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SURNAME:

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

Docket No. DMEA 2390 - Tungsten

August 18, 1952

Iron and Ferro-Alloy Division, DMEA

Cancellation of application.
Docket No. DMEA 2390 - Tungsten
Vasco No. 1 Mine
Boulder County, Colorado

The field team recommended that the application be approved and a contract granted.

Memorandum, dated August 7, 1952, from the field team, Region IV, advises that the application has been cancelled.

Also, the following information was taken from the Monthly Reports, Mining Division, Region IV, Bureau of Mines:

> June 21, 1952 to July 20, 1952 - A contract has been prepared, but the Operator does not desire to proceed with the work. The contract will be cancelled.

T. L. Chapman

TLChapman'lm
8/18/52

cc: Admn. Reading File
Docket
R. W. Geehan, USBM
D. M. Lemmon, USGS
G. C. Selfridge
T. L. Chapman

Field Report

Mining Division
Region IV

May 8, 1952

Memorandum

To: Field Team, Region IV

From: Acting Chief, Mining Division, Region IV

Subject: Final Report, DMA Docket 2390, Vasco No. 1 Tungsten Mine, Boulder County, Colorado

Enclosed are the original and eight copies of the final engineering report By R. L. Bolmer of the U. S. Bureau of Mines on the Vasco No. 1 tungsten mine.

The project is estimated to cost $25,000 and will explore the Henning vein and the Vasco No. 1 vein both of which are in a favorable area.

The field examiners recommend that the application be approved and we concur in their recommendation.

W. H. King
W. H. King

Enclosures

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
AUG 14 1952

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Region IV

Building 20
Denver Federal Center
Denver 14, Colorado
April 25, 1952

Mining Division
Date Rec'd.
APR 29 1952
BUREAU OF MINES
Denver, Colorado

Memorandum

To: Acting Chief, Mining Division, Region IV

From: Chief, Colorado Branch, Mining Division

Subject: DMEA 2390, Vanco No. 1 Tungsten Mine, Boulder County, Colorado

Please find enclosed the original and eight copies of an engineering report by R. L. Balmer on the above Defense Minerals Exploration Administration docket, together with an equal number of copies of the "Summary, Conclusions, and Recommendations", by Ogden Tweto and R. L. Balmer.

Balmer concludes that a revised exploration proposal estimated to cost $25,000.00 is justified. Two veins will be explored: the Henning vein, which has encouraging prospects, and the Vanco No. 1 vein, which is less promising but is still in a favorable area.

Drifting on the third level on the Vanco No. 1 vein has been reduced by the examiners from the 300 feet requested to 175 feet. This seems advisable. Sinking the shaft and drifting on the Vanco No. 1 vein from a new level ought to be contingent on findings in the drifting on the third level. If the drifting on the Henning vein on the third level develops ore, thought should be given to fourth level work on this vein. The same would be true of any ore found by the third level drifting on the Vanco No. 1 vein. In fact, drifting on the fourth level on the Vanco No. 1 vein might be in order, at least from an economical view, in preference to shaft sinking and work on a new level and, possibly as well as, drifting on the Vanco No. 1 vein on the third level, as Balmer has pointed out.

Paul H. Bennett's lease has to be assigned to the partnership and landlord's subordination agreements will have to be obtained.

I concur with Balmer's conclusions and recommendations.

Scott W. Hazen Jr.
Scott W. Hazen, Jr., for
W. M. Traver, Jr.

enclosures

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

200 New Customhouse
Denver 2, Colorado

April 23, 1962

Memorandum

To: DMEA Field Team, Region IV

From: A. H. Koschmann

Subject: DMEA Docket 2390, Vasco No. 1 Tungsten Mine, Boulder County, Colorado, Sewell, Bennett, et al., Applicants

Attached are 8 copies of the geological report by Ogden Tweto covering subject docket.

The subject property has been highly productive and in general, Tweto considers exploration in this mine promising. He recommends, without reservation, drifting 100 feet on the Morning vein on the 3rd level as proposed by the applicant. He also recommends extension of the 3rd level drift on the Vasco No. 1 vein 195 feet to the northeast, sinking the shaft 60 feet and drifting 300 feet northeast on the Vasco No. 1 vein with the last 150 feet of drifting to be contingent on results of the first 150 feet.

I concur with this recommendation.

The brochure is enclosed.

A. H. Koschmann
A. H. Koschmann
Supervising Geologist
Colorado-Wyoming

Enclosures (8)

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

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

DMEA 2390, Vasco No. 1 Mine

Boulder County, Colorado

Tungsten

Ogden Tweto, Geologist
U. S. Geological Survey

R. L. Bolmer, Mining Engineer
Bureau of Mines

April 23, 1952

DMEA 2390

VASCO NO. 1 TUNGSTEN MINE
BOULDER COUNTY, COLORADO

Summary, Conclusions, and Recommendations

By Ogden Tweto
Geologist
U. S. Geological Survey

and

R. L. Bolmer
Mining Engineer
Bureau of Mines

DMEA 2390

VASCO NO. 1 TUNGSTEN MINE
BOULDER COUNTY, COLORADO

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

By Ogden Tweto and R. L. Bolmer

The Vasco No. 1 mine is on the east flank of Hurricane Hill, about half a mile north of Tungsten village, in the western part of the Boulder County tungsten district, Colorado. The mine is owned by Hetzer Mines, Inc., and is leased by P. H. Bennett, one of the partners. Although relatively small and shallow, comprising a shaft 200 feet deep and four rather short levels, the mine has made an output of more than 15,000 units WO_3, chiefly from rich ore mined prior to 1914.

The mine is in mixed schist, gneiss, granite, and aplite. Most of the production has come from the Vasco No. 1 vein, from an ore shoot that extended from the surface to the third level. Within the last year a substantial output was made from the Henning vein, which branches into the footwall of the Vasco No. 1 vein, and, at the time of examination, a very good showing of ore (30-inch width of drift estimated to run 5 to 6 percent WO_3) had just been found on this vein on the second level, on the under side of a flat cross fault.

The applicant has submitted a loan request for a project estimated to cost $24,630.00, to drive a drift 100 feet on the Henning vein on the third level and drive a connecting raise from this drift to the second level, to extend the third level drift on the Vasco No. 1 vein 300 feet northeast, and to sink

the shaft 60 feet and drift 300 feet to the northeast on a new fifth level. The drift on the Henning vein is well warranted in view of the good showing of ore on this vein on the second level. The drift is recommended, but the raise is not recommended as it may not be needed for exploratory purposes. The proposals to drift northeast on the third level and to sink the shaft and drift on the fifth level are essentially wildcat ventures, but they would explore promising ground. They are recommended for approval with the exception that the third level drift be cut from 300 to 175 feet in order to stay within the property line, and that the decision to drift the last 150 feet on the new fifth level rest with the field team and be contingent upon results of the other work on this vein.

A project including (1) unwatering the mine and rehabilitating sections of the shaft now under water, (2) drifting 100 feet on the Henning vein on the third level, (3) extending the third level drift on the Vasco No. 1 vein 175 feet northeast, (4) sinking the shaft 70 feet, and (5) drifting 300 feet northeast on the Vasco No. 1 vein is recommended for approval. The cost of the project is estimated to be $25,000.00, of which the Government's share would be 75 percent, or $18,750.00.

VASCO NO. 1 TUNGSTEN MINE

BOULDER COUNTY, COLORADO

MENELL, DEMOTT, ET AL., APPLICANTS

DMEA DOCKET 2390

Geologic Report

By Ogden Tweto
U. S. Geological Survey
Denver, Colorado

VASCO NO. 1 TUNGSTEN MINE
BOULDER COUNTY, COLORADO

INTRODUCTION

The Vasco No. 1 mine is beside the Hurricane Hill road, on the east flank of Hurricane Hill, about half a mile north of Tungsten village, in the western part of the Boulder County tungsten district, Colorado. The mine is one of several on the so-called Vasco tract, a quarter section now owned by Betzer Mines, Inc. P. H. Bennett, one of the applicants, holds a lease (expiring in 1957) on approximately the north half of the tract. The Vasco No. 1 mine is in the northwest corner of the tract, only a few feet from the west line, and about 800 feet from the north line. Bennett also holds a lease on a portion of the 1308 claim (from M. F. Bonnelli) and a portion of the Leach claim (from Betzer Mines) both of which adjoin the Vasco tract on the west.

The Vasco No. 1 has been highly productive for so small and shallow a mine. The output prior to 1914 seems to have been at least 15,000 units WO_3. Minor output was made when the mine was open in 1916-18 and 1943. As shown in figure 1, the mine comprises an inclined shaft 221 feet deep and 4 rather short levels. The chief output came from the Vasco No. 1 vein from the surface down to the third level. During operations in 1945 and 1951, T. J. Henning discovered and developed a vein in the footwall of the Vasco No. 1 on the first level. For the past few months the applicants and present operators have been exploring the Henning vein by drifting on the second level and have recently encountered some good ore.

The applicants have requested an Exploration Loan for a project estimated to cost $24,630 to do about 100 feet of drifting on the Henning vein on the 3d level and drive a connecting raise to the 2d level, extend the drift on the Vasco No. 1 vein northeastward about 300 feet on the third level, sink the shaft 60 feet and drift northeastward 300 feet.

GEOLOGY

The Vasco No. 1 mine is in mixed rocks; schist, gneiss, aplite, and granite. In general, schist and gneiss predominate near the surface, and aplite and granite become more abundant at depth. The vein strikes northeast and dips northwest. Much of the vein has been stoped out, particularly east of the shaft and down to the third level. It is said that high grade ferberite two feet or more thick was found at places in this stope. The main ore shoot lay on each side of the shaft at the surface; it split just above the first level into two prongs, each of which was worked down to or a little below the 3d level. On the 4th level, and much of the 3d, the vein is a strong quartz vein between walls of hard, sericitized and silicified granite or gneiss; it contains many open spaces but is barren of ferberite.

The ore shoot on the Henning vein was about 40 feet long on the first level but narrowed and became leaner downward; only a narrow prong extended to the second level, although ferberite is present in the floor of the second level drift for a short distance beneath this stope. About 100 feet southwest of the Vasco No. 1 vein on the second level, the drift on the Henning vein cut a flat fault that displaces the vein a few feet. Under this fault, the vein contains good ore. At the time of examination,

3 or 4 rounds had been driven beyond the fault, and at the breast the vein contained a 4-inch streak of ferberite, plus many smaller veinlets in a zone 18-24 inches wide. The drift face, about 30 inches wide, was estimated to run 5 to 6 percent WO_3.

CONCLUSIONS

In view of the excellent showing of ore on the Henning vein below, or southwest, of the flat fault on the second level, the proposed drift on the Henning vein on the 3d level is a promising prospect. The vein is exposed in the footwall crosscut on the 3d level, where it is a 4-inch sheared zone with spots of horn quartz. The flat fault is exposed near the breast of the crosscut (fig. 1). The flat fault should intersect the vein at a distance of 25 to 40 feet from the beginning of the proposed drift on the Henning vein. The applicants propose to drive the drift 100 feet and put up a 40 foot raise to the 2d level from the drift. The drift is recommended for approval; the raise should not be needed for exploration purposes if ore is found in the drift, and it is therefore recommended for tentative denial.

