	2.19	267.97	.09	11.01	.15	1.84	.80	9.79
32	457450	2618730	4000	3.13	12502	2.66	332.55	.12	15.00	.25	3.13	.91	11.38
33	457470	2618710	2000	2.89	5776	1.00	57.76	.09	5.20	.17	.98	.80	4.62
34	457470	2618730	4000	2.94	11780	1.37	161.39	.10	11.78	.24	2.83	.88	10.37
			95880		282587		4013.93		667.30		104.22		391.59

Rakah : 590 m
Cut-off grade : 0.35 Cu

No	X(E)	Y(N)	Volume	S.G.	Tonnage	Cu		Zn		Au		Ag	
						grade	content	grade	content	grade	content	grade	content
			(m3)	(t/m3)	(ton)	(%)	(ton)	(%)	(ton)	(g/t)	(kg)	(g/t)	(kg)
1	457330	2618730	1600	2.84	4545	.66	30.00	.18	8.18	.79	3.59	1.67	7.59
2	457330	2618770	2920	2.83	8267	.53	43.81	.07	5.79	.20	1.65	1.60	13.23
3	457350	2618710	480	2.88	1382	.92	12.71	.20	2.76	.44	.61	1.24	1.71
4	457350	2618730	4000	2.88	11514	.87	100.17	.27	31.09	.36	4.15	1.25	14.39
5	457350	2618750	4000	2.88	11514	.88	101.32	.21	24.18	.22	2.53	1.43	16.47
6	457350	2618770	4000	2.93	11704	1.20	140.45	.11	12.87	.18	2.11	1.72	20.13
7	457370	2618710	1200	2.89	3466	.96	33.27	.33	11.44	.40	1.39	1.20	4.16
8	457370	2618730	4000	2.94	11780	1.38	162.56	.45	53.01	.32	3.77	1.25	14.73
9	457370	2618750	4000	2.92	11666	1.18	137.66	.29	33.83	.20	2.33	1.32	15.40
10	457390	2618710	1200	2.88	3454	.89	30.74	.35	12.09	.31	1.07	1.09	3.77
11	457390	2618730	4000	2.92	11666	1.15	134.16	.37	43.16	.26	3.03	1.26	14.70
12	457410	2618650	4000	2.85	11400	.66	75.24	.03	3.42	.23	2.62	.55	6.27
13	457410	2618670	2500	2.81	7030	.41	28.82	.21	14.76	.26	1.83	.74	5.20
14	457410	2618710	800	2.86	2288	.74	16.93	.30	6.86	.25	.57	1.08	2.47
15	457410	2618730	4000	2.88	11514	.90	103.63	.31	35.69	.23	2.65	1.22	14.05
16	457430	2618650	4000	2.82	11286	.46	51.92	.12	13.54	.23	2.60	.63	7.11
17	457430	2618670	3500	2.81	9842	.45	44.29	.17	16.73	.24	2.36	.78	7.68
18	457430	2618710	500	2.84	1420	.61	8.66	.24	3.41	.21	.30	1.06	1.51
19	457450	2618650	2400	2.80	6726	.37	24.89	.16	10.76	.22	1.48	.71	4.78
20	457450	2618690	600	2.80	1682	.40	6.73	.19	3.19	.21	.35	.97	1.63
21	457470	2618690	1200	2.80	3363	.37	12.44	.14	4.71	.21	.71	1.05	3.53
			54900		157509		1300.40		351.47		41.70		180.51

Rakah : 580 m
Cut-off grade : 0.35 Cu

No	X(E)	Y(N)	Volume (m3)	S.G. (t/m3)	Tonnage (ton)	Cu grade (%)	Cu content (ton)	Zn grade (%)	Zn content (ton)	Au grade (g/t)	Au content (kg)	Ag grade (g/t)	Ag content (kg)
1	457370	2618690	2000	2.81	5624	.37	20.81	.20	11.25	2.16	12.15	1.25	7.03
2	457390	2618730	4000	2.82	11286	.45	50.79	.13	14.67	1.21	13.66	1.25	14.11
3	457410	2618730	1600	2.80	4484	.36	16.14	.14	6.28	.71	3.18	1.25	5.61
			7600		21394		87.74		32.20		28.99		26.75

Rakah : 570 m
Cut-off grade : 0.35 Cu

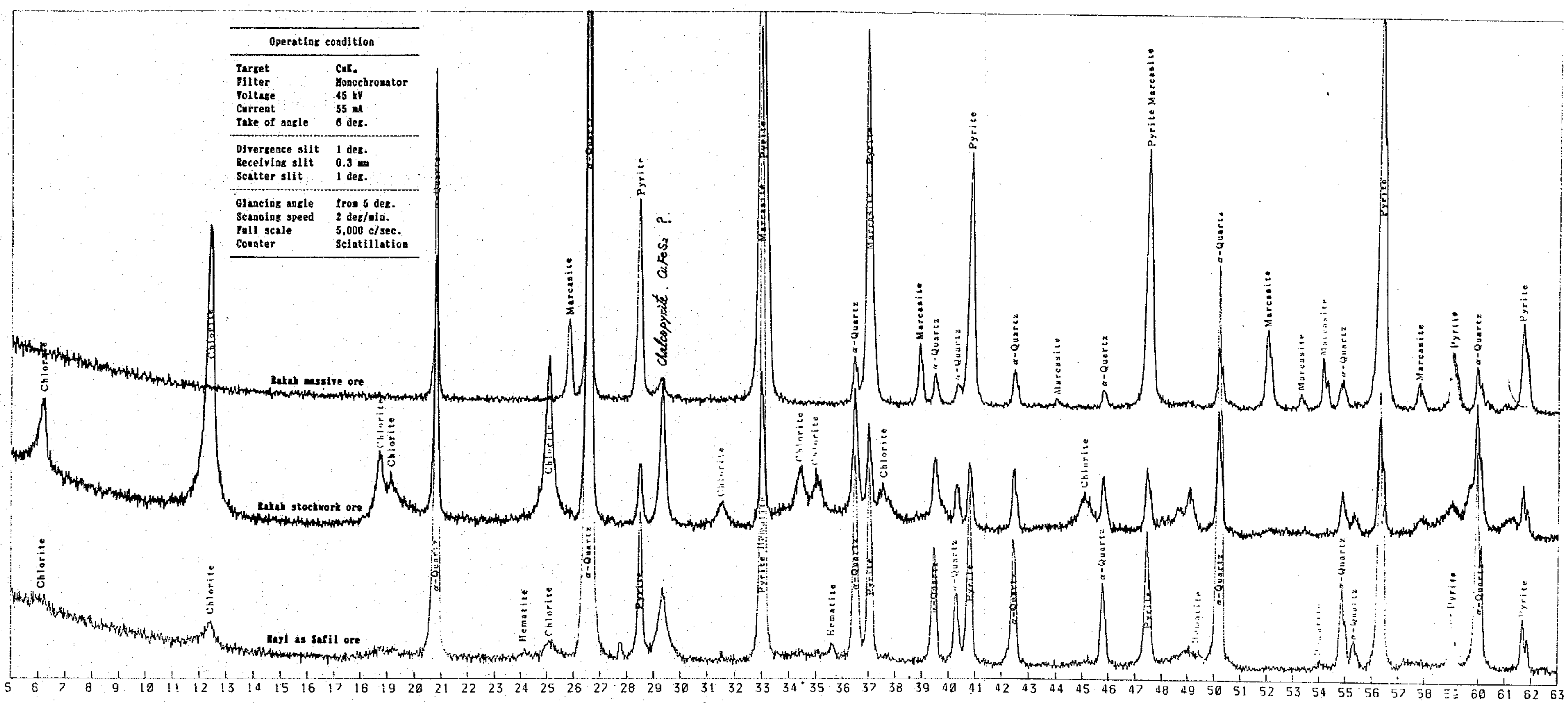
No	X(E)	Y(N)	Volume (m3)	S.G. (t/m3)	Tonnage (ton)	Cu grade (%)	Cu content (ton)	Zn grade (%)	Zn content (ton)	Au grade (g/t)	Au content (kg)	Ag grade (g/t)	Ag content (kg)
1	457390	2618690	2000	2.80	5605	.39	21.86	.19	10.65	.53	2.97	1.50	8.41
			2000		5605		21.86		10.65		2.97		8.41

Rakah : 560 m
Cut-off grade : 0.35 Cu

No	X(E)	Y(N)	Volume (m3)	S.G. (t/m3)	Tonnage (ton)	Cu grade (%)	Cu content (ton)	Zn grade (%)	Zn content (ton)	Au grade (g/t)	Au content (kg)	Ag grade (g/t)	Ag content (kg)
1	457390	2618690	4000	2.87	11476	.86	98.69	.12	13.77	.52	5.97	.98	11.25
2	457390	2618710	4000	2.87	11476	.84	96.40	.09	10.33	.56	6.43	.93	10.67
3	457410	2618690	3480	2.94	10216	1.33	135.87	.05	5.11	.53	5.41	1.01	10.32
4	457410	2618710	4000	2.87	11476	.82	94.10	.08	9.18	.66	7.57	1.02	11.71
5	457430	2618690	4000	2.86	11438	.78	89.22	.06	6.86	.63	7.21	1.05	12.01
6	457450	2618690	4000	2.85	11400	.69	78.66	.06	6.84	.78	8.89	1.11	12.65
7	457470	2618690	4000	2.88	11514	.90	103.63	.06	6.91	.91	10.48	1.17	13.47
			27480		78996		696.57		59.00		51.96		82.08

Appendix 5

X-ray diffraction pattern of head samples


Operating condition
Target CuKα
Filter Monochromator
Voltage 45 kV
Current 55 mA
Take of angle 6 deg.
Divergence slit 1 deg.
Receiving slit 0.3 mm
Scatter slit 1 deg.
Glancing angle from 5 deg.
Scanning speed 2 deg/min.
Full scale 5,000 c/sec.
Counter Scintillation
Rakah massive ore
Rakah stockwork ore
Nayl as Safil ore
Chalcopyrite, CuFeS2 ?
Chlorite
α-Quartz
Marcasite
Pyrite
Hematite
Pyrite Marcasite
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 60 61 62 63

Appendix 6

Details and results of flotation tests

[illegible]

[illegible]

Table 1 Flotation Test Results of Hayl as Safil Ore
- Effect of feed size on copper selective flotation -

TEST No.	OPER ATION	CONDITIONS									PROD UCTS	WEIGHT	ASSAY			DISTRIBUTION		
		Time min.	P.D. %	Size %	Temp ℃	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final		%	Cu %	Fe %	S %	Cu %	Fe %	S %
	GRINDING	8	60								C.Head	100.00	1.14	15.73	14.33	100.00	100.00	100.00
1	ROUGHER	10	35	50	25	2000	30	27.9	12.1	11.7	C-1	25.99	4.02	36.93	42.22	91.34	61.03	76.56
	SCAVEN-	5					5	9.3	11.7	11.6	C-2	5.34	0.57	34.67	36.93	2.66	11.77	13.76
	GER										Tail	68.67	0.10	6.23	2.02	6.00	27.20	9.68
	GRINDING	11	60								C.Head	100.00	1.16	16.10	14.58	100.00	100.00	100.00
2	ROUGHER	10	35	60	25	2000	30	27.9	12.0	11.8	C-1	16.03	6.58	36.68	40.65	90.61	36.52	44.69
	SCAVEN-	5					5	9.3	11.8	11.6	C-2	1.31	1.40	31.65	31.75	1.58	2.58	2.86
	GER										Tail	82.66	0.11	11.86	9.25	7.81	60.90	52.45
	GRINDING	13	60								C.Head	100.00	1.16	16.19	14.52	100.00	100.00	100.00
3	ROUGHER	10	35	70	26	2000	30	27.9	12.1	11.8	C-1	12.45	8.37	35.04	38.47	89.82	26.95	32.98
	SCAVEN-	5					5	9.3	11.8	11.6	C-2	1.50	1.56	33.41	33.77	2.02	3.10	3.50
	GER										Tail	86.05	0.11	13.16	10.72	8.16	69.95	63.52
	GRINDING	16	60								C.Head	100.00	1.16	16.03	14.31	100.00	100.00	100.00
4	ROUGHER	10	35	80	25	2000	30	27.9	12.0	11.6	C-1	11.11	9.30	34.16	38.26	89.42	23.68	29.70
	SCAVEN-	5					5	9.3	11.6	11.3	C-2	1.86	1.43	34.79	35.73	2.30	4.03	4.64
	GER										Tail	87.03	0.11	13.31	10.80	8.29	72.29	65.67

Table 2 Flotation Test Results of Hail as Safil Ore
- Effect of KAX on copper selective flotation varying pH value -

TEST No.	OPERATION	CONDITIONS									PRODUCTS	WEIGHT	ASSAY			DISTRIBUTION		
		Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final		%	Cu %	Fe %	S %	Cu %	Fe %	S %
	GRINDING	16	60								C.Head	100.00	1.16	15.81	14.66	100.00	100.00	100.00
5	ROUGHER	10	35	80	27	860	30	27.9	8.6	8.2	C-1	15.34	6.07	35.92	41.31	80.14	34.87	43.24
	SCAVEN-	5					5	27.9	8.2	8.1	C-2	5.27	2.42	36.42	41.30	10.98	12.15	14.85
	GER										Tail	79.38	0.13	10.55	7.74	8.88	52.98	41.91
	GRINDING	16	60								C.Head	100.00	1.16	16.57	14.62	100.00	100.00	100.00
6	ROUGHER	10	35	80	28	1100	30	27.9	9.8	9.0	C-1	12.36	7.66	33.91	36.44	81.33	25.30	30.82
	SCAVEN-	5					5	9.3	9.0	8.7	C-2	4.29	2.54	37.68	40.51	9.36	9.76	11.89
	GER										Tail	83.35	0.13	12.91	10.05	9.31	64.94	57.29
	GRINDING	16	60								C.Head	100.00	1.16	16.08	14.67	100.00	100.00	100.00
7	ROUGHER	10	35	80	28	1500	30	27.9	10.8	9.7	C-1	9.93	9.58	32.40	35.90	82.27	20.01	24.31
	SCAVEN-	5					5	9.3	9.7	9.4	C-2	2.40	2.70	33.03	35.52	5.60	4.92	5.81
	GER										Tail	87.67	0.16	13.77	11.69	12.13	75.07	69.89
	GRINDING	16	60								C.Head	100.00	1.16	16.03	14.31	100.00	100.00	100.00
4	ROUGHER	10	35	80	25	2000	30	27.9	12.0	11.6	C-1	11.11	9.30	34.16	38.26	89.42	23.68	29.70
	SCAVEN-	5					5	9.3	11.6	11.3	C-2	1.86	1.43	34.79	35.73	2.30	4.03	4.64
	GER										Tail	87.03	0.11	13.31	10.80	8.29	72.29	65.67

Table 3 Flotation Test Results of Hail as Safil Ore
- Effect of AP3501 on copper selective flotation varying pH value -

TEST No.	OPER ATION	CONDITIONS									PROD UCTS	WEIGHT	ASSAY			DISTRIBUTION		
		Time min.	P.D. %	Size %	Temp °C	Lime g/T	AP3501 g/T	AF65 g/T	pH Intial	pH Final		%	Cu %	Fe %	S %	Cu %	Fe %	S %
	GRINDING	16	60								C.Head	100.00	1.18	16.90	14.92	100.00	100.00	100.00
8	ROUGHER	10	35	80	27	800	46.7	27.9	8.1	7.9	C-1	14.28	6.28	36.69	39.74	75.68	31.00	38.02
	SCAVEN-	5					5.8	9.3	7.9	7.8	C-2	2.07	3.41	32.71	33.45	5.96	4.01	4.64
	GER										Tail	83.65	0.26	13.13	10.23	18.36	65.00	57.34
	GRINDING	16	60								C.Head	100.00	1.14	16.57	14.50	100.00	100.00	100.00
9	ROUGHER	10	35	80	28	1000	46.7	27.9	9.2	8.8	C-1	12.10	8.19	35.04	37.32	86.68	25.58	31.14
	SCAVEN-	5					5.8	9.3	8.8	8.6	C-2	2.23	1.83	34.04	34.75	3.58	4.59	5.36
	GER										Tail	85.67	0.13	13.51	10.75	9.74	69.83	63.51
	GRINDING	16	60								C.Head	100.00	1.17	17.42	14.84	100.00	100.00	100.00
10	ROUGHER	10	35	80	28	1500	46.7	23.3	11.1	10.2	C-1	9.82	10.35	32.66	35.22	86.48	18.41	23.30
	SCAVEN-	5					5.8	9.3	10.2	9.8	C-2	2.43	1.84	35.17	35.73	3.81	4.92	5.86
	GER										Tail	87.75	0.13	15.22	11.98	9.71	76.68	70.84
	GRINDING	16	60								C.Head	100.00	1.19	16.57	14.46	100.00	100.00	100.00
11	ROUGHER	10	35	80	29	2000	46.7	27.9	11.8	11.4	C-1	8.53	12.16	32.53	35.09	86.84	16.75	20.70
	SCAVEN-	5					5.8	9.3	11.4	11.0	C-2	2.20	1.87	35.80	37.52	3.45	4.76	5.71
	GER										Tail	89.27	0.13	14.57	11.92	9.71	78.49	73.58

