26. RENISON ASSOCIATED TIN MINES

TR8-179-183 R. 423

MILL PRODUCTS

Investigation

Samples of mill products were submitted by the Renison Associated Tin Mines for research examinations. The requested information was as follows.

Mill Sulphide Tailing and Gravity Tailing.

Required for sizing and analyses of fractions for tin. Examination of fractions for free and composite cassiterite. The samples were stated to be monthly composites labelled 19.9.62.

Sale Tin Concentrates.

Separate samples of firsts and seconds for sizing analyses and magnetic separation. The firsts were labelled RB3 and RB3A, and the seconds RBS3. All minus 200 mesh sizings were performed in a multi-tube hydraulic elutriator.

Summary

1. Examination of the fractions of the sulphide tailing showed a total tin content of 0.36 per cent, and concentration on a Haultain superpanner and subsequent mineragraphic examination showed cassiterite to be present as free and composite grains, details of which are shown in this report. Wet magnetic separation resulted in a lower tin content of the magnetic pyrrhotite fraction with the non-magnetic fraction increased to 0.83 per cent. This process may be worth further study for treatment of the floated sulphides, or for removal of pyrrhotite prior to flotation of non-magnetic sulphides.

2. Examination of the gravity tailings showed that the majority of the loss is in the finest fractions, and 66 per cent of the tin reported in elutriator fractions 4, 5, 6 and 7.

The results of superpanner concentrations and mineragraphic examinations show that composite cassiterite exists in the tailings, and that the proportion decreases in the finer fractions. Examination of E.f.5 shows that appreciable tin is free.

3. Magnetic separation of the sale concentrates resulted in an increase in grade of the "Firsts" from 61.6 to 70.2 per cent tin, with a recovery of 89.4 per cent, and the "Seconds" increased from 39.5 to 61.3 per cent, with a recovery of 88.7 per cent. Removal of pyrrhotite and "dolomite" (pistomesite) in milling operations may be worth further study. Continuous wet magnetic separation could be applied in several ways. Low intensity separation could be applied to the ground ore for removal of the pyrrhotite followed by flotation of non-magnetic sulphides. By this means a saving in the cost of flotation reagents could be anticipated. High intensity separation of the pistomesite and other feebly magnetic minerals before or after concentration may have useful applications.

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

Superpanner concentration and mineragraphic examination of the concentrates have been undertaken on several fractions, with the following results.

Sulphide Tailings + 200 Mesh Fraction

This tailing fraction was reduced from 0.31 per cent to 0.24 per cent tin by removal of a concentrate containing 5 per cent of tin, and amounting to 3½ per cent of the fraction. Mineragraphic examination showed the majority of the cassiterite to be present as composite grains.

E.F. 2

This fraction was reduced in tin content from 0.26 per cent to 0.14 per cent tin by removal of a concentrate containing 5 per cent of tin and amounting to 2.4 per cent by weight of the fraction. Examinations showed that the concentrate contained about 5 per cent of cassiterite as free grains, and a minor quantity as composite grains.

Elutriation of Mill Tailings

Fraction	Cassiterite Mineral Size Range Microns	Settled in Rising Velocities of mm./sec.	Sulphide Tailing Percent			Gravity Tailing Percent		
			Weight	Tin	Tin Dist.	Weight	Tin	Tin Dist.
+150 mesh ..	..	..	20.4	0.27	15.3	13.9	0.25	7.3
+200 ,, ..	+76	..	15.4	0.31	12.4	13.8	0.16	4.6
E.F. 1. ..	76–40	6.16	5.1	0.69	9.7	Trace	..	..
2. ..	40–28	3.05	34.5	0.26	24.8	9.6	0.45	9.0
3. ..	28–20	1.54	10.4	0.44	12.7	13.2	0.24	6.6
4. ..	20–30	0.61	5.7	0.71	11.2	11.8	0.24	5.9
5. ..	13–10	0.19	2.4	0.64	4.3	11.8	1.14	28.1
6. ..	10– 5	0.07	4.1	0.34	3.9	4.5	0.94	8.9
7. ..	– 5	..	2.9	0.71	5.7	21.4	0.66	29.6
Composite ..	..	..	100.0	0.36	100.0	100.0	0.48	100.0
Tin Percent by Vanning Assay ..	..	..	..	0.14	..	..	0.05	..