The proposals to extend the 3d level drift northeast 300 feet and to sink the shaft and drift are harder to appraise and in general are less attractive than the project on the Henning vein. Both these proposals are wildcat ventures. Arguments in favor of driving the 3d level northeastward are: (1) The drift would be largely in granite and would intersect aplite dikes known at the surface; many ore bodies in this area are localized where veins cross aplite dikes in granite. (2) The vein is a strong quartz vein both at the present breast on the 3d level

and at the surface, where it is marked by abundant quartz "float" and is reported to have yielded some ferberite "float." (3) About 150 feet ahead of the present breast, the Yasso No. 1 vein should intersect the strong Lincoln-Payrock vein; such an intersection might localize an ore shoot. Arguments in favor of sinking 60 feet and drifting northeast are: (1) Although the 4th level is essentially barren, the vein is strong and quartz-bearing, and in hard wallrocks; further work on such a vein might reveal tungsten in any round. (2) The mine is shallow for one of such relatively high productivity, and the bottom level is as much as 500 feet higher than some mined orebodies in nearby mines. Nothing is known that is geologically adverse to an orebody below the present workings, and only exploration will determine whether one exists.

In summary, there can be no assurance that the proposals to drive the 3d level northeastward and to sink the shaft and drift northeastward will lead to a discovery, but the areas concerned are good places to do wildcat prospecting; therefore, applying the philosophy that without searching in such geologically favorable areas no ore will be found, the two proposals are recommended for approval. The applicants have proposed to drift 300 feet on each of the two levels concerned. The distance on the 3d level should be cut to 175 feet, which would bring the drift to within a few feet of the property line. There is ample room for a drift of 300 feet on the proposed 5th level.

RECOMMENDATIONS

A project to include (1) drifting 100 feet on the Denning vein on the 3d level, as shown in figure 1, (2) extending the 3d level drift on

the Vasco No. 1 vein 175 feet to the northeast, and (3) sinking the shaft 60 feet and drifting 300 feet northeast on the Vasco No. 1 vein, with the last 150 feet of drifting to be contingent on what is found in the first 150 feet, is recommended for approval. The cost of this project is estimated to be $25,000 in the accompanying engineering report (Government participation 75%, or $18,750).

DMEA 2390

VASCO NO. 1 TUNGSTEN MINE
BOULDER COUNTY, COLORADO

Engineering Report

By R. L. Bolmer
Mining Engineer
Bureau of Mines

DMEA 2390

VASCO NO. 1 TUNGSTEN MINE
BOULDER COUNTY, COLORADO

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DMEA 2390

VASCO NO. 1 TUNGSTEN MINE
BOULDER COUNTY, COLORADO

ENGINEERING REPORT

By

R. L. Bolmer

INTRODUCTION

Bennett and Newell Mines, a partnership, has submitted an application for aid under the Defense Production Act of 1950 for an exploration project at the Vasco No. 1 tungsten mine in Boulder County, Colo. The application, dated January 10, 1952, has been assigned docket number DMEA 2390.

The project, as proposed by the applicant, would explore two veins both laterally and in depth in the No. 1 mine at an estimated cost of $24,630.00. In detail, the proposal involves (1) drifting 100 feet to the south and raising 40 feet on the Henning vein off the third level of the mine, (2) extending a third level drift on the Vasco No. 1 vein 300 feet northeast, and (3) sinking the existing shaft an additional 60 feet and drifting 300 feet northeast on a new fifth level.

The applicant's proposal has been modified to a slight extent in the accompanying geological report. Costs of the modified proposal have been outlined in this report and are estimated at $25,000.00.

LOCATION, TOPOGRAPHY, AND PHYSICAL FEATURES

The Vasco No. 1 mine is in the NW1/4SW1/4, sec. 8, T. 1 S., R. 72 W., sixth principal meridian, Boulder County, Colo. It is located on the east flank of Hurricane Hill about half a mile north of the village of Tungsten, in the western portion of the Boulder tungsten district (fig. 1). The mine is accessible from either Boulder or Nederland via State Highway 119 and a mine road. State Highway 119 is a surfaced, all-weather road. The mine road is maintained by the county and should be passable all year.

The elevation of the mine is 8,500 feet. Climatic conditions at this elevation may be severe during the winters, but, in the past, mines in the area generally have been able to operate the year around. The area is typical of the eastern slope of the Front Range at this altitude, being characterized by a rounded, mountainous terrain cut by steep, narrow canyons.

Boulder, 12 miles east on State Highway 119, is the nearest commercial center and shipping point. Nederland, the mining and milling center of the district, is 2 miles to the southwest. Power lines of the Public Service Company of Colorado are extended on to the property. Timber for general mining purposes is not available on the property but it can be secured from local saw mills. Water, sufficient for mining operations, is made by the mine.

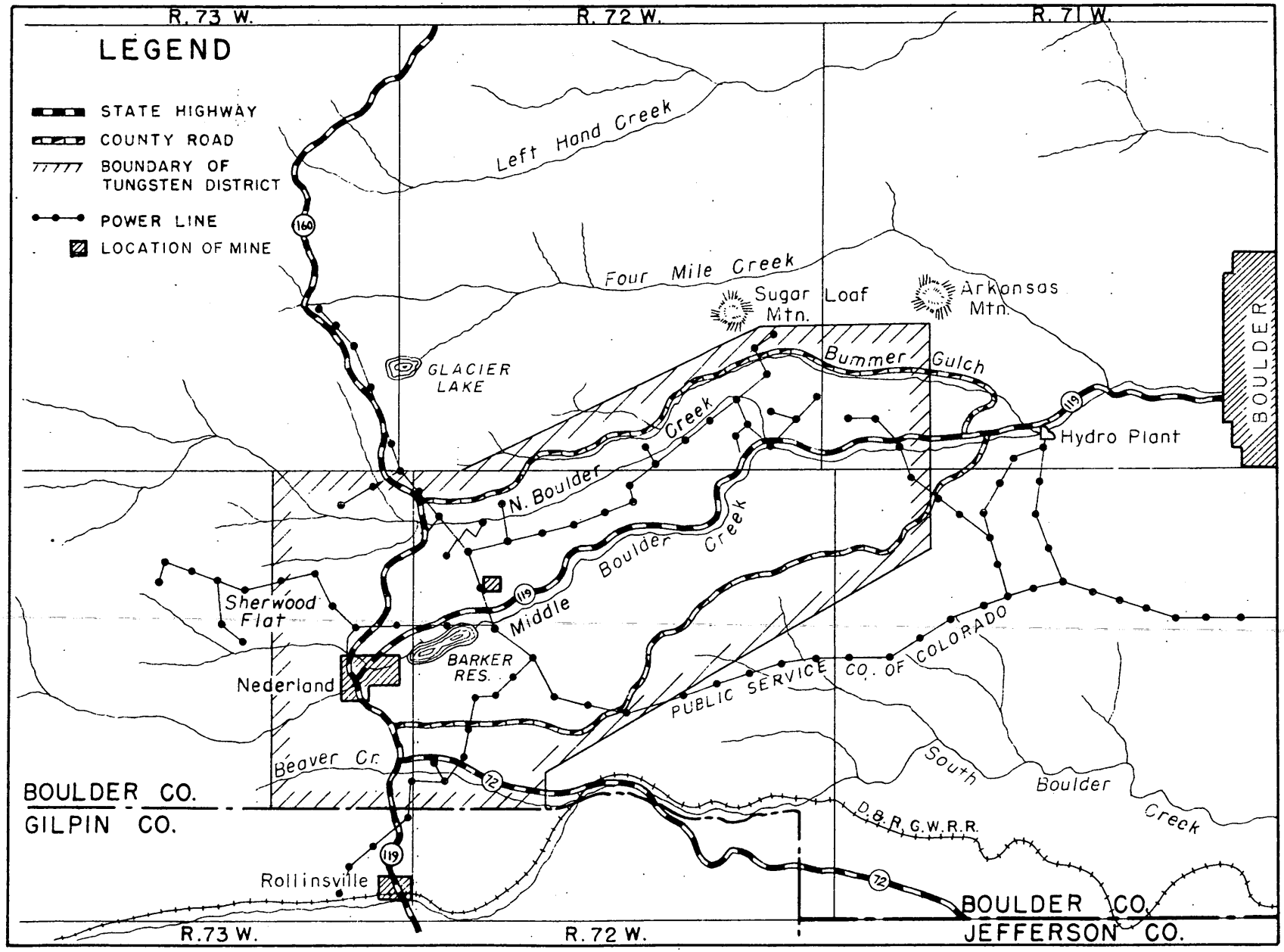

FIG. 1-LOCATION MAP, VASCO NO. 1 MINE, BOULDER CO. COLO., DMEA 2390

HISTORY AND PRODUCTION

Tungsten was discovered in 1905 at what was later to become the Vasco No. 5 mine and the discovery of the Nos. 1, 2, 3, 4, 7, 8, and 10 mines followed rapidly. The patented agricultural tract containing these discoveries was purchased in 1915-16 by the Vanadium Alloy Steel Corporation. It operated the mines continuously until 1919. Production in excess of $2,000,000 was reported.

In 1925 the property was sold to the Tungsten Production Company. The Vasco No. 6 mine was developed and it alone produced over $1,000,000 in ore. Spasmodic work was performed in several of these mines during World War II but these small, high-cost, lessee operations were shut down when the Metal Reserve Corporation stopped buying tungsten ores.

The property was purchased by the present owner, Hetzer Mines, Inc., in 1950. The mines have been leased in part since that time. Production from the No. 1 mine has been reported in excess of 15,000 units WO_3. Most of this was from rich ore mined prior to 1914. Lessees of the mine in 1951 are reported to have produced ore valued at $15,000.

OWNERSHIP AND EXTENT

Hetzer Mines, Inc., owner of the Vasco tract comprising the SW1/4 sec. 8, T. 1 S., R. 72 W., has leased to Paul H. Bennett, one of the applicant partners, that northwest portion of the tract containing the Vasco No. 1 mine. This property is more fully described in the mining lease, a copy of which is attached to the application.

The No. 1 mine is in the northwest corner of the tract under lease only a few feet from the west line. The veins strike southwest into section 7. Bennett has obtained a lease on a portion of two claims which cover the vein extension into section 7. Hetzer Mines has leased him a portion of the Loach lode mining claim, survey number 19049, adjoining the Vasco tract in section 7. He is also the lessee of a portion of the 1905 mining claim, survey number 19959, in section 7, which adjoins both the Vasco tract and the Loach claim (fig. 2). His lease from Hetzer Mines is for a term of 5 years or until August 1, 1956. His lease on the 1905 claim is for one year or until January 20, 1953, with a one-year's renewal option. Both leases call for a royalty of 15 percent to be paid on any ore produced.

Bennett must assign his interest in these leases to the partnership and landlord's subordination agreements must be obtained from the property owners before a contract can be let.