Table 4 Flotation Test Results of Hayl as Safil Ore
- Effect of AP3418 on copper selective flotation varying pH value -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp ℃	Lime g/T	AP3418 g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	ASSAY Fe %	ASSAY S %	DISTRIBUTION Cu %	DISTRIBUTION Fe %	DISTRIBUTION S %
	GRINDING	16	60								C.Head	100.00	1.17	16.05	14.53	100.00	100.00	100.00
12	ROUGHER	10	35	80	28	980	46.4	27.9	8.1	8.0	C-1	10.59	7.71	35.83	40.23	69.93	23.63	29.32
	SCAVEN-	5					7.7	9.3	8.0	8.0	C-2	1.58	3.87	32.00	32.73	5.23	3.15	3.56
	GER										Tail	87.84	0.33	13.38	11.10	24.84	73.22	67.12
	GRINDING	16	60								C.Head	100.00	1.18	16.42	14.73	100.00	100.00	100.00
13	ROUGHER	10	35	80	29	1140	46.4	27.9	9.2	8.7	C-1	8.10	9.78	33.32	36.67	67.25	16.44	20.18
	SCAVEN-	5					7.7	9.3	8.7	8.6	C-2	2.00	4.47	32.98	34.05	7.58	4.01	4.62
	GER										Tail	89.90	0.33	14.53	12.32	25.17	79.54	75.20
	GRINDING	16	60								C.Head	100.00	1.17	16.31	14.54	100.00	100.00	100.00
14	ROUGHER	10	35	80	28	1400	46.4	27.9	10.7	10.0	C-1	10.31	9.51	33.88	37.54	83.94	21.43	26.62
	SCAVEN-	5					7.7	9.3	10.0	9.7	C-2	2.40	2.36	35.59	38.03	4.86	5.25	6.29
	GER										Tail	87.28	0.15	13.70	11.18	11.20	73.32	67.09
	GRINDING	16	60								C.Head	100.00	1.15	15.65	14.62	100.00	100.00	100.00
15	ROUGHER	10	35	80	30	2520	46.4	27.9	11.8	11.2	C-1	12.84	8.03	32.43	38.68	89.42	26.59	33.96
	SCAVEN-	5					7.7	9.3	11.2	11.0	C-2	2.90	1.30	34.46	37.71	3.27	6.38	7.48
	GER										Tail	84.27	0.10	12.45	10.16	7.31	67.02	58.56

Table 5 Flotation Test Results of Hayl as Safil Ore
- Effect of AP404 on copper selective flotation varying pH value -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	AP404 g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	ASSAY Fe %	ASSAY S %	DISTRIBUTION Cu %	DISTRIBUTION Fe %	DISTRIBUTION S %
	GRINDING	16	60								C.Head	100.00	1.15	15.94	14.89	100.00	100.00	100.00
16	ROUGHER	10	35	80	28	740	54.1	27.9	8.1	7.9	C-1	8.35	9.12	33.83	39.03	66.13	17.71	21.88
	SCAVEN-	5					7.7	9.3	7.9	7.8	C-2	2.01	5.11	31.34	34.12	8.94	3.96	4.62
	GER										Tail	89.64	0.32	13.93	12.21	24.92	78.33	73.51
	GRINDING	16	60								C.Head	100.00	1.17	15.81	14.80	100.00	100.00	100.00
17	ROUGHER	10	35	80	28	1000	54.1	27.9	9.2	8.8	C-1	6.56	12.75	30.60	35.35	71.76	12.70	15.68
	SCAVEN-	5					7.7	18.6	8.8	8.6	C-2	2.32	5.15	32.84	36.21	10.27	4.83	5.69
	GER										Tail	91.11	0.23	14.31	12.77	17.97	82.47	78.63
	GRINDING	16	60								C.Head	100.00	1.17	15.91	14.85	100.00	100.00	100.00
18	ROUGHER	10	35	80	28	1400	54.1	27.9	10.8	10.0	C-1	7.98	12.01	30.72	35.84	82.19	15.41	19.27
	SCAVEN-	5					7.7	9.3	10.0	9.6	C-2	1.82	2.99	34.20	37.63	4.66	3.91	4.61
	GER										Tail	90.20	0.17	14.23	12.53	13.15	80.68	76.12
	GRINDING	16	60								C.Head	100.00	1.15	15.41	14.36	100.00	100.00	100.00
19	ROUGHER	10	35	80	30	2980	54.1	27.9	11.9	11.4	C-1	8.23	11.66	29.21	34.71	83.29	15.60	19.90
	SCAVEN-	5					7.7	9.3	11.4	11.3	C-2	1.73	2.80	32.07	34.94	4.20	3.60	4.21
	GER										Tail	90.04	0.16	13.83	12.10	12.51	80.80	75.89

Table 6 Flotation Test Results of Hayl as Safil Ore
– Recovery as a function of flotation time on copper selective flotation varying KAX dosage –

TEST No.	OPER ATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PROD UCTS	WEIGHT %	ASSAY Cu %	ASSAY Fe %	DISTRIBUTION Cu %	DISTRIBUTION Fe %
	GRINDING	16	60								C.Head	100.00	1.16	15.83	100.00	100.00
	ROUGHER1	3	35	80	31	2080	30	18.6	11.6		C-1	6.68	13.34	31.67	77.16	13.37
	2	3								11.1	C-2	1.84	4.15	34.31	6.61	3.99
20	3	4				200		9.3	11.6	11.1	C-3	1.40	2.64	33.83	3.20	3.00
	4	5				150		9.3	11.5	11.3	C-4	0.66	2.21	31.19	1.26	1.30
	5	5				150		9.3	11.5	11.2	C-5	0.45	1.91	30.71	0.74	0.87
	6	10				200	5	9.3	11.6	11.0	C-6	2.55	1.61	33.71	3.55	5.42
											Tail	86.42	0.10	13.20	7.48	72.06
	GRINDING	16	60								C.Head	100.00	1.12	15.31	100.00	100.00
	ROUGHER1	3	35	80	30	2050	40	18.6	11.6		C-1	10.44	8.28	33.79	76.99	23.03
	2	3								11.0	C-2	2.22	3.76	32.79	7.43	4.75
21	3	4				100		9.3	11.4	11.0	C-3	1.66	2.90	30.54	4.28	3.30
	4	5				100		9.3	11.4	11.0	C-4	0.77	2.32	27.53	1.58	1.38
	5	5				100		9.3	11.4	11.0	C-5	0.71	1.92	25.78	1.21	1.19
	6	10				100	5	9.3	11.4	11.2	C-6	2.45	1.56	30.54	3.41	4.89
											Tail	81.77	0.07	11.51	5.10	61.46

Table 7 Flotation Test Results of Hayl as Safil Ore
- Effect of feed size on bulk flotation -

TEST No.	OPERATION	CONDITIONS									PRODUCTS	WEIGHT	ASSAY			DISTRIBUTION		
		Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final		%	Cu %	Fe %	S %	Cu %	Fe %	S %
22	GRINDING	8	60	50	29	620	30	37.2	7.2	7.4	C.Head	100.00	1.16	15.99	15.56	100.00	100.00	100.00
	ROUGHER	10	35								C-1	32.74	2.99	36.05	42.01	84.45	73.81	88.42
	SCAVENGER	5					5	9.3	7.4	7.5	C-2	3.17	2.45	20.71	20.45	6.71	4.11	4.17
											Tail	64.08	0.16	5.51	1.80	8.84	22.08	7.41
23	GRINDING	11	60	60	29	880	30	37.2	7.2	7.4	C.Head	100.00	1.18	15.97	15.47	100.00	100.00	100.00
	ROUGHER	10	35								C-1	29.51	3.16	36.91	43.02	78.83	68.20	82.09
	SCAVENGER	5					5	18.6	7.4	7.4	C-2	3.87	2.68	23.14	22.66	8.78	5.61	5.68
											Tail	66.61	0.22	6.28	2.84	12.39	26.19	12.23

Table 8 Flotation Test Results of Hayl as Safil Ore
- Effect of pH value on bulk flotation -

TEST No.	OPER ATION	CONDITIONS Time min.	P.D. %	Size %	Temp ℃	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PROD UCTS	WEIGHT %	ASSAY Cu %	ASSAY Fe %	ASSAY S %	DISTRIBUTION Cu %	DISTRIBUTION Fe %	DISTRIBUTION S %
	GRINDING	8	60			H2SO4					C.Head	100.00	1.12	16.21	14.58	100.00	100.00	100.00
24	ROUGHER	10	35	50	28	443	30	27.9	4.0	4.4	C-1	30.59	2.93	39.19	42.77	80.03	73.96	89.74
	SCAVEN-	5					5	9.3	4.4	4.4	C-2	5.15	2.97	18.09	18.93	13.65	5.74	6.68
	GER										Tail	64.27	0.11	5.12	0.81	6.31	20.30	3.57
	GRINDING	8	60								C.Head	100.00	1.16	15.99	15.56	100.00	100.00	100.00
22	ROUGHER	10	35	50	29	620	30	37.2	7.2	7.4	C-1	32.74	2.99	36.05	42.01	84.45	73.81	88.42
	SCAVEN-	5					5	9.3	7.4	7.5	C-2	3.17	2.45	20.71	20.45	6.71	4.11	4.17
	GER										Tail	64.08	0.16	5.51	1.80	8.84	22.08	7.41
	GRINDING	8	60								C.Head	100.00	1.16	16.26	15.26	100.00	100.00	100.00
25	ROUGHER	10	35	50	26	480	30	27.9	8.0	7.9	C-1	29.03	3.32	39.44	44.34	83.11	70.43	84.37
	SCAVEN-	5					5	9.3	7.9	7.9	C-2	2.77	2.89	25.12	25.31	6.89	4.27	4.59
	GER										Tail	68.21	0.17	6.03	2.47	10.00	25.30	11.04
	GRINDING	8	60								C.Head	100.00	1.20	16.45	15.51	100.00	100.00	100.00
26	ROUGHER	10	35	50		1000	30	27.9	10.0	9.2	C-1	17.54	5.22	39.69	44.66	76.45	42.31	50.50
	SCAVEN-	5					5	9.3	9.2	8.9	C-2	5.66	1.59	39.44	43.07	7.52	13.57	15.73
	GER										Tail	76.80	0.25	9.45	6.82	16.04	44.12	33.78
	GRINDING	8	60								C.Head	100.00	1.14	15.73	14.33	100.00	100.00	100.00
1	ROUGHER	10	35	50	25	2000	30	27.9	12.1	11.7	C-1	25.99	4.02	36.93	42.22	91.34	61.03	76.56
	SCAVEN-	5					5	9.3	11.7	11.6	C-2	5.34	0.57	34.67	36.93	2.66	11.77	13.76
	GER										Tail	68.67	0.10	6.23	2.02	6.00	27.20	9.68

Table 9 Flotation Test Results of Hayl as Safil Ore
- Recovery as a function of flotation time on bulk flotation varying KAX dosage -

TEST No.	OPER ATION	CONDITIONS									PROD UCTS	WEIGHT	ASSAY			DISTRIBUTION		
		Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final		%	Cu %	Fe %	S %	Cu %	Fe %	S %
	GRINDING	8	60								C.Head	100.00	1.14	15.73	14.33	100.00	100.00	100.00
1	ROUGHER	10	35	50	25	2000	30	27.9	12.1	11.7	C-1	25.99	4.02	36.93	42.22	91.34	61.03	76.56
	SCAVEN-	5					5	9.3	11.7	11.6	C-2	5.34	0.57	34.67	36.93	2.66	11.77	13.76
	GER										Tail	68.67	0.10	6.23	2.02	6.00	27.20	9.68
	GRINDING	8	60								C.Head	100.00	1.16	15.77	14.64	100.00	100.00	100.00
27	ROUGHER	10	35	50	32	2000	40	37.2	11.6	10.8	C-1	26.22	3.95	36.95	42.83	89.18	61.41	76.71
	SCAV'ER1	10				200	10	9.3	11.4	10.7	C-2	8.82	0.80	28.79	31.09	6.08	16.10	18.73
	SCAV'ER2	10				200	10	18.6	11.3	10.5	C-3	3.75	0.49	12.36	10.31	1.58	2.94	2.64
											Tail	61.22	0.06	5.04	0.46	3.16	19.56	1.92

Table 10 Flotation Test Results of Hayl as Safil Ore
- Effect of pH value and KAX dosage on bulk rougher/cleaner flotation -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	Fe %	S %	DISTRIBUTION Cu %	Fe %	S %
	GRINDING	8	60								C.Head	100.00	1.13	15.84	14.47	100.00	100.00	100.00
	ROUGHER	30	35	50	31	2400	60	65.1	11.6	11.0	R-C	39.55	2.77	32.70	36.10	96.80	81.65	98.66
28	REGRIND-	6									1C-C	16.91	5.44	40.13	46.70	81.21	42.82	54.55
	ING										1C-M	22.65	0.78	27.16	28.19	15.59	38.83	44.11
	1CLEANER	5	15	90	26	200	2		10.6	9.7	Conc	13.90	5.90	40.55	47.49	72.34	35.57	45.60
	2CLEANER	4	18		25	50			10.4	9.8	2C-M	3.01	3.34	38.17	43.05	8.87	7.25	8.95
											Tail	60.45	0.06	4.81	0.32	3.20	18.35	1.34
	GRINDING	8	60								C.Head	100.00	1.14	15.96	14.50	100.00	100.00	100.00
	ROUGHER	30	35	50	30	2300	60	65.1	11.6	11.0	R-C	40.20	2.74	32.70	35.59	96.85	82.35	98.68
29	REGRIND-	6									1C-C	14.64	6.47	39.54	45.38	83.15	36.26	45.81
	ING										1C-M	25.56	0.61	28.78	29.99	13.70	46.09	52.87
	1CLEANER	5	15	90	26	300	2		11.4	11.0	Conc	10.88	7.54	39.67	45.75	72.04	27.03	34.32
	2CLEANER	4	15		26	200			11.4	11.2	2C-M	3.76	3.36	39.17	44.31	11.11	9.23	11.50
											Tail	59.80	0.06	4.71	0.32	3.15	17.65	1.32
	GRINDING	8	60								C.Head	100.00	1.12	15.91	14.57	100.00	100.00	100.00
	ROUGHER	30	35	50	32	2400	60	74.4	11.4	10.9	R-C	41.56	2.62	31.60	34.46	97.39	82.52	98.28
30	REGRIND-	6									1C-C	9.88	9.61	35.41	42.52	84.91	21.98	28.82
	ING										1C-M	31.68	0.44	30.41	31.95	12.48	60.54	69.46
	1CLEANER	5	16	90	27	2000	2		12.3	12.2	Conc	6.45	12.76	34.54	42.60	73.65	14.00	18.85
	2CLEANER	4	11		26	500			12.3	12.2	2C-M	3.43	3.67	37.04	42.37	11.26	7.98	9.96
											Tail	58.44	0.05	4.76	0.43	2.61	17.48	1.72
	GRINDING	8	60								C.Head	100.00	1.15	15.93	14.56	100.00	100.00	100.00
	ROUGHER	30	35	50	33	2600	60	55.8	11.6	10.9	R-C	39.68	2.82	32.69	36.01	96.87	81.41	98.14
31	REGRIND-	8									1C-C	9.77	9.89	35.44	42.79	83.66	21.74	28.72
	ING										1C-M	29.90	0.51	31.79	33.79	13.21	59.67	69.41
	1CLEANER	5	15	95	27	1200	2		12.0	11.8	Conc	7.84	11.69	34.97	42.98	79.38	17.21	23.15
	2CLEANER	4	11		28	600			12.0	11.9	2C-M	1.93	2.56	37.37	42.00	4.28	4.53	5.57
											Tail	60.32	0.06	4.91	0.45	3.13	18.59	1.86

