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Item 18

Report on the
STAR TUNGSTEN MINE AND VICINITY

Elko County, Nevada

M. R. Klepper

Nolan (2)
Lasky
Lemmon
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File

U. S. Geological Survey

October 2, 1942

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Report on the
STAR TUNGSTEN MINE AND VICINITY

Abstract

The Star Tungsten Mine is 2 miles east of Harrison Pass, Elko County, Nevada. It explores the largest of a number of small scheelite-bearing tectonic bodies that have been formed locally along the contact between the Harrison Pass quartz monzonite stock or associated dikes and the Paganip limestone. The zone that contains the ore bodies is about 2 miles long and 1500 feet wide and strikes northerly. A 25-ton mill was erected on the property in 1940 and production began in 1941. Since that time about 1500 tons of 2% WO₃ ore have been milled, yielding 1800 units of WO₃, a recovery of approximately 50%. Production during 1942 has averaged 125 units a month.

On the Star Tungsten Property 4200 tons of ore or 6000 units of WO₃ are measurable; 2500 tons or 3000 units are indicated. Approximately 3000 units of WO₃ will be lost if the 4200 tons of measurable ore are milled in the present plant. A \$10,000 loan to finance remodeling of the present mill or construction of a new mill should assure an additional yield of 2000 units of WO₃ from the measurable ore alone.

U. S. Bureau of Mines exploratory work on this or adjacent properties is not recommended.

* This statement assumes that a mill capable of making 80% recovery can be built. This seems to be a reasonable expectation if plants treating similar ores are a criterion.

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INTRODUCTION

The writer spent five weeks in August and September, 1942 investigating the scheelite deposits of the Star Tungsten Mine and vicinity, Elko County, Nevada as a part of the strategic-mineral investigation program of the U. S. Geological Survey. At different times he was capably assisted by John H. Niese and G. Melvin Quinney of the Survey. The hospitality and wholehearted cooperation of Messrs. Ogilvie, Lane and Francis of the Star Tungsten Mine is deeply appreciated.

LOCATION

The Star Tungsten Mine is in the northwest quarter of T. 28 N., R. 28 E., Mount Diablo base and meridian, Elko County, Nevada. It is situated in the central part of a northerly trending belt of scheelite mineralization along the east slope of the Ruby Mountain Range about 2 miles east of Harrison Pass. This belt extends from the crest of the hill north of Harrison Pass Creek to the crest of the hill south of Lincoln Creek, a length of about two miles. The altitude in this belt ranges between 6500' and 7100'.

The mine is easily accessible from the north and east. Elko is 35 miles distant by gravel road via Harrison Pass; Currie and Warm Springs on U. S. Highway No. 40 are each about 40 miles distant by gravel roads via Ruby Valley. In the vicinity of the mine the winters are severe and the Harrison Pass road is often blocked by snow for a month or more, but the Ruby Valley roads are seldom impassable and mining, milling and transportation are rarely impeded for more than a day or two at a time.

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PERTINENT FACTS ABOUT THE STAR TUNGSTEN PROPERTY

Ownership

The Star Tungsten Mine is owned jointly by George F. Ogilvie, E. Lane and A. Francis, all of Elko, Nevada. Twelve claims, Star Tungsten and Star Tungsten #1-11, were located by Lane and Francis in 1939 and later Mr. Ogilvie was admitted to the partnership.

Production

Scheelite was discovered in 1916 or 1917 and a number of prospect pits and shallow shafts were dug at this time, but there is no record of production before 1941. In March 1941 the first concentrates from the Star Tungsten Mill were sold. Since then 1500 units* have been produced from not more than 1500 tons of ore. During the current year production has averaged 125 units a month.

Workings

The principal working on the Star Tungsten property is a 150-foot adit with a 65-foot winze from which levels have been started at depths of 45 feet and 65 feet. Two 15-foot shafts and a number of surface cuts and pits are the only other workings on the property.

Mill

A three-table gravity mill designed to handle 25 tons of ore a day was built in 1940. That this mill is poorly adapted to handle the heavy tantalite ore which is moved directly from secondary crusher to tables without classification is indicated by tailing assays that yielded between 1.0% and 1.1% WO₃. Examination of the accumulated tailings under an ultra-violet lamp suggests that these assays are representative. It is believed

* Includes estimated September production.

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that the mill feed averages about 2.0% WO_3 , and consequently the indicated recovery is only about 50%. Probably the 1000 tons of 1% tailings that are partly impounded and partly scattered on the flat below the mill could be profitably retreated in a more efficient mill.

During the year the mill has been handling only about 125 tons of ore a month (about 30 eight-hour shifts).

GEOLOGY

General

The scheelite-bearing contact zone lies between the Harrison Pass stock to the west and Pagonip limestone to the east. In this zone which trends northerly and averages about 1500' wide (figure 1) the Pagonip has been invaded by dikes and sills and metamorphosed into hornfels and marble. Small testite bodies have been formed in a few places along the contact. The regional geology has recently been more fully described by Sharp (1).

Rock Units

Metamorphic Rocks.— All of the original sedimentary rocks in the mapped area have been metamorphosed. Light-colored, dense fine-grained hornfels predominated. Fresh specimens are white, light gray or pale green, but most weathered surfaces are drab gray. Some beds contain porphyroblasts of brown garnet as large as 2" in diameter.

Granular white marble beds from a few inches up to 20' thick are interlayered with the hornfels. Clusters of wollastonite crystals occur in some beds.

Small irregular testite bodies have formed locally along the contact. Generally the testite which consists of quartz, garnet, epidote or

(1). Sharp, R. P., Bull. U. S. A., v. 55, 647-690, 1942.

pyroxene, calcite and schist is a brown medium-grained rock. In some specimens epidote or pyroxene predominates and the color is dark green.

Granite Rocks: White, coarse-grained, partly porphyritic biotite quartz monzonite comprises most of the stock (2). It weathers to a granular rubble of quartz and feldspar. A younger alaskite intrusive rock which exhibits granitic, aplitic, graphic or pegmatitic textures is common along the eastern margin of the stock and as dikes and sills cutting the metamorphic rocks. It is siliceous, almost devoid of dark minerals and locally contains muscovite. A few dikes of coarse-grained green monzonite (?) porphyry are exposed in the northern part of the map area. A small amount of basic igneous rock was found in the southern part.

Since schist-bearing talcite has been found in contact with each of the intrusive types described above, except the green monzonite (?) porphyry, and since the contacts between the different intrusives are generally concealed, all igneous rocks were mapped as one unit. In the following paragraphs the term "granite" will be used in referring to the undivided intrusives.

Structure and Contact Metamorphism

The metamorphic sequence forms a simple homoclinal structure which dips to the east at angles of between 40 degrees and 60 degrees. No major faults were recognized, but the angular pattern of the contacts suggests that intrusion may have been controlled by minor faults or joints. The main granite contact is very irregular, in places paralleling the bedding and elsewhere cutting sharply across it, but has a general northerly trend. Many apophyses extend out from the main contact into the metamorphic rocks.

(2). Sharp, R. P., op. cit., p. 674. Sharp calls this rock granite although he has determined that it contains 13% of oligoclase.

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and in some places they have completely isolated sedimentary blocks. The underground workings and diamond drill holes indicate that the downward course of the contacts is about as irregular as their surface trace (See Figure 2).

Although the sedimentary rocks have been metamorphosed into hornfels and marble throughout a belt averaging about 1500' wide the metamorphism has been most intense near contacts with the "granite". It is only along or near these contacts that tectite bodies have formed and that garnet porphyroblasts have developed. Adjacent to tectite bodies the "granite" has commonly been sillified and contains epidote and hornblende.

ORE BODIES*

Localization

The following observations concerning the localization of the tectite ore bodies are considered to be of significance:

- (1). All known tectite ore bodies in the district lie along a "granite" contact.
- (2). Marble appears to be most receptive to the formation of tectite, but in some cases both marble and hornfels grade into tectite. Where the intrusive contact transgresses bedding one or more beds may be transformed into tectite for 25' or more from the contact, while the adjacent less susceptible beds are changed to tectite for only a few inches or a few feet adjacent to the contact. Although most of the scheelite is confined to tectite, in a few places the adjacent hornfels contains low grade scheelite mineralization for a width of a few feet.

*Bodies of scheelite-bearing tectite that are not of mineable size or grade are also considered under this heading.

- (3). More than 90% of the contact is barren, and beds along these barren zones resemble those that have been metamorphosed to tectite elsewhere.
- (4). Tectite ore bodies occur adjacent to quartz monzonite, porphyritic quartz monzonite and alaskites of different textures. The intrusives are commonly silicified adjacent to tectite bodies and in some places epidote and hornblende have been developed in them.

In summary: These tectite ore bodies appear to have been formed later than any of the known intrusions by solutions that migrated along permeable sections of the intrusive contacts or were released from local pockets in the igneous rock in which volatile constituents were concentrated. Certain beds were more susceptible to tectitization and scheelite mineralization than others, but all of the factors that are necessary to explain why the tectite ore bodies occur where they do and to predict successfully where others may be found are not known.

Size and Shape

Known ore bodies are small. The largest has been partly delimited by underground workings and diamond drill holes. It probably contains less than 8000 tons of ore that are estimated to average 1.5% WO₃. The majority of the bodies contain only a few hundred tons of ore.

Most of the bodies are irregular in shape. Where the contact parallels the bedding the ore bodies tend to be confined to one bed or a few parallel beds, and consequently are tabular. When the contact cuts sharply across bedding a pipe-like ore body which is irregular in plan may be formed.

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DESCRIPTION OF SPECIFIC ORE BODIES

Star Tungsten Property

Main Ore Body.— The Star Tungsten main ore body lies along the main contact between the Harrison Pass stock and the metamorphic rocks. It crops out for a length of 75 feet and is explored by an 150-foot adit, a 60-foot winze and two short levels driven from the winze at depths of 45 feet and 65 feet. About 3000 tons of ore that will probably average 1.5% WO₃ are blocked out between the surface and the bottom of the workings.

This ore body is shown in Figure 2. It varies in width between 5 feet and 12 feet, averaging about 6 feet. Although it has not been fully opened up along the strike it probably will average about 50 feet long. It is bounded by quartz monzonite on the west and by hornfels which contains only a small amount of scheelite on the east. Surface creppings, drill holes K-11 and K-18 and the north face of the 65-foot level indicate that the ore pinches out northward along a line that strikes steeply south. Above the 65-foot level "granite" cuts sharply across the strike of the ore body and forms its south boundary, but below this level and farther south drill holes K-15 and K-21 have intersected a northerly trending contact mineralized with scheelite.

Only minor post-mineral faults have been encountered in the workings. On the adit level the ore is displaced 15 feet by a steep fault and on the 45-foot level a number of younger low angle faults locally thicken the ore body.

The drill holes indicate about 1500 tons of ore that will probably average 1.0% WO₃, and rather completely delimit the ore body, although a few thousand tons of ore may lie deeper along the projected southward rake.

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South Ore Body.- The South ore body lies along the main contact between the stock and the metamorphic rocks at the summit of the hill 1000' south of the Main ore body. A testite bed that is believed to average 2.5% WO_3 is exposed for a length of 70' with an average width of 3'. It is bounded by silicified alaskite that parallels the bedding on the west, by an alaskite sill along the southern part of the east contact and by hornfels along the northern part. It is gradually pinched out to the south as the alaskite intrusives east and west of it merge, and terminates abruptly against biotite quartz monzonite to the north. In a 15-foot shaft near the south end of the ore body the width of the ore pinches from 6' to 3' between the surface and the bottom. Along the east contact of the alaskite sill non-persistent lenses of 1%-2% WO_3 ore up to 2' wide occur. It is not likely that these could be mined profitably.

Hole K-7 intersected 2' of good ore 30' below the bottom of the shaft; K-18 intersected a barren contact 15' deeper. In both holes narrow extensions of the eastern lenses were also intersected. Two more short holes would be desirable to indicate whether the shoot extends to greater depth along the steeply dipping biotite quartz monzonite contact that limits the ore body at the north.

This ore body contains about 20 tons of ore per foot of depth. About 700-tons of 2.0%-2.5% WO_3 ore are indicated in the depth at which the ore bottoms in the drill holes mentioned above is considered to be the average.

N 7 Ore Lens.- The N 7 ore lens is along the north border of an alaskite tongue about 500' southeast of the Main ore body. Thin testite beds have been formed here and there for about 100' along the contact which cuts sharply across the bedding. The best surface showing is about 4' wide and 25' long and contains an estimated 1% WO_3 . Three drill holes intersected

barren contacts at depths of 30' beneath the best surface showings.

Other Zones.— Other small lenses of schistite-bearing tectite are shown on Figure 1. Probably the best of these contain no more than a few hundred tons of 1% WO_3 ore. The small tectite pods formed along the dike at the north end of the mapped area are almost barren.

Campbell Property

A tectite ore body has been prospecting on the property of Russell Campbell of Salt Lake City, Utah. This ore body lies along the crest of a spur extending northward from the main ridge south of Lincoln Creek. It is about 4500' S 15 degrees W of the Star Tungsten Mine. Tectite ore has been formed along both contacts of a vertical biotite quartz monzonite dike which varies from a few inches to 8' in width. Different beds have been converted to tectite for varying distances from the dike (see figure 3). The surface exposure of this ragged-edged tectite body covers 400 square feet and is believed to average 1.0% WO_3 . If the ore body extends downward in the form of a pipe it contains 40 tons of 1% WO_3 ore per foot of depth, and if it is not cut off at shallow depth by the main quartz monzonite body that crops out 30' to the west, it may contain several thousand tons. One or two shallow drill holes would give a more reliable basis for an estimate of the shape of the body and tonnage and grade of ore.

A concentration of tectite cobbles and boulders, some of which are ore, occurs in the overburden that conceals the "granite" contact about 400' north of the ore body mentioned above. Trenching in this area may uncover a lens or lenses of tectite ore in place.

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SUMMARY OF RESERVES

Star Tungsten Property

| <u>Ore Body</u> | <u>Measurable Ore</u> | | | <u>Indicated Ore</u> | | | <u>Inferred Ore</u> | | |
|-----------------|-----------------------|-------------|---------------|----------------------|-------------|---------------|---------------------|-------------|--------------|
| | <u>Tons</u> | <u>SNOS</u> | <u>Units</u> | <u>Tons</u> | <u>SNOS</u> | <u>Units</u> | <u>Tons</u> | <u>SNOS</u> | <u>Units</u> |
| Main | 3000 | 1.5 | 4500 | 1500 | 1.0 | 1500 | *3000 | | |
| South | 200 | 2.5 | 500 | 500 | 2.0 | 1000 | - | | |
| Others | 500 | 1.0 | 500 | - | | | - | | |
| Tailings | <u>300</u> | 1.0 | <u>300(1)</u> | <u>500</u> | 1.0 | <u>500(2)</u> | - | | |
| Totals | 4200 | | 6000 | 2500 | | 3000 | *3000 | | |

Recovery if treated in
mill that can make 80%
recovery.....4800

2400

Expected recovery if
treated in present
mill.....2750(3)

1250(3)

Loss that could be
prevented in new or
remodeled mill.....2050

1150

Campbell Tungsten Property

| <u>Measurable Ore</u> | | | <u>Indicated Ore</u> | | | <u>Inferred Ore</u> | | |
|-----------------------|-------------|--------------|----------------------|-------------|--------------|---------------------|-------------|--------------|
| <u>Tons</u> | <u>SNOS</u> | <u>Units</u> | <u>Tons</u> | <u>SNOS</u> | <u>Units</u> | <u>Tons</u> | <u>SNOS</u> | <u>Units</u> |
| 400 | 1.0 | 400 | - | - | - | 2000 | - | - |

*Less than (1). Easily recoverable; (2). Can be recovered;
(3). Excludes tailings since they cannot profitably be treated in present mill.

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RECOMMENDATIONS

(1). That the Bureau of Mines does not instigate an exploratory program. Knowles Bros. of Elko, Nevada have uncovered critical contacts on the surface and drilled 19 holes totalling 2510 feet beneath known ore bodies. In my opinion further exploration by the Bureau is not warranted. I have recently expressed this same opinion in a conference with Mr. Glenn Allen, District Engineer for Nevada, U. S. Bureau of Mines, Reno, Nevada.

(2). That a loan of \$ 10,000 for the construction of a new mill would be warranted, if requested. The table on page 11 shows that at least 2000 and possibly 3000 additional units could be recovered from the available ore and tailings if a recovery of 80% rather than 50% could be attained.

If suitable arrangements can be made Knowles Bros., a reputable Elko partnership, will lease the property, construct a 25 ton mill and operate the property on a more extensive and efficient basis than it has been heretofore. They may also be able to make arrangements to explore the Campbell property.

M. R. Klepper




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


GEOLOGIC MAP OF CAMPBELL TUNGSTEN PROPERTY, HARRISON PASS, ELKO CO., NEVADA.

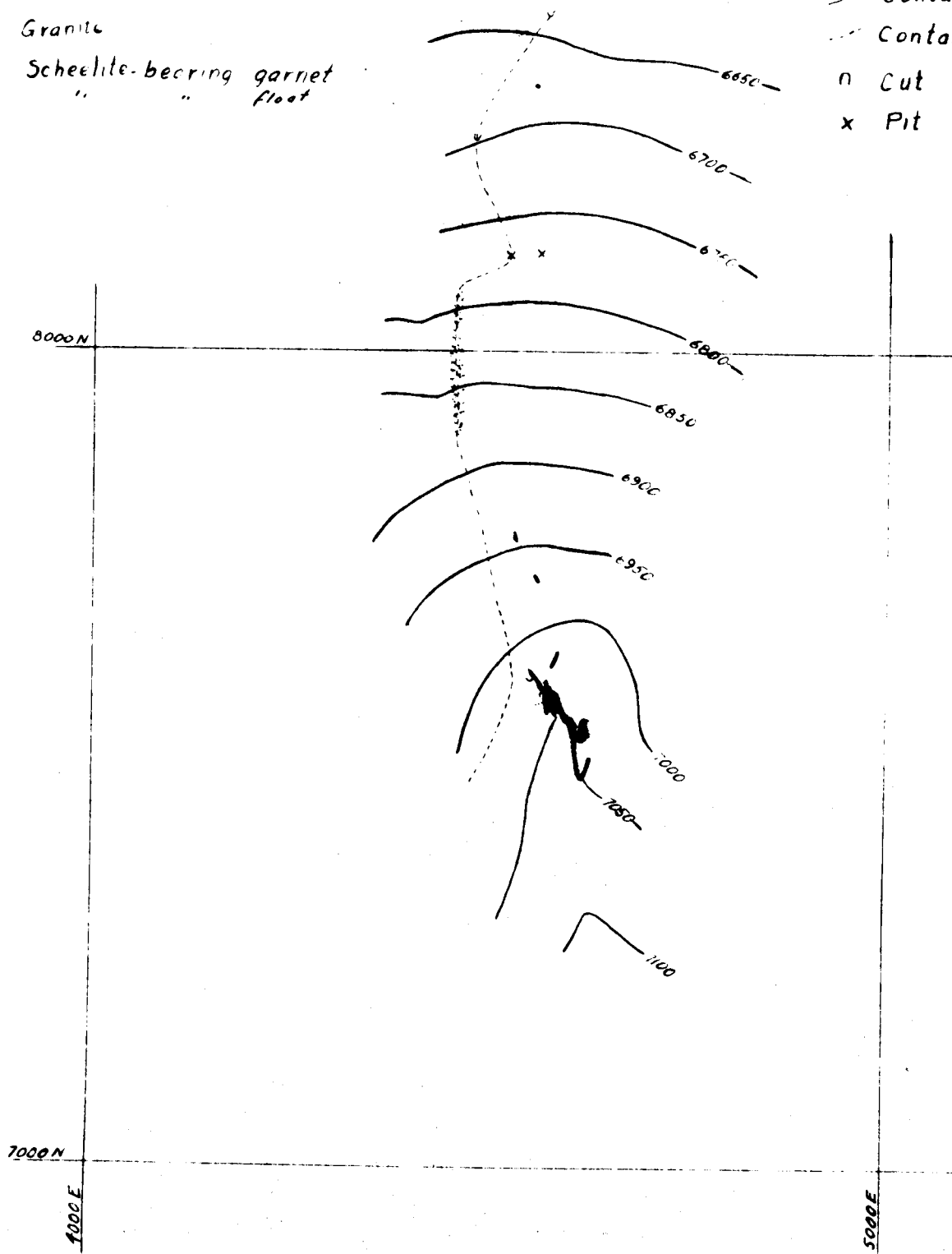
M. R. Klepper
C. M. Swinney

U.S. Geological Survey
August 1942

Scale
0 500'
Contour Interval 50'

-  Hornfels
-  Granite
-  Scheelite-bearing garnet float

-  Contact, located
-  Contact, approximate
-  Cut
-  Pit



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Tungstania, Nevada
May 26, 1942

Memorandum to T. B. Nolan

Star Tungsten Mine, Harrison Pass, Elko County, Nevada

The writers spent May 22 at the Star Tungsten property, 49 miles south of Elko, Nevada, at the east side of Harrison Pass. The Harrison Pass road crosses the property within 300 feet of the mine and mill, which lie at an elevation of 6550 feet.

Ownership

The property consists of 11 full claims and one fractional claim, all unpatented, and recorded in Elko as Star Tungsten Nos. 1-11. The claims were originally located in 1917 by Sullivan and Johnston, and relocated in July, 1939, by E. Lane and A. W. Francis. The claims are now held in partnership by Lane, Francis, and James Ogilvie of Elko.

Geology

A nearly concordant intrusive contact between quartz monzonite and limestone strikes northerly and dips about 60° east (Fig.2). Along the contact, scheelite-bearing garnet beds have been exposed by shallow trenches, two short shafts and the main adit. Probably these garnet zones are discontinuous, having been formed where calcareous beds of favorable composition were adjacent to the contact. Thinner garnet beds are present as far as 25 feet from the quartz monzonite. Quartz bodies carrying small amounts of molybdenite cut the limestone and the quartz monzonite. There is no apparent relation between the quartz veins and the scheelite deposits.

Size and grade of orebodies.

Scheelite is confined to the garnet zones, favoring especially those rich

in epidote. Some bodies of massive garnet are nearly barren. In the mineralized garnet the scheelite is dominantly fine grained and evenly distributed, but in places there are higher grade streaks paralleling the bedding.

