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DEPARTMENT OF MINES

COLLEGE, ALASKA

November 9, 1951

MEMORANDUM REPORT

TO: Leo H. Saarela, Commissioner of Mines, Juneau, Alaska

FROM: Robert H. Saunders, Associate Mining Engineer, College, Alaska

SUBJECT: Gilmore Dome Tungsten Deposits - KX 58-4

The preliminary report, "Tungsten Deposits in the Fairbanks District, Alaska" by F. M. Byers, Jr. of the United States Geological Survey, was received in this office October 29, 1951. This Memorandum Report is being written at the request of the Commissioner of Mines to discuss that part of the U. S. G. S. report that pertains to the deposits on Gilmore Dome. During the summer of 1942, I was employed as Junior Engineer by the Cleary Hills Mines Co. to assist in the prospecting of the Gilmore Dome tungsten deposits. Part of the information in this report was derived from my own experience, and part was obtained from conversations with Mr. Charles Lazeration, who was employed on the property from 1942 until operations ceased in 1944.

Mr. Byers has written an excellent report; the maps included in Fig. 5 are particularly worthy of praise. Mr. Byers describes structural features related to ore deposition which we did not recognize in 1942, and perhaps the most outstanding of these features is the presence of drag folds in the crystalline limestone that serves as a host rock. Folding accompanied by thickening of the limestone at the crests and troughs of the folds accounts for variations in thickness and dip of the ore lenses, and thereby explains irregularities in the deposit that were puzzling to us in the early stages of exploration. Mr. Byers has also pointed out that the amphibolite in the footwall of the limestone has played an important part in ore deposition. After starting the shaft, we discovered that the presence of ore lenses depended on the presence of fractures in the footwall of the limestone, but we failed to realize that the presence of those fractures in turn depended on the presence of the amphibolite.

A brief history of the prospecting and mining of the deposit is of interest because it explains the location and course of some of the underground workings. Trenching was started early in the summer of 1942. Trenches 2, 3 and 4 were between the two old shafts; trench 3 was at the site of the present shaft but was filled in when shaft sinking started. The best ore exposed by trenching was in trench 3 near the intersection of a quartz vein with the crystalline limestone. Trench 3, therefore, was selected as the best location for sinking a prospect shaft. From the bottom of the trench, shaft timbers were built extending upward at about forty-five degrees to a point slightly above the original surface. These timbers were supported by a wooden framework and were closely lagged on all four sides. The material that had been excavated from the trench was bulldozed back into place around the timbers; we then had a timbered shaft that extended from the surface down to solid bedrock. A one-half ton skip was used for hoisting in the shaft. The headframe was so designed that the skip dumped into a three-quarter ton ore car at the surface.

The shaft ran out of ore about sixty feet down the dip. Weathered calcareous schist in the hanging wall necessitated forepoling in sinking the shaft; hard amphibolite in the footwall necessitated heavy blasting in the lifters. Consequently sets of timber were frequently blasted out. Difficulty in sinking and lack of ore led to the decision to start drifting on the "50 level". The short drift to the southwest encountered no ore. The drift to the northeast went through a lens of ore about twenty-five feet long. A winze was started to follow down the dip of the lens of ore in the northeast drift. The winze showed that the ore went down at least twenty feet, so the management decided to sink the shaft deeper in order to explore from below the ore-body exposed in the winze, and also to explore for other ore-bodies down the dip.

When shaft sinking was resumed, the shaft was steepened so that the hard amphibolite was carried in the back of the shaft, and the shaft was extended downward in the footwall of the ore-bearing horizon to the "150 level".

The map in Fig. 5 shows the results of exploration on the "150 level". The raise northeast of the shaft showed that the winze from the "50 level" had been stopped just short of the bottom of ore. Other ore-bodies were discovered; all the ore-bodies exposed were mined above the "150 level" by overhand stoping to the limits of the ore. Underhand stoping was carried on below the "150 level", but ore is still exposed in most of these underhand stopes. A second raise on the northeast side of the shaft broke into the 1916 workings; access was gained to a drift 200 feet long, under the old workings. This old drift showed that mining in 1916 had reached the bottom of ore, and no new ore-bodies had been located under the old stopes. Access was not gained to the old workings on the southeast side of the shaft, and it is, therefore, impossible to say whether or not there is any indication of ore extending in depth under those old works. It is, however, noteworthy that there are indications of ore in the southeastward extension of the "150 level".

