

*TR 11-154-158***R. 517****28. RENISON LTD: MILL SULPHIDE FLOTATION CLEANER
SINK CONCENTRATION TESTS****Sample**

Approximately 10 gallons of thickened cleaner sink pulp were received from the above company. The company requested gravity concentration tests by two stages of tabling, followed by flotation rejection of sulphides from the gravity concentrates.

Investigation

The pulp sample was fed to a hydrosizer having a rising current designed to overflow nominally minus 200 mesh cassiterite. The overflow and spigot products were tabled separately to produce moderate grade concentrates (20 to 30 per cent tin). The tailings from these operations were combined.

The two concentrates were then retabled to a somewhat higher grade and then submitted to flotation for sulphide removal. One and two stages of cleaning were applied to spigot and overflow

concentrates, respectively. Reagents used were: sulphuric acid, copper sulphate, sodium ethyl xanthate, potassium amyl xanthate and cresylic acid. These reagents are currently used in Renison milling practice.

Sizing analyses were performed on the feed sample and the combined first table tailing.

All products were assayed for tin and sulphur.

Head Assays

	%
Tin	4.40
Sulphur	5.34
Arsenic	0.80

Test Results

The following tabulation should be read in conjunction with the test flowsheet (fig. 44).

Product	Weight	Per Cent		Per Cent Distribution	
		Tin	Sulphur	Tin	Sulphur
Tin Concentrates—					
Spigot F1T*	0.95	24.3	4.18	5.0	0.8
F2T	0.06	8.00	20.2	0.1	0.2
O'Flow F3T	4.19	44.2	0.50	40.2	0.4
F4T	0.43	45.5	1.65	4.2	0.1
F5T	0.30	23.6	9.39	1.5	0.5
Total Tin Conc.	5.93	39.7	1.82	51.0	2.0
Sulphides—					
Spigot F2C	0.23	1.40	33.2	0.1	1.4
O'Flow F5C	1.33	3.90	37.5	1.1	9.3
Total Sulphides	1.56	3.5	36.9	1.2	10.7
Gravity Tailings—					
T1+T2 Com- bined Tail	87.64	2.25	5.12	42.8	83.4
Spigot T3T	2.76	4.65	3.55	2.8	1.8
O'Flow T4T	2.11	4.85	5.44	2.2	2.1
Total Gravity Tailing	92.51	2.38	5.36	47.8	87.3
Composite Head ...	100.00	4.61	5.38	100.0	100.0

* F1T=Sulphide Flotation Stage 1 Tailing.