The main ore body now exposed has been developed by an adit and surface cuts to a maximum depth of 90' below the surface (Fig. 3). The adit follows the contact for 100'. The first 70' is in ore; the last 30' shows a progressive decrease in mineralization to about 0.1% of WO_3 at the face. The average width of ore is 7'.

The company reports that 1500 tons of ore have been milled from the adit and winze and 30 tons of concentrate recovered, and that the tails average about 1% of WO_3 . A number of company assays agree with these data (See appendix). According to this, the ore mined and mill thus far has averaged about 3% of WO_3 .

It is probable that the block shown in Figure 4 still contains about 3000 tons of 3% ore, or 9000 units. Geologic evidence indicates that an equal tonnage of lower grade ore may be expected in the adjacent rock.

At "A" (Fig. 2) 300' of the contact has been cut by trenches, all of which show scheelite ore. There are no exposures between the trenches. The soil mantle averages about 2-3' deep. The width of the ore-bearing zone ranges from 1 to 5 feet. The mineralized rock appears to average 1% or better. Assuming that the mineralization is continuous between trenches and extends at the center to a depth of 150' with an average width of 2' and an average grade of 1%, there are approximately 4000 tons or 4000 units of WO_3 in this zone.

At "B" two parallel mineralized zones are exposed. A 15' vertical shaft has been sunk on a lens of ore 6' wide averaging 2% of WO_3 . Twenty feet east of this lens two pits 40' apart cut across an 18" zone of 3% ore. These workings indicate about 500 tons of 2.5% ore or 1250 units of WO_3 .

At "C" a 15' shaft has been put down on a lens of 1% ore 5' wide (Fig. 2 and photo). A shallow trench 15' north exposes 2' of garnet rock. This zone may yield about 150 tons of 1% ore or 150 units.

In addition to these three zones a number of scattered pits along the contact expose acheselite-bearing garnet ranging in width from 1 to 5 feet and up to two or three percent in grade.

Reserves

Estimated reserves in the mine and zones A, B, C total 7650 tons or 14400 units of WO_3 , the ore averaging approximately 2% of WO_3 . Our observations suggest that an equal tonnage of sub-marginal grade between 0.5 and 0.5% may be expected. Mr. G. D. Jermain of the U. S. Bureau of Mines is at present taking a number of samples at the property to check the company's estimates and assays.

Recommendations

We believe that exploratory work on this property by the Geological Survey and the Bureau of Mines is warranted. The first work should consist of trenching and sampling the contact south from the mine and in area "C". A geologic map of the area along the contact should be prepared at the same time. This program would take about 3 weeks. No diamond drilling is proposed at present, but if the surface trenching and sampling show sufficient promise, the contact beneath the winze and beneath zones A, B, and C (as well as any additional zones that may be uncovered) can readily be explored by diamond drill holes.

M. R. Klepper
Junior Geologist

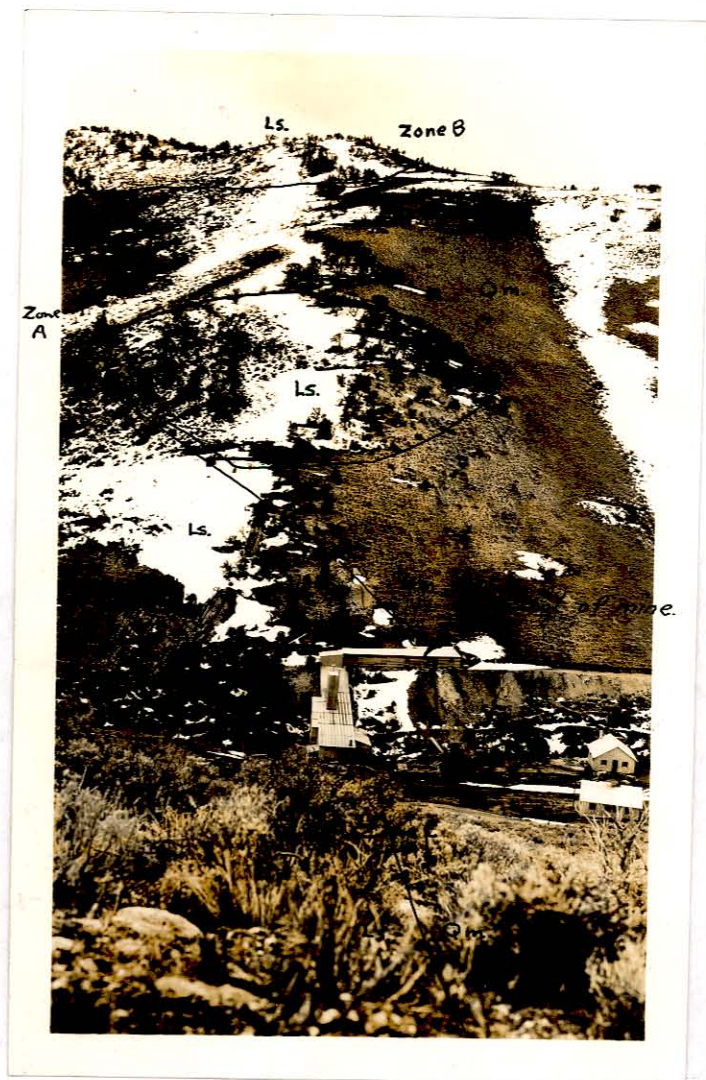
cc. Mr. Hewett
Mr. Lasky
Mr. Lemmon
File

J. H. Wiese
Junior Geologist

APPENDIX

Assay data furnished by Star Tungsten Mine owners are as follows:

| <u>Sample</u> | <u>Location</u> | <u>Wt. %</u> |
|---------------|--|--------------|
| Grab | Muck pile at bottom of shaft. (Winze) | 2.73 |
| Ceare grab | Muck pile at bottom of winze. | 3.08 |
| 18 ft. cut | Shaft bottom. (Winze) | 3.26 |
| 3 ft. cut | Pit 500' north of south end line #2 claim. | 0.75 |
| Grab | 15' shaft at "B" | 2.65 |
| Grab | Pit in center of zone "A" | 3.02 |
| 3 ft. cut | Center of claim #6. | 0.40 |
| 4 ft. cut | Across north wall of shaft at "C" | 1.18 |
| 13 ft. cut | 25' above bottom of winze. | 3.02 |
| Middlings | #5 table | 7.35 |
| Middlings | #1 and #2 tables | 2.26 |
| Heads | Fine ore bin. | 2.90 |
| Tails | Tail race. | 1.06 |
| Tails | Tail pond. | 0.86 |



Star Tungsten Mine
Harrison Pass, Nevada

Looking south along contact.
Mill in foreground.

5-22-42



Star Tungsten Mine

Harrison Pass, Nevada

15' Shaft in Zone C

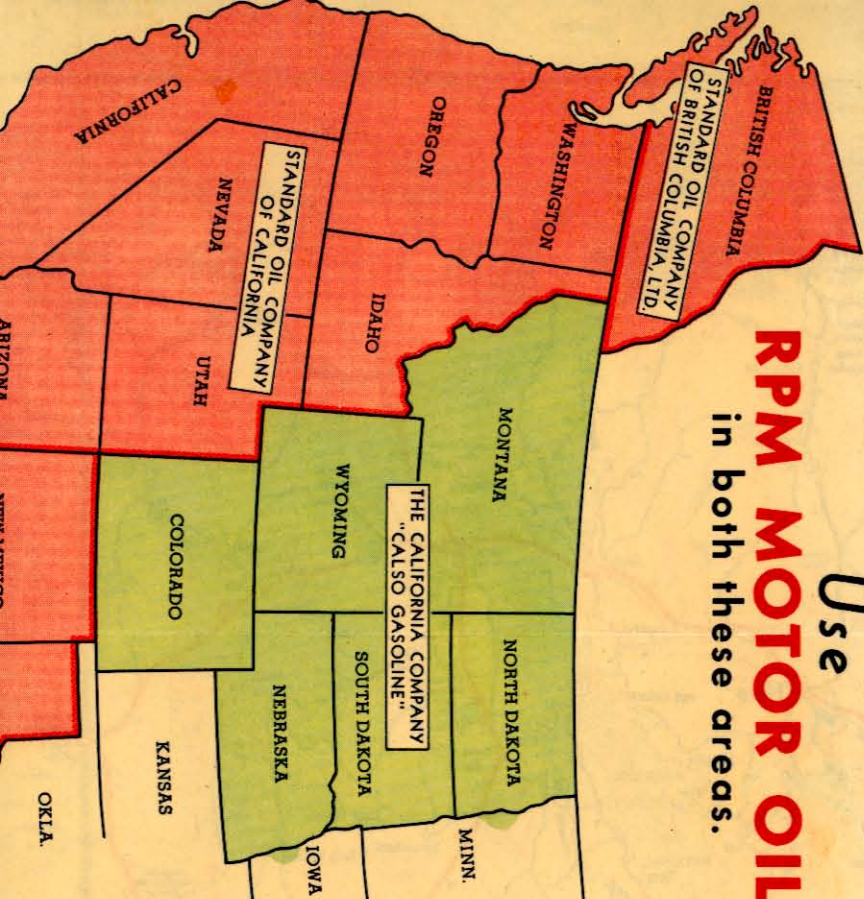
Looking North

5-22-42



Ask for
STANDARD GASOLINE
in the pink-shaded area
and for
CALSO GASOLINE
in the area shown in green.

Use
RPM MOTOR OIL
in both these areas.



Nevada

Arizona

| CITY | STATION | KILO | CHAIN |
|---------|---------|------|-------|
| RENO | KOH | 1380 | NBC |
| BISBEE | KSUN | 1200 | |
| GLOBE | KWJB | 1210 | |
| JEROME | KCRJ | 1310 | |
| PHOENIX | KOY | 1390 | CBS |
| SAFFORD | KJAR | 620 | NBC |
| TUCSON | KGLU | 1420 | |
| TUCSON | KYUJ | 1370 | CBS |
| YUMA | KUMA | 1420 | NBC |

California

| | | | |
|-------------|------|------|----------|
| BAKERSFIELD | KERN | 1370 | CBS, NBC |
| BAKERSFIELD | KPMC | 1550 | MBS, DL |
| BERKELEY | KRE | 1370 | |
| BERRY MILLS | KMPC | 710 | |
| CHICO | KHSL | 1260 | MBS, DL |
| EL CENTRO | KXO | 1500 | MBS, DL |
| EUREKA | KTEM | 1450 | MBS, DL |
| FRESNO | KARM | 1310 | CBS |
| FRESNO | KMI | 580 | CBS, NBC |
| GLENDALE | KIEV | 850 | |
| HOLLYWOOD | KFWB | 950 | CBS |
| HOLLYWOOD | KMTW | 570 | |
| LONG BEACH | KFOX | 1250 | CBS |
| LONG BEACH | KGER | 1360 | |
| LOS ANGELES | KBCA | 780 | NBC |

* — Operates Daytime Only
CBS — Columbia Broadcasting System

RADIO LOG

California (cont.)

| CITY | STATION | KILO | CHAIN |
|----------------|---------|------|----------|
| LOS ANGELES | KFAC | 1300 | |
| LOS ANGELES | KFI | 640 | NBC |
| LOS ANGELES | KFSG | 1120 | |
| LOS ANGELES | KFPD | 1000 | |
| LOS ANGELES | KGFL | 1290 | |
| LOS ANGELES | KHJ | 980 | MBS, DL |
| LOS ANGELES | KNX | 1050 | CBS |
| MERCED | KRDO | 1120 | |
| MODESTO | KYOS | 1040 | MBS, DL |
| MODESTO | KTRB | 740 | |
| MONTREY | KDON | 1210 | MBS, DL |
| OAKLAND | KLS | 1280 | |
| OAKLAND | KIX | 880 | |
| OAKLAND | KROW | 930 | |
| PASADENA | KPPC | 1210 | |
| PASADENA | KVCV | 1200 | MBS, DL |
| SACRAMENTO | KTBK | 1490 | CBS, NBC |
| SACRAMENTO | KROY | 1210 | CBS |
| SAN BERNARDINO | KI XM | 1210 | MBS, DL |
| SAN DIEGO | KGB | 1330 | MBS, DL |
| SAN FRANCISCO | KFSD | 600 | CBS, NBC |
| SAN FRANCISCO | KSAN | 610 | MBS, DL |
| SAN FRANCISCO | KSFN | 1420 | CBS |
| SAN FRANCISCO | KGQ | 790 | NBC |
| SAN FRANCISCO | KIBS | 1070 | |
| SAN FRANCISCO | KPO | 580 | NBC |
| SAN FRANCISCO | KSFQ | 560 | |
| SAN FRANCISCO | KSTP | 1230 | CBS |
| SAN JOSE | KVA | 1010 | MBS, DL |
| SAN JOSE | KWQ | 1010 | |
| SAN JOSE | KYEC | 1200 | |
| SANTA ANA | KYOE | 1500 | MBS, DL |

CBS — California Radio System
DL — Don Lee Broadcasting System
Above data correct at time of printing

California (cont.)

| CITY | STATION | KILO | CHAIN |
|---------------|---------|------|-------|
| SANTA BARBARA | KDB | 1500 | MB |
| SANTA BARBARA | KTNB | 1220 | CBS |
| SANTA ROSA | KSRQ | 1310 | |
| STOCKTON | KGDM | 1100 | |
| STOCKTON | KWG | 1200 | CBS |
| VISALIA | KVIC | 890 | |
| WATSONVILLE | KHUB | 1310 | |

Alaska

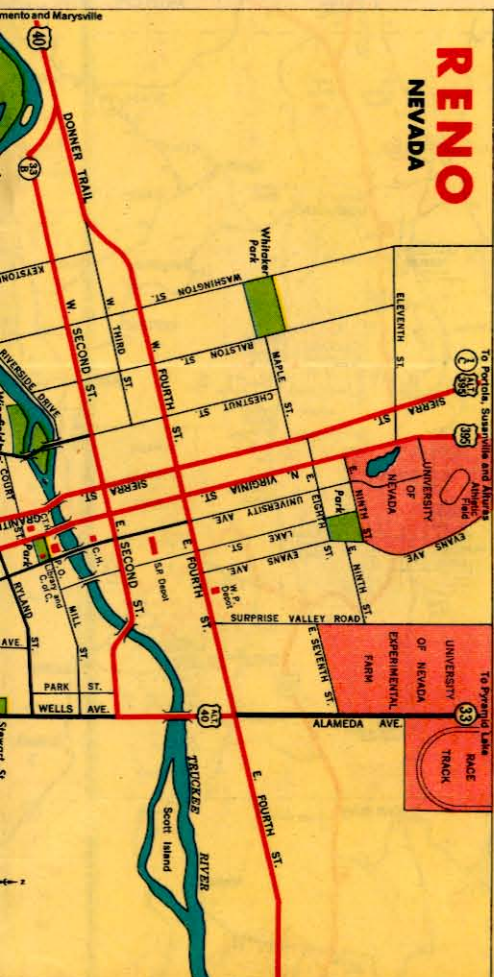
Oregon

Utah

| | | | |
|----------------|------|------|--|
| BOISE | KIDO | 1350 | |
| IDAHO FALLS | KID | 1320 | |
| POCAHELLO | KSEI | 900 | |
| TWIN FALLS | KTFI | 1240 | |
| PORTLAND | KEX | 1160 | |
| PORTLAND | KWB | 620 | |
| PORTLAND | KOIN | 940 | |
| CEGAR CITY | KSUB | 1310 | |
| OGDEN | KLO | 1400 | |
| PRICE | KEUB | 1420 | |
| SALT LAKE CITY | KDYL | 1290 | |
| SALT LAKE CITY | KSL | 1130 | |
| SALT LAKE CITY | KUTA | 1500 | |

MBS — Mutual Broadcasting System
NBC — National Broadcasting Company

RENO
NEVADA



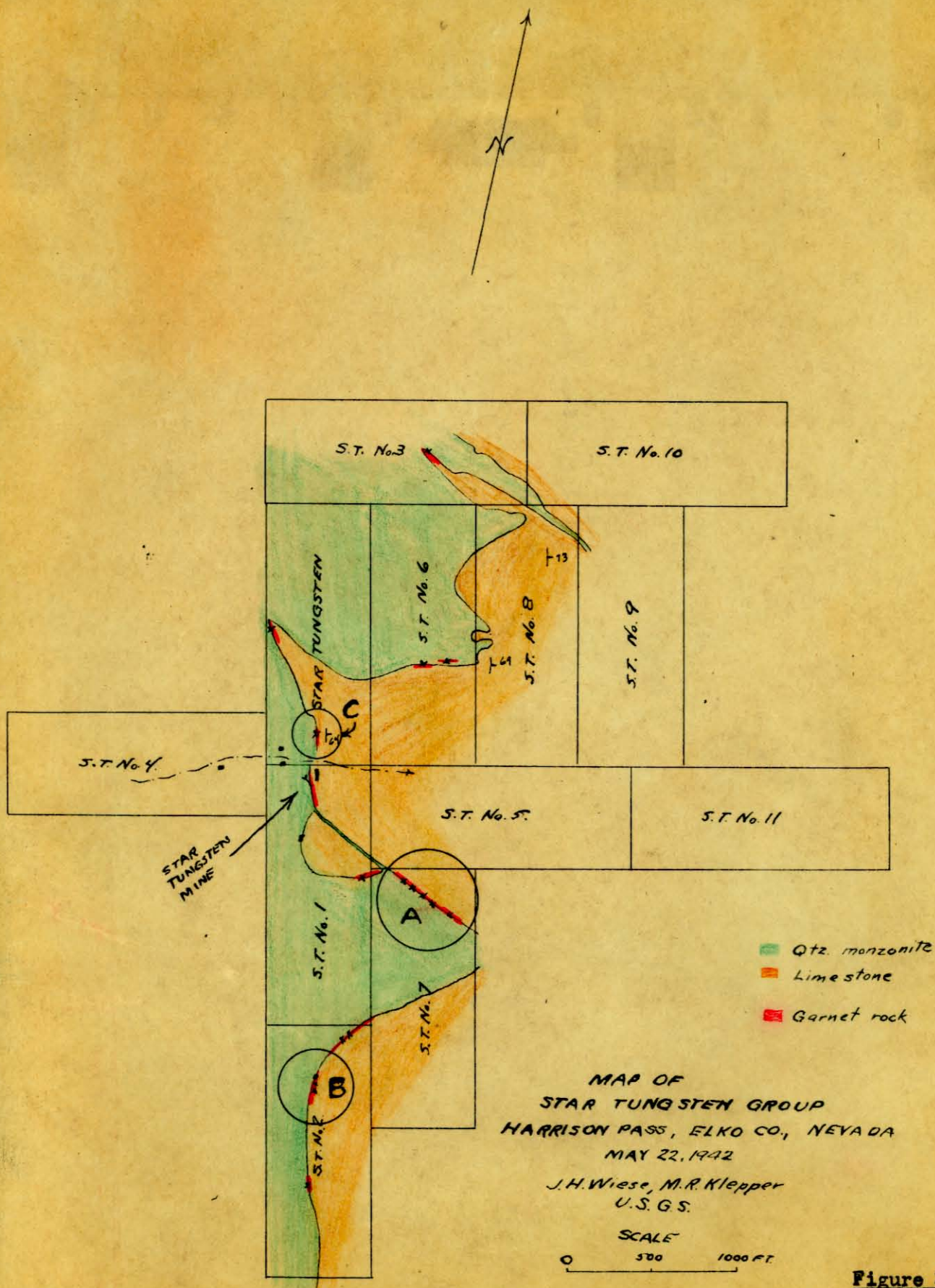
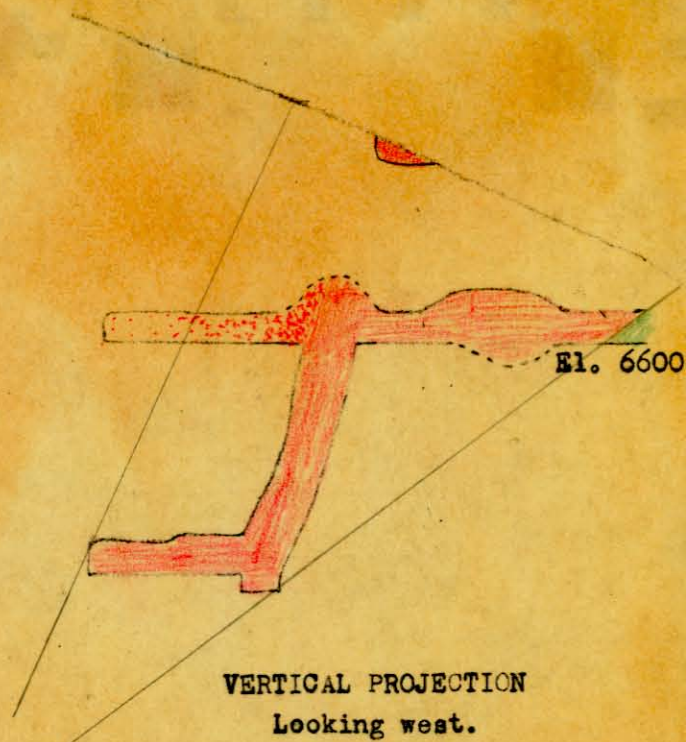
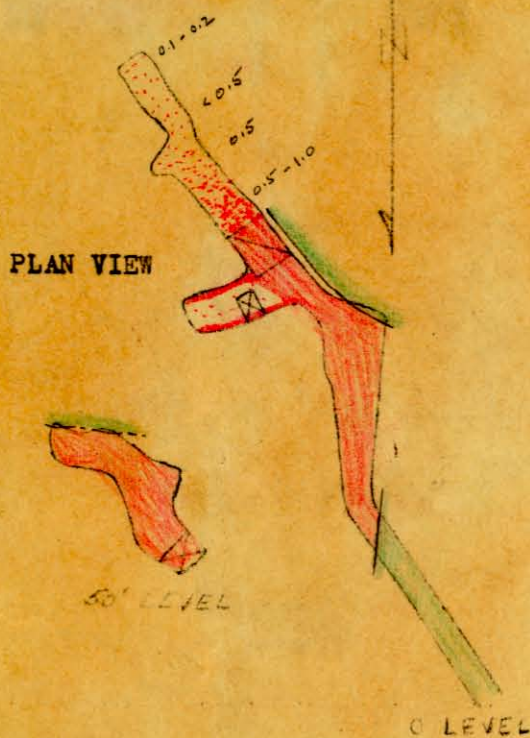


Figure 2



STAR TUNGSTEN MINE
HARRISON PASS, ELKO COUNTY, NEVADA

Scale: 1 inch equals 40 feet.

