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

DEFENSE MINERALS ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION III

Montrose Mining Company

Elko County, Nev.

- Tungsten -

Application dated May 19, 1952
No docket number has been assigned

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

Roscoe M. Smith, geologist
U. S. Geological Survey

Wendell M. Bell, geologist
U. S. Geological Survey

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The Montrose Mining Company, P. O. Box 98, Mountain City, Nevada, represented by Robert L. and Price D. Montrose, applied May 19, 1952 to the Defense Minerals Exploration Administration for government assistance in a $48,000 program to explore for the downward continuation of scheelite ore exposed on the surface of their claims in the Alder mining district, Elko County, Nevada.

The property was examined on June 28, 1952 in conjunction with an examination of an adjoining property.

Scheelite occurs in tactite in numerous surface exposures in concentrations up to 0.5? percent WO_3. About 1,000 tons of ore averaging 0.25 percent WO_3 is inferred to lie below the three best exposures.

As scheelite is found in several tactite layers over a considerable area, there is a reasonable chance that exploratory work will reveal reserves greater than it is now possible to infer. Exploratory work may also reveal ore of higher grade than 0.25 percent WO_3.

The applicant proposed an indefinite program of drifting, trenching, road construction, and building construction in unspecified locations. He estimated that the program would require about eight months to complete.

Although some exploratory work is justified, the applicant's program is not well planned, and a program to consist of two phases is suggested:

1. Map the scheelite exposures in detail, determine the most advantageous locations for diamond drill holes, and outline a drilling program.
2. From surface locations, diamond drill to explore for the downward continuation of ore exposed on the surface. About 1,000 feet of drilling should be allowed for this work.

The program is estimated to cost about $10,000 and would require about three months to complete.

It is recommended that the government enter into a contract with the applicant to provide 75 percent of the cost of the proposed mapping and diamond drilling.

INTRODUCTION

An examination of this property was made on June 28, 1952 by an engineer [1] of the Bureau of Mines, Region III and geologists [2] of the U. S. Geological Survey.

The purpose of the examination was to secure samples and data, together with geological maps in order to evaluate the property prior to forwarding the application through the regular procedure. Time and money were saved by making the examination at this time as the engineers were conducting another examination in the immediate vicinity.

During their inspection of the property, the engineers were accompanied by the Montrose brothers, whose knowledge of the exposures was very helpful.

LOCATION

This mining property consists of 18 unsurveyed mining claims, held by location in the Alder Mining District and approximately 19.3 miles east of Nevada State Highway 43 at Wild Horse, Nevada.

The claims are situated between the Knowles Brothers Tungsten property on the south and the J. W. Mink Tungsten claims on the north.

1/ Glenn G. Gentry.

2/ Roscoe M. Smith and Mendell M. Bell.

HISTORY AND DEVELOPMENT

The Montrose brothers filed on these mining claims about two years ago and since then they have been actively engaged in driving an adit 310 feet in length on the Apex No. 1 claim and in exposing the surface mineralization in areas adjacent to the adit.

No production of tungsten ores has been made from the property. Two buildings have been constructed as follows:

1 building housing the air compressor, located at the portal of the adit.
1 building for living accommodations, located approximately one mile west of the adit; can accommodate 4 men.

Both buildings are in reasonably good condition and could be utilized for the recommended exploration program.

Mining equipment on hand and reported as in good condition are as follows:

1 Air compressor, Gardner-Denver, portable, 210 c.f.m., operated by gasoline engine
2 Jackhammers, Ingersoll-Rand, Model S-49, mounted on shell with columns and cross arms, safety clamp
300 feet of 2-inch iron pipe
Miscellaneous hand tools
800 feet of 14-pound rail
1 Mine car, iron body, 18-inch track gauge
2 Trucks, 4-wheel drive

WATER

Sufficient water is available at the living quarters for domestic consumption. Water for mining purposes will have to be hauled from this source to the mine.

POWER

No transmitted electric power is available at the property and all machinery would be operated by means of Diesel or gasoline engines.

CLIMATE AND TOPOGRAPHY

The mine area is located near the crest of the Divide leading to Tennessee Creek and at an elevation of about 8,000 feet. The country is mountainous and rough and severe winter storms should be expected from December through March.

APPLICANTS EXPERIENCE

The Montrose brothers have apparently had considerable and varied experience in and around the mines at Mountain City, Nev., as well as in other locations. Price Montrose states that he is one of the owners of the adjoining Knowles Tungsten claims and that he assisted in the diamond drilling project on these claims.

From the amount of road construction work done, the appearance of the 310-foot adit, and the efforts to prospect the surface of the exposures, it is considered that they would be entirely competent to carry out the drilling project proposed.

Additional and experienced miners can probably be secured in Mountain City, Nev.

SAMPLING

Sample No.	% WO_3	Oz. Au/T	Description
282	+0.01	Trace	South wall of adit at 190 feet from portal. Sample width 2.8 feet. Material altered limestone and opalite. No mineralization observed by mineralight.
285	0.09	Trace	Shallow pit about 60 feet north of breast of adit and 65 feet above the adit. Sample width 1.8 feet. Observation by mineralight shows large scheelite crystals about 2 feet above sample location. Montrose reports sampling done here in 1950 assayed 0.38% WO_3.

Sample No.	%WO_3	Oz. Au/T	Description
284	0.25	Trace	Shallow pit about 4 feet deep, 50 feet northeast of No. 283 sample and near crest of hill. Sample width 3.2 feet. Observation by mineralight, estimated 0.5% WO_3. Montrose reports this ore will assay 0.4% WO_3.
285	0.06	Trace	150 feet below crest of hill and on north slope approximately 1/2 mile south of Tennessee Creek; face of tactite exposure; sample width 3.5 feet; observation by mineralight, estimated from 0.4% to 0.6% WO_3.
286	0.12	Trace	87 feet north and 15 feet above No. 283 sample; chip sample across tactite exposure; sample width 29 feet; good mineralization scattered over a considerable area; observation by mineralight, estimated 0.3% to 0.4% WO_3.
287	+0.01	Trace	Upper part of tactite bed 16 feet south of No. 288 sample and at same elevation. Tactite bed here is exposed for a thickness of 19 feet; sample width 5 feet; observation by mineralight, estimated 0.2% WO_3.
288	0.01	Trace	43 feet south of No. 287 sample. Trench 12 feet long by 2½ feet wide by 2½ feet deep. Three vertical cuts each 2 feet in length from northwest wall of trench, and all cuts combined as one sample. Observation by mineralight, estimated 0.2% to 0.4% WO_3.
289	0.19	Trace	From center of Apex No. 1 claim, S 80° E, 79 feet to sample location; narrow cut about 8 feet in length; width of sample 2 feet. Observation by mineralight, estimated 0.4% WO_3.

All sampling was done during daylight hours and prior to use of mineralight at the night inspection.

GEOLOGY

The rocks in the area are limestone and shale of Paleozoic age which are intruded by a granodiorite stock and by granitic alaskite and sills and dikes. Near the sills the sedimentary rocks are partly metamorphosed to tactite; scheelite is associated with the tactite.

The limestone is thin-bedded and commonly shaly; it is interbedded with shales and calcareous shales and strikes north and dips 30°-45° west.

The granodiorite is medium-grained and forms a large stock (fig. 2). Adjacent to the granodiorite the sedimentary rocks are intruded by sills and dikes as much as 200 feet wide which range in composition from alaskite to granodiorite. Both the granitic and sedimentary rocks are cut by quartz stringers as much as 8 inches wide which fill fractures with random strikes and dips. The limestone beds adjacent to the granitic rocks are metamorphosed to tactite layers; the shale beds are metamorphosed to hornfels.

ORE DEPOSITS

The ore bodies are irregular concentrations of scheelite in parallel tactite layers which range in width from a fraction of an inch to 19 feet, and are separated by layers of barren tactite and hornfels. The ore bodies extend along the strike of the tactite layers for as much as 40 feet; as they have not been explored below the outcrops, their depths are not known. They are commonly adjacent to the dikes or to zones of quartz stringers.

The best exposure of the ore bodies is at the site of sample RM 284 (fig. 3). Here a tactite layer 3 feet thick contains scheelite in fractures and disseminated throughout the rock in concentrations estimated to be as high as

0.5 percent WO_3. The Montrose adit (fig. 4) was driven under the outcrop of the best exposure but revealed no scheelite. Other exposures contain spotty and irregular concentrations of scheelite, mostly along fractures, over an area about 600 feet square. Much of the mineralized area is covered by a thin mantle of top soil which locally contains small scheelite crystals; the grade of this material is estimated to be as high as 0.1 percent WO_3.

ORE RESERVES

There are no measured ore reserves on the Montrose property. Indicated reserves of a few tons, contained in the tactite layers under the mineralized outcrops at the sites of samples BM 283, 284, and 286, are estimated to average about 0.25 percent WO_3.

If it is assumed that the scheelite-bearing tactite extends about half the distance from the surface to the Montrose adit (fig. 4), then 1,050 tons of ore containing about 0.25 percent WO_3 may be inferred to be in the three lenses below samples BM 283, 284, and 286, each 20 feet long, 3 feet wide, and extending 70 feet down the dip of the beds.

PROPOSED EXPLORATION

In his application the applicant proposed a $48,000 program to consist of driving 1,000 feet of adit, 3,000 feet of trenching, one mile of road, and construction of buildings to house men and equipment.

The examining engineer and geologists do not consider the proposed work to be well planned, but do believe that a limited amount of diamond drilling to test the downward continuation of the mineralized tactite beds exposed at the surface is warranted. Accordingly, an exploration program consisting of two phases is suggested:

1. Map the scheelite exposures in adequate detail to select diamond drill hole locations best suited for testing the deposit at depth, and outline a drilling program.
2. From surface locations, diamond drill to explore for the downward continuations of ore exposed on the surface. About 1,000 feet of drilling should be allowed for this work.

The total cost of the program is estimated to be $10,000 and would require about three months to complete. The government's share of the cost would be $7,500.00.

