O T T A W A December 14th, 1943.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1554.

Concentration of Tantalite Ore from the Moose Property (Destaffany Tungsten-Gold Mines Limited), Yellowknife Area, Northwest Territories.

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Shipment:

Three bulk samples of ore, total weight approximately 300 pounds, were received on October 18th, 1943. These were submitted by Dr. A. W. Jolliffe, of the Geological Survey, Bureau of Geology and Topography, Department of Mines and Resources, Ottawa.

The samples submitted were:

No. A153,	from the	south	section,	weight	135 pounds.
No. A154,	" "	middle	" ,	"	74 "
No. A160,	" "	north	" ,	"	60 "

Location of the Property:

The samples were taken from Destaffany's Dyke No. 2 on the Moose Claims Nos. 1 and 2 of the Destaffany Tungsten-Gold Mines Limited. The property is located on Hearne channel on the east arm of Great Slave Lake, Northwest Territories.

Results of the Investigation:

Examination of Concentrates A153, A154 and A160 by Dr. H. V. Ellsworth, of the Geological Survey, indicated that the mineral is columbite. This result leads to the conclusion that the deposit represented by the samples submitted for the investigation will not yield encouraging values. By calculation, sample A153 was found to be worth from $3.00 to $4.00 per ton of ore, depending on the amount of tantalite actually present. The maximum value of sample A154, assuming the highest grade of concentrate, would be only $3.46 per ton of ore. Concentrate A160 was too low grade to be considered.

Description of the Deposit:

Excerpts from Dr. A. W. Jolliffe's report on the property read as follows:

"The dyke extends for about 1,400 feet north from a point less than 150 feet from (and about 60 feet above) Great Slave Lake. Its outcrop is up to 200 feet wide and is interrupted about midway along its length by a muskeg about 400 feet across, and in its southern half, by an east-west fault which causes a left-hand displacement of 120 feet. The dyke walls commonly dip 30 to 85 degrees to the west.

"The country rock is nodular greywacke of the Yellowknife group, which strikes northeasterly and dips to the southeast. The dyke pinches out at both ends.

"Minerals identified with reasonable certainty include feldspar (both microline and cleavelandite), quartz, spodumene, light-yellow mica, amblygonite, graphite, beryl, tantalite, cassiterite, tourmaline, and lazulite. The only ones that seem sufficiently abundant to be of possible economic interest are tantalite and the lithium minerals spodumene and amblygonite.

"Tantalite is found throughout the dyke but in widely varying amounts. It occurs chiefly in very thin radiating bladed crystals, in cleavelandite near beryl, which are up to 3½x1/16 inch. The highest-grade section seen extends south of the fault for about 100 feet along and near the foot wall (east side) of the dyke, and averages about 5 feet wide."

"The lithium minerals are likewise erratically distributed throughout the dyke. In the middle section (between the fault and the muskeg), bands up to 5x50 feet carry more than 25 per cent spodumene. Amblygonite is also an important

(Description of the Deposit, cont'd) -

constituent of parts of the dyke but is distinguished from the less valuable minerals only with difficulty and no estimate of grade could be made. The largest crystal face of spodumene seen measured 2x4 feet, and of amblygonite 2x3 feet. Both appear to be parts of still larger crystals."

Concentration of the Ore:

The samples were crushed to pass a 20-mesh screen, and then were screened on 48- and 65-mesh screens, giving the following products: -20+48, -48+65, and -65 mesh. The plus 65 mesh fractions were concentrated on a Wilfley table. The table middlings and tailings were reground to pass a 65-mesh screen. The minus 65 mesh products were then concentrated on a Wilfley table.

The cleaned concentrates were screened on 28-, 35-, 48- and 65-mesh screens and the various products were examined microscopically. The plus 48 mesh products carried considerable gangue attached to mineral, indicating that a concentrate free of attached gangue could not be made at a grind coarser than 48 mesh. The -48+65 mesh concentrate showed some attached gangue but the amount was relatively small.

The final tantalite concentrates contained some sulphides, a light brown mineral, and a little free quartz, the light brown particles being more abundant than the sulphides. This brown mineral could not be eliminated from the tantalite concentrate. Later tests showed that this mineral was cassiterite.

Some magnetic material was removed from each concentrate by means of a hand magnet. This included magnetite and metallics from the grinding mill.

(Continued on next page)

(Concentration of the Ore, cont'd) -

Results of Concentration:

SAMPLE NO.		A153	A154	A160
Original Feed*		125.5 lb.	67 lb.	55 lb.
Magnetics from Concentrates		10.2 gm.	2.2 gm.	3.0 gm.
- 48 + 65 mesh concentrate	(1)	80.0 gm.	11.9 gm.	1.9 gm.
- 65 +100 " "	(1)	59.2 "	6.0 "	3.0 "
-100 +150 " "	(1)	52.3 "	7.1 "	2.5 "
-150 +200 " "	(1)	45.5 "	8.0 "	1.8 "
-200 " "	(1)	54.7 "	11.7 "	3.2 "
- 65 +100 mesh concentrate	(2)	2.7 gm.	4.3 gm.	0.6 gm.
-100 +150 " "	(2)	7.5 "	8.3 "	3.5 "
-150 +200 " "	(2)	5.0 "	3.8 "	2.2 "
-200 " "	(2)	11.0 "	8.7 "	2.8 "
Total concentrate -		317.9 gm.	69.8 gm.	21.5 gm.
Calculated weight of concentrate per ton of ore -		11.2 lb. /ton	4.6 lb. /ton	1.7 lb. /ton

(1) Original concentrates.
(2) Concentrates from reground middlings.

