

TRI-60-62

R. 292

## ALLUVIAL MATERIAL CONTAINING CHROMITE, &c.—MONTAGU SWAMP

### Sample

A sample of alluvial material weighing 105 lbs. was received from Mr. A. A. Walker of Smithton. The sample was stated to be obtained from Montagu Swamp in the Smithton district.

The sample consist substantially of water-worn quartz together with heavy minerals of which chromite, cassiterite, rutile and gold are of economic interest. Sizing of the sample gave the following results:—

Fraction	Per cent Weight
+ $\frac{3}{8}$ inch (aperture 0.33 in) .....	8.2
+ 6 mesh (aperture 0.14 in.) .....	13.1
+ 10 mesh B.S. ....	20.2
+ 14 mesh B.S. ....	11.8
+ 16 mesh B.S. ....	6.5
+ 22 mesh B.S. ....	10.6
+ 30 mesh B.S. ....	7.6
+ 44 mesh B.S. ....	7.1
+ 52 mesh B.S. ....	3.3
+ 60 mesh B.S. ....	1.2
+ 85 mesh B.S. ....	1.7
+ 100 mesh B.S. ....	0.4
+ 200 mesh B.S. ....	1.1
— 200 mesh B.S. ....	7.2
	100.0

The first two fractions contained traces of chromite and sizings from minus 6 mesh to plus 16 mesh did not contain chromium. Plus  $\frac{3}{8}$ -inch and plus 6 mesh fractions did not contain gold.

### Investigation

Concentration tests were required to determine the quantities of minerals present of economic interest. Recommendations for methods of separation of the minerals was also requested.

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

### Summary

1. The sample contains chromite with minor quantities of cassiterite, rutile and gold.

2. The coarse fractions did not contain any of the above minerals and concentration tests were undertaken on the minus 6 mesh material. Concentration by jigging and tabling resulted in a concentrate amounting to 2.86 per cent by weight with the following analysis:—

	Per cent
Cr <sub>2</sub> O <sub>3</sub> .....	55.0
Al <sub>2</sub> O <sub>3</sub> .....	12.6
Fe .....	16.1
MgO .....	10.0
TiO <sub>2</sub> .....	0.43
Tin .....	0.08
Gold .....	1.26 grains per ton of concentrate

Magnetic separation of the chromite from the rutile, tin and gold resulted in the following products:—

	Per cent			
Magnetic Chromite Concentrate	Cr <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe	MgO
2.83 per cent .....	55.5	12.8	16.3	10.3

	Per cent		
Non-Magnetic Concentrate	Tin	TiO <sub>2</sub>	Gold
0.03 per cent .....	7.5	40.8	5 dwts./ton

Sizing analyses of the concentrate are shown under test results.

3. The estimated gross value of the concentrate has been derived from a value for chromite stated by Mr. Walker to be £17 per ton, tin at 163s. 3d. per unit (7th May, 1956), rutile £140 per ton, and gold £15 12s. 6d. per oz.

**GROSS VALUE OF GRAVITY CONCENTRATE**

	£	s.	d.
Chromite, 99 per cent .....	16	16	7
Tin, 0.08 per cent .....	0	13	0
Rutile, 0.43 per cent .....	0	12	0
Gold, 1.26 grains at 7.8 pence grain .....	0	0	10
	£18	2	5

4. The minus 6 mesh fraction was concentrated in a Denver jig and the minus 30 mesh jig tailings were re-concentrated on a Wilfley table to act as a scavenger after the jig and determine the quantity recovered by tabling. The sizing analysis of the concentrates indicates that the majority of the chromite can be recovered by controlled jig concentration although some losses of the finer sizes will occur unless tables or Humphrey spirals are used to concentrate the finer fractions. The jig concentrate amounted to 2.57 per cent weight and the table concentrate 0.29 per cent.

5. Tests show practically complete recovery of the chromite, &c., by combined jig and table concentration.

The method recommended for treatment would be to some extent dependent upon the average grade of wash and most suitable means of handling same. The method tentatively recommended is as follows:—

Screen the wash through a trommel to remove trash and gravel to approximately 6 mesh size or finer. Concentrate undersize to a crude concentrate on Humphrey spiral concentrators, and re-concentrate to sale grade on cleaner spirals. Alternatively, final removal of gangue can be performed by jigging, kieving or tabling. Recover gold by amalgamation. Subsequent treatment depends upon the quantity of minerals present. If the cassiterite and rutile maintain a low level it may not be profitable to separate and realise on them. However, with cassiterite in particular it may be necessary to remove it as an undesirable ingredient of chromite concentrate. Chromite is frequently non-magnetic, and samples so far examined have all responded to magnetic separation. This is an effective and convenient method of separation, but it is suggested that the magnetic qualities of the chromite in various sections of the deposit be determined before acceptance of this method of separation.

6. The quantities of cassiterite and rutile in the sample were too small to investigate methods of separation.

The specific gravities of these minerals are 6.8 for cassiterite and 4.2 for rutile and this difference will allow of reasonably good separation by several gravity methods.

### Test Results

#### JIG AND TABLE CONCENTRATION

Followed by electro-magnetic separation of chromite from cassiterite, rutile and gold.

The sample after screening on a 6 mesh screen (aperture 0.14 inch) for rejection of oversize was fed to a test Denver jig and the concentrate was retreated to produce a high-grade concentrate. The jig tailings were screened on a 30 mesh B.S. screen and the undersize was concentrated on a No. 13 Wilfley table and the concentrate produced was recleaned to remove residual gangue.

Results of electro-magnetic separation are shown in paragraph 2 of the summary.

Examination of the jig and table tailings showed possible traces only of chromium and tin.

#### SIZING ANALYSES—MAGNETIC CHROMITE CONCENTRATES

B.S. Screen Fraction	Jig Concs.	Table Concs.
+ 25	0.8	...
+ 30	6.4	...
+ 44	36.5	24.5
+ 52	30.9	25.0
+ 60	12.6	17.9
+ 85	11.4	23.4
+ 100	0.9	3.2
— 100	0.5	6.0