Duplicate

DEPARTMENT OF MINES LABORATORY

Launceston.

16th May, 1944.

No 116

INVESTIGATION NO. 186/44.

MT. BISCHOFF

Preliminary Information.

Investigation.

A sample of tailings in pulp form in a sealed container, stated to be from North Valley Mill, was submitted for concentration tests. Concentration tests were confined to the "slimes" or finer fraction of the tailings as information was required relating to recoveries of cassiterite in the "slimes" only.

Classification.

The sample was classified in an upward current of 20 m.m./sec. in a pipe classifier with the following results. Unsettled solids refer to solids in suspension in the classifier overflow after 12 hours settlement.

Product	Percent Weight	Percent Tin	Percent Tin Distribution	Percent Sulphur
Sands (Spigot)	30.98	0.21	19.60	7.92
Classifier Overflow	67.98	0.39	79.96	8.84
Unsettled Solids	1.04	0.14	0.44	
Composite	100.	0.33	100.	

Total weight of sample received 27.4 K. G.

Sizing Analyses. (B.S. Screens.)

	Sands (Spigot)			Classifier Overflow		
				Percent.		
Size	Weight	Tin	Tin Distribution	Weight	Tin	Tin Distribution
+ 44	42.69	0.23	46.72			
+ 60	21.01	0.18	17.98			
+ 85	23.76	0.16	18.08	0.44	0.05	0.05
+100	3.88	0.16	2.95	1.16	0.04	0.13
+120				2.52	0.05	0.33
+150	6.93	0.24	7.90	6.04	0.08	1.22
+200	1.23	0.56	3.28	9.40	0.10	2.39
-200	0.50	1.31	3.09	(80.44)	(0.47)	(95.88)
1.S 1				7.20	0.36	6.59
2				13.56	0.40	13.79
3				10.76	0.67	18.35
4				9.36	0.67	15.96
5				7.24	0.65	11.98
6				6.09	0.55	8.52
7				26.23	0.31	20.69
Composite	100.	0.21	100.	100.	0.39	100.

Figures in brackets for classifier overflow minus 200 mesh product are composites of Infra-Sizer fractions 1 to 7 inclusive.

The following test work refers to the Classifier Overflow only.

Flotation Rejection of Sulphides.

Tests have been undertaken for flotation of the bulk of the sulphides with minimum loss of cassiterite.

Preliminary tests resulted in rejections of 80.93 to 88.44 percent of sulphur. The rougher flotation concentrates amounted to 16 to 19 percent by weight and contained 0.1 to 0.2 percent tin or approximately 5 percent of the total tin.

Reagents tested were Ethyl and Amyl Xanthates and Cresylic Acid as a frother. Slightly better results were obtained with the addition of copper sulphate.

Test 4. Flotation rejection of Sulphides, table concentration of flotation tailings to a low grade concentrate.

Weight of material treated 9.9 K.G.

Flotation Conditions.

Batch flotation in 2000 gram. lots.

Sulphuric Acid		2 lbs/ton	15 minutes
Copper Sulphate		0.25 lbs/ton	5 "
Sodium Ethyl Xanthate		0.5 lbs/ton	5 "
Cresylic Acid	0.15 lb/ton	float	7 "
Pine Oil	0.01 / ton	"	2 "

p.H. values of pulps 7 to 7.5

Rougher float recleaned once with minor additions of reagents towards the conclusion of the float.

These reagent conditions are not necessarily to be regarded as preferred reagent combinations. It will be shown later in the completed report that 80 percent of the sulphides were floated with Ethyl Xanthate and Cresylic acid only.

Table Concentration.

Flotation tailings were tabled for the production of rougher concentrate. The following table shows the combined results of flotation and tabling.

Results Test 4.

	Percent.		Percent Tin	Sulphur	
Product	Weight	Tin	Distribution	%	% Dist.
Table Concentrate	1.64	8.40	36.51	15.86	2.94
Table Middling	1.32	0.36	1.16	3.93	0.64
Table Tailing	89.34	0.27	57.40	1.21 calc.	11.92 calc.
Flotation Concentrate	16.90	0.11	4.93	44.72	85.5
Composite	100.	0.38	100.	8.84	100.

Test 5. Tabling for the production of a pyritic concentrate and flotation of the sulphides in the table concentrate. Test undertaken for comparative purposes with Test 4. Flotation conditions similar to test 4 but without H_2SO_4.

Results.

Product.	Percent Weight	Percent Tin	Percent Tin Distribution	Sulphur %	Sulphur % Dist.
Table Concentrate					
(Flotation Tailing	3.47	4.54	40.00	6.60	2.60
(" Concentrate	6.79	0.26	4.50	47.28	36.31
Table Middling	7.86	0.28	5.59	10.69	9.50
" Tailing	81.88	0.24	49.91	5.57 calc.	51.59 calc.
Composite	100.	0.39	100.	8.84	100.

Concentration of the rougher tin concentrates to marketable grade.

The majority of the recovered cassiterite ranged from a nominal grain size of 76 to 14 microns. Thirty five percent of the forty cent of the tin in the concentrate of test 5 assaying 4.54 percent tin was within this range. Concentration to a high quality concentrate is a difficult operation for two reasons.

1. Fine grain sizes of the cassiterite.
2. Associated gangue mainly consists of carbonate minerals of a probable Sp. G. of approximately 3.5.

Test work, unless with pilot plant operation, is not regarded as acceptable evidence for the production of a finished concentrate and mill operation is obviously desirable for this purpose.

For the two reasons quoted, vanning concentration tests give indifferent results and actual results obtained show a recovery of approximately 50 percent; this can be inclined to 90 percent by preliminary acid treatment. To supply data relating to recovery and grade the rougher concentrate of Test 4 was concentrated on a Super-panner with the following results:-

Concentration of Test 4 Table Concentrates (Super-Panner).

Product	Percent Weight	Percent Tin	Percent Tin Distribution
Concentrate	8.76	70.2	78.93
Tailing	~~91.24~~	1.8	21.07

calculations based on an 80 percent recovery of the cassiterite from the rougher table concentrate of Test 5 to a finished concentrate of 70 percent tin gives the following results.

Estimated recovery in the Classifier overflow.

Recovery 32 percent or 0.126 percent tin.

Estimated overall recovery in the tailing sample as received.

Recovery 25.59 percent or 0.086 percent tin.

It is noted that the sample tested has a lower tin content than previous samples.

The following table shows the calculated recoveries obtained in Test 5, and tin distribution of feed.

Tin Recoveries in sizings.

Size	Nominal Grain size for Cassiterite	Percent Tin Distribution in Feed	Percent Tin Recovered in each sizing (calculated)
+ 200 mesh	+ 76 microns	4.12	39.08
I.S. 1	76 - 45	6.59	59.03
2	45 - 30	13.79	70.64
3	30 - 20	18.35	74.61
4	20 - 14	15.96	42.42
5	14 - 10	11.98	17.36
6	10 - 8	8.52	8.82
7	8 - 0	20.69	10.10