Table 11 Flotation Test Results of Rakah Stockwork Ore
- Effect of feed size on copper selective flotation -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp ℃	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	ASSAY Fe %	ASSAY S %	DISTRIBUTION Cu %	DISTRIBUTION Fe %	DISTRIBUTION S %
	GRINDING	9	60								C.Head	100.00	1.25	19.89	9.62	100.00	100.00	100.00
32	ROUGHER	10	35	50	27	2000	25	27.9	10.8	10.0	C-1	20.81	5.55	36.44	38.37	92.48	38.13	82.98
	SCAVEN-	5					5	9.3	10.0	9.6	C-2	2.80	1.17	30.70	26.31	2.62	4.32	7.66
	GER										Tail	76.39	0.08	14.98	1.18	4.89	57.55	9.37
	GRINDING	11	60								C.Head	100.00	1.25	20.11	9.54	100.00	100.00	100.00
33	ROUGHER	10	35	60	27	2000	25	27.9	10.7	9.8	C-1	18.54	6.16	37.46	39.57	91.48	34.54	76.95
	SCAVEN-	5					5	9.3	9.8	9.6	C-2	2.85	1.53	34.65	31.95	3.49	4.90	9.53
	GER										Tail	78.61	0.08	15.49	1.64	5.04	60.56	13.52
	GRINDING	13	60								C.Head	100.00	1.28	20.14	9.72	100.00	100.00	100.00
34	ROUGHER	10	35	70	27	2000	25	27.9	10.8	10.1	C-1	17.39	6.84	37.58	39.97	93.23	32.47	71.53
	SCAVEN-	5					5	9.3	10.1	9.8	C-2	1.62	1.33	34.53	31.84	1.69	2.78	5.31
	GER										Tail	80.98	0.08	16.10	2.78	5.08	64.75	23.16
	GRINDING	16	60								C.Head	100.00	1.25	20.05	9.71	100.00	100.00	100.00
35	ROUGHER	10	35	80	27	2000	25	27.9	10.6	9.9	C-1	14.29	8.24	37.20	39.60	94.04	26.51	58.27
	SCAVEN-	5					5	4.7	9.9	9.6	C-2	1.63	0.97	33.38	28.90	1.26	2.71	4.85
	GER										Tail	84.08	0.07	16.88	4.26	4.70	70.78	36.88

Table 12 Flotation Test Results of Rakah Stockwork Ore
- Effect of KAX on copper selective flotation varying pH value -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp ℃	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	ASSAY Fe %	ASSAY S %	DISTRIBUTION Cu %	DISTRIBUTION Fe %	DISTRIBUTION S %
	GRINDING	16	60								C.Head	100.00	1.36	20.07	9.40	100.00	100.00	100.00
36	ROUGHER	10	35	80	27	1000	25	27.9	8.7	8.2	C-1	19.86	6.48	37.68	38.13	94.63	37.29	80.60
	SCAVEN-	5					5	9.3	8.2	8.2	C-2	2.69	0.70	31.27	26.03	1.38	4.19	7.45
	GER										Tail	77.45	0.07	15.17	1.45	3.99	58.52	11.95
	GRINDING	16	60								C.Head	100.00	1.35	19.92	9.32	100.00	100.00	100.00
37	ROUGHER	10	35	80	27	1500	25	27.9	9.6	8.9	C-1	18.01	7.12	37.18	37.64	95.03	33.62	72.72
	SCAVEN-	5					5	9.3	8.9	8.7	C-2	2.26	0.85	32.40	27.88	1.42	3.67	6.76
	GER										Tail	79.73	0.06	15.67	2.40	3.54	62.71	20.52
	GRINDING	16	60								C.Head	100.00	1.25	20.05	9.71	100.00	100.00	100.00
35	ROUGHER	10	35	80	27	2000	25	27.9	10.6	9.9	C-1	14.29	8.24	37.20	39.60	94.04	26.51	58.27
	SCAVEN-	5					5	4.7	9.9	9.6	C-2	1.63	0.97	33.38	28.90	1.26	2.71	4.85
	GER										Tail	84.08	0.07	16.88	4.26	4.70	70.78	36.88
	GRINDING	16	60								C.Head	100.00	1.25	19.96	9.41	100.00	100.00	100.00
38	ROUGHER	10	35	80	27	4000	25	27.9	11.4	10.9	C-1	12.89	9.04	37.05	39.06	93.58	23.93	53.53
	SCAVEN-	5					5	4.7	10.9	10.7	C-2	1.03	1.91	30.02	24.92	1.59	1.56	2.74
	GER										Tail	86.07	0.07	17.28	4.78	4.84	74.51	43.73

Table 13 Flotation Test Results of Rakah Stockwork Ore
- Effect of AP3501 on copper selective flotation varying pH value -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	AP3501 g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	Fe %	S %	DISTRIBUTION Cu %	Fe %	S %
	GRINDING	16	60								C.Head	100.00	1.26	20.12	9.45	100.00	100.00	100.00
39	ROUGHER	10	35	80	27	620	40.9	27.9	8.1	7.8	C-1	17.64	6.69	36.82	38.36	93.54	32.28	71.60
	SCAVEN-	5					5.8	9.3	7.8	7.6	C-2	2.17	0.80	32.34	28.80	1.37	3.48	6.60
	GER										Tail	80.19	0.08	16.12	2.57	5.08	64.24	21.80
	GRINDING	16	60								C.Head	100.00	1.24	16.27	9.59	100.00	100.00	100.00
40	ROUGHER	10	35	80	29	1500	40.9	18.6	9.4	8.8	C-1	13.56	8.47	35.82	37.61	92.49	29.85	53.20
	SCAVEN-	5					5.8	9.3	8.8	8.6	C-2	2.51	1.04	32.09	28.59	2.10	4.95	7.48
	GER										Tail	83.93	0.08	12.64	4.49	5.41	65.20	39.31
	GRINDING	16	60								C.Head	100.00	1.25	20.11	9.56	100.00	100.00	100.00
41	ROUGHER	10	35	80	29	2000	40.9	18.6	10.6	9.8	C-1	10.90	10.61	31.90	31.88	92.87	17.30	36.35
	SCAVEN-	5					5.8	9.3	9.8	9.4	C-2	2.09	1.33	34.16	30.62	2.24	3.56	6.71
	GER										Tail	87.00	0.07	18.29	6.26	4.89	79.14	56.95
	GRINDING	16	60								C.Head							
42	ROUGHER	10	35	80	29	4000	40.9	9.3	12.2	11.8	C-1		can not contrl froth					
	SCAVEN-	5					5.8	9.3	11.8	11.6	C-2							
	GER										Tail							

Table 14 Flotation Test Results of Rakah Stockwork Ore
- Effect of AP3418 on copper selective flotation varying pH value -

TEST No.	OPERATION	CONDITIONS									PRODUCTS	WEIGHT	ASSAY			DISTRIBUTION		
		Time min.	P.D. %	Size %	Temp ℃	Lime g/T	AP3418 g/T	AF65 g/T	pH Intial	pH Final		%	Cu %	Fe %	S %	Cu %	Fe %	S %
43	GRINDING	16	60	80	28	1500					C.Head	100.00	1.26	20.29	9.73	100.00	100.00	100.00
	ROUGHER	10	35				38.7	27.9	9.4	8.8	C-1	16.49	7.14	36.32	38.39	93.75	29.52	65.07
	SCAVENGER	5					7.7	9.3	8.8	8.7	C-2	4.24	0.73	37.81	38.06	2.47	7.91	16.60
											Tail	79.27	0.06	16.02	2.25	3.79	62.58	18.33
44	GRINDING	16	60	80	29	2000					C.Head	100.00	1.26	21.23	9.46	100.00	100.00	100.00
	ROUGHER	10	35				38.7	27.9	10.3	9.6	C-1	13.09	9.09	34.18	34.77	94.65	21.07	48.11
	SCAVENGER	5					7.7	9.3	9.6	9.4	C-2	2.90	0.58	36.54	34.49	1.34	5.00	10.59
											Tail	84.01	0.06	18.68	4.65	4.01	73.93	41.31
45	GRINDING	16	60	80	27	3400					C.Head	100.00	1.24	19.57	9.67	100.00	100.00	100.00
	ROUGHER	10	35				38.7	18.5	12.0	11.6	C-1	9.14	12.89	28.71	28.90	94.64	13.41	27.30
	SCAVENGER	5					7.7	9.3	11.6	11.4	C-2	0.90	1.41	28.51	22.60	1.02	1.32	2.11
											Tail	89.96	0.06	18.55	7.59	4.34	85.28	70.59
46	GRINDING	16	60	80	29	2000					C.Head	100.00	1.27	21.53	9.55	100.00	100.00	100.00
	ROUGHER	10	35				30.9	27.9	10.6	9.8	C-1	12.38	9.58	35.42	35.39	93.45	20.36	45.87
	SCAVENGER	5					7.7	9.3	9.8	9.6	C-2	2.60	0.58	40.07	37.94	1.19	4.84	10.33
											Tail	85.02	0.08	18.94	4.92	5.36	74.80	43.81

Table 15 Flotation Test Results of Rakah Stockwork Ore
- Effect of AP404 on copper selective flotation varying pH value -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	AP404 g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	Fe %	S %	DISTRIBUTION Cu %	Fe %	S %
	GRINDING	16	60								C.Head	100.00	1.28	19.56	10.09	100.00	100.00	100.00
47	ROUGHER	10	35	80	28	820	38.7	18.6	8.0	7.7	C-1	16.58	7.14	36.39	40.43	92.72	30.84	66.45
	SCAVEN-	5					7.7	9.3	7.7	7.6	C-2	3.49	0.83	34.50	33.79	2.27	6.15	11.67
	GER										Tail	79.94	0.08	15.42	2.76	5.01	63.01	21.87
	GRINDING	16	60								C.Head	100.00	1.24	19.59	9.77	100.00	100.00	100.00
48	ROUGHER	10	35	80	29	1500	38.7	27.9	9.3	8.7	C-1	11.65	9.94	33.83	36.63	93.02	20.12	43.67
	SCAVEN-	5					7.7	9.3	8.7	8.6	C-2	2.14	0.84	34.84	33.68	1.44	3.80	7.36
	GER										Tail	86.21	0.08	17.29	5.55	5.54	76.09	48.97
	GRINDING	16	60								C.Head	100.00	1.26	19.50	9.87	100.00	100.00	100.00
49	ROUGHER	10	35	80	28	2620	38.7	23.3	11.0	10.2	C-1	7.59	15.14	29.85	32.89	91.33	11.62	25.29
	SCAVEN-	5					7.7	9.3	10.2	9.9	C-2	1.28	2.11	31.84	29.93	2.15	2.09	3.89
	GER										Tail	91.13	0.09	18.46	7.67	6.52	86.29	70.83
	GRINDING	16	60								C.Head	100.00	1.25	20.11	9.36	100.00	100.00	100.00
50	ROUGHER	10	35	80	29	2000	30.9	27.9	10.8	10.0	C-1	8.45	13.52	31.65	28.82	91.26	13.30	26.01
	SCAVEN-	5					7.7	9.3	10.0	9.8	C-2	1.58	1.80	31.02	26.23	2.27	2.44	4.42
	GER										Tail	89.97	0.09	18.84	7.24	6.47	84.27	69.56

Table 16 Flotation Test Results of Rakah Stockwork Ore
- Recovery as a function of flotation time on copper selective flotation varying KAX dosage -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	ASSAY Fe %	DISTRIBUTION Cu %	DISTRIBUTION Fe %
51	GRINDING	16	60								C.Head	100.00	1.26	19.35	100.00	100.00
	ROUGHER1	3	35	80	30	2240	25	18.6	10.6		C-1	10.98	9.80	32.75	85.74	18.59
	2	3								9.4	C-2	1.67	4.25	29.75	5.64	2.56
	3	4				200		9.3	10.6	9.8	C-3	1.13	2.06	24.23	1.85	1.41
	4	5				100		9.3	10.4	9.7	C-4	0.50	1.82	24.23	0.73	0.63
	5	5				200		9.3	10.7	9.8	C-5	0.30	1.14	22.32	0.27	0.34
	6	10				300	5	9.3	10.6	9.8	C-6	0.98	1.37	24.71	1.07	1.25
											Tail	84.44	0.07	17.23	4.71	75.21
52	GRINDING	16	60								C.Head	100.00	1.23	19.01	100.00	100.00
	ROUGHER1	3	35	80	31	2320	35	18.6	10.5		C-1	16.20	6.90	35.65	90.52	30.37
	2	3						9.3		9.6	C-2	1.59	2.75	29.21	3.54	2.44
	3	4				200		9.3	10.8	10.0	C-3	0.83	2.05	23.37	1.38	1.02
	4	5						9.3	10.0	9.6	C-4	0.49	1.45	21.94	0.58	0.57
	5	5				100		9.3	10.4	9.6	C-5	0.35	0.92	20.86	0.26	0.39
	6	10				200	5	9.3	10.8	9.9	C-6	0.82	0.74	22.53	0.49	0.98
											Tail	79.72	0.05	15.32	3.23	64.23

Table 17 Flotation Test Results of Rakah Stockwork Ore
- Effect of feed size on bulk flotation -

TEST No.	OPER ATION	CONDITIONS									PROD UCTS	WEIGHT	ASSAY			DISTRIBUTION		
		Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final		%	Cu %	Fe %	S %	Cu %	Fe %	S %
	GRINDING	9	60								C.Head	100.00	1.20	20.20	10.28	100.00	100.00	100.00
53	ROUGHER	10	35	50	27	420	25	27.9	7.0	7.1	C-1	24.59	4.57	36.93	35.72	93.28	44.96	85.49
	SCAVEN-	5					5	9.3	7.1	7.2	C-2	2.29	0.98	23.49	14.04	1.86	2.66	3.13
	GER										Tail	73.12	0.08	14.47	1.60	4.86	52.38	11.38
	GRINDING	11	60								C.Head	100.00	1.25	19.89	9.44	100.00	100.00	100.00
54	ROUGHER	10	35	60	26	660	25	27.9	7.0	7.2	C-1	20.64	5.52	36.57	37.54	90.95	37.95	82.10
	SCAVEN-	5					5	9.3	7.2	7.3	C-2	3.49	1.29	27.11	19.70	3.59	4.76	7.29
	GER										Tail	75.87	0.09	15.02	1.32	5.45	57.29	10.61

