

O T T A W A

October 15th, 1942.  
December 15th, 1942.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1315.

Concentration of Molybdenum Ore from  
Indian Peninsula, Kewagama Lake,  
Abitibi District, Quebec.

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Concentration of Molybdenum Ore from  
Indian Peninsula, Kewagama Lake,  
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Shipment:

A shipment of 197 pounds of ore was received on October 7th, 1942. The ore had been taken from a property known as the St. Maurice Mines Company Limited. The shipment was submitted by J. G. McCrea, General Manager, Sigma Mines (Quebec) Limited, Bourlamaque, Quebec.

Location of the Property:

The property of the St. Maurice Mines Company Limited is located in the northwest portion of Indian Peninsula, on

(Location of the Property, cont'd) -

Lake Kewagama, in the township of Preissac, Abitibi district, Quebec. The property consists of five mining claims, of which the three principal ones are Huestis, Sweezey, and Doucet.

Purpose of the Investigation:

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

Character of the Ore:

The shipment consisted of rejects from diamond drill cores. Some of these rejects had been crushed. The gangue was light-coloured quartz with some mica. The molybdenite present was very sparingly disseminated and varied considerably in size. No microscopic examination was included.

Sampling and Analysis:

The coarse portion of the shipment was crushed and added to the fines. The whole shipment was then sampled by standard methods and was found to contain:

Molybdenite ( $\text{MoS}_2$ ) - 0.60 per cent.

Investigative Procedure and Results:

Flotation tests were made at various grinds.

81.7 per cent  $\text{MoS}_2$  was recovered in a concentrate assaying 93.45 per cent  $\text{MoS}_2$  at a grind of 72.6 per cent minus 200 mesh. The tailing assayed 0.08 per cent  $\text{MoS}_2$ .

The molybdenite concentrate was found to contain 1.52 per cent bismuth and 0.03 per cent phosphorus.

DETAILS OF THE TESTS:

Tests Nos. 1, 2, and 3. - Flotation.

Three samples of ore were ground in ball mills with steel balls at a dilution of four parts solids to three parts of water for various periods.

Reagents:

| <u>To ball mill -</u>                        | <u>Lb./ton</u> |
|--|----------------|
| Sodium silicate (water glass) <sup>⊕</sup> - | 1.0            |
| Kerosene -                                   | 1.0            |

⊕ Added to depress mica present.

To flotation -

Pine oil (frother) - 0.10

Dilution approximately 30 per cent solids.

The flotation concentrate was recleaned. Due to the small amount of molybdenite present in the samples, the dilution was much higher than would be the case in a continuous operation. An addition of pine oil was required to produce a froth in the cleaner cell.

Results:

| Test No. 1. - Grind, 38.9 per cent minus 200 mesh. |                        |   |  |                                |
|--|------------------------|---|--|--------------------------------|
| Product  | Weight,<br>per<br>cent | MoS <sub>2</sub><br>assays,<br>per cent | Distribution:<br>of MoS <sub>2</sub> ,<br>per cent | Ratio of<br>concentra-<br>tion |
| Feed <sup>⊕</sup>                                  | 100.00                 | 0.52                                    | 100.00   |                                |
| Cleaner conc.                                      | 0.50                   | 82.95                                   | 79.31  | 200:1.                         |
| Cleaner tailing                                    | 0.98                   | 3.00                                    | 5.62   | 102:1.                         |
| Flot. tailing                                      | 98.52                  | 0.08                                    | 15.07  |                                |

⊕ Feed assay calculated from the products.

(Continued on next page)

(Details of Tests, cont'd) -

Results, cont'd:

| Test No. 2. - Grind, 55.7 per cent minus 200 mesh. |                  |                                   |   |                        |
|--|------------------|-----------------------------------|---|------------------------|
| Product  | Weight, per cent | MoS <sub>2</sub> assays, per cent | Distribution of MoS <sub>2</sub> , per cent | Ratio of concentration |
| Feed <sup>⊕</sup>                                  | 100.00           | 0.44                              | 100.00                                      |                        |
| Cleaner conc.                                      | 0.45             | 85.26                             | 86.28                                       | 222:1.                 |
| Cleaner tailing                                    | 0.65             | 1.78                              | 2.60  | 154:1.                 |
| Flot. tailing                                      | 98.90            | 0.05                              | 11.12                                       |                        |
|  |                  |                                   |   |                        |
| Test No. 3. - Grind, 72.6 per cent minus 200 mesh. |                  |                                   |   |                        |
| Feed <sup>⊕</sup>                                  | 100.00           | 0.48                              | 100.00                                      |                        |
| Cleaner conc.                                      | 0.42             | 93.45                             | 81.73                                       | 238:1.                 |
| Cleaner tailing                                    | 0.24             | 3.44                              | 1.72  | 417:1.                 |
| Flot. tailing                                      | 99.34            | 0.08                              | 16.55                                       |                        |

⊕ Feed assay calculated from the products.