U. S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DEFENSE MINERALS EXPLORATION ADMINISTRATION
DOCKET NO.

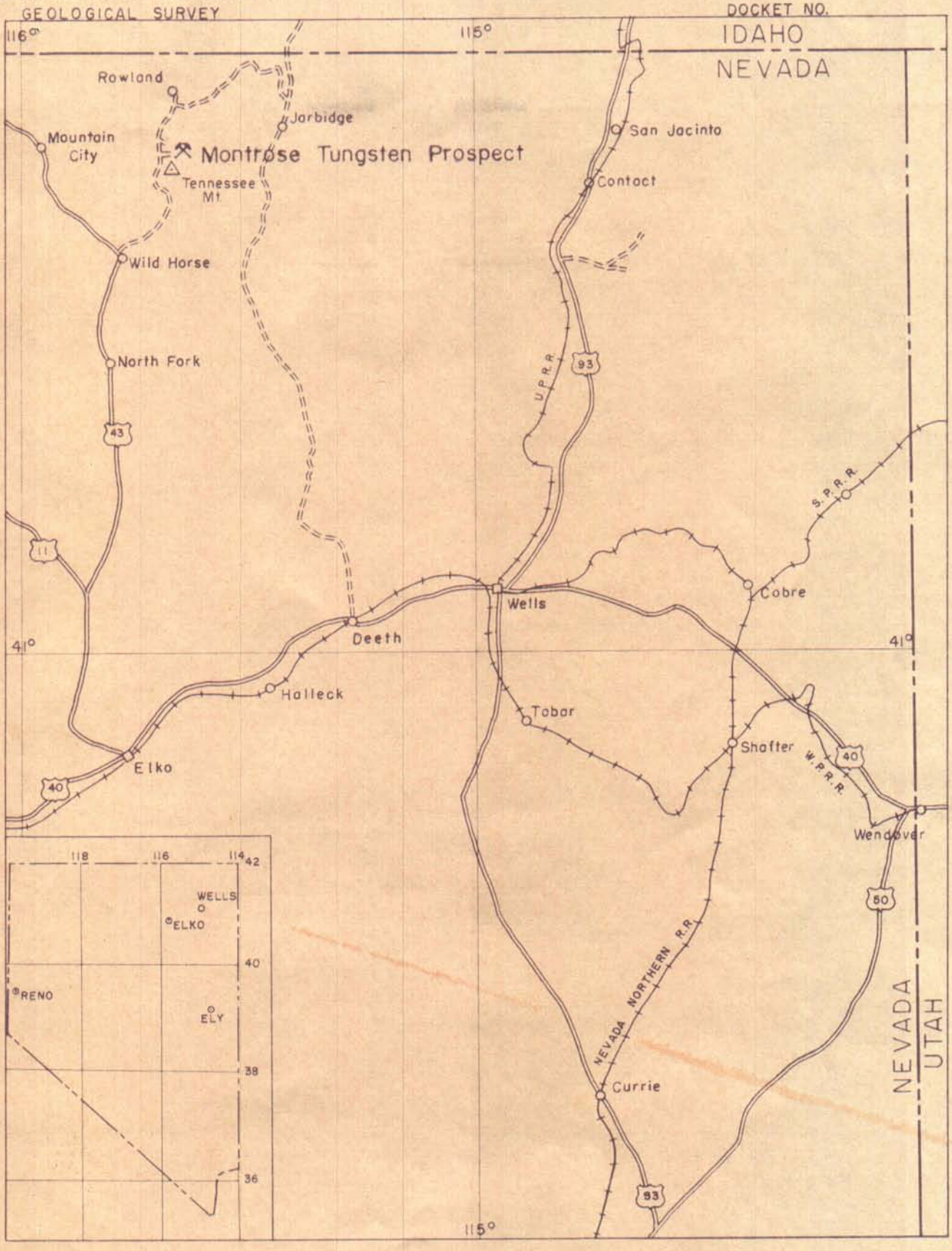

FIG. 1 INDEX MAP OF NEVADA

0 10 20 30 40 Miles

Scale 1:1,000,000

U. S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DEFENSE MINERALS EXPLORATION ADMINISTRATION
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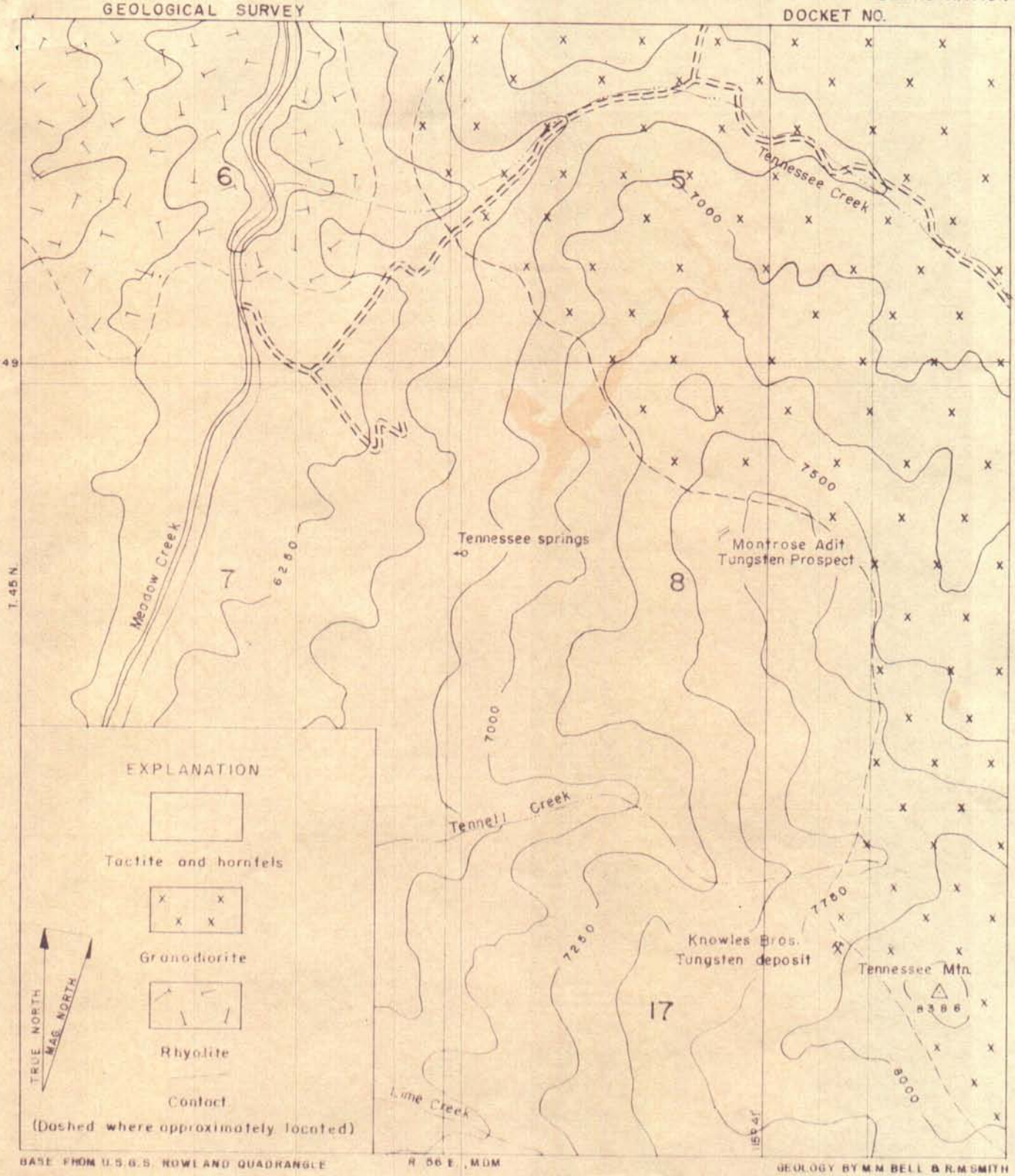

BASE FROM U.S.G.S. ROWLAND QUADRANGLE

GEOLOGY BY M.M. BELL & R.M. SMITH

FIG. 2

GEOLOGIC SKETCH MAP OF THE MONTROSE CLAIMS

ELKO COUNTY, NEVADA

0 1 MILE
Scale

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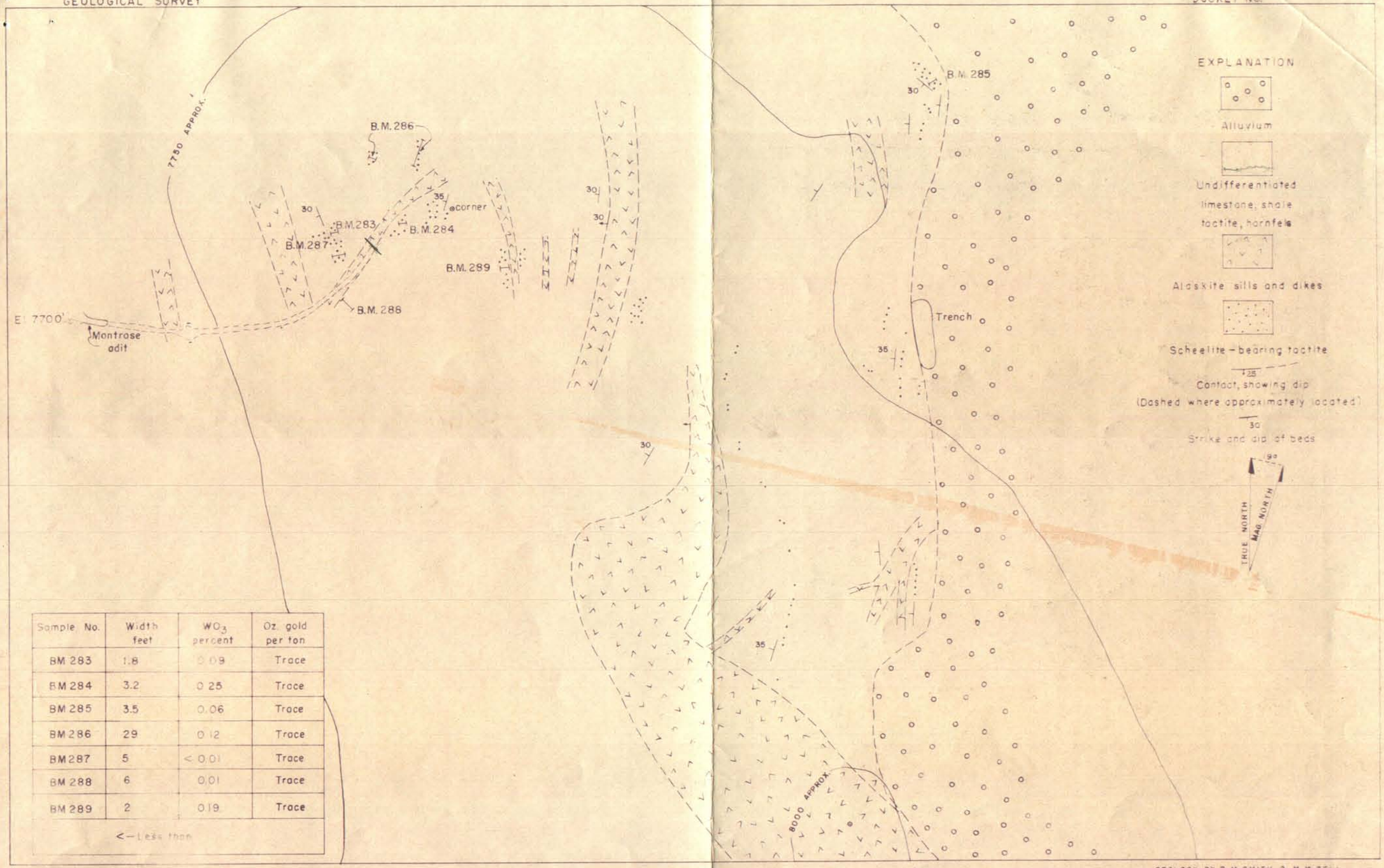
DEFENSE MINERALS EXPLORATION ADMINISTRATION
DOCKET NO.



Sample No.	Width feet	WO_3 percent	Oz. gold per ton
BM 283	1.8	0.09	Trace
BM 284	3.2	0.25	Trace
BM 285	3.5	0.06	Trace
BM 286	29	0.12	Trace
BM 287	5	< 0.01	Trace
BM 288	6	0.01	Trace
BM 289	2	0.19	Trace

< — Less than

GEOLOGY BY R. M. SMITH & M. M. BELL

FIG. 3 GEOLOGIC SKETCH MAP OF THE MONTROSE TUNGSTEN PROSPECT

ELKO COUNTY, NEVADA

0 100 200 FEET
Scale

(43) Item 19

Bishop

UNION CARBIDE NUCLEAR COMPANY

REPORT OF MINE EXAMINATION

GARNET HILLS TUNGSTEN PROPERTY
ELKO COUNTY, NEVADA

W. H. Kohler
J. L. Morgan
P. E. Galli

Bishop, California
December 5, 1956

ground to valid use for milling purposes.

H I S T O R Y

Original discovery and location was made during the summer and fall of 1949, by F. D. Montrose and A. A. Knowles. During 1951 the owners excavated the upper adit in Area 4 and drilled several short diamond drill holes from the surface; unfortunately no adequate records of this drilling were kept.

In 1953 the property was leased to Garnet Tungsten Mining Co., an Oregon firm. A DMEA loan was obtained, and during 1954 the lower adit in Area 4 was driven. In 1955 the property was sub-leased to Shunshine Mining Co., an Idaho firm. Small amounts of diamond drilling and surface trenching were done during the summer of 1955, after which both Garnet Tungsten Mining Co. and Sunshine Mining Co. cancelled their leases. Only fragments of the work done by these firms is now available.

On June 1, 1956 the property was optioned to Union Carbide and Carbon Corporation, whose trenching and drilling program is covered in this report.

A D J O I N I N G A N D N E A R B Y P R O P E R T I E S

Currently there is no tungsten production from the region. The contact zone adjacent to the north-west is covered by a number of claims held by the Montrose brothers of Mountain City. Except for one small outcrop about 1,000 feet north of the Garnet Hills boundary line, the tactite outcropping on the Montrose claims is essentially barren of scheelite. A 300-foot adit driven at a relatively shallow depth beneath the one mineralized outcrop failed to prove a downward extension of the scheelite-bearing tactite.

The contact zone to the south-east of the Garnet Hills Property is reported to be covered for a distance of approximately three miles by claims owned by W. D. Mink of Elko, Nevada. As far as is known only two small tactite lenses outcrop on the Mink claims, and both of these are only sparsely mineralized.

G E O L O G Y

GENERAL

The Garnet Hills property lies within a region of steeply tilted palezoic sedimentary rocks which here crop out over an area of approximately 250 square miles. In the northwest portion of the exposed area these rocks have been intruded by two, and possibly three, granitoid stocks of probable Cretaceous age.(1) The Garnet Hills tungsten deposits, which are undoubtedly genetically related to the largest of these stocks, are localized within an 8,000 foot segment of the Contact Metamorphosed halo of calcareous sedimentary rocks marginal to the intrusive. The area surrounding the outcrop of sedimentary and intrusive rocks is largely covered by Tertiary Volcanic rocks. The volcanic rocks are nowhere present on the Garnet Hill Property, and since they have no relationship to the scheelite deposits, they will not be discussed further in this report.

GARNET HILLS PROPERTY

The sedimentary rocks within the area comprising the Garnet Hills Property consist of a series of interbedded thin beds of gray to light gray argillaceous limestone, light gray to dark or bluish gray finely to coarsely gray limestone, gray to bluish gray shale, and light gray to purplish gray phyllite. The strike of the bedding varies from N 40° W near the southeast end of the property to N 06° E at the northwest end of the property. The dip of the bedding varies from 45° to 60° to the southwest and northwest respectively.

(1) K. O. Bushnell, The Geology of the Rowland Quadrangle, Nevada, Unpublished Ph.D thesis submitted to Yale University, 1955, p. 87.

The above sedimentary rocks are a part of the series designated as the Tennessee Mountain formation by Coash and tentatively assigned to the lower Paleozoic by Bushnell.(2)

The intrusive rock composing the stock is reported by Bushnell(3) to be variable in composition from adamellite - - a rock with at least 10% quartz in which the alkali feldspar is more than one-third, but less than two-thirds of the total feldspar content - - to granite. For purposes of this examination, however, the intrusive rocks of the stock were classified megascopically in the field as granite. The texture of the granite varies from fine to coarse grained, the finer grained fraction occurring mostly and adjacent to the margins of the stock. Numerous aplite dikes of various strikes and dips cut both the granite and sedimentary rocks. Although there may be some genetic relationship between these dikes and the scheelite deposits, the relationship is not readily apparent in the field.

The sedimentary rocks around the stock are reported to show evidence of contact metamorhism for distances of as much as a mile and a half from the contact(4). On the Garnet Hills Property the more intense and readily discernible alteration is confined to within about 400 feet of the intrusive contact. The more intensely altered calcareous rocks adjacent to acid intrusive rocks are commonly referred to as tactite. In this area the tactite occurs as individual lenses of variable dimensions and intensity of alteration. Frequently the different lenses are separated by segments of the igneous-sedimentary contact where little or no alteration is apparent. All of the scheelite deposits of economic significance on the Garnet Hills Property are confined to the tactite lenses.

(2) Bushnell, OP. Cit.) p. 32.
(3) Bushnell, OP. Cit.) p. 74
(4) Bushnell, OP. Cit.) p. 35

The principal constituents of the tactite here are megascopically described in order of abundance as dark reddish brown garnet, dark green epidote, and quartz. Locally either epidote or quartz may be the predominating mineral of the group. For purposes of this examination an additional tactite classification has been made on the basis of the apparent intensity of alteration. The less intensely altered rocks of the tactite zone will hereafter be referred to as light silicate tactite. The light silicate tactite is characterized by light brown to salmon colored garnets, pale green vesuvianite, and quartz. The light silicate tactite contains sparsely and erratically distributed scheelite, but so far as could be determined, no concentrations of economic interest. Frequently the tactite and light silicate tactite grade imperceptibly into one another, and the boundaries are, therefore, somewhat arbitrary.

The tactite zone throughout much of its traverse of the property is partially or totally covered by over burden. However, available outcrops and exposures in several bulldozer trenches indicate an irregular and discontinuous configuration of the tactite with a general northwesterly trend, except for the northwest 2,500' segment of the zone where the trend is approximately N 05° E.

