

LAUNCESTON, 15th May, 1945.

N<sup>o</sup> 132.ORE DRESSING INVESTIGATION NO. 76-81/45.TIN ORE - MOUNT CLEVELAND, KARAYAH.TABLE CONCENTRATION.Previous Investigations.

No. 94/44 )  
 No. 63/44 ) Table Concentration. Samples supplied by Mr. C.E. Gray.

C.S.I.R. Mineragraphic Investigation No. 309. Examination of test products from ore dressing investigation No. 63/44.

C.S.I.R. Mineragraphic Investigation No. 305. Examination of ore specimens.

Sample.

The sample used for this investigation consisted of equal quantities of six samples obtained by the Government Geologist and stated to be from underground workings 50 ft. below Halls Cut, Mt. Cleveland Mine. These samples have been previously assayed with the following results.

Reg. No.	Description	Total	Tin Percent		Sulphur Percent
			Vanning Percent Tin	Assay Percent Recovery	
76-1	2'	0.97	0.84	86.6	13.5
77-2		1.53	1.29	84.3	11.4
78-3	66' from X-cut	0.70	0.53	75.7	11.4
79-4	46' " " "	1.06	0.82	77.5	10.2
80-5	26' " " "	0.66	0.54	81.8	18.4
81-6	6' " " "	0.93	0.79	84.9	12.4

Vanning assays were performed as follows: Samples ground to minus 60 mesh and digested with HCl and HNO<sub>3</sub> to remove sulphides and residues vanned to high grade concentrates. Treatment included re-grinding and vanning of primary vanned tailings.

The ore consists essentially of fine grained quartz and green chloritic mica intergrown with sulphide minerals. The pre-dominant sulphide mineral is pyrrhotite and Dr. Stillwell identified the presence of the following in minor quantities: Chalcopyrite, splalerite, stannite, native bismuth and marcasite. The stannite was determined as amounting to about 0.4 percent of the total sulphides present. The percentage of sulphides present was found to be approximately twenty-five. Previous investigation has shown that some cassiterite is present in ball mill ground material as composite grains with stannite (usually a partial skin or rim of stannite). This association has been isolated as the reason for comparatively high tin loss in flotation concentrates in previous investigations.

The composite sample was assayed with the following results:-

Tin	1.0 percent
Copper	0.39 "
Sulphur	12.9 "
Acid Insoluble	39.8 "
Pb, Sb, Bi, As	Nil

Investigation.

Concentration tests have been undertaken of a similar nature to those reported in investigation No. 63/44. Tests 1 and 2 consist of table concentration to pyritic concentrates. The concentrate from Test 2 was roasted and vanned to a finished concentrate. Test 3 consists of flotation rejection of sulphides and table concentration of the flotation tailings. The ore was stage ball mill ground to the desired size for each test and had previously been reduced to minus 5 mesh size by roll crushing.

Sp. and C/o abbreviations in the tables refer to products from Spigot and Classifier Overflow respectively.

Test 1. Minus 36 mesh grind, classified and table concentration to pyritic concentrates.

Results.

<u>Product</u>	<u>Percent</u>		<u>Percent Tin Distribution</u>
	<u>Weight</u>	<u>Tin</u>	
Concentrate (Sp)	15.13	2.54	38.94
" (C/o)	6.74	3.56	<u>24.33 63.27</u>
Middling (Sp.)	10.32	0.72	7.53
" (C/o)	6.72	0.51	3.48
Tailing (Sp.)	17.37	0.63	11.09
" (C/o)	43.72	0.33	14.63
Composite	100.00	0.98	100.00
Composite-Concentrate	21.87	2.85	63.27

Ratio of concentration 4.57

Test 2. Minus 36 mesh grind, classification and table concentration to pyritic concentrates. Classification and grinding of primary middlings and tailings to approximately minus 150 mesh size and table concentration of same.

Results.

<u>Product.</u>	<u>Percent</u>		<u>Percent Tin Distribution</u>
	<u>Weight.</u>	<u>Tin.</u>	
Concentrate (Sp.)	14.15	2.66	37.6
" (C/o)	6.36	4.02	25.55
" Secondary	2.63	5.89	<u>15.47 78.62</u>
Middling	7.39	0.64	4.73
Tailing	69.47	0.24	16.65
Composite	100.00	1.00	100.00
Composite Concentrate	23.14	3.4	78.62

A sample of the composite concentrate was roasted and vanned to a high grade concentrate and a recovery of 82.6 percent of the tin was obtained.

This represents an overall recovery of 64.9 percent.

Test 3.

Flotation rejection of sulphides and table concentration.

Minus 85 mesh grind, cleaner flotation of sulphides, classification and rougher table concentration of flotation tailings to concentrates of moderate quality and (spigot 24.14 and classifier overflow 5.93 percent tin) re-concentration of the rougher concentrates to a finished product with Haultain super-panner.

Flotation Conditions.

	<u>Pounds per ton/minutes</u>	
	<u>Rougher</u>	<u>Cleaner</u>
Copper Sulphate	0.5/15	-
Sodium Ethyl Xanthate	0.5/5	0.25/5
Cresylic Acid	0.17	0.1
Flotation time	/5	/5
pH value	5.7	-
T43	-	0.1

Results.

<u>Product.</u>	<u>Percent</u>		<u>Percent Tin Distribution</u>
	<u>Weight</u>	<u>Tin</u>	
Concentrate	0.96	60.2	<u>56.63</u>
Middlings	11.04	1.15	12.37
Tailing (Sp.)	17.00	0.37	6.13
" (C/o)	42.90	0.30	12.54
Cleaner Flotation Concentrate	28.10	0.45	12.33
Composite	100.00	1.03	100.00

Summary.

1. Primary and secondary grinding and concentration to pyritic concentrates resulted in a recovery of 78.6 percent of the tin in a concentrate containing 3.4 percent tin. Roasting and vanning of this concentrate resulted in a recovery of 64.9 percent in a concentrate containing 68 percent tin. Secondary grinding to 150 mesh and concentration to a pyritic concentrate increased recovery to the pyritic concentrate stage by 15 percent. (Test 2).
2. A recovery of 56.6 percent was obtained by grinding to minus 85 mesh, rejection of sulphides by cleaner flotation and concentration of the flotation tailings. The flotation concentrate amounted to 28.1 percent by weight and contained 0.45 percent tin or 12.3 percent of the total tin.

Conclusions.

Fine grinding is necessary for optimum recovery and

for the production of pyritic concentrates is best accomplished by primary and secondary grinding with concentration after each reduction.

Concentration to pyritic concentrates, roasting and re-concentration shows a higher recovery (8.3%) than flotation rejection of sulphides and concentration of the flotation tailings. Intimate association of cassiterite and stannite is the reason for the higher loss in treatment utilizing flotation of sulphides. In test 3 with a minus 85 mesh grind the flotation concentrate assayed 0.45 percent tin. This loss is reducible by finer grinding and at approximately minus 200 mesh is only half of that shown at 85 mesh. Such fine grinding however may not result in improved recovery owing to sliming of a proportion of the cassiterite.

CHIEF CHEMIST & METALLURGIST.