A screen test was made on each tailing to show the degree of grinding.

| Screen Test. |                  |            |            |            |
|--------------|------------------|------------|------------|------------|
| Mesh No.     | Weight, per cent |            |            |            |
|              | Test No. 1       | Test No. 2 | Test No. 3 | Test No. 4 |
| + 48         | 2.2              | 0.2        | -          | -          |
| - 48+ 65     | 9.0              | 1.4        | 0.1        | -          |
| - 65+100     | 16.3             | 6.8        | 2.1        | 1.2        |
| +100+150     | 19.7             | 17.6       | 9.5        | 5.5        |
| -150+200     | 13.9             | 18.3       | 15.7       | 11.3       |
| -200         | 38.9             | 55.7       | 72.6       | 82.0       |
|              | 100.0            | 100.0      | 100.0      | 100.0      |

Test No. 4. - Flotation.

This test was made with a large sample of ore, which was ground and floated in batches of 2,000 grams each in order to accumulate a sample of cleaner concentrate.

The rougher concentrate was recleaned twice.

(Continued on next page)

(Test No. 4, cont'd) -

The following reagents were added:

| <u>To the ball mill -</u>       | <u>Lb./ton</u> |
|---------------------------------|----------------|
| Sodium silicate (water glass) - | 0.5            |
| Kerosene -                      | 0.4            |
| <br>                            |                |
| <u>To flotation -</u>           |                |
| Pine oil -                      | 0.10           |

Each batch was floated until no molybdenite could be seen in the froth. Some slime gangue and mica were carried into the rougher concentrate.

The rough concentrate was recleaned with the addition of 0.5 pound of water glass per ton added to each cleaning operation.

| Results:               | Grind, 82 per cent minus 200 mesh. |   |   |                                      |
|------------------------|------------------------------------|---|---|--------------------------------------|
| Product                | : Weight,<br>: per<br>: cent       | : MoS <sub>2</sub><br>: assays,<br>: per cent | : Distribution<br>: of MoS <sub>2</sub> ,<br>: per cent | : Ratio of<br>: concen-<br>: tration |
| Feed                   | : 100.00                           | : 0.48  | : 100.00  | :                                    |
| Cleaner conc.          | : 0.49                             | : 87.36                                       | : 88.73   | : 204:1.                             |
| Cleaner tailing No. 1: | : 0.37                             | : 0.48  | : 0.37  | : 270:1.                             |
| "    "    No. 2:       | : 0.11                             | : 2.81  | : 0.64  | : 910:1.                             |
| Flot. tailing          | : 99.03                            | : 0.05  | : 10.26   | :                                    |

Microscopic examination of the concentrate showed that gangue attached to molybdenite and free gangue had been carried into the cleaner concentrate. This concentrate assayed 3.08 per cent insoluble (gangue).

Another concentrate prepared by floating the balance of the ore, approximately 150 pounds, had the following analysis:

|                    | <u>Per cent</u> |
|--------------------|-----------------|
| MoS <sub>2</sub> - | 85.50           |
| Bismuth -          | 1.52            |
| Phosphorus -       | 0.03            |
| Copper -           | None detected.  |

Summary:

The investigation discloses that the molybdenite flotation concentrate contains an appreciable quantity of bismuth. Chemical investigations are being made to determine whether the bismuth can be eliminated or reduced in quantity.

The phosphorus in this sample of concentrate is under the limit of 0.20 per cent.

The specifications of the Metals Reserve for molybdenite at present are as follows:

|                  | <u>Per cent</u> |
|------------------|-----------------|
| MoS <sub>2</sub> | - 85 minimum.   |
| Copper           | - 0.6 maximum.  |
| Iron             | - 3.00 "        |
| Phosphorus)      |                 |
| Tin )            | - 0.20 "        |
| Arsenic )        |                 |

Due to the low-grade character of the feed, the results indicate a ratio of concentration of 200:1.

The flow-sheet adopted by the Bureau of Mines, and which has proved satisfactory on test runs on most Canadian molybdenites, includes the passing of the cleaner flotation concentrate over a travelling 80-mesh screen. The fine impurities, sulphides and gangue pass through the screen while the coarse and agglomerated fine molybdenites do not. The throughs are returned to the circuit and the impurities eventually pass out into the tailing.

With this sample, the small amount of ore available did not permit of the investigation of this phase of the flow-sheet. It is probable that the bismuth, as bismuthenite, would be removed from the final concentrate and that the concentrate then would have a satisfactory bismuth content.

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Conclusions:

Sodium silicate was added to the grind, as a precaution to depress mica, and may not be required in milling operations.

In order to determine the recovery and character of the concentrate to be expected in a full-scale operation ~~when~~ the ore body has been reached, tests should be made on a representative sample of the proposed mill feed. The results obtained in this investigation can therefore only apply to the sample of ore submitted in the shipment.

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