Faults of various strikes and dips cut the contact in several places. Surface expressions of these faults are largely obscured and in places the presence of faults is merely suspected. It has been established that there has been post-mineral movement on some, and possibly on all, of the observed faults. Individual faults will be discussed below with respect to their relationships to particular areas.

ORE OCCURRENCE

The ore mineral of principal interest on the Garnet Hills property is scheelite, the calcium tungstate ore of tungsten. The scheelite occurs in

in the tactite as disseminated crystals concentrated primarily along bedding planes, or less frequently as indiscriminately disseminated crystals. Ore-grade concentrations appear to be confined to favorable beds within the tactite, and ore deposits are usually relatively narrow with respect to the tactite body as a whole. Assay returns indicate that all of the scheelite contains small amounts of Molybdenum. Molybdenum also occurs locally in the tactite as the Sulphide Molybdenite and as the Calcium Molybdate - - calcium tungstate powellite. Most of the Molybdenite and indentifiable powellite appear to be confined to the proximity of intrusive contacts. An unidentified dark uranium occurs as a thin streak within fragments of aplite included within a shear zone cut by the lower drift. (Underground Map) Chloritic fault gouge in the shear zone also exhibits weak radioactivity. Assay returns from samples taken across the shear zone indicate a maximum $U_3 O_8$ content of 0.12%. A series of three drill holes, which cut the projection of the shear zone approximately 50 feet below and to either side of the drift exposure, failed to disclose additional uranium mineralization. Qualitative spectrographic analyses of a composite sample from surface trenches and a composite sample from underground drill holes show no significant amounts of any other ore minerals.

SPECIFIC AREAS AND ORE BODIES

The tactite zone as observed on the Garnet Hills Property actually consists of several separate tactite bodies each of which differs from the others along different segments of the contact. For this reason the tactite zone has been divided into areas for more simplicity of presentation. (Index to Detail Sheets) Each of the areas, together with their contained ore bodies, are described below.

Area 1 includes approximately the most southeasterly 2,500 feet of the tactite zone covered by the property. The southeast end of the area is marked by the property line, and the northwest end is marked by a granite dike which separates Area 1 and Area 2. The rocks of this area are predominately light silicate tactite completly interfingered with garnet-epidote-quartz tactite, fine to medium grained granite, and recrystallized limestone. In general the granite has been intruded across the bedding of the sedimentary rocks, but in places the igneous - sedimentary contacts parallel the bedding. Although the intensity of alteration in Area 1 is of a low order, the extent of alteration is greater than in any of the other areas, being at least 400 feet wide at the widest measurable point. Strike of the bedding varies from N 10° W to N 85° W and southwesterly dips vary from 450 - 60°.

Scheelite is sparsely and erratically distributed through the tactite and light silicate tactite throughout Area 1. No scheelite concentrations of ore grade and tonnage are visible on outcrop. However, an apparently continuous narrow bed of ore-bearing tactite was uncovered in trenches 1-A, 1-B, and 1-C. (Detail Sheets 14, 15, and 16) This bed has an average strike of N55°W and a dip of 60° to the southwest. The hanging wall rock is a hard crystalline limestone. The foot wall rock exposed in trenches 1-A and 1-B is a fine grained granite and that exposed in trench 1-C is a hard crystalline limestone. The width of the tactite exposed in the trenches varies from 10 to 30 feet, and the mineralized width varies from 10 to 30 feet, although the tactite is not everywhere mineralized across the complete width. If it can be assumed that the bed is scheelite - bearing between exposures in the three trenches, this ore body has a strike length of at least 380 feet. The southeast end of the ore body probably does not extend far beyond trench 1-A, because the mineralized

bed appears to grade laterally into an essentially barren light silicate tactite exposed on outcrop 45 feet to the southeast. The northwest the mineralized bed terminates between trenches 1-C and 1-D which are 150 feet apart. Drill Hole GH-10, which intersected the hanging wall contact of the tactite bed 100 feet down dip from the exposure in trench 1-B, disclosed only weak scheelite mineralization. On the basis of this drill hole information it is assumed that the dip length of the ore body is relatively shallow.

It is not likely that this deposit contains important tonnages of scheelite ore. However, a limited amount of open pit ore could be mined profitably in conjunction with production from other deposits on the property. At the time the trenching was being done in this area the exact location of the southeast boundary of the property was in doubt, and it was deemed unwise to carry this work to the southeast past trench 1-A. It is possible that there may be other blind ore bodies in the unexplored southeasterly portion of Area 1, and if the Company should decide to exercise its option on the property, further work is recommended in this unexplored area.

Area 2 to the northwest of Area 1 covers approximately 1,000 feet of the igneous - sedimentary contact. The southeast boundary of this area is the granite dike which terminates Area 1. The northwest boundary of the area lies between trenches 2-G and 3-A where a granite dike separates a segment of the contact which has no tactite alteration from the segment to the northwest which is bordered by a zone of garnet - epidote - quartz - tactite. (General Plan Map)

Except for one embayment of essentially barren tactite and light silicate tactite into the granite, the most southeasterly 320-foot segment of the contact in this area is roughly conformable to the strike of the bedding which here has a strike of N35°W to N27°W and a southwest dip of 55° to 74° (Detail Sheets No. 12 and No. 13) Except for the embayment mentioned above, the calcareous sedimentary rocks along this segment of the contact have been uniformly altered to a garnet - epidote - quartz tactite from 30 to 50 feet outward from the contact. The hanging wall rock is a relatively hard crystalline limestone interbedded with a thin bedded, sandy textured limestone. Near the northwest end of the tactite body the limestone is locally bleached and limonite stained. Where it is exposed on outcrop and in trenches 2-B and 2-C the tactite contains moderately to sparsely disseminated scheelite throughout. To the southeast this ore body is terminated between trenches 2-A and 2-B to the northwest it is terminated between trenches 2-C and 2-D by a zone of faulting and kaolinized granite. Marginal to this zone in trench 2-C, three, northwest trending dikes have cut the tactite, and the tactite is badly shattered and partially altered.

Drill Hole GH-3, which was collared near the southeast end of the ore body, intersected the hanging wall contact of the tactite 205 feet down dip from the outcrop. This hole cut 80 feet of weakly scheelite mineralized tactite alternating with numerous streaks of fine grained granite and aplite. Drill hole GH-1, which was collared near the center of the ore body, intersected the hanging wall contact 220 feet down dip from the outcrop and cut 28 feet of low-grade scheelite mineralization. Drill Hole GH-5, which was collared near the northwest end of the ore body, was oriented to intersect the hanging wall contact 220 feet down dip from the outcrop. This hole cut

badly shattered rock from collar to bottom, and at the approximate depth of the projected hanging wall contact intersection, barren hematite stained fault gouge was encountered between limestone and granite.

The drill hole information indicates that the mineable dip length of this ore body is probably less than 200 feet. However, in view of the extent and continuity of the scheelite - bearing tactite on the surface, it does not seem unreasonable to expect the ore to extend to a feasible open pit mining depth of at least 100 feet.

To the north of trench 2-D the tactite is discontinuous and irregular in configuration. (Detail Sheet No. 11) The larger of the two tactite bodies exposed along this segment of the contact in trench 2-E contains moderately to sparsely disseminated scheelite. This body, however, is obviously an isolated remnant and not likely to contain significant tonnages of ore.

At the north edge of the above described tactite body the igneous-sedimentary contact swings abruptly to the west and cuts the bedding at a relatively sharp angle. Where this segment of the contact is exposed in trenches 2-F and 2-G recrystallized limestone and sparse fragments of light silicate tactite are the only evidence of contact metamorphism.

Area 3 covers approximately 800 feet of the igneous-sedimentary contact. The southeast boundary of the area is between trenches 2-G and 3-A where a granite tongue or dike separates the unaltered contact at the northwest end of Area 2 and the tactite bordered contact of Area 3. The northwest boundary is arbitrarily placed at the igneous-sedimentary contact near the north end of trench 3-F. The information from trenches and drill holes indicates that this area is essentially a segment of sedimentary rocks that is roughly rectangular in plan view. This segment is surrounded by granite and bordered by tactite on the north, east, and south sides. (General Plan Map)

The tactite marginal to the most southerly 200 feet of the east side of the sedimentary segment has an average width of approximately 50 feet and a strike length of at least 350 feet. (Detail Sheets No. 8, No. 9, and No. 10) The lowest exposure of this tactite body in trench 3-C is approximately 120 feet lower in elevation than the highest exposure in trench 3-A. The strike of the bedding in the tactite varies from N 10° W to N 30° W and southwesterly dips range from 55° to 70°. The footwall rock in trench 3-A is a soft and friable granite and in trench 3-C it is a relatively soft thin bedded limestone. The hanging wall rock in trenches 3-A, 3-B, and 3-C is a relatively hard crystalline limestone. At least two granite and aplite dikes with average widths of 20 feet cut the tactite in a near westerly direction. Scheelite is moderately to sparsely dissemmated throughout the tactite. Ore-grade scheelite concentrations, however, appear to be confined primarily to an average 15 foot wide zone near the hanging wall.

Drill Hole GH-2, which was collared near the southeast end of the ore body, intersected the hanging wall contact approximately 220 feet down dip from the outcrop. This hole cut 35 feet of interbedded tactite and light silicate tactite, both of which contain low-grade scheelit mineralization. Drill Hole GH-13, which was collared near the northwest end of the ore body, cut badly broken and obviously faulted rock from collar to bottom. The hanging wall contact, which underlies 30 feet of granite and aplite in the hole, was intersected 230 feet down dip from the exposure in trench 3-C. The 23 feet of tactite cut in this hole, which is badly fractured and altered, contains only a trace of scheelite.

Drill hole information indicates that this ore body, like the one described in Area 2, probably has a dip length of less than 200 feet. However, it does not seem unreasonable to expect the ore to extend for at least 100

its option on the property, further exploration of this zone is warranted.

The tactite body marginal to the north side of Area 3 differs from the tactite marginal to the east side in that it is intensely shattered and altered at the surface, has a more glassy, or siliceous, appearance, and the contained scheelite is more sparsely and irregularly disseminated. This body appears to be continuous and relatively uniform in thickness between trenches 3-A and 3-D. (Detail Sheets No. 8 and No. 9) In trenches 3-A and 3-D only isolated blocks and fragments of tactite are exposed. (Detail Sheets No. 7 and No. 8)

The scheelite mineralization in this body was not considered of sufficient interest to warrant further exploration. However, a limited amount of low-grade ore could probably be mined in conjunction with the mining of other deposits on the property.

Area 4 covers approximately 600 feet of the igneous - sedimentary contact. The southeast boundary of the area is the north side the westerly trending granite tongue which bounds the north side of the sedimentary segment described in Area 3. The northwest boundary of the area is the westerly trending depression along which Tennel Creek flows. It is thought that this depression is the surface expression of a major shear zone.

Area 4 encompasses the largest and most consistently mineralized of the tactite bodies on the Garnet Hills Property. At the surface this tactite body strikes roughly N 30° W and has a strike length of approximately 420 feet. Average dip is 55° to 60° to the southwest. The hanging wall rock at the contact is a relatively soft phyllite which is over lain at depth by interbedded, relatively hard crystalline limestone, light silicate tactite, and phyllite. To the southeast the tactite terminates at the north edge of the granite tongue

which separates Areas 3 and 4. The strike of the granite-tactite contact between levels of the upper and lower adits is East-West and the dip is near vertical. (Underground Map). This contact cannot be projected in depth to the West, otherwise the granite would have been intersected above the tactite in Drill Hole GH-4. (General Plan Map) To the northwest the main tactite body is terminated by a highly faulted granite. (Detail Sheet No. 3) The granite-tactite contact of this end of the tactite body has a general east-west strike and is roughly parallel to the contact at the southeast end. The dip of the contact at the northwest end varies from 84° to the south at the exposure in trench 4-B to 75° to the north, where it is cut in the lower adit.

The northeast side of the main tactite body in this area is bounded by an elongated depression which has an approximate N 40° W trend. (Detail Sheets No. 3, No. 4, and No. 6) This depression, which appears to be the topographic expression of a major fault, separates the main tactite outcrop from a smaller, badly shattered and igneous intruded tactite outcrop to the northeast. No evidence of such a fault was noted in Drill Holes GH-4, 11, and 12, all of which intersected the granite-tactite footwall contact. (Section Drill Hole GH-4) It may be, however, that the dip of the assumed fault is near vertical, or to the northeast, in which case these drill holes would not have proceeded far enough to penetrate the fault.

One possible interpretation of the faulting in this part of Area 4 is that there was lateral movement along the fault inferred above with the northeast block moving northwest relative to the southwest block. This fault was in turn cut by a series of east-west faults with lateral movement on the north

blocks being to the west relative to the south blocks. Such an interpretation would explain the spatial relationships of the tactite outcrops in this area and the tactite exposed near the north end of trench 4-B. There may have been faulting in the Area prior to the igneous intrusion, but most of the movement was probably penecontemporaneous with the intrusion. There has definitely been post-intrusive and post-mineral movement along some of the faults as is evidenced by the 20 foot width of scheelite-bearing tactite and tactite gouge within the granite near the middle of trench 4-B. The source of this scheelite-bearing fault gouge is undetermined at this writing but is considered of sufficient interest to warrant further exploratory work by the Company should it decide to exercise its option on the property.

The several faults observed in the upper and lower adits appear to exhibit no particular pattern of orientation. One fault cut in surface Drill Holes GH-4, 11, and 15 approximately 140 feet stratigraphically above the tactite hanging wall has been determined to have an approximate strike of north-south and an approximate dip of 51° to the west. This fault is not likely to have any effect on the ore body at depths at which mining may be done, but it is mentioned here for consideration relative to possible future diamond drilling in this area.

Scheelite is sparsely to moderately disseminated throughout the tactite in Area 4, but ore-grade concentrations appear to be confined largely to favorable beds within 50 feet stratigraphically below the hanging wall contact of the main tactite body. The intensity of scheelite mineralization varies locally, within the favorable beds. In general, it appears that the largest

concentration of ore-grade scheelite occurs within the first 30 to 60 feet of tactite marginal to the granite at the southeast end of the main tactite body. Information from Drill Holes GH-16, 18, and 19 suggests that scheelite mineralization may be more intense in and near those zones where aplite dikes have cut the favorable beds. (Underground Map)

Drill Hole GH-4, which was collared near what was at first thought the center of the ore body, intersected the tactite hanging wall approximately 220 feet down dip from the level of the lower adit. This hole cut 94 feet of relatively low-grade scheelite mineralization. If the granite-tactite contact were projected along the strike and dip determined from the exposure in the upper adit and the granite-tactite intersection in Drill Holes GH-6, 8, and 9, the projection would fall within a few feet of the tactite cut by Drill Hole GH-4. If such were the case, however, it would be expected that the scheelite mineralization cut in this hole would be of a better grade.

