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ORE DRESSING AND METALLURGICAL LABORATORIES

Report No. 221

The concentration of molybdenite ore from the Bain Mine, Indian Lake, Quebec.

by C. S. Parsons.

Shipment: A car load shipment of 30.75 tons of molybdenite ore was received March 17, 1925 from the Bain mine, situated at Indian Lake, Masham Township, Hull County, Que. The shipment was submitted by H. H. Claudet, Esq., Rockliffe, Ottawa, Ont.

Purpose of experimental tests: A large scale tonnage check test was desired to determine the amenability of this type of molybdenite ore to concentration.

Characteristics of the ore: The molybdenite is of the medium-large flake variety associated with a large amount of massive iron pyrite. The gangue is pyroxenite and other lime silicate minerals. The richer portions of the ore consist almost entirely of iron sulphides. This type of ore, occurring in many parts of eastern Canada is distinguished by the above chanacteristics from the more disseminated and highly siliceous types, such as the Moss mine ore, north of Quyon, Que, and that of occurrences to the south of Amos, Que. The ore received showed evidence of considerable oxidization, and had apparently been taken from near the surface of the deposit.

Sampling & analysis: Due to the large flake and spotty nature of the ore it is very difficult to obtain an accurate sample of this type of ore. A sample of one-twentieth of the feed to the ball mill, which

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had been crushed to 1¼" by a jaw crusher, was cut by a Vezin sampler. This was reduced by graded crushing and sampling. A sample was also taken of the ground feed to the flotation cells. This wet sample showed a higher assay for the ore than the dry sample, and both samples were slightly lower than the calculated assay of the ore from the contents of the concentration products. The calculated assay of the ore showed it to contain 1.00% MoS_2

Experimental tests: The flow sheet given below was followed in conducting the test. This flow sheet has proven applicable to the concentration of most types of molybdenite ores:

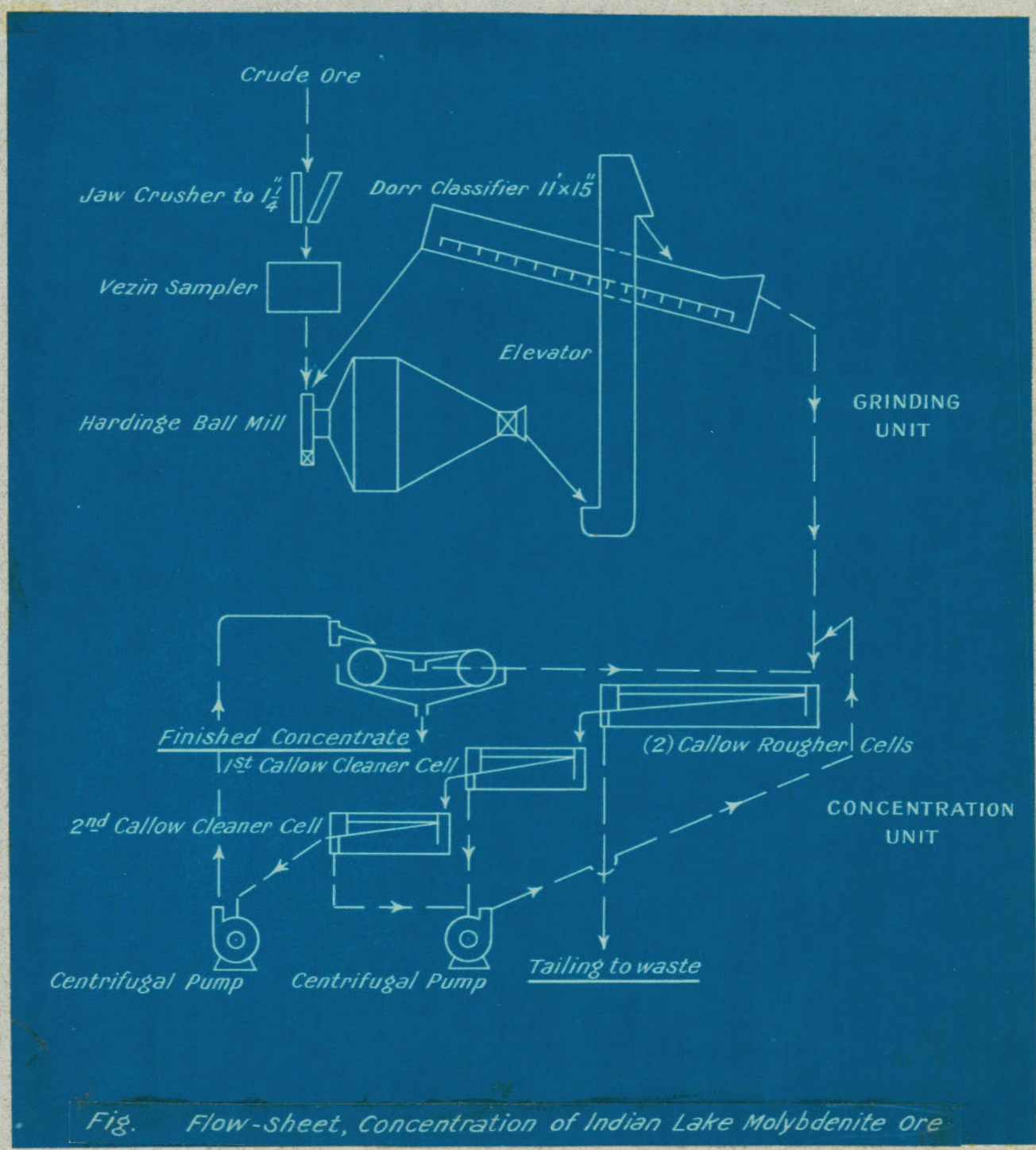

Fig. Flow-Sheet, Concentration of Indian Lake Molybdenite Ore

Reagents used:

Kerosene (British American Oil Co's "Lampolene" brand)	0.3 lb/ton
Pine oil (steam distilled)	0.3 "

Screen test of feed to flotation cells:

Mesh	Wt. gms	Wt. %	Cumulative %
+35	2.7	0.5	0.5
-35+48	14.4	2.9	3.4
-48+65	45.7	9.1	12.5
-65+100	107.2	21.5	34.0
-100+150	74.0	14.8	48.8
-150+200	68.3	13.7	62.5
-200	187.7	37.5	100.0

Daily Record of Run:

Date	Description of sample	Weight of product	Analysis MoS_2 %
March 23	Feed to flotation cells (class.o'flow)		1.17
	Concentrates - first two hours operatn	26.5	76.07
	Concentrates - remainder of day	51.0	79.09
	Tailings		0.11
March 25	Feed to flotation cells (class.o'flow)		0.98
	Concentrates	122.0	81.88
	Tailings		0.17
March 26	Feed to flotation cells "		1.04
	Concentrates	70.0	80.70
	Tailings		0.09
March 30	Feed to flotation cells "		0.85
	Concentrates	89.5	79.84
	Tailings		0.11
March 31	Feed to flotation cells "		0.74
	Concentrates	74.0	78.13
	Tailings		0.13
April 1	Feed to flotation cells "		0.97
	Concentrates	66.5	81.56
	Tailings		0.08
April 2	Feed to flotation cells "		0.78
	Concentrates	66.0	73.38
	Tailings		0.12
April 3	Feed to flotation cells "		0.65
	Concentrates	123.0	74.46
	Tailings		0.18
	Clean-up of ball mill, classifier, etc.	669.0	2.98

NOTE: Last two days run after ore all in ball mill and circuit being run out to obtain as much concentrate as possible. Concentrates of lower grade, and tailings higher than average. First two hours run on first day, some zinc picked up from previous operations, concentrates lower grade than average, contaminated with zinc.

Screen analysis of concentrates - second days run:

Mesh	Weight %	Analysis MoS_2
+65	22.5	86.08
-65+100	14.0	78.11
-100+150	13.0	82.80
-150	50.5	78.32

Analysis of picked flakes:

Hand picked large flakes	98.50% MoS_2
Hand picked flakes, +28 mesh concentrates	95.30% "

These analyses show that the flake contains a small amount of iron sulphides between the laminae, and it would be impossible to obtain a concentrate by mechanical means much over 90% MoS_2

Summary of Concentration results:

One car of ore, net weight	61,500 lb.
Analysis of sample cut from dry ore by Vesin sampler	0.83% MoS2
Average analysis of daily sample wet feed to cells	0.92% "
Analysis of feed obtained by actual weight of MoS2 recovered in concentrate and by calculation of tailing and clean-up	1.00+% "
Content in MoS2, using 1.00+% MoS2 assay	616.72 lb.
Amount of concentrate obtained	668.5 "
Analysis of total concentrate by calculation	78.5% MoS2
Content MoS2 in concentrate	524.58 lb.
Clean-up from run (669 lb. @ 2.98% MoS2)	19.94 "
Average analysis of daily tailing samples	0.12% MoS2
Content MoS2 in tailing	72.20 lb.
Recovery of MoS2 by actual weights of products made	87.0 %
Recovery figured from formula $R = \frac{100(H-T)c}{H(C-T)}$	88.2 %

Conclusions: The above results show that on an ore of this type averaging 1% MoS2, a concentrate containing 80% MoS2 can be produced with a recovery of better than 88% of the molybdenite values in the ore.

The ore submitted was taken from near the surface and was more or less oxidized. This state of the ore did not have any appreciable effect on the recovery, as tailings as low as 0.08% MoS_2 were produced during the run. It may, however, have had some effect on the grade of the concentrate. It is possible that on fresh ore of this grade, a concentrate of 85% MoS_2 could be obtained.

The production of a high grade concentrate from this type of molybdenite ore in which the iron sulphides predominate over the siliceous gangue minerals, is more difficult than from the more highly siliceous ores. More careful control of reagents, pulp densities, defloculation devices, etc. is required. With proper control, the results given above should be obtained, and with the possibility of producing higher grade concentrates on freshly mined ore.