In 1943 the tunnel shown in Fig. 5 was started for a twofold purpose: first, to explore for ore-bodies northeast of the underground workings, and, second, to provide access to the underground workings through a horizontal haulageway. The hillside near the tunnel adit provided a more suitable location for a surface plant than did the hilltop around the collar of the shaft. Fig. 5 shows that the tunnel encountered no ore-bodies, and, in 1944, the whole project was abandoned.

I am inclined to disagree with Mr. Byers' hypothesis that temperature and pressure within one-eighth mile of the contact were too high for the formation of scheelite. Scheelite is characteristically a high temperature mineral; Lindgren (1) describes deposits in which scheelite is found on the periphery of marble inclusions in igneous rocks. I believe the paucity of ore lenses between Gilmore Dome and the contact to the south should, at the present time, be attributed entirely to the scarcity of suitable host rock and the absence of a competent bed to provide fractures for the ore-bearing solutions. If future exploration in depth proves that the ore-forming horizon and the quartz-filled fissures extend downward to an igneous intrusion and that no ore has been formed at the contact, then the hypothesis that the temperature was too high would seem much more plausible.

Usually the intensity of contact metamorphism decreases progressively as the distance from the contact increases. There is undoubtedly a contact somewhere in depth under Gilmore Dome; it is therefore possible that the number and size of ore-bodies may increase in depth toward the contact. There is, however, a lower limit of mineralization; the limit may be some distance above the contact. Joesting (2) stated that elevations from plane table surveys show that the nearest known granite contacts on the surface are from 300 to 500 ft lower than the exposures of scheelite in the prospect trenches. He further stated that there are indications that the granite itself is domed up under Gilmore Dome. It is hazardous, therefore, to predict that even "inferred ore" will extend more than 600 ft down the dip (300 ft vertically) from the surface.

On page 21 in his report, Mr. Byers has given two methods for calculating the reserves of "indicated ore". He has made one assumption with which I definitely disagree. Because he used the same assumption in both methods, it is necessary here to discuss my disagreement with respect to only one of his methods, and it is more convenient to use his second method. Mr. Byers has indirectly assumed that there is still "indicated ore" above the "150 level".

Mr. Lazeration states that the stopes driven up from the "150 level" run out of ore. On the northeast side of the shaft, there are two blocks exposed on three sides and partly exposed on a fourth side with no indication of ore. On the southwest side there are two smaller blocks exposed on three sides with no indication of ore. Certainly, further prospecting is not justified in a block measuring 550 ft along the strike and 150 ft down the dip in which there are three shafts, four raises, 500 ft of drifts, and several stopes all out of ore. The area that has produced 4500 units of tungsten trioxide is, therefore, not just the area of the underground workings but the total area above the "150 level". Thus the production to date has come from an area extending 150 ft down the dip and 370 ft along the strike, or 55,500 sq ft.

(1) Lindgren, Waldemar, MINERAL DEPOSITS: fourth ed. pg. 729.

(2) Joesting, Henry R., STRATEGIC MINERAL OCCURRENCES IN ALASKA, PAMPHLET NO. 2: Territorial Department of Mines Publication, pg. 24. 1943.

In calculating indicated ore, we can safely predict that the ore-body will continue in size and tenor down the dip from the lowest level a distance equal to one-half the length of ore exposed in the lowest level. If we assume, rather optimistically, that ore extends under the inaccessible workings to the southeast, we have a length of 340 ft. This indicates an extension in depth of 170 ft and an area of 57,800 sq ft. Substituting these figures in Mr. Byers' equation, we have:

$$\frac{55{,}500 \text{ sq ft mined area}}{57{,}800 \text{ sq ft unmined area}} = \frac{4500 \text{ mined units}}{\text{unmined units}}$$

This gives 4680, or about 4700, unmined units remaining in the "indicated ore".