E.F. 3

This fraction was reduced from 0.44 to 0.22 per cent of tin by concentration on a superpanner, and the concentrate contained 10 per cent of tin, and amounted to 2.25 per cent by weight of the fraction. Mineragraphic examination showed 10 per cent of free grains of cassiterite leaving about 3 per cent of cassiterite as composite grains.

E.F. 4

This fraction was reduced from 0.71 per cent tin to 0.24 per cent by concentration on a superpanner, with the production of a concentrate containing 10.4 per cent of tin, and amounting to 4.63 per cent by weight. Examination of the concentrate showed 12 per cent of free cassiterite grains leaving only about 1 per cent as composites.

A sample of the sulphide tailing was submitted to cleaner wet magnetic separation which resulted in an appreciable separation of the tin values as shown below:—

	Per Cent		
	Weight	Tin	Tin Dist.
Magnetics	73.0	0.2	39.5
Non-magnetics	27.0	0.83	60.4
Composite	100.0	0.37	100.0

No attempt was made to concentrate the cassiterite in the non-magnetic fraction.

Gravity Tailing

E.F. 2

This fraction was reduced from 0.45 to 0.22 per cent tin by removal of a concentrate containing 33.6 per cent of tin, and amounting to 0.69 per cent by weight. Twenty five per cent of cassiterite in the concentrate was present as free grains leaving approximately 18 per cent as composite grains.

E.F. 5

This fraction was very difficult to concentrate on the Haultain superpanner due to the similar appearance of cassiterite and carbonate gangue. However, a concentrate was made containing 33 per cent of tin. This treatment resulted in a drop in the tin content of the tailing from 1.14 per cent of 0.5 per cent tin.

The concentrate contained 43 per cent of cassiterite, and mineragraphic examinations showed that 30 per cent was present as free grains.

Sizing of Mill Concentrates by Elutriation

Fraction	RB3 and 3A "Firsts" Percent			RBS 3 "Seconds" Percent		
	Weight	Tin	Tin Dist.	Weight	Tin	Tin Dist.
+200 mesh	13.5	39.1	8.5	4.2	17.0	1.8
E.f. 1.	22.0	72.1	25.5	5.0	58.3	7.4
2.	22.2	66.5	23.8	23.7	54.1	32.5
3.	18.1	68.1	19.8	25.0	36.2	22.9
4.	16.4	62.1	16.4	29.2	34.4	25.4
5.	4.5	50.8	3.7	8.3	33.2	7.0
6.	3.3	44.0	2.3	4.6	25.6	3.0
Composite	100.0	62.2	100.0	100.0	39.5	100.0

Magnetic Separation of Mill Concentrates

Concentrates were submitted to cleaner magnetic separation on a "Rapid" high intensity electromagnetic separator, with the following results:—

	RB3 and 3A "Firsts"			
	Per Cent			
Product	Weight	Tin	Tin Dist.	Iron
Highly Magnetic	4.3	9.5	0.7	46.8
Feebly Magnetic	17.2	35.6	9.9	15.8
Non-Magnetic	78.5	70.2	89.4	1.0
Composite	100.0	61.6	100.0	5.5

	RBS3 "Seconds"			
	Per Cent			
Product	Weight	Tin	Tin Dist.	Iron
Highly Magnetic	9.1	6.7	1.5	34.9
Feebly Magnetic	33.8	11.5	9.8	26.1
Non-Magnetic	57.1	61.3	88.7	1.6
Composite	100.0	39.5	100.0	12.9