PE-058-08

PE 58-8

TERRITORY OF ALASKA

DEPARTMENT OF MINES

COLLEGE, ALASKA

WORK DONE IN 1956-57 ON THE SPRUCE HEN TUNGSTEN PROSPECT, FAIRBANKS QUADRANGLE

The Spruce Hen tungsten prospect has been described in U. S. Geological Survey Bulletin 1024-I, TUNGSTEN DEPOSITS IN THE FAIRBANKS DISTRICT, ALASKA, by F. M. Byers, Jr; in Territorial Department of Mines Pamphlets Nos. 1 and 2, STRATEGIC MINERAL OCCURRENCES IN INTERIOR ALASKA by Henry R. Joesting; and in a Territorial Department of Mines Memorandum Report dated March 20, 1954, by Robert H. Saunders.

The property is owned by Mr. Lloyd Lounsbury of Fairbanks. In 1956 it was leased to Mr. Leslie Dodson of Fairbanks and Mr. Crook, a Colorado miner who apparently has had many years experience in the tungsten mining business. Additional bulldozer trenching was done on the prospect, and a vertical shaft was sunk 42 feet on the mineralized zone.

The prospect was examined on July 17, 1957; at that time there was no one on the property, and it appeared that no work had been done for several days. There are two buildings; a wanigan for living quarters and a small frame building that serves as hoist-house and work shop. A compressor - apparently the same one that Mr. Lounsbury was using in 1953 - is in position near the shaft collar. A headframe has been built over the shaft. Timbers for the headframe are made of five thicknesses of 2-inch planks held together by bolts. Good workmanship is evident in the shaft-timbering and in the construction of the headframe.

Mr. Crook stopped work on the property in mid-June, 1957, because of the low tungsten price, but he remained in Fairbanks throughout most of the summer. He said that he and Mr. Dodson have a long-term lease and that they intend to hold onto the property until the price of tungsten rises; he believes that the price will continue to fluctuate as it has done in the past. In 1957 one ton of ore from the prospect was milled at the Alaska Metals Mining Company mill at Gilmore Dome.

Hoist-house and shaft headframe at the Spruce Hen prospect.

November, 1957

Robert H. Saunders
Territorial Mining Engineer

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TERRITORY OF ALASKA

DEPARTMENT OF MINES

COLLEGE, ALASKA

March 20, 1954

MEMORANDUM REPORT

TO: Phil R. Holdsworth, Commissioner of Mines

FROM: Robert H. Saunders, Associate Mining Engineer

SUBJECT: SPRUCE HEN SCHEELITE PROSPECT K+ 58-146

INTRODUCTION

The Spruce Hen scheelite prospect is in the Fairbanks District at 64° 57' N latitude and 147° 31' W longitude on the ridge between First Chance Creek and Steele Creek. The prospect has been examined and described by Henry R. Joesting, Territorial Department of Mines, and by several geologists of the U. S. Geological Survey. The most recent description of the prospect was made by F. M. Byers, Jr. of the U. S. Geological Survey in a report entitled: TUNGSTEN DEPOSITS IN THE FAIRBANKS DISTRICT, ALASKA. Byers' report was released in 1951, but the data regarding the Spruce Hen prospect probably were gathered during the years 1942 to 1945. I visited the property on September 17, 1953. The owner was absent at the time of my visit.

DESCRIPTION

According to Byers' report, the mineralized zone trends N 60° E, dips about 30° NW, and is about 3 feet wide. It has been traced for 800 feet by pits and trenches, but the mineralization is not uniform throughout the length of the mineralized zone. In geology, mineralogy, and genesis, the deposit appears to be similar to the deposits at Gilmore Dome.

Lloyd Lounsbury is the present owner of the Spruce Hen prospect. He is employed full time by the Alaska Road Commission, and his work on the prospect is confined to weekends and holidays. His work so far has consisted of stripping the overburden with a bulldozer, breaking the rock in the mineralized zone by drilling and blasting, and bulldozing the broken rock into stockpiles.

There are two large open-cuts on the prospect, and about 100 tons of ore is piled near the open-cuts. Lounsbury has a small mill near Ester that has been used for

milling gold ores. The scheelite ore will be trucked to the mill for concentrating. A small ball mill and a Plat-O table probably will be the only pieces of equipment available for milling the ore. Lounsbury plans to mill the 100 tons of ore during the early summer of 1954.