There are so few data available for calculating the quantity of "inferred ore" that any method of calculation could be criticized. I do not feel justified, therefore, in making any criticism of Mr. Byers' calculation of "inferred ore", except that it is worth repeating that there is some geological indication that the ore does not extend more than 600 ft down the dip from the surface.

The deposits on Gilmore Dome are particularly interesting to me because I believe there is a remote possibility that a small "bonanza" exists along the granite contact. If the shaft were to be extended down the dip, it would probably reach the contact within 450 ft of the present bottom. If the "bonanza" does exist, it would then be discovered; the lower limit of ore formation would be determined; it would then be possible to predict whether the property is destined to produce a substantial quantity of tungsten from a "bonanza" ore-shoot or to continue as a site for "sniping" operations during times when tungsten commands a high price. Unfortunately, in either case, the life of the property would be short.

Respectfully submitted,

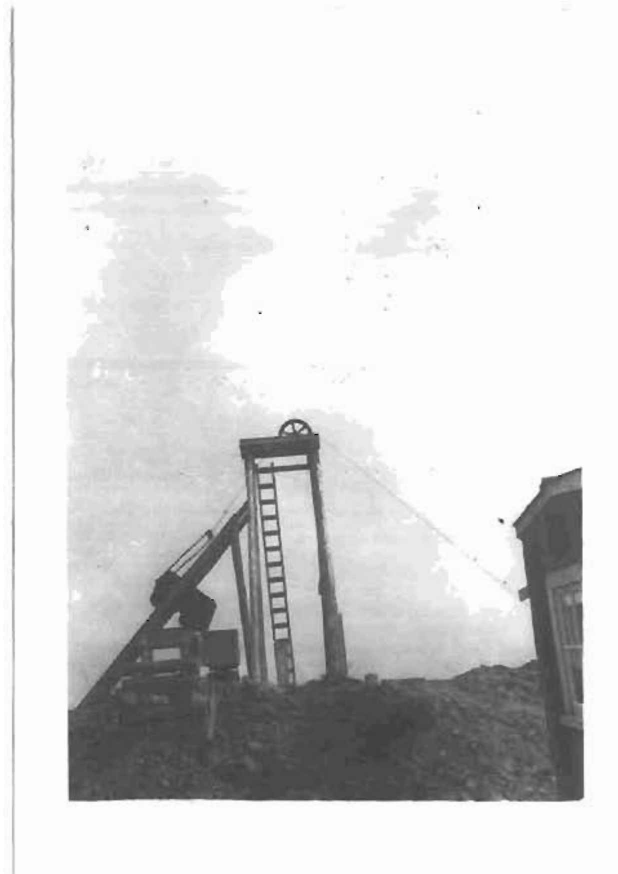
Robert H. Saunders

Robert H. Saunders
Associate Mining Engineer

Hoist and engine used for shaft sinking.

Compressor used for shaft sinking.

Shaft timbers in place in Trench 3.



Shaft Headframe.

Office Memorandum . Territorial Department of Mines

364-58

To : Phil R. Holdsworth Office: College

From : Bob Saunders Date : Sept 9, 1955

Subject : ALASKA METALS MINING COMPANY -- GILMORE DOME TUNGSTEN PROSPECT

On August 31, 1955 I visited the Gilmore Dome prospect with E. H. Beistline and R. M. Chapman. We examined some recently dug bulldozer trenches, took some soil samples which are to be sent to the USGS laboratory at Denver, visited a nearby mill that was used for milling scheelite ore during World War I, and visited a small mill used by two of the owners of the Alaska Metals Mining Company for small-scale milling during World War II.

MILL USED DURING WORLD WAR I.

The mill that was used during World War I is on the left limit side of Yellow Pup about one mile northeast of the top of Gilmore Dome. It was housed in a frame building; the roof of the building is gone, and the wallsoand floor have deteriorated.