M. R. Klepper, J. H. Wiese
U. S. Geological Survey

May 22, 1942

Granite
>1.0 % ore
<1.0 % ore

Figure 3

(80)
Dec 18

Elko (Star), Nevada

Known variously as the Star tungsten group, Ogilvie property, and Breckon property. At Harrison Pass, Elko County, Nevada, 54 miles by road southeast of Elko. "Tungsten is present as scheelite in a limestone - granite contact zone... about 5000 ft. long". Explored by 25 to 30 shallow test pits and cuts and by a 150-foot adit.

Examined for the Bureau by J. R. Guiteras on Sept. 22, 1940, who recommended as follows: "While it is doubtful if an appreciable tonnage of tungsten can be developed, a sampling project by a party equipped with an ultra-violet lamp is warranted". G. D. Jermain, project engineer at Tungstania, was instructed last month to examine this deposit to review Guiteras' recommendation, but his report has not yet been received.

Tungstania, Nevada
via McGill
May 16, 1942

Memorandum to T. B. Nolan

Harrison Pass district, Nevada

Accompanied by George D. Jermain of the U.S. Bureau of Mines, I made a trip to the Star Tungsten mine at Harrison Pass, Elko County, Nevada on May 15.

We intended to make a brief examination of the property, but this was prevented by a severe snowstorm which descended upon us shortly after our arrival, *causing us to flee.*

As soon as weather conditions permit, probably about May 20, Klepper and I will go to Harrison Pass and spend two days mapping the workings and the granite-limestone contact. Jermain will take one or two men along to sample the workings and the outcrops.

The scheelite occurs in a garnet tactite about 6 feet wide along the contact of granite and limestone. The ore has been followed by a 125' drift and a 50' winze to a depth of about 80' below the outcrop. At the time of our visit, the ground was covered with snow. According to the foreman, the ore shoot ^(or shoots) has been exposed by trenches over a strike length of a few hundred feet. Production to date has been about 1500 tons of ore which yielded 25-30 tons of concentrate containing 50% of WO_3 . The mill tails assay 0.8 to 1.1% of WO_3 , according to the owners. A very rough estimate of the possible tonnage is 10,000 tons of ore containing 1-3% of WO_3 .

We will write a more complete report on the property next week.

cc. Hewett
Lasky
Lemmon ✓
File

Very truly yours,

John H. Wiese

Ruby Valley, Nevada
August 25, 1942

Mr. T. B. Nolan
U. S. Geological Survey
Washington, D. C.

Dear Mr. Nolan:

Subject: Star Tungsten, Harrison Pass, Elko County, Nevada:
Monthly Report for August, 1942

During the past month we have made a geologic map of the underground workings and part of the surface of the Star Tungsten Property. During the same time Knowles Bros. of Elko have exposed concealed intervals along the contact by bulldozing and drilled 15 diamond drill holes totalling 1330 feet beneath promising surface showings. If their exploration indicates sufficient ore they will lease the property and erect a larger and more efficient mill. Their drilling program is now nearly completed but, except for the main ore body, no zone containing over 500 tons of ore has been found.

Results of geologic mapping and this exploratory work are summarized below:

1. The main ore body is developed by two levels and a 65 foot shaft. The O Level, 155 feet long, follows a steeply dipping tabular garnetite ore body averaging 7 feet in width for 75 feet. The shaft is in ore and at 45 feet a level follows ore for 30 feet. At the bottom of the shaft the ore has pinched to one or two feet and a level is being started to follow it along the strike. Diamond drilling has partially delimited this ore body along the strike. Three holes to be drilled during the

next week will explore the zone where ore may occur at a depth of 80 feet below the O Level.

About 4000 tons of ore have been partially blocked out, and if none of these three holes intersect ore not over 2000 tons can be inferred. Grade of ore already mined, as estimated from recovery and assay of tailings, is between 2.0 and 2.5% WO_3 . The ore body is bounded by nearly barren hornfels or granite. Little, if any, low grade ore exists.

2. The three most promising surface showings (exclusive of the main ore body) have been explored by diamond drilling. All are scheelite-bearing garnet lenses at or near the granite contact and terminate at less than 50 feet depth. Depth and strike length are about the same.

3. It is not likely that any ore bodies crop out that are not now known. No stratigraphic or structural control has yet been found. Since the contact is very irregular both in plan and in section zones where blind ore bodies might be expected can be outlined only in a very general way. Blind ore shoots undoubtedly exist, but they are probably no larger than those now outlined. The cost of locating such hidden bodies would be large.

4. Three quarters of a mile south of the adit a 10' garnet zone with 1-1.5% WO_3 is exposed in a cut for a length of 20', and ore float is common for a few hundred feet. The whereabouts of the owner, Russell Campbell is unknown.

During the year Star Tungsten has been producing about 125 units a month. July production was 111 units. The same is expected this month. Total production (started March 1941) has been 1365 units.

Yours very truly,

M. R. Klepper

J. H. Weiss

(80)
Item 18

Supplementary Memorandum on
STAR TUNGSTEN MINE
Harrison Pass, Elko County, Nevada

T. B. Nolan (3)
S. G. Lasky
D. M. Larrison
File

M. R. Klepper
Assistant Geologist
Ely, Nevada
September 10, 1943

Supplementary Memorandum on
STAR TUNGSTEN MINE
Harrison Pass, Elko County, Nevada

Abstract

During the first week of September the writer and P. Joralemon visited the Star Tungsten property, situated one mile east of Harrison Pass, Elko County, Nevada. Maps made last year were revised, and the geology of workings completed during the past year was mapped.

There has been no production of tungsten concentrate from the property since September 1942, but a new 30-ton gravity mill was erected, and underground workings have been driven in preparation for stoping. The new mill was put into operation during the last week of August. It is expected to recover an average of 350 pounds of 60% WO₃ concentrate per 8-hour shift.

A revised estimate of ore reserve, based on the recent mapping and map revision, was compiled. Measured ore totals 3400 tons containing 3975 units of WO₃; indicated ore totals 2350 tons containing 2960 units; inferred ore totals 3350 tons containing 3825 units. More than 50% of this reserve is in the Main ore body. The operation is expected to continue for about a year. Anticipated total production for the operation is 8000 units of WO₃.

General

The writer and P. Joralemon spent the first week of September 1943 at the Star Tungsten mine, one mile east of Harrison Pass in southwestern Elko County, Nevada. During this time the surface and underground geologic maps prepared by the writer, J. Wiss, and M. Swinney in August-September 1942 were revised, and underground workings completed during the past year were surveyed and mapped geologically.

Operations: March 1941 to September 1943

The owners, George Ogilvie, E. Lane and A. Francis, all of Elko, operated the property on a small scale from March 1941 to September 1942. During this time they milled about 1500 tons from the Main ore body in an inefficient 25-ton mill, and recovered 1500 units of WO₃. In October they leased the property to Knowles Brothers, an Elko partnership.

The lessees started to rebuild the old mill in November 1942. In February 1943, just as rebuilding had been completed, the mill was destroyed by fire. Construction of a new 30-ton gravity mill was started in April and completed in August. The present

flow sheet of this mill includes primary crusher, ball mill, Fahrenwald Sizer, and four tables.

Ore was first treated in the new mill during the last week of August. Production during the first few days of September averaged about 350 pounds of 30-60% SO_3 concentrate from 10 tons of ore milled per shift. Assays of mill feed, concentrate and tailings, collected at intervals during one day, indicate a recovery of 75%. If recovery cannot be improved by changing the present gravity flow sheet, the lessees plan to install flotation cells. As soon as the problems of recovery and manpower have been solved, operation of the mill will be increased to 30 tons daily (3 shifts). The lessees hope to attain this rate by November 1. Until that time production will probably average about 1 ton of 60% SO_3 concentrate per week.

During the past year an inclined shaft was sunk to facilitate mining of the Main ore body. (See pl. 2). Adits have been driven to develop the small ore body west of the mill and the one near the crest of the hill south of the Main ore body (adits 33-A and 36-A on plates 1 and 3). A shaft is now being sunk on a low-grade ore zone at the south end of the property. (See pl. 1).

Mineralogy of the Ore

Garnet, quartz, and epidote are the major constituents of the ore. Scheelite, calcite, and an unidentified fluorescent mineral commonly make up from 1% to 4% of the ore. Pyrite, molybdenite, powellite, and possibly bismuth occur very sparingly.

Examination of the current and accumulated tailings with ultra-violet light shows that "all that fluoresces is not scheelite". The fluorescent color of scheelite from this property varies from blue-white to golden yellow. According to the color comparison chart, most of the scheelite contains between 1.5% and 5.0% CaMoO_4 . Another mineral whose fluorescent color is also within this range is common in the ore. On the average this mineral is probably more abundant than scheelite, for in the tailings, one of every twenty or thirty grains fluoresces yellow. In the pan these grains seem to have about the same specific gravity as garnet. They are hard and somewhat brittle, though not

as easily shattered as scheelite. They are not attacked by HCl. The writer believes that they might be zircon.

The losses are greatly disturbed by the fact that the amount of fluorescent mineral flowing off in the tailings is substantially greater than the amount of scheelite recovered. The writer has sent two samples of tailings to the Survey, requesting that this fluorescent mineral be identified.

Description of Specific Ore Bodies

Main ore body.-- (See plates 1 and 2). The Main ore body lies along the contact between a stock of intrusive quartz monzonite and a sequence of marble and hornfels. In general, it is bounded on two sides by quartz monzonite, or an aplitic border phase of the monzonite, and on two sides by marble and hornfels, containing small, irregular bodies of low-grade actinolite that tend to parallel bedding. Although alteration and mineralization has been more intense along some beds than others, the major controlling factor appears to have been proximity to the intrusive contact. Both the intrusive contact and the shape of the ore body are irregular. This irregularity is in part due to changes in dip and strike of the contact, and to tongues extending out from the main intrusive mass, and in part to low-angle normal faults of small displacement. The most important of these faults has a maximum component of displacement of almost 50'. In general, however, the ore body tapers downward. It is expected to terminate as shown in the projections on plate 2. Dimensions appear to average 30' long, 10' to 15' broad, and 160' along the incline. About 1500 tons of ore have already been mined from the body.

This ore body is explored by an 150-foot adit, a 65-foot winze, and short levels driven from the winze at depths of 45' and 65' below the collar. An inclined shaft has been driven beneath the ore body in preparation for removal of the remaining ore.

The ore body is rather completely outlined by workings, and by holes drilled from the surface and from underground. Measured ore totals 2000 tons, indicated ore 1250 tons, and inferred ore 1500 tons. Grade is believed to average at least 1.25% H_2O_3 . There is a reasonable expectation that 5000 more units of H_2O_3 will be produced from

this ore body. If the mill is operated on a 3-shift basis during the winter, this reserve will probably be exhausted by May 1944.

South ore body.- (See workings at 36-A, plate 3). The South ore body lies along the main intrusive contact at the summit of the hill south of the Main ore body. (See plate 1). At the surface it is exposed for a length of 70' and has an average width of 3'. Grade averages at least 2.0% WO_3 . It is bordered by the splittic margin of the main intrusive on the west, and by alaskite and hornfels on the east. The ore band trends northerly, more or less parallel to bedding.

A crosscut adit was driven to intersect this ore body at a depth of 50', the maximum depth at which ore was found in holes drilled from the surface. The bottom of the ore shoot was intersected almost directly beneath the shallow shaft shown on plates 1 and 3. At this level the ore shoot strikes easterly and is pinched out by quartz monzonite encroaching from both the hanging wall and footwall sides. It is probable that the ore exposed on the level is continuous, or nearly continuous, with the ore at the surface. Because of the irregularity of the intrusive contacts, however, the ore more sharply cuts across bedding on the level, whereas it is essentially parallel to bedding at the surface. On the level mineralized tongues extend away from the contact ore band along favorable beds, but none of mineable width and grade have been exposed.

A stope has been started above the level and will be carried through to the surface. About 200 tons of ore averaging 1.5% WO_3 have already been mined. Because of the irregularity of the body, and of the different trend at the surface and at a depth of 50', it is difficult to estimate the reserve of ore. The following figures are believed to be conservative: 250 tons measured, 250 tons indicated, and 400 tons inferred. Grade is expected to average between 1.5% and 2.0% WO_3 .

None of the other small ore lenses exposed in this vicinity at the surface or in the adit appear to be of commercial grade and size.

Mill ore body.- (See workings at 35-A, plate 3). The Mill ore body lies about 30' west of the new mill. It is exposed for a length of 25' at the surface and has a width of 4'. It has been followed to a depth of 35' by a 70-foot adit. Here again, the ore body lies along the main intrusive contact and is nearly parallel to bedding. It is displaced a few feet by each of a series of low-angle normal faults. (See sections C-C' and D-D', plate 3). Development of this ore body has been discontinued, for the grade averages less than 0.75% WO_3 , and the lessees cannot profitably mine the thin, relatively low-grade slices of ore.

Three holes were drilled to determine the depth to which this ore body extends. Because of the several flat faults that cut the ore body, and because of the irregularity of the intrusive contact, these holes do not conclusively prove the depth to which ore continues, nor does the adit delimit the length of the ore body. It is probable that the body does not contain more than 500 tons of mineable 0.75% WO_3 ore.

South shaft.- (See plate 1). At the south end of the property a mineralized band has been exposed for a length of 100' by trenches along the main intrusive contact. An exploratory shaft is being sunk near the south end of the zone. It is now 15' deep. The mineralized band has a steeply dipping quartz monzonite footwall. It parallels, or nearly parallels, bedding. It averages between 3' and 4' wide, but is estimated to average only 0.25% WO_3 . The best ore occurs where the shaft is being sunk. Here 3' of ore is estimated to average 0.4% WO_3 . The fact that ore from this shaft was milled in about equal amount with ore from the South (36-A) body partly explains why so little scheelite was recovered during the first week of mill operation.

No reserve of commercial ore is in sight, but the lessees hope that grade will improve at greater depth along the contact.

North open cut.- (See plate 1). A road has been built to the lens of ore shown in the northwest corner of plate 1. This lens forms one corner of a small pondant and is explored by an open cut. It is not expected to contain more than 200 tons of 1.0-1.5% WO_3 ore.

Tailings.— The tailings pile was recently again sampled. Assay returns indicate an average grade of only 0.4% WO_3 . As this is considerably lower than samples tested by the U. S. Bureau of Mines (1.16 % WO_3) and by Wingfield interests (1.05%), the writer has sent a cut from the again samples to the Survey for assay.

The lessees estimate that 750 tons of accumulated tailings can be collected and milled. If, however, the grade is only 0.4% WO_3 , treatment in the present gravity plan may not be profitable.

Campbell property.— Knowles Bros. have taken a lease on the Russell Campbell property south of Mamkin Creek. As soon as weather permits next spring, they will develop the ore body shown on a map accompanying my report of October 2, 1942.

Ore Reserve.— The reserve of ore at the Star Tungsten property is believed to be adequate to supply the new mill with 30 tons daily for seven or eight months. It is probable that next spring 1500 tons or more can be developed on the Campbell property, and that a few hundred tons can be mined from surface workings on the Star property. The writer believes that the operation has a one year life expectancy, and that about 8000 units of WO_3 will be produced.

Revised Summary of Reserve

| <u>Ore body</u> | <u>Measured</u> | | | <u>Indicated</u> | | | <u>Inferred</u> | | | <u>Total</u> | |
|-----------------|---|----------------------------------|--------------|------------------|----------------------------------|--------------|-----------------|----------------------------------|--------------|--------------|--------------|
| | <u>Tons</u> | <u>%WO_3</u> | <u>Units</u> | <u>Tons</u> | <u>%WO_3</u> | <u>Units</u> | <u>Tons</u> | <u>%WO_3</u> | <u>Units</u> | <u>Tons</u> | <u>Units</u> |
| Main | 2000 | 1.35 | 2700 | 1250 | 1.35 | 1625 | 1500 | 1.25 | 1875 | 4750 | 6260 |
| South (36-A) | 250 | 1.7 | 425 | 250 | 1.7 | 425 | 400 | 1.5 | 600 | 900 | 1450 |
| Mill (35-A) | 150 | 0.6 | 90 | 150 | 0.6 | 90 | 200 | 0.5 | 100 | 500 | 280 |
| South Shaft | No ore of commercial grade has yet been found | | | | | | | | | | |
| North Cut | 100 | 1.2 | 120 | 50 | 1.2 | 60 | 50 | 1.0 | 50 | 200 | 250 |
| Campbell | 400 | 1.0 | 400 | 600 | 1.0 | 600 | 1200 | 1.0 | 1200 | 2200 | 2200 |
| Tailings | <u>500</u> | <u>0.4</u> | <u>200</u> | <u>250</u> | <u>0.4</u> | <u>100</u> | — | — | — | <u>750</u> | <u>300</u> |
| Total | 3400 | | 3935 | 2550 | | 2960 | 3350 | | 3825 | 9300 | 10,720 |

80

Item 18

UNITED STATES
DEPARTMENT OF THE INTERIOR
OSCAR L. CHAPMAN, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION III

DMA-1452X (Tungsten), Star Tungsten Mine

Elko County, Nevada

R. M. Smith and D. C. Laub, Geologists
U. S. Geological Survey

Glenn G. Gentry, Mining Engineer
U. S. Bureau of Mines

October 29, 1962

Docket No.: DMA-1452X (Tungsten)

Name and address of applicant: George F. Ogilvie
595 A Street
Elko, Nevada

Name and location of property: Star Tungsten Mine
Elko County, Nevada

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Mr. George F. Ogilvie and Mr. Andrew W. Francis, partners, 595 A Street, Elko, Nevada, Docket DMA-1452 (tungsten) applied on May 26, 1951 to the Defense Minerals Exploration Administration for Government participation in a \$15,000 program to explore surface and underground showings of ore at the Star Tungsten mine, Ruby Range, Elko County, Nev.

A field examination was requested on July 25, 1952 by the Field Team of Region III to determine whether the ore reserves are sufficient to justify the proposed project, to outline a suitable exploratory program, and to obtain the data necessary to complete a contract. Accordingly, an examination was made on August 26 and 27, 1952.

The applicant proposed to explore two deposits; the No. 7 ore body, where he proposed to drive four adits under the best outcrop, and the South shaft ore body, where he proposed to crosscut to, and sink a winze on a faulted segment of the ore body that was mined on the 40-foot level.

The exploratory program was discussed with the applicant and a revised program consisting of two phases was outlined:

1. South Shaft: Crosscut 50 feet and drift 50 feet on the 40-foot level - cut two surface trenches, each approximately 25 feet in length.

2. No. 7 ore body: Extend the existing open cut southeast for 50 feet.

The program is estimated to cost \$3,910.70 and will require about 2½ months to complete. The Government's share of the cost will be \$2,935.03.

It is concluded that there is a fair chance that a small body of tungsten ore will be revealed by each of the proposed projects, and it is recommended that the Government enter into a contract with the applicant to do the work.

TIME SPENT ON PROPERTY

Pursuant to the application, the Star Tungsten Mine was examined and sampled on August 26 and 27, 1952 by geologists^{1/} of the U. S. Geological Survey and an engineer^{2/} of the U. S. Bureau of Mines of Region III. The geologists and engineer also again conferred with Mr. Ogilvie at his residence in Elko, Nevada on August 31, 1952.

During the examination of the mining property, the examining engineers were accompanied over the surface of the claims by Mr. Ogilvie and Mr. Francis on August 26. However, the applicants did not accompany the Field Team during the examination of the underground workings of the South Shaft. Mr. Francis was physically unable to descend the shaft and Mr. Ogilvie stated that his knowledge of the underground workings was very limited and he had not been in the mine for several years.

On August 27 Mr. Ogilvie departed for Reno, Nevada to attend a County Commissioners meeting and Mr. Francis remained at the mine camp.

^{1/} R. M. Smith and D. C. Laub.
^{2/} Glenn G. Gentry.

The Field Team concentrated their examination on the area of the South shaft and the No. 7 claim ore body. These locations are areas where the applicants propose to do the exploration work and in which the most favorable scheelite deposition was observed.

LOCATION AND ACCESSIBILITY

The Star Tungsten Mine, owned by George F. Ogilvie of 595 A Street, Elko, Nevada and Andrew W. Francis of Ruby Valley, Nevada, consists of a group of 15 mining claims, unsurveyed, and held by right of location. The claims are reported to be located in sec. 18, T. 28 N., R. 58 E., ^{Harrison} ^{Pass} ^{-Dist,} M.D.S. & M., in an unnamed mining district of Elko County, Nev.

The mining property is reached by automobile by traveling south from Elko, Nev., via Nevada State Highway No. 46 for a distance of 43.3 miles over an all weather road, thence in an easterly direction 13.8 miles over an unimproved road.

The South shaft is situated 3.4 miles from the mill camp. One and one half miles of this mine road extends through a narrow canyon with heavy grades.

The mine is situated at an approximate altitude of 6700 feet above sea level in a rough and mountainous district. At this altitude, in the Ruby Range, the winter months usually bring stormy weather and heavy snowfall. Operations from December to March would probably be expensive and difficult and at times impossible unless adequate equipment was available for clearing the roads.

COMPETENCE OF APPLICANTS

Mr. Francis is physically unable to do any of the heavy work due to a back injury sustained at some unknown date in the past. He could

probably act in the capacity of a cook for men employed.

Mr. Ogilvie, while apparently in good physical condition, is one of the County Commissioners of Elko County, Nevada and has many and various duties to perform. These duties entail considerable travel and it is doubtful that he could spend much time at the mine. It would, therefore, be necessary to employ a thoroughly experienced miner as the lead man, who would be able to follow the instructions from Mr. Ogilvie.

The proposed exploration contract should therefore be drawn up on a cost per foot basis in order to eliminate lost time and unnecessary delays.

PROPERTY RIGHTS

The mining claims held by location by the applicants are as follows:

| <u>Claim</u> | <u>Recorded in Book No.</u> | <u>Page</u> | |
|---------------|---------------------------------|-------------|--|
| Star Tungsten | 26 | 41 | |
| " " No. 1 | 26 | 42 | |
| " " No. 2 | 26 | 42 | |
| " " No. 3 | 26 | 43 | |
| " " No. 4 | 26 | 44 | |
| " " No. 5 | 26 | 44 | |
| " " No. 6 | 26 | 45 | |
| " " No. 7 | 26 | 46 | |

Recorded in the Office
of the County Recorder,
Elko County Courthouse,
Elko, Nevada.

