

TR7-185-187 R. 418

NATURE OF TIN LOSSES IN SAND TAILINGS

Approximately 150 pounds of sand tailings were obtained from Aberfoyle Tin N.L. on the 26th July, 1962. The sample was stated to represent two weeks production during July, 1962, and was chosen because of its rather abnormally high tin content.

Investigation

The company requested an investigation into the nature of the tin losses in the sand tailing, and further requested an investigation into possible recovery of the tin after regrinding.

Summary

1. Seventy-five (75) percent of the tin in the sand tailing is finer than 200 mesh, and 65 percent is finer than 350 mesh. The presence of much of this material is due to inefficient sizing prior to concentration.
2. Concentration units are operating quite efficiently on material in the size range suited to the units. Thus the plus 120 mesh material assays only 0.08 percent tin.
3. About 42 percent of the tin in the tailings is recoverable by gravity concentration. However, it is unlikely that such recoveries would be possible on equipment presently installed at Aberfoyle.
4. Any increase in recovery from regrinding must be expected from the coarser size fractions. As the 77.6 percent of the tailing coarser than 120 mesh assayed only 0.08 percent tin, it is obvious that there is very little scope for further recovery of tin by regrinding these fractions.

Research

The sample as received assayed 0.28 percent tin.

A sizing analysis gave—

Size Fraction	Weight %	Assay % Sn	Distribution % Sn
Plus 5 mesh	Trace		
10 mesh	1.2	10.0	0.11
16 mesh	8.8		
22 mesh	12.7		
36 mesh	17.4		
44 mesh	6.0	9.4	0.07
60 mesh	10.1		
85 mesh	12.0		
100 mesh	3.4		
120 mesh	6.0	8.4	0.15
150 mesh	3.7		
200 mesh	4.7		
350 mesh	4.9		0.60
20 microns	5.7		2.77
Minus 20 microns	3.4		0.88
Composite	100.0		0.29
			100.0

Material in the minus 16 plus 120 mesh size range is quite satisfactory, assaying between 0.06 and 0.08 percent tin. Material in the plus 16 mesh size range is a little higher in tin content at 0.11 percent tin, but is still reasonable. The higher tin content is probably due to some composites. The whole of the plus 120 mesh material assays 0.08 percent tin and contains 77.6 percent by weight of the sample, and 20.7 percent of the tin.

The material in the minus 120 plus 200 mesh and in the minus 200 plus 350 mesh size ranges assays 0.15 and 0.60 percent tin respectively. Cassiterite in these size ranges should be recoverable on say numbers 4 or 5 sand tables or on slime tables. However, it may be that some material in this size range enters the fine jigs or the coarsest sand tables and is not being recovered there. It is unlikely that this tin is present as composites.

Material in the minus 350 mesh plus 20 micron (quartz equivalent) assays 2.77 percent tin and contains 54.5 percent of the total tin in the tailing. Some of this tin could be recovered by slime tabling and much of it could be recovered by tilting decks. Composites are unlikely to be present.

The minus 20 micron material contains about 10 percent of the total tin in a product assaying 0.88 percent tin. It is unlikely that any appreciable quantity of this cassiterite could be recovered by gravity concentration.

To sum up, 75 percent of the tin in the tailings is finer than 200 mesh, and 65 percent is finer than 350 mesh. The majority of this material should not appear in the feed to the sand concentration units and its presence there is due to inefficient sizing ahead of the concentration units. For material within the correct size range, that is, plus (say) 120 mesh, the sand concentration units are operating quite efficiently, as is evidenced by the overall assay of 0.08 percent for the 77.6 percent of the tailing coarser than 120 mesh.

Regrinding and retreatment of the coarse fractions is unlikely to yield any significant increase in tin recovery due to the low tin content of these sizes, that is, 0.08 percent tin.

Vanning of Several Fractions

To show that much of the tin in the fine fractions is indeed recoverable, portion of these fine fractions were concentrated by "vanning". A "vanning" recovery should be close to optimum gravity recovery.

Results were:—

Size Fraction	Assay % Sn	Vanning Assay % Sn	Distribution of Tin in Tailing %	Proportion of Tin Recovered in fraction %	Proportion of Tin Recovered Overall %
Plus 120 mesh	0.08	—	20.7	—	—
200 mesh	0.15	0.10	4.3	67	2.9
350 mesh	0.60	0.49	10.2	82	8.3
20 microns	2.77	1.59	54.5	57	31.1
Minus 20 microns ..	0.88	0.03	10.3	3	0.3
Composite	0.29	—	100.0	—	42.6

These results indicate that about 42 percent of the tin in the sand tailing is recoverable by gravity concentration.

British Standard Screens were used throughout the investigation.

The 20 micron (quartz equivalent) separation was carried out by decantation. This separation is equivalent to about 14 microns cassiterite equivalent.