Table 18 Flotation Test Results of Rakah Stockwork Ore
- Effect of pH value on bulk flotation -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	Fe %	S %	DISTRIBUTION Cu %	Fe %	S %
	GRINDING	9	60			H2SO4					C.Head	100.00	1.22	20.15	9.48	100.00	100.00	100.00
55	ROUGHER	10	35	50	28	701	25	27.9	3.9	4.7	C-1	26.12	4.37	35.17	33.74	93.31	45.59	93.01
	SCAVEN-	5					5	9.3	4.7	4.8	C-2	2.05	1.19	20.85	8.82	2.00	2.12	1.91
	GER										Tail	71.83	0.08	14.67	0.67	4.70	52.29	5.08
	GRINDING	9	60								C.Head	100.00	1.20	20.20	10.28	100.00	100.00	100.00
53	ROUGHER	10	35	50	27	420	25	27.9	7.0	7.1	C-1	24.59	4.57	36.93	35.72	93.28	44.96	85.49
	SCAVEN-	5					5	9.3	7.1	7.2	C-2	2.29	0.98	23.49	14.04	1.86	2.66	3.13
	GER										Tail	73.12	0.08	14.47	1.60	4.86	52.38	11.38
	GRINDING	9	60								C.Head	100.00	1.28	19.98	10.27	100.00	100.00	100.00
56	ROUGHER	10	35	50	26	740	25	27.9	8.0	7.7	C-1	23.78	4.93	35.54	36.64	91.55	42.31	84.82
	SCAVEN-	5					5	9.3	7.7	7.7	C-2	1.96	1.35	24.74	16.30	2.07	2.43	3.11
	GER										Tail	74.25	0.11	14.87	1.67	6.38	55.26	12.07
	GRINDING	9	60								C.Head	100.00	1.29	19.77	9.80	100.00	100.00	100.00
57	ROUGHER	10	35	50	26	1000	25	27.9	9.2	8.6	C-1	22.51	5.18	36.05	37.00	90.41	41.06	84.98
	SCAVEN-	5					5	9.3	8.6	8.5	C-2	3.05	1.37	25.25	17.99	3.24	3.90	5.61
	GER										Tail	74.43	0.11	14.62	1.24	6.35	55.04	9.42
	GRINDING	9	60								C.Head	100.00	1.25	19.89	9.62	100.00	100.00	100.00
32	ROUGHER	10	35	50	27	2000	25	27.9	10.8	10.0	C-1	20.81	5.55	36.44	38.37	92.48	38.13	82.98
	SCAVEN-	5					5	9.3	10.0	9.6	C-2	2.80	1.17	30.70	26.31	2.62	4.32	7.66
	GER										Tail	76.39	0.08	14.98	1.18	4.89	57.55	9.37

Table 19 Flotation Test Results of Rakah Stockwork Ore
- Recovery as a function of flotation time on bulk flotation varying KAX dosage -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	ASSAY Fe %	ASSAY S %	DISTRIBUTION Cu %	DISTRIBUTION Fe %	DISTRIBUTION S %
32	GRINDING	9	60								C.Head	100.00	1.25	19.89	9.62	100.00	100.00	100.00
	ROUGHER	10	35	50	27	2000	25	27.9	10.8	10.0	C-1	20.81	5.55	36.44	38.37	92.48	38.13	82.98
	SCAVEN-GER	5					5	9.3	10.0	9.6	C-2	2.80	1.17	30.70	26.31	2.62	4.32	7.66
											Tail	76.39	0.08	14.98	1.18	4.89	57.55	9.37
58	GRINDING	9	60								C.Head	100.00	1.30	19.16	9.56	100.00	100.00	100.00
	ROUGHER	10	35	50	32	2200	35	27.9	11.0	9.6	C-1	23.33	5.21	33.71	35.92	93.70	41.06	87.67
	SCAV'ER1	10				200	5	18.6	10.8	9.6	C-2	2.35	1.10	25.19	17.56	1.99	3.09	4.32
	SCAV'ER2	10				200	5	18.6	10.8	9.6	C-3	1.75	0.71	22.08	12.28	0.96	2.01	2.24
											Tail	72.57	0.06	14.21	0.76	3.36	53.83	5.77

table 20 Flotation Test Results of Rakah Stockwork Ore
- Effect of pH value and KAX dosage on bulk rougher/cleaner flotation -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	ASSAY Fe %	ASSAY S %	DISTRIBUTION Cu %	DISTRIBUTION Fe %	DISTRIBUTION S %
	GRINDING	9	60								C.Head	100.00	1.23	19.27	9.71	100.00	100.00	100.00
	ROUGHER	30	35	50	31	2600	45	65.1	10.6	10.2	R-C	30.82	3.88	31.17	29.99	97.19	49.85	95.16
59	REGRIND-	4									1C-C	13.24	8.22	37.00	42.51	88.60	25.42	57.93
	ING										1C-M	17.58	0.60	26.78	20.57	8.58	24.43	37.22
	1CLEANER	5	12	90	26	250	1.4		10.2	10.0	Conc	12.16	8.60	37.29	43.29	85.10	23.53	54.20
	2CLEANER	4	14		26	50			10.4	9.8	2C-M	1.08	3.99	33.67	33.67	3.50	1.88	3.74
											Tail	69.18	0.05	13.97	0.68	2.81	50.15	4.84
	GRINDING	9	60								C.Head	100.00	1.24	22.22	9.53	100.00	100.00	100.00
	ROUGHER	30	35	50	31	2740	45	65.1	10.6	10.0	R-C	31.46	3.79	40.07	28.76	96.13	56.75	94.96
60	REGRIND-	4									1C-C	12.54	8.69	36.51	41.54	87.89	20.61	54.68
	ING										1C-M	18.92	0.54	42.43	20.29	8.24	36.14	40.29
	1CLEANER	5	12	90	26	600	1.4		11.4	11.2	Conc	10.96	9.30	36.79	42.31	82.19	18.15	48.66
	2CLEANER	4	13		27	100			11.2	11.0	2C-M	1.58	4.47	34.54	36.20	5.71	2.46	6.01
											Tail	68.54	0.07	14.02	0.70	3.87	43.25	5.04
	GRINDING	9	60								C.Head	100.00	1.23	15.62	9.79	100.00	100.00	100.00
	ROUGHER	30	35	50	32	2660	45	74.4	10.6	10.3	R-C	34.52	3.46	30.23	27.21	96.81	66.84	95.99
61	REGRIND-	4									1C-C	9.66	11.22	34.29	38.86	87.93	21.20	38.35
	ING										1C-M	24.87	0.44	28.66	22.69	8.88	45.63	57.64
	1CLEANER	5	13	90	27	1600	1.4		12.2	12.0	Conc	7.25	13.05	34.04	39.46	76.82	15.81	29.24
	2CLEANER	4	11		28	350			12.1	12.0	2C-M	2.40	5.70	35.04	37.06	11.12	5.39	9.10
											Tail	65.48	0.06	7.91	0.60	3.19	33.16	4.01
	GRINDING	9	60								C.Head	100.00	1.25	19.51	9.65	100.00	100.00	100.00
	ROUGHER	30	35	50	32	2440	45	55.8	10.8	10.6	R-C	29.31	4.10	32.62	31.49	96.59	49.01	95.61
62	REGRIND-	6									1C-C	8.14	12.62	35.43	40.68	82.48	14.79	34.30
	ING										1C-M	21.17	0.83	31.54	27.96	14.11	34.23	61.31
	1CLEANER	5	12	95	27	1400	1.4		12.2	11.9	Conc	6.98	14.18	35.04	40.70	79.50	12.54	29.43
	2CLEANER	4	9		27	450			12.0	12.1	2C-M	1.16	3.21	37.80	40.55	2.99	2.25	4.87
											Tail	70.69	0.06	14.07	0.60	3.41	50.99	4.39

Table 21 Flotation Test Results of Rakah Massive Ore
- Preliminary tests on copper selective flotation -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp ℃	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	ASSAY Fe %	ASSAY S %	DISTRIBUTION Cu %	DISTRIBUTION Fe %	DISTRIBUTION S %
	GRINDING	10.5	50								C.Head	100.00	1.60	37.13		100.00	100.00	
	ROUGHER	10	20	80	28	11100	200	46.4	11.0		C-1	40.69	0.92	44.28		23.44	48.53	
63	SCAV'ER1	5				250		11.6	11.1-	10.3	C-2	5.22	2.64	42.02		8.63	5.91	
	SCAV'ER2	5							11.1-	10.8	C-3	2.67	4.28	40.15		7.17	2.89	
	SCAV'ER3	10				250		11.6		10.8	C-4	3.19	4.87	38.70		9.72	3.32	
											Tail	48.23	1.69	30.29		51.05	39.35	
	GRINDING	10.5	50								C.Head	100.00	1.66	36.64		100.00	100.00	
	ROUGHER	10	20	80	27	11475	200	46.4	11.1		C-1	37.13	0.96	43.27		21.50	43.85	
64	SCAV'ER1	5				250		11.6	11.2-	10.8	C-2	8.51	2.01	41.95		10.31	9.74	
	SCAV'ER2	5							11.2-	10.8	C-3	4.97	2.93	40.27		8.78	5.46	
	SCAV'ER3	10				250	50	23.2	11.2-	10.8	C-4	14.05	2.13	40.51		18.05	15.54	
											Tail	35.34	1.94	26.35		41.36	25.42	
	GRINDING	16	50								C.Head	100.00	1.66	36.49		100.00	100.00	
	ROUGHER	10	20	94	27	14850	200	69.6	11.1		C-1	27.79	1.30	42.79		21.78	32.59	
65	SCAV'ER1	5				250			11.2-	10.8	C-2	4.92	3.59	39.43		10.66	5.32	
	SCAV'ER2	5				250		11.6	11.2-	10.8	C-3	2.79	3.87	39.07		6.52	2.99	
	SCAV'ER3	10				250	50	23.2	11.1-	10.9	C-4	14.02	2.04	41.35		17.24	15.88	
											Tail	50.47	1.44	31.25		43.81	43.22	
	GRINDING	16	50			12500				6.5	C.Head	100.00	1.63	37.17	41.56	100.00	100.00	100.00
	ROUGHER	10	20	94	29	5625	200	46.4	11.0		C-1	30.96	1.54	44.23	49.49	29.29	36.84	36.87
66	SCAV'ER1	5							11.2-		C-2	4.71	3.17	42.43	47.07	9.18	5.38	5.34
	SCAV'ER2	5				250		11.6		10.8	C-3	3.10	3.82	40.75	45.82	7.27	3.40	3.42
	SCAV'ER3	10				250	50	11.6		10.9	C-4	14.38	1.97	42.67	48.38	17.41	16.51	16.74
											Tail	46.85	1.28	30.05	33.38	36.85	37.87	37.63

Table 22 Flotation Test Results of Rakah Massive Ore
- Effect of feed size on copper selective flotation -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp ℃	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	ASSAY Fe %	ASSAY S %	DISTRIBUTION Cu %	DISTRIBUTION Fe %	DISTRIBUTION S %
	GRINDING	4.5	50			17500				10.0	C.Head	100.00	1.61	36.36	42.09	100.00	100.00	100.00
67	ROUGHER	10	20	50	28	1175	150	46.4	11.2		C-1	17.75	3.41	39.83	47.85	37.62	19.44	20.17
	SCAV'ER1	10				250		11.6	11.2-	10.8	C-2	5.63	2.63	40.31	45.28	9.21	6.24	6.06
	SCAV'ER2	10				500	50	34.8		10.9	C-3	11.81	1.59	40.55	47.77	11.67	13.17	13.40
											Tail	64.81	1.03	34.31	39.20	41.50	61.15	60.36
	GRINDING	6.5	50			17500				10.2	C.Head	100.00	1.51	36.21	41.87	100.00	100.00	100.00
68	ROUGHER	10	20	60	29	1075	150	46.4	11.2		C-1	22.01	2.30	41.75	47.29	33.57	25.38	24.86
	SCAV'ER1	10				250		11.6	11.3-	10.8	C-2	6.25	2.46	40.07	45.73	10.19	6.91	6.82
	SCAV'ER2	10				500	50	34.8		11.0	C-3	14.23	1.23	41.87	47.98	11.61	16.45	16.30
											Tail	57.52	1.17	32.27	37.87	44.63	51.26	52.02
	GRINDING	8.5	50			17500				9.9	C.Head	100.00	1.73	36.09	41.61	100.00	100.00	100.00
69	ROUGHER	10	20	70	29	1250	150	46.4	11.2		C-1	25.26	3.06	40.91	47.79	44.72	28.64	29.01
	SCAV'ER1	10						11.6	11.3-	10.8	C-2	7.52	2.32	39.83	45.17	10.10	8.30	8.17
	SCAV'ER2	10				500	50	23.2		11.0	C-3	13.35	1.17	41.75	48.14	9.03	15.44	15.44
											Tail	53.86	1.16	31.91	36.60	36.15	47.62	47.38
	GRINDING	11	50			18750				10.4	C.Head	100.00	1.67	35.86	41.16	100.00	100.00	100.00
70	ROUGHER	10	20	80	28	800	150	34.8	11.2		C-1	22.84	3.30	40.07	47.53	45.06	25.52	26.38
	SCAV'ER1	10				500		23.2	11.3-	10.8	C-2	7.58	2.21	40.67	45.08	10.01	8.60	8.30
	SCAV'ER2	10				250	50	23.2		10.8	C-3	20.01	1.03	41.99	47.59	12.32	23.43	23.14
											Tail	49.57	1.10	30.71	35.02	32.60	42.45	42.18
	GRINDING	16	50			20000				10.6	C.Head	100.00	1.62	36.45	42.41	100.00	100.00	100.00
71	ROUGHER	10	20	94	32	1175	150	34.8	11.4		C-1	21.66	3.31	41.51	48.62	44.20	24.67	24.83
	SCAV'ER1	10				250		23.2	11.2-	10.8	C-2	7.28	2.82	41.39	47.49	12.66	8.27	8.15
	SCAV'ER2	10				500	50	34.8		10.8	C-3	25.02	1.03	42.95	50.12	15.89	29.48	29.57
											Tail	46.04	0.96	29.75	34.50	27.25	37.58	37.45

Table 23 Flotation Test Results of Rakah Massive Ore
- Effect of KAX dosage on copper selective flotation -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Cu %	ASSAY Fe %	ASSAY S %	DISTRIBUTION Cu %	DISTRIBUTION Fe %	DISTRIBUTION S %
	GRINDING	16	50			12500					C.Head	100.00	1.63	37.17	41.56	100.00	100.00	100.00
	ROUGHER	10	20	94	29	5625	200	46.4	11.0		C-1	30.96	1.54	44.23	49.49	29.29	36.84	36.87
66	SCAV'ER1	5							11.2-		C-2	4.71	3.17	42.43	47.07	9.18	5.38	5.34
	SCAV'ER2	5				250		11.6		10.8	C-3	3.10	3.82	40.75	45.82	7.27	3.40	3.42
	SCAV'ER3	10				250	50	11.6		10.9	C-4	14.38	1.97	42.67	48.38	17.41	16.51	16.74
											Tail	46.85	1.28	30.05	33.38	36.85	37.87	37.63
	GRINDING	16	50			20000					C.Head	100.00	1.62	36.45	42.41	100.00	100.00	100.00
71	ROUGHER	10	20	94	32	1175	150	34.8	11.4		C-1	21.66	3.31	41.51	48.62	44.20	24.67	24.83
	SCAV'ER1	10				250		23.2	11.2-	10.8	C-2	7.28	2.82	41.39	47.49	12.66	8.27	8.15
	SCAV'ER2	10				500	50	34.8		10.8	C-3	25.02	1.03	42.95	50.12	15.89	29.48	29.57
											Tail	46.04	0.96	29.75	34.50	27.25	37.58	37.45
	GRINDING	16	50			17500					C.Head	100.00	1.61	36.54	41.91	100.00	100.00	100.00
	ROUGHER	10	20	94	28	700	100	46.4	11.0		C-1	9.97	4.90	39.79	46.70	30.24	10.85	11.10
72	SCAV'ER1	5				250			11.2-		C-2	5.16	3.93	39.79	45.75	12.57	5.62	5.64
	SCAV'ER2	5				250		11.6		10.8	C-3	3.54	3.21	39.79	45.99	7.05	3.86	3.89
	SCAV'ER3	10					50	23.2		10.9	C-4	19.50	1.52	42.19	48.69	18.36	22.51	22.65
											Tail	61.83	0.83	33.78	38.45	31.78	57.15	56.72
	GRINDING	30	50			20000					C.Head	100.00	1.64	36.77	41.73	100.00	100.00	100.00
	ROUGHER	10	20	>99	27	900	100	34.8	11.0		C-1	7.64	4.29	39.78	44.91	19.98	8.27	8.23
73	SCAV'ER1	5						11.6	11.2-		C-2	3.00	4.89	38.99	43.97	8.95	3.18	3.16
	SCAV'ER2	5				250		11.6		10.8	C-3	2.10	4.53	38.39	44.14	5.80	2.19	2.22
	SCAV'ER3	10				500	20	23.2		11.1	C-4	6.76	4.06	39.71	44.96	16.72	7.30	7.28
											Tail	80.49	0.99	36.11	41.01	48.56	79.05	79.11

