O T T A W A September 23rd, 1942.

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of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1307.

Scheelite Ore from the Lucky Boy Mine,
on Kaslo Creek, Slocan Mining Division,
British Columbia.

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Shipment:

Two samples of scheelite ore from the Lucky Boy mine, Kaslo Creek, British Columbia, were received on August 27th, 1942. One lot was fine ore and weighed 24 pounds; the other lot was coarse ore and weighed 23½ pounds.

The shipment was submitted by J. M. Tillen, Trout Lake City, British Columbia.

Location of the Property:

The property of the Lucky Boy Mine is said to consist of three claims on the south side of Kaslo creek, 14 miles from Kaslo, in the Slocan mining division of British Columbia.

Purpose of the Investigation:

The investigation was made to determine the grade and character of scheelite concentrate that could be recovered from the ore.

Character of the Ore:

The ore was apparently taken from or near the surface of the deposit, as some pieces showed surface oxidation. No appreciable amount of sulphides was seen in the ore. The gangue appeared to be mostly quartz.

Under the ultra-violet light a considerable amount of scheelite could be seen, in fairly coarse particles.

Sampling and Analysis:

The fine ore was designated Sample No. 1 and the coarse ore Sample No. 2.

Both samples were crushed and sampled by standard methods and were found to contain:

	WO_3, per cent
Sample No. 1, fines -	4.84
Sample No. 2, coarse -	5.08

Investigative Procedure:

The investigation was made on the fine ore, as it was stated to be the more representative of the two samples submitted.

The investigation included table concentration followed by flotation and straight flotation.

Results of Test Work:

75 per cent of the WO_3 in the ore was recovered as a table concentrate which assayed 70 per cent WO_3. The ratio of concentration was 19.6:1.

Flotation of the table tailing recovered a WO_3 concentrate which assayed 16.95 per cent WO_3 and contained 10.5 per cent of the WO_3 in the feed. A scavenger WO_3 concentrate included most of the remainder of the WO_3 in the original feed.

Straight flotation of the ore showed that it contained practically no sulphides. The WO_3 concentrate assayed 41.9 per cent WO_3. The combined WO_3 concentrate and scavenger WO_3 concentrate assayed 24.3 per cent WO_3 and contained 99 per cent of the WO_3 in the feed.

Details of the Tests:

Test No. 1. - Table Concentration Followed by Flotation of the Table Tailing.

A portion of Sample No. 1 (fine ore) was crushed to pass a 14-mesh screen.

The ore was screened on 35-, 48- and 65-mesh screens, giving products -14+35, -35+48, -48+65, and -65 mesh.

The +35, +48, and +65 mesh products were concentrated on a Wilfley table. The table tailing from each was crushed minus 65 mesh and combined with the original minus 65 mesh ore and tabled.

The plus 65 mesh concentrates were then sampled and assayed as one lot. The minus 65 mesh concentrate was assayed separately. The assay of the combined concentrates was then calculated.

(Continued on next page)

(Test No. 1, cont'd) -

Flotation of Minus 65 Mesh Table Tailing:

A sample of the table tailing was reground in a ball mill.

Reagents to ball mill - Lb./ton

Soda ash	-	1.0
Water glass	-	1.0

Grind, 70 per cent minus 200 mesh.

pH, 8.2.

Reagents to float scheelite - Lb./ton

Emulsol X-1	-	0.10
Orso	-	0.10
Cresylic acid	-	0.05

Flotation period, 2 minutes.

Reagents to float the scavenger WO_3 concentrate -

Orso	-	0.3, added in stages.
Cresylic acid	-	None required.