Drill Hole GH-11, an inclined hole, and GH-15 a vertical hole, were collared from the same location near the northwest end of the ore body. Drill Hole GH-11 intersected the tactite hanging wall approximately 210 feet down dip from the level of the lower adit and cut 29 feet of average ore-grade scheelite. Drill Hole GH-15 intersected the tactite hanging wall approximately 370 feet down dip from the level of the lower adit, and cut 35 feet of low-grade scheelite mineralization. The tactite hanging wall intersection in GH-15 is approximately 80 feet vertically above the projected intersection. Whether this anomalous intersection is due to a flattening of the dip, fault displacement, or hanging wall tickening of the tactite cannot be determined from available information.

Drill Hole A-3 was drilled as part of a D ME A sponsored project in 1953.

According to available information, this hole should have penetrated the tactite hanging wall approximately 45' feet northwest of the penetration by GH-11 and approximately 100 feet down dip from the level of the lower adit. Drill Hole A-3 is reported to have cut 23 feet of scheelite mineralization that assayed 0.31% WO_3.

Area 5 covers the northwesterly 2,500 foot segment of the igneous sedimentary contact on the Garnet Hills property. The southeast boundary of this area is at Tennell Creek, and the northwest boundary coincides with the northwest boundary of the property. The tactite marginal to the intrusive in this area is predominately light silicate in character and relatively discontinuous on outcrop. (General Plan Map) It was noted that each light silicate tactite outcrop in this area is invariably cut by one or more northeast trending aplite dikes. Scheelite in the light silicate tactite is very sparse and eratic in occurence. The only true tactite noted in the area is that cropping out between trenches 5-A and 5-B and small isolated blocks within the granite. (Detail Sheets No. 1 and No. 2) The tactite in all cases is essentially barren of scheelite mineralization.

The Garnet No. 4 Claim lies across an east-west trending depression, which appears to be the topographic expression of a large fault. (General Plan Map) To the southeast of this depression the strike of the bedding varies from N 20° W to N 40° W and southwest dips vary from 49° to 65°. To the north of this depression the strike of the bedding is N 10° W and northwest dips vary from 50° to 55°.

The abrupt change in lithology of the tactite and scheelite mineralization from Area 4 to Area 5 is probably related to faulting along the depression

through which Tennell Creek now flows. The possible magnitude, relative direction, and relative time of movement along this fault zone has not been determined. The movement may have been of such nature as to place sedimentary beds unfavorable for the formation of scheelite-bearing tactite within the zone now exposed at the surface, or possibly the sedimentary rocks now cropping out at the surface were not within the vertical range at which scheelite-bearing tactite was formed. In any event the possibility of finding scheelite-bearing tactite at depth in Area 5 should be kept in mind for possible future exploration.

E Q U I P M E N T

There is no mining or milling equipment on either the mining claims or the mill sites. Near the mining area is a small, one-room habitable cabin, the only structure.

D E V E L O P M E N T A N D M I N I N G M E T H O D S

Present development of the property consists solely of two underground adits in Area 4, totaling 634 lineal feet, 320 feet of which is in ore. These workings have largely developed 97,000 tons of ore, but the majority of this might be best mined by surface (open pit) methods.

The relationship between the surface of the ground and all of the ore bodies immediately below the surface is such that open pit mining methods could be carried to a depth of approximately 100 feet, giving costs somewhat less than by underground methods. Mining ore to that depth would require the mining and disposal of 2.5 tons of waste for each ton of ore. This is not considered excessive. Open pit methods could produce 190,000 tons of ore, or approximately 50% of the total estimated reserves of the property.

42 CONTIGUOUS CLAIMS

IN INDEPENDENCE MTN. RAS.

EL. 7,468

SCHEELITE + POWELLITE

W/ PYRITE, MOLYBDENITE, MINOR CHALCOPYRITE & PITCHBLENDE

U. CARB. FORMA. LESSON

396,000 TONS 0.42% WO_3

5,000 TONS MINED

5 DDH's, 40 LH's

500' DRFTNG. 120' RAISING

NORTHERN MINER.

FEB. 10, 1977

OXBOW TUNGSTEN

GJ-PD-34
(REV. 7/60)

OFFICIAL USE ONLY

DIGEST OF NOVEMBER 24, 1958 ORE RESERVE SURVEY

DISTRIBUTION (43)
POR...(2)
DRM...(2)
MA ...(1)
FIELD BR....(2)
Hem

INITIAL SUBMISSION DATE: July 30, 1959

CONTROLLER: Abram A., George G., Edward A. Knowles, and Price D. Montrose
ADDRESS: Mountain City, Nevada

REPRESENTATIVE: Price D. Montrose
ADDRESS: Mountain City, Nevada

PROPERTY: GARNET MINE
CLAIMS: Garnet 1-8, Garnet Extension 1-15, and Barium 1 and 2.

DISTRICT: Salt Lake
COUNTY: Elko
NEAREST MILL: Vitro, Salt Lake City
LOCALITY: Mountain City
S/T/R: 7,8,16,17,& 18/45N/56E MDM
MILES: 345
STATE: Nevada
CERT. NO.: None
HAULAGE COST:

AEC EXAMINERS & DATE: Robert E. Cohenour, May 18, 1961
AEC EVALUATORS & DATE: Robert E. Cohenour, August 18, 1961
CO. REP. PRESENT: Price D. Montrose

ORE RESERVE	TONS	%U3O8	%V2O5
AEC 11/1/57:	None		
AEC 11/24/58:	None		
AEC CURRENT: 7/1/61	None		
COMPANY 11/24/58:	2,000	0.50	-

AEC CUTOFF (THICK.): -
(GRADE): -
MINING COST - DIRECT: -
ESTIMATED EXPENDITURES IN RELIANCE ON MAY 1956 ANNOUNCEMENT: None

AVG. DEPTH: -
AVG. THICKNESS: -
TOTAL: -

AVAILABILITY (MINING): -
(MILLING): -
TOTAL INVESTMENT: None for uranium

PRODUCTION RECORD

	TONS	%U3O8	%V2O5
1952	None		
1953			
1954			
1955	None		
1956			
1957			
1958	None		
1959			
1960			
TOTAL PRODUCTION TO: 7/1/61	None		

DATA SUBMITTED, RELIABILITY, AND COMPLETENESS:	The operator furnished claim map and tungsten reserve map. Data complete but lacked backup for reserve estimate.
GEOLOGIC SETTING, ORE OCCURRENCE, AND METAL. TYPE:	The uranium ore is confined to a post-intrusive fault zone. The mine is developed in a skarn zone which contains garnet and tungsten. The mineral is uraninite in quartz.
ACTIVITY AT PROPERTY DURING VISIT:	There was no activity. It was necessary to drain the workings to get into the mine.
PREVIOUS EXAM. OR REPORTS OF RECORD:	PRR-SL-139, B. J. Sharp and R. J. Meehan, 5/8/56 DMEA-2820 (Tungsten) Knowles Bros., H. W. Jones and Robert G. Reeves, 1956 Airborne Radiometric Survey, US AEC SLAO-TM-7, A. M. Peterson, 1956.
HISTORY OF EXPLORATION AND OPERATION:	The property was developed in 1955 through a DMEA loan and in 1956-58 was further developed by Union Carbide Nuclear. In 1958 the property was returned to the owners. Uranium was discovered during the DMEA work in 1955.
EXTENT AND NATURE OF MINE DEVELOPMENT:	The mine was developed by 400 feet of drift and 620 feet of drilling with DMEA funds. Union Carbide Nuclear drilled 2000 feet of diamond drill holes.
DIFFERENCES BETWEEN COMPANY AND AEC RESERVES:	Prospector optimism and projecting a non-economic ore showing. AEC estimate based on assays and minable width.
FORECAST OF PRODUCTION AND ORE POTENTIAL:	Production unlikely. Potential is good.

(NOTE: FOR MORE SPACE, FOOTNOTE AND USE REVERSE SIDE.)

Arthur E. Granger, Chief
Salt Lake Branch, PED

September 13, 1961

Robert E. Cohenour, Geological Engineer
Salt Lake Branch

ORE RESERVE STUDY FOR REQUIREMENTS OF AEC ANNOUNCEMENT, PRESS RELEASE NO. 220 OF NOVEMBER 24, 1958, ON THE GARNET CLAIMS (GARNET-TUNGSTEN MINE) ELKO COUNTY, NEVADA (SALT LAKE DISTRICT)

PSL:REC:mkc

Summary

The Garnet claims are on the western flank of Tennessee Mountain in northwestern Elko County, Nevada. The uranium minerals were discovered in a fault zone 290 feet from the portal as a result of an exploration project for tungsten. The uranium occurs as sooty pitchblende in a quartz veinlet within a post-intrusion fault. The owners submitted a reserve of 2,000 T. @ 0.50% U_3O_8 but currently no ores were assigned to the property because of the lack of a minable width of ore grade rock. The mine is not sufficiently developed to property appraise the uranium, but the potential is good. The property was examined on May 18, 1961, by Robert E. Cohenour accompanied by Price D. Montrose.

Introduction: Twenty-five unpatented mining claims, Garnet 1 through 8, Garnet Extension 1 through 15, and Barium 1 and 2, comprise the Garnet group. Twenty of the claims are contiguous (encl. 1); the locations of the Garnet Extension 7, 8, and 15, and Barium 1 and 2, are not known. The claims are in secs. 7, 8, 16, 17, and 18, T. 45 N., R. 56 E., Mount Diablo meridian in north central Elko County, Nevada. The claims extend from the 8,356-foot summit of Tennessee Mountain to about 7,200 feet above sea level (fig. 1). The trend of the group is northwesterly from the summit of Tennessee Mountain. The winters are severe, and cause cessation of all mining activities from November through March. The portal of the main workings is approximately one mile east of Meadow Creek, northward flowing tributary of Bruneau River. The country sustains perennial waters and the wet mines furnish ample water for drilling and culinary purposes. The nearest supply point for fuel and staples is Mountain City, Nevada, some 27 miles westerly by road. Elko, Nevada, 82 miles south, is the nearest shipping and major supply point by railroad. Electric power could be obtained for mine operation; a high-voltage power line of the Idaho Power Company passes about 1-1/2 miles northeast of the property.

Road Log - Elko, Nevada to Carnet-Tungsten Mine:

Accumulated Mileage	
0.0	Junction of Nevada Highway 11 at western city limits, Elko, Nevada - Turn north (right) on Nevada Highway 11.
27.2	Junction - Continue straight ahead on Nevada Highway 43. (Nevada 11 turns left and leads to Tuscarora)
51.0	Pass through settlement of North Fork, Nevada.
63.4	Pass through settlement of Wildhorse, Nevada.
65.3	Junction - Turn right (leaving Nevada Highway 11), proceed northerly on Gold Creek-Rowland road.
65.9	Junction - Continue straight ahead. Road to left leads to Sunflower Flats.
67.6	Pass through Mendive Ranch yard.
70.9	Junction - Continue straight ahead. (Road left to Coleman Canyon)
71.2	Junction - Continue straight ahead.
73.9	Junction - Turn left. Road fork to right goes to Gold Creek Ranger Station.
76.4	Junction - Continue straight ahead. Road left leads to Mountain City via Sunflower Flats.
76.7	Cross cattle guard.
78.9	Cross cattle guard.
79.8	Junction - Turn right, cross Meadow Creek. Main road continues straight ahead to Rowland, Nevada. (Road to mine is steep dugway on north side of drainage)
81.7	End of road. Mine portal 100 yards southeasterly up bull-dozer trail.

Road Log - Mountain City, Nevada to Carnet-Tungsten Mine, via Sunflower Flats:

0.0	Post Office Mountain City, Nevada, proceed southerly on Nevada Highway 43.
4.2	Junction - Turn left and cross bridge (containing gate) over Owyhee River, proceed on sinuous secondary road up Haystack Creek (dry).
7.8	Junction - Keep to right. Road fork to left leads to California Creek.
9.7	Junction - Keep straight ahead (road entering from left leads to California Creek), proceed down Allegheney Creek.
13.9	Pass under highline.

Road log (continued)

Accumulated Mileage	
14.5	Cross cattle guard (now on Happy Joe claims, Sunflower Flats area)
15.1	Junction - Turn left on road to Jarbidge and Gold Creek. (Road straight ahead leads to Highway 43 in vicinity of Wildhorse Reservoir. Prominence to left is designated "Point of Rocks").
16.2	Junction - Turn right to Rowland and Jarbidge Road. Road straight ahead leads to Grasmere, Idaho, via McDonald Creek
18.8	Cross cattle guard.
21.7	Junction - Turn left on Rowland and Jarbidge Road. Main road right leads to Elko (77 miles).
22.0	Cross cattle guard - Waterlog Summit.
24.2	Cross cattle guard.
25.1	Junction - Turn right leaving Rowland and Jarbidge Road. Cross Meadow Creek, proceed up steep dugway.
27.0	End of road - Mine portal 100 yards southeasterly.

