

TR16-272-274

R.625. Separation of wolframite and scheelite from mill concentrates from Mt Horror.

A mixed mill concentrate formed by jigging and tabling from the mill at Mt Horror was submitted by G. Gerke for the separation of the wolframite from the scheelite.

A second sample (table concentrate), was also submitted for the determining of the grade, and the wolframite and scheelite content.

The samples were registered as follows:

Reg. No.	Product
710060	Mixed mill concentrate
710061	Table concentrate

The sample of mixed mill concentrate contained approximately 8.8 kg, while the sample of table concentrate contained only 100 g.

The calculated head assays of the samples were as follows:

Reg. No.	% WO <sub>3</sub>
710060	63.3
710061	18.3

TEST WORK

The mixed mill concentrate (Sample No. 710060) was screened on 3/16 inch, 7#, 10#, 14#, 22#, 44# and 85# screens.

Each screen fraction below 7# was individually treated on the Rapid magnetic separator to produce four magnetic fractions and a non-magnetic fraction. Each fraction for each size range was assayed.

The material coarser than 7# was roll crushed until it passed the 7# screen. It was then screened on 14 and 44# screens and the +14#, -14 +44# and -44# fractions were magnetically separated individually. Similar products from the magnetic separation of each size fraction were bulked and assayed.

The table concentrate (Sample No. 710061) was screened on 22, 44 and 85# screens. All the magnetic fractions from each size range were bulked. The non-magnetic fractions from each size range were also bulked. These bulked products were then assayed.

TEST RESULTS

Product	% Weight	Assay % WO <sub>3</sub>	% WO <sub>3</sub> Distribution
+7# (crushed etc.)	M/A1	0.1	31.5
	M/A2	1.3	69.3
	M/A3	Trace	59.4
	M/A4	0.2	20.8
	N	1.1	13.0
-7 +10#	M/A1	Trace	34.7
	M/A2	1.5	71.7
	M/A3	1.0	71.2
	M/A4	0.2	55.9
	N	0.9	20.4

Product	% Weight	Assay % WO <sub>3</sub>	% WO <sub>3</sub> Distribution
-10 +14#	M/A1	0.1	0.1
	M/A2	3.8	4.3
	M/A3	1.7	1.9
	M/A4	0.5	0.5
	N	1.7	1.3
-14 +22#	M/A1	0.2	0.1
	M/A2	14.1	15.9
	M/A3	2.9	3.3
	M/A4	1.0	1.0
	N	4.9	5.3
-22 +44#	M/A1	0.2	0.1
	M/A2	16.1	18.1
	M/A3	1.7	1.8
	M/A4	1.8	1.2
	N	6.5	6.0
-44 +85#	M/A1	0.2	0.1
	M/A2	8.6	9.8
	M/A3	2.9	3.1
	M/A4	2.3	1.2
	N	7.0	4.6
-85#	M/A1	0.2	0.1
	M/A2	8.9	9.9
	M/A3	0.7	0.7
	M/A4	1.2	0.8
	N	4.5	3.8
	100.0	(63.3)	100.0

These results can be summarised as follows:

Product	% Weight	Assay % WO <sub>3</sub>	% WO <sub>3</sub> Distribution
Total M/A1	1.0	31.5	0.5
Total M/A2	54.3	71.3	61.1
Total M/A3	10.9	69.3	11.9
Total M/A4	7.2	43.5	5.0
Total N	26.6	51.2	21.5
	100.0	63.3	100.0

If all the magnetic fractions were bulked, the resulting product would assay 67.7% WO<sub>3</sub> and contain 78.5% of the WO<sub>3</sub> in the combined rougher concentrate.

By bulking all the M/A2 and M/A3 fractions, the resulting concentrate would assay 71.0% WO<sub>3</sub> and contain 73% of the WO<sub>3</sub> in the combined rougher concentrate. There should be no trouble in finding a market for a concentrate of this grade. It may even fetch a premium price.

By including the M/A1 fractions with M/A2 and M/A3, the concentrate would assay 70.4% WO<sub>3</sub> and contain 73.5% of the WO<sub>3</sub>. By including the M/A4 fractions with M/A2 and M/A3, the concentrate would assay 68.2% WO<sub>3</sub> and contain 78.0% of the WO<sub>3</sub> present in the rougher concentrate.

The non-magnetic fraction, N, would assay 51.2% WO<sub>3</sub> after bulking and would contain 21.5% of the WO<sub>3</sub> in the rougher concentrate.

The non-magnetic fractions in the size range -14 +22#, -22 +44#, -44 +85#, and -85# were subjected to further gravity concentration tests. There was insufficient material to attempt this in the size fractions coarser than 14#. The results of the gravity concentrations were as follows:

Product	% Weight	Assay % WO <sub>3</sub>	% WO <sub>3</sub> Distribution
-14 +22#	N TC	4.6	69.6
	TT	0.3	24.6
-22 +44#	N TC	5.5	65.8
	TT	1.0	6.27
-44 +85#	N TC	4.4	66.4
	TT	2.6	2.41
-85#	N TC	3.7	65.4
	TT	0.8	6.37

These results may be summarised as follows:

Product	% Weight	Assay % WO <sub>3</sub>	% WO <sub>3</sub> Distribution
N TC	18.2	66.8	19.3
N TT	4.7	5.17	0.4

The results of the test on the table concentrate were as follows:

Product	% Weight	Assay % WO <sub>3</sub>	% WO <sub>3</sub> Distribution
Total M/A	53.2	22.1	64.4
N	46.8	13.9	35.6
	100.0	(18.3)	100.0

#### CONCLUSIONS

Magnetic separation of the combined jig and table concentrate can produce a wolfram concentrate of saleable grade, i.e. greater than 65% WO<sub>3</sub>. By not including the strongly magnetic fraction and the weakly magnetic fraction a wolfram concentrate assaying 71% WO<sub>3</sub> can be obtained which may attract a premium price.

By tabling the non-magnetic fractions a saleable grade of scheelite can be produced.

The wolframite/scheelite ratio in the combined concentrate was approximately 4:1 while the ratio in the table concentrate was approximately 2:1.

An examination of the WO<sub>3</sub> distribution in the detailed results table shows that the proportion of scheelite present in each size fraction increases as the product size decreases.