The above claims are situated in the Humboldt National Forest and were located on September 2, 1939 by E. Lane and Andrew Francis.

| | | | |
|---------------------|----|-----|--|
| Star Tungsten No. 8 | 26 | 565 | |
| " " No. 9 | 26 | 565 | |
| " " No. 10 | 26 | 565 | |
| " " No. 11 | 26 | 566 | |

Recorded in the Office
of the County Recorder,
Elko County Courthouse,
Elko, Nevada.

The above claims are situated in the Humboldt National Forest and were located on September 27, 1941 by E. Lane and Andrew Francis.

| <u>Claim</u> | <u>Recorded in Book No.</u> | <u>Page</u> | |
|----------------------|---------------------------------|-------------|---|
| Star Tungsten No. 12 | 26 | 567 | Recorded in the Office of the County Recorder, Elko County Courthouse, Elko, Nevada. |

The above claim was located by A. W. Francis and George Ogilvie.

Star Tungsten No. 13 Not recorded. Located in June or July of 1952 by A. W. Francis and George Ogilvie, situated in the Ruby Valley National Wildlife Refuge. This claim was located in order to reclaim mill tailings in the No. 2 tailing pond.

The 13 mining claims are unsurveyed and are in an unnamed mining district in Elko County, Nev. The applicants state that there are no liens, mortgages or debts against the mining claims.

During the month of October 1942, the applicants executed a lease on the mining claims to the Knowles brothers of Elko, Nevada and Mountain City, Nev. The lessee constructed a milling plant and actively operated the property until about July or August 1944 and apparently discontinued operations after October 9, 1944.

The applicants report that the above lease was not recorded and that neither party has notified the other that the lease has been cancelled or declared null and void.

The milling plant, owned by the Knowles brothers and containing the greater part of the milling machinery, still remains on the property.

DESCRIPTION OF THE PROPERTY

Surface facilities consist of the following:

| | |
|-----------------------|-------------------------------------|
| 7 Residence buildings | 1 Garage and shop building |
| 1 Change room | 1 Steel water tank, 10' by 10' |
| 1 Cookhouse | 1500 Ft. of wood flume (11" by 11") |

500 Ft. of 4-inch iron pipe

1 Ingersoll-Rand air compressor, 165 c.f.m.,
portable, mounted on steel wheels. Reported
in good condition and in use by J. W. Mink
at his tungsten mine, east of Wild Horse,
Nev.

1 Ford truck, 1 $\frac{1}{2}$ -ton capacity. Fair condition.

2 Jackhammers

1 Stoper

Misc. air and water hose

)
) Fair condition.

The camp buildings are in reasonably good condition and could
accommodate about 20 men.

The Field Team concentrated their examination upon areas in which
the applicant considered the most favorable possibilities to exist and
where said applicant proposed to do the exploration work. This in-
cludes the South shaft, inclined slightly to the East to a depth of
40 feet and one drift, approximately 144 feet in length, extending in
a northerly direction from the bottom of the shaft. The only facilities
remaining at the shaft consists of a headframe, in need of considerable
repairs or replacement, and the timber and bucket-guides down the shaft.

There are no surface facilities, of any nature, located at the
No. 7 ore body.

GEOLOGY

The rocks of the Harrison Pass area are limestone and shale of
Ordovician^{3/4} age which are intruded by a quartz monzonite stock. Near
the contact -- in a zone about 1500 feet wide -- the limestone is meta-
morphosed to marble and the shale is metamorphosed to hornfels. Along
the contact, small irregular taconite bodies have been formed from both

^{3/} Sharp, R. P., 1942, Bull. G.S.A., v. 53, p. 647, 690.

^{4/} Klepper, W. E., Oct. 1942, Report on the Star Tungsten Mine and
vicinity, Elko County, Nevada, U.S.G.S., unpublished report.

marble and hornfels. Scheelite deposits are associated with the tactite.

In the mine area the metamorphic rocks strike northeast and dip 45° to 60° southeast (fig. 2). They are predominately hornfels which are dense, fine-grained, white, gray, or green, and are commonly thin-bedded. Interlayered with the hornfels are white, granular marble beds which range from a few inches to about 100 feet in thickness.

The quartz monzonite in the mine area constitutes the eastern edge of the Harrison Pass stock and is commonly an equigranular biotite quartz monzonite, although it is locally porphyritic. It weathers readily and generally does not form outcrops. It is cut by dikes of aplite, alaskite, and quartz monzonite which also occur as dikes and sills in the metamorphic rocks.

The tactite consists of garnet, pyroxene, epidote, quartz and calcite.

The contact zone trends northerly and is about 1500 feet wide. In this zone the contact is very irregular; in some places it is parallel to the bedding and in others it cuts across the beds.

The rocks are cut by low angle normal faults which strike northerly and dip west -- displacements of as much as 50 feet have been measured in the main ore body (fig. 2), but displacements of 5 to 10 feet are more common.

ORE DEPOSITS

The ore bodies are small, irregular tactite bodies which occur along the contact of the quartz monzonite with the metamorphic rocks.

The ore mineral is scheelite containing small amounts of molybdenum -- probably in powellite.

Tactite is formed along the contact of the intrusive rocks with marble and also with hornfels. Klepper found that marble is more favorable for the formation of tactite than is hornfels.

Tungsten ore has been mined from several deposits in the area and two of these, the No. 7 ore body and the South shaft ore body, warrant further exploration. The other deposits are considered by the applicant to be worked out.

At the No. 7 ore body a tactite body ranging from 1 to 7 feet in width is partly exposed for a strike length of about 100 feet along the contact of hornfels and marble with a narrow tongue of granodiorite. The widest and highest grade tactite appears to have formed along the hornfels which dips steeply south. Three diamond-drill holes cut the contact below the outcrop and no tactite was recovered in the core, but none of these holes cut the contact along the downward continuation of the hornfels. Although it is unlikely that the tactite will continue to a depth of more than a few 10's of feet, the high grade of the ore (sample BM-322) warrants a small amount of exploratory work.

At the South shaft it is estimated that about 700 tons, averaging from 0.5 to 1.0 percent WO_3 , has been mined between the surface and the 40-foot level from a tactite body along the contact of marble and hornfels with granodiorite. The best ore formed along the marble.

On the surface, south of the South shaft, along the contact of the granodiorite and hornfels, tactite is exposed in two small cuts. Here the tactite contains scheelite, and assays as high as 0.25 percent WO_3 .

In the north face of the 40-foot level, the tactite zone is 7 to 8 feet wide and is exposed above a normal fault. A sample from this face assayed 0.77 percent WO_3 .

SAMPLING

The following samples were taken by the Field Team:

| <u>Sample No.</u> | <u>% Fe_2O_3</u> | <u>Description</u> |
|-------------------|---|--|
| BM-318 | 0.41 | Shovel sample from No. 1 tailing pond. Estimated to contain about 1600 tons. |
| BM-319 | 0.28 | Shovel sample from No. 2 tailing pond. Estimated to contain about 2000 tons. |
| BM-320 | 0.77 | Width 27 inches. Face of North drift from bottom of the South shaft. |
| BM-321 | 0.46 | Width 30 inches. South shaft. At bottom of the shaft and on south side of the shaft. |
| BM-322 | 2.06 | Width 41 inches. Face of open cut No. 7 ore body. |
| BM-323 | 0.24 | Width 22 inches. Surface exposure of taconite. S. 25° E, 63 feet from South shaft. |
| BM-324 | 0.01 | Width 24 inches. Surface exposure of taconite and limestone - S. 12° E, 74 feet from BM-323. |
| BM-325 | 0.12 | Width 4.3 feet - North drift off bottom of South shaft. On east wall of drift and 5 feet south of face of drift. |
| BM-326 | 0.42 | Width 18 inches. Across back of North drift and 18 feet north of center line of South shaft. |
| BM-327 | 0.15 | Width 24 inches. South end of main stope above North drift off South shaft. |
| BM-328 | 0.17 | Width 37 inches. South side of South shaft and 12 feet above bottom of shaft. |

Facilities for sampling other parts of the underground workings were not available and could not be provided by the applicant during the examination.

ORE RESERVES

Total reserves of 2,036 tons are estimated for the South shaft and No. 7 ore bodies and are summarized as follows:

South shaft ore body:

| | <u>Tons</u> | <u>% Fe_2O_3</u> | <u>Units</u> |
|-----------|-------------|---|--------------|
| Measured | 25 | 0.5 | 12 |
| Indicated | 900 | 0.35 | 315 |
| | (200 | 0.5 | 100) |
| Inferred | (200 | 0.35 | 70) |
| | (400 | 1.0 | 400) |

| No. 7 ore body: | Tons | % WO_3 | Units |
|-----------------|------|-----------------|-------|
| Measured | 10 | 2.0 | 5 |
| Indicated | 100 | 1.0 | 100 |
| Inferred | 200 | 1.0 | 200 |
| Total | 305 | 0.59 | 1202 |

South shaft: Except for a few tons of ore around the edge of the old stope above the 40-foot level, there are no measured ore reserves in the South shaft ore body. About 900 tons of indicated ore, containing 0.35 percent WO_3 , is estimated to be in the block above the 40-foot level (fig. 3 - section along line B-B'). Inferred reserves of a few hundred tons are estimated to be in three blocks:

1. North of the existing stope above the normal fault in the block 50 feet long, 3 feet wide, and 15 feet high - 200 tons containing 0.5 percent WO_3 .
2. South of the South shaft between the normal fault and the surface, in the block 100 feet long, 3 feet wide and 30 feet high - 200 tons containing 0.35 percent WO_3 . (In making this calculation, $\frac{1}{2}$ of the block is considered to be ore. This reserve is the objective of the proposed surface trenching.)
3. Below the normal fault east of the existing workings, in the block 100 feet long, 3 feet wide, and 15 feet down the dip -- 400 tons containing 1.0 percent WO_3 . This block is the faulted segment of the ore body which was stoped above the 40-foot level.

No. 7 ore body: About 10 tons of measured ore containing about 2.0 percent WO_3 is exposed in the face of the open cut at the site of sample BM-322. About 100 tons of indicated ore containing 1.0 percent WO_3 is estimated to be in the block 50 feet long, 3 feet wide, and 10 feet high, above the level of the open cut and extending 50 feet south of the existing face.

In addition, 200 tons of ore containing 1.0 percent WO_3 are inferred to be in the block 50 feet long, 3 feet wide and 20 feet down the dip below the level of the existing open cut.

PAST PRODUCTION

The applicant reports a production of approximately 6,000 tons of crude ore, the greater part of which came from the shaft on the main ore body adjacent to the camp. These underground workings are reported to have been mined out but are now filled with water and could not be examined.

A tabulation of the tungsten concentrates produced, obtained from the applicants records, accompanies this report (see Appendix A).

MANPOWER - SUPPLIES

Water: No water is available at either of the sites of the proposed exploration and would have to be hauled via truck.

Power: There is no transmitted electric power in the district and it will be necessary to use machinery operated by either Diesel or gasoline engines.

Labor: The nearest source for experienced miners and mine labor is at Elko, Nev. The type of miners required for this job are difficult to obtain and it will probably require some time to secure desirable workmen.

PROPOSED EXPLORATION

The applicant has proposed an indefinite exploration project by means of a few tunnels, drifts and winzes; the lengths and depths of which would depend upon conditions as found but presently unknown to the applicant.

The applicant has estimated that it will require from one to one and one half years to complete the project at a cost of \$10,000.00.

The Field Team do not consider that the applicants proposal, as outlined in his statement attached to the MF-103 application, under date of May 26, 1951, is justified by the geological evidence underground and of surface exposures.

The Field Team does however consider the property at the South shaft and the No. 7 ore body to have sufficient merit to justify a very modest exploration program and have proposed an alternate program which is estimated to cost \$3,910.70 and should be completed in 57 working days.

Mr. George Ogilvie has advised the Field Team that it will be necessary for him to borrow sufficient funds to finance his share of the project and believes that he can borrow the money. Mr. Andrew Francis has advised the Field Team that he is presently unable to invest any money in the project.

It is therefore apparent that Mr. Ogilvie will have to finance the exploration program until such time as the monthly reports have been received, approved and paid. The starting date will no doubt depend upon Mr. Ogilvie's success in supplying the necessary funds for payroll and establishing credit for necessary mining supplies.

The proposed exploration work, if not started by Nov. 1 of this year, should be postponed until about May 1, 1953. This is due to expected weather and road conditions during the winter months, the isolation of the mine workings and the increased cost of operations during bad weather.

EXPLORATION PROJECT

Starting date: Probably not less than 15 days after contract is executed.

Time required to complete project: 57 working days.

Description of project:

South shaft ore body:

1. Drive a crosscut east for a distance of 50 feet from a point about 15 feet south of the north face of the North drift. This crosscut is to be no larger than $4\frac{1}{2}$ feet wide by 6 feet in height. Broken rock is to be removed by wheelbarrow and piled in the North drift.
2. Extend the North drift in a northwesterly direction for a distance of 50 feet along the tactite zone. The size of the drift is not to exceed $4\frac{1}{2}$ feet wide by 6 feet in height. Broken rock is to be removed by wheelbarrow and piled in the North drift.
3. Trench No. 1 - Surface - S. 25° E, 63 feet from the South shaft. Size of trench: 25 feet long by 3 feet wide by 3 feet deep.
4. Trench No. 2 - Surface - S. 12° E, 75 feet from Trench No. 1. Size of trench: 25 feet long by 3 feet wide by 3 feet deep.
5. Surface exploration of the No. 7 ore exposure. Ex-

tend the present open cut in a southeasterly direction for a distance of 50 feet. Width of cut not to exceed 4 feet. (Note:- The floor of the present open cut is approximately 8 feet below the surface).

| | | |
|---------|---------------------------|-----------------|
| Totals: | Drifting and crosscutting | 100 feet |
| | Trenching | 50 " |
| | Open cut | 50 " |
| | Total | <u>200 feet</u> |

Allowable costs of project:

a. Independent contracts None

b. Labor

| | |
|------------------|----------------|
| 1 Miner-foreman | @ \$15.00/day |
| 1 Laborer-helper | @ 14.00/day |
| 1 Cook | @ 5.00/day |
| 1 Bookkeeper | @ 100.00/month |

c. Operating materials and supplies:

| | |
|---|-----------------|
| 31 50-pound boxes of 45% dynamite @ \$12.50 | \$387.50 |
| 5000 feet of fuse @ \$14.25 per M | 71.25 |
| 500 No. 8 blasting caps @ \$2.75 per C | 13.75 |
| 600 gals. gasoline for compressor @ \$0.32 | 192.00 |
| 12 gals. compressor oil @ \$2.50 per gal. | 30.00 |
| 1 gal. castor machine oil @ \$3.00 | 3.00 |
| 150 feet BM - 2" by 4" and 1" by 4" material for ladders | 15.00 |
| 25 pounds of nails @ \$0.15 | 3.75 |
| 2 long handled, round point shovels @ \$3.50/ea. | 7.00 |
| 2 " " square " " @ \$3.50 " | 7.00 |
| 50 mine wedges @ \$0.05 ea. | 2.50 |
| 1 miners axe, single bit, 4½ pounds | 5.00 |
| 1 double jack, with handle | 5.00 |
| 1 single jack, " " | 3.00 |
| 2 miners drift picks, handled @ \$4.00 ea. | 8.00 |
| 1 wheelbarrow, rubber tire | 25.00 |
| 100 pounds miners carbide @ \$0.08 | 8.00 |
| 100 gals. gasoline for trucks @ \$0.32 | 32.00 |
| 10 qts. oil for trucks @ \$0.35 | 3.50 |
| lubricating oil and cup grease | 5.00 |
| | <u>\$827.25</u> |

d. Operating equipment:

1. To be purchased None

2. To be rented None

3. Owned and furnished by the operator:

| | |
|---|-----------------|
| 1 Ingersoll-Rand air compressor, 165 c.f.m. second hand, reported as in good condition. Estimated value \$1500.00, monthly depreciation 1/60 \$250.00 per month - 1.5 months | \$375.00 |
| 1 Jackhammer, large, mounted, wet, estimated value \$180.00, monthly depreciation 1/60 . . . \$2.50 per month - 1.5 months | 3.75 |
| 100 Feet of air hose) 100 Feet of water hose) second hand Estimated value \$60.00, monthly depreciation 1/60 . . . \$1.00 per month - 1.5 months | 1.50 |
| 1 Column and bar (second hand). Estimated value \$25.00, monthly depreciation 1/60 ... \$0.42 per month - 1.5 months | .63 |
| Drill steel (second hand) 18 pieces | |
| Drill bits (estimated at \$200) new and used bits on hand @ \$0.625 ea. | 125.00 |
| 1 Ford truck, 1 1/2-ton capacity. Estimated value \$500.00, monthly depreciation 1/60 ... \$8.33 per month - 1.5 months | 12.50 |
| 1 Bit sharpener (second hand). Estimated value \$50.00, monthly depreciation 1/60 ... \$0.83 per month - 1.5 months | 1.25 |
| 1 Truck, pickup, estimated value \$1000.00, monthly depreciation 1/60 ... \$16.66 per month - 1.5 months | 25.00 |
| 500 Feet of 2-inch black iron pipe (second hand). Estimated value \$0.12 per foot - \$60.00, monthly depreciation 1/60 ... \$1.00 per month - 1.5 months | 1.50 |
| | <u>\$548.13</u> |

e. Rehabilitation and repairs of existing buildings: None

f. New buildings, improvements and installations to be purchased, installed or constructed:

Installation of approximately 500 linear feet of 2-inch black iron pipe from compressor set up at the No. 1 tailing pond to the No. 7 ore body. Labor: 2 days time for 2 men @ \$29.00 per day \$ 58.00

g. Miscellaneous:

The air compressor, owned by the applicants, is now in use at the J. W. Mink, Little Joe group of tungsten claims, situated approximately 15 miles east of Wild Horse, Nev., or approximately 157 miles north of the applicants property. This machine was apparently borrowed or rented by Mr. Mink and should be returned to the Star Tungsten mine at no cost to the exploration project.

Labor: 2 days time for 2 men in moving from the mine camp to the South shaft and installation of necessary air and water lines 58.00

Labor: 1 days time for 2 men constructing ladders 29.00

2 days time for 2 men installing air and water lines and ladders down old raise north of the South shaft 58.00

Labor: Moving air compressor from South shaft to No. 1 tailing pond for work on No. 7 ore body and installation of compressor - 1 days time for 2 men 29.00

Installation of approximately 500 feet of 2-inch air line from compressor to No. 7 ore body - 2 men for 2 days time 58.00

Analytical work:

20 samples for WO_3 analysis @ \$5.00 100.00

| | | |
|--|-------------------|-------------------|
| Total allowable labor cost: | | |
| 1 bookkeeper @ \$100.00/month | 2 months | \$ 200.00 |
| 1 miner-foreman @ \$15.00/day | 57 days | 855.00 |
| 1 miner's helper-laborer @ \$14.00/day | - 57 days | 798.00 |
| 1 cook @ \$5.00/day | 57 days | 285.00 |
| | | <u>\$2,138.00</u> |
| | Add 14% insurance | 299.32 |
| | | <u>\$2,437.32</u> |
| Total allowable cost of operating materials and supplies | | 827.25 |
| Total allowable cost of analytical work | | 100.00 |
| Total allowable cost of monthly depreciation | | 546.13 |
| Total cost of project | | <u>\$3,910.70</u> |
| Government participation 75% or | \$2,933.03 | |
| Time required to complete project | 57 days | |

Mr. George Ogilvie and Andrew Francis should assemble the necessary equipment at the mine camp and place in good operating condition prior to the start of any exploration work and at no cost to the project.

Mr. Ogilvie is to direct and supervise the operations and to take samples and prepare the accounting and monthly reports on Form MF-104.

The mill building and concentrating machinery are owned by the Knowles brothers of Elko, Nev., and are located adjacent to the mine camp and alongside of the Harrison Pass Highway. The building is of frame construction covered with tar paper. The roof should be entirely recovered immediately in order to protect the machinery and equipment which consists of:

- 1 Coarse ore bin, timber construction, size 11.2 feet by 12 feet, bottom on 45 degree slope (good condition)
- 1 Conical, steel ore bin, extra heavy steel plate, about 50-ton capacity (good condition)
- 1 Rue-Ken balanced crusher, size 50 (10-inch by 24-inch) Serial No. 5016P6, 365 RPM (good condition)
- 1 Belt conveyor, belt 16-inch by 32 feet. Gear driven from line shaft. Small pinon gear badly worn. Belt appears in good condition.
- 1 International Diesel engine, 75-horsepower, 4-cylinder, No. UDF529, V-belt drive to crusher. Reported to be in good condition.
- 1 Senco belt conveyor, steel frame, 16-inch by 51 feet belt. Model CHM-Serial No. 43-5591. Driven by electric motor. Appears to be in good condition.

- 1 Double deck vibrating screen No. 86735, screen size 24-inch by 48-inch. Mfg. by the Denver Equipment Co., electric motor driven. Motor has been removed. The screen appears to be in fair condition. (This is owned by the applicant).
- 1 Straub ball mill, No. 45, size 3 feet by 4 feet, V-belt driven by one Westinghouse electric motor, constant speed, 25-horsepower, 440 V., Serial No. 806259, Style 350475 PX. Appears to be in good condition, however, the ball mill liner plates could not be examined.
- 1 Settling cone, steel, 1/8-inch plate, 45-inches wide at top by 76 inches long by 58 inches deep. Looks to be in good condition.
- 1 Straub concentrating table, standard size. Looks to be in reasonably good condition. Deck linoleum in only fair condition. Riffles are in fair condition. The electric motor drive and line shaft have been removed.
- 1 Flat-a concentrating table, standard size, V-belt driven from electric motor. Electric motor and V-belts have been removed. Extra heavy riffles, 1-inch wide. Will be necessary to replace the deck linoleum. (Owned by the applicants).
- 1 Power unit: Cummins Diesel engine, 6-cylinder, water cooled. (No name plate or number on engine). Connected to: Palmer regulating alternator, 65KVA, 240V, 137 Amps., 50 KW, 1200 RPM, 3 ph, 60 cycle, No. 500400. V-belt drive to Palmer generator, type comp., 1.5-horsepower, 125 V, 12 amps, DC, 1725 RPM, No. 3217LC19775. Together with necessary wall, throw out switches. This equipment has not been operated since 1944 and therefore the condition is not determined.
- 1 Iron pan for concentrate dryer. 3/8-inch iron plate, 43 inches wide by 9 feet 6 inches long, with sides 6 inches deep. Looks to be in good condition.
- 1 Outside storage tank for Diesel fuel oil, steel tank, 56-inch diameter by 15 feet 8 inches long. Looks to be in good condition.

