TR18_173_175

R.655. Extraction of gold from residue dumps at Beaconsfield.

L.J. Rhodes
H.K. Wellington

PART 2. GOLD RECOVERY TESTS

Four samples were submitted by B.M.I. Mining Pty Ltd which were said to be auger drillings from the old Tasmania mine dumps at Beaconsfield. The registration numbers and description of the samples are as follows:

Reg. No.	*Identification*	*Depth (m)*
725207	No. 1	0-1.5
725208	No. 2	0-0.6
725209	No. 3	0-0.9
725210	No. 4	0-0.3

The samples were submitted for gold recovery tests.

TEST WORK

A head sample was cut from each of the samples, assayed for gold and subjected to a sizing analysis.

A composite sample was then made by bulking Samples 725207, 725208 and 725210. Sample 725209 was not included in the composite as it was said to be not a truly representative sample, but it was used in the preliminary grinding tests to establish the grinding time necessary to produce a 90% -106 µm product.

One kilogram samples were cut from the composite sample and ground for 15 minutes in the 8-inch (203 mm) x 8-inch diameter laboratory ball mill at a pulp density of 67% solids, and then subjected to the following gold recovery tests.

In Test N1, the ground product was transferred to an agitator and was agitated with water and then allowed to settle, and the clear water was decanted. Fresh water was added and the process was repeated. This was done to remove any soluble salts that may have been present. Water was again added together with 6 g of sodium cyanide and 3 g of lime. The sample was then agitated for 16 hours.

In Test N2, the ground product was transferred to a flotation cell and the sulphides were floated off using 250 g/t of potassium amyl xanthate and 18 g/t of methyl iso-butyl carbinol as a frother. The concentrate was roasted and the calcine was agitated in water for 16 hours with 6 g of sodium cyanide and 6 g of lime. The flotation tail was also agitated in water for 16 hours with 6 g of sodium cyanide and 6 g of lime. A portion of the flotation tail was subjected to a sizing analysis as a check on grinding.

Gravity concentrates were produced by tabling (in Test N3) and jigging (in Test N4) the ground product. The concentrates were roasted and then agitated in water for 16 hours with 6 g of sodium cyanide and 6 g of lime.

Gold was precipitated from the pregnant solutions in each test and recovered by cupellation.

RESULTS

The assays of the four samples submitted were as follows:

Table 1. THE RESULTS OF SIZING ANALYSIS OF THE SAMPLES

Screen aperture	725207 (No. 1)		725208 (No. 2)		725209 (No. 3)		725210 (No. 4)	
	% Mass	% Mass Cum.	% Mass	% Mass Cum.	% Mass	% Mass Cum.	% Mass	% Mass Cum.
+2.36 mm	0.2	0.2	0.2	0.2	Trace	Trace	0.3	0.3
+1.18 mm	0.1	0.3	0.4	0.6	0.1	0.1	0.4	0.7
+600 µm	3.1	3.4	14.4	15.0	6.8	6.9	12.4	13.1
+300 µm	42.5	45.9	51.8	66.8	55.2	62.1	44.9	58.0
+150 µm	31.6	77.5	16.5	83.3	24.5	85.6	24.9	82.9
+75 µm	13.7	91.2	6.0	89.3	7.7	94.3	7.8	90.7
+38 µm	5.0	96.2	4.0	93.3	2.9	97.2	2.3	93.0
-38 µm	3.8	100.0	6.7	100.0	2.8	100.0	7.0	100.0

Reg. No.	Identification	Gold (g/t)
725207	No. 1	1.7
725208	No. 2	8.0
725209	No. 3	2.9
725210	No. 4	3.1

The results of sizing analyses of the samples are given in Table 1.

The assay of the composite head sample was 3.8 g/t of gold and 1.1 g/t of silver.

The mass distributions of the products in the flotation and gravity concentration tests were as follows:

	N2 flotation	N3 tabling	N4 jigging
Concentrate (% mass)	3.1	2.3	5.0
Tail (% mass)	96.9	97.7	95.0

The recovery of gold in the tests were as follows:

	N1	N2	N3	N4
Cyanidation of all feed (%)	40.5			
Cyanidation of roasted conc. (%)		57.7	19.8	20.4
Cyanidation of flotation tail (%)		9.7		
Total recovery %	40.5	67.4	19.8	20.4
Total recovery g/t	1.55	2.57	0.75	0.78

Cyanide and lime consumptions were as follows:

	N1	N2	N3	N4
Sodium cyanide consumption (kg/t)	3.30	4.55	4.55	4.64
Lime consumption (kg/t)	2.99	5.09	4.91	4.91

The flotation tail from Test N4 was sized to determine the size of the ground product. The result was 9.6% +106 µm.

The recovered gold content of the flotation concentrate in Test N4 was 71.9 g/t.

CONCLUSIONS

Cyanidation of a roasted flotation concentrate and cyanidation of the flotation tail from dump material after it has been ground to 10% +106 µm, gives a recovery of 67.4% of the gold or 2.57 g of gold per tonne of dump material.

Straight cyanidation of the ground dump material or cyanidation of roasted gravity concentrates from ground dump material yielded poor gold recoveries.

[18 January 1973]