

TR14-193-195

## R.584. Razorback tin ore concentration test

At the request of N. L. Lindsay of Newmont (Australia) Pty Ltd preliminary tin concentration tests were carried out on a sample of sulphide ore prepared from samples taken by Placer Prospecting Pty Ltd to determine the recovery of tin.

### SAMPLE

The sample was made from —18 mesh portions from the following samples:

Mines Department Registered No.	Placer Prospecting Pty Ltd No.
663590	6064
663591	6067
663592	6069

These portions were thoroughly mixed to form the sample for testing.

This sample was riffled to provide a head sample for assay, and 2,000 g samples for concentration tests.

The head sample assayed as follows:

cassiterite	Sn 3.2%	Zn 0.14%
soluble	Sn 0.18%	Pb 0.13%
	Cu 0.22%	

NOTE: (1) No responsibility will be accepted for the results shown in this report except in so far as they apply to the sample tested.

(2) All screens used were from the British Standard Screen Series.

(3) Make-up water used in tests was Launceston town supply.

### TEST WORK

In the first test (N1), a 2,000 g sample was ground in a Warman laboratory 8-in x 8-in ball mill for 5 minutes at 70% solids. The pulp was transferred to a Denver 'Sub-A' laboratory flotation machine model D-2 and make-up water was added to bring the pulp to the desired level for flotation. After thorough mixing of the pulp, the pulp was allowed to settle. A sample of water was drawn off and the pH was found to be 4.4. It was decided that no acid addition was required at this pH level for satisfactory flotation of the pyrrhotite.

The pulp was conditioned for 15 minutes with 1 lb/ton of copper sulphate. 0.5 lb/ton of sodium ethyl xanthate and 0.04 lb/ton of cresylic acid were then added with conditioning for one minute.

The pyrrhotite floated very readily. After 7 minutes flotation, a further 0.5 lb/ton of sodium ethyl xanthate was added. However, a secondary lift in flotation rate was not evident and flotation was stopped after a total time of 10 minutes.

The flotation tail was screened on an 85 mesh screen, and the screen over-size and under-size were tabled separately on the Deister laboratory table using the sand deck. A concentrate, a middling and a tailing were produced in each case.

In the second test, N2, the 2,000 g sample was ground for 10 minutes. In order to reduce the rate of froth removal, the initial sodium ethyl xanthate addition was reduced to 0.3 lb/ton. After 7 minutes flotation, a further 0.2

lb/ton of sodium ethyl xanthate was added. This addition increased the rate of froth formation at this stage, and it was necessary to float for a total of 15 minutes in order to bring flotation to completion. The purpose of the less vigorous flotation in the second test was to reduce the possibility of mechanical entrainment of cassiterite particles in the flotation froth.

The flotation tail from the second test was screened on a 120 mesh screen, and the screen products were tabled separately on the Deister laboratory table, using the sand deck.

The details for the conditions of the two tests are as follows:

Reagent or condition		N1	N2
Grinding time	min.	5	10
pH		4.4	—*
Copper sulphate	lb/ton	1.0	1.0
Conditioning time	min.	5	5
Cell speed	r.p.m.	1800	1800
Cresylic acid	lb/ton	0.04	0.04
Sodium ethyl xanthate	lb/ton	0.5	0.3
Conditioning time	min.	1	1
Sodium ethyl xanthate after 7 min. flotation	lb/ton	0.5	0.2
Flotation time	min.	10	15
Flotation tailings screened	mesh	85	120

\* Not determined

The flotation concentrate and each of the table products were assayed for cassiterite Sn and soluble Sn. The results are as follows:

Test	Products	% Weight	Assay %		Distribution %	
			C.Sn	S.Sn	C.Sn	S.Sn
N1	FC	70.2	0.84	0.20	17.8	89.8
	+ 85 mesh FT:TC	1.9	28.2	0.15	16.2	1.9
	TM	0.2	5.55	0.03	0.3	0.0
	TT	11.3	1.04	0.06	3.6	4.5
	- 85 mesh FT:TC	2.8	59.5	0.06	50.4	1.3
	TM	3.3	2.60	0.03	2.6	0.6
	TT	10.3	2.93	0.03	9.1	1.9
	F/D	100.0	3.31	0.16	100.0	100.0
	(calculated)					
N2	FC	71.7	0.64	0.20	14.4	93.4
	+ 120 mesh FT:TC	0.9	44.2	0.12	12.5	0.7
	TM	2.0	3.40	0.11	2.1	1.3
	TT	8.0	0.70	0.04	1.7	1.9
	- 120 mesh FT:TC	3.0	56.9	0.03	53.5	0.7
	TM	2.9	1.75	0.02	1.6	0.7
	TT	11.5	3.95	0.02	14.2	1.3
	F/D	100.0	3.19	0.15	100.0	100.0
	(calculated)					
	F/D (assay)		3.21	0.18		

ABBREVIATIONS:

C.Sn	cassiterite tin
FC	flotation concentrate
F/D	feed
FT	flotation tailing
S.Sn	acid soluble tin, e.g., stannite
TC	table concentrate
TM	table middling
TT	table tailing

A summary of the cassiterite Sn recovery in concentrates is as follows:

Test	Product	Assay %	Recovery %
N1 .....	table concentrates	46.9	66.6
N2 .....	table concentrates	54.0	66.0

#### CONCLUSIONS

It is possible to produce a tin concentrate assaying 50% tin with recovery of 66%.

Some 70% of the ore occurs as sulphides, chiefly pyrrhotite, which is readily floatable.

Stannite tin is present in minor amounts.

There appears to be only a minor middling problem. In test N1 only 2.9% of the tin appeared in the middling fractions. In test N2 3.7% of the tin appeared in the middling fractions.

Higher tin recovery should be achieved by retreatment of the middlings, by cleaning of the sulphide concentrate, and by more sophisticated recovery techniques than were attempted in these tests.