

REPORT NO. 216

Examination of Kirkland Lake mill tailings  
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Shipment: A shipment of 50 pounds of mill tailings from the Wright Hargreaves Mines Ltd., Kirkland Lake, Ont., was received October 16, 1924.

Purpose of Experimental tests: The test work was conducted to determine whether the values in the tailings could be recovered by flotation, and also to get some idea of the reasons for the high tailing losses.

Assay of sample submitted: The assay of the tailings submitted for test purposes showed them to contain 0.06 oz/ton in gold. It is reported that at times the tailings exceed this value, depending on the refractory nature of the ore being treated.

Experimental tests: The experimental tests consisted of screen analysis of the tailings, classification tests, and flotation tests.

Screen analysis of tailings from wet sizing test on Tyler standard screens: Head sample :: 0.06 oz/ton gold

Mesh	Weight %	Assay Au oz/ton	Values %
-100+150	19	0.10	35
-150+200	12	0.07	15
-200	69	0.04	50
Totals	100	0.055	100

The above screen test shows that 31% of the tailing stays on a 200 mesh screen, 69% passes a 200 mesh screen; that this 31% oversize containing 50% of the gold values in the tailings.

Classification tests on tailing: Several classification tests were made to determine the distribution of the values in the classified products, sands and slimes. The results of a number of these tests are given below:

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Product	Weight %	Assay Au oz/ton	Values %
Sands	76.5	0.08	89.7
Slimes	23.5	0.03	10.3
Totals	100.0	0.068	100.0
Sands	61.8	0.10	80.2
Slimes	38.2	0.04	19.8
Totals	100.0	0.077	100.0
Sands	80.7	0.07	93.5
Slimes	19.3	0.02	6.5
Totals	100.0	0.06	100.0
Sands	73.3	0.08	95.6
Slimes	26.7	0.01	4.4
Totals	100.0	0.061	100.0

The above classification tests show that the high tailing values are in the coarser material and that cyanidation has extracted the values to a much greater extent from the fine slimes.

Flotation tests on classified sands:

The following flotation tests were made on the sand products from the classification tests given above. The values in the flotation products do not check up with the values in the classified sands, probably due to the small amount of material being used in the tests, the low assay value of the material and products, and the difficulty in cleaning up the testing apparatus.

Heads: Classified sand - 0.10 oz/ton

Product	Weight %	Assay Au oz/ton	Values %
Concentrate	7.2	0.40	60.6
Tailing	92.8	0.02	39.4
Totals	100.0	0.047	100.0
Concentrate	3.0	0.70	44.5
Middling	8.5	0.10	18.0
Tailing	88.5	0.02	37.5
Totals	100.0	0.047	100.0

Heads: Classified sand - 0.08 oz/ton

Concentrate	4.1	0.60	44.1
Middling	13.0	0.05	11.5
Tailing	82.9	0.03	44.4
Totals	100.0	0.056	100.0

The flotation results on the classified sand tailings are, so far, not very promising. They show a possible recovery of 40% of the values in the cyanide tailings, in a concentrate assaying 0.6 oz/ton or \$12 per ton. This concentrate would represent about 4% by weight of the ore fed to the mill.



Summary: From the results of the screen test and classification tests given above it would seem that too coarse grinding is responsible, to a large extent, for the high tailing losses. Cyanidation seems to have made good extractions on the -200 mesh material and on the classified slimes. 50% of the tailing values is in 31% of the tailings remaining on 200 mesh. Over 80% of the tailing values is in the sands from classification, and less than 20% in the slimes. An all-slime process should, therefore, increase the recovery materially and give a low tailing. It would seem that more efficient classification is required in the tube mill circuit. This may mean the installation of a bowl to receive the classifier overflow, and of an additional tube mill in circuit with the bowl, in order to make an all slime process. The problem is one of economics; whether this additional installation would be offset by the increased recoveries.

It is the opinion of many engineers that it is the presence of tellurides which accounts for the high tailing losses. If it is the case that these tellurides grind readily, one would expect them to slime easily, and that the slimes would carry the higher values. This is not the case, and would lead one to believe that the losses are in the coarse pyrite. A microscopic examination is being made of the coarse pyritic concentrates in the tailings to determine if the tellurides are present with the pyrite. Flotation of cyanide tailings does not seem to work very satisfactorily. This was found to be the case when tried in the Cobalt camp.