* After cutting out the head sample from each shipment, the remainder was the original feed for each test, as indicated.

Summary of Investigations by Dr. H. V. Ellsworth, Mineralogist, of the Mineralogical Section, Geological Survey of Canada, on Tantalite Concentrate from Samples A153, A154, and A160, as reported to Dr. A. W. Jolliffe:

"Concentrate No. A153(-48+65 mesh) was examined under the binocular microscope and the following impurities were seen: quartz and feldspars as individual grains, but perhaps even more often attached to tantalite grains; creamy to light brownish grains with adamantine lustre like scheelite or zircon, or perhaps monazite. Under ultra-violet light quite numerous grains fluoresced bluish-white, suggesting scheelite rather than zircon (zircon fluoresces yellowish). Grains of pyrite and rusty magnetic metal particles were also quite abundant, and a grain of pale bluish (phosphate?) was rarely seen. Cassiterite subsequently was found to be present. Specific gravity, as received, by my precision method was 6.7719 at

(Summary of Investigations by Dr. Ellsworth, cont'd) -

20.15° C. (8+gm. used).

"10 grams of this concentrate was treated with concentrated HNO_3, then with concentrate HCl to remove pyrite and steel. After washing, it was panned and the heavy concentrate thus obtained was used for a specific gravity determination. Specific gravity 5.8072 at 19.28° C. (8.7+gm. used).

"Concentrate A154. Under the binocular microscope, the same impurities as in A153 were seen to be present, but pyrite and steel particles were even more abundant; and a reduction test with zinc showed that cassiterite is much more abundant in this than in A153 and may be, by guess, between 5 and 10 per cent. Specific gravity, as received, 6.1918 at 18.60° C. The whole concentrate, 11.9 gm., was treated like A153 with HNO_3 and HCl and was quite severely panned on a watch glass, after which the specific gravity was found to be 6.2651 at 22.22° C. (9.9+gm., the whole amount of repanned concentrate was used).

"From the specific gravities, the mineral appears to be columbite, with A153 carrying perhaps 20 to 25 per cent Ta_2O_5 and A154 perhaps 30 to 40 per cent Ta_2O_5.

"Assuming that the mineral is columbite, the values are not encouraging, as shown from the following calculations: Suppose concentrates are 95 per cent pure columbite carrying 83 per cent earth acids and that the specific gravities obtained on the H.V.E. purified concentrates A153 and A154 represent maximum values, a supposition justified by the fact that cassiterite with higher specific gravity than that of the mixture is present and will probably more than compensate for any lighter impurities still present. Then the combined oxides factor for concentrates is .95 x .83 = .78 and A153 with 11.2 pounds concentrate per ton of ore contains

(Summary of Investigations by Dr. Ellsworth, cont'd) -

8.7 pounds combined oxides per ton, and if the oxides are in the ratio of 25 Ta_2O_5 to 58 Cb_2O_5, there are $\frac{58}{83}$ x 8.7 = 6 pounds Cb_2O_5 per ton at $0.50 per pound = $3.00 per ton. However, if by any chance there should be 30 per cent Ta_2O_5 present, then there are $\frac{30}{83}$ x 8.7 = 3.14 pounds Ta_2O_5 per ton at $1.30 per pound = $4.08 per ton as tantalite ore.

"Similarly for A154, at 4.6 pounds concentrate per ton there are 3.59 pounds combined oxides per ton and assuming the best possible, i.e., that it carries 40 per cent Ta_2O_5 and could pass as tantalite ore, there would be $\frac{40}{83}$ x 3.59 = 1.73 pounds Ta_2O_5 per ton = $3.46 per ton.

"Concentrate A160, at 1.7 pounds per ton, is evidently not worth considering."

CONCLUSIONS:

The investigation discloses that the ore lends itself to gravity concentration of the heavy minerals present. Other heavy minerals with the columbite-tantalite minerals included cassiterite and some scheelite. The latter two minerals were not amenable to mechanical separation from columbite-tantalite and were included with the columbite concentrate.

Sample A153 had a calculated value of from $3.00 to $4.00 per ton of ore, depending on the amount of tantalite present. Sample A154 had a maximum value of only $3.46 per ton of ore, assuming the highest grade of concentrate. Concentrate A160 was too low in grade to be considered.

It is concluded that the deposit as represented by these samples has a very low value due to the mineral's being

(Conclusions, cont'd) -

columbite instead of tantalite.

These results can apply only to the samples submitted for the investigation.

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