DESCRIPTION OF THE DEPOSITS

The Vasco No. 1 vein strikes northeast-southwest and dips steeply northwest in a mixed schist and granite wall rock. It is a quartz vein which has been explored laterally for over 400 feet and in depth for about 200 feet. An ore shoot of high-grade ferberite (reported 2 feet or more in thickness) was mined for about 150 feet from the surface. On the surface, the shoot was about 250 feet in length and lay on each side of the shaft. The body split just above the first level and each split was

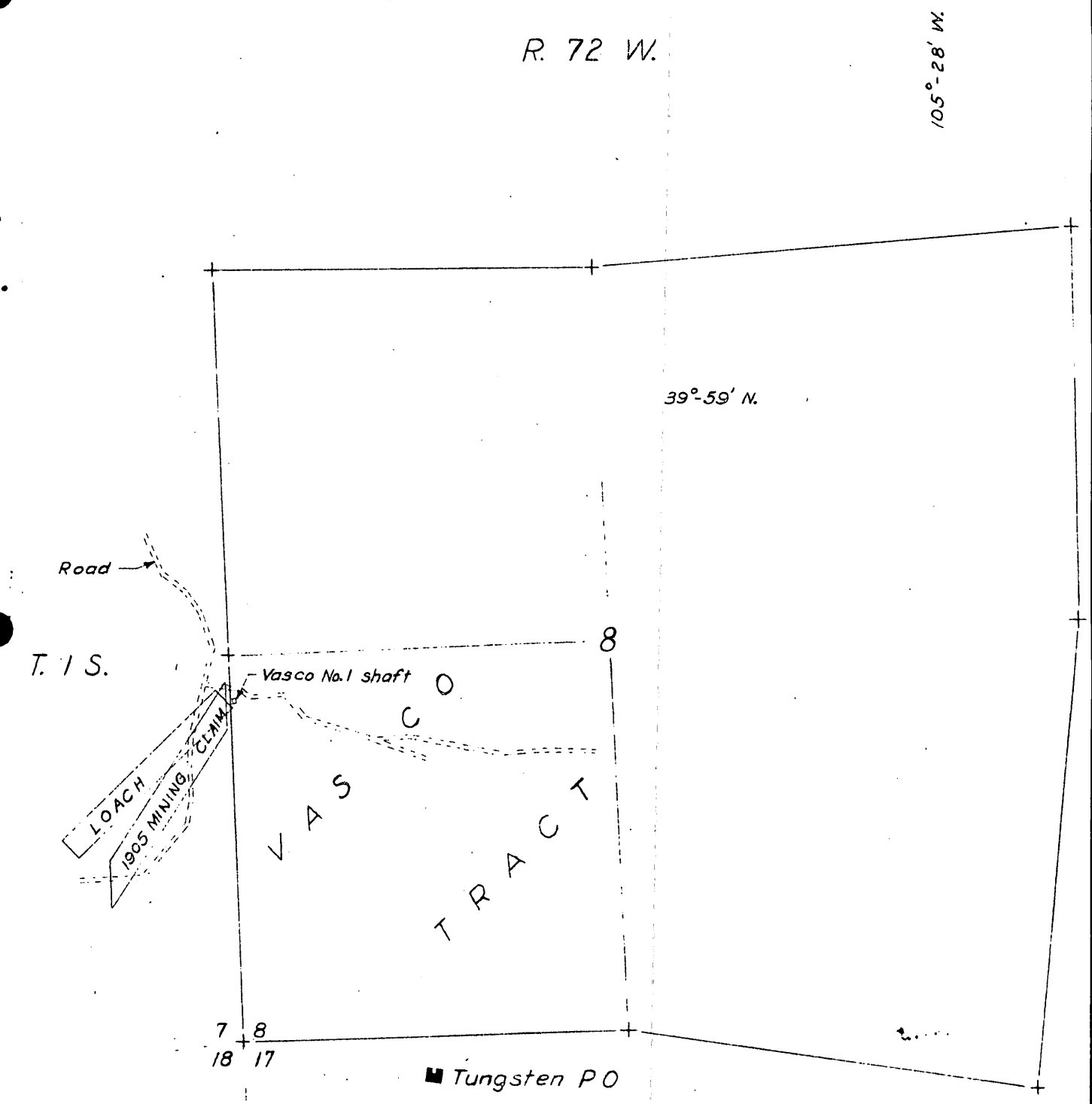

Figure 2 - Sketch showing property under lease
Bennett & Newell Mines - DMEA 2390 (Vasco No. 1 mine)

stoped down to or a little below the third level. Below here and towards the northeast, the vein is strong but barren of ferberite. The vein weakens towards the southwest.

The Henning vein, in the footwall of the No. 1 vein, strikes nearly north-south and dips easterly. An ore shoot was stoped for about 40 feet along the first level but it pinched out just below the second level. A second level drift on this vein disclosed a flat fault that displaced the vein a few feet. Below this fault, the Henning vein contains good ore. The present operators are extending the drift beyond the fault and the advance has been reported in good ore.

ORE RESERVES

Except for the recent disclosure of ore on the Henning vein, minable ore reserves are nonexistent in the mine. The full extent of the Henning discovery is yet to be established; however, it does indicate the occurrence of ore with depth in one section on the Henning vein. Reserves discovered heretofore on the Vasco No. 1 vein have been depleted. The No. 1 vein probably extends laterally and in depth beyond existing mine development. Ore might be inferred along such vein projection but, except for one large ore shoot, all development on this vein has shown it to be barren.

PRESENT STATUS

Exploration and Development

Figure 1 of the accompanying geological report shows the existing development of the Vasco No. 1 mine. The mine is opened

by a 220-foot inclined shaft sunk on the No. 1 vein. Four level drifts driven at 50- to 80-foot intervals developed the vein northeast and southwest off the shaft. Crosscuts into the footwall from the first, second, and third level drifts cut the Henning vein which was explored by drifting on the first and second levels. Several crosscuts were driven into both the foot and hanging walls of the No. 1 vein from the various levels but, for the most part, these disclosed nothing of importance.

The present operators have rehabilitated and unwatered the shaft to about the third or 150-foot level. On the first level, they are extending southwest a drift on the No. 1 vein. On the second level, they are drifting to the south on the Henning vein.

Mining and Milling Equipment and Other Facilities

The following equipment and facilities are in use at the mine and will be available for use of the proposed project:

Shaft house and headframe
15 horsepower electric hoist (cable capacity, 400 feet)
180 c.f.m. electric air compressor
3-1/2- by 6-foot air receiver
Stoper and drifter with accessories

Facilities for milling are not available at the mine. Any ore produced will be sold to the custom mill of the Vanadium Corporation of America in Nederland.

PROJECT PROPOSALS, WITH COSTS

The applicant proposes to explore the Henning vein on the third level of the mine by a 100-foot drift and by a 40-foot raise connecting into the level above (fig. 3). In the accompanying

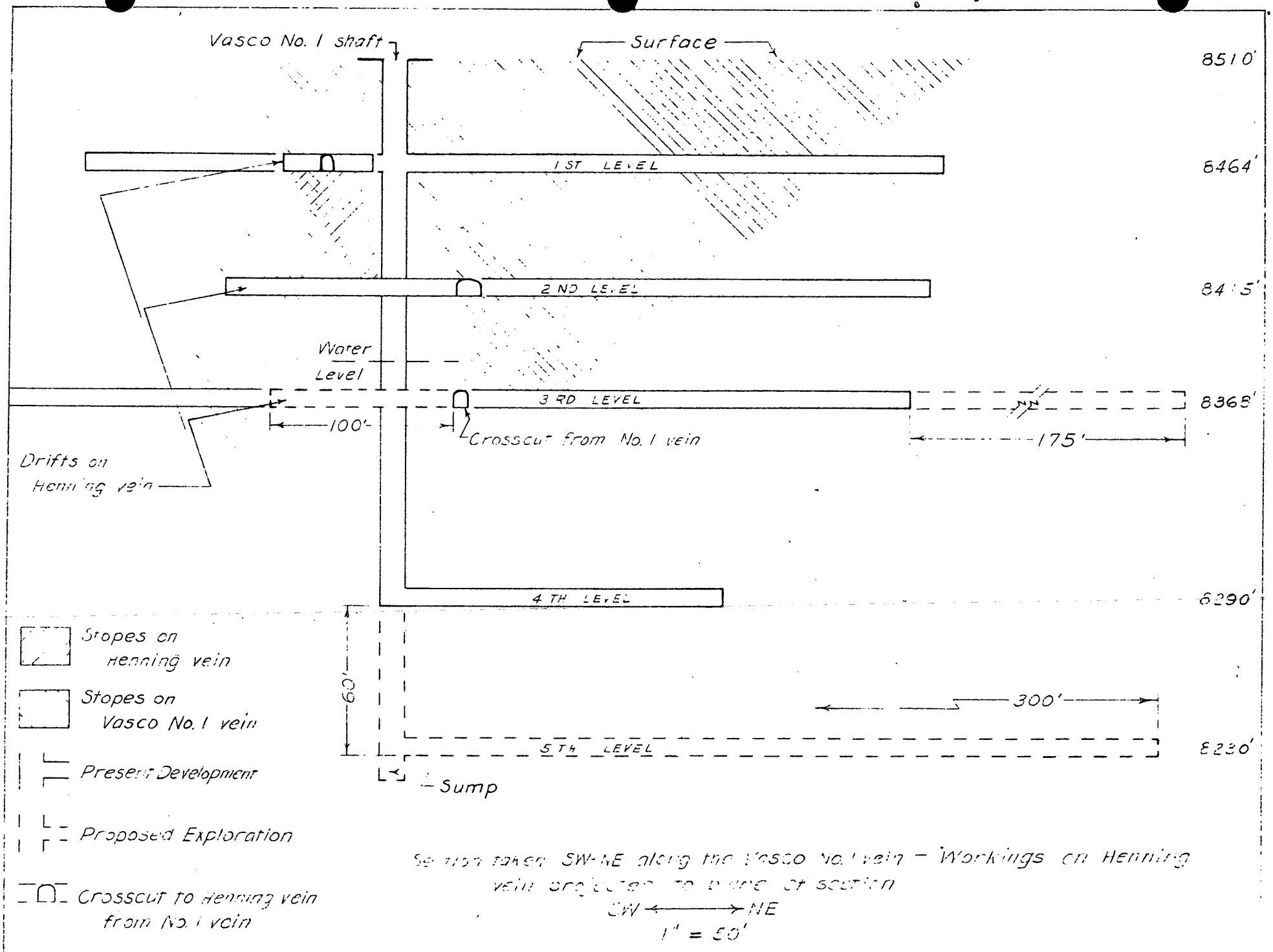

Figure 3 – Vertical section of the Vasco No. 1 mine, Boulder Co., Colo. DWEA-2390

geological report, the proposed drift is considered a promising prospect. It is further considered that the proposed raising would not increase the exploration potential appreciably and therefore it has been deleted from the applicant's proposal.

The applicant also proposes exploration of the No. 1 vein by (1) extending the third level drift on that vein 300 feet northeast and (2) deepening the shaft 60 feet and drifting on a new fifth level 300 feet northeast. Exploration of the No. 1 vein is considered less promising. The proposed 300-foot extension of the third level drift has been reduced to 175 feet in order to keep the work within the property line. The lower levels of the mine are under water and a certain amount of rehabilitation work in the shaft will be required after the mine has been unwatered.

Summary of Proposed Work (as modified)

	Estimated time (working days)
Install pumping facilities, unwater mine, rehabilitate shaft from 150 to 220 feet	12 days
Deepen shaft 70 feet (10-foot sump included)	40 days*
Drift a total of 575 feet	113 days*
	165 days or approximately 7 months

*Double shift.