County records in Elko, Nevada, indicate the following data pertaining to the claims:

Claim	Book	Page	Date Located	Instrument	Locators
Garnet #1	28	269	8/30/49	Notice of Location	Abram A., George G., & Edward A. Knowles and Price D. Montrose
" #2	"	"	"	"	" "
" #3	"	"	"	"	" "
" #4	28	"	"	"	" "
" #5	"	"	"	"	" "
" #6	"	271	"	"	" "
" #7	"	"	"	"	" "
" #8	"	272	"	"	" "
Garnet Extension #1	"	281	9/20/49	"	A.A.Knowles & Price D. Montrose
" " #2	"	308	"	"	" "
" " #3	"	309	"	"	" "
" " #4	29	407	7/2/51	"	E.A., A.A. & G.G. Knowles and Price D. Montrose
" " #5	"	408	"	"	" "
" " #6	"	409	"	"	" "

Abstract (continued)

Claim	Book	Page	Date Located	Instrument	Locators
Garnet Extension #7	29	410	7/2/51	Notice of Location	E.A.,A.A.,G.G. Knowles and Price D. Montrose
" " #8	"	411	"	"	" "
" " #9	"	412	"	"	" "
" " #10	"	413	"	"	" "
" " #11	"	414	"	"	" "
" " #12	"	415	"	"	" "
" " #13	"	416	"	"	" "
" " #14	"	417	"	"	" "
" " #15	"	418	"	"	" "
Barium #1	28	272	8/30/49	"	Price Montrose & Knowles Bros.
" #2	"	309	9/20/49	"	A.A.Knowles & Price D. Montrose
Garnet #1-8	"	327	8/31/59	Proof of Labor	Price Montrose at al*
Garnet Extension 1-15	"	"	"	" "	" " "
Barium #1-2	"	"	"	" "	" " "

* et al: Abram A. Knowles, Edward A. Knowles, George G. Knowles.
Signed - Price Montrose, Diamond Jim Mine, North Fork, Nevada.

1. On December 31, 1956, Price D. Montrose and Thelma Montrose, Abram A. Knowles and Doris F. Knowles, and George G. Knowles quitclaimed the Garnet 1 through 8, Barium 1 and 2, and Garnet Extension 1 through 15 mining claims to Union Carbide & Carbon Corporation for 10% royalty of gross value of tungsten mined. Royalty ceases after $244,000 paid. Also 10% royalty of gross value of uranium and vanadium content to $250,000. Recorded in Book 71, pages 328 through 331, on February 26, 1957.

2. Union Carbide & Carbon Corporation quitclaimed all the claims to Montrose et al. Recorded in Book 75, pages 199 through 201, on November 26, 1958. The date of the instrument was also November 26, 1958.

The following reports regarding the Garnet-Tungsten area are available:

Preliminary reconnaissance report SL-139, B. J. Sharp and R. J. Meehan, 1956 (encl. 3)
DMEA-2820 (Tungsten) - Knowles Brothers, H. W. Jones and Robert C. Reeves, 1956.

Geology and mineral resources of Elko County, Nevada, Bulletin 54, Nevada Bureau of Mines, A. E. Granger, et al., 1957.

Airborne radiometric survey of Elko County, Nevada, U.S. AEC, SLAO-TM-7, A. M. Peterson, 1956.

Geology and Ore Deposits: The Garnet-Tungsten mine is on the northwest slope of Tennessee Mountain in an area of moderate to steep relief (figs. 2 and 3). Tennessee Mountain is composed of Paleozoic sedimentary rocks that have been intruded by granitic rocks of Cretaceous(?) age. The sedimentary rocks are highly deformed interbedded shales, limey shales and thinly-bedded limestone of the Tennessee Mountain formation. The Tennessee Mountain formation is probably of mid or lower Paleozoic age, since it underlies the Sunflower formation of late Pennsylvanian age. The two formations are separated by a widespread unconformity, the hiatus of which is unknown. The formation strikes N. 40° - 60° W., and dips from 40° - 70° SW. in the vicinity of the mine. The rocks are broken by many small irregularly trending normal faults. Some tight, relatively small-scale folding was noted. The granitic rock crops out on the crest and on the eastern slopes of Tennessee Mountain. It is a coarse porphyritic rock ranging in composition from quartz monzonite to granite. Aplite and alaskite dikes cut both the granitic and the sedimentary rocks.

At the mine, the contact between the intrusion and the sedimentary rocks trends from the southeast to the northwest and dips from vertical to 50° southwest. The contact is irregular in detail, with a tongue of granitic rock extending several hundred feet into the sedimentary rock. In the mine area the intrusive contact approximately parallels the strike of the sedimentary rocks. Lenses of tactite have formed along the contact. The tactite consists of approximately 60% garnet; the remainder is pyroxene hornblende with minor amounts of chlorite, actinolite, and epidote. The tactite lenses are elongate parallel to the strike and dip of the sedimentary rocks. Three main lenses range from 100 to 500 feet in length, are 25 to 150 feet wide, and the greatest exposure down-dip is 400 feet. Scheelite, the main ore mineral, is disseminated in small amounts in the tactites. Molybdenite, powellite, and pyrite are associated with the scheelite.

The uranium occurs as a sooty black mineral, probably pitchblende, in a quartz vein filling in a fault situated in the lower adit 290 feet from the portal (fig. 4). The early investigations by DMEA field teams indicated that the uranium mineral occurred in nodules of hard, black, siliceous rock from 2 to 10 inches in diameter. The present

investigation revealed that the uranium is confined as a thin vein between fault gouge ranging between 6 and 10 inches on both the hanging and footwall blocks. The vein ranges from 2 to 3 inches in width and is most radioactive on the northeast wall of the drift. The differential head face scanner was used on this zone, and a radiometric grade of 0.33% U_3O_8 was obtained. A chip channel sample 4 inches in width was taken for mineral determination and assay. The sample assayed 3.10% U_3O_8 with a radiometric equivalent of 1.21% and 0.13% copper (encl. 4). A sample of greenish gouge which occurs as a 6-inch zone on the footwall beneath the uranium and quartz vein, assayed 0.04% U_3O_8 with a radiometric equivalent of 0.01% U_3O_8, nil % copper and 0.45% molybdenum (encl. 3). The greenish mineral was checked and found to be mainly a clay mineral.

The position of the uraniferous quartz vein in a fault cutting the tactite, places the mineralization epoch of the uranium as definitely post-intrusion, and suggests the possibility that other occurrences may be found within the granitic rocks. The uranium mineralization is an extremely late phase phenomena if it is related to the intrusion.

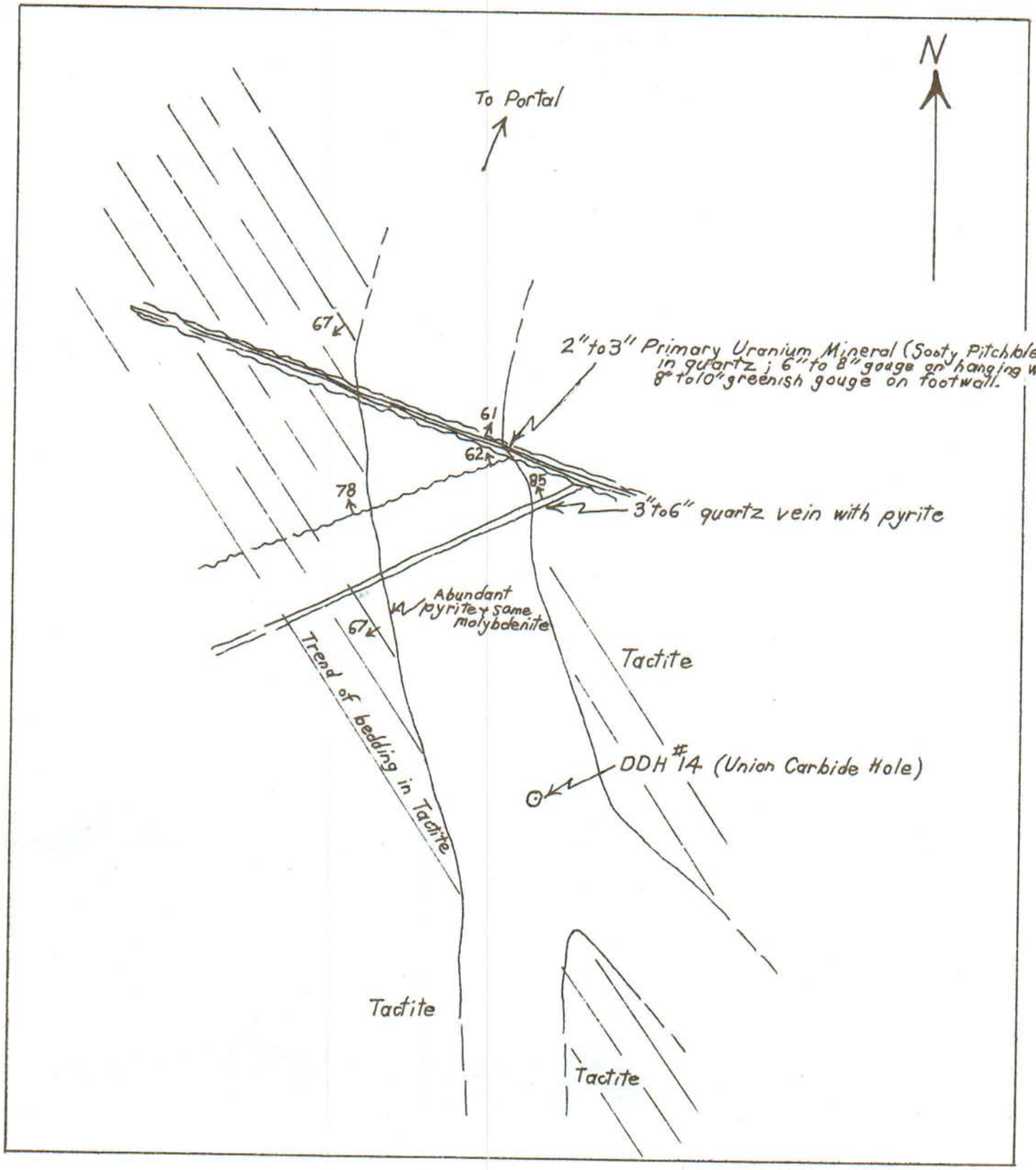
Ore Reserves: No indicated or inferred ore reserves are assigned to the Garnet-Tungsten claims. The absence of a minable width of ore is the singular factor in the negative appraisal. However, the uraniferous veinlet appears to be thickening eastward and may yield a minable width within a few rounds. A few tons may be hand-cobbed if development were extended to the east along the vein. The fault gouge is nearly 2 feet in width and represents sufficient breakage to harbor a minable width of ore.

The potential of this structure is good, and a large tonnage may have been realized if development had been continued.

The operator, Price D. Montrose, of Mountain City, Nevada, submitted an estimated ore reserve of 2,000 tons at 0.50 percent U_3O_8 (encl. 5).

Costs: All costs incurred were borne by exploration efforts directed toward development of tungsten, both by the owners under a DMEA project and later by the Union Carbide & Carbon Corporation.

Enclosures:
GJ-PD-34
Figures 1, 2, 3, and 4
Enclosures 1, 2, 3, 4, and 5
Photograph



Map of Uraniferous Area of the Garnet Tungsten Mine Elko County, Nevada

R.E. Cohenour
May 1961

In Northeastern Nevada GARNET MINE (43)

Oxbow resumes tungsten production

VANCOUVER – Milling and mining were resumed this month at the Tennessee Mountain tungsten mine, Elko Cty., Northeastern Nevada, held under option by Oxbow Tungsten Mines, subsidiary of Oxbow Resources, Sankar Ramani, president, told The Northern Miner.

Production, which was commenced on July 1, 1976, was halted on Feb. 1, 1977, due to winter weather conditions and to equipment overhaul. The 200-ton mill is being operated at an average daily rate of 180 tons.

The company still is seeking a partner to provide adequate finances for an expanded operation, Mr. Ramani said. Two major companies have looked at the property, but so far have not advised Oxbow of their decisions.

According to a report dated Apr. 7, 1977, by W. G. Stevenson, W. G. Stevenson & Associates Ltd., consulting geologists, the operation holds an attractive profit potential unless the price of tungsten is reduced appreciably in the near future. The present payments for tungsten as covered by the agreement with Union Carbide Corp. would appear to support a profitable operation at the projected rate (180 tons per day) of production. Union Carbide has agreed to purchase all of Oxbow's production from Oct. 1, 1976, to Oct. 1, 1977. During the period July, 1976, to Feb. 1, 1977, the mill handled 14,800 tons of ore and the concentrates were shipped to Union Carbide at Bishop, California.

Mr. Stevenson, who visited the property late in March, said the upper workings and the stopes immediately above the lower workings are inaccessible and the new waste and ore dumps over the ore zone on the surface prevent a definitive assessment of the ore reserve.

Based on his review of past drilling and his observations in the lower level (there are two adits) the estimate made by Sunshine Mining Co. in 1953 of 255,000 tons of probable and possible ore with a grade of 0.31% of tungsten oxide (WO_3) appears reasonable. This estimate is for the No. 1 lens in the northwest part of the property above the 7,400-ft elevation. Sunshine estimated an additional 400,000 tons of similar grade from the 7,400 to the 7,300-ft. elevation.

Mr. Stevenson collected nine samples, six of them from three draw points from stopes above the lower level. The six samples averaged 0.53% WO_3. A sample from the wall of the lower drift over a length of 13 ft. averaged 0.46%. Two samples from an ore dump near the portal of the upper tunnel assayed 0.33%. The dump, he estimated, contained 7,000 tons of ore and the grade of the two samples is representative of this tonnage.

Available for study was data on 35 diamond drill holes, 20 of which were drilled from surface and 15 from underground workings. All the underground holes and 11 of the surface holes were designed to test the mineralization in the No. 1 lens.

Mr. Stevenson said that he believes the Sunshine Mining ore reserve estimate and the one made in 1975 by E. O. Chisholm (**N.M.**, Feb. 10, 1977) are compatible.

The exploration potential, he said, holds considerable attraction. The geology is complex, but he believes additional sampling, mapping and drilling would reveal structures and ore controls that might lead to the discovery of new mineral deposits and extensions to the known tactite lenses. Nos. 2 and 3 lenses near the centre of the property have been diamond drilled and modest amounts of tungsten have been developed. These lenses and others warrant more detailed geological mapping and diamond drilling.

On the basis of a milling rate of 180 tons a day, 250 days a year, the Sunshine Mining tonnage estimate would sustain an operation for 5-6 years. An ore stockpile has been accumulated at the mill and the mine sufficient for 4.5 months' mill feed.

KNOWLES BROS GARNET TUNGSTEN } 155

THE NORTHERN MINER May 19, 1977

Docket DMEA 2680
(Tungsten), Montrose Mining Company
Price D. Montrose, P. O. Box 96, Mountain City, Nevada

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The Montrose Mining Company, Mountain City, Nevada, applied May 19, 1952 to the Defense Minerals Exploration Administration for government assistance in a $38,000 program to explore the downward continuation of scheelite showings exposed on the surface of their claims in the Alder Mining District, Elko County, Nevada.