Table 24 Flotation Test Results of Rakah Massive Ore
- Effect of KAX on copper selective flotation varying pH value -

TEST No.	OPER ATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PROD UCTS	WEIGHT %	ASSAY Au g/t	Ag g/t	Cu %	Fe %	S %	DISTRIBUTION Au %	Ag %	Cu %	Fe %	S %
74	GRINDING	16	50			15000					C.Head	100.00	11.41	6.52	1.64	37.00	41.86	100.00	100.00	100.00	100.00	100.00
	ROUGHER	20	20	94	28	725	100	69.6	7.8	7.8	C-1	40.80	13.34	5.07	2.01	42.05	48.27	47.71	31.74	50.10	46.37	47.05
	SCAVEN-GER	10					50	23.2	7.8	7.8	C-2	39.24	12.23	4.10	1.14	43.05	48.57	42.07	24.68	27.33	45.66	45.53
											Tail	19.96	5.84	14.23	1.85	14.77	15.56	10.22	43.58	22.56	7.97	7.42
75	GRINDING	16	50			17500					C.Head	100.00	10.28	4.23	1.62	36.67	42.02	100.00	100.00	100.00	100.00	100.00
	ROUGHER	20	20	94	29		100	58	9.3	9.0	C-1	13.78	13.44	6.51	3.47	39.05	43.40	18.02	21.23	29.44	14.68	14.24
	SCAVEN-GER	10					50	11.6	9.0	8.9	C-2	11.48	16.12	7.00	3.54	40.30	46.01	18.01	19.01	25.02	12.62	12.57
											Tail	74.73	8.80	3.38	0.99	35.67	41.15	63.97	59.75	45.54	72.70	73.19
76	GRINDING	16	50			20000					C.Head	100.00	9.48	7.90	1.65	35.82	42.76	100.00	100.00	100.00	100.00	100.00
	ROUGHER	10	20	94	31		100	46.4	10.4	10.3	C-1	18.09	13.77	5.89	3.83	39.59	47.77	26.28	13.48	41.96	19.99	20.20
	SCAV'ER1	10						11.6	10.3	10.2	C-2	4.66	12.88	6.09	3.29	40.31	47.63	6.34	3.59	9.29	5.25	5.19
	SCAV'ER2	10					50	23.2	10.2	10.0	C-3	17.29	9.64	3.16	1.29	42.47	50.60	17.59	6.91	13.51	20.50	20.46
											Tail	59.97	7.87	10.02	0.97	32.42	38.61	49.80	76.02	35.24	54.27	54.15
72	GRINDING	16	50			17500					C.Head	100.00	10.60	3.46	1.61	36.54	41.91	100.00	100.00	100.00	100.00	100.00
	ROUGHER	10	20	94	28	700	100	46.4	11.0		C-1	9.97	18.38	6.54	4.90	39.79	46.70	17.27	18.82	30.24	10.85	11.10
	SCAV'ER1	10				500		11.6			C-2	8.71	14.71	6.58	3.64	39.79	45.85	12.08	16.55	19.63	9.48	9.53
	SCAV'ER2	10					50	23.2		10.9	C-3	19.50	10.93	3.61	1.52	42.19	48.69	20.10	20.33	18.36	22.51	22.65
											Tail	61.83	8.67	2.48	0.83	33.78	38.45	50.55	44.29	31.78	57.15	56.72

Table 25 Flotation Test Results of Rakah Massive Ore
- Effect of AP3501 on copper selective flotation varying pH value -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	AP3501 g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Au g/t	Ag g/t	Cu %	Fe %	S %	DISTRIBUTION Au %	Ag %	Cu %	Fe %	S %
	GRINDING	16	50			15000					C.Head	100.00	11.67	4.48	1.66	36.60	42.07	100.00	100.00	100.00	100.00	100.00
77	ROUGHER	20	20	94	29	575	153.3	69.6	7.5	7.7	C-1	44.74	14.08	3.86	2.04	41.55	48.22	53.96	38.57	55.03	50.80	51.29
	SCAVEN-	10					51.1	34.8	7.7	7.7	C-2	34.77	11.31	2.65	1.12	42.43	48.98	33.68	20.58	23.48	40.31	40.48
	GER										Tail	20.49	7.04	8.93	1.74	15.89	16.89	12.36	40.86	21.49	8.90	8.23
	GRINDING	16	50			15000					C.Head	100.00	10.09	4.30	1.63	36.50	43.77	100.00	100.00	100.00	100.00	100.00
78	ROUGHER	20	20	94	28	1975	153.3	69.6	9.4	9.3	C-1	18.54	13.77	4.74	2.28	41.67	49.67	25.30	20.46	25.92	21.16	21.04
	SCAVEN-	10				125	51.1	46.4	9.3	9.1	C-2	19.19	13.77	6.09	2.37	41.93	51.06	26.19	27.20	27.88	22.04	22.38
	GER										Tail	62.28	7.86	3.61	1.21	33.29	39.77	48.51	52.34	46.20	56.80	56.58
	GRINDING	16	50			17500					C.Head	100.00	10.80	3.64	1.65	35.86	43.38	100.00	100.00	100.00	100.00	100.00
79	ROUGHER	20	20	94	28	800	153.3	46.4	10.2	9.9	C-1	20.93	17.41	6.09	3.72	38.80	47.83	33.73	34.97	47.18	22.64	23.07
	SCAVEN-	10				376	51.1	23.2	10.4	10.1	C-2	9.15	11.99	5.19	2.34	40.17	47.76	10.15	13.03	12.97	10.24	10.07
	GER										Tail	69.93	8.67	2.71	0.94	34.42	41.48	56.12	52.00	39.84	67.12	66.86
	GRINDING	16	50			20000					C.Head	100.00	10.70	4.35	1.63	36.32	43.79	100.00	100.00	100.00	100.00	100.00
80	ROUGHER	20	20	94	29	1625	153.3	46.4	11.2	11.1	C-1	22.24	17.82	7.67	3.72	39.30	48.29	37.02	39.20	50.73	24.06	24.52
	SCAVEN-	10				250	51.1	23.2	11.1	11.0	C-2	7.57	13.20	5.64	2.36	40.55	48.36	9.34	9.82	10.96	8.46	8.36
	GER										Tail	70.19	8.18	3.16	0.89	34.92	41.87	53.64	50.98	38.31	67.48	67.11
	GRINDING	16	50			20000					C.Head	100.00	6.53	2.98	1.62	35.98		100.00	100.00	100.00	100.00	
81	ROUGHER	10	20	94	31	1075	102.2	34.8	11.4		C-1	11.99	17.39	6.93	4.67	38.87		31.93	27.88	34.57	12.95	
	SCAV'ER1	10				250		11.6	11.2-	10.8	C-2	6.30	11.66	5.88	3.10	39.46		11.26	12.44	12.07	6.91	
	SCAV'ER2	10				500	51.1	34.8		11.2	C-3	8.58	6.66	4.62	2.40	39.34		8.75	13.30	12.71	9.38	
											Tail	73.13	4.29	1.89	0.90	34.81		48.06	46.38	40.64	70.76	

Table 26 Flotation Test Results of Rakah Massive Ore
- Effect of AP3418 on copper selective flotation varying pH value -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	AP3418 g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Au g/t	Ag g/t	Cu %	Fe %	S %	DISTRIBUTION Au %	Ag %	Cu %	Fe %	S %
82	GRINDING	16	50			15000					C.Head	100.00	10.90	3.66	1.65	36.85	42.22	100.00	100.00	100.00	100.00	100.00
	ROUGHER	20	20	94	29	500	154.6	46.4	7.4	7.6	C-1	50.16	12.32	3.14	1.78	42.55	48.68	56.69	43.05	54.07	57.92	57.84
	SCAVEN-	10					48.3	23.2	7.6	7.6	C-2	25.55	12.14	2.65	1.41	41.55	48.41	28.45	18.50	21.81	28.80	29.30
	GER										Tail	24.29	6.67	5.79	1.64	20.15	22.35	14.86	38.44	24.12	13.28	12.86
83	GRINDING	16	50			15000					C.Head	100.00	10.28	3.04	1.40	36.35	41.96	100.00	100.00	100.00	100.00	100.00
	ROUGHER	20	20	94	28	1975	154.6	58	9.4	8.9	C-1	28.07	11.40	3.61	2.20	41.80	48.44	31.12	33.32	44.13	32.28	32.40
	SCAVEN-	10				250	48.3	23.2	9.2	8.9	C-2	17.94	12.69	3.84	1.95	41.55	48.30	22.15	22.66	25.01	20.51	20.65
	GER										Tail	53.99	8.90	2.48	0.80	31.79	36.49	46.73	44.03	30.87	47.21	46.95
84	GRINDING	16	50			17500					C.Head	100.00	10.43	2.69	1.62	35.40	41.98	100.00	100.00	100.00	100.00	100.00
	ROUGHER	20	20	94	29	1325	154.6	58	10.2	9.8	C-1	17.79	17.42	3.84	3.70	39.42	45.45	29.70	25.37	40.53	19.81	19.26
	SCAVEN-	10				375	48.3	23.2	10.4	9.8	C-2	11.24	13.16	3.61	2.53	39.92	46.18	14.17	15.06	17.51	12.67	12.36
	GER										Tail	70.98	8.25	2.26	0.96	33.67	40.44	56.13	59.57	41.96	67.52	68.38
85	GRINDING	16	50			20000					C.Head	100.00	11.08	4.96	1.62	35.79	42.39	100.00	100.00	100.00	100.00	100.00
	ROUGHER	20	20	94	30	1500	154.6	46.4	11.2	11.0	C-1	27.53	16.86	5.64	3.16	40.30	48.74	41.91	31.28	53.81	31.01	31.66
	SCAVEN-	10				250	48.3	23.2	11.1	10.8	C-2	10.28	12.14	4.51	1.88	40.30	48.50	11.27	9.34	11.96	11.58	11.76
	GER										Tail	62.18	8.34	4.74	0.89	33.04	38.57	46.82	59.38	34.23	57.41	56.58
86	GRINDING	16	50			20000					C.Head	100.00	8.70	2.88	1.63	35.68		100.00	100.00	100.00	100.00	
	ROUGHER	10	20	94	30	800	106.3	34.8	11.4		C-1	14.63	10.23	4.83	4.32	38.15		17.21	24.56	38.76	15.64	
	SCAV'ER1	10				250		23.2	11.2	10.8	C-2	6.42	10.88	4.83	2.82	39.11		8.03	10.78	11.11	7.04	
	SCAV'ER2	10				250	48.3	34.8		11.0	C-3	8.75	6.58	4.41	2.12	39.82		6.62	13.42	11.38	9.77	
											Tail	70.20	8.44	2.10	0.90	34.34		68.13	51.24	38.75	67.55	

Table 27 Flotation Test Results of Rakah Massive Ore
- Effect of AP404 on copper selective flotation varying pH value -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp ℃	Lime g/T	AP404 g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Au g/t	Ag g/t	Cu %	Fe %	S %	DISTRIBUTION Au %	Ag %	Cu %	Fe %	S %
	GRINDING	16	50			15000					C.Head	100.00	10.43	4.39	1.62	36.96	41.97	100.00	100.00	100.00	100.00	100.00
87	ROUGHER	20	20	94	29		154.6	46.4	7.2	7.5	C-1	14.99	12.51	6.27	3.25	39.80	45.51	17.99	21.40	30.02	16.15	16.26
	SCAVEN-	10					48.3	23.2	7.5	7.6	C-2	5.92	15.66	6.76	3.16	40.30	46.15	8.89	9.11	11.52	6.46	6.51
	GER										Tail	79.09	9.64	3.86	1.20	36.17	40.99	73.12	69.49	58.46	77.40	77.23
	GRINDING	16	50			15000					C.Head	100.00	11.71	3.90	1.62	36.68	41.78	100.00	100.00	100.00	100.00	100.00
88	ROUGHER	20	20	94	29	1125	154.6	58	9.3	8.9	C-1	11.27	14.83	6.03	3.44	39.67	44.44	14.27	17.43	23.88	12.19	11.99
	SCAVEN-	10				250	48.3	23.2	9.4	8.9	C-2	7.62	17.33	6.27	3.34	40.30	46.30	11.28	12.26	15.68	8.38	8.45
	GER										Tail	81.11	10.75	3.38	1.21	35.92	40.99	74.45	70.31	60.44	79.43	79.57
	GRINDING	16	50			20000					C.Head	100.00	11.60	2.45	1.61	37.05	41.99	100.00	100.00	100.00	100.00	100.00
89	ROUGHER	20	20	94	32	1425	154.6	46.4	11.2	10.8	C-1	14.28	17.42	4.96	4.34	38.92	44.64	21.44	28.88	38.59	15.00	15.18
	SCAVEN-	10				500	48.3	23.2	11.2	10.9	C-2	7.77	17.79	4.29	3.67	39.92	46.07	11.91	13.58	17.74	8.37	8.52
	GER										Tail	77.95	9.92	1.81	0.90	36.42	41.10	66.65	57.53	43.67	76.63	76.30
	GRINDING	16	50			20000					C.Head	100.00	5.40	3.47	1.60	35.45		100.00	100.00	100.00	100.00	
90	ROUGHER	10	20	94	30	1375	106.3	34.8	11.4		C-1	4.78	17.10	4.83	4.08	37.20		15.13	6.66	12.16	5.01	
	SCAV'ER1	10				250		23.2	11.2-	10.8	C-2	2.16	13.53	5.88	3.97	35.77		5.42	3.67	5.35	2.18	
	SCAV'ER2	10				375	48.3	23.2		11.0	C-3	5.27	11.16	6.51	5.61	38.39		10.88	9.89	18.43	5.71	
											Tail	87.79	4.22	3.15	1.17	35.17		68.58	79.78	64.06	87.10	

Table 28 Flotation Test Results of Rakah Massive Ore
- Recovery as a function of flotation time on copper selective flotation -

TEST No.	OPER ATION	Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PROD UCTS	WEIGHT %	ASSAY Au g/t	ASSAY Ag g/t	ASSAY Cu %	ASSAY Fe %	ASSAY S %	DISTRIBUTION Au %	DISTRIBUTION Ag %	DISTRIBUTION Cu %	DISTRIBUTION Fe %	DISTRIBUTION S %
	GRINDING	16	50			20000					C.Head	100.00	8.03	5.89	1.63	35.74	41.47	100.00	100.00	100.00	100.00	100.00
	ROUGHER 1	10	20	94	32	1100	100	34.8	11.3		C-1	9.02	10.59	7.35	4.89	38.03	44.68	11.89	11.25	27.00	9.60	9.72
	2	10				500		11.6			C-2	4.34	15.10	6.51	5.05	37.19	43.26	8.16	4.79	13.42	4.52	4.53
	3	10				250	20	23.2			C-3	6.09	14.24	4.20	3.67	38.87	44.79	10.80	4.34	13.68	6.62	6.58
91	4	10				250	20	23.2	11.4-	10.8	C-4	5.01	7.23	3.78	2.57	40.07	44.90	4.51	3.21	7.88	5.61	5.42
	5	10				250	20	23.2			C-5	5.38	4.37	2.73	1.78	39.83	45.87	2.93	2.49	5.86	6.00	5.95
	6	10				500	20	11.6			C-6	5.39	4.79	2.52	1.33	40.91	47.06	3.21	2.30	4.38	6.16	6.11
	7	10				250	20	11.6			C-7	9.86	4.37	2.10	0.76	42.59	49.32	5.36	3.51	4.59	11.75	11.72
	8	10				500	50	34.8		11.0	C-8	24.99	9.66	1.68	0.45	43.55	50.72	30.05	7.12	6.88	30.45	30.56
											Tail	29.93	6.20	12.01	0.89	23.04	26.88	23.10	60.98	16.31	19.29	19.40