The results of the combined concentration are shown in the following table:

Results of Combined Concentration:

Product	Weight, per cent	WO_3 assay, per cent	Distribution of WO_3, per cent		Ratio of concentration
Feed	100.00	4.77	100.00		
+65 table conc.	3.77	71.76	56.77		26.5:1.
-65 " "	1.33	65.91	18.40		75.2:1.
Combined table concentrate	5.10	70.24		75.17	19.6:1.
WO_3 flot. conc.	2.96	16.95	10.53		33.8:1.
WO_3 scav. "	16.31	3.76	12.87		6.1:1.
Combined flot. conc.	19.27	5.80		23.40	5.2:1.
Flotation tailing	75.63	0.09	1.43	1.43	

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(Test No. 1, cont'd) -

The results of this test indicate that a 70 per cent WO_3 concentrate can be obtained by table concentration from ore similar to that of Sample No. 1, fine ore. An additional recovery of from 15 to 20 per cent of the WO_3 may be expected by flotation of the table tailing.

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Test No. 2. - Straight Flotation.

A portion of Sample No. 1 (fine ore) was ground in a ball mill at a dilution of 4 parts solids to 3 parts water.

Reagents to ball mill -

		Lb./ton
Soda ash	-	3.0
Amyl xanthate	-	0.2
Cresylic acid	-	0.05

Grind, 71 per cent minus 200 mesh.

pH in flotation cell after dilution to approximately 30 per cent solids was 8.9.

Flotation of Sulphides -

The reagents added to the ball mill were to activate and float sulphides. However, no appreciable amount of sulphides appeared. The pulp was then conditioned to recover scheelite.

Reagents -

		Lb./ton
Water glass	-	1.0

Ten minutes' agitation was given after adding water glass.

Emulsol X-1	-	0.05
Orso	-	0.03
Cresylic acid	-	None required.

No conditioning time is required with the above reagents. The scheelite concentrate was recovered in 3 minutes.

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(Test No. 2, cont'd) -

Additional reagents were added in stages as required, to recover the scavenger WO_3 concentrate:

		Lb./ton
Emulsol X-1	-	0.05
Orso	-	0.15
Cresylic acid	-	0.10

In practice, the scavenger concentrate is returned to the WO_3 flotation feed. The WO_3 in this concentrate is recovered in the WO_3 concentrate.

Results:

Product	Weight, per cent	WO_3 assay, per cent	Distribution of WO_3, per cent	Ratio of concentration
Feed*	100.00	6.04	100.0	
WO_3 conc.	5.70	41.88	39.5	17.5:1.
Scav. conc.	18.94	19.06	59.7	5.3:1.
Combined conc.	24.64	24.34	99.2	4.1:1.
Flot. tailing	75.36	0.06	0.8	

* The feed assay was calculated from the products.

The results of this test indicate that a grade of concentrate suitable for chemical treatment can be recovered from ore similar to that submitted in the shipment as Sample No. 1, fine ore.

In practice, no amyl xanthate would be required in ore containing no sulphides.

The consumption of soda ash was slightly higher than it would be on fresh, unoxidized ore.

CONCLUSIONS:

The results of the investigation indicated that suitable grades of concentrate could be obtained from ore similar in grade and character to that submitted in the shipment as Sample No. 1, fine ore.

With ore of this grade, coarse crushing through rolls and rod mills, or low-discharge ball mills, should be adopted to avoid excessive production of fines, and grinding should be coarse to break the scheelite free from gangue. The grinding mill should discharge over a screen instead of a classifier, to avoid overgrinding of the heavy scheelite. The material passing through the screen then should be hydraulically sized and concentrated. The coarser sizes can be jigged or tabled and the coarser middling and tailing reground and returned to the circuit.

The table tailing should be floated.

A mill consisting of gravity concentration for the coarse scheelite and flotation to recover the fine mineral will yield highest recoveries. Also, a concentrate acceptable by Atlas Steels Limited, Welland, Ontario, Canada, will be produced together with a lower grade of flotation concentrate.

To date, the only purchaser of low-grade concentrate is the United States Vanadium Corporation, Salt Lake City, Utah, U.S.A. This company is prepared to purchase, and treat by chemical methods, products similar to that obtained by flotation in this investigation.

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