All iron pipe and pipe fittings in the mill are reported to be owned by the applicants.

The milling plant is reported to have been designed as a 50-ton plant. However, the applicant reports that the maximum daily tonnage treated, only amounted to 37 tons of crude ore.

It is considered probable that the Knowles brothers will sell the milling machinery to anyone who will pay the asking price. Therefore,

the Field Team has no information as to how long the plant will remain at the property.

GENERAL INFORMATION

The applicant has advised the Field Team that he is endeavoring to sell or lease the mining claims and has made a tentative offer to Mr. Warren Overholser of Gabbs, Nev. The purchase price asked amounts to \$100,000.00, payable on a 25% Royalty basis and with a guaranteed minimum Royalty of \$400.00 per month.

Whether or not the sale will be consummated is unknown.

APPENDIX "A"

Production by applicant: NO_2 concentrates

| Date | Amount lbs | Assay % NO_2 | Lot No. | Units NO_2 | Price | Exp. | Credits |
|----------------|---------------|--------------------------|---------|---------------------|---------|-----------------|------------------|
| Apr. 17, 1941 | 2245 | 30.0 | 1 | 33.675 | \$18.75 | \$29.03 | \$631.40 |
| June 4, 1941 | 1494 | 54.44 | 2 | 40.667 | 20.75 | 15.57 | 843.84 |
| July 14, 1941 | 1802 | 61.15 | 3 | 55.096 | 21.75 | 15.36 | 1198.34 |
| Aug. 7, 1941 | 2446 | 61.00 | 4 | 74.603 | 21.75 | 18.86 | 1622.62 |
| Sept. 4, 1941 | 2450 | 56.12 | 5 | 68.747 | 21.75 | 19.48 | 1496.25 |
| Nov. 21, 1941 | 3395 | 55.20 | 6 | 93.702 | 20.15 | 24.41 | 1944.32 |
| Jan. 7, 1942 | 3631 | 61.40 | 7 | 99.742 | 20.75 | 23.14 | 2069.65 |
| Feb. 18, 1942 | 4617 | 48.35 | 8 | 116.451 | 20.75 | 29.86 | 2416.35 |
| Apr. 3, 1942 | 9881 | 46.10 | 9 | 237.632 | 20.75 | 49.65 | 4930.99 |
| Apr. 16, 1942 | 3303 | 47.92 | 10 | 79.063 | 20.75 | 29.23 | 1640.66 |
| May 15, 1942 | 5733 | 52.20 | 11 | 150.545 | 20.75 | 34.48 | 3123.81 |
| June 16, 1942 | 3513 | 49.44 | 12 | 86.771 | 20.75 | 26.84 | 1800.50 |
| July 9, 1942 | 3206 | 56.20 | 13 | 90.069 | 20.75 | 28.62 | 1869.34 |
| Aug. 10, 1942 | 3099 | 60.30 | 14 | 111.223 | 23.15 | 26.02 | 2574.81 |
| Sept. 30, 1942 | 2123 | 62.65 | 15 | 55.888 | 22.15 | 17.12 | 1237.92 |
| Nov. 23, 1942 | 4697 | 52.20 | 16 | 122.592 | 22.15 | 33.03 | 2715.41 |
| | <u>58707</u> | | | <u>1516.487</u> | | <u>\$423.09</u> | <u>\$3115.21</u> |

Shipped to M.R.C.

| | | | | | | | |
|----------------|--------------|-------|---|---------------|--|--|---------------|
| Aug. 25, 1942 | 4592 | 12.56 | 1 | 29.512 | | | 93.84 |
| Sept. 23, 1942 | 4399 | 7.60 | 2 | 16.720 | | | 89.00 |
| Nov. 30, 1942 | 2316 | 6.45 | 3 | 7.530 | | | 47.50 |
| | <u>11417</u> | | | <u>53.762</u> | | | <u>229.74</u> |

MCg concentrates produced by Knowles brothers and shipped to Metals Reserve.

| Date | Amount lbs. | Assay % MCg | Lot No. | Units MCg | Units Paid | Gross Receipts | Treatment | Settlement | 25% Royalty |
|---------------|----------------|----------------|---------|-----------------|-----------------|--------------------|-------------------|---------------------|--------------------|
| Jan. 13, 1944 | 20289 | 52.18 | 4 | 529.37 | 514.16 | \$ 15424.50 | \$ 808.28 | \$ 14,610.92 | \$ 3,652.73 |
| Feb. 2, 1944 | 20022 | 55.56 | 5 | 554.21 | 539.19 | 16175.70 | 824.51 | 15,340.98 | 3,835.25 |
| Feb. 11, 1944 | 19923 | 51.30 | 6 | 511.15 | 496.21 | 14896.50 | 750.18 | 14,095.97 | 3,523.99 |
| Apr. 12, 1944 | 19922 | 41.30 | 7 | 411.39 | 396.45 | 11893.50 | 650.34 | 11,203.04 | 2,800.76 |
| Apr. 19, 1944 | 20053 | 35.20 | 8 | 352.95 | 337.91 | 10137.50 | 623.68 | 9,503.41 | 2,375.85 |
| Apr. 19, 1944 | 16429 | 35.80 | 9 | 294.10 | 281.77 | 8453.10 | 515.90 | 7,925.91 | 1,982.23 |
| Apr. 19, 1944 | 17396 | 37.80 | 10 | 328.82 | 315.77 | 9473.10 | 563.70 | 8,900.59 | 2,225.15 |
| May 15, 1944 | 17903 | 40.86 | 11 | 365.78 | 352.35 | 10570.50 | 607.43 | 9,963.95 | 2,488.49 |
| May 15, 1944 | 16181 | 47.00 | 12 | 427.28 | 413.64 | 12409.20 | 672.73 | 11,727.23 | 2,931.82 |
| May 31, 1944 | 4760 | 49.00 | 13 | 116.62 | 113.05 | 3391.50 | 180.88 | 5,208.22 | 802.05 |
| June 19, 1944 | 11193 | 50.55 | 14 | 283.49 | 275.09 | 8602.15 | 434.61 | 6,161.89 | 1,540.97 |
| June 12, 1944 | 15950 | 53.40 | 15 | 426.93 | 414.94 | 9983.56 | 642.80 | 9,307.69 | 2,326.92 |
| July 29, 1944 | 15949 | 59.60 | 16 | 475.31 | 463.35 | 11120.40 | 690.64 | 10,421.71 | 2,605.43 |
| July 29, 1944 | 19624 | 53.00 | 17 | 520.04 | 505.32 | 12127.68 | 784.56 | 11,332.83 | 2,833.21 |
| Oct. 9, 1944 | 9936 | 45.80 | 18 | 566.60 | 527.58 | 4324.02 | -- | 4,270.59 | 1,067.65 |
| | <u>247579</u> | | | <u>6,164.04</u> | <u>5,644.77</u> | <u>\$156947.52</u> | <u>\$8,305.69</u> | <u>\$147,938.03</u> | <u>\$36,992.50</u> |

Total production compiled from applicants records

| | <u>Lbs. MCg contents.</u> | <u>Units MCg</u> | <u>Total Receipts</u> |
|---------------|---------------------------|------------------|-----------------------|
| 1941 | 55,707 | 1,516,497 | |
| 1942 | 111,427 | 53,762 | |
| 1944 | 247,579 | 6,154,040 | |
| <u>Totals</u> | <u>317,713</u> | <u>7,734,299</u> | <u>\$189,292.47</u> |

The above production data secured from applicants shipping receipts.

United States
Department of the Interior
Bureau of Mines
Rare and Precious Metals Experiment Station
Reno, Nevada.

Hydrometallurgical & Ore-Dressing Branch
Box D, University Station

Region III

September 26, 1952

Mr. Glenn G. Gentry
U. S. Bureau of Mines
P. O. Box 1551
Reno, Nevada

Project No. Gentry

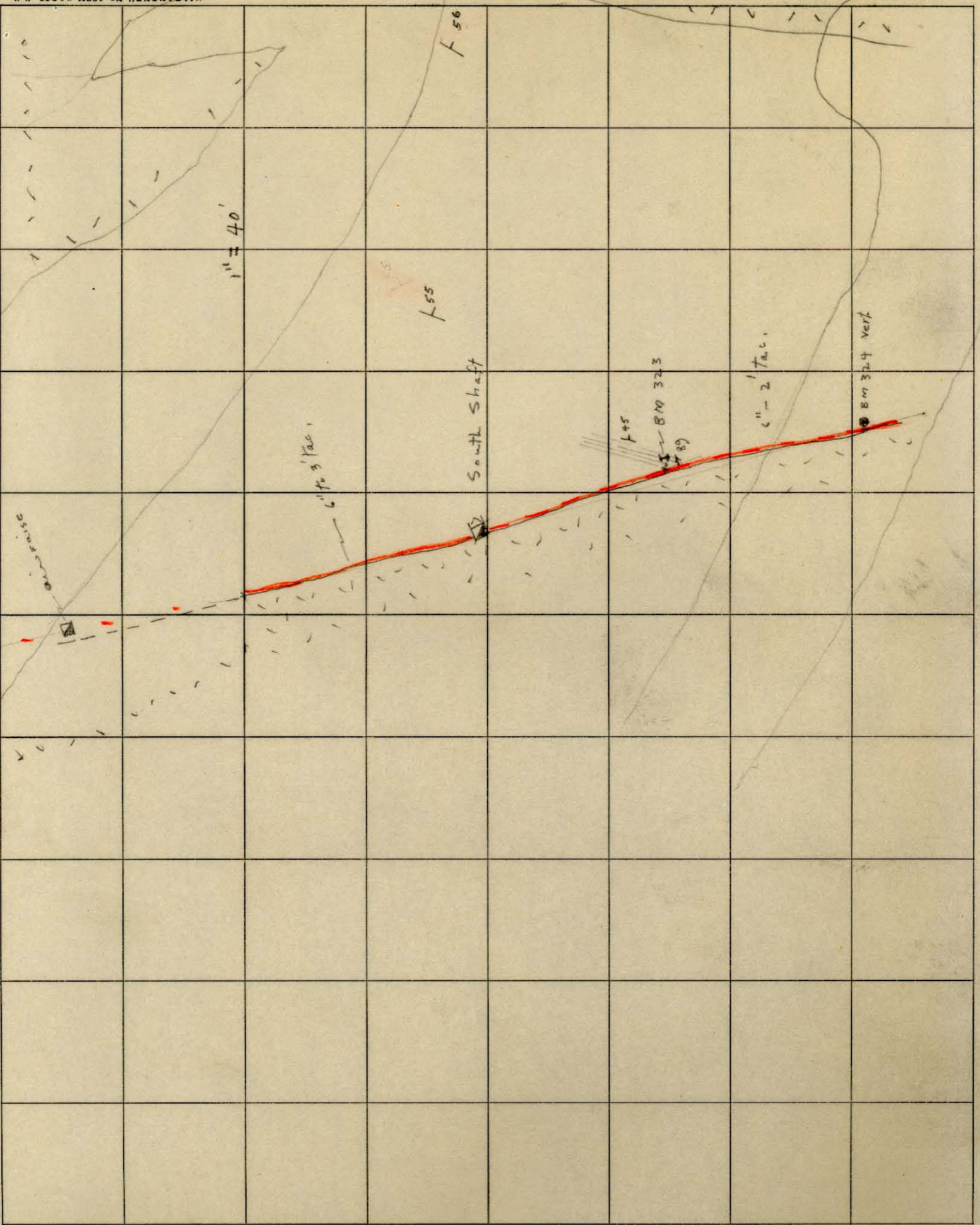
Star Tungsten Mine, Elko Co., Nev.
DMEA - 1452

| <u>Sample No.</u> | <u>% WO₃</u> |
|-----------------------------------|-------------------------|
| BH-318 ⁴ tailings pond | 0.41 |
| 319 ⁴ tailings pond | 0.28 |
| 320 - 27" | 0.77 |
| 321 - | 0.46 |
| No. 7 surf 322 - 41" | 2.06 |
| surf 323 - | 0.24 |
| surf 324 - | *0.01 |
| 325 - ? | 0.12 |
| 326 - | 0.42 |
| 327 | 0.15 |
| 328 | 0.17 |

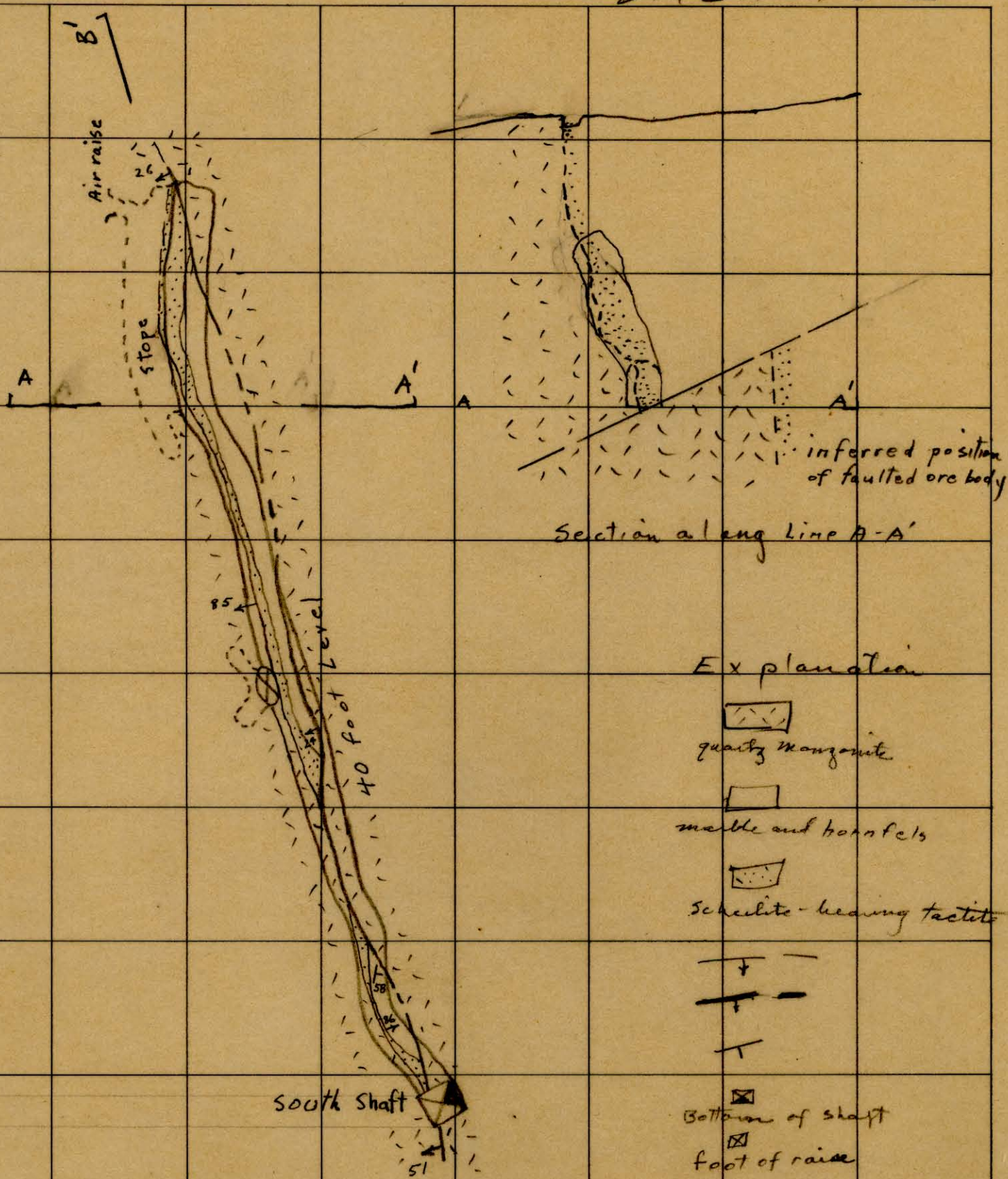
A. L. Engel for
J. B. Zadra, Chief

Note: * = less than

CC: A. C. Johnson

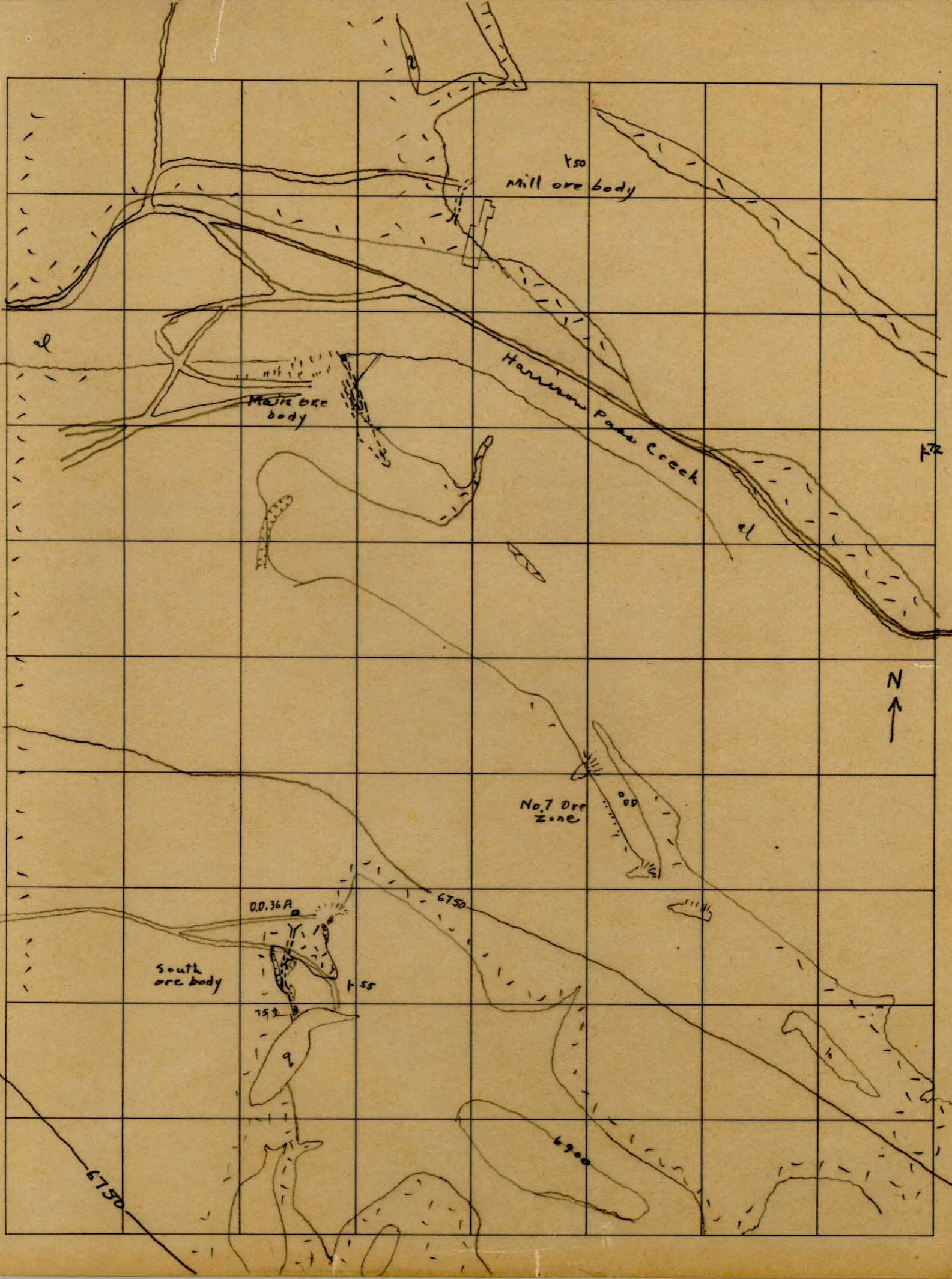


DMEA 1452



Section along line B-B'

Geologic map of the 40 foot Level
South Shaft - Star Tungsten Mine
Elko County, Nevada



80

Item 18

Report on the
STAR TUNGSTEN MINE AND VICINITY

Elko County, Nevada

M. R. Klepper

Nolan (2)
Lasky
Lamm
Allen (2)
File _____

U. S. Geological Survey

October 2, 1942

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Report on the
STAR TUNGSTEN MINE AND VICINITY

Abstract

The Star Tungsten Mine is 2 miles east of Harrison Pass, Elko County, Nevada. It explores the largest of a number of small scheelite-bearing tantalite bodies that have been formed locally along the contact between the Harrison Pass quartz monzonite stock or associated dikes and the Pogenip limestone. The zone that contains the ore bodies is about 2 miles long and 1500 feet wide and strikes northerly. A 25-ton mill was erected on the property in 1940 and production began in 1941. Since that time about 1500 tons of 2% WO₃ ore have been milled, yielding 1500 units of WO₃, a recovery of approximately 50%. Production during 1942 has averaged 125 units a month.

On the Star Tungsten Property 4200 tons of ore or 6000 units of WO₃ are measurable; 2500 tons or 3000 units are indicated. Approximately 3000 units of WO₃ will be lost if the 4200 tons of measurable ore are milled in the present plant. A \$10,000 loan to finance remodeling of the present mill or construction of a new mill should assure an additional yield of 2000 units of WO₃ from the measurable ore alone.*

U. S. Bureau of Mines exploratory work on this or adjacent properties is not recommended.

* This statement assumes that a mill capable of making 80% recovery can be built. This seems to be a reasonable expectation if plants treating similar ores are a criterion.

INTRODUCTION

The writer spent five weeks in August and September, 1942 investigating the scheelite deposits of the Star Tungsten Mine and vicinity, Elko County, Nevada as a part of the strategic-mineral investigation program of the U. S. Geological Survey. At different times he was capably assisted by John H. Wiese and C. Melvin Swinney of the Survey. The hospitality and wholehearted cooperation of Messrs. Ogilvie, Lane and Francis of the Star Tungsten Mine is deeply appreciated.