A foreman who doubles as a hoistman, a mine-timberman, and one underground laborer will be needed to complete rehabilitation work. A double shift will be employed while sinking and drifting. Besides the foreman, two miner-timbermen and three underground laborers will be required; a laborer will assist a miner-timberman

on each shift and the third laborer will operate the hoist, perform surface work, and so forth on the second shift.

Labor requirements:

1	Foreman (doubles as hoistman, surface man)	$2.00 per hour
2	Combination miner and timberman	1.75 per hour
3	Underground laborers	1.50 per hour

In the following estimate of costs, a 6-day work week was considered; overtime payment for work over 40 hours a week has been included.

Estimated Costs

	Rehabilitation	Sinking	Drifting
Labor:			
Foreman	$ 242.62	$ 693.20	$ 1,958.22
Miner-timbermen	212.24	1,212.80	3,426.16
Laborers	182.00	1,560.00	4,407.00
Compensation insurance, OAB, etc.	23.14	154.00	433.62
Total labor	$ 660.00	$3,620.00	$10,225.00
Supplies:			
Pipe	$ 130.00	$ 70.00	$ 250.00
Track	-	-	600.00
Explosives	-	350.00	1,700.00
Drill steel, bits	-	150.00	875.00
Timber	100.00	130.00	150.00
Tools, repair parts, misc.	35.00	100.00	525.00
Total supplies	$ 265.00	$ 800.00	$ 4,100.00
Power:	$ 75.00	$ 480.00	$ 675.00
Total direct cost	$1,000.00	$4,900.00	$15,000.00

Estimated cost of equipment:

Depreciation allowance for equipment furnished by applicant:

Drifter,	4 months at	$10.00 =	$ 40.00
Compressor,	7 months at	$100.00 =	700.00
Hoist,	7 months at	$25.00 =	175.00
2 Mine cars,	7 months at	$10.00 =	70.00
			$985.00

To be purchased:

350 feet, 3-conductor, electric cable	$350.00

To be rented:

2-inch centrifugal pump, motor,	7 months at	$60.00 =	$420.00
Drifter (only if needed),	4 months at	$75.00 =	300.00
Sinker,	2 months at	$50.00 =	100.00
35 horsepower motor, starter for hoist,	7 months at	$60.00 =	420.00
Mucking machine,	6 months at	$225.00 =	1,350.00
			$2,590.00

The only other service deemed necessary for the proposed project is bookkeeping. An allowance of $25.00 per month is included for this service.

Summary of Estimated Project Costs

Rehabilitation		$ 1,000.00
Sinking		4,900.00
Drifting		15,000.00
Equipment:	Depreciation	985.00
	Purchase	350.00
	Rental	2,590.00
Bookkeeping		175.00
Estimated total cost		$25,000.00

The exploration value of a single drift would not equal that of the proposed work but it should be sufficient to evaluate this section of the vein and determine whether additional work is warranted.

The value which could be derived from the applicant's proposal might outweigh the economies of drifting only on the fourth level. Serious objections, therefore, are not raised to the applicant's proposal; however, it is essentially a wildcat venture and the completion of all the proposed exploration should be contingent upon results obtained from the initial portions of the work.

Only 150 feet of drifting on the new fifth level seem warranted under present conditions. Decision to drift the remaining distance on this level should rest with the field team and be contingent upon results of the other work on the vein. Drifting the last 150 feet on this level thus might be deleted from the project if conditions warrant, or work of an equivalent cost could be substituted should more favorable locations be discovered.

RECOMMENDATIONS

The proposed exploration project at the Vasco No. 1 tungsten mine, as submitted by Bennett and Newell Mines and as modified in this report, has been estimated to cost $25,000.00. The project, as detailed below, is recommended for approval in this amount.

(1) Unwater the lower levels of the mine and perform necessary rehabilitation on the sections of the Vasco No. 1 shaft now under water.

(2) Drift 100 feet to the south on the Henning vein off the third level of the mine.

(3) Extend a third level drift on the No. 1 vein 175 feet to the northeast.

(4) Deepen the No. 1 shaft 70 feet.

(5) Drive a new fifth level drift on the No. 1 vein for a distance of 300 feet northeast from the shaft and approximately 60 feet below the fourth level (the decision to complete the last 150 feet of this drift is to rest with the field team).

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : Docket No. DMEA 2390 - Tungsten

DATE: August 18, 1952

FROM : Iron and Ferro-Alloy Division, DMEA

SUBJECT: Cancellation of application.
Docket No. DMEA 2390 - Tungsten
Vasco No. 1 Mine
Boulder County, Colorado

The field team recommended that the application be approved and a contract granted.

Memorandum, dated August 7, 1952, from the field team, Region IV, advises that the application has been cancelled.

Also, the following information was taken from the Monthly Reports, Mining Division, Region IV, Bureau of Mines:

> June 21, 1952 to July 20, 1952 - A contract has been prepared, but the Operator does not desire to proceed with the work. The contract will be cancelled.

T. L. Chapman

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

August 7, 1952

Memorandum

To: Administrator, Defense Minerals Exploration Administration Attention: 210

From: Field Team, Region IV

Subject: Final Report, DMEA Docket 2390 (Tungsten), Vasco No. 1 Mine, Boulder County, Colorado

Enclosed are four copies of the report on DMEA-2390.

The application has been cancelled.

W. H. King

W. H. King

A. H. Koschmann

A. H. Koschmann

Enclosure

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

May 8, 1952

Memorandum

To: Acting Administrator, Defense Minerals Exploration Administration - Attention: Code 210

From: Field Team, Region IV

Subject: Final Report, DMEA Docket 2390, Vasco No. 1 Tungsten Mine, Boulder County, Colorado

Exploration assistance in the amount of $25,000 has been approved and the contract will be prepared by this office.

Four copies of the report will be forwarded you when the contract is signed.

The original and one copy of Form 3b is attached.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 12 1952

W. H. King
W. H. King for
J. H. East, Jr.

A. H. Koschmann
A. H. Koschmann

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

May 8, 1952

Memorandum

To: Acting Administrator, Defense Minerals Exploration Administration - Attention: Code 210

From: Field Team, Region IV

Subject: Final Report, DMEA Docket 2390, Vasco No. 1 Tungsten Mine, Boulder County, Colorado

Exploration assistance in the amount of $25,000 has been approved and the contract will be prepared by this office.

Four copies of the report will be forwarded you when the contract is signed.

The original and one copy of Form 3b is attached.

W. H. King
W. H. King for
J. H. East, Jr.

A. H. Koschmann
A. H. Koschmann

Mining Division
Region IV

May 8, 1952

Memorandum

To: Field Team, Region IV

From: Acting Chief, Mining Division, Region IV

Subject: Final Report, DMA Docket 2370, Vasco No. 1 Tungsten Mine, Boulder County, Colorado

Enclosed are the original and eight copies of the final engineering report by R. L. Bolmer of the U. S. Bureau of Mines on the Vasco No. 1 tungsten mine.

The project is estimated to cost $25,000 and will explore the Henning vein and the Vasco No. 1 vein both of which are in a favorable area.

The field examiners recommend that the application be approved and we concur in their recommendation.

W. H. King

W. H. King

Enclosures

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
AUG 14 1952

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Region IV

Building 20
Denver Federal Center
Denver 14, Colorado
April 25, 1952

Mining Division
Date Rec'd.
APR 25 1952
BUREAU OF MINES
Denver, Colorado

Memorandum

To: Acting Chief, Mining Division, Region IV

From: Chief, Colorado Branch, Mining Division

Subject: DMEA 2390, Vasco No. 1 Tungsten Mine, Boulder County, Colorado

Please find enclosed the original and eight copies of an engineering report by R. L. Palmer on the above Defense Minerals Exploration Administration docket, together with an equal number of copies of the "Summary, Conclusions, and Recommendations", by Ogden Tweto and R. L. Palmer.

Palmer concludes that a revised exploration proposal estimated to cost $25,000.00 is justified. Two veins will be explored: the Henning vein, which has encouraging prospects, and the Vasco No. 1 vein, which is less promising but is still in a favorable area.

Drifting on the third level on the Vasco No. 1 vein has been reduced by the amendment from 300 feet requested to 175 feet. This seems advisable. Sinking the shaft and drifting on the Vasco No. 1 vein from a new level ought to be contingent on findings in the drifting on the third level. If the drifting on the Henning vein on the third level develops ore, thought should be given to fourth level work on this vein. The same would be true of any ore found by the third level drifting on the Vasco No. 1 vein. In fact, drifting on the fourth level on the Vasco No. 1 vein might be in order, at least from an economical view, in preference to shaft sinking and work on a new level and, possibly as well as, drifting on the Vasco No. 1 vein on the third level, as Palmer has pointed out.

Paul E. Bennett's lease has to be assigned to the partnership and landlord's subordination agreements will have to be obtained.

I concur with Palmer's conclusions and recommendations.

Scott W. Hazen Jr.
Scott W. Hazen, Jr., for
W. M. Traver, Jr.

enclosures

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

200 New Customhouse
Denver 2, Colorado

April 25, 1952

Memorandum

To: DMTA Field Team, Region IV

From: A. H. Koschmann

Subject: DMTA Docket 2590, Vasco No. 1 Tungsten Mine, Boulder County, Colorado, Sewell, Jeannett, et al., Applicants

Attached are 8 copies of the geological report by Ogden Tweto covering subject docket.

The subject property has been highly productive and in general, Tweto considers exploration in this mine promising. He recommends, without reservation, drifting 100 feet on the Morning vein on the 3rd level as proposed by the applicant. He also recommends extension of the 3rd level drift on the Vasco No. 1 vein 105 feet to the northeast, sinking the shaft 60 feet and drifting 300 feet northeast on the Vasco No. 1 vein with the last 100 feet of drifting to be contingent on results of the first 150 feet.

I concur with this recommendation.

The brochure is enclosed.

A. H. Koschmann
A. H. Koschmann
Supervising Geologist
Colorado-Wyoming

Enclosures (8)

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

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

DMEA 2390, Vasco No. 1 Mine

Boulder County, Colorado

Tungsten

Ogden Tweto, Geologist
U. S. Geological Survey

R. L. Bolmer, Mining Engineer
Bureau of Mines

April 23, 1952

DMEA 2390

VASCO NO. 1 TUNGSTEN MINE
BOULDER COUNTY, COLORADO

Summary, Conclusions, and Recommendations

By Ogden Tweto
Geologist
U. S. Geological Survey

and

R. L. Bolmer
Mining Engineer
Bureau of Mines

DMEA 2390

VASCO NO. 1 TUNGSTEN MINE
BOULDER COUNTY, COLORADO

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

By Ogden Tweto and R. L. Bolmer

The Vasco No. 1 mine is on the east flank of Hurricane Hill, about half a mile north of Tungsten village, in the western part of the Boulder County tungsten district, Colorado. The mine is owned by Hetzer Mines, Inc., and is leased by Bennett, one of the partners. Although relatively small and shallow, comprising a shaft 200 feet deep and four rather short levels, the mine has made an output of more than 15,000 units WO_3, chiefly from rich ore mined prior to 1914.

