

TR 10-118-121

R. 494

**CONSOLIDATED GOLD FIELDS-RENISON LIMITED:
MILL VANNER FEED - TILTING DECK TESTS**

Samples

The sample was received as pulp of about 50 per cent solids labelled Mill Vanner Feed. A small sample for preliminary work was obtained by sampling the agitated pulp.

Assays

Vanner Feed Tin 6.17 per cent
 Sulphur 3.19 per cent

Investigation

Preliminary examination of the sample comprised sizing analyses and vanning assays to give an indication of what recoveries could be anticipated from tilting deck concentration. The tilting decks under favourable conditions give high recoveries of cassiterite down to approximately 10 micron nominal particle size.

An extensive series of tests was undertaken. Variations tested were: deck slope, concentration period, pulp feed rate and pulp density of feed.

Examples of the effects of scavenging tailings are also shown, and in one case a rougher deck concentrate was desulphidized by froth flotation, and the flotation sink further upgraded by cleaner deck concentration.

Sizing analyses of two rough deck tailings were made and from these tin recoveries in individual sizes were calculated.

Summary

The high tin content of about 6 per cent in this sample results in much more rapid filling of the tilting deck strake cloth than with lower grade feed, and best results are thus obtained by operating at lower feed rates or shorter concentration periods than with lower grade feeds.

A wide range of tests have demonstrated the results that are obtainable under varying conditions.

Grades of concentrates have ranged from 7.65 to 52.5 per cent tin, with related recoveries ranging from 85.6 to 58.5 per cent. Ratios of concentration ranged from 1.58 to 8.34 in rougher concentration. The percentage of the cassiterite recovered in the mill vanner feed by vanning assay amounts to 73.6 per cent.

Details of tests are shown in tabulations. Tilting deck test tailings from tests 6 and 16 were submitted to vanning assays as shown below.

Vanning Assays

Test No.	Deck Concentration		Deck Tails Van. Tin Per Cent
	Tin Recovery	Conc. Per Cent Tin	
16	85.6	7.65	0.13
6	74.1	12.7	0.37

At any given deck slope, the reduction of feed rate results in increased recovery with a lower concentration ratio. These effects are most pronounced by reducing the rate of pulp flow over the decks, but a more useful relationship between recovery and ratio of concentration is obtained by maintaining a reasonable pulp flow and reducing feed rate by feed dilution.

A plot of ratio of concentration against per cent tin recovery in concentrates shows the relationships between these quantities. The relationship is independent of deck slope and time of concentration, but is influenced advantageously by feed dilution. The effect of feed dilution is not pronounced, however, in high recoveries with low ratios of concentration, i.e. above 80 per cent.

The sizing analyses of tilting deck tailings from tests 6 and 15 are of interest, and show the lower recoveries of tin in the three finest fractions, with the high ratio of concentration.

Sizings

Fraction	MILL VANNER FEED			
	Per Cent		Per Cent Distribution	
	Weight	Tin	Tin	Tin Cumulative
+200 mesh B.S.S.	4.94	1.01	0.8	0.8
Cyclosizer 1	9.37	15.3	23.2	24.0
2	12.20	9.64	19.1	43.1
3	16.03	8.43	21.9	65.0
4	12.55	6.48	13.2	78.2
5	6.54	5.12	5.4	83.6
-5	38.37	2.64	16.4	100.0
Composite Head	100.00	6.17	100.0	
Van. Tin 4.54 per cent.				
Per Cent Tin recovered by vanning 73.6.				

Sizing of Tilting Deck Tailings

Fractions		Per Cent		Per Cent Dist.		Per Cent Tin Recovery in Individual Fractions
		Weight	Tin	Tin	Tin Cum.	
Test 6:						
Deck Tail						
+200 mesh BSS		3.4	0.33	0.5	0.5	87.5
Cyclosizer 1	....	5.0	0.75	1.6	2.1	98.3
2	....	5.6	0.48	1.2	3.3	98.4
3	....	10.0	2.36	10.1	13.4	88.1
4	....	13.0	4.23	23.6	37.0	53.8
5	....	7.1	3.97	12.1	49.1	42.6
-5	....	55.9	2.12	50.9	100.0	19.5
Composite Tail	100.0	2.33	100.0	Mean 74.1

TEST CONDITIONS AND RESULTS — MILL VANNER FEED

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ORE DRESSING INVESTIGATIONS.