The property was examined on June 28, 1952 by an engineer from the Bureau of Mines and geologists from the U. S. Geological Survey, and a report recommending a program of mapping and drilling was prepared. At the request of E. H. Bailey, dated September 30, 1952, the property was re-examined on October 28-29, 1952. A detailed map of the area was prepared and additional samples were taken after examining the area at night with a mineralight.

The weighted average of all samples taken in 0.13 percent WO_3, which is well below the cut off point of 0.30 percent WO_3 required for shipping ore at both the Getchell mill in Nevada, and the U. S. Vanadium Co. mill at Bishop, California. If, in the future, a mill is installed in the vicinity of the Knowles property, the ore may then be of commercial value.

Ore reserves total 500 tons averaging 0.27 percent WO_3 which is inferred in the block below sample BM 419 (fig. 3).

The examining geologists conclude that the likelihood of a significant discovery is small and that the ore reserves do not justify exploratory work at the property by the DMEA.

The examining engineer of the U. S. Bureau of Mines, however, considers that the property offers the possibility of producing a moderate tonnage of low grade ore over a larger area than shown by the present exposures. While the exploration must be considered as speculative, he believes the property to have

sufficient merit to justify 400 feet of diamond drilling estimated to cost $3,000.00 of which the government's share would be $2,250.00. The examining engineer and geologists recommend that the application be approved if exploration of deposits of this potential size are in the national interest.

Introduction

This mining property was examined and sampled during the day and night of June 28, 1952 by a Field Team composed of geologists 1/ of the U. S. Geological Survey and an engineer 2/ of the U. S. Bureau of Mines. During this examination and

1/ R. M. Smith and M. M. Bell, Geologists, U. S. Geological Survey
2/ Glenn G. Gentry, Mining Engineer, U. S. Bureau of Mines

inspection by mineralight the Field Team was accompanied by Messrs. Price and Robert Montrose, owners of the mining claims.

Eight samples were secured from the most promising exposures of tactite and in locations where the owners had made numerous inspections by mineralight, and in areas where they proposed to explore. Additional examination, by mineralight, by the examining engineers, indicated that the locations sampled were representative of the exposures.

Pursuant to instructions contained in a letter dated September 23, 1952, addressed to Mr. H. C. Miller, Executive Officer, Region III and signed by Mr. Ernest Wm. Ellis, Acting Chairman, Operating Committee, the Montrose mining property was again examined and sampled on October 28-29, November 1, 1952 by geologists 1/ of the U. S. Geological Survey and an engineer 2/ of the U. S. Bureau

1/ R. M. Smith, D. C. Laub, Ralph J. Roberts, Geologists, U. S. Geological Survey
2/ Glenn G. Gentry, Mining Engineer, U. S. Bureau of Mines.

of Mines. On the afternoon and night of October 28, the engineers were accompanied by Mr. Price Montrose.

Ten samples were secured from areas adjacent to the previous sampling and over areas where inspection by mineralight indicated that representative mineralization could be expected.

The areas sampled contained the exposures where some small amount of surface exploration had been done and on outcrops where scheelite mineralization had been observed by means of the mineralight. No additional development had been done by the applicant and therefore no further exposures had been cleared for sampling.

Location

The property consists of 18 unsurveyed mining claims, held by location, in the Alder mining district, Elko County, Nevada, approximately 19.3 miles east of Nevada State Highway 43 at Wild Horse, Nevada. They are located principally in Section 8, T. 45N., R. 56 E., MDB and M.

History and Development

The Montrose brothers filed on these mining claims about two years ago and since then they have been actively engaged in driving an adit 310 feet in length on the Apex No. 1 claim and in exposing the surface mineralization in areas adjacent to the adit.

No production of tungsten ores has been made from the property. Two buildings have been constructed as follows:

1 building housing the air compressor, located at the portal of the adit.
1 building for living accommodations, located approximately one mile west of the adit; can accommodate 4 men.

Both buildings are in reasonably good condition and could be utilized. Mining equipment on hand and reported as in good condition are as follows:

1 Air compressor, Gardner-Denver, portable, 210 c.f.m., operated by gasoline engine.
2 Jackhammers, Ingersoll-Rand, Model S-49, mounted on shell with columns and cross arms, safety clamp.
300 feet of 2-inch iron pipe
Miscellaneous hand tools
800 feet of 14-pound rail
1 Mine car, iron body, 18-inch track gauge
2 Trucks, 4-wheel drive

Water

Sufficient water is available at the living quarters for domestic consumption. Water for mining purposes will have to be hauled from this source to the mine.

Power

No transmitted electric power is available at the property and all machinery would be operated by means of diesel or gasoline engines.

Climate

The mine area is located near the crest of the divide leading to Tennessee creek and at an elevation of about 8,000 feet. The country is mountainous and rough and severe winter storms should be expected from December through March.

Applicant's Experience

The Montrose brothers have apparently had considerable and varied experience in and around the mines at Mountain City, Nevada, as well as in other locations. Price Montrose states that he is one of the owners of the adjoining Knowles tungsten claims and that he assisted in the diamond drilling project on these claims.

From the amount of road construction work done, the appearance of the 310-foot adit, and the efforts to prospect the surface of the exposures, it is considered that they would be entirely competent to carry out any proposed exploratory work. Additional experienced miners can probably be secured in Mountain City, Nevada.

Geology

The sedimentary rocks in the area are limestone and shale of Paleozoic age. They are cut by a large granodiorite stock and by alaskite dikes and sills. Near the dikes and sills the sedimentary rocks have been metamorphosed to tactite which contains scheelite in some places.

The limestone is thin-bedded and is interbedded with shale and calcareous shale/of which all strike north and dip 25° - 30° W. Adjacent to the granodiorite the sedimentary rocks are cut by sills and dikes as much as 200 feet wide, which range in composition from alaskite to granodiorite. Both the granitic and

sedimentary rocks are cut by quartz veins as much as 8 inches wide that fill fractures having random strikes and dips.

The limestone beds adjacent to the granitic rocks are metamorphosed to tactite; the shale beds are metamorphosed to hornfels.

Ore Deposits

The ore bodies are irregular concentrations of scheelite in parallel layers of tactite that range in width from a fraction of an inch to 19 feet, and are separated by barren tactite, hornfels and alaskite sills. The ore bodies extend along the strike of the tactite layers for as much as 40 feet; they have not been explored below the outcrops and their depths are not known. The scheelite deposits are commonly adjacent to the dikes and sills or to zones of quartz stringers.

The scheelite showings are scattered over an area 900 by 1,400 feet. Although the area is partly covered by a thin mantle of soil, exposures are for the most part fair. The scheelite showings were sampled wherever possible in trenched as well as in surface exposures. The weighted average of all the samples taken is 0.13 percent WO_3; the best sample of disseminated scheelite is BM419 which gave an analysis of 0.27 percent WO_3; it was cut across the slope for a distance of 28 feet which represents an actual thickness of 10 feet. Samples B.M.415 and B.M.286 assayed 0.09 and 0.02 percent WO_3 respectively, indicating that B.M.419 is not representative of the grade of the deposit as a whole. Sample 417 represents a tactite layer containing a few non-persistent high grade seams.

The Montrose adit (fig. 3) was driven under the best surface showings and cut three tactite layers which contained no scheelite. It would therefore seem unwise to project the ore layers from the surface more than a few feet.

Sampling

Sample No.	Percentage WO_3	Width Feet	Description
BM282	0.01	2.8	South wall of adit 190 feet from portal, altered limestone and apalite. No mineralization observed by mineralight.
BM283	0.09	1.8	Shallow pit about 60 feet north of breast of adit and 65 feet above the adit.
BM284	0.25	3.2	Shallow pit about 4 feet deep, 50 feet northeast of BM283 and near crest of hill.
BM285	0.06	3.5	150 feet below crest of hill and on north slope approximately 1/2 mile south of Tennessee Creek, face of tactite exposure.
BM286	0.12	29.0	84 feet north and 15 feet above BM283; chip sample across tactite exposure.
BM287	0.01	5.0	Upper part of tactite bed 16 feet south of BM283 and at same elevation. Tactite bed here exposed has a thickness of 19 feet.
BM288	0.01	6	43 feet south of BM287. Trench 12 feet long by 2 1/2 feet divide by 2 1/2 feet deep.
BM289	0.19	2	From center of Apex claim No. 1, 550° E. 79 feet to sample location.
BM411	*0.01	4.4	Surface exposure of tactite S. 60° W. 8 feet from BM287.
BM 412	*0.01	3.9	Surface exposure of tactite N. 80° W. 8 feet from BM411.
BM413	*0.01	4.0	Surface exposure of tactite S. 12° E. 68 feet from BM289.
BM414	*0.01	4.6	Surface exposure of limestone and tactite S. 2° E. 41 feet from BM 288.
BM415	0.09	4.0	Exposure of tactite in shallow surface trench. S. 35° E. 65 feet from BM284.
BM416	0.08	3.6	Surface exposure of tactite S. 12° E. 68 feet from BM289.
BM417	0.40	2.6	Narrow band of tactite occuring in a large outcrop on the east side of the ridge south of BM285.
BM418	0.02	3.8	Tactite exposure N. 30° W. 13 feet from BM285.
BM419	0.27	28.0	Chip sample from surface exposure N. 36° E. 40 feet from BM284.
BM420	*0.01	2.4	Cliff exposure about 4 feet lower than BM418.

* Less than

Ore Reserves

There are no measured ore reserves at the Montrose property. Indicated reserves of a few tons averaging not more than 0.27 percent WO_3 are present at

the side of BM 419.

If it is assumed the scheelite bearing tactite extends about one-fourth the distance from the surface to the Montrose adit (fig. 3) then 500 tons of ore containing 0.27 percent WO_3 may be inferred in the block 10 feet thick, 20 feet long, and 30 feet down the dip of the beds. Other areas are either too small or too low grade to infer a tonnage.

It is possible, however, that the tactite beds exposed in the adit might contain scheelite at other places along the strike, or along the dip. It is also possible that the tactite beds at samples BM 289 and 418 (fig. 3, section AA') might contain scheelite in commercial quantities below the surface exposures. As there are no showings of commercial grade these possibilities are a hope rather than an inference, and any exploration would be speculative.

Proposed Exploration

The applicant has proposed a program including the driving of 1,000 feet of adit, 3,000 feet of trenching, 1 mile of road, and construction of buildings to house men and equipment. The total cost was estimated to be $48,000 of which the government's share would be $36,000.

The examining engineer recommends 400 feet of diamond drilling in the areas represented by samples BM 417, BM 285, BM 384, and BM 283.

4 drill holes @ 100 feet each = 400 feet @ $7.50 per foot $3,000.00

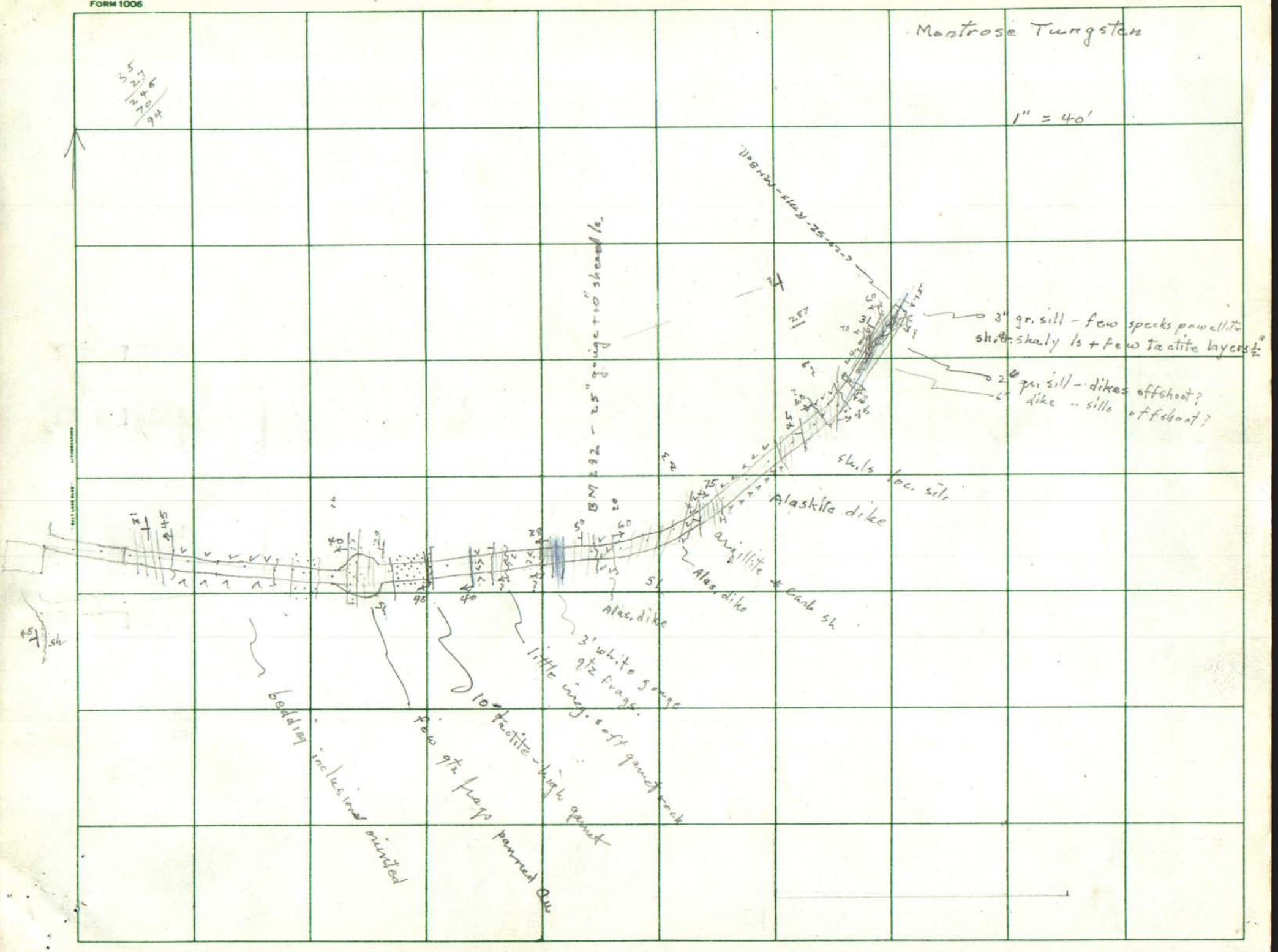
Government participation @ 75% = $2,250.00

[Glenn: do costs need to be detailed? I cannot spot the DD holes as I don't know where to drill. Would prefer to "follow the ore" rather than drill.]

