

NOTE.—All communications on Departmental business to be addressed to the Chief Chemist and Metallurgist, Mines Office, Launceston.



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Tasmania.

Department of Mines Laboratory,

Launceston, 5th September 1942.

Duplicate

The Director of Mines,
 Hobart.

No 77.

Investigation No. 689/42.

Middle
Tailings, Test Arm, Beaconsfield.

A sample of sands weighing 39 lbs was obtained from ~~Test~~ *Middle* Arm on the 8th August 1942 and represented a composite of several bores to a depth of 3 feet. The sample consisted essentially of quartz sand with minor quantities of sulphides and silice. Assay results are given in terms of the long ton (2240 lbs.) No responsibility is taken for the results given in this report except in so far as they apply to the sample tested. Water from city supply and B.S. Screens were used for these tests.

Object of Investigation.

Concentration tests by flotation for recovery of gold and copper contents of the minus 80 mesh fraction of the sample only, without subjecting to any grinding. The sizing separation was performed by hydraulic classification. Examination of the spigot product (+80 mesh) showed that it contained unattached sulphides in the finer fractions, consequently it was decided in addition to test by flotation the minus 60 mesh portion of the spigot product.

Products obtained by hydraulic classification.

Classifier overflow solids in suspension after 12 hours were assayed separately and not included in flotation tests.

<u>Product</u>	<u>Percent</u>	<u>Assays.</u>		<u>Distribution</u>		
		<u>Gold</u> <u>lbs/ton</u>	<u>Percent</u> <u>Cu S</u>	<u>Percent.</u>	<u>Au</u>	<u>Cu</u>
Spigot sands	71.0	1.8	0.09 0.59	58.0	41.1	53.3
Classifier overflow	28.4	3.2	0.31 1.28	41.4	56.6	46.3
Unsettled solids	0.6	2.3	0.58 0.52	0.6	2.3	0.4
Composite	100.0	2.2	0.15 0.78			

FROM Department of Mines Laboratory,

Launceston, Tasmania,

TO ~~The Director of Mines~~

Spigot Sands. Plus and Minus 60 Mesh.

<u>Product</u>	<u>Percent of Total sample.</u>	<u>Assays.</u>	
		<u>Gold. Wts/ton.</u>	<u>Copper Percent.</u>
+60	47.4	1.6(calc)	.06
-60	23.6	2.18	.15
Comp.	71.0	1.8	0.09

Screen Analyses.

<u>Screen Size.</u>	<u>Spigot Sands.</u>		<u>Classifier Overflow.</u>	
	<u>Percent.</u>	<u>Percent Cum.</u>	<u>Percent.</u>	<u>Percent Cum.</u>
Plus 20	1.0	1.0		
" 40	35.1	36.1		
" 60	30.7	66.8		
" 80	19.3	86.1	1.0	1.0
" 100	9.8	95.9	3.4	4.4
Minus 100	4.1	100.0		
Plus 150	N.D.		13.8	18.2
" 200	"		21.0	39.2
Minus 200	"		60.8	100.0

Flotation.

Tests No's 1, 2 and 3 represent tests on the Classifier overflow and test 5 on the minus 60 mesh portion of the spigot sands.

Flotation Conditions.

	<u>Test 1</u>	<u>Test 2</u>	<u>Test 3</u>	<u>Test 5</u>
Minutes Agitation of Pulp.	5	5	5	5
Minutes Conditioning.	5	5	5	5
Minutes Flotation.	5	5	7	15
p.H. value after test.	8	8	8	8
Frother.	Fine	None	Fine	Fine

FROM Department of Mines Laboratory,
Launceston, Tasmania,

TO ~~The Director of Mines.~~

Reagents. lbs/ton.

	<u>Test 1</u>	<u>Test 2</u>	<u>Test 3</u>	<u>Test 5</u>
Methyl Xanthate.	0.5	0.5	—	—
Reagent No. 208.	—	—	0.25	0.25
Reagent No. 301.	—	—	0.25	0.25
Na ₂ CO ₃ .	—	—	0.5	0.5
NaCl.	—	2%	—	—

Results.

<u>Test No.</u>	<u>Product</u>	<u>Percent</u>	<u>Assays.</u>			<u>Distribution</u>		
			<u>Gold</u> <u>lbs/ton</u>	<u>Percent</u> <u>Cu.</u>	<u>S.</u>	<u>Au</u>	<u>Percent</u> <u>Cu</u>	<u>S</u>
1	Conc.	5.2	30.8	1.81	12.49	51.3	31.1	50.1
"	Tails	94.8	1.6	0.22	0.68	48.7	68.9	49.9
"	Comp.	100.0	3.1	0.3	1.2			
2	Conc.	8.0	20.8	1.2	7.69	50.1	32.3	46.5
"	Tails	92.0	1.8	0.22	0.77	49.9	67.7	53.5
"	Comp.	100.0	3.3	0.3	1.32			
3	Conc.	3.5	43.8	2.39	17.63	49.8	28.3	48.8
"	Tails	96.5	1.6	0.22	0.67	50.2	71.7	51.2
"	Comp.	100.0	3.0	0.29	1.26			
5	Conc.	2.3	56.6	1.74	26.95	59.7	25.5	60.2
"	Tails	97.7	0.9	0.12	0.42	40.3	74.5	39.8
"	Comp.	100.0	2.18	0.15	1.03			

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Launceston, Tasmania.