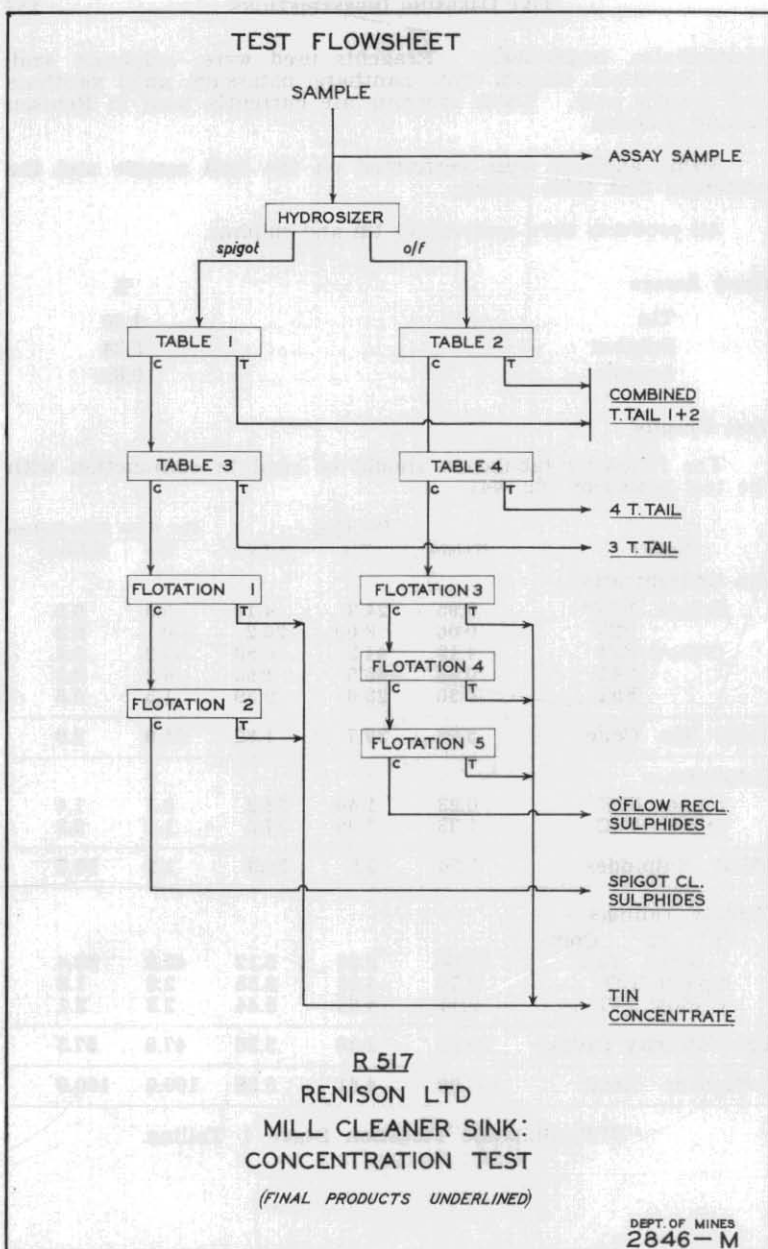


FIGURE 44

Sizing Analyses

Fraction	SnO ₂ Microns	Head Sample						T1+T2 Combined Tail.			
		Per Cent			% Distribution			Per Cent		% Distribution	
		Weight	Tin	Sulphur	Tin	Tin Cum.	Sulphur	Weight	Tin	Tin	Tin Cum.
+200 mesh	+76	5.0	0.65	4.57	0.7	0.7	4.3	2.0	0.23	0.2	0.2
+300 mesh	-76+53	2.7	1.20	6.57	0.7	1.4	3.3	1.5	0.20	0.1	0.3
C.S. 1	-53+21	5.8	25.0	6.08	33.0	34.4	6.6	0.8	2.00	0.7	1.0
2	-21+17	4.5	11.4	3.88	11.7	46.1	3.3	2.6	1.65	1.9	2.9
3	-17+12	6.0	9.01	4.05	12.3	58.4	4.6	5.0	3.85	8.6	11.5
4	-12+ 8	9.0	5.84	3.14	11.9	70.3	5.3	9.7	4.40	19.0	30.5
5	- 8+ 6	4.5	4.30	3.55	4.4	74.7	3.0	6.3	4.30	12.0	42.5
Minus 5	- 6	62.5	(1.78)	(5.95)	25.3	100.0	69.6	72.1	(1.79)	57.5	100.0
Comp. Head		100.0	4.40	5.34	100.0		100.0	100.0	2.25	100.0	

() Derived figures.

Tin Recovery in Individual Sizings

Size Fraction	% Tin Recovery
+200 mesh	88.6
+300 mesh	94.5
C.S. 1	99.1
2	93.1
3	70.1
4	31.6
5	Neg.
Minus 5	3.1
Mean Recovery	57.2

The above tabulation has been derived from sizing analyses of the feed sample and T1+T2 combined table tailings. The figures quoted therefore relate to recoveries obtained in the primary tabling operations.

Summary

1. Two stage table concentration followed by flotation rejection of sulphides from gravity concentrates resulted in a tin recovery of 51.0 per cent in the final concentrate. This concentrate assayed 39.7 per cent tin and 1.82 per cent sulphur.

2. The sizing analysis of the sample confirms that this recovery is of the order that could be expected from table concentration. About 54 per cent of the tin is in the minus 17 micron size range and is unlikely to be recovered by tabling. Comparison of feed and tail sizings illustrates how recovery depreciates with increasing fineness.

3. Sulphide flotation was found to be somewhat difficult in the spigot table concentrates, using reagents currently in use at Renison. Sulphide rejection from this product was 61 per cent after Cleaner Flotation. Sulphides floated readily from the classifier overflow concentrate under the same conditions showing a sulphide rejection of 90 per cent after recleaner flotation.

Average sulphide rejection from both gravity concentrates was 84.6 per cent. Total sulphide reject contained 1.2 per cent of the total tin, and assayed 36.9 per cent sulphur.

Discussion

The test work detailed above has been limited to the programme suggested by the company. However, the examinations have shown that this product would be more suitably treated by tilting decks and/or vanners than by tables.

A study of the feed sizing analyses shows that more than 60 per cent by weight of the material reports in the cyclosizer overflow, whereas some 70 per cent of the tin reports in C.S. fraction 4 or coarser. It is apparent that desliming by hydraulic cycloning of the material under suitable conditions should enable some 60 per cent by weight to be discarded in the cyclone overflow without loss of recoverable tin. Obvious advantages of this procedure would be reduction of the duty required of subsequent concentrating devices, and the supply of a considerably upgraded feed to them.

The extreme fineness of the sample suggests that some over-grinding of the cassiterite could have occurred. An examination of the grain size of cassiterite in the rougher sulphides would provide some information on this point.