Table 29 Flotation Test Results of Rakah Massive Ore
- Effect of feed size and pH value on bulk flotation -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Au g/t	Ag g/t	Cu %	Fe %	S %	DISTRIBUTION Au %	Ag %	Cu %	Fe %	S %
	GRINDING	4.5	50			12500					C.Head	100.00	10.17	5.43	1.62	36.68	42.29	100.00	100.00	100.00	100.00	100.00
92	ROUGHER	20	20	50	30	2900	250	69.6	8.3	8.0	C-1	72.80	11.03	3.86	1.59	42.43	49.02	78.94	51.79	71.62	84.22	84.38
	SCAVEN-	10					50	34.8	8.0	8.0	C-2	7.47	12.79	5.07	2.10	36.17	41.12	9.39	6.98	9.71	7.37	7.26
	GER										Tail	19.73	6.02	11.34	1.53	15.64	17.91	11.67	41.23	18.67	8.41	8.35
	GRINDING	4.5	50			15000					C.Head	100.00	11.62	5.89	1.57	36.34	42.76	100.00	100.00	100.00	100.00	100.00
93	ROUGHER	20	20	50	29	2125	250	69.6	9.2	9.0	C-1	67.10	13.34	3.62	1.63	41.67	49.08	77.00	41.23	69.61	76.94	77.01
	SCAVEN-	10				125	50	23.2	9.0	8.8	C-2	8.12	10.01	4.34	1.70	38.67	44.51	6.99	5.98	8.79	8.64	8.45
	GER										Tail	24.78	7.51	12.55	1.37	21.15	25.09	16.01	52.79	21.61	14.42	14.54
	GRINDING	8.5	50			15000					C.Head	100.00	11.20	5.37	1.61	36.39	42.71	100.00	100.00	100.00	100.00	100.00
94	ROUGHER	20	20	70	29	575	250	69.6	8.0	8.0	C-1	76.35	12.23	4.83	1.55	41.93	49.44	83.39	68.68	73.73	87.97	88.38
	SCAVEN-	10					50	34.8	8.0	7.8	C-2	8.14	12.97	4.58	1.79	35.67	40.39	9.43	6.94	9.08	7.98	7.70
	GER										Tail	15.51	5.19	8.44	1.78	9.51	10.80	7.19	24.38	17.20	4.05	3.92
	GRINDING	8.5	50			15000					C.Head	100.00	11.67	5.32	1.57	36.96	42.53	100.00	100.00	100.00	100.00	100.00
95	ROUGHER	20	20	70	29	1475	250	69.6	9.3	9.4	C-1	65.58	13.16	4.58	1.74	42.18	48.91	73.92	56.49	72.50	74.85	75.42
	SCAVEN-	10					50	23.2	9.4	8.9	C-2	17.41	12.60	3.86	1.07	40.17	45.33	18.79	12.64	11.84	18.93	18.56
	GER										Tail	17.01	5.00	9.65	1.45	13.52	15.04	7.28	30.87	15.67	6.22	6.01

Table 30 Flotation Test Results of Rakah Massive Ore
- Effect of pH value on bulk rougher/cleaner flotation -

TEST No.	OPER ATION	CONDITIONS									PROD UCTS	WEIGHT	ASSAY					DISTRIBUTION				
		Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final		%	Au g/t	Ag g/t	Cu %	Fe %	S %	Au %	Ag %	Cu %	Fe %	S %
	GRINDING	8.5	50			15000					C.Head	100.00	5.15	4.45	1.60	36.17	41.37	100.00	100.00	100.00	100.00	100.00
	ROUGHER	30	20	70	31	4375	300	127.6	9.1	8.8	R-C	84.61	5.50	3.66	1.65	41.22	47.38	90.49	69.53	87.32	96.44	96.91
	REGRIND-	11									1C-C	27.33	6.59	4.07	2.24	41.81	50.01	34.99	25.02	38.24	31.59	33.04
	ING										1C-M	57.28	4.99	3.46	1.37	40.94	46.12	55.50	44.51	49.08	64.84	63.87
	1CLEANER	7	18	>95	29	4475	4	23.2	12.2	12.0	1CS-C	11.04	7.19	5.33	2.64	41.41	48.18	15.42	13.22	18.19	12.64	12.86
96	1CL-SCAV	10	17				4	11.6	12.0	12.0	1CS-T	46.24	4.46	3.01	1.07	40.83	45.63	40.08	31.29	30.89	52.20	51.01
	2CLEANER	5	9		26	3000			12.3	12.3	2C-C	10.33	8.84	5.43	3.76	40.47	49.61	17.74	12.60	24.23	11.55	12.38
	3CLEANER	4	9		26	2000			12.3	12.3	2C-M	17.00	5.22	3.25	1.32	42.63	50.25	17.25	12.42	14.01	20.04	20.66
											Conc	4.98	11.27	6.03	5.14	39.71	49.33	10.91	6.75	15.99	5.47	5.94
											3C-M	5.34	6.58	4.87	2.47	41.17	49.87	6.83	5.85	8.24	6.08	6.44
											Tail	15.39	3.18	8.81	1.32	8.38	8.32	9.51	30.47	12.68	3.56	3.09

Table 31 Flotation Test Results of Hayl as Safil Ore and Rakah Stockwork Ore
- Scalp rougher/cleaner flotation -

TEST No.	OPER ATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	col'or g/T	AF65 g/T	pH Intial	pH Final	PROD UCTS	WEIGHT %	ASSAY Au g/t	Ag g/t	Cu %	Fe %	S %	DISTRIBUTION Cu %	Fe %	S %
	GRINDING	16	60			2000	AP3501				C.Head	100.00			1.13	16.11	14.85	100.00	100.00	100.00
	ROUGHER	10	35	80	31	1030	46.7	27.9	11.8	11.2	R,RS-C	15.07			6.88	33.03	36.65	91.74	30.90	37.21
							KAX				R-T	84.93			0.11	13.11	10.98	8.26	69.10	62.79
	ROUG'ER-	20				375	10	32.6	11.6	11.1	Conc.1	2.96	3.10	17.16	18.99	31.55	38.45	49.70	5.79	7.66
	SCA'ER										1C-C	4.39			7.85	35.33	40.42	30.46	9.62	11.94
	CLEANING	OF	1ST	ROUG'	ER	FROTH					1C-M	7.73			1.69	32.29	33.83	11.58	15.49	17.61
	1-CL'ER	9			25	2000			12.8	12.8	1CS-C	1.00	1.14	9.97	4.01	37.15	41.32	3.55	2.30	2.78
	2-CL'ER	7			25	400			12.8	12.8	1CS-T	6.73			1.35	31.57	32.72	8.03	13.18	14.83
	3-CL'ER	5			25	800			12.8	12.8	2C-C	3.16			9.68	35.05	40.97	27.04	6.87	8.72
	4-CL'ER	5			24	800			12.8	12.8	2C-M	1.23			3.15	36.05	39.00	3.42	2.75	3.22
97	5-CL'ER	4			24	600			12.8	12.8	3C-C	2.69			10.46	34.83	41.20	24.85	5.81	7.45
	REGRIND	3.5				1000					3C-M	0.47			5.24	36.30	39.63	2.20	1.07	1.26
Hayl											4C-C	2.06			11.69	34.24	41.02	21.25	4.37	5.68
Ore	CLEANING	OF	2ND	ROUG'	ER	FROTH					4C-M	0.63			6.46	36.78	41.80	3.60	1.44	1.77
							KAX				5C-C	1.59			12.84	33.63	40.59	18.03	3.31	4.34
	1-CL'ER	15			26	200	1	9.3	12.9	12.8	5C-M	0.47			7.78	36.30	42.48	3.22	1.05	1.34
	1CL-SCA	10						4.7	12.8	12.8	Conc.2	1.26	2.57	15.07	13.98	33.25	40.13	15.55	2.60	3.40
	2-CL'ER	14			25	700			12.8	12.9	6C-M	0.33			8.50	35.08	42.35	2.48	0.72	0.94
	3-CL'ER	12			25	400			12.8	12.8										
	4-CL'ER	9			26	600			12.9	12.8	TTL-C	4.22			17.50	32.06	38.95	65.25	8.39	11.06
	5-CL'ER	8			25	500		4.7	12.8	12.8	TTL-M	4.13			5.06	36.41	40.72	18.46	9.33	11.32
	6-CL'ER	8			26	500		4.7	12.8	12.8	TTL-T	91.65			0.20	14.47	12.58	16.30	82.28	77.62
	GRINDING	16	60			2000	AP3501				C.Head	100.00			1.21	19.55	9.69	100	100	100
	ROUGHER	10	35	80	30	1620	40.9	18.6	10.8	10.4	R,RS-C	14.44			7.94	30.16	28.44	95.04	22.28	42.41
							KAX				R-T	85.56			0.07	17.76	6.52	4.96	77.72	57.59
	ROUG'ER-	20				450	10	37.2	11.0	10.5	Conc.1	2.75	4.62	6.49	23.36	30.45	33.55	53.15	4.28	9.51
	SCA'ER										1C-C	3.67			11.72	28.82	28.93	35.63	5.41	10.96
	CLEANING	OF	1ST	ROUG'	ER	FROTH					1C-M	8.02			0.94	30.68	26.47	6.26	12.59	21.93
	1-CL'ER	6			25	1900			12.8	12.9	1CS-C	0.52	1.66	3.71	4.69	30.57	27.73	2.03	0.82	1.50
98	2-CL'ER	6			24	100			12.9	12.8	1CS-T	7.50			0.68	30.69	26.38	4.23	11.78	20.43
	3-CL'ER	6			23	500			12.9	12.9	2C-C	2.48			16.26	28.86	31.34	33.38	3.66	8.02
Raka	4-CL'ER	6			23	600			12.9	12.9	2C-M	1.19			2.28	28.74	23.93	2.25	1.75	2.94
h st	REGRIND	3.5				1000					3C-C	2.12			18.33	29.09	32.60	32.13	3.15	7.12
ockw											3C-M	0.36			4.16	27.53	23.96	1.25	0.51	0.90
ork	CLEANING	OF	2ND	ROUG'	ER	FROTH					4C-C	1.88			19.37	29.49	33.10	30.24	2.84	6.44
Ore							KAX				4C-M	0.23			9.87	25.82	28.52	1.89	0.31	0.68
	1-CL'ER	15			25	200	1	4.7	12.8	12.7	Conc.2	1.64	3.56	6.96	19.95	29.96	33.35	27.12	2.51	5.65
	1CL-SCA	10						9.3	12.7	12.6	5C-M	0.24			15.48	26.31	31.44	3.12	0.33	0.79
	2-CL'ER	14			24	800			12.8	12.8										
	3-CL'ER	11			24	400			12.8	12.8	TTL-C	4.39	0.00	0.00	22.08	30.27	33.48	80.27	6.79	15.16
	4-CL'ER	9			24	400			12.9	12.8	TTL-M	2.55	0.00	0.00	4.99	28.45	25.84	10.54	3.71	6.81
	5-CL'ER	8			24	400			12.8	12.8	TTL-T	93.06	0.00	0.00	0.12	18.80	8.12	9.19	89.49	78.03

Table 32 Flotation Test Results of Rakah Massive Ore

- Effect of mixing ratio of Rakah massive ore on bulk flotation of composite ore -

TEST No.	OPERATION	CONDITIONS R* %	Time min.	P.D. %	Size %	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Au g/t	ASSAY Ag g/t	ASSAY Cu %	ASSAY Fe %	ASSAY S %	DISTRIBUTION Au %	DISTRIBUTION Ag %	DISTRIBUTION Cu %	DISTRIBUTION Fe %	DISTRIBUTION S %
	GRINDING		9	60							C.Head	100.00			1.25	17.03				100.00	100.00	
99	ROUGHER	0	15	35	48	2200	35	37.2	11.4		C-1	29.60			3.96	35.29				93.96	61.35	
	SCAV'ER1		5			200	5	9.3	11.4-	10.6	C-2	2.67			0.78	21.40				1.67	3.35	
	SCAV'ER2		10			400	5	18.6		11.1	C-3	2.52			0.61	15.64				1.23	2.32	
											Tail	65.21			0.06	8.61				3.14	32.98	
	GRINDING		9	60							C.Head	100.00	0.96	2.00	1.20	17.66	14.58	100.00	100.00	100.00	100.00	100.00
100	ROUGHER	5	15	35	48	2900	45	37.2	11.4		C-1	28.39	2.65	4.41	3.80	35.79	42.04	77.95	62.58	90.09	57.54	81.83
	SCAV'ER1		5			200	5	9.3	11.3-	10.5	C-2	4.23	2.29	6.72	0.96	29.03	30.64	10.03	14.20	3.39	6.95	8.88
	SCAV'ER2		10			200	5	18.6		11.1	C-3	3.95	1.65	6.30	0.69	22.03	20.14	6.76	12.44	2.28	4.93	5.46
											Tail	63.44	0.08	0.34	0.08	8.51	0.88	5.26	10.78	4.24	30.58	3.83
	GRINDING		9	60							C.Head	100.00	1.48	2.10	1.22	18.34	15.79	100.00	100.00	100.00	100.00	100.00
101	ROUGHER	10	15	35	48	3820	50	37.2	11.4		C-1	31.53	3.51	3.78	3.41	35.92	42.21	74.59	56.80	88.46	61.76	84.26
	SCAV'ER1		5			200	5	9.3	11.4-	10.6	C-2	2.11	3.22	5.67	2.10	23.92	23.15	4.58	5.70	3.65	2.75	3.09
	SCAV'ER2		10			200	5	18.6		11.0	C-3	4.03	3.65	7.77	0.99	24.40	23.58	9.91	14.92	3.28	5.36	6.01
											Tail	62.33	0.26	0.76	0.09	8.86	1.68	10.92	22.58	4.62	30.12	6.63
	GRINDING		9	60							C.Head	100.00	1.80	2.44	1.27	20.51	19.07	100.00	100.00	100.00	100.00	100.00
102	ROUGHER	20	15	35	48	5240	80	27.9	11.4		C-1	38.51	3.72	3.99	2.89	37.80	45.20	79.40	63.05	87.37	70.99	91.30
	SCAV'ER1		5			200	5	9.3	11.4-	10.8	C-2	1.58	3.51	6.93	3.05	19.02	14.64	3.07	4.49	3.78	1.47	1.21
	SCAV'ER2		10			200	5	18.6		11.0	C-3	1.95	3.44	8.48	1.92	18.90	13.47	3.71	6.77	2.93	1.79	1.38
											Tail	57.96	0.43	1.08	0.13	9.11	2.01	13.81	25.69	5.92	25.75	6.11
	GRINDING		9	60							C.Head	100.00	3.28	3.12	1.34	22.85	21.82	100.00	100.00	100.00	100.00	100.00
103	ROUGHER	30	15	35	48	6800	110	27.9	11.4		C-1	42.78	6.23	3.51	2.60	39.30	45.78	81.18	48.09	82.79	73.60	89.74
	SCAV'ER1		5			200	5	9.3	11.2-	10.8	C-2	1.59	5.87	15.92	4.34	21.28	19.00	2.85	8.13	5.15	1.49	1.39
	SCAV'ER2		10			200	5	18.6		10.8	C-3	2.05	4.94	12.61	2.68	20.02	15.78	3.08	8.26	4.08	1.79	1.48
											Tail	53.58	0.79	2.07	0.20	9.86	3.01	12.89	35.52	7.98	23.12	7.39
	GRINDING		9	60							C.Head	100.00	5.08	3.69	1.38	24.65	25.22	100.00	100.00	100.00	100.00	100.00
104	ROUGHER	40	15	35	48	7600	110	27.9	11.4		C-1	43.47	8.95	3.10	2.42	40.17	48.00	76.52	36.56	76.01	70.84	82.75
	SCAV'ER1		5			200	5	9.3	11.2-	10.8	C-2	1.85	8.66	8.27	5.62	24.53	24.31	3.15	4.15	7.51	1.84	1.78
	SCAV'ER2		10			200	5	18.6		10.8	C-3	2.32	6.87	6.41	3.29	23.78	22.16	3.13	4.03	5.51	2.23	2.04
											Tail	52.37	1.67	3.89	0.29	11.81	6.47	17.20	55.26	10.97	25.03	13.44

the composite ore was prepared by mixing Hayl as Safil ore with Rakah stockwork ore in the ratio 1.85 to 1.
R* : Percent of Rakah massive ore

Table 33 Flotation Test Results of Composite Ore
- Bulk and copper selective rougher/cleaner flotation -