TO The Director of Mines

The concentrates were not cleaned and contained a proportion of slime. An elutriation test was made with the classifier overflow to ascertain assay values of the slime. Velocity of separation by upward current was 0.2 mm/sec giving an overflow for quartz of a nominal size of minus 18 microns.

Product	Percent	Assays					
		Gold wts/ton	Percent		Percent Distribution		
			Cu	S	Au	Cu	S
Residue	78	3.1	0.26	1.33	74.3	63.9	80.9
Overflow	22	3.8	0.52	1.11	25.7	36.1	19.1

Sizing analysis and Copper distribution of flotation tailings.

A composite sample of flotation tailings from tests on the classifier overflow was screened to 200 mesh and minus 200 mesh sized by elutriation. Nominal particle sizes for quartz are shown in the elutriated fractions.

Product	Percent	Nominal Size for Quartz. microns	Copper	
			Percent	Percent Distribution
+100mesh	5.3		0.06	1.3
+150mesh	14.7		0.1	5.7
+200mesh	16.1		0.18	11.2
El. Fraction				
1	0.5	120	0.9	1.7
2	9.1	80	0.35	12.3
3	12.4	54	0.2	9.6
4	22.6	30	0.21	18.4
5	10.8	18	0.25	10.5
Fraction 5 overflow.	18.5	-18	0.41	29.3

Examination of Flotation Tailings

Pyritic concentrates of the flotation tailings were microscopically examined and it was observed that the majority of the pyrite was coated with a brown coloured adherent film which was found to consist of an iron compound.

FROM Department of Mines Laboratory,

Launceston, Tasmania,

TO.....~~The Director of Mines~~.....SUMMARY.

Flotation tests of the classifier overflow resulted in recoveries of 49.8 to 51.3 percent of gold and 28.3 to 32.3 percent of copper in concentrates assaying 20.8 to 43.8 dwts of gold and 1.2 to 2.39 percent of copper. The concentrates represented 3.5 to 8 percent of the sample tested. In addition flotation of the minus 60 mesh portion of the spigot sands resulted in a recovery of 59.7 percent of gold and 25.5 percent copper in a concentrate assaying 56.6 dwts of gold and 1.74 percent of copper.

It has been shown that tarnished sulphides have been the main cause of low recoveries of sulphides and as the sulphur and gold distributions are similar it is reasonable to assume that increase in sulphide recoveries would to some extent improve gold recoveries. Confirmation of the above is shown in Investigation No. 81/41 on sands stated to be obtained from the same locality.

<u>Product.</u>	<u>Percent</u>	<u>Assay.</u> <u>Gold</u> <u>Dwts/ton</u>	<u>Percent gold.</u> <u>Extraction.</u>
Flotation Conc. Test No. 8.	2.51	36.37	40.55
Flotation Conc. Test No. 7.	4.2	40.7	76.0

Invest 81/41

No. 7 test was ball mill ground to 90 percent minus 200 mesh and test No. 8 was made on the tailings as received. An additional 9.2 grains / ton were extracted by cyanidation of No. 7. flotation tailings bringing the total extraction up to 93 percent.

Summarizing the results obtained the sizing of the tailings gave the following products for treatment:-

Classifier overflow	28.4 percent
Minus 60 mesh spigot sands	23.6 percent.

The averaged flotation recoveries of these two products amounted to:-

Gold	1.44 dwts/ton
Copper	0.067 percent.

Conclusions.

Concentrates were not cleaned and improvement in grade could be anticipated.

The pyrite is not in a suitable condition for maximum recovery by flotation and the effect of grinding to expose fresh surfaces should be investigated.

FROM Department of Mines Laboratory,
Launceston, Tasmania.

TO The Director of Mines.

Flotation tests should be extended to test the suitability of the available water supply.

Reagents used in these tests are normally effective for the flotation of the sulphides and fine free gold. The elutriation test on the flotation tailings shows a comparatively high copper content of several of the finer sizes and in particular the minus 18 micron fraction. Although it is reasonable to assume that these losses were partially occasioned by coated or oxidised sulphide particles any extension of research should include the identification of the mineral or minerals with subsequent consideration of reagent combination designed for their recovery.

CHIEF CHEMIST AND METALLURGIST.

8/11/43.

Calc. for ^{Annual} 1942ⁿ Repat.
Comp Value of -60 Sands & C.O.

As 2.68 Dwt's

Cu 0.23 %.

Comp. Res. by Prob.	Comp assays		70% Recoveries		Actual Recoveries	
	As	Cu	Dwt's	Cu % (by assay)	As Dwt's	Cu % (by assay)
Cons for C.O.	2.84	30.8	1.81			
" Sands	1.04	56.6	1.74			
Comp.	<u>3.88</u>	<u>37.7</u>	<u>1.79</u>	54.6	30.2	<u>1.44</u> <u>0.06</u>