The samples described by Byers had a weighted average of 0.5 per cent WO_3. Recent samples taken by Lounsbury have averaged slightly more than 1 per cent WO_3. By visual inspection under a Mineralite, a few specimens taken from the dump appeared to contain 1 per cent or more WO_3.

Respectfully submitted,

Robert H. Saunders

Robert H. Saunders
Associate Mining Engineer

Tractor and compressor used for mining.

Open-cut on the Spruce Hen prospect.

TERRITORY OF ALASKA
DEPARTMENT OF MINES
COLLEGE, ALASKA

U. S. BUREAU OF MINES MINERAL DRESSING REPORT ON A SAMPLE OF SCHEELITE ORE FROM THE SPRUCE HEN CLAIM, FAIRBANKS DISTRICT, ALASKA

BUREAU OF MINES -- REGION I
METALLURGICAL DIVISION

Mineral Dressing Report
Spruce Hen Tungsten

Ore:

The sample of tungsten ore submitted for testing was procured by S. H. Lorain, Regional Director, Bureau of Mines, and William S. Twenhofel, Geologist, U. S. Geological Survey, from the Spruce Hen property, one of a series of claims near Fairbanks, Alaska, controlled by Lloyd Lounsbury. The sample was submitted to the laboratory September 20, 1951.

Physical Character:

A petrographic examination of the sample submitted revealed it to be a contact metamorphic rock containing predominantly idocrase and pyroxene with some associated quartz, fluorite, garnet, wollastonite, and relatively small amounts of scheelite, chlorite, and epidote. Traces of limonite and calcite are present.

The study showed that most of the scheelite is unlocked in the minus 65- plus 100-mesh fraction but that grinding to minus 100-mesh is required to effect maximum liberation.

Chemical Character:

A representative head sample, prepared from the ore submitted, had the following partial chemical analysis:

Chemical Analysis

Assay, per cent										Oz per ton	
WO_3	Zn	Cu	Pb	Fe	Insol.	Mn	P	Sb	As	Au	Ag
0.25	*0.05	*0.02	*0.05	5.2	65.5	0.3	0.06	*0.1	*0.05	0.005	0.55

A semi-quantative spectrographic analysis made of a representative portion of the ore revealed the presence and approximate quantities of the metals listed in the following table. Any other elements, if present, are in amounts lower than the minimum detachable by the routine technique employed.

Al	Be	Bi	Ca	Cu	Mg	Fe	Mn	Ni	Si	Ti	V	Mo	Zn	W
A	E	E	A	E	C	A	D	F	A	D	E	E	E	D

Legend: A – over 10 per cent
B – 5 to 10
C – 1 to 5
D – 0.1 to 1
E – 0.01 to 0.1 per cent
F – 0.001 to 0.01
G – less than 0.001

*less than

Treatment:

The sample was submitted to the laboratory for preliminary testing to determine the amenability of the ore to concentration. The following procedures were investigated:

1. Sizing
2. Flotation
3. Table concentration
4. Combined tabling and flotation.

Sizing

A sample of ore was roll-crushed and screen-sized wet using standard Tyler screens, to produce a series of sized fractions from plus 10- to minus 200-mesh. The finest fraction was deslimed by decantation. The tungsten content of each fraction was determined. Results are shown in the following table.

Product	Screen Analysis Weight per cent	Assay, per cent WO_3	Distribution per cent WO_3
Plus 10-mesh	28.22	0.14	20.7
Plus 20-mesh	26.01	.05	6.7
Plus 35-mesh	14.18	.05	3.6
Plus 48-mesh	5.13	.32	8.3
Plus 65-mesh	4.67	.34	8.3
Plus 100-mesh	4.79	.47	11.9
Plus 150-mesh	3.29	.58	9.8
Plus 200-mesh	2.88	.31	4.7
Minus 200-mesh Sand	7.70	.54	21.8
Slime	3.13	.27	4.2
Calculated Head	100.00	.20	100.00
Combined plus 35-mesh	68.41	.09	31.0
Combined minus 35-mesh	31.59	.42	69.0

The sizing test indicated that there is a definite concentration in the finer sizes of roll-crushed ore. If the tungsten loss could be minimized the rejection of a large portion of the ore without further treatment would appreciably reduce plant cost.