TEST No.	OPERATION	CONDITIONS Time min.	P.D. %	Size %	Temp °C	Lime g/T	KAX g/T	AF65 g/T	pH Intial	pH Final	PRODUCTS	WEIGHT %	ASSAY Au g/t	Ag g/t	Cu %	Zn %	Fe %	S %	DISTRIBUTION Au %	Ag %	Cu %	Zn %	Fe %	S %
	GRINDING	9	60								C.Head	100.00	0.48	3.16	1.17	0.24	16.81	13.12	100	100	100	100	100	100
	ROUGHER	30	35	48	32	2800	50	93	11.4	10.5	R-C	40.48	1.12	7.38	2.83	0.53	29.64	31.60	93.82	94.54	97.46	87.80	71.36	97.46
	REGRIND	7.5				1000				12.2	R-T	59.52	0.05	0.29	0.05	0.05	8.09	0.56	6.18	5.46	2.54	12.20	28.64	2.54
	CLEANING OF ROUG'ER FROTH										1C-C	7.43	3.56	21.08	13.39	2.32	32.67	38.71	54.92	49.58	84.80	70.76	14.44	21.91
	1-CL'ER	15	21	95	28	1700		27.9	12.8	12.6	1C-M	33.05	0.57	4.30	0.45	0.13	28.96	30.00	38.90	44.96	12.66	17.04	56.92	75.55
	1CL-SCA	10	18				6	18.6	12.6	12.6	1CS-C	2.02	1.14	6.26	2.59	0.52	36.78	41.05	4.79	4.01	4.47	4.32	4.43	6.33
	2-CL'ER	13	14		26	400		4.7	12.8	12.8	1CS-T	31.02	0.53	4.17	0.31	0.10	28.45	29.28	34.12	40.95	8.20	12.72	52.50	69.22
	3-CL'ER	13	13		25	400			12.8	12.8	2C-C	6.07	4.06	23.68	15.83	2.73	32.40	39.44	51.08	45.48	81.88	67.85	11.69	18.24
	4-CL'ER	12	12		26	400			12.8	12.7	2C-M	1.36	1.36	9.51	2.51	0.52	33.86	35.42	3.84	4.10	2.91	2.91	2.74	3.68
105	5-CL'ER	12	11		25	400			12.8	12.8	3C-C	5.31	4.37	24.81	17.41	3.00	31.87	39.40	48.09	41.68	78.73	65.26	10.06	15.93
	6-CL'ER	11	10		25	500			12.8	12.8	3C-M	0.76	1.89	15.77	4.87	0.83	36.05	39.78	2.98	3.80	3.16	2.59	1.63	2.31
BULK											4C-C	4.83	4.69	25.74	18.45	3.20	31.48	39.21	47.06	39.39	76.03	63.46	9.05	14.45
											4C-M	0.47	1.06	15.31	6.71	0.93	35.93	41.29	1.04	2.29	2.70	1.80	1.01	1.48
											5C-C	4.49	4.91	25.86	19.18	3.35	31.26	39.09	45.76	36.77	73.40	61.72	8.35	13.38
											5C-M	0.34	1.82	24.12	8.96	1.24	34.35	40.77	1.30	2.63	2.63	1.75	0.70	1.07
											Conc	4.11	5.20	25.94	19.95	3.52	31.06	38.97	44.30	33.72	69.82	59.27	7.59	12.19
											6C-M	0.38	1.82	25.05	10.93	1.55	33.37	40.40	1.45	3.05	3.58	2.45	0.76	1.18
											TTL-C	4.11	5.20	25.94	19.95	3.52	31.06	38.97	44.30	33.72	69.82	59.27	7.59	12.19
											TTL-M	5.35	1.39	11.74	4.27	0.72	35.46	39.39	15.40	19.87	19.45	15.80	11.28	16.05
											TTL-T	90.55	0.21	1.62	0.14	0.07	15.07	10.40	40.29	46.41	10.73	24.93	81.14	71.76
	GRINDING	16	60								C.Head	100.00	0.53	2.77	1.26	0.28	17.33	13.01	100	100	100	100	100	100
	ROUGHER	30	35	80	31	3120	45	65.1	11.6	11.3	R-C	19.28	1.85	9.99	5.80	1.01	35.20	38.15	67.82	69.65	89.07	70.71	39.16	56.52
	REGRIND	4				1000					R-T	80.72	0.21	1.04	0.17	0.10	13.06	7.01	32.18	30.35	10.93	29.29	60.84	43.48
	CLEANING OF ROUG'ER FROTH										1C-C	6.39	3.12	14.62	14.09	2.58	34.31	39.92	37.82	33.75	71.67	59.82	12.64	19.59
	1-CL'ER	15	20	95	26	500		9.3	12.8	12.8	1C-M	12.89	1.23	7.70	1.69	0.23	35.64	37.28	30.00	35.90	17.40	10.89	26.52	36.93
	1CL-SCA	10	15				1	9.3	12.8	12.6	1CS-C	1.40	2.50	11.97	8.28	0.83	34.23	38.81	6.66	6.07	9.25	4.22	2.77	4.18
	2-CL'ER	13	14		26	400			12.8	12.8	1CS-T	11.49	1.07	7.18	0.89	0.16	35.81	37.09	23.34	29.83	8.14	6.67	23.74	32.75
	3-CL'ER	13	11		26	400			12.8	12.8	2C-C	4.85	3.70	17.37	17.84	3.27	32.50	38.86	34.10	30.49	68.99	57.54	9.10	14.49
	4-CL'ER	12	9		27	500			12.8	12.8	2C-M	1.53	1.28	5.88	2.20	0.41	40.07	43.27	3.72	3.26	2.68	2.28	3.54	5.09
106	5-CL'ER	11	8		25	500			12.8	12.8	3C-C	4.13	4.07	18.86	20.24	3.72	31.23	37.94	31.88	28.14	66.55	55.65	7.44	12.03
	6-CL'ER	10	7		25	500			12.8	12.8	3C-M	0.73	1.61	8.93	4.21	0.72	39.71	44.06	2.22	2.35	2.44	1.90	1.66	2.46
STRAIGHT											4C-C	3.60	4.37	19.93	21.90	4.08	30.52	37.37	29.86	25.93	62.76	53.27	6.34	10.33
											4C-M	0.53	2.01	11.59	9.01	1.24	36.05	41.84	2.02	2.22	3.80	2.38	1.10	1.70
											5C-C	3.15	4.59	19.16	22.98	4.40	30.11	36.96	27.44	21.80	57.59	50.22	5.47	8.94
											5C-M	0.45	2.82	25.25	14.36	1.86	33.37	40.20	2.42	4.13	5.17	3.05	0.87	1.40
											Conc	2.77	4.77	18.51	23.68	4.66	29.96	36.88	25.08	18.54	52.24	46.83	4.79	7.85
											6C-M	0.38	3.29	23.95	17.82	2.48	31.18	37.57	2.35	3.26	5.35	3.39	0.68	1.09
											TTL-C	2.77	4.77	18.51	23.68	4.66	29.96	36.88	25.08	18.54	52.24	46.83	4.79	7.85
											TTL-M	5.02	2.04	11.73	7.18	0.95	36.69	41.28	19.39	21.28	28.69	17.22	10.63	15.92
											TTL-T	92.21	0.32	1.81	0.26	0.11	15.89	10.76	55.52	60.18	19.07	35.95	84.58	76.23

Table 34 Flotation Test Results of Composite Ore
- Scalp rougher/cleaner flotation -

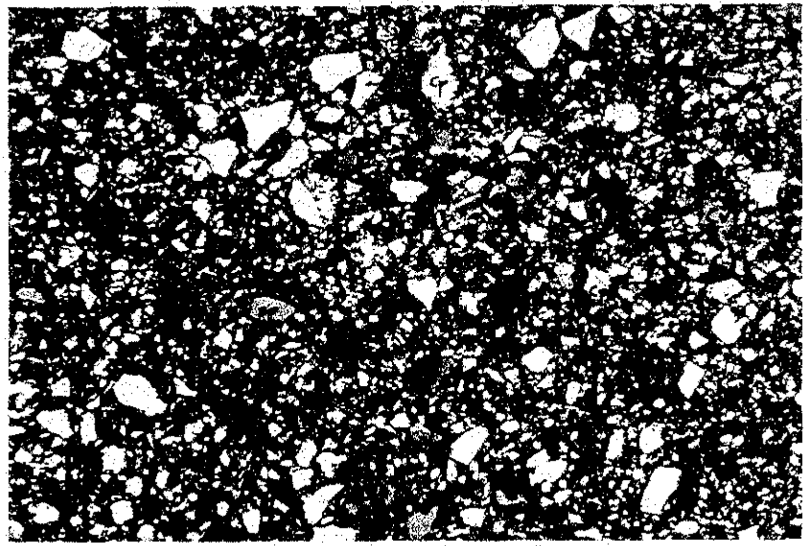
TEST No.	OPER ATION	CONDITIONS Time min.	P.D. %	Size %	Temp ℃	Lime g/T	col'or g/T	AF65 g/T	pH Intial	pH Final	PROD UCTS	WEIGHT %	ASSAY Au g/t	Ag g/t	Cu %	Zn %	Fe %	S %	DISTRIBUTION Au %	Ag %	Cu %	Zn %	Fe %	S %
	GRINDING	16	60			2000	AP3501				C.Head	100.00	0.49	2.57	1.15	0.24	16.75	13.34	100	100	100	100	100	100
	ROUGHER	5	35	80	31	1100	46.7	23.3	11.6	11.2	R,RS-C	16.78	1.81	9.72	6.47	1.16	30.52	34.08	62.37	63.43	94.22	82.41	30.56	42.86
							KAX				R-T	83.22	0.22	1.13	0.08	0.05	13.98	9.16	37.63	36.57	5.78	17.59	69.44	57.14
	ROUG'ER-	25				600	10	46.5	11.6	10.9	Conc.1	2.94	3.89	16.98	19.78	3.83	29.23	38.02	23.51	19.42	50.50	47.61	5.13	8.38
	SCA'ER										1C-C	4.63	2.43	12.52	8.31	1.30	32.78	38.68	23.15	22.56	33.42	25.38	9.06	13.43
											1C-M	9.20	0.83	5.99	1.29	0.24	29.79	30.51	15.71	21.45	10.30	9.42	16.37	21.05
	CLEANING	OF	1ST	ROUG'	ER	FROTH					1CS-C	0.96	1.61	6.97	3.78	0.52	33.62	37.85	3.17	2.60	3.14	2.10	1.92	2.72
	1-CL'ER	9			25	800			12.8	12.9	1CS-T	8.25	0.74	5.88	1.00	0.21	29.35	29.66	12.54	18.86	7.16	7.32	14.45	18.33
	2-CL'ER	8			24	600			12.8	12.9	2C-C	3.45	2.81	14.13	10.14	1.56	32.78	39.75	19.89	18.95	30.36	22.77	6.75	10.27
	3-CL'ER	6			24	450		4.7	12.8	12.8	2C-M	1.18	1.34	7.84	2.98	0.52	32.76	35.57	3.26	3.61	3.06	2.60	2.32	3.16
107	4-CL'ER	5			25	500			12.8	12.8	3C-C	2.80	3.05	15.48	11.33	1.73	32.62	39.94	17.56	16.86	27.55	20.50	5.45	8.38
	5-CL'ER	5			23	500			12.8	12.8	3C-M	0.65	1.75	8.27	4.99	0.83	33.50	38.93	2.33	2.08	2.81	2.27	1.30	1.89
SCA											4C-C	2.22	3.25	16.69	12.53	1.91	32.39	39.85	14.82	14.39	24.10	17.93	4.28	6.62
LP	REGRIND	3.5				1000					4C-M	0.58	2.28	10.89	6.81	1.04	33.50	40.26	2.74	2.48	3.46	2.57	1.17	1.76
	CLEANING	OF	2ND	ROUG'	ER	FROTH					5C-C	1.63	3.82	18.07	14.23	2.04	31.86	39.57	12.81	11.47	20.17	14.11	3.11	4.84
							KAX		12.8	12.8	5C-M	0.58	1.68	12.85	7.76	1.55	33.86	40.64	2.01	2.91	3.93	3.82	1.18	1.78
	1-CL'ER	15			25	200	1	9.3	12.8	12.8	Conc.2	1.21	4.30	18.29	15.98	2.07	31.42	39.06	10.72	8.63	16.83	10.62	2.28	3.55
	1CL-SCA	10						9.3	12.8	12.7	6C-M	0.42	2.42	17.42	9.16	1.97	33.13	41.06	2.09	2.84	3.34	3.50	0.83	1.29
	2-CL'ER	14			25	400			12.8	12.8														
	3-CL'ER	13			24	400			12.8	12.8	TTL-C	4.15	4.01	17.36	18.67	3.32	29.87	38.32	34.23	28.05	67.33	58.23	7.41	11.93
	4-CL'ER	11			24	400			12.8	12.8	TTL-M	4.38	1.73	9.71	5.19	0.91	33.34	38.39	15.60	16.52	19.73	16.87	8.71	12.60
	5-CL'ER	9			23	500			12.9	12.8	TTL-T	91.47	0.27	1.56	0.16	0.06	15.37	11.01	50.17	55.43	12.94	24.91	83.89	75.47
	6-CL'ER	3			24	450			12.8	12.8														
	GRINDING	16	60			2000	AP3501				C.Head	100.00	0.58	2.57	1.17	0.23	17.03	13.30	100	100	100	100	100	100
	ROUGHER	2	35	80	29	960	46.7	18.6	11.7	11.4	R,RS-C	14.66	2.22	10.45	7.40	1.28	31.95	34.81	57.63	59.54	92.71	81.53	27.50	38.38
							KAX				R-T	85.34	0.28	1.22	0.10	0.05	14.47	9.60	42.37	40.46	7.29	18.47	72.50	61.62
	ROUG'ER-	28				500	10	46.5	11.4	11.1	Conc.1	1.08	3.96	15.89	22.67	4.35	29.84	35.99	7.55	6.64	20.83	20.25	1.88	2.91
	SCA'ER										1C-C	6.21	3.19	13.58	12.03	1.99	33.11	38.32	35.12	32.76	63.85	53.52	12.07	17.89
	CLEANING	OF	1ST	ROUG'	ER	FROTH					1C-M	7.38	1.14	7.03	1.27	0.24	31.28	31.68	14.97	20.14	8.02	7.75	13.55	17.57
	1-CL'ER	2			23	400			12.9	12.8	1CS-C	0.78	2.28	9.36	4.00	0.52	35.20	38.51	3.16	2.84	2.67	1.76	1.61	2.26
	2-CL'ER	2			23	500			12.9	12.9	1CS-T	6.59	1.01	6.75	0.95	0.21	30.82	30.87	11.81	17.30	5.35	6.00	11.93	15.31
	3-CL'ER	1.5			23	450			12.8	12.8	2C-C	5.18	3.45	14.46	13.77	2.28	32.77	38.73	31.71	29.13	61.04	51.22	9.98	15.11
											2C-M	1.02	1.88	9.14	3.21	0.52	34.83	36.23	3.41	3.63	2.81	2.30	2.09	2.79
108	REGRIND	3.5				1000					3C-C	4.65	3.61	15.10	14.89	2.49	32.46	38.74	29.73	27.26	59.14	50.01	8.86	13.54
	CLEANING	OF	2ND	ROUG'	ER	FROTH					3C-M	0.54	2.08	8.93	4.14	0.52	35.44	38.64	1.98	1.87	1.90	1.21	1.12	1.56
SCA							KAX				4C-C	4.20	3.76	15.61	15.74	2.65	32.18	38.63	28.02	25.49	56.49	48.21	7.94	12.20
LP	1-CL'ER	15			26	500	1	4.7	12.8	12.7	4C-M	0.45	2.15	10.23	6.94	0.93	35.08	39.79	1.70	1.78	2.65	1.80	0.92	1.34
	1CL-SCA	10						9.3	12.7	12.7	5C-C	3.73	3.93	16.20	16.73	2.83	32.12	38.73	26.02	23.51	53.41	45.71	7.04	10.88
	2-CL'ER	14			24	400			12.9	12.8	5C-M	0.47	2.42	10.89	7.73	1.24	32.64	37.87	2.00	1.97	3.08	2.50	0.89	1.33
	3-CL'ER	13			24	350			12.9	12.8	Conc.2	1.33	4.56	16.98	19.68	3.52	31.42	38.09	10.76	8.79	22.39	20.29	2.46	3.81
	4-CL'ER	11			24	400			12.9	12.8	6C-M	2.40	3.58	15.77	15.10	2.44	32.51	39.08	15.26	14.73	31.01	25.42	4.59	7.06
	5-CL'ER	9			24	800			12.8	12.9	6CS1-C	1.20	3.83	16.55	17.38	2.90	32.16	38.90	8.14	7.71	17.81	15.05	2.26	3.51
	6-CL'ER	1			24	500			12.8	12.8	6CS1-M	1.20	3.33	15.00	12.84	1.99	32.86	39.26	7.12	7.02	13.21	10.37	2.32	3.55
	6CL-SV1	2							12.8	12.9	6CS2-C	0.89	3.42	14.15	13.77	2.07	33.37	39.78	5.40	4.90	10.48	7.98	1.74	2.66
	6CL-SV2	6							12.9	12.9	6CS2-M	0.31	3.09	17.42	10.18	1.76	31.42	37.79	1.72	2.12	2.73	2.39	0.58	0.89
							NaHSO3	ZnSO4																
							g/t	g/t			TTL-C	4.50	4.00	16.04	18.61	3.27	31.63	38.14	31.85	28.03	71.51	63.57	8.35	12.90
						1-CL	30.0	8.2			TTL-M	3.57	2.21	10.25	5.19	0.77	34.45	37.89	13.97	14.21	15.84	11.96	7.22	10.17
						2-CL	7.5	2.1			TTL-T	91.94	0.33	1.62	0.16	0.06	15.64	11.13	54.18	57.76	12.65	24.47	84.44	76.93