Ore was hauled by horse and wagon from the shafts at the top of Gilmore Dome and dumped into a bin at the mill. Ore from the bin went through a jaw crusher and onto a shaker screen. Oversize from the screen was fed through a set of rolls and into a bucket elevator; the elevator returned the material to the screen. Undersize from the screen went through a battery of jigs, and overflow from the jigs went to a concentrating table. Presumably, middlings were obtained from the table and returned to the circuit. A boiler and steam engine were housed in a separate building beside the mill. The rolls and some of the other equipment appear to be in remarkably good condition considering the length of time the mill has been idle.

MILL USED DURING WORLD WAR II.

Farther upstream on the right limit side of Yellow Pup there are a small ball mill and a concentrating table that were used by Mel Anderson and Elmer Stohl during World War II. This equipment is not housed in a building. The mill is made of steel plate, and it was intended for use without liners. Anderson said that the mill would handle 4 to 5 tons in 10 to 12 hours but only about 25 tons were milled in it. Two gasoline engines powered this equipment, but the engines have been stolen. Probably the mill and table would be suitable for testing, however, they will deteriorate if they continue to stand in the open.

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The lower trench was covered with loose rock, a round having been blasted preparatory to starting a new adit. A sample from a seven-feet-long channel in the lower trench ran 1.5 per cent WO_3. A stockpile of perhaps 200 tons has been built from material taken from the two trenches. Particles of scheelite are scattered through the overburden overlying the apex of the deposit. Probably there has been some downward migration of scheelite particles in fractures in the ore horizon; this would make the upper few feet of the deposit appear richer than the main body, and the results of sampling near the surface would be misleading.

The compressor is in position at the lower trench for use in driving a new adit; track has been laid for dumping waste and ore; and the haulage motor and loading machine are on the track. A small supply of mine timbers is piled nearby. The present DMEA program will provide for 100 feet of drift, and if the ore continues for that distance, the owners hope to get additional DMEA assistance.

SEP
PHIL R.
Commissioner

To :

Office:

From :

Date :

Subject :

CURRENT EXPLORATION.

In 1951, before the present exploration program began, the accessible underground workings at Gilmore Dome consisted of an inclined shaft at the top of Gilmore Dome with levels at 50 and 150 feet down the incline, and an adit on the northeast side of the dome slightly lower in elevation than the 150-ft level in the shaft. All of these workings were driven by the Cleary Hill Mines Co during World War II. There were also two inaccessible shafts, one on each side of the Cleary Hill shaft, and there was an inaccessible adit the portal of which was near the portal of the Cleary Hill adit. These latter two shafts were sunk during World War I, and the adit was driven during the 1920's.

When the present exploration program began, the Alaska Metals Mining Company extended the Cleary Hill adit to connect with the workings on the 150-ft level; then the company drove another adit about 800 feet long below the Cleary Hill adit; this was called the Eisenhower adit. In addition to the underground workings there were numerous bulldozer trenches.

All of the underground workings are on claims owned by the Stepovich estate. On the south side of the Stepovich claims is a group of claims that was staked by Lou Colbert during World War II, and east of the Colbert claims is a group of claims that was staked by the owners of the Alaska Metals Mining Company during World War II. After Colbert's death, his claims reverted to the public domain and they were restaked by the owners of the Alaska Metals Mining Company. The company has leased the Stepovich claims.

The Eisenhower adit and the Cleary Hill adit are both on what appears to be the extension of the ore horizon that was mined through the three shafts. This ore horizon apparently passes slightly to the north of Yellow Pup, and the portal to the Eisenhower adit lies just north of the head of Yellow Pup. In 1954 and the summer of 1955, stripping and trenching were done on the claims that were staked by the owners of the Alaska Metals Mining Company. The trenches are on a ridge on the south side of Yellow Pup, and they are about 250 feet lower in elevation than the Eisenhower adit. The trenches appear to be on an extension of the ore horizon that was discovered by Colbert.

The ore horizon is exposed in two trenches 75 to 100 feet apart. In the upper trench the deposit appears to be about seven feet wide. Examination in the trench with an ultra-violet lamp indicated that the deposit would run one to two per cent WO_3 across this width.