Flotation

Preliminary flotation tests gave unsatisfactory results. Although up to 95 per cent of the tungsten was recovered, the concentrates were not readily cleaned and the highest-grade product made assayed only 11.6 per cent WO_3.

Table Concentration

A sample of ore was roll-crushed to pass a 20-mesh sieve, screened on a 48-mesh sieve, and the two fractions were tabled separately without further sizing. A low-grade reject was considered of prime importance but no attempt was made to obtain a high-grade concentrate. Over 85 per cent of the tungsten was recovered in a concentrate that assayed 1.27 per cent WO_3. The major loss appeared in the tailing from the coarse fraction. Considerable of the scheelite was present in unliberated particles.

A second test was made on ore roll-crushed to minus 35-mesh prior to treatment. The material was fed to the shaking table using a hydraulic sizing cone. Results are shown in the following table:

Table Concentration

Product	Weight per cent	Assay per cent WO_3	Distribution per cent WO_3
Concentrate	0.308	65.6	68.9
Middling	1.012	8.5	29.4
Tailing	88.215	*0.005)	1.7
Slime	10.465	*0.005)	
Calculated Head	100.00	0.29	100.0

By tabling hydraulically-sized ore crushed to minus 35-mesh, 68.9 per cent of the tungsten was recovered in a concentrate that assayed 65.6 per cent WO_3. An additional 29.4 per cent of the total tungsten was present largely as locked particles, in the table middling product.

Tabling and Flotation

In an effort to beneficiate the table middling product of the preceding test, a sample of the product was stage-ground in a laboratory ball mill to minus 100-mesh and treated by fatty-acid flotation. Operation data and metallurgical results are summarized in the following table.

Flotation, Table Middling Metallurgical Data

Product	Weight per cent	Assay per cent WO_3	Distribution per cent WO_3
Cleaner conc.	14.09	54.9	91.2
Cleaner tail	2.30	32.1	8.7
Rougher tail	83.61	*0.01	0.1
Calc Middling	100.00	8.48	100.0
Calc Rougher conc.	16.39	51.7	99.9

* less than 0.01, calculated as 0.005.

Operation Data

Grind: Minus 100-mesh

Circuit	pH	Reagents, pounds per ton flotation feed		
		Na_2CO_3	Sodium silicate	Collector**
Conditioner	10.2	4.0	0.5	1.0
Rougher	10.2	-	-	2.0
Cleaner	9.8	-	-	-

Flotation of the re-ground middling product was highly successful. Nearly all of the tungsten present was recovered in a rougher concentrate that assayed 51.7 per cent WO_3. The cleaning step increased the grade to 54.9 per cent WO_3, but resulted in a loss of 8.7 per cent of the tungsten in the flotation feed.

The following table summarizes the results obtained by the tabling and flotation procedures described above.

Tabling and Flotation

Product	Weight per cent	Assay per cent WO_3	Distribution per cent WO_3
Table conc.	0.308	65.6	68.9
Flot. rougher conc.	.166	51.7	29.4
Comb. reject	99.562	*0.005	1.7
Calculated Head	100.000	0.29	100.0
Combined conc.	0.474	60.7	98.3

Tabling ore crushed to minus 35-mesh, followed by regrinding and flotation of the table middling product, recovered 98.3 per cent of the tungsten in a combined concentrate that assayed 60.7 per cent WO_3.

Conclusions:

The Spruce Hen tungsten ore, although low in grade, was found to be amenable to beneficiation by combined tabling and flotation treatment. Crushing to minus 35-mesh appears to be required for table concentration, and hydraulic sizing prior to tabling appears advantageous.

Petrographer : R. D. Hess, Region II
Spectrographer : D. M. Mortimer, Region II

Rollien R. Wells, Acting Chief
Metallurgical Division,
Region I

Copied by Robert H. Saunders, Territorial Department of Mines, from a report borrowed from Lloyd Lounsbury.

* less than
** Collector-frother employed was an aqueous emulsion containing 1.25 per cent oleic acid, 1.25 per cent Neo-fat D-142 (a mixture of oleic and linoleic acid) and stabilized with 0.5 per cent Emcol X-25.