TR7-187-189 R. 419

DRESSING SHED RESIDUES

Sample

A sample of dressing shed residues was received from the Dorset Tin Division, Storeys Creek Tin Mining Co. N.L., with a request for concentration tests by magnetic separation and gravity concentration directed at the concentration of the contained cassiterite and monazite. The sample weight was about 60 lbs. and it contained 3.96 percent of tin. The monazite was estimated at approximately 5 percent. The remainder of the sample consisted mainly of ilmenite and zircon.

Sizing Analysis

Mesh Size B.S.S.	Percent Weight	Percent Tin
+ 5	0.2	1.2
— 5 + 10	0.9	7.7
— 10 + 20	14.4	5.4
— 20 + 44	21.9	2.7
— 44 + 60	18.2	2.5
— 60 + 100	38.7	3.9
— 100	5.7	9.9

Investigation

The sample was sized by screening to the sizes shown above, and each fraction except the plus 10 mesh submitted to magnetic separation to produce a highly magnetic fraction, a weakly magnetic fraction containing the monazite, and a non-magnetic fraction containing the tin.

The tin in the non-magnetics was further concentrated by jigging of the two coarser sizes and by tabling of the finer sizes.

Retreatment of the weakly magnetic fraction was found necessary to achieve the desired grade of monazite concentrate.

Summary

1. To ensure best separation the sample was screened into a number of fractions and each fraction separately treated on a "Laboro" rapid magnetic separator.
2. Tin content is more or less evenly distributed throughout the sizings.

3. Monazite content is concentrated mainly in the minus 60 plus 100 and minus 100 mesh fractions. Cleaner magnetic separation of these fractions produced a concentrate containing 90 percent monazite and 2.80 percent tin. The monazite concentrate amounted to 4.3 percent by weight.

   Monazite concentrates from the coarser concentrates were of low grade and negligible weight and were included with the highly magnetic fraction.

4. Magnetic separation produced a low grade tin concentrate in the non-magnetic fraction amounting to 33.8 percent by weight and containing 10.7 percent tin. Tin recovery in this concentrate was 91.4 percent.

   Loss of tin in the highly magnetic fraction, with one treatment only, was small; the loss was 3.9 percent in a product amounting to 60.8 percent by weight and containing 0.25 percent of tin.

5. Gravity concentration of the non-magnetics produced:—

   (i) Tin concentrate A, 5.37 percent by weight, assaying 46.4 percent tin with a recovery 63.0 percent of the tin, and

   (ii) Tin concentrate B, 4.76 percent by weight assaying 12.8 percent tin with a recovery of tin amounting to 15.2 percent.

   The combined gravity concentrate amounted to 10.1 percent by weight, contained 30.6 percent tin and represented an overall tin recovery of 78.3 percent.

   Production of high grade tin concentrate from the non-magnetics by gravity methods is difficult because of the high proportion of heavy gangue minerals. Electrostatic separation of the non-magnetics would result in higher grade concentrates.

6. Details of tin and monazite recoveries in individual fractions and overall tin distribution are shown in the tabulation of test results.

Screen Fraction	Product	Percent Weight	Percent Sn	Percent Sn Distribution
5 mesh	—	0.2	1.18	—
— 5 + 10 mesh	—	0.9	7.7	—
+ 10 mesh	Untreated	1.1	0.65	1.8
— 10 + 22	Tin Conc. A	1.05	53.9	14.3
	Tin Conc. B	1.74	3.56	1.6
	Gravity Tailing	5.72	1.69	2.5
	Highly Magnetic	5.89	0.97	1.4
	Total — 10 + 22	14.4	5.4	19.8
— 22 + 44	Tin Conc. A	0.67	51.2	8.7
	Tin Conc. B	0.28	10.8	0.7
	Gravity Tailing	8.62	2.20	4.8
	Highly Magnetic	12.33	0.22	0.7
	Tital — 22 + 44	21.9	2.7	14.9
— 44 + 60	Tin Conc. A	0.53	53.4	7.1
	Tin Conc. B	0.59	19.4	2.9
	Gravity Tailing	4.25	0.49	0.5
	Highly Magnetic	12.83	0.30	1.0
	Total — 44 + 60	18.2	2.5	11.5

Screen Fraction	Product	Percent Weight	Percent Sn	Percent Sn Distribution	
— 60 + 100	Tin Conc. A	1.88	44.0	20.9	
	Tin Conc. B	1.70	21.6	9.2	
	Gravity Tailing	4.33	4.58	5.0	
	Monazite Conc.	3.19	2.38	1.9	91.5% monazite
	Highly Magnetic	27.60	0.09	0.7	
	Total — 60 + 100	38.7	3.9	37.7	
— 100	Tin Conc. A	1.24	38.2	12.0	
	Tin Conc. B	0.45	7.5	0.8	
	Gravity Tailing	0.79	1.28	0.3	
	Monazite Conc.	1.10	4.0	1.1	87.1% monazite
	Highly Magnetic	2.12	0.24	0.1	
	Total — 100	5.7	9.9	14.3	
Composite		100.0	3.96	100.0	
	Tin Conc. A	5.37	46.4	63.0	
	Tin Conc. B	4.76	12.8	15.2	
	Tin Conc. A + B	10.13	30.6	78.3	
	Total non-Mag.	33.84	10.7	91.4	
Total	Monazite Conc.	4.29	2.80	3.0	90.1% monazite
	Highly Magnetic	60.77	0.25	3.9	