REPORT ON PROGRESS OF WORK AT THE

GILMORE DOME SCHEELITE PROSPECT, 1957

PX 58-4

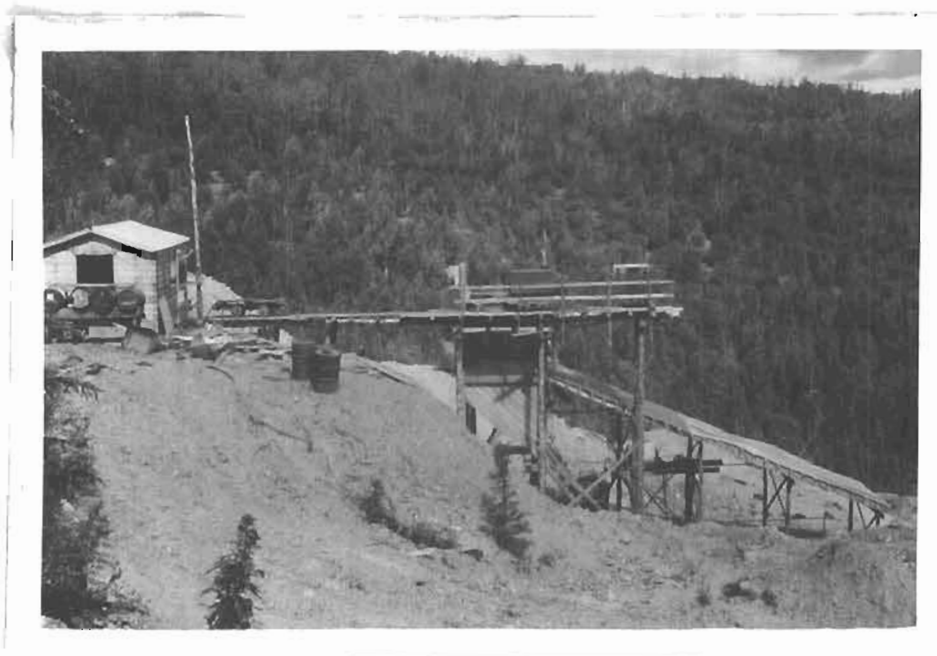
The scheelite deposits at Gilmore Dome have been described in U. S. Geological Survey Bulletin 1024-I, TUNGSTEN DEPOSITS IN THE FAIRBANKS DISTRICT, ALASKA, by F. M. Byers, Jr; in TDM Pamphlet No. 2, STRATEGIC MINERAL OCCURRENCES IN INTERIOR ALASKA, by Henry R. Joesting; and in two short TDM reports by Robert H. Saunders dated November, 1951 and September, 1955, respectively. The property was examined again by Saunders on July 19, 1957. This report is written to describe the work that was done between September, 1955 and July, 1957.

In September 1955, an adit was started by Alaska Metals Mining Company on the south side of Yellow Pup about 250 feet lower in altitude than the Eisenhower adit. This new adit had been driven 300 feet by July 19, 1957. The adit was started on a scheelite-bearing zone; it followed the zone due west until it went through a fault and into barren schist. Beyond the fault the adit turned south-southwest and continued into the hill cutting across the cleavage in the schist. Some small horizons of limestone were encountered, and a few copper-stained fissures were found in the schist.

The work was being done under a DMEA contract. The total amount of the contract was $52,000; most of this money had been spent before 1957, and the owners planned to complete the contract in 1957 by diamond drilling and 150 feet of drifting. The crew consisted of three men: Elmer Stohl, who is one of the owners of the Alaska Metals Mining Company, and two miners from were found, it was intended that the drift would follow along it to find any ore-shoots that might occur. It was planned that after the completion of the DMEA contract the property would be closed down until such time as the price of tungsten becomes high enough to make mining feasible.

Camp buildings.

Looking toward Eisenhower adit from new adit.



Generator shed and mill.

Cully Ore Disintegrator and Straub table in mill.