* TTL-C of Test No.108 = Conc.1 + Conc.2 + 6CS1-C + 6CS2-C

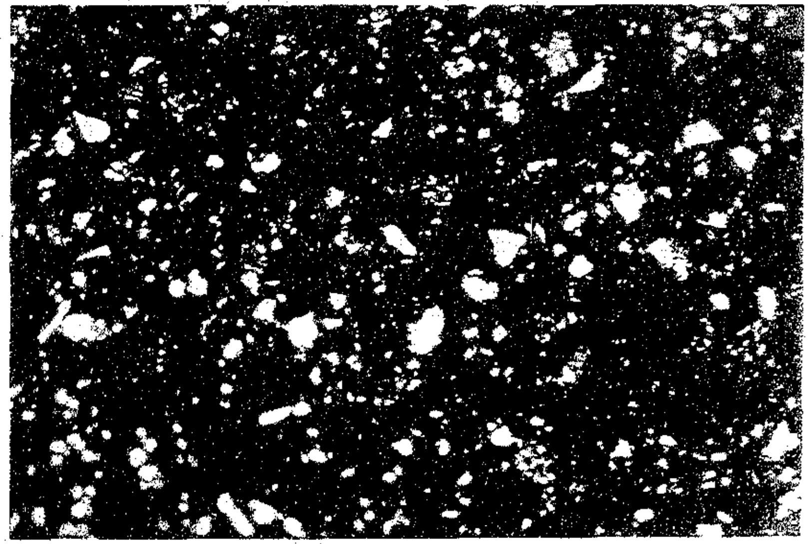
Appendix 7

SEM and microprobe images of test samples

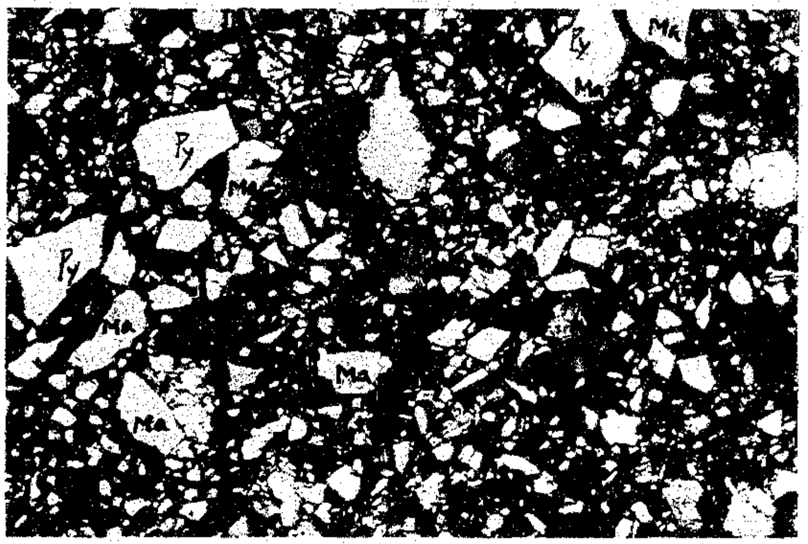
Photomicrograph 1 Flotation products of Rakah massive ore



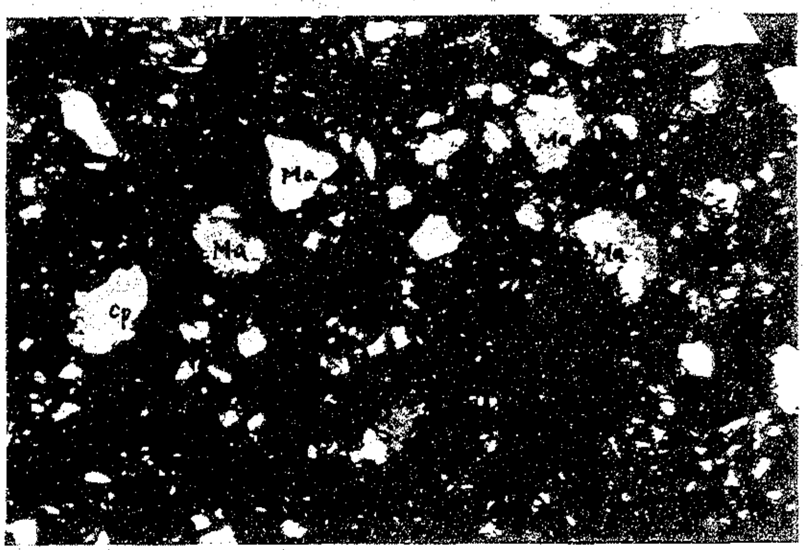
10 min. Product (magnification: × 175, 100 μm)



30 min. Product (magnification: × 175, 100 μm)

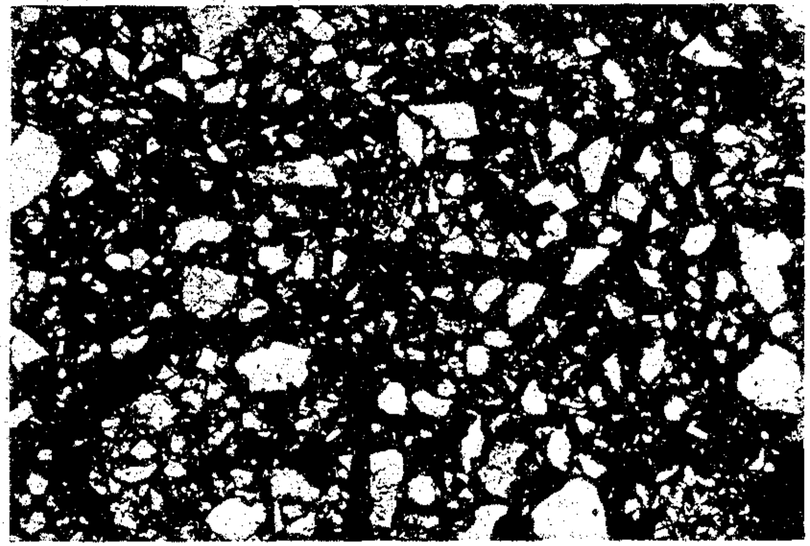


10 min. Product (magnification: × 350, 50 μm)

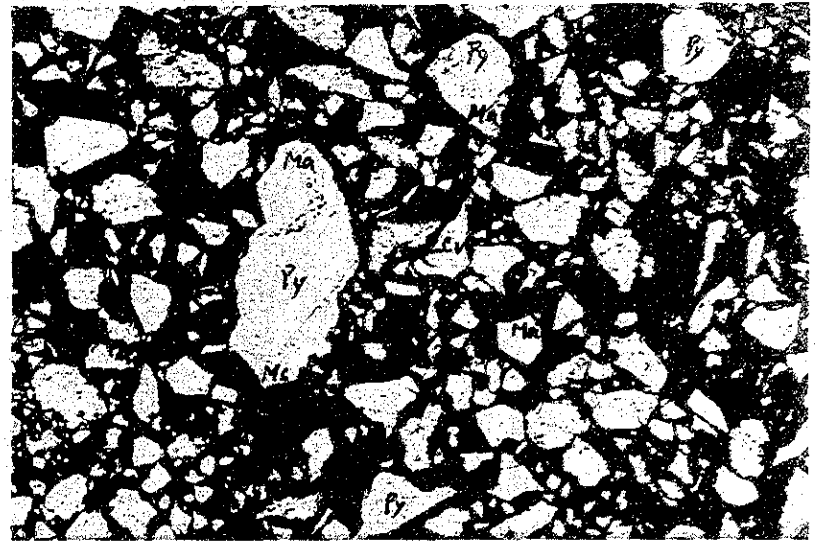


30 min. Product (magnification: × 350, 50 μm)

Photomicrograph 2 Flotation products of Rakah massive ore



50 min. Product (magnification: × 175, 100 μm)

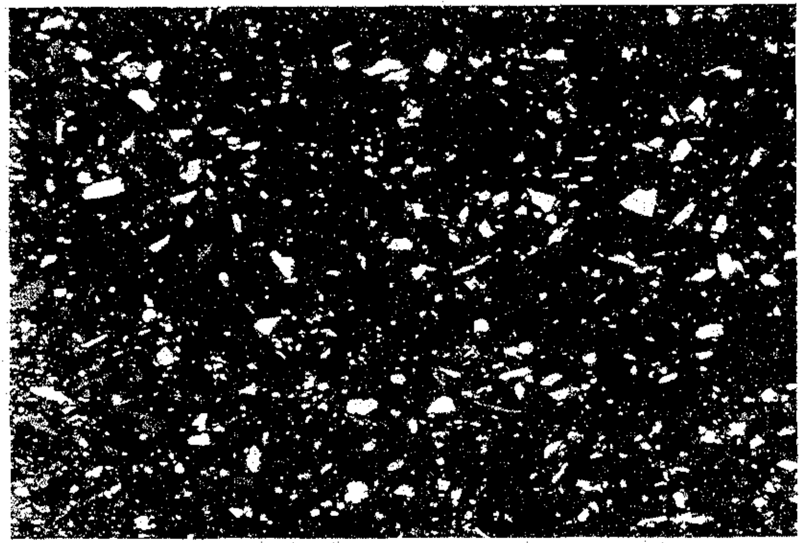


80 min. Product (magnificaiton: × 175, 100 μm)

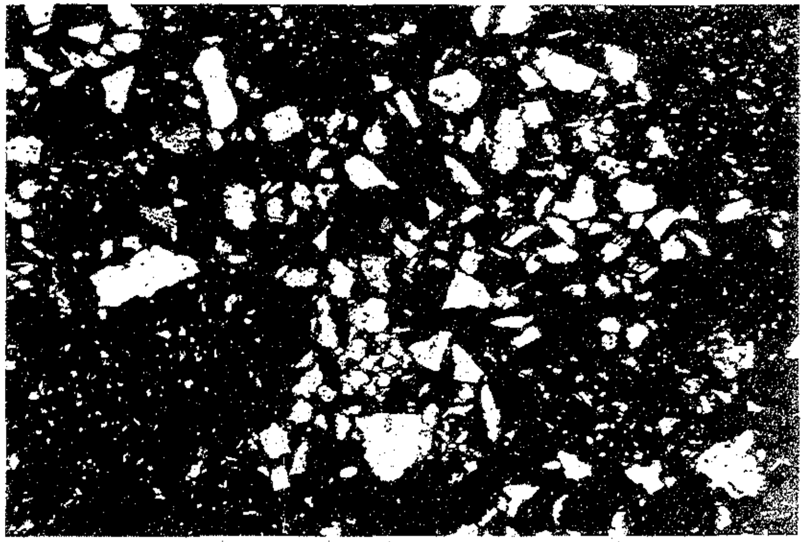
50 min. Product (magnification: × 350, 50 μm)

80 min. Product (magnification: × 350, 50 μm)

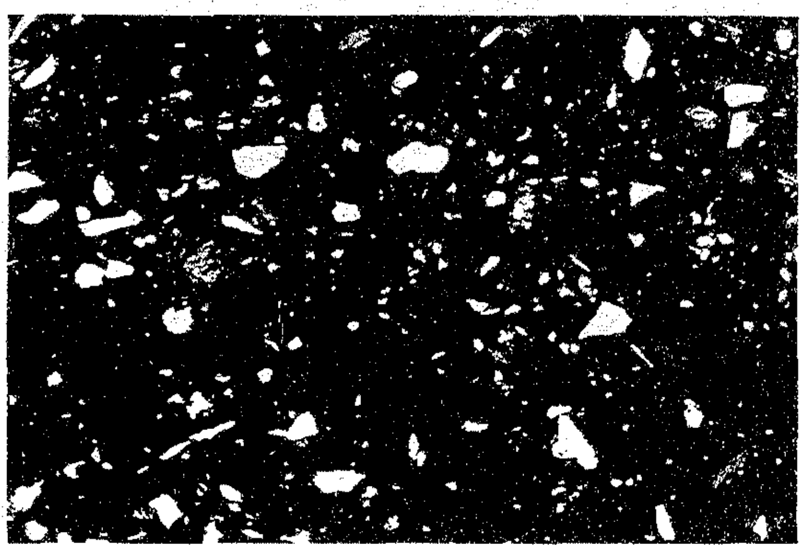
Photomicrograph 3 Flotation products of Rakah massive ore



tailing (magnification: × 175, 100 μm)



tailing (magnification: × 175, 100 μm)

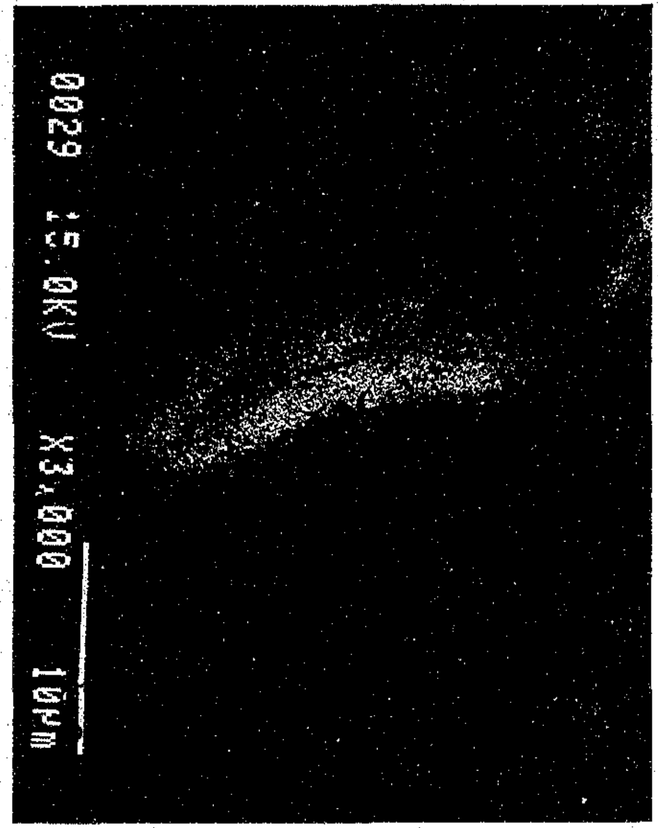


tailing (magnification: × 350, 50 μm)

X-ray image of tailing by EPMA analysis

Back scattered electron image

X-ray images of tailing by EPMA analysis



Cu Kα X-ray Image

Si Kα X-ray Image