The mine is in mixed schist, gneiss, granite, and aplite. Most of the production has come from the Vasco No. 1 vein, from an ore shoot that extended from the surface to the third level. Within the last year a substantial output was made from the Henning vein, which branches into the footwall of the Vasco No. 1 vein, and, at the time of examination, a very good showing of ore (30-inch width of drift estimated to run 5 to 6 percent WO_3) had just been found on this vein on the second level, on the under side of a flat cross fault.

The applicant has submitted a loan request for a project estimated to cost $24,630.00, to drive a drift 100 feet on the Henning vein on the third level and drive a connecting raise from this drift to the second level, to extend the third level drift on the Vasco No. 1 vein 300 feet northeast, and to sink

the shaft 60 feet and drift 300 feet to the northeast on a new fifth level. The drift on the Henning vein is well warranted in view of the good showing of ore on this vein on the second level. The drift is recommended, but the raise is not recommended as it may not be needed for exploratory purposes. The proposals to drift northeast on the third level and to sink the shaft and drift on the fifth level are essentially wildcat ventures, but they would explore promising ground. They are recommended for approval with the exception that the third level drift be cut from 300 to 175 feet in order to stay within the property line, and that the decision to drift the last 150 feet on the new fifth level rest with the field team and be contingent upon results of the other work on this vein.

A project including (1) unwatering the mine and rehabilitating sections of the shaft now under water, (2) drifting 100 feet on the Henning vein on the third level, (3) extending the third level drift on the Vasco No. 1 vein 175 feet northeast, (4) sinking the shaft 70 feet, and (5) drifting 300 feet northeast on the Vasco No. 1 vein is recommended for approval. The cost of the project is estimated to be $25,000.00, of which the Government's share would be 75 percent, or $18,750.00.

VASCO NO. 1 TOMISON RIDGE

BOULDER COUNTY, COLORADO

MERELL, BENNETT, ET AL., APPLICANTS

DWRA DOCKET 2390

Geologic Report

By Ogden Tweto
U. S. Geological Survey
Denver, Colorado

VASCO NO. 1 TUNGSTEN MINE
BOULDER COUNTY, COLORADO

INTRODUCTION

The Vasco No. 1 mine is beside the Hurricane Hill road, on the east flank of Hurricane Hill, about half a mile north of Tungsten village, in the western part of the Boulder County tungsten district, Colorado. The mine is one of several on the so-called Vasco tract, a quarter section now owned by Metzer Mines, Inc. P. H. Bennett, one of the applicants, holds a lease (expiring in 1957) on approximately the north half of the tract. The Vasco No. 1 mine is in the northwest corner of the tract, only a few feet from the west line, and about 300 feet from the north line. Bennett also holds a lease on a portion of the 1900 claim (from E. F. Connelli) and a portion of the Leach claim (from Metzer Mines) both of which adjoin the Vasco tract on the west.

The Vasco No. 1 has been highly productive for so small and shallow a mine. The output prior to 1914 seems to have been at least 16,000 units WO_3. Minor output was made when the mine was open in 1916-18 and 1943. As shown in figure 1, the mine comprises an inclined shaft 221 feet deep and 4 rather short levels. The chief output came from the Vasco No. 1 vein from the surface down to the third level. During operations in 1945 and 1951, F. J. Henning discovered and developed a vein in the footwall of the Vasco No. 1 on the first level. For the past few months the applicants and present operators have been exploring the Henning vein by drifting on the second level and have recently encountered some good ore.

The applicants have requested an Exploration Loan for a project estimated to cost $24,630 to do about 100 feet of drifting on the Henning vein on the 3d level and drive a connecting raise to the 2d level, extend the drift on the Vasco No. 1 vein northeastward about 300 feet on the third level, sink the shaft 60 feet and drift northeastward 300 feet.

GEOLOGY

The Vasco No. 1 mine is in mixed rocks: schist, gneiss, aplite, and granite. In general, schist and gneiss predominate near the surface, and aplite and granite become more abundant at depth. The vein strikes northeast and dips northwest. Much of the vein has been stoped out, particularly east of the shaft and down to the third level. It is said that high grade ferberite two feet or more thick was found at places in this stope. The main ore shoot lay on each side of the shaft at the surface; it split just above the first level into two prongs, each of which was worked down to or a little below the 3d level. On the 4th level, and much of the 3d, the vein is a strong quartz vein between walls of hard, sericitized and silicified granite or gneiss; it contains many open spaces but is barren of ferberite.

The ore shoot on the Henning vein was about 40 feet long on the first level but narrowed and became leaner downward; only a narrow prong extended to the second level, although ferberite is present in the floor of the second level drift for a short distance beneath this stope. About 100 feet southwest of the Vasco No. 1 vein on the second level, the drift on the Henning vein cut a flat fault that displaces the vein a few feet. Under this fault, the vein contains good ore. At the time of examination,

3 or 4 rounds had been driven beyond the fault, and at the breast the vein contained a 4-inch streak of ferberite, plus many smaller veinlets in a zone 18-24 inches wide. The drift face, about 30 inches wide, was estimated to run 5 to 6 percent WO_3.

CONCLUSIONS

In view of the excellent showing of ore on the Henning vein below, or southwest, of the flat fault on the second level, the proposed drift on the Henning vein on the 3d level is a promising prospect. The vein is exposed in the footwall crosscut on the 3d level, where it is a 4-inch sheared zone with spots of horn quartz. The flat fault is exposed near the breast of the crosscut (fig. 1). The flat fault should intersect the vein at a distance of 25 to 40 feet from the beginning of the proposed drift on the Henning vein. The applicants propose to drive the drift 100 feet and put up a 40 foot raise to the 2d level from the drift. The drift is recommended for approval; the raise should not be needed for exploration purposes if ore is found in the drift, and it is therefore recommended for tentative denial.

The proposals to extend the 3d level drift northeast 300 feet and to sink the shaft and drift are harder to appraise and in general are less attractive than the project on the Henning vein. Both these proposals are wildcat ventures. Arguments in favor of driving the 3d level northeastward are: (1) The drift would be largely in granite and would intersect aplite dikes known at the surface; many ore bodies in this area are localized where veins cross aplite dikes in granite. (2) The vein is a strong quartz vein both at the present breast on the 3d level

and at the surface, where it is marked by abundant quartz "float" and is reported to have yielded some ferberite "float." (3) About 100 feet ahead of the present breast, the Vasco No. 1 vein should intersect the strong Lincoln-Payrock vein; such an intersection might localize an ore shoot. Arguments in favor of sinking 50 feet and drifting northeast are: (1) Although the 4th level is essentially barren, the vein is strong and quartz-bearing, and in hard wallrocks; further work on such a vein might reveal tungsten in any round. (2) The mine is shallow for one of such relatively high productivity, and the bottom level is as much as 600 feet higher than some mined orebodies in nearby mines. Nothing is known that is geologically adverse to an orebody below the present workings, and only exploration will determine whether one exists.

In summary, there can be no assurance that the proposals to drive the 3d level northeastward and to sink the shaft and drift northeastward will lead to a discovery, but the areas concerned are good places to do wildcat prospecting; therefore, applying the philosophy that without searching in such geologically favorable areas no ore will be found, the two proposals are recommended for approval. The applicants have proposed to drift 300 feet on each of the two levels concerned. The distance on the 3d level should be cut to 175 feet, which would bring the drift to within a few feet of the property line. There is ample room for a drift of 300 feet on the proposed 5th level.

RECOMMENDATIONS

A project to include (1) drifting 100 feet on the Henning vein on the 3d level, as shown in figure 1, (2) extending the 3d level drift on

the Vasco No. 1 vein 175 feet to the northeast, and (3) sinking the shaft 60 feet and drifting 300 feet northeast on the Vasco No. 1 vein, with the last 150 feet of drifting to be contingent on what is found in the first 150 feet, is recommended for approval. The cost of this project is estimated to be $25,000 in the accompanying engineering report (Government participation 75%, or $18,750).

DMEA 2390

VASCO NO. 1 TUNGSTEN MINE
BOULDER COUNTY, COLORADO

Engineering Report

By R. L. Bolmer
Mining Engineer
Bureau of Mines

DMEA 2390

VASCO NO. 1 TUNGSTEN MINE
BOULDER COUNTY, COLORADO

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DMEA 2390

VASCO NO. 1 TUNGSTEN MINE
BOULDER COUNTY, COLORADO

ENGINEERING REPORT

By

R. L. Bolmer

INTRODUCTION

Bennett and Newell Mines, a partnership, has submitted an application for aid under the Defense Production Act of 1950 for an exploration project at the Vasco No. 1 tungsten mine in Boulder County, Colo. The application, dated January 10, 1952, has been assigned docket number DMEA 2390.

The project, as proposed by the applicant, would explore two veins both laterally and in depth in the No. 1 mine at an estimated cost of $24,630.00. In detail, the proposal involves (1) drifting 100 feet to the south and raising 40 feet on the Henning vein off the third level of the mine, (2) extending a third level drift on the Vasco No. 1 vein 300 feet northeast, and (3) sinking the existing shaft an additional 60 feet and drifting 300 feet northeast on a new fifth level.

The applicant's proposal has been modified to a slight extent in the accompanying geological report. Costs of the modified proposal have been outlined in this report and are estimated at $25,000.00.

LOCATION, TOPOGRAPHY, AND PHYSICAL FEATURES

The Vasco No. 1 mine is in the NW1/4SW1/4, sec. 8, T. 1 S., R. 72 W., sixth principal meridian, Boulder County, Colo. It is located on the east flank of Hurricane Hill about half a mile north of the village of Tungsten, in the western portion of the Boulder tungsten district (fig. 1). The mine is accessible from either Boulder or Nederland via State Highway 119 and a mine road. State Highway 119 is a surfaced, all-weather road. The mine road is maintained by the county and should be passable all year.

The elevation of the mine is 8,500 feet. Climatic conditions at this elevation may be severe during the winters, but, in the past, mines in the area generally have been able to operate the year around. The area is typical of the eastern slope of the Front Range at this altitude, being characterized by a rounded, mountainous terrain cut by steep, narrow canyons.

Boulder, 12 miles east on State Highway 119, is the nearest commercial center and shipping point. Nederland, the mining and milling center of the district, is 2 miles to the southwest. Power lines of the Public Service Company of Colorado are extended on to the property. Timber for general mining purposes is not available on the property but it can be secured from local saw mills. Water, sufficient for mining operations, is made by the mine.