LOCATION

The Star Tungsten Mine is in the northwest quarter of T. 28 N., R. 58 E., Mount Diablo base and meridian, Elko County, Nevada. It is situated in the central part of a northerly trending belt of scheelite mineralization along the east slope of the Ruby Mountain Range about 2 miles east of Harrison Pass. This belt extends from the crest of the hill north of Harrison Pass Creek to the crest of the hill south of Limekiln Creek, a length of about two miles. The altitude in this belt ranges between 6500' and 7100'.

The mine is easily accessible from the north and east. Elko is 55 miles distant by gravel road via Harrison Pass; Currie and Warm Springs on U. S. Highway No. 40 are each about 40 miles distant by gravel roads via Ruby Valley. In the vicinity of the mine the winters are severe and the Harrison Pass road is often blocked by snow for a month or more, but the Ruby Valley roads are seldom impassable and mining, milling and transportation are rarely impeded for more than a day or two at a time.

PERTINENT FACTS ABOUT THE STAR TUNGSTEN PROPERTY

Ownership

The Star Tungsten Mine is owned jointly by George F. Ogilvie, E. Lane and A. Francis, all of Elko, Nevada. Twelve claims, Star Tungsten and Star Tungsten #1-11, were located by Lane and Francis in 1939 and later Mr. Ogilvie was admitted to the partnership.

Production

Scheelite was discovered in 1916 or 1917 and a number of prospect pits and shallow shafts were dug at this time, but there is no record of production before 1941. In March 1941 the first concentrates from the Star Tungsten Mill were sold. Since then 1500 units* have been produced from not more than 1500 tons of ore. During the current year production has averaged 125 units a month.

Workings

The principal working on the Star Tungsten property is a 150-foot adit with a 65-foot winze from which levels have been started at depths of 45 feet and 65 feet. Two 15-foot shafts and a number of surface cuts and pits are the only other workings on the property.

Mill

A three-table gravity mill designed to handle 25 tons of ore a day was built in 1940. That this mill is poorly adapted to handle the heavy tungsten ore which is moved directly from secondary crusher to tables without classification is indicated by tailing assays that yielded between 1.0% and 1.1% WO₃. Examination of the accumulated tailings under an ultra-violet lamp suggests that these assays are representative. It is believed

* Includes estimated September production.

that the mill feed averages about 2.0% WO_3 , and consequently the indicated recovery is only about 50%. Probably the 1000 tons of 1% tailings that are partly impounded and partly scattered on the flat below the mill could be profitably retreated in a more efficient mill.

During the year the mill has been handling only about 125 tons of ore a month (about 20 eight-hour shifts).

GEOLOGY

General

The scheelite-bearing contact zone lies between the Harrison Pass stock to the west and Pogonip limestone to the east. In this zone which trends northerly and averages about 1500' wide (figure 1) the Pogonip has been invaded by dikes and sills and metamorphosed into hornfels and marble. Small tactite bodies have been formed in a few places along the contact. The regional geology has recently been more fully described by Sharp (1).

Rock Units

Metamorphic Rocks.— All of the original sedimentary rocks in the mapped area have been metamorphosed. Light-colored, dense fine-grained hornfels predominated. Fresh specimens are white, light gray or pale green, but most weathered surfaces are drab gray. Some beds contain perphyroblasts of brown garnet as large as $\frac{1}{2}$ " in diameter.

Granular white marble beds from a few inches up to 20' thick are interlayered with the hornfels. Clusters of wollastonite crystals occur in some beds.

Small irregular tactite bodies have formed locally along the contact. Generally the tactite which consists of quartz, garnet, epidote or

(1). Sharp, R. P., Bull. G. S. A., v.55, 647-690, 1942.

pyroxene, calcite and scheelite is a brown medium-grained rock. In some specimens epidote or pyroxene predominates and the color is dark green.

Igneous Rocks.— White, coarse-grained, partly porphyritic biotite quartz monzonite comprises most of the stock (2). It weathers to a granular rubble of quartz and feldspar. A younger alaskite intrusive rock which exhibits granitic, aplitic, graphic or pegmatitic textures is common along the eastern margin of the stock and as dikes and sills cutting the metamorphic rocks. It is siliceous, almost devoid of dark minerals and locally contains muscovite. A few dikes of coarse-grained green monzonite (?) porphyry are exposed in the northern part of the map area. A small amount of basic igneous float was found in the southern part.

^{6.3} Since scheelite-bearing tuffite has been found in contact with each of the intrusive types described above, except the green monzonite (?) porphyry, and ^{6.4} since the contacts between the different intrusives are generally concealed, all igneous rocks were mapped as one unit. In the following paragraphs the term "granite" will be used in referring to the undivided intrusives.

Structure and Contact Metamorphism

The metamorphic sequence forms a simple homoclinal structure which dips to the east at angles of between 40 degrees and 60 degrees. No major faults were recognized, but the angular pattern of the contacts suggests that intrusion may have been controlled by minor faults or joints. The main granite contact is very irregular, in places paralleling the bedding and elsewhere cutting sharply across it, but has a general northerly trend. Many apophyses extend out from the main contact into the metamorphic rocks.

(2). Sharp, R. P., op. cit., p. 674. Sharp calls this rock granite although he has determined that it contains 35% of oligoclase.

and in some places they have completely isolated sedimentary blocks. The underground workings and diamond drill holes indicate that the downward course of the contacts is about as irregular as their surface trace (See figure 2).

Although the sedimentary rocks have been metamorphosed into hornfels and marble throughout a belt averaging about 1500' wide the metamorphism has been most intense near contacts with the "granite". It is only along or near these contacts that tectite bodies have formed and that garnet porphyroblasts have developed. Adjacent to tectite bodies the "granite" has commonly been silicified and contains epidote and hornblende.

ORE BODIES*

Localization

The following observations concerning the localization of the tectite ore bodies are considered to be of significance:

- (1). All known tectite ore bodies in the district lie along a "granite" contact.
- (2). Marble appears to be most receptive to the formation of tectite, but in some zones both marble and hornfels grade into tectite. Where the intrusive contact transgresses bedding one or more beds may be transformed into tectite for 25' or more from the contact, while the adjacent less susceptible beds are changed to tectite for only a few inches or a few feet adjacent to the contact. Although most of the scheelite is confined to tectite, in a few places the adjacent hornfels contains low grade scheelite mineralization for a width of a few feet.

*Bodies of scheelite-bearing tectite that are not of mineable size or grade are also considered under this heading.

(3). More than 95% of the contact is barren, and beds along these barren zones resemble those that have been metamorphosed to tectite elsewhere.

(4). Tectite ore bodies occur adjacent to quartz monzonite, porphyritic quartz monzonite and alaskites of different textures. The intrusives are commonly silicified adjacent to tectite bodies and in some places epidote and hornblende have been developed in them.

In summary: These tectite ore bodies appear to have been formed later than any of the known intrusions by solutions that migrated along permeable sections of the intrusive contacts or were released from local pockets in the igneous rock in which volatile constituents were concentrated. Certain beds were more susceptible to tectitization and scheelite mineralization than others, but all of the factors that are necessary to explain why the tectite ore bodies occur where they do and to predict successfully where others may be found are not known.

Size and Shape

Known ore bodies are small. The largest has been partly delimited by underground workings and diamond drill holes. It probably contains less than 8000 tons of ore that are estimated to average 1.5% UO₃. The majority of the bodies contain only a few hundred tons of ore.

Most of the bodies are irregular in shape. Where the contact parallels the bedding the ore bodies tend to be confined to one bed or a few parallel beds, and consequently are tabular. When the contact cuts sharply across bedding a pipe-like ore body which is irregular in plan may be formed.

DESCRIPTION OF SPECIFIC ORE BODIES

Star Tungsten Property

Main Ore Body.- The Star Tungsten Main ore body lies along the main contact between the Harrison Pass stock and the metamorphic rocks. It crops out for a length of 75 feet and is explored by an 150-foot adit, a 60-foot winze and two short levels driven from the winze at depths of 45 feet and 65 feet. About 3000 tons of ore that will probably average 1.5% WO₃ are blocked out between the surface and the bottom of the workings.

This ore body is shown in Figure 2. It varies in width between 5 feet and 12 feet, averaging about 6 feet. Although it has not been fully opened up along the strike it probably will average about 50 feet long. It is bounded by quartz monzonite on the west and by hornfels which contains only a small amount of scheelite on the east. Surface croppings, drill holes K-11 and K-18 and the north face of the 65-foot level indicate that the ore pinches out northward along a line that strikes steeply south. Above the 65-foot level "granite" cuts sharply across the strike of the ore body and forms its south boundary, but below this level and farther south drill holes K-13 and K-21 have intersected a northerly trending contact mineralized with scheelite.

Only minor post-mineral faults have been encountered in the workings. On the adit level the ore is displaced 15 feet by a steep fault and on the 45-foot level a number of younger low angle faults locally thicken the ore body.

The drill holes indicate about 1500 tons of ore that will probably average 1.0% WO₃, and rather completely delimit the ore body, although a few thousand tons of ore may lie deeper along the projected southward rake.

South Ore Body.- The South ore body lies along the main contact between the stock and the metamorphic rocks at the summit of the hill 1000' south of the Main ore body. A taconite bed that is believed to average 2.5% WO₃ is exposed for a length of 70' with an average width of 3'. It is bounded by silicified alaskite that parallels the bedding on the west, by an alaskite sill along the southern part of the east contact and by hornfels along the northern part. It is gradually pinched out to the south as the alaskite intrusives east and west of it merge, and terminates abruptly against biotite quartz monzonite to the north. In a 15-foot shaft near the south end of the ore body the width of the ore pinches from 6' to 3' between the surface and the bottom. Along the east contact of the alaskite sill non-persistent lenses of 1%-2% WO₃ ore up to 2' wide occur. It is not likely that these could be mined profitably.

Hole K-7 intersected 2' of good ore 30' below the bottom of the shaft; K-18 intersected a barren contact 15' deeper. In both holes narrow extensions of the eastern lenses were also intersected. Two more short holes would be desirable to indicate whether the shoot extends to greater depth along the steeply dipping biotite quartz monzonite contact that limits the ore body at the north.

This ore body contains about 20 tons of ore per foot of depth. About 700 tons of 2.0%-2.5% WO₃ ore are indicated if the depth at which the ore bottoms in the drill holes mentioned above is considered to be the average.

#7 Ore Zone.- The #7 ore zone is along the north border of an alaskite tongue about 800' southeast of the Main ore body. Thin taconite beds have been formed here and there for about 100' along the contact which cuts sharply across the bedding. The best surface showing is about 4' wide and 25' long and contains an estimated 1% WO₃. Three drill holes intersected

barren contacts at depths of 50' beneath the best surface showings.

Other Zones.— Other small lenses of scheelite-bearing tactite are shown on Figure 1. Probably the best of these contain no more than a few hundred tons of 1% WO₃ ore. The small tactite pods formed along the dike at the north end of the mapped area are almost barren.

Campbell Property

A tactite ore body has been prospected on the property of Russell Campbell of Salt Lake City, Utah. This ore body lies along the crest of a spur extending northward from the main ridge south of Limokiln Creek. It is about 4500' S 15 degrees W of the Star Tungsten Mine. Tactite ore has been formed along both contacts of a vertical biotite quartz monzonite dike which varies from a few inches to 8' in width. Different beds have been converted to tactite for varying distances from the dike (see figure 3). The surface exposure of this ragged-edged tactite body covers 400 square feet and is believed to average 1.0% WO₃. If the ore body extends downward in the form of a pipe it contains 40 tons of 1% WO₃ ore per foot of depth, and if it is not cut off at shallow depth by the main quartz monzonite body that crops out 50' to the west, it may contain several thousand tons. One or two shallow drill holes would give a more reliable basis for an estimate of the shape of the body and tonnage and grade of ore.

A concentration of tactite cobbles and boulders, some of which are ore, occurs in the overburden that conceals the "granite" contact about 400' north of the ore body mentioned above. Trenching in this area may uncover a lense or lenses of tactite ore in place.

SUMMARY OF RESERVES

Star Tungsten Property

| <u>Ore Body</u> | <u>Measurable Ore</u> | | | <u>Indicated Ore</u> | | | <u>Inferred Ore</u> | | |
|-----------------|-----------------------|------------------------|---------------|----------------------|------------------------|---------------|---------------------|------------------------|--------------|
| | <u>Tons</u> | <u>%WO₃</u> | <u>units</u> | <u>Tons</u> | <u>%WO₃</u> | <u>Units</u> | <u>Tons</u> | <u>%WO₃</u> | <u>Units</u> |
| Main | 3000 | 1.5 | 4500 | 1500 | 1.0 | 1500 | *3000 | | |
| South | 200 | 2.5 | 500 | 500 | 2.0 | 1000 | - | | |
| Others | 500 | 1.0 | 500 | - | | | - | | |
| Tailings | <u>500</u> | 1.0 | <u>500(1)</u> | <u>500</u> | 1.0 | <u>500(2)</u> | - | | |
| Totals | 4200 | | 6000 | 2500 | | 3000 | *3000 | | |

Recovery if treated in
mill that can make 80%
recovery.....4800

2400

Expected recovery if
treated in present
mill.....2750(3)

1250(3)

Loss that could be
prevented in new or
remodeled mill.....2050

1150

Campbell Tungsten Property

| <u>Measurable Ore</u> | | | <u>Indicated Ore</u> | | | <u>Inferred Ore</u> | | |
|-----------------------|------------------------|--------------|----------------------|------------------------|--------------|---------------------|------------------------|--------------|
| <u>Tons</u> | <u>%WO₃</u> | <u>Units</u> | <u>Tons</u> | <u>%WO₃</u> | <u>Units</u> | <u>Tons</u> | <u>%WO₃</u> | <u>Units</u> |
| 400 | 1.0 | 400 | - | - | - | 2000 | - | - |

*less than: (1). Easily recoverable; (2). Can be recovered;

(3). Excludes tailings since they cannot profitably be treated in present mill.

RECOMMENDATIONS

(1). That the Bureau of Mines does not instigate an exploratory program. Knowles Bros. of Elko, Nevada have uncovered critical contacts on the surface and drilled 19 holes totalling 2310 feet beneath known ore bodies. In my opinion further exploration by the Bureau is not warranted. I have recently expressed this same opinion in a conference with Mr. Glenn Allen, District Engineer for Nevada, U. S. Bureau of Mines, Reno, Nevada.

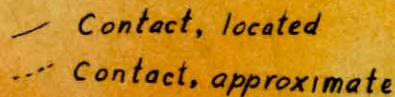
(2). That a loan of \$ 10,000 for the construction of a new mill would be warranted, if requested. The table on page 11 shows that at least 2000 and possibly 3000 additional units could be recovered from the available ore and tailings if a recovery of 80% rather than 50% could be attained.

If suitable arrangements can be made Knowles Bros., a reputable Elko partnership, will lease the property, construct a 25 ton mill and operate the property on a more extensive and efficient basis than it has been heretofore. They may also be able to make arrangements to explore the Campbell property.


M. R. Klepper

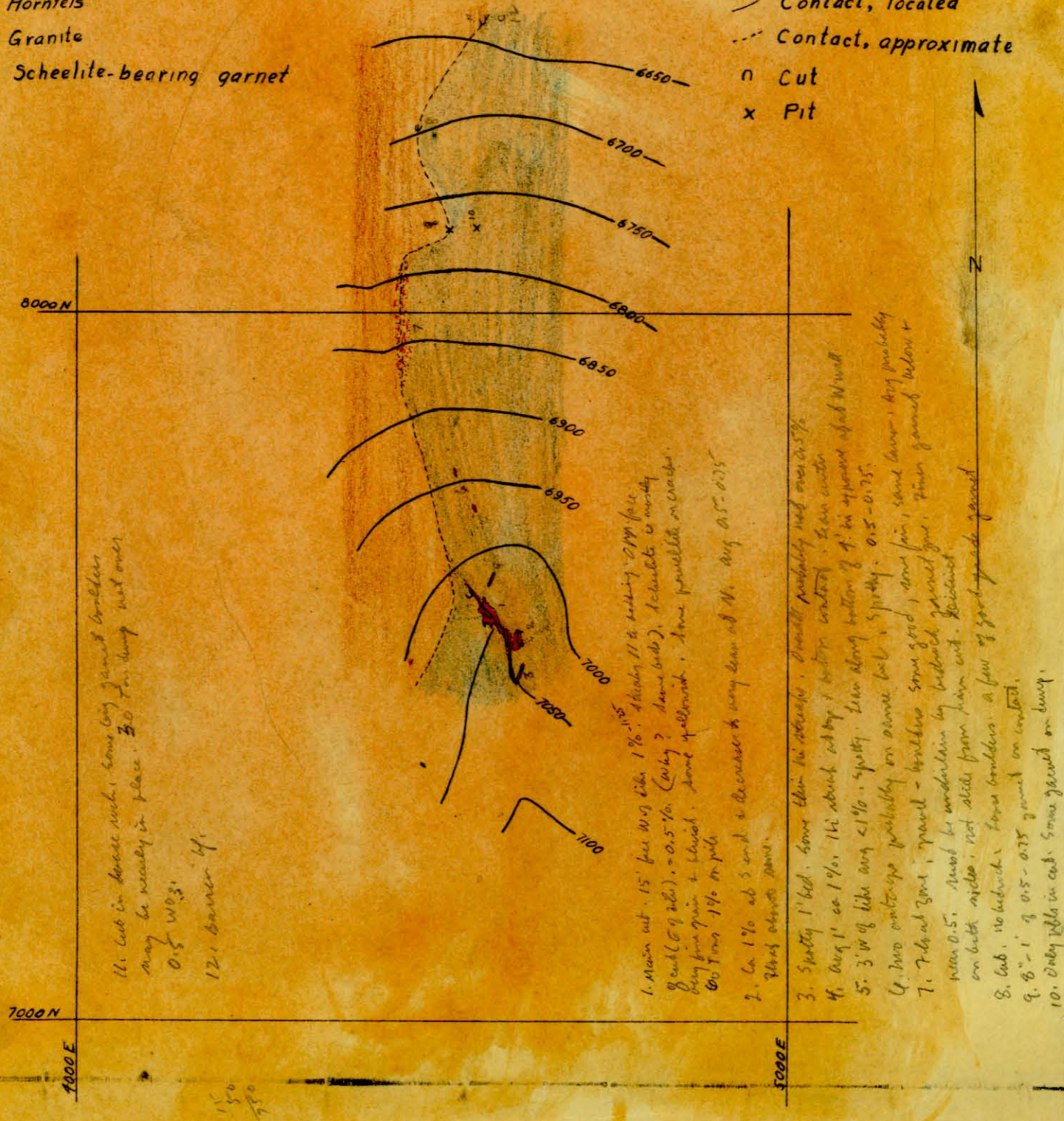
M. R. Klepper
C. M. Swinney

Scale
0 500'
Contour Interval 50'



n Cut

x Pit



Cut 150' above road, 1000' E of Map.

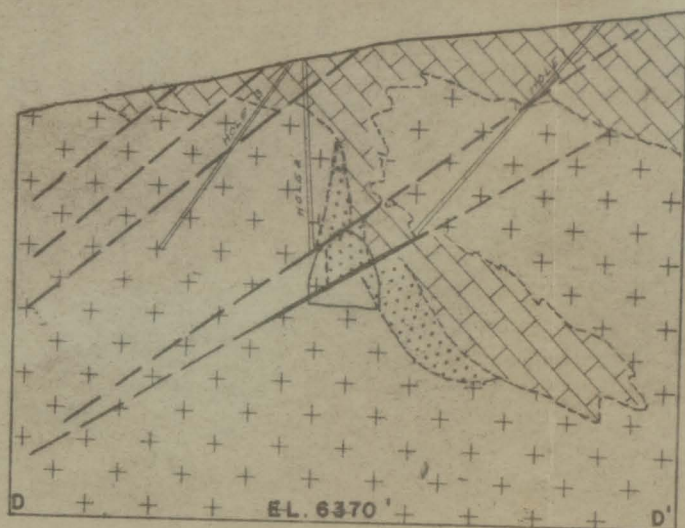
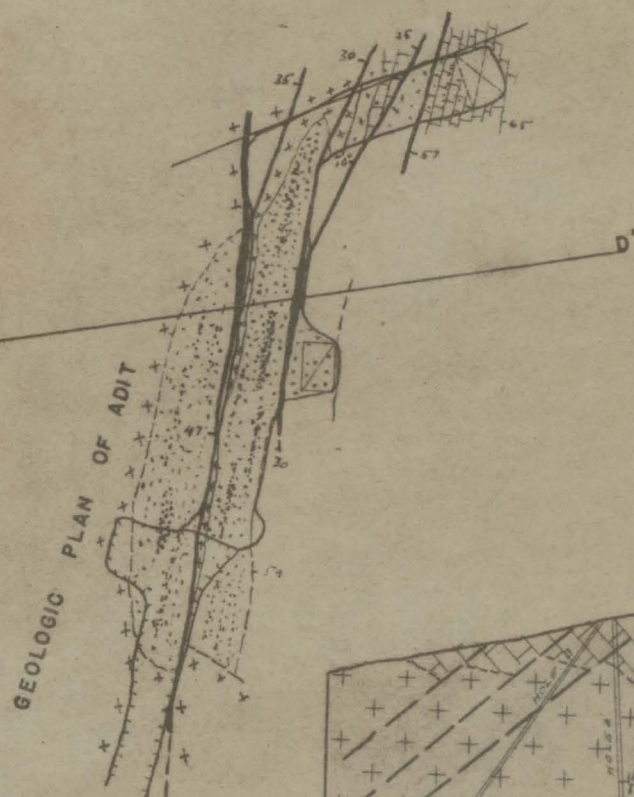
$$\frac{91}{90r} \frac{np}{0.11\%} \frac{1}{9r}$$

Barrel contains small pods good WO_3 , avg of free 0.1% WO_3

25 Ton Pile - 0.1 WO_3

Opened up for Car

VERTICAL SECTION
ALONG C-C'



VERTICAL SECTION ALONG D-D'

