

TRI-65-68

R. 297**ALLUVIAL MATERIAL—MONTAGU SWAMP
CHROMITE, &c.****Previous Investigations**

R292, R293 and R294-5.

Sample

A sample weighing 3960 lbs. dry weight was forwarded by Mr. A. A. Walker at the request of this department.

Investigation

A large sample was required to perform a continuous concentration test on a Humphreys spiral concentrator in order to test the efficiency of the concentrator for this purpose.

Summary

1. The sample was treated at a rate of one ton per hour by two-stage screening and concentration of screen undersize on a five-turn Humphreys spiral concentrator. Of this treatment rate 0.5 ton per hour was screen undersize and was the feed rate to the spiral. The five-turn spiral is a standard unit, two feet in diameter, 6 feet 4 inches high, with a 13½-inch pitch.

Screens used were half-inch to remove large oversize, followed by a Hummer screen fitted with a longitudinal mesh "Ton-Cap" screen No. 302. This screen has an aperture width of 0.064 inch, closely equivalent to a 10-mesh British Standard screen.

Water used was 18½ gallons per minutes as follows—to sprays on Hummer screen, 5.5; to spiral, 10.6; and to spiral wash water, 2.4.

2. The concentrate produced amounted to 7.3 per cent of the wash and presented a concentration ratio of 13.7 to 1. This rougher concentrate contained 24.34 per cent of heavy minerals. The quantity of chromite amounted to 1.76 per cent and other heavy minerals 0.017 per cent or 1.777 per cent of cleaned concentrate.

3. The spiral tallings were sized and re-concentrated in a jig and on a table to determine losses with the spiral concentration, and the quantity of heavy minerals recovered amounted to 0.013 per cent. The Humphrey spiral thus recovered 99.26 per cent of the heavy minerals that could have been recovered by sizing and classification and concentration with jigs and tables.

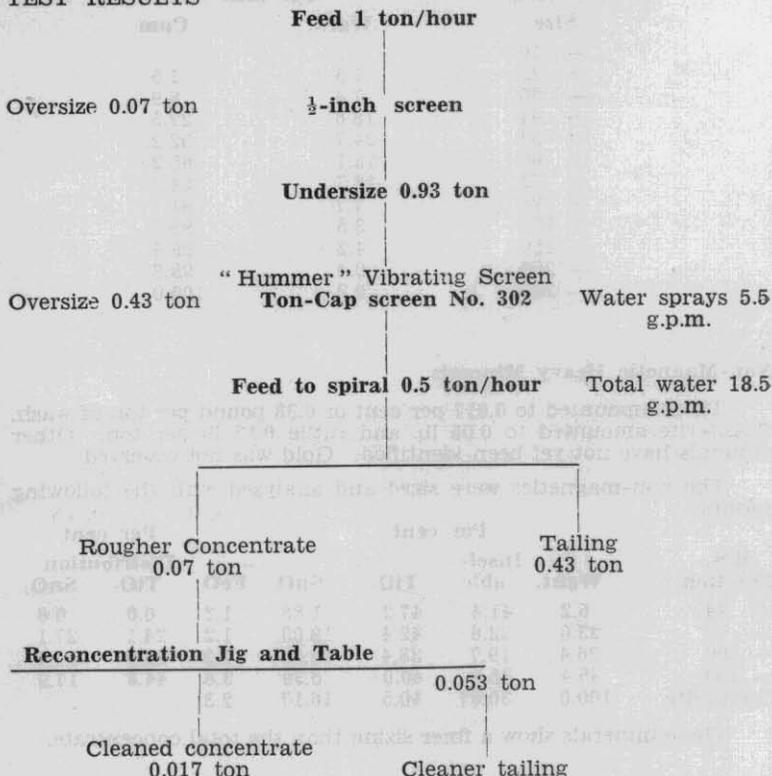
4. Small quantities of fine material were not detached from the barren screen oversizes by the dry and wet screening treatments, and tests were made to determine the losses involved with the following results:—

	Per cent
Heavy minerals from plus half-inch material	0.034
Heavy minerals from Hummer oversize	0.069
Total	<u>0.103</u>

This evidence shows that only an additional 0.1 per cent of concentrate could be recovered by re-treatment of the oversizes to remove the residual quantities of fine material for concentration.

CONCENTRATION RESULTS R297

TEST RESULTS



Tabulation of Products

+ ½-inch	0.07 tons/hour	7.0 weight per cent
- ½ + 10 mesh	0.43 tons/hour	43.0 weight per cent
Spiral concentrate	0.07 tons/hour	7.0 weight per cent
Spiral tailing	0.43 tons/hour	43.0 weight per cent

The cleaned concentrate amounted to 1.777 per cent and 1.76 per cent was magnetic chromite of the following analysis:—

CHROMITE—MAGNETIC CONCENTRATE

Analysis	Per cent
Cr ₂ O ₃	54.2
Fe	16.3
Al ₂ O ₃	12.1
MgO	10.9

SIZING ANALYSIS OF CLEANED SPIRAL CONCENTRATE

B.S. Mesh	Size	Per cent Wght.	Cum
+	16
+	22	1.5	1.5
+	30	7.4	8.9
+	44	18.6	27.5
+	52	24.7	52.2
+	60	13.1	65.3
+	72	18.7	84.0
+	85	7.7	91.7
+	100	3.5	95.2
+	150	4.2	99.4
+	200	0.4	99.8
-	200	0.2	100.0

Non-Magnetic Heavy Minerals

These amounted to 0.017 per cent or 0.38 pound per ton of wash. Cassiterite amounted to 0.05 lb. and rutile 0.15 lb per ton. Other minerals have not yet been identified. Gold was not observed.

The non-magnetics were sized and analysed with the following results:—

B.S. Fraction	Wght.	Per cent				Per cent Distribution		
		Insol- uble	TiO ₂	SnO ₂	FeO	TiO ₂	SnO ₂	
+	44	5.2	41.4	47.2	1.83	1.2	6.0	0.6
+	72	23.0	32.6	42.4	19.03	1.2	24.1	27.1
+	100	26.4	19.7	38.4	33.33	1.2	25.0	54.4
-	100	45.4	35.3	40.0	6.39	3.6	44.8	17.9
Composite	100.0	30.87	40.5	16.17	2.3			

These minerals show a finer sizing than the total concentrate.

Spiral Tailings—Sizing

B.S. Fraction	Per cent Wght.	
+	16	15.5
+	22	17.4
+	30	13.8
+	44	14.0
+	60	10.8
+	85	5.5
+	100	1.7
+	150	4.0
+	200	2.0
-	200	15.3

About half of the — 200 mesh fraction is extremely fine and is noted as a white suspension during treatment. An analysis shows this finest material to be practically pure silica (97.4 per cent SiO₂).