

TR16-312-31A

R.636. Examination of alluvial tin concentrates from Colemans Creek.

Two small samples were submitted for preliminary examination by P. O'Connor and P. Cooney. One was a sample of 'finished' concentrate of the best grade obtained by the partners with present treatment methods (presumably streaming in a sluice box) and the other, a sample of hand picked impurity from the concentrate.

A larger sample of concentrate was submitted later for further metallurgical testing.

The samples were stated to have been obtained from operations at Colemans Creek, near Zeehan.

The object of the tests was to find a simple method of upgrading the concentrate as produced (50-60% Sn) to 70% Sn.

#### PRELIMINARY EXAMINATION

These examinations consisted of sizing and magnetic separation of the concentrate (Reg. No. 712658) and magnetic separation and identification of the minerals in the hand picked impurity (Reg. No. 712659).

The results of these tests showed that:

- (1) The main impurities were ilmenite and monazite.
- (2) These minerals could be removed by magnetic separation to give a high grade concentrate in the non-magnetic fraction without appreciable loss of tin.
- (3) Sizing on 22# could produce a high grade oversize fraction which however contained only about one-third of the total tin.

#### TEST RESULTS

##### *Sizing Analysis of Concentrate*

#	µm	% Wt	% Sn	% Sn Distn
+22	710	27.1	66.7	34.1
+36	425	35.3	57.6	38.3
+44	355	6.5	46.1	5.7
+52	300	13.5	37.8	9.6
-52		17.6	37.2	12.3
Comp. Conc.		100.0	53.1	100.0

##### *Magnetic Separation of Concentrate*

Fraction	% Wt	% Sn	% Sn Distn
M/A1 (ilmenite)	10.6	4.03	0.9
M/A2 (monazite)	13.8	8.15	2.1
N (tin conc.)	75.6	67.5	97.0
Composite	100.0	52.6	100.0

FURTHER METALLURGICAL TESTS ON THE LARGER SAMPLE OF CONCENTRATE

These consisted of a further confirmatory magnetic separator test, jig and table concentration tests on unsized feed, and a sluice box test on the -22# fraction.

The results of these tests showed that:

- (1) magnetic separation is a feasible method of upgrading the concentrate,
- (2) jig concentration under carefully controlled conditions results in a slight upgrading of the concentrate,
- (3) table concentration of the unsized feed is useless as an upgrading operation,
- (4) streaming of the -22# fraction in a sluice box is not an effective upgrading operation.

TEST RESULTS

Magnetic Separation

Product	% Wt	% Sn	% Sn Distn
M/A1 (ilmenite)	12.3	4.9	1.2
M/A2 (monazite)	16.6	12.4	3.9
N (tin conc.)	71.1	70.2	94.9
Composite Head	100.0	52.6	100.0

Jig Concentration (Unsize Feed)

Product	% Wt	% Sn	% Sn Distn
J/C	86.9	58.8	95.5
J/T	13.1	18.5	4.5
Comp. Head	100.0	53.5	100.0

Table Concentration (Unsize Feed)

Product	% Wt	% Sn	% Sn Distn
T/C	71.1	52.5	70.0
T/T	28.9	55.3	30.0
Comp. Head	100.0	53.3	100.0

Sluice box Test

The sample was screened on 22# and an attempt was made to upgrade the -22# fraction by streaming in a miniature sluice box. Visual observation showed that upgrading was not feasible.

Fraction	% Wt	% Sn	% Sn Distn
+22#	24.2	71.2	32.0
-22#	75.8	48.4	68.0
Head	100.0	53.9	100.0

SUMMARY

From the results of the above tests it is evident that little more can be done to upgrade this material by the application of simple gravity methods of concentration. The reasons for this are that the material has a rather extended size range and the two main contaminating minerals, ilmenite and monazite, are relatively heavy (specific gravity 4.5-5.0 and 5.0-5.5 respectively) and hence are difficult to remove by gravity methods. It is possible that close sizing followed by separate tabling of the sized fractions would produce the desired result but this would require the installation of rather elaborate sizing equipment and a number of tables if any volume of concentrate is to be treated.

Even if this were done it is doubtful whether the final concentrate grade would be much over 60% Sn.

A better approach to the problem would be to apply high intensity magnetic separation to the dry unsized crude concentrate. The tests have shown that this method of treatment would result in the production of concentrates of the order of 70% Sn by the removal of magnetic material amounting to about 30% by weight and containing about 5% of the total tin.

The relative economics of selling the crude concentrate as produced or a product upgraded by magnetic separation should be carefully assessed. The ilmenite can be regarded as a waste by-product of upgrading, but a market may exist for a high grade monazite product.

Product	Wt %	Sn %	Fe %
Crude Feed	100.0	51.8	100.0
Head	100.0	51.8	100.0

Table 1: Crude Concentration (Unsized Feed)

Product	Wt %	Sn %	Fe %
Crude Feed	100.0	51.8	100.0
Head	100.0	51.8	100.0
Tail	100.0	51.8	100.0

Table 2: Concentration (Sized Feed)

Product	Wt %	Sn %	Fe %
Crude Feed	100.0	51.8	100.0
Head	100.0	51.8	100.0
Tail	100.0	51.8	100.0

Table 3: Sluice Box Feed

The sample was screened to 150 mesh and an attempt was made to upgrade the -150 mesh fraction by treatment in a magnetic sluice box. Visual observation showed that upgrading was not feasible.

Fraction	Wt %	Sn %	Fe %
Head	100.0	51.8	100.0
-150 Mesh	100.0	51.8	100.0
+150 Mesh	100.0	51.8	100.0