FORM 1006

Montrose Tungsten

1" = 40'



FORM 1006

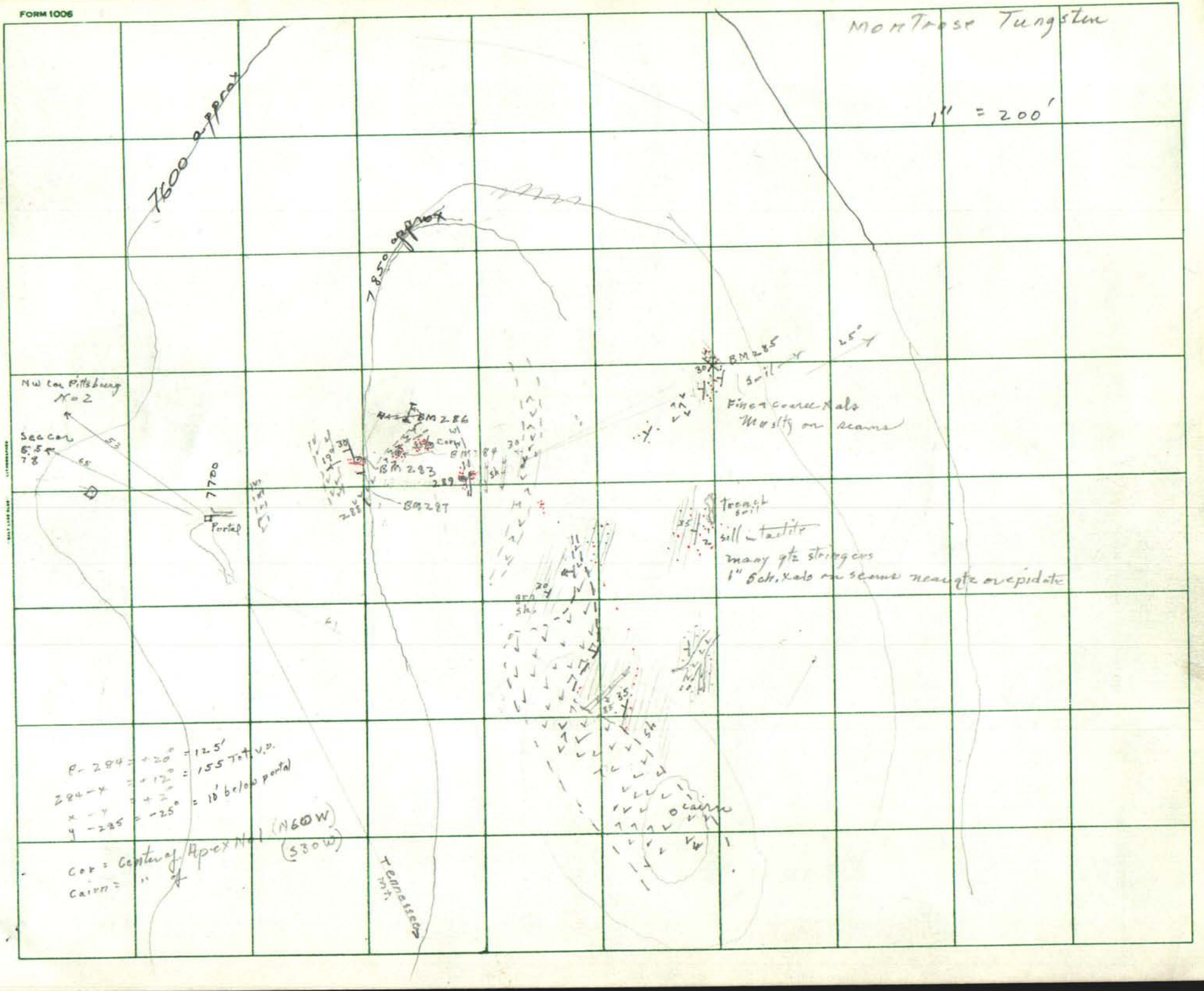
⊼ A – near tent house

1. NW Cor. compressor shed alt. 7700.0
2. ℄ road
3. intsn roads
4. disc. Mon. Apex No 4 – Alasi for. 5' E+W +30' N30W
5. black outcrop
6. ℄ lower road @ curve
7. bck. sl. hornfels with 1/4" tactite bedding seams N15W 35°W
   2' sill 50'E of 7   2' sill 100'E of 7

decl. = 0°   1" = 100'

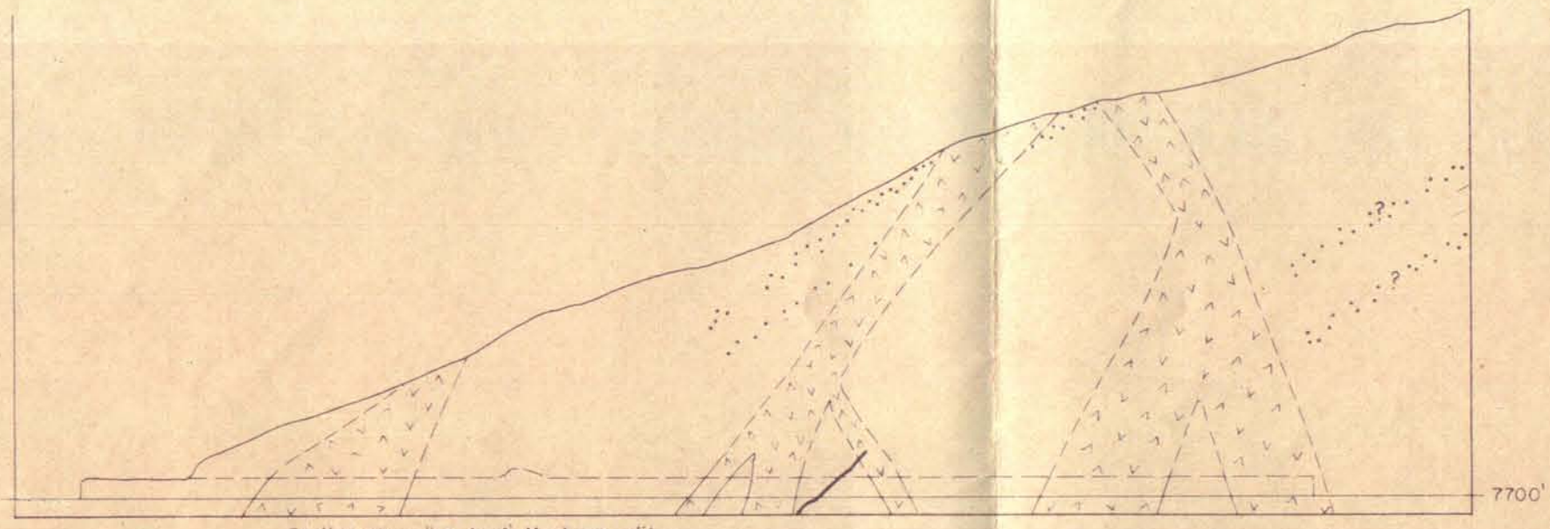
∴ tactite float

FORM 1006

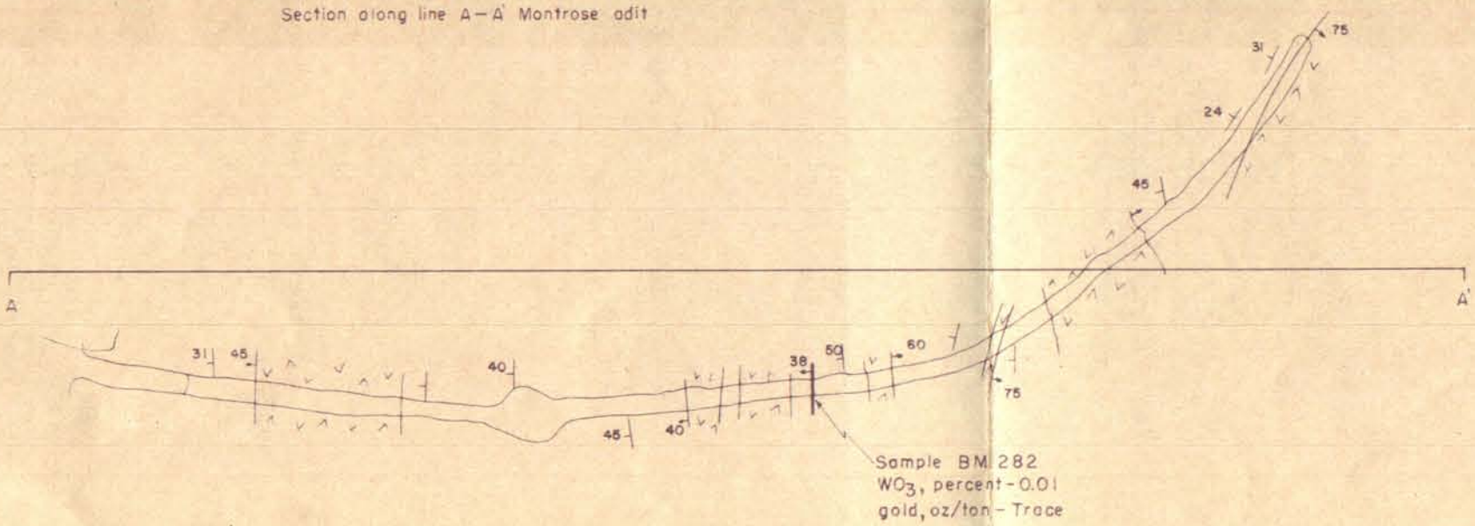

Montrose Tungsten
1" = 200'
7600 approx
7850 approx
NW cor Pittsburg No 2
Sec cor 5 7 8
BM 286
BM 283
BM 285
Portal
Fine coarse Xals
Mostly on seams
Trench
sill in tactite
many qtz stringers
1" 6 cts. Xals on seams near qtz or epidote
P-284 = +20° = 125'
284-X = +12° = 155 Tot. V.D.
X-Y = +2°
Y-285 = -25° = 18' below portal
Cor = Center of Apex No 1 (N60W)
Cairn = " " (S30W)
Tennessee
Cairn

U. S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DEFENSE MINERALS EXPLORATION ADMINISTRATION
DOCKET NO.



Section along line A–A' Montrose adit



EXPLANATION

Undifferentiated
limestone, shale
tactite, hornfels

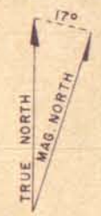
Aloskite sills and dikes

Scheelite – bearing tactite

25
Contact, showing dip
(Dashed where approximately located)

55
Fault, showing dip
(Dashed where approximately located)

30
Strike and dip of beds



GEOLOGY BY R. M. SMITH AND M. M. BELL

FIG. 4

GEOLOGIC MAP OF MONTROSE ADIT

ELKO COUNTY, NEVADA

0 40 80 FEET
Scale

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

November 26, 1952

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

Project No. Gentry

Montrose Mining Co. - DMEA 2680
Elko County, Nevada

Sample No.	%, WO_3	%, Mo	Oz Au/T	Oz Ag/T
BM- 411	*0.01	*0.01	0.005	Trace
BM- 412	*0.01	*0.01	Trace	Trace
BM- 413	*0.01	*0.01	Trace	Trace
BM- 414	*0.01	*0.01	Trace	Trace
BM- 415	0.09	*0.01	Trace	Trace
BM- 416	0.08	0.01	Trace	Trace
BM- 417	0.40	*0.01	Trace	Trace
BM- 418	0.02	*0.01	Trace	Trace
BM- 419	0.27	0.01	Trace	Trace
BM- 420	*0.01	0.01	Trace	Trace

Charles Gribble Tungsten-Antimony Property
Elko County, Nevada - DMEA -2695

			%, Sb		
BM- 421	0.90	*0.01	0.09	Trace	Trace
BM- 422	0.01	*0.01	0.07	Trace	Trace
BM- 423	1.05	*0.01	0.11	Trace	Trace

J. B. ZADRA

J. B. Zadra, Chief

*Note: * = less than

CC - A. C. Johnson

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

November 26, 1952

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

Project No. Gentry

Knowles Bros. Tungsten Property
Elko County, Nevada

Sample No.	%, WO_3	%, Mo	Oz Au/T	Oz Ag/T
BM- 424	0.45	0.02	Trace	Trace
425	0.37	*0.01	Trace	Trace
426	0.19	0.01	Trace	Trace
427	*0.01	0.01	Trace	Trace
428	0.13	*0.01	Trace	Trace
429	0.42	0.01	Trace	Trace
430	0.21	*0.01	Trace	Trace
431	0.05	*0.01	Trace	Trace
432	0.53	0.03	Trace	Trace
433	0.42	0.02	Trace	Trace

.288 Arg.