Test No.	Conc.		Deck Feed		Type	Deck Concentrates			Deck Tailings			Ratio of Conc. K
	Period Minutes	Gal/min/ft.				% Solids	Per Cent			Per Cent		
			Weight	Tin			Tin Dist.	Weight	Tin	Tin Dist.		
Tests at Deck Slope of 2 inches per foot												
1	3	1	20	Rougher	18.6	20.2	62.9	81.4	2.73	37.1	5.38	
2	4	1	20	Cleaner	6.6	52.5	58.5					
				Sulphide Float	1.4	2.18	0.4					
				Cleaner Tail	7.6	2.11	2.7					
				Composite Ro.	15.6	23.4	61.6	84.4	2.69	38.4	6.43	
3	5	1	20	Rougher	14.3	26.4	63.2	85.7	2.56	36.8	6.99	
4	6	1	20	Rougher	12.0	29.3	59.6	88.0	2.71	40.4	8.34	
7	3	1	20	Rougher	14.8	24.0	59.5					
				Scavenger	10.2	7.41	12.7					
				Composite Conc.	25.0	17.2	72.2	75.0	2.21	27.8	3.99	
8	4	1	20	Rougher	11.5	28.3	55.4					
				Scavenger	6.8	10.4	12.0					
				Composite Conc.	18.3	21.6	67.6	81.7	2.34	32.6	5.46	
13	4	$\frac{1}{2}$	20	Rougher	33.1	13.5	76.3	69.9	1.99	23.7	2.97	
14	3	$\frac{1}{2}$	20	Rougher	40.1	11.2	77.9	59.9	2.13	22.1	2.49	
17	4	1	10	Rougher	22.5	19.5	72.3	77.3	2.17	27.7	4.44	
18	3	1	10	Rougher	32.9	15.3	77.1	67.1	2.23	22.9	3.04	
Tests at Deck Slope of 1 inch per foot												
6	3	1	20	Rougher	34.4	12.7	74.1	65.6	2.33	25.9	2.94	
10	2	1	20	Rougher	40.3	11.4	76.1	59.7	2.42	23.9	2.48	
15	4	$\frac{1}{2}$	20	Rougher	58.3	8.16	84.3	41.7	2.13	15.7	1.71	
16	3	$\frac{1}{2}$	20	Rougher	63.3	7.65	85.6	36.7	2.22	14.4	1.58	
19	4	1	10	Rougher	43.3	11.0	80.6	56.7	2.05	19.6	2.31	
20	3	1	10	Rougher	49.1	10.0	81.3	50.9	2.22	18.7	2.04	
Tests at Deck Slope of $\frac{3}{4}$ inch per foot												
11	3	1	20	Rougher	53.0	9.04	79.6	47.0	2.61	20.4	1.89	
12	2	1	20	Rougher	54.9	8.94	80.1	45.1	2.71	19.9	1.82	

Test 15:

Deck Tail

+200 Mesh BSS					
Cyclosizer 1	}	1.7	0.53	0.4	99.8
2					
3		2.4	1.23	1.4	99.1
4		9.6	3.07	13.8	83.3
5		9.0	3.95	16.7	51.8
-5		77.3	1.87	67.7	35.4
Composite Tail		100.0	2.13	100.0	Mean 84.3

Equivalent Cassiterite Particle Diameter for Cyclosizer Fractions

Cyclosizer Fraction 1	—76 +21 microns
2	—21 +17 "
3	—17 +12 "
4	—12 + 8 "
5	— 8 + 6 "
-5	— 6 "