

Ottawa Ont. Jan. 28th 1919

Report of Ore Dressing & Metallurgical Laboratories

Test No. 105

A shipment of ore was received on Aug. 6th 1918 from "The New Hazelton, Gold and Cobalt Mines" New Hazelton, B.C.

This shipment consisted of 669 bags, which gave the following weights, analyses and content:-

Net weight (wet) --- 53,772 pounds.

Moisture - 1.01% --- 544 "

Dry net weight --- 53,228 "

Analysis - MoS₂ --- 1.40%

MoO₃ --- 0.18%

Co. --- 1.12%

Ni. --- 0.60%

As. --- 8.98%

Au. --- 1.24 ozs.

Content

Content --- MoS₂ --- 745.19 pounds

Co. --- 596.15 "

Ni. --- 319.37 "

As. --- 4779.87 "

Au. --- 33.00 ozs.

The object of the test work was to concentrate the values in the ore and also obtain a separation of these values as far as practical. As the Cobalt, Nickel, Arsenic and gold values were intimately associated it was feasible to concentrate these by water concentration and also to obtain a separation and concentration of the Molybdenite values by Flotation.

The shipment was divided into three lots as follows:-

LOT No. 1 - Test # 1 - Dry net weight - 12,144 pounds

LOT No. 2 - Test # 2 - " " " 35,234 "

LOT No. 3 - Test # 3 - " " " 5,850 "

105

Lot No. 1. - Test No. 1 :- The procedure was as follows:-

The ore was crushed to 20 mesh and concentrated on a Wilfley Concentrator to remove, as much as possible of the cobalt, nickel, arsenic and gold values. Two products were made, a concentrate and tailing. The tailings were reground in a Sturtevant Mill to 60 mesh and the Molybdenite concentrated by means of the Callow Pneumatic Flotation Process. The Flotation Tailings were run over the Wilfley Concentrator to further remove any cobalt, nickel, arsenic and gold values which

Lot No 2 : Test No. 2 :- The procedure was as follows:-

The ore was crushed to 40 mesh and concentrated on a Wilfley Concentrator to remove as much as possible of the cobalt, nickel, arsenic and gold values. Two products were made, a concentrate and tailing. The tailings were reground in a Sturtevant Mill to 80 mesh and the molybdenite concentrated by Flotation in a Callow Unit. The Flotation Tailings were run over the Wilfley Concentrator and the tailings from the table were considered final and allowed to go to waste.

Lot No. 3 - Test No. 3 :- The procedure was as follows:-

The ore was ground in a Sturtevant Mill to 80 mesh and the molybdenite first floated in a Callow Unit. The Flotation Tailings were concentrated on a Wilfley Concentrator to remove the cobalt, nickel, arsenic and gold values, and the Tailings from the table pumped to waste.

This latter test was run to obtain a comparison of results between stabling followed by flotation and flotation followed by stabling.

The results are contained in the following tables:-

CONCENTRATION TABLES. - NEW HAZELTON GOLD & COBALT MINES LTD.