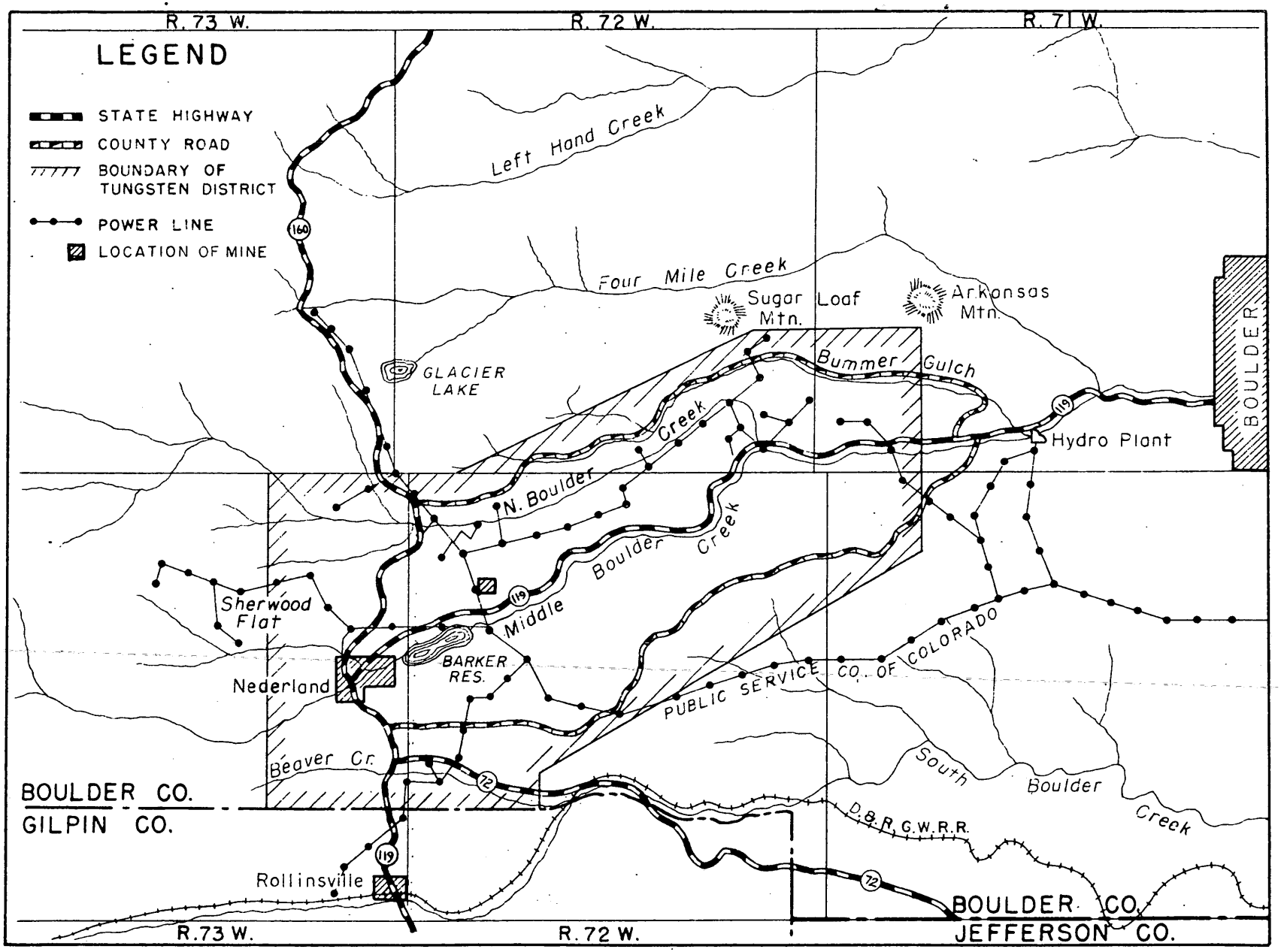

FIG. 1-LOCATION MAP, VASCO NO. 1 MINE, BOULDER CO. COLO., DMEA 2390

HISTORY AND PRODUCTION

Tungsten was discovered in 1905 at what was later to become the Vasco No. 5 mine and the discovery of the Nos. 1, 2, 3, 4, 7, 8, and 10 mines followed rapidly. The patented agricultural tract containing these discoveries was purchased in 1915-16 by the Vanadium Alloy Steel Corporation. It operated the mines continuously until 1919. Production in excess of $2,000,000 was reported.

In 1925 the property was sold to the Tungsten Production Company. The Vasco No. 6 mine was developed and it alone produced over $1,000,000 in ore. Spasmodic work was performed in several of these mines during World War II but these small, high-cost, lessee operations were shut down when the Metal Reserve Corporation stopped buying tungsten ores.

The property was purchased by the present owner, Hetzer Mines, Inc., in 1950. The mines have been leased in part since that time. Production from the No. 1 mine has been reported in excess of 15,000 units WO_3. Most of this was from rich ore mined prior to 1914. Lessees of the mine in 1951 are reported to have produced ore valued at $15,000.

OWNERSHIP AND EXTENT

Hetzer Mines, Inc., owner of the Vasco tract comprising the SW1/4 sec. 8, T. 1 S., R. 72 W., has leased to Paul H. Bennett, one of the applicant partners, that northwest portion of the tract containing the Vasco No. 1 mine. This property is more fully described in the mining lease, a copy of which is attached to the application.

The No. 1 mine is in the northwest corner of the tract under lease only a few feet from the west line. The veins strike southwest into section 7. Bennett has obtained a lease on a portion of two claims which cover the vein extension into section 7. Hetzer Mines has leased him a portion of the Loach lode mining claim, survey number 19049, adjoining the Vasco tract in section 7. He is also the lessee of a portion of the 1905 mining claim, survey number 19959, in section 7, which adjoins both the Vasco tract and the Loach claim (fig. 2). His lease from Hetzer Mines is for a term of 5 years or until August 1, 1956. His lease on the 1905 claim is for one year or until January 20, 1953, with a one-year's renewal option. Both leases call for a royalty of 15 percent to be paid on any ore produced.

Bennett must assign his interest in these leases to the partnership and landlord's subordination agreements must be obtained from the property owners before a contract can be let.

DESCRIPTION OF THE DEPOSITS

The Vasco No. 1 vein strikes northeast-southwest and dips steeply northwest in a mixed schist and granite wall rock. It is a quartz vein which has been explored laterally for over 400 feet and in depth for about 200 feet. An ore shoot of high-grade ferberite (reported 2 feet or more in thickness) was mined for about 150 feet from the surface. On the surface, the shoot was about 250 feet in length and lay on each side of the shaft. The body split just above the first level and each split was

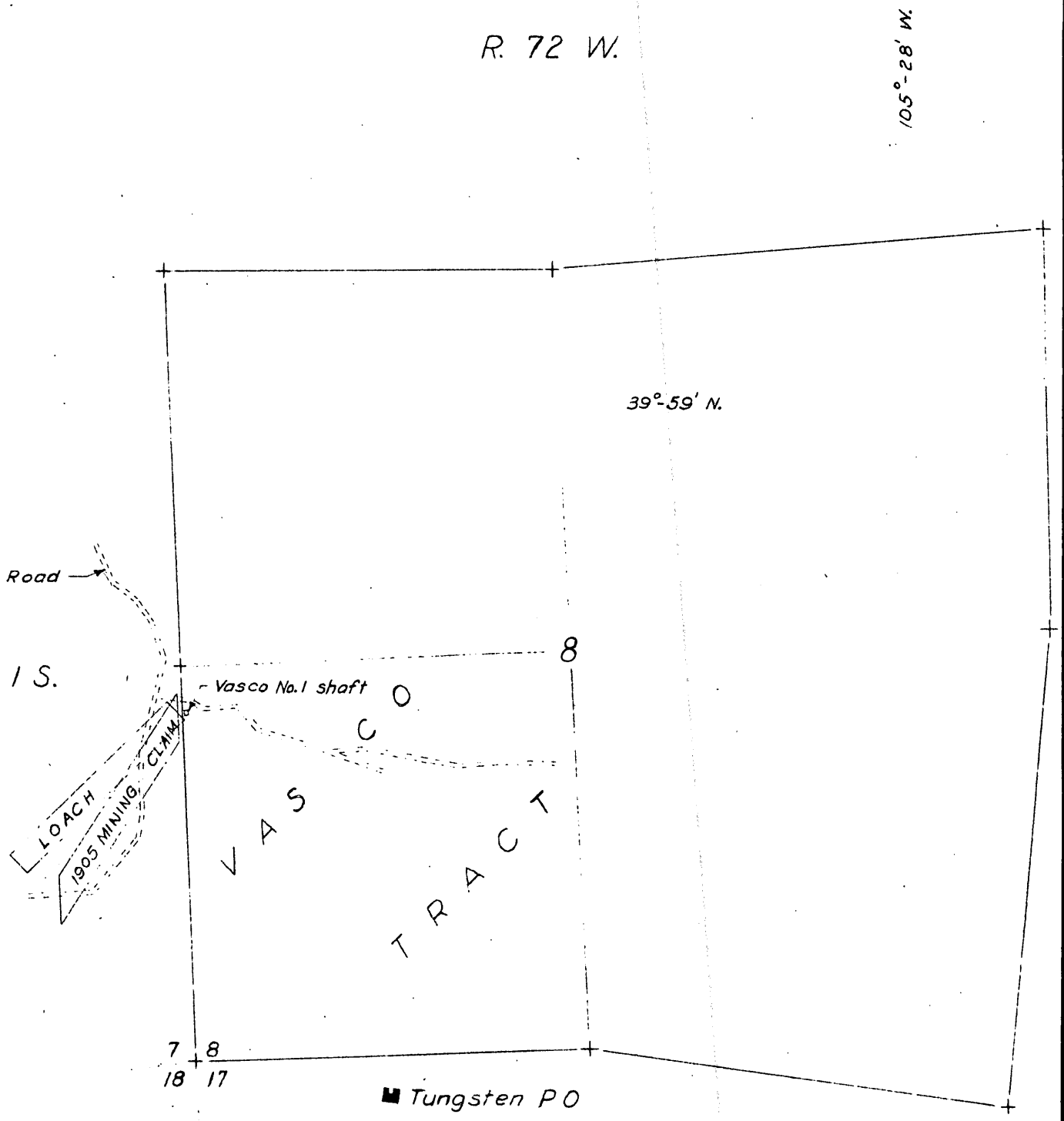

Figure 2 - Sketch showing property under lease
Bennett & Newell Mines - DMEA 2390 (Vasco No. 1 mine)

stoped down to or a little below the third level. Below here and towards the northeast, the vein is strong but barren of ferberite. The vein weakens towards the southwest.

The Henning vein, in the footwall of the No. 1 vein, strikes nearly north-south and dips easterly. An ore shoot was stoped for about 40 feet along the first level but it pinched out just below the second level. A second level drift on this vein disclosed a flat fault that displaced the vein a few feet. Below this fault, the Henning vein contains good ore. The present operators are extending the drift beyond the fault and the advance has been reported in good ore.

ORE RESERVES

Except for the recent disclosure of ore on the Henning vein, minable ore reserves are nonexistent in the mine. The full extent of the Henning discovery is yet to be established; however, it does indicate the occurrence of ore with depth in one section on the Henning vein. Reserves discovered heretofore on the Vasco No. 1 vein have been depleted. The No. 1 vein probably extends laterally and in depth beyond existing mine development. Ore might be inferred along such vein projection but, except for one large ore shoot, all development on this vein has shown it to be barren.

PRESENT STATUS

Exploration and Development

Figure 1 of the accompanying geological report shows the existing development of the Vasco No. 1 mine. The mine is opened

by a 220-foot inclined shaft sunk on the No. 1 vein. Four level drifts driven at 50- to 80-foot intervals developed the vein northeast and southwest off the shaft. Crosscuts into the footwall from the first, second, and third level drifts cut the Henning vein which was explored by drifting on the first and second levels. Several crosscuts were driven into both the foot and hanging walls of the No. 1 vein from the various levels but, for the most part, these disclosed nothing of importance.

