TR6_160_163

R. 369 & R. 370

SAVAGE RIVER MAGNETITE

BENEFICIATION BY WET MAGNETIC SEPARATION

Sample

R.369 diamond drill core from No. 4 hole, 100 feet to 839 feet nine inches.

R.370 diamond drill core from holes No. 5 and No. 6, footage being 36 feet to 871 feet two inches, and 52 feet to 559 feet three inches, respectively.

The samples were, as far as practical, composed on a footage basis, composites being made up from unground discards from assay samples of core.

Composite head samples were assembled from test products, and analysed with the following results:—

	R.369 %	R.370 %
Fe	46.4	30.4
S	5.6	3.6
P_2O_5	0.33	0.34
Al_2O_3	1.44	4.60
SiO_2	10.5	22.4
Mn	0.11	0.09
TiO_2	0.62	0.79

Previous Literature

Mines Department Ore Dressing Investigation No. 326, January, 1958.

Mines Department Ore Dressing Investigation No. 334, June, 1958.

Mines Department Ore Dressing Investigation No's.355-359, November, 1958.

C.S.I.R.O. Mineragraphic Investigation No. 736, March, 1958.

Investigation

Beneficiation by wet magnetic separation was investigated on the samples. Previous investigations have shown that near optimum beneficiation is obtained by magnetic separation after grinding the ore to minus 60 mesh B.S.S., and the tests reported herein were limited to this size.

Size reduction was performed by closed circuit wet screening and ball mill grinding to minus 60 mesh B.S.S. The minus 60 mesh ore was classified in a hydraulic classifier, using a rising velocity of 20 millimeters per second. The classifier overflow was fed directly to the magnetic separator—Dings Crockett 6-inch submerged belt type, belt speed 138 feet per minute.

Classifier spigot product was retained separately for similar treatment.

Rougher, cleaner and recleaner stages of concentration were investigated on the samples.

All iron determinations refer to HCl soluble and in general represent the iron present as magnetite.

No responsibility is accepted for the results shown in this report except in so far as they apply to the sample tested.

Summary

1. Samples R.369, Hole No. 4, is of considerably higher grade than R.370, Holes Nos. 5 and 6. However, both samples respond equally well to beneficiation.

2. Recoveries of iron in magnetic concentrates are similar in both samples, being of the order of 96 to 98%.

3. Rejection of sulphur from classifier overflow concentrates is better than from spigot concentrates. Phosphorus rejection is similar in both concentrates. Sulphur elimination is therefore a function of size reduction to a greater degree than is phosphorus elimination.

4. Cleaning of the rougher magnetic concentrates results in a marked increase in iron grade while significantly decreasing the sulphur and phosphorus content.

5. Recleaner concentration shows no sensible appreciation of concentrate quality over a cleaner concentration.

Sizing.

Sizings were performed on classifier overflow and spigot feeds, and combined to give the sizing of the total feed and are shown below.

	Plus Mesh Size B.S.S						Minus 200 Mesh
	60	85	100	120	150	200	B.S.S.
R.369 Cl/O'flow	Nil	1.2	1.2	3.6	5.8	11.6	76.6
R.369 Spigot	Nil	35.0	16.3	19.5	11.4	9.0	8.8
R.369 Total Feed	Nil	20.5	9.8	12.7	9.0	10.2	37.8
R.370 Cl./O'flow	Nil	1.4	1.9	4.2	5.7	9.4	77.4
R.370 Spigot	0.3	53.4	15.9	14.4	7.2	4.2	4.6
R.370 Total Feed	0.1	27.0	8.8	9.2	6.4	6.9	41.6

Test Results

Product	Wght	Percent Fe	S	P_2O_5	Percent Distribution Fe	S	P_2O_5
R.369 Hole No. 4							
Cl/O Magnetics	22.0	64.5	0.3	0.05	30.6	1.2	3.4
Cl/O 2nd Cl. Tails	0.6	15.0	8.7	0.78	0.2	0.9	1.5
Cl/O 1st Cl. Tails	3.3	5.7	8.6	1.06	0.4	5.1	10.7
Cl/O Ro. Tails	16.9	4.4	10.1	1.10	1.6	30.5	56.7
Sp. Magnetics	47.2	65.0	0.6	0.05	66.2	5.1	7.3
Sp. 2nd Cl. Tails	0.4	26.1	11.1	0.36	0.2	0.8	0.3
Sp 1st Cl. Tails	0.8	12.8	16.5	0.63	0.2	2.3	1.5
Sp. Ro. Tails	8.8	3.1	34.4	0.69	0.6	54.1	18.6
Comp. Ore	100.0	46.4	5.6	0.33	....	....	....
Total Concs.							
Rougher	74.3	61.0	1.2	0.11	97.8	15.4	24.7
Cleaner	70.2	64.2	0.6	0.06	97.2	8.0	12.5
Recleaner	69.2	64.8	0.5	0.05	96.8	6.3	10.7
Non-Magnetics from re-cleaner separation	30.8	4.9	17.0	0.95	3.2	93.7	98.3
R.370 Holes No's. 5 and 6							
Cl/O Magnetics	13.6	64.3	0.3	0.09	28.7	1.1	2.4
Cl/O 2nd Cl. Tails	1.3	6.6	4.0	0.70	0.3	1.4	2.7
Cl/O 1st Cl. Tails	5.4	2.7	2.4	0.66	0.5	3.6	10.5
Cl/O Ro. Tails	30.5	1.9	3.6	0.63	1.9	30.4	56.6
Sp. Magnetics	31.6	64.4	0.6	0.04	66.9	5.3	3.7
Sp. 2nd Cl. Tails	0.3	13.0	8.1	0.43	0.1	0.7	0.4
Sp. 1st Cl. Tails	0.8	8.8	8.3	0.41	0.2	1.8	1.0
Sp. Ro. Tails	16.5	2.6	12.2	0.47	1.4	55.7	22.7
Comp. Ore	100.0	30.4	3.6	0.34	....	....	....
Total Concs.							
Rougher	53.0	55.5	0.9	0.13	95.7	13.9	20.7
Cleaner	46.8	62.4	0.7	0.07	96.0	8.5	9.2
Recleaner	45.2	64.4	0.5	0.05	95.6	6.4	6.1
Non-Magnetics from re-cleaner separation	54.8	2.5	6.2	0.58	4.4	93.6	93.9

Additional determinations were made as follows:—

	Percent Al_2O_3	SiO_2	Mn	TiO_2
R.369.				
Total recleaner magnetics	0.64	3.3	0.11	0.62
Total recleaner non-magnetics	3.23	26.7	0.11	0.62
Ore	1.44	10.5	0.11	0.62
R.370.				
Total recleaner magnetics	0.91	3.6	0.07	0.61
Total recleaner non-magnetics	7.64	37.8	0.11	0.94
Ore	4.60	22.4	0.09	0.79

A chemical analysis has been made of the minus 60 mesh non-magnetic products from both samples. Results are as follows:—

	R.369 Percent	R.370 Percent
SiO_2	26.7	37.8
Al_2O_3	3.23	7.64
Fe_2O_3	1.28	6.11
HCl.Sol.Fe.	4.90	2.50
FeS_2	31.80	11.60
MnO	0.14	0.14
TiO_2	0.62	0.94
P_2O_5	0.95	0.58
CaO	1.83	7.00
MgO	20.89	19.08
Na_2O	0.05	0.19
K_2O	0.08	0.74