TEST No.	PRODUCT	Mesh.	Weight Lbs.	Analysis						Content					Percentages of Values.				
				MoS ₂ %	MoO ₃ %	Co. %	Ni %	As. %	Au. oz.	MoS ₂ Lbs.	Co. Lbs.	Ni Lbs.	As. Lbs.	Au. ozs.	MoS ₂ %	Co. %	Ni %	As. %	Au. %
TEST No. 1	Table Concentrates	20	1574	1.00		5.42	3.14	51.00	7.55	15.74	85.31	49.42	802.74	5.94	9.3	62.7	67.8	73.6	78.9
	Flotation Concentrates	60	155	52.28		0.53	0.27	3.52	1.50	81.03	0.82	0.42	5.46	0.116	47.6	0.6	0.6	0.5	1.5
	2 nd Table Concentrates	60	217	1.34		5.05	2.70	47.73	3.05	2.90	10.96	5.86	103.57	0.33	1.7	8.1	8.1	9.4	4.4
	Tailings	60	10198	0.67		0.35	0.10	1.52	0.04	68.33	35.69	10.20	155.01	0.204	40.2	26.2	14.0	14.2	2.7
	Losses									2.02	3.23	6.96	23.75	0.94	1.2	2.4	9.5	2.3	12.5
	Crude Ore		12144	1.40	0.18	1.12	0.60	8.98	1.24	170.02	136.01	72.86	1090.53	7.53	100.0	100.0	100.0	100.0	100.0
TEST No. 2	Table Concentrates	40	4725	2.20		6.05	3.95	55.15	7.80	103.95	285.86	186.64	2605.84	18.43	21.0	72.5	88.3	82.3	84.4
	Flotation Concentrates	80	569	53.47		0.60	0.25	3.31	1.35	304.24	3.41	1.42	18.83	0.38	61.7	0.9	0.7	0.6	1.7
	2 nd Table Concentrates	80	91	1.35		3.75	2.48	35.02	2.30	1.23	3.41	2.26	31.87	0.10	0.3	0.9	1.1	1.0	0.5
	Tailings	80	29849	0.25		0.26	0.04	1.48	0.02	74.62	77.61	11.94	441.77	0.30	15.1	19.6	5.7	14.0	1.4
	Losses									9.23	24.33	9.14	65.70	2.63	1.9	6.1	4.2	2.1	12.0
	Crude Ore		35234	1.40	0.18	1.12	0.60	8.98	1.24	493.27	394.62	211.40	3164.01	21.84	100.0	100.0	100.0	100.0	100.0
TEST No. 3	Flotation Concentrates	80	94	58.29		0.78	0.47	4.50	6.60	54.79	0.73	0.44	4.23	0.31	66.9	1.1	1.3	0.8	8.5
	Table Concentrates	80	980	1.51		5.35	3.05	44.70	3.90	14.80	52.43	29.89	438.06	1.91	18.0	80.0	85.2	83.4	52.7
	Tailings	80	4776	0.26		0.25	0.10	1.62	0.03	12.42	11.94	4.78	77.37	0.07	15.1	18.2	13.6	14.7	1.9
	Losses										0.42		5.67	1.337		0.7		1.1	36.9
	Crude Ore		5850	1.40	0.18	1.12	0.60	8.98	1.24	81.90	65.52	35.10	525.33	3.627	100.0	100.0	100.0	100.0	100.0
RE Run of Flotation Conc's.	Table Concentrates		68	16.04		5.32	3.48	29.80	23.40	10.91	3.62	2.37	20.26	0.80	These Results do not check with				
	Flotation Conc's #1	+	250	70.20		0.22	0.08	1.20	0.02	175.50	0.55	0.20	3.00	0.0025	the totals given in last line of this table				
	" #2	+	150	67.80		0.32	0.13	1.28	0.30	101.70	0.48	0.19	1.92	0.0225	which is the totals of Flotation Conc's from				
	Flotation Middlings	+	350	36.63		0.78	0.37	4.86	0.20	128.21	2.73	1.29	17.01	0.035	Tests 1, 2 & 3, because there was a small accumu-				
	Losses									23.74	2.42	1.77	13.67	0.054	lation from the three tests remaining in the cells				
	Totals		818	53.80		0.61	0.28	3.49	0.20	440.06	4.96	2.28	28.52	0.806	which was rerun with Flotation Concentrates.				
SUMMARY	Table Concentrates	*	7655	7.95		5.65	3.65	53.30	7.20	149.27	432.51	279.41	4060.12	27.558	20.0	72.6	87.5	84.9	83.5
	Flotation Products	*	750	54.06		0.50	0.22	2.92	0.16	405.41	3.76	1.68	21.93	0.06	54.4	0.6	0.5	0.5	0.2
	Tailings		44823	0.35	0.20	0.28	0.06	1.50	0.03	155.37	125.24	26.92	674.15	0.574	20.9	21.0	8.4	14.1	1.7
	Losses									35.14	34.64	11.36	23.67	4.808	4.7	5.8	3.6	0.5	14.6
	Crude Ore		53228	1.40	0.18	1.12	0.60	8.98	1.24	745.19	596.15	319.37	4779.87	33.006	100.0	100.0	100.0	100.0	100.0

Note: * Final Concentration Products, Table Concentrates and Flotation Products. Flotation Products marked +, namely Conc's #1, #2 and Middlings.

Conclusions :-

From the above Summary the Actual Recoveries made on this load of ore were as follows :-

In Table Concentrates :-

Cobalt - 72.6% Nickel 87.5% - Arsenic 84.9%; Gold - 83.5%

In Flotation Products - Molybdenite - 54.4%.

These recoveries should be improved upon in practice where a closed circuit could be maintained and the losses due to handling and slime overflow would be reduced to a minimum.

As the Molybdenum values are of secondary value as compared to the other metals present, it is advisable to remove as much as possible of the Cobalt, nickel, arsenic and gold values before flotation to recover the Molybdenite values. From the above tables it is shown that most of these values can be removed at 40 mesh, and as it is necessary to grind to 100 mesh to recover the Molybdenite values it would not be wise to float first and table afterwards as the loss in cobalt-nickel-arsenic-gold values due to fine grinding would not compensate for the higher recovery of the Molybdenite.

From the test work conducted, the procedure to follow on the concentration of this ore would be as follows :-

The crude ore crushed in a jaw crusher to 1 1/2" or 1" and ground in a wet ball mill in circuit with a classifier to about 40 mesh and concentrated on tables of the Wessley type; the table tailings reground in a ball or tube mill to 100 mesh in circuit with a classifier and the Molybdenite floated in an oil flotation unit; the tailings from the flotation unit concentrated on slime tables or vacuumers.