The present operators have rehabilitated and unwatered the shaft to about the third or 150-foot level. On the first level, they are extending southwest a drift on the No. 1 vein. On the second level, they are drifting to the south on the Henning vein.

Mining and Milling Equipment and Other Facilities

The following equipment and facilities are in use at the mine and will be available for use of the proposed project:

Shaft house and headframe
15 horsepower electric hoist (cable capacity, 400 feet)
180 c.f.m. electric air compressor
3-1/2- by 6-foot air receiver
Stoper and drifter with accessories

Facilities for milling are not available at the mine. Any ore produced will be sold to the custom mill of the Vanadium Corporation of America in Nederland.

PROJECT PROPOSALS, WITH COSTS

The applicant proposes to explore the Henning vein on the third level of the mine by a 100-foot drift and by a 40-foot raise connecting into the level above (fig. 3). In the accompanying

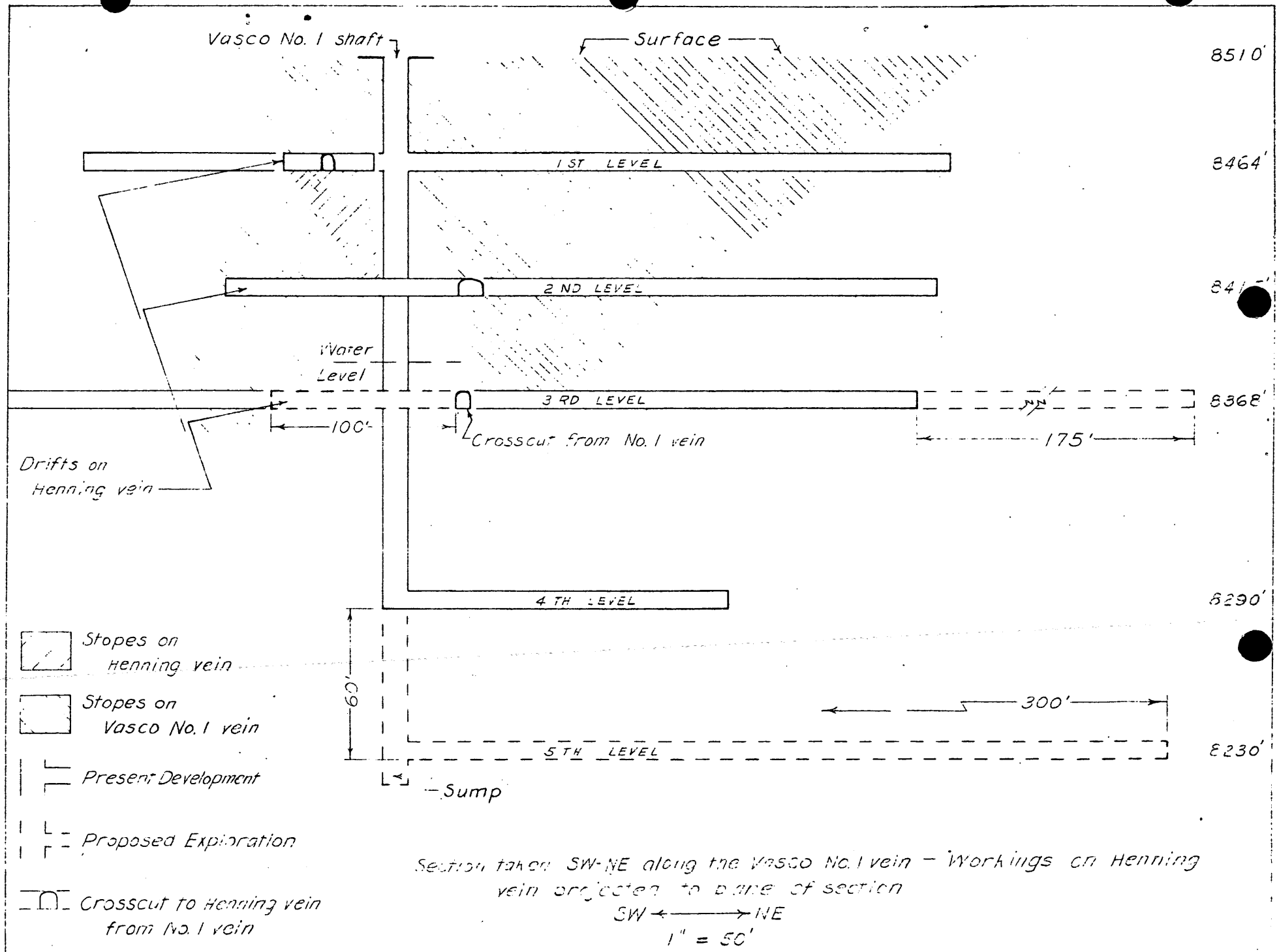

Figure 3 – Vertical section of the Vasco No. 1 mine, Boulder Co., Colo. DMEA-2390

geological report, the proposed drift is considered a promising prospect. It is further considered that the proposed raising would not increase the exploration potential appreciably and therefore it has been deleted from the applicant's proposal.

The applicant also proposes exploration of the No. 1 vein by (1) extending the third level drift on that vein 300 feet northeast and (2) deepening the shaft 60 feet and drifting on a new fifth level 300 feet northeast. Exploration of the No. 1 vein is considered less promising. The proposed 300-foot extension of the third level drift has been reduced to 175 feet in order to keep the work within the property line. The lower levels of the mine are under water and a certain amount of rehabilitation work in the shaft will be required after the mine has been unwatered.

Summary of Proposed Work (as modified)

	Estimated time (working days)
Install pumping facilities, unwater mine, rehabilitate shaft from 150 to 220 feet	12 days
Deepen shaft 70 feet (10-foot sump included)	40 days*
Drift a total of 575 feet	113 days*
	165 days or approximately 7 months

*Double shift.

A foreman who doubles as a hoistman, a mine-timberman, and one underground laborer will be needed to complete rehabilitation work. A double shift will be employed while sinking and drifting. Besides the foreman, two miner-timbermen and three underground laborers will be required; a laborer will assist a miner-timberman

on each shift and the third laborer will operate the hoist, perform surface work, and so forth on the second shift.

Labor requirements:

1	Foreman (doubles as hoistman, surface man)	$2.00 per hour
2	Combination miner and timberman	1.75 per hour
3	Underground laborers	1.50 per hour

In the following estimate of costs, a 6-day work week was considered; overtime payment for work over 40 hours a week has been included.

Estimated Costs

	Rehabilitation	Sinking	Drifting
Labor:			
Foreman	$ 242.62	$ 693.20	$ 1,958.22
Miner-timbermen	212.24	1,212.80	3,426.16
Laborers	182.00	1,560.00	4,407.00
Compensation insurance, OAB, etc.	23.14	154.00	433.62
Total labor	$ 660.00	$3,620.00	$10,225.00
Supplies:			
Pipe	$ 130.00	$ 70.00	$ 250.00
Track	-	-	600.00
Explosives	-	350.00	1,700.00
Drill steel, bits	-	150.00	875.00
Timber	100.00	130.00	150.00
Tools, repair parts, misc.	35.00	100.00	525.00
Total supplies	$ 265.00	$ 800.00	$ 4,100.00
Power:	$ 75.00	$ 480.00	$ 675.00
Total direct cost	$1,000.00	$4,900.00	$15,000.00

Estimated cost of equipment:

Depreciation allowance for equipment furnished by applicant:

Drifter,	4 months at	$10.00	= $ 40.00
Compressor,	7 months at	$100.00	= 700.00
Hoist,	7 months at	$25.00	= 175.00
2 Mine cars,	7 months at	$10.00	= 70.00
			$985.00

To be purchased:

350 feet, 3-conductor, electric cable	$350.00

To be rented:

2-inch centrifugal pump, motor,	7 months at	$60.00	= $420.00
Drifter (only if needed),	4 months at	$75.00	= 300.00
Sinker,	2 months at	$50.00	= 100.00
35 horsepower motor, starter for hoist,	7 months at	$60.00	= 420.00
Mucking machine,	6 months at	$225.00	= 1,350.00
			$2,590.00

The only other service deemed necessary for the proposed project is bookkeeping. An allowance of $25.00 per month is included for this service.

Summary of Estimated Project Costs

Rehabilitation		$ 1,000.00
Sinking		4,900.00
Drifting		15,000.00
Equipment:	Depreciation	985.00
	Purchase	350.00
	Rental	2,590.00
Bookkeeping		175.00
Estimated total cost		$25,000.00

CONCLUSIONS

The exploration work proposed by the applicant has been recommended with only minor modifications in the accompanying geological report. The work recommended involves only ordinary mining principles and the partners are believed to possess the necessary experience to carry out the project in a reasonably efficient manner. Costs have been estimated only on that portion of the proposed project recommended in the geological report.

The applicant has estimated the unit sinking and drifting costs at $50.00 and $25.00, respectively. Operators in this district performing identical work under similar conditions have experienced considerably higher costs. In this report, unit costs of $85.00 for sinking and $31.00 for drifting have been estimated. Although the extent of the proposed work has been reduced, these higher unit costs have increased the total cost of the project to approximate that of the applicant's original estimate.

Exploration of the No. 1 vein appears less attractive than that of the Henning vein; however, some work on it seems warranted in the light of its past production and relatively limited development. The section along the No. 1 vein selected for exploration is considered the most favorable, but it is questionable whether the amount of work proposed is justified on the basis of present knowledge.

A 250-foot extension of the existing fourth level would explore laterally nearly the same section of the vein as would the 475 feet of drifts on two levels proposed by the applicant.

The exploration value of a single drift would not equal that of the proposed work but it should be sufficient to evaluate this section of the vein and determine whether additional work is warranted.

The value which could be derived from the applicant's proposal might outweigh the economies of drifting only on the fourth level. Serious objections, therefore, are not raised to the applicant's proposal; however, it is essentially a wildcat venture and the completion of all the proposed exploration should be contingent upon results obtained from the initial portions of the work.

Only 150 feet of drifting on the new fifth level seem warranted under present conditions. Decision to drift the remaining distance on this level should rest with the field team and be contingent upon results of the other work on the vein. Drifting the last 150 feet on this level thus might be deleted from the project if conditions warrant, or work of an equivalent cost could be substituted should more favorable locations be discovered.

RECOMMENDATIONS

The proposed exploration project at the Vasco No. 1 tungsten mine, as submitted by Bennett and Newell Mines and as modified in this report, has been estimated to cost $25,000.00. The project, as detailed below, is recommended for approval in this amount.

(1) Unwater the lower levels of the mine and perform necessary rehabilitation on the sections of the Vasco No. 1 shaft now under water.

(2) Drift 100 feet to the south on the Henning vein off the third level of the mine.

(3) Extend a third level drift on the No. 1 vein 175 feet to the northeast.

(4) Deepen the No. 1 shaft 70 feet.

(5) Drive a new fifth level drift on the No. 1 vein for a distance of 300 feet northeast from the shaft and approximately 60 feet below the fourth level (the decision to complete the last 150 feet of this drift is to rest with the field team).

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

July 31, 1952

Mr. L. S. Newell dmea 2390
1158 Kearney Street
Denver, Colorado

Dear Mr. Newell:

We have not heard from you since our discussion during the latter part of June of the revised project on the Vasco No. 1 Mine.

