TR14-189-190

R.568. Concentration tests, Royal George No. 2 Level sample

From underfoot channel samples from No. 2 Level of the Royal George Mine submitted for chemical analysis, a composite was made for metallurgical tests to assess the probable recovery of cassiterite. The composite assayed 0.84% Sn and 3.2% S.

METHOD

(1) A cassiterite sizing determination was carried out to determine the liberation point of the majority of the cassiterite present in the sample.

(2) A sizing analysis of the sample was conducted.

(3) A heavy media separation at a specific gravity of 2.95 was used to see if it were possible to remove some of the barren material from the cassiterite sizing determination.

(4) The composite sample was riffled in half, and one half was stage ground at approximately 60% solids, at five minute intervals through a 60 mesh screen, using the laboratory ball mill.

(5) The ground ore (— 60 mesh) was sized into — 60 + 100, — 100 + 200, and — 200 mesh fractions which were gravity concentrated on the Deister laboratory table.

(6) The gravity concentrates obtained were combined, and flotation in a Denver D-1 laboratory flotation cell was employed to remove the pyrite present.

RESULTS

(1) The cassiterite grain size determination proved to be an almost impossible task due to the presence of insoluble minerals. However, the following result was obtained from an initial weight of 300 g.

Aperture μ	Fraction	Assay % Sn	Tin distribution	
			%	% Cumulative
+ 300	+ 52 mesh	5.11	10.2	10.2
− 300 + 150	+ 100 mesh	5.76	29.0	39.2
− 150 + 75	+ 200 mesh	5.21	30.7	69.9
− 75 + 53	+ 300 mesh	4.35	11.1	81.0
− 53 + 28	E/F2	9.02	7.8	88.8
− 28 + 20	E/F3	2.15	4.1	92.9
− 20 + 13	E/F4	2.13	4.3	97.2
− 13 + 10	E/F5	2.16	2.3	99.5

(2) The sizing analysis of the ore composite head was:

Aperture μ	Fraction	% Weight	% Cumulative Wt
+ 2400	+ 7 mesh	35.6	35.6
− 2400 + 1200	+ 14 mesh	18.4	54.0
− 1200 + 600	+ 25 mesh	12.5	66.5
− 600 + 300	+ 52 mesh	10.0	76.5
− 300 + 150	+ 100 mesh	7.2	83.7
− 150 + 75	+ 200 mesh	6.2	89.9
− 75	− 200 mesh	10.1	100.0
Head		100.0	

(3) The heavy media separation test at S.G. 2.95 revealed that for this particular ore it was impossible to produce a float product low enough in Sn value to be discarded. The following results were obtained:

		% Weight	Assay % Sn	% Sn distribution
− 10	E/F6	3.15	0.5	100.0
Head		(0.60)	100.0	
Sink		38.6	1.51*	69.3
Float		61.4	0.42	30.7
Head		100.0	0.84	100.0

(4) The gravity concentration provided the following results:

Product	% Weight	Assay % Sn	% Sn distribution
Bulk—			
Concentrate	1.7	38.2	74.7
Middlings	4.3	1.0*	5.0
Tailings	91.0	0.15*	15.6
Sulphide—			
Flotation concentrate	2.3	0.92	2.4
Flotation tail	0.7	2.88	2.3
Head	100.0	0.87*	100.0

* Calculated assays

CONCLUSIONS

(1) An overall recovery of 74.7% was obtained at a grade of 38.2% Sn.

(2) In any further work the pyrite should be removed before tin concentration is attempted.