J. B. ZADRA

J. B. Zadra, Chief

*Note: * = less than

CC - A. C. Johnson

6-303
(March 1947)

cc: Wm. H. King

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
Salt Lake City, Utah

No. 34

Report to Mr. S. R. Wilson

Chemical Laboratory Report

Date received Nov. 20, 1952

Date reported Nov. 24, 1952

Serial No.	DESCRIPTION	Lot No.	WO_3	Mo
	Montrose Tungsten Elko County, Nevada			
	DMEA-2680			
7875		Montrose 2	0.10	<0.05

U. S. GOVERNMENT PRINTING OFFICE 16—33553-3

Signed H. E. Peterson

U. S DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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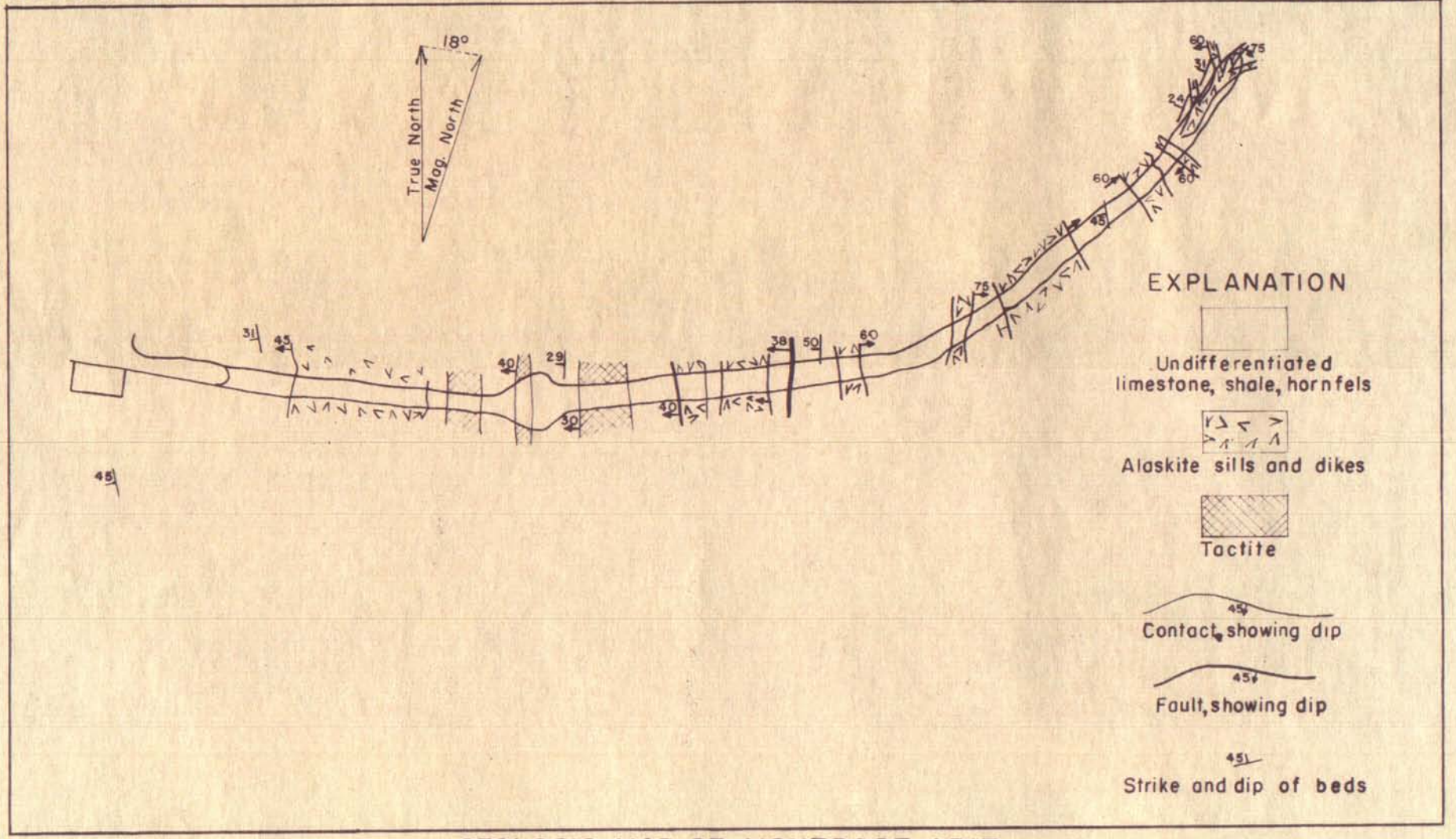
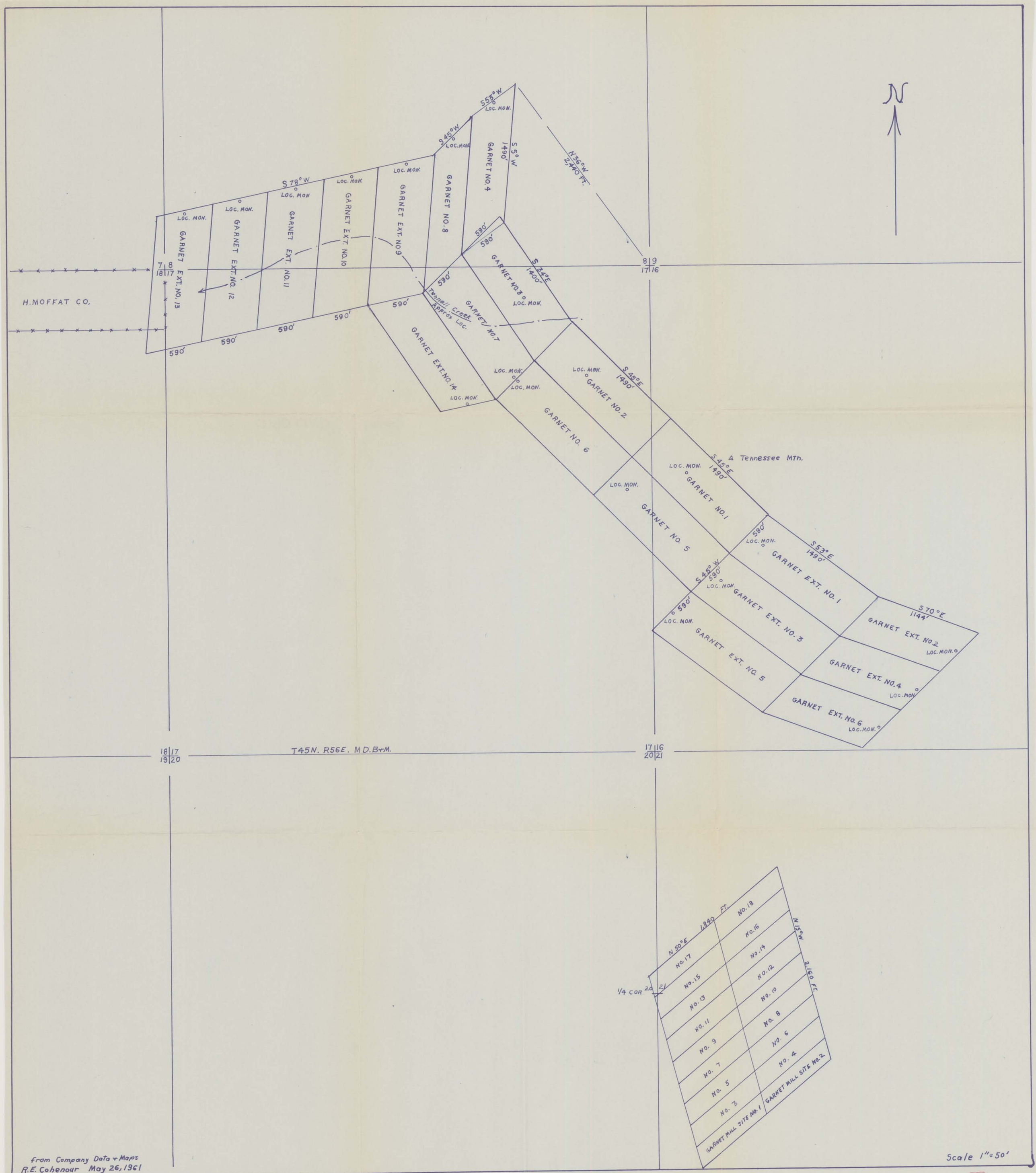


FIG. 4

GEOLOGIC MAP OF MONTROSE ADIT
ELKO COUNTY, NEVADA

0 40 80 120 FT.
Scale



from Company Data & Maps
R.E. Cohenour May 26, 1961

Scale 1" = 50'

MAP OF GARNET TUNGSTEN CLAIMS, ELKO CO., NEVADA

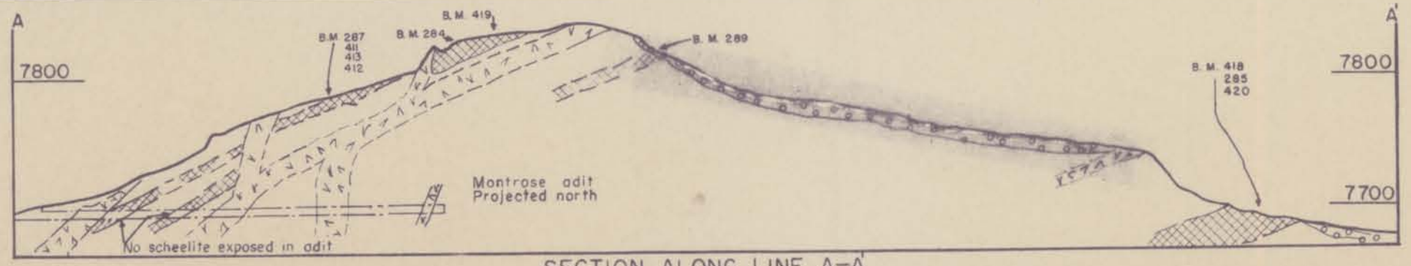
(43)

Item 19

01900016

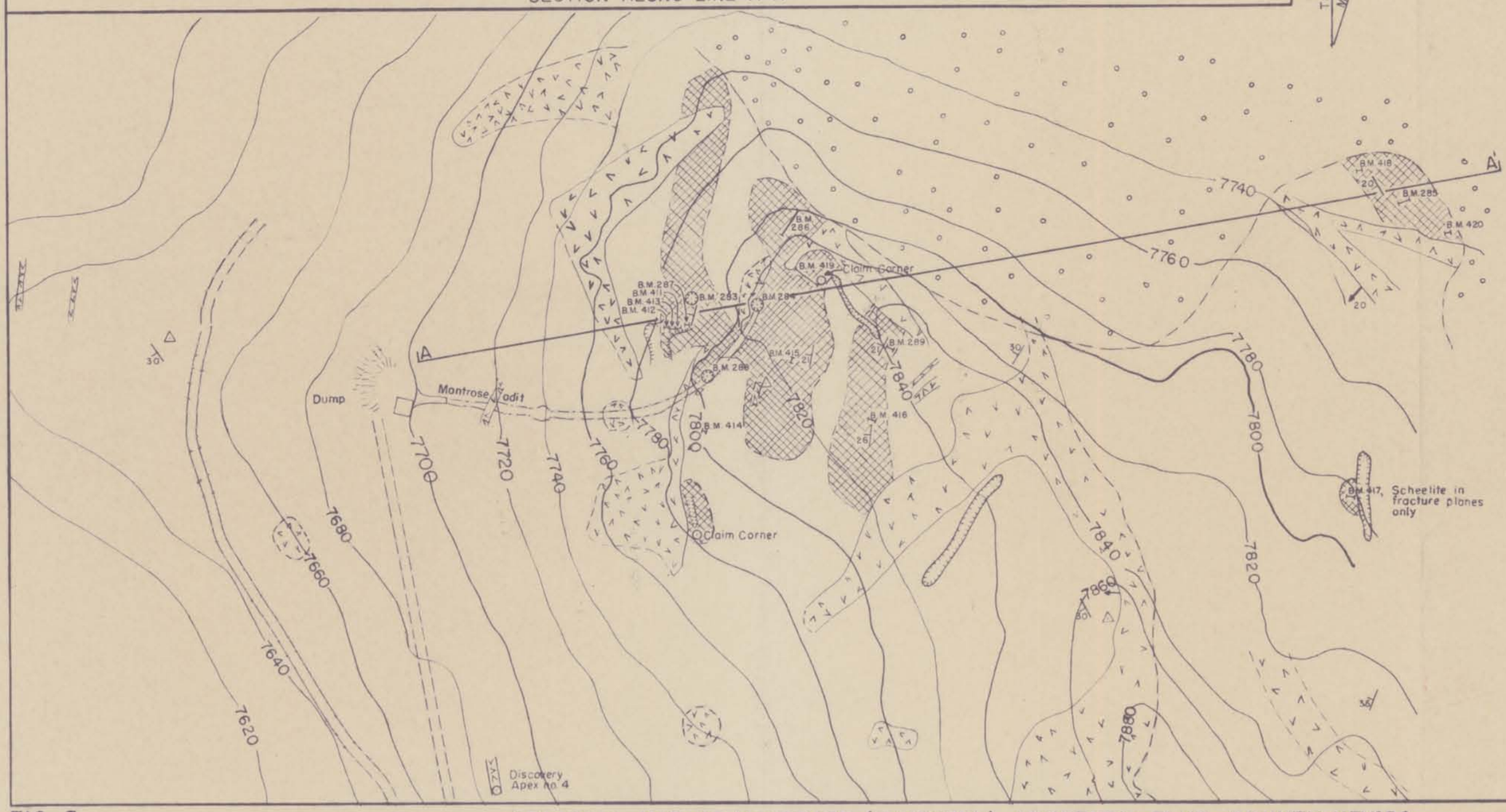
U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DEFENSE MINERALS EXPLORATION ADMINISTRATION
DOCKET NO. 2680



SECTION ALONG LINE A-A'

sample no.	width feet	WO_3 percent	check assay
B.M. 283	1.8	0.09	
B.M. 284	3.2	0.25	0.58
B.M. 285	3.5	0.06	
B.M. 286	29.0	0.12	
B.M. 287	5.0	0.01	
B.M. 288	6.0	0.01	
B.M. 289	2.0	0.19	
B.M. 411	4.4	0.01	0.10
B.M. 412	3.9	0.01	
B.M. 413	4.0	0.01	
B.M. 414	4.6	0.01	
B.M. 415	4.0	0.09	
B.M. 416	3.6	0.08	
B.M. 417	2.6	0.40	
B.M. 418	3.8	0.02	
B.M. 419	28.0	0.27	
B.M. 420	2.4	0.01	



EXPLANATION

- Alluvium
- Undifferentiated hornfels limestone, shale, tactite
- Alaskite sills and dikes
- Scheelite-bearing tactite
- Contact, showing dip (Dashed where approximately located)
- Strike and dip of beds
- Trench

FIG. 3

GEOLOGIC MAP OF MONTROSE (TUNGSTEN) PROPERTY, ELKO COUNTY, NEVADA

Contour Interval 20 feet

0 100 200 300 ft.
Scale

Geology by R.M. Smith & D.C. Loub

Phone Gentry 2/3/53 am
150' adit El. 7780 412 to 413
100' DD 7740 across 420 am
Total $6,000

0190 00116