We are therefore assuming that you are not interested in exploration assistance on this project and are placing your application in our inactive file.

Very truly yours,

W. H. King

W. H. King
Executive Officer
Field Team, Region IV

JFS:jp
cc Subj
Chron
Secretary to the Operating Committee (2)
WMTraver
AHKoschmann (2)
Paul Bennett, 1386 Mapleton Ave., Boulder, Colo.

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DMEA-2390

DEFENSE MINERALS ADMINISTRATION WASHINGTON, D.C.

FEB 26 4 07 PM '52

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

February 21, 1952

Memorandum

To: Acting Administrator, Defense Minerals Exploration Administration
Attention: 210

From: Executive Officer, Field Team, DMEA, Region IV

Subject: Docketing for Exploration Assistance

Enclosed herewith in duplicate are DMA Form 3a and Form MF-103, pertaining to the following application for Government assistance in exploration work.

The Vasco #1 Mine
1158 Kearney Street
Denver 20, Colorado

W. H. King
W. H. King for
J. H. East, Jr.

Enclosures

Returned to Region IV:
1. cc of original memo
2. MF-103 with attachments
3. Map

2-26-52
S. R.

Form MF-103
(April 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.
Approval expires 6-30-51.

APPLICATION FOR AID FOR AN EXPLORATION PROJECT PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PRODUCTION ACT OF 1950

DO NOT FILL IN THIS BLOCK

Docket No. DMEA-2390

Date received 2-26-52

Participation

The Vasco #1 Mine
1158 Kearney Street
Denver 20, Colorado

FR 8478

Name and address of applicant

Date

FILL IN THIS BLOCK

Date of application January 10, 1952

Estimated cost 24,630.00

Mineral or metal Tungsten

Percentage of Government participation 75

Location of mine Nederland Mining District of Boulder County, Colorado

Date of filing MF-100

DMA Docket Number, if available

INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four signed copies of the application to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive officer thereof, with your name and address on each sheet of the application and all accompanying papers. If any question is inapplicable, or if you cannot answer it, so state on the form. Where the space provided for answer is insufficient, answer on a separate sheet, annex it to the application form, and refer to it in space for answer. If the application is approved, you will be presented with an exploration project contract on Form MF-200, for your signature.

DEFENSE MINERALS ADMINISTRATION WASHINGTON FEB 26 1952

THE APPLICANT

*1. Is applicant an individual, partnership, or corporation? Partnership

*2. If a partnership, state names and addresses of partners. See Annexed Sheet

*3. If a corporation, state names and addresses of officers, directors, and five largest stockholders.

*4. Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who will manage the project. See Annexed Sheet

*5. Are you the owner or the lessee of the property? Lessee

6. If owner, state what claims, liens, or encumbrances, if any, are against the property.

7. If lessee, attach a copy of the lease and state if it is in good standing.

NOTE.—It will be necessary to procure and attach to the exploration project contract agreements of claimants, lienors, encumbrances and lessors subordinating their interests in the property to the interest of the Government under the contract.

8. Furnish current financial statement, showing assets and liabilities, and a profit and loss statement. See Attached Sheet

9. How much money is applicant prepared to invest in proposed project? Is it sufficient to pay your part of the cost of the project as detailed in question 23 of this application form, in accordance with the regulations on Government participation (Section 9 of Mineral Order 5)? 6,157.50 This amount is sufficient.

*If you have already answered these questions on MF-100, you are not required to answer the questions for this application.

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THE PROPERTY

10. (*a*) Give a description of the real property that will be in any way involved in the exploration project, including any existing mine or operating property. See attached Sheets

(*b*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted.

NOTE.—If both areas are the same, so state. The only obligation to repay the Government is from the net earnings from any commercial discovery made in the area specified in (*b*) above in which the exploration is to be conducted, and the expenditure of funds which may be charged as costs of the project must be limited to that area or to work necessary to perform the exploration in that area.

*11. State the present and former names of the property, if any. See Attached Sheets

*12. State, in detail, the location of the property with reference to towns, railroads, roads, shipping points, including distances and directions and kinds and conditions of roads. See Attached Sheets

*13. State source and quantity of water available for operations and its sufficiency at all seasons. See Attached Sheets State amount of power to be used, rate per hour or other cost, and source.

*14. Describe any existing useable facilities, equipment, buildings, or structure now on the property that will be devoted to the exploration work. See Attached Sheets

15. State in detail how the ore could be shipped and how and where milled. See Attached Sheets

*16. History:

(*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for any past suspensions of operations. See Attached Sheets

(*b*) State briefly the known history and production of adjoining and neighboring properties. See Attached Sheets

(*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations. See Attached Sheets

*17. Production:

(*a*) If mine is in production, furnish the following information:

	Tons per day	*Grade or analysis*	*Cost per ton*	*Net value per ton*
(1) Mining				
(2) Milling				
(3) Shipped or sold				

Not Producing

*18. Ore or mineral reserves: (If property is or has been operating.) Not Producing

(*a*) Describe the ore or mineral deposits briefly.

(*b*) Submit available maps and assay data.

(*c*) Give estimated tonnage and grade of each class of ore reserves.

19. State any conditions or circumstances regarding the property not sufficiently brought out by the foregoing questions.

See Attached Sheets

THE EXPLORATION

20. For what mineral or minerals and for what types of deposits and ores will the exploration be conducted? See Attached Sheets

21. Describe briefly, but concisely, the proposed work and the estimated time required to complete it.

NOTE.—The Government will not participate in a project that will require more than 2 years to complete.

22. Furnish statement of the geological basis of the project with particular emphasis on factors leading the operator to expect the finding of commercial ore bodies. This statement should be accompanied by supporting maps such as geological maps, maps of the proposed openings and assay maps, sample lists, and other pertinent data. See Attached Sheets

THE REQUIREMENTS AND COSTS

23. Tabulate in the form of an itemized statement with a sum for each item the estimated requirements and costs of the project so that the total will give the estimated cost of the project in which the Government will participate, as follows:

(*a*) Labor, by numbers and classes (miners, muckers, millmen, etc.), with wages of each.

(*b*) Supervisors, by numbers and positions, with salaries of each.

(*c*) Cost of necessary repairs to existing facilities, structures, and buildings.

(*d*) Cost of necessary installation or construction of additional facilities, structures, and buildings.

(*e*) Cost of items of equipment, not now owned by the applicant which must be purchased for operations at a cost of $50 or more each.

(*f*) Cost of rental for equipment which the operator proposes to rent.

(*g*) Rental value of items of equipment which the operator now owns and which will be devoted to the work.

(*h*) Cost of materials and supplies, including items of equipment costing less than $50 each.

(*i*) Cost of power, water, utilities, and any other items not provided for above.

See Attached Sheets

24. Furnish a time schedule of the project, stated in terms of months after project is approved, showing progress expected to be accomplished and the money expected to be spent.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

The Vasco #1 Mine
(Name of company)

By Lester Stanley Newell
(Signature of authorized official)

January 10, 1952
(Date)

Partner & Manager
(Title)

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

*Same as footnote on page 1.

16—64067-1 U. S. GOVERNMENT PRINTING OFFICE

INDEX

INDEX TO SUPPLEMENTAL SHEETS

THE VASCO #1 MINE
1158 Kearney St.
Denver, Colorado

Sheets 1 thru 5 -	Supplementary material to application form - Items 1 thru 24
Sheets 6 thru 9 -	Copy Vasco #1 Lease
Sheets 10 thru 14	Copy of 1905 lease
Sheet 15	Copy of Loach Lease
Sheet 16	Plan of Vasco #1 workings together with proposed development

COPY

Supplemental Sheet #1

The Vasco #1 mine, 1158 Kearney Street, Denver 20, Colorado.

Item 2. The names and addresses of parties are
L. S. Newell, 1158 Kearney Street, Denver, Colorado.
Paul H. Bennett, 1736 Mapleton Avenue, Boulder, Colorado.
Edward Williams, 935 Colorado Boulevard, Denver, Colorado.
Oliver Lindstrom, Boulder, Colorado.

Item 4(a) This is a new partnership, and at this time is actively engaged in prospecting and developing on the 50' level and 100' level of the Vasco #1 Mine.

(b) Active mining work will be in charge of L. S. Newell, whose history and experience record appears below:

The above party is a graduate of the University of Colorado receiving a BS degree in Mechanical Engineering. During the summer from 1928 through 1932 was engaged in developing, under contract, a lode mine located at Caribou, Colorado. From 1933 through 1938 was engaged as a consulting engineer in both lode and placer mining by a Mr. A. M. Johnson of Hollywood, California, now deceased. The work entailed examination of both placer and lode mines in the western United States, British Columbia and Old Mexico. In many instances detailed investigations as to ore reserves, development costs, benefication plants were made.

From 1939 through 1942 was part owner, operator and manager of gold property located in Boulder County, Colorado. This venture was a successful venture and may be investigated by returns into the U. S. Bureau of Mines under the name M. B. Newell, Lester A. Newell and L. S. Newell doing business as the Cash Mine.

1942 through 1943 was employed by Remington Arms, Denver, Colorado as process engineer in the manufacture of 30 caliber cartridge cases. 1943 through 1952 employed by the Thompson Pipe and Steel Company, first two years as a design engineer, balance of time as sales engineer.

Item 8 Partnership has operated approximately 8 weeks, the partners supplying funds as required. A statement would, to this date, show an investment of approximately $4,000.00. However, funds will be supplied as per Item 9 with approval of this application.

Supplemental Sheet #2

The Vasco #1 Mine, 1158 Kearney Street, Denver 20, Colorado

Item 10 Items (a) and (b) are the same:
A rectangular block of ground located in the Northwest quarter of Section Eight, Township One South, Range 72 West and described as follows: Beginning at the Northwest corner of Section Eight running south on section line a distance of 400', thence east a distance of 7000', thence due north 400' to the north line of Section Eight, thence 700' west along north line to close with the point of beginning. Also:

Commencing at Corner #3 of the 1905 Mining Claim thence South along the easterly boundary of said claim 316.5 feet; thence North 56° 51' West 184.229 feet to the Northwesterly boundary of said claim; thence North 33° 09' West, 226.772 to place of beginning. Being a part of the 1905 Mining Claim. The intent hereof being to include in this lease only such part of said claim lying North and East, on a vertical plane, of a line drawn at right angles to the north westerly boundry of said claim thru a point being the northermost part of the Peterson shaft located on said claim to the easterly boundry of said claim including only such lode or lodes discovered on said portion of said claim within the vertical plane of said base line.

Also that part of the Loach Lode Mining Claim, Survey Lot No. 19049, lying east of the road now laid out and traveled across said lode.

Item 12 This property is located 16 miles West of Boulder, Colorado and One mile north of State Highway #119, Boulder,County, and two miles northeast of Nederland. Boulder is the nearest railroad and shipping point being served by the Union Pacific and the Colorado and Southern Railroads. Colorado State Highway #119 is newly graded and paved between Boulder and Nederland. The road to the mine is a fair all weather road maintained by the county.

Item #13 Ample water is available from the mine for drilling operations and cooling of compressors. Electric power is now being supplied for operations by the Public Service Company of Colorado. The power costs will approximate 3¢ per K.W. hour under load conditions as anticipated.

Item #14 The