WORKINGS AT 35-A

GEOLOGIC, PLANS, SECTIONS, AND PROJECTION
OF WORKINGS IN MINOR ORE BODIES

STAR TUNGSTEN MINE

HARRISON PASS, ELKO COUNTY, NEVADA

U.S. GEOLOGICAL SURVEY SEPTEMBER 1943

0 5 10 15 20 SCALE 40 60 80 FEET

TACTITE ORE: CONCENTRATION OF
DOTS SHOWS APPROXIMATE GRADE
BETWEEN 0.1 AND 2.5% WO₃

QUARTZ MONZONITE

MARBLE AND HORNFELS INCLUDING
SMALL NON-COMMERCIAL STREAKS
OF TACTITE ORE

FAULT, LOCATED

FAULT, UNCERTAIN

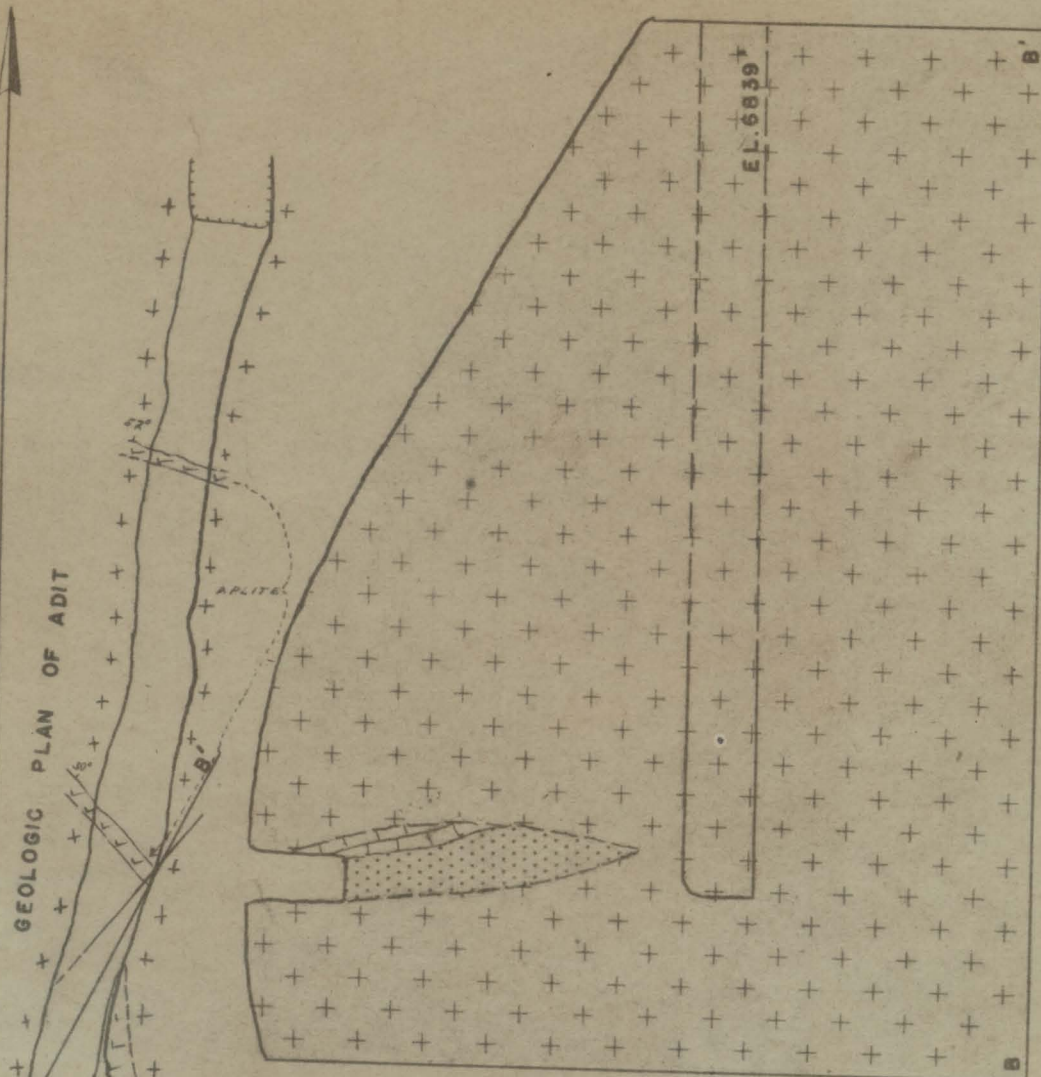
DRILL HOLE IN PLANE OF SECTION

DRILL HOLE, PROJECTED

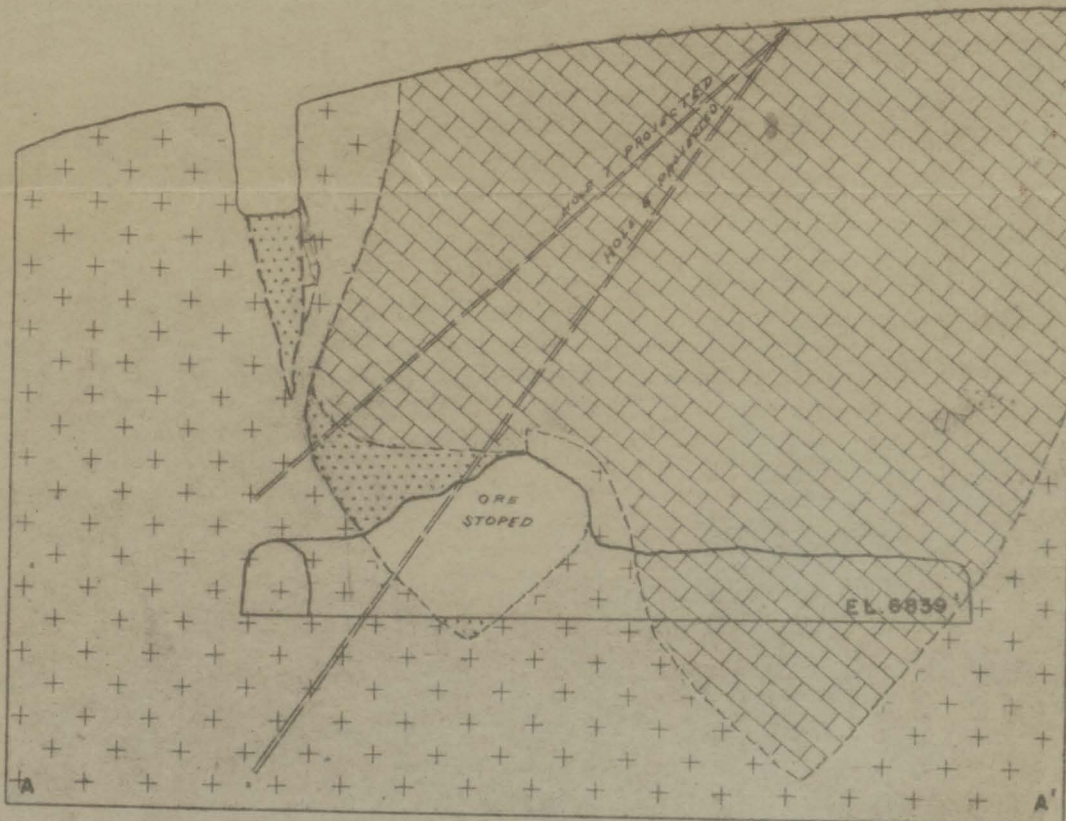
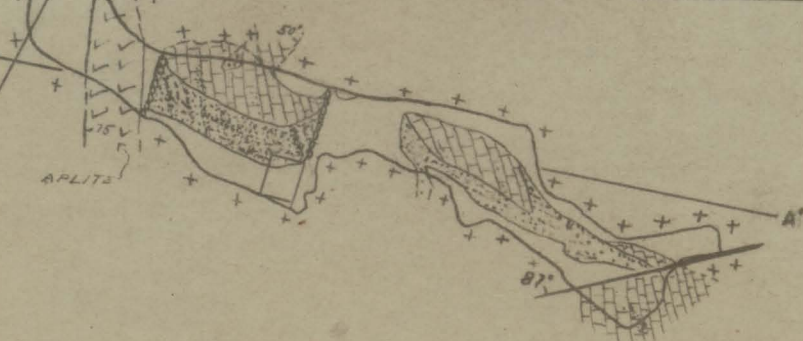
SURVEY AND GEOLOGY BY M.R. KLEPPER AND P. JORALEMON

036-A

PL. 3



VERTICAL SECTION ALONG B-B'

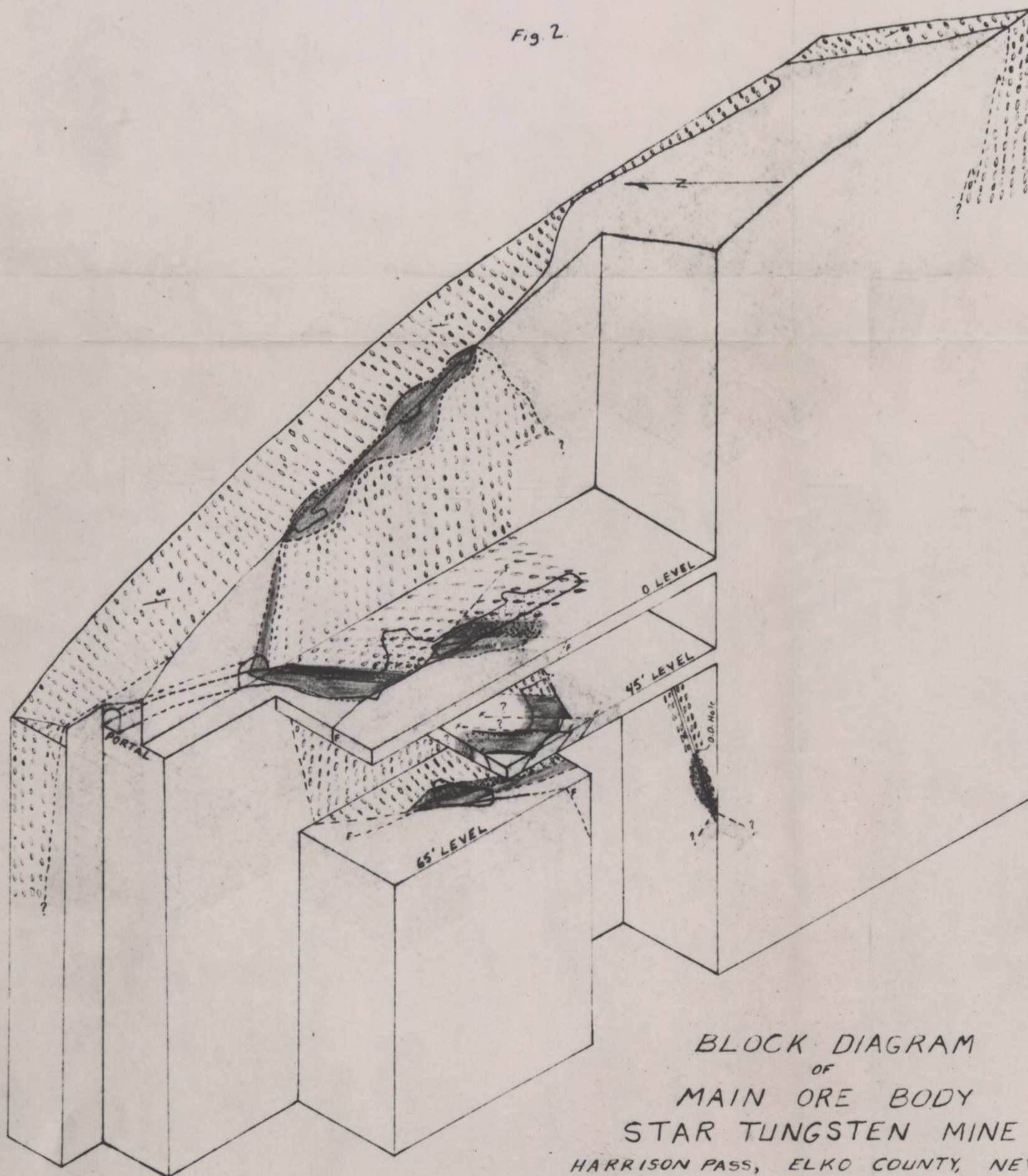


VERTICAL PROJECTION ALONG A-A'

WORKINGS AT 36-A

2280 0014

Fig. 2.



BLOCK DIAGRAM
OF
MAIN ORE BODY
STAR TUNGSTEN MINE

HARRISON PASS, ELKO COUNTY, NEVADA
M.R. KLEPPER, U.S. GEOLOGICAL SURVEY, SEPT. 1942
1" = 40'

EXPLANATION

- | | |
|-----------------------------------|--------------------|
| Granite | Fault, located |
| Hornfels | Fault, uncertain |
| Hornfels, mineralized | Contact, located |
| Ore, 1% WO ₃ or better | Contact, uncertain |
| Ore, less than 1% WO ₃ | |

U. S. GEOL. SURVEY

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ONLY

EXPLANATION

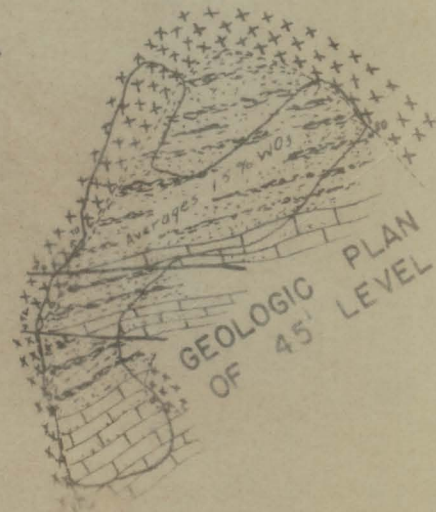
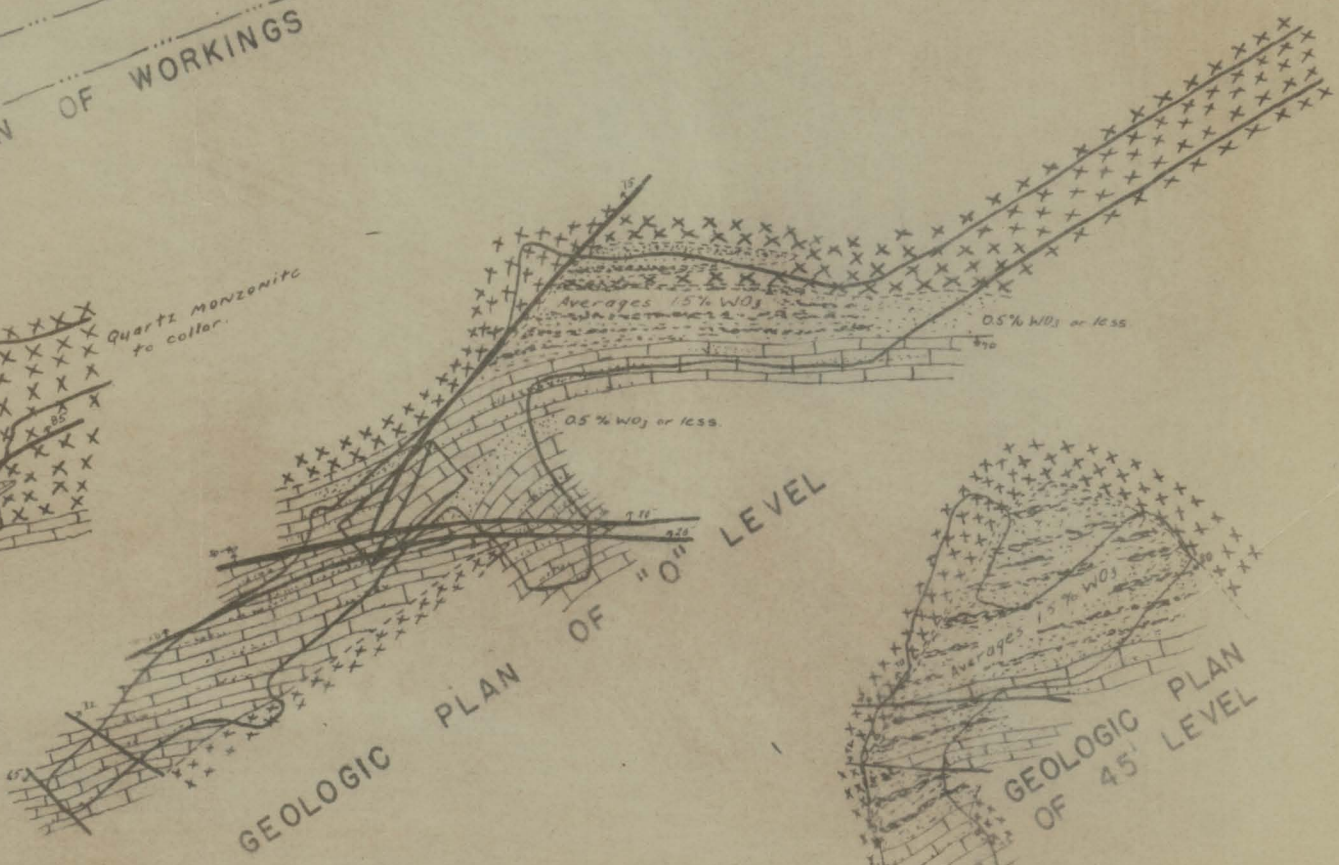
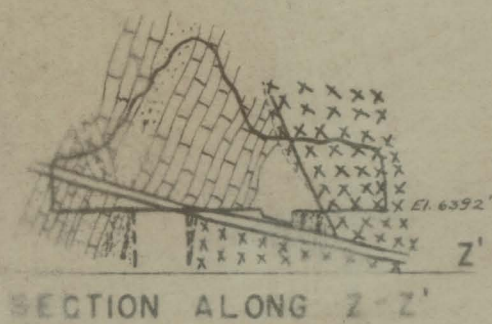
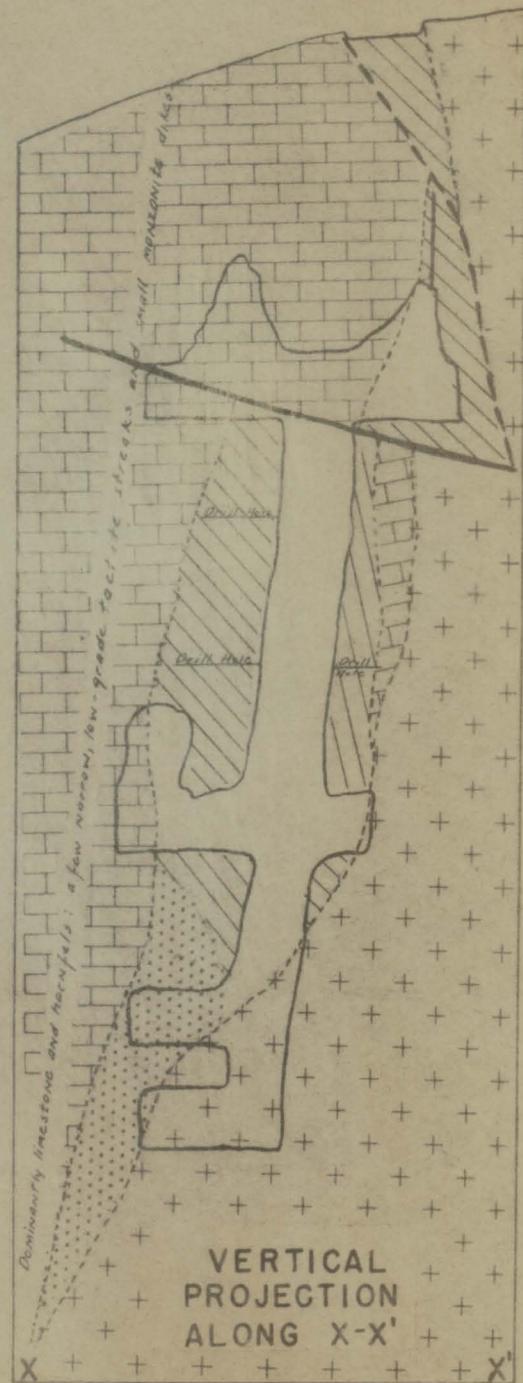
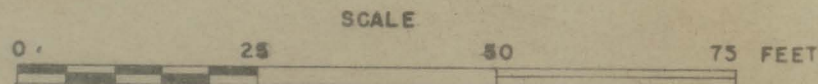
- | | |
|------------------------------------|---|
| ON PROJECTIONS AND SECTION | |
| | ORE: STOPED |
| | ORE: INDICATED AND MEASURED |
| | ORE: INFERRED |
| ON PLANS | |
| | ORE: CONCENTRATION OF DOTS |
| | SHOWS APPROXIMATE GRADE |
| | IN RANGE BETWEEN 0.1 AND 3.0% WO ₃ |
| ON PLANS, PROJECTIONS, AND SECTION | |
| | QUARTZ MONZONITE AND APLITE |
| | MARBLE AND HORNFELS, INCLUDING |
| | STREAKS OF LOW-GRADE TACTITE ORE |
| | "0" LEVEL-EL. 6392' |
| | 45' LEVEL-EL. 6347' |
| | 65' LEVEL-EL. 6327' |
| | 76' LEVEL-EL. 6316' |
| | INCLINED SHAFT |
| | FAULT, LOCATED |
| | FAULT, UNCERTAIN |

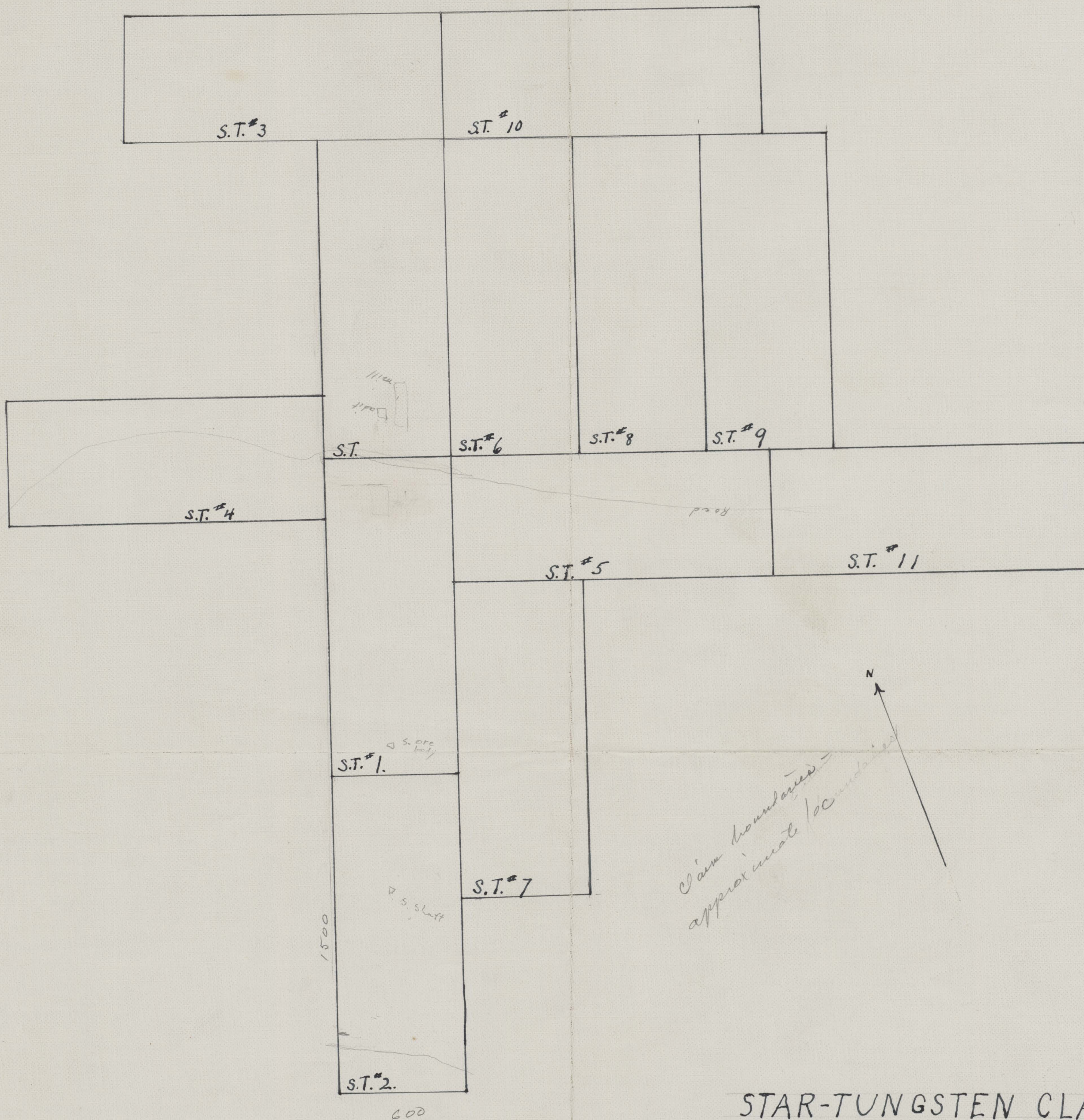
GEOLOGY OF WORKINGS IN MAIN ORE BODY

STAR TUNGSTEN MINE

HARRISON PASS, ELKO COUNTY, NEVADA

U.S. GEOLOGICAL SURVEY SEPTEMBER 1943





STAR-TUNGSTEN CLAIMS
HARRISON PASS, ELKO COUNTY, NEVADA.

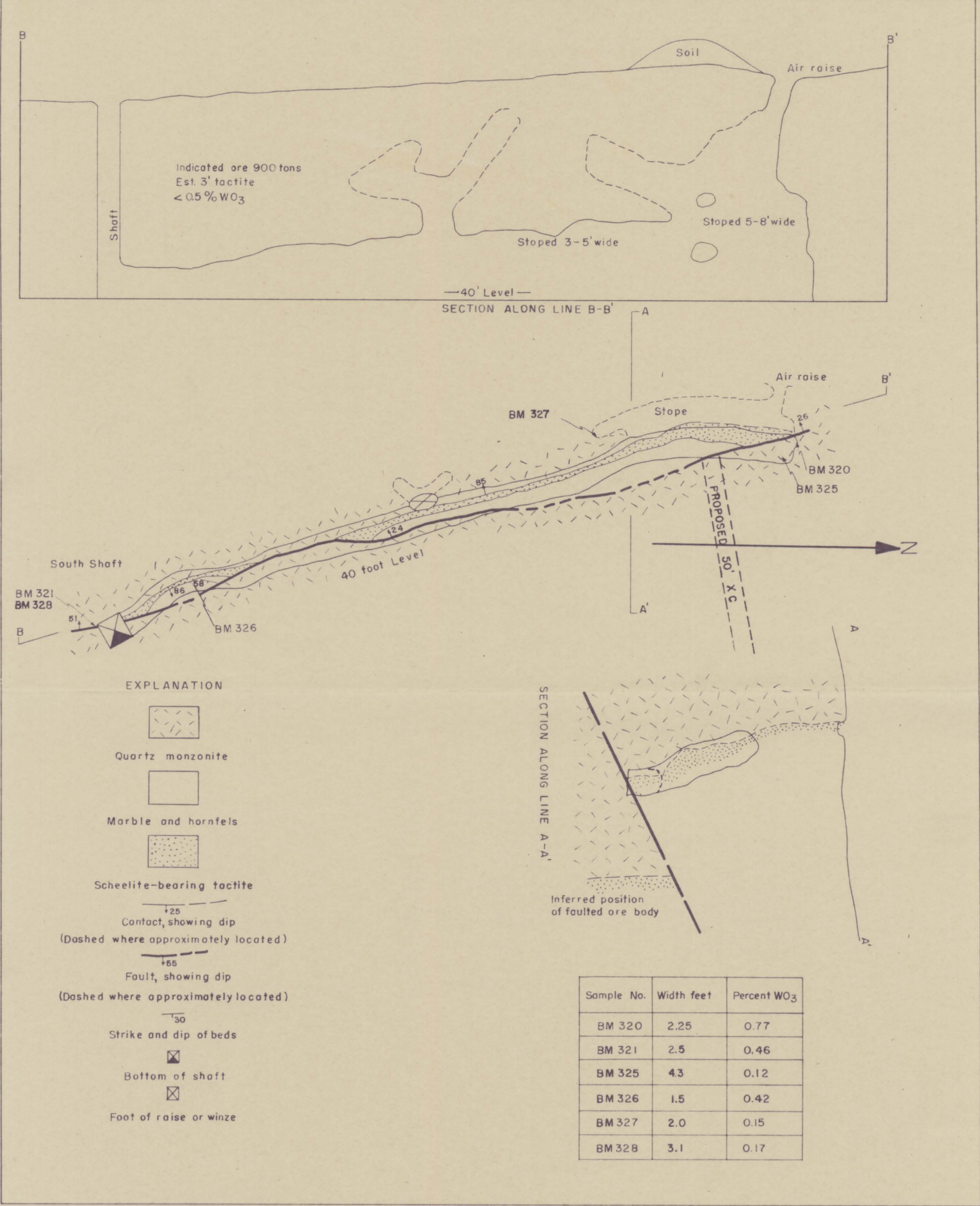


FIG. 3

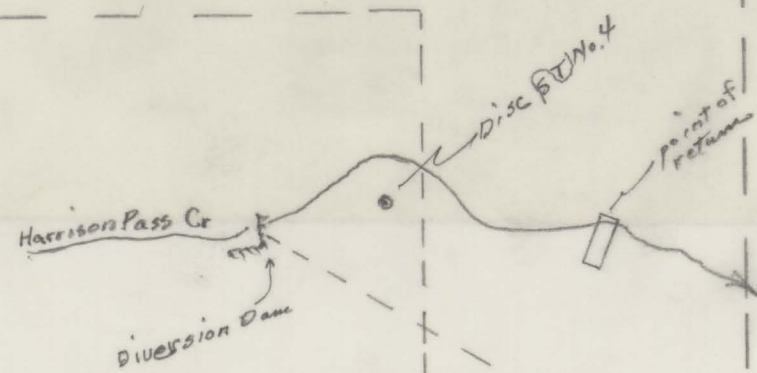
GEOLOGIC MAP OF THE 40 FOOT LEVEL

SOUTH SHAFT-STAR TUNGSTEN MINE

ELKO COUNTY, NEVADA

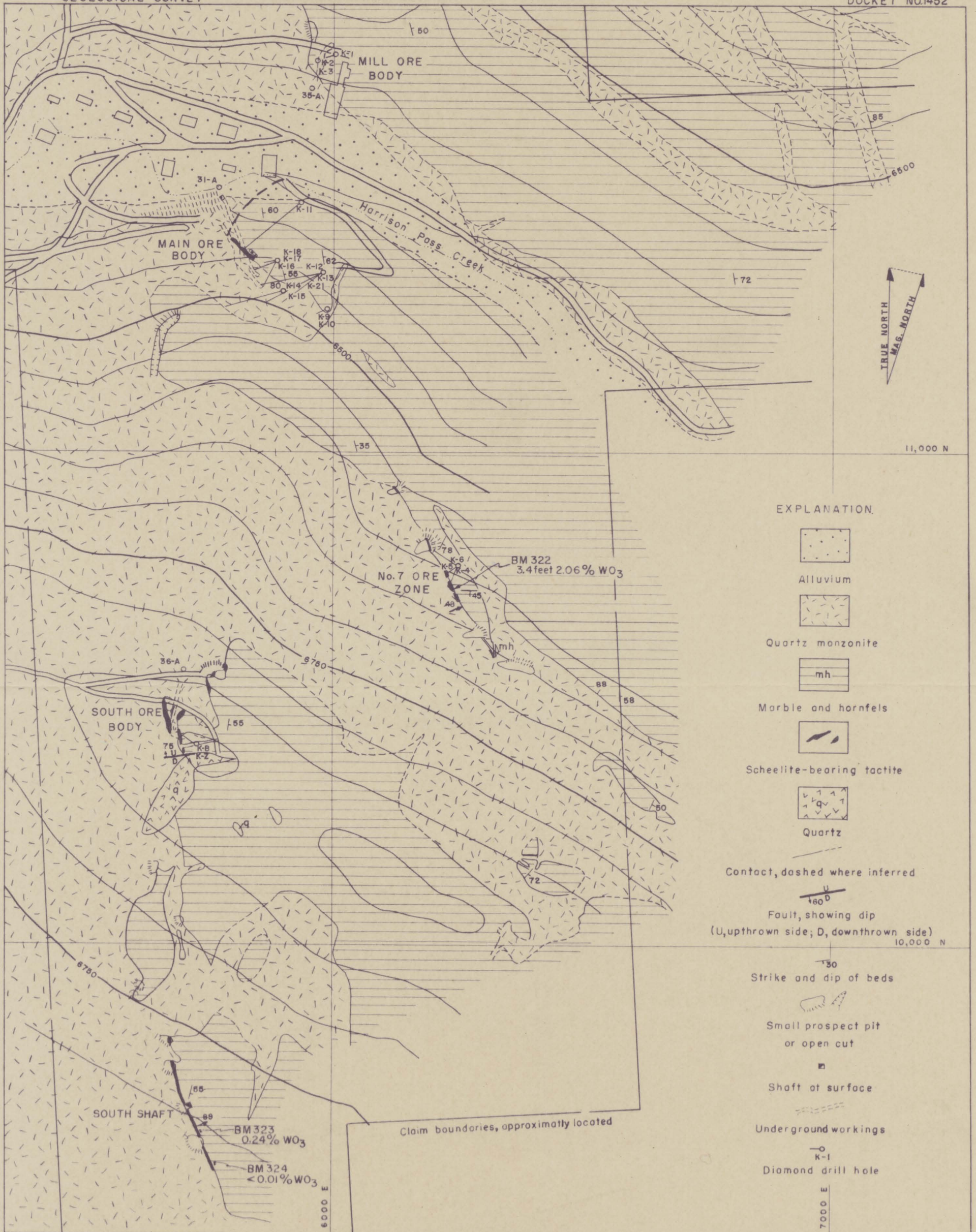
GEOLOGY BY R. M. SMITH

Star Tungsten No. 4



S59° 44' E
7023.00
To E 1/16 Cor
between S17
Cor. found S201

unsurveyed
T 28 N R 58 E MDM
water right survey 6/20/41
W H Settelmeyer
Scale 1" = 300'



AFTER M.R. KLEPPER AND PETER JORALEMON AUGUST 1943

FIG. 2
GEOLOGIC MAP OF STAR TUNGSTEN PROPERTY
HARRISON PASS, ELKO COUNTY, NEVADA

0 200 400 FEET
Scale

2280 0014

Sept 13, 1941
W H Settelmyer
1" = 400'

Point of Use - Mill
Same as application
No. 10546
Harrison Pass Co

Unsurveyed
T28N R58E MDB&M

Proposed Pipe Line

Star Tungsten No. 12

Lime Kiln Canyon

Proposed
Point of Diversion

S86°26'E 7508.00

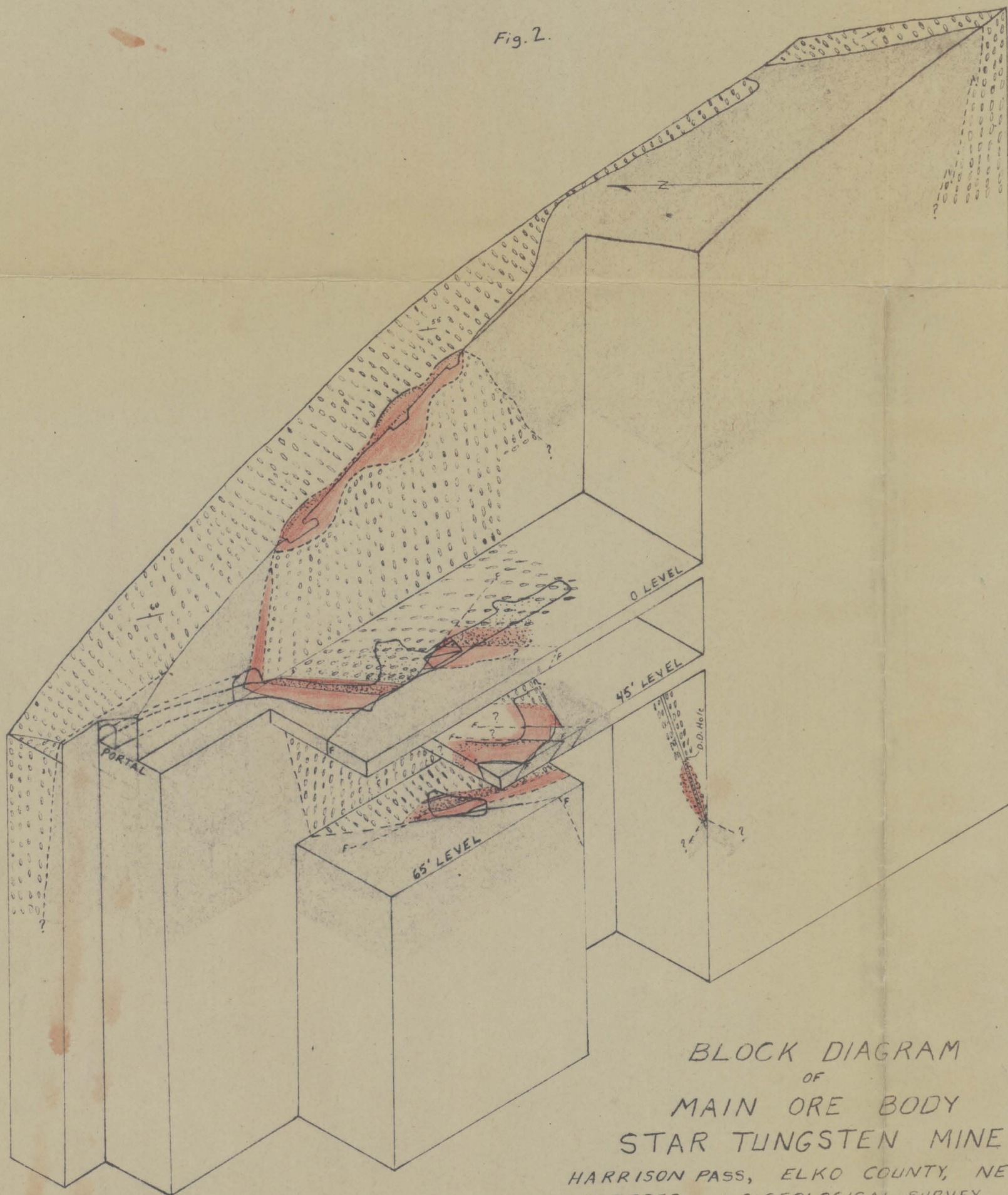
T₂ E 1/16 517
520

18, 17

19 20

22800014

Fig. 2.



BLOCK DIAGRAM
OF
MAIN ORE BODY
STAR TUNGSTEN MINE

HARRISON PASS, ELKO COUNTY, NEVADA
M.R. KLEPPER, U.S. GEOLOGICAL SURVEY, SEPT. 1942
1" = 40'

EXPLANATION

- Granite
- Hornfels
- Hornfels, mineralized
- Ore, 1% WO_3 or better
- Ore, less than 1% WO_3

- F—F Fault, located
- F...F Fault, uncertain
- Contact, located
- Contact, uncertain

This is a detailed geological map of a mountainous region, likely in the Adirondacks. The map features topographic contour lines with elevations ranging from 6000 to 7000 feet. Geological units are labeled with letters: 'G' for gneiss, 'OP' for orthogneiss, 'CP' for calcic amphibolite, and 'Gal' for galena. The map shows a complex pattern of folds and faults, with some faults labeled 'F1' and 'F2'. A prominent fault line runs diagonally across the center of the map. A north arrow is located in the lower right quadrant, and a scale bar is at the bottom right. The map is overlaid with a grid of latitude and longitude lines. The title 'ADIRONDACK MOUNTAINS' is partially visible at the top.






M. R. Klepper
John H. Wiese






U.S. Geological Survey
August 1942





SCALE

A horizontal scale bar with markings at 0 and 500 feet.

Contour Interval 50'

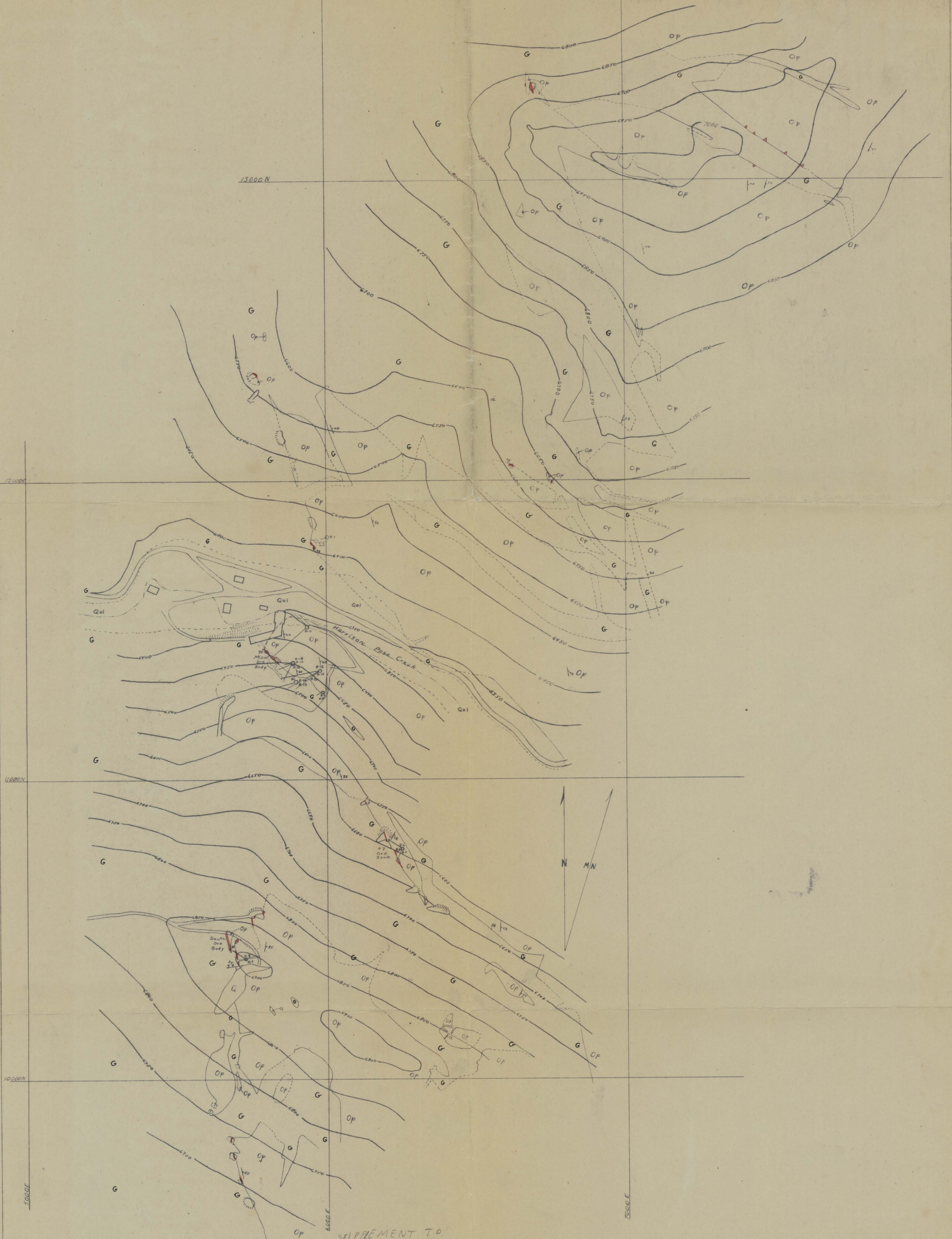
- | | |
|---|--------------------------|
|  | Alluvium |
|  | Hornfels |
|  | Granite |
|  | Scheelite-bearing garnet |
|  | Quartz |

-  Contact, located
-  Contact, approximate
-  Fault
-  Shaft
-  Cut or Pit

-  Underground working
 Road
 Building
 Diamond drill hole

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Fig 1



SUPPLEMENT TO
 GEOLOGIC MAP OF
 STAR TUNGSTEN PROPERTY, HARRISON PASS, ELKO CO., NEVADA

U.S. GEOLOGICAL SURVEY
 M. R. Klepper
 John H. Wiese

AUGUST 1942
 U.S. Geological Survey
 August 1942

SCALE
 0 500'
 Contour Interval 50'

- | | | |
|--------------------------|----------------------|---------------------|
| Alluvium | Contact, located | Underground working |
| Hornfels | Contact, approximate | Road |
| Granite | Fault | Building |
| Scheelite-bearing garnet | Shaft | Diamond drill hole |
| Quartz | Cut or Pit | |

Geology + Topography by Klepper + Wiese, 7-42
 Revised by Klepper + Finkelman, 8-43
 Geology and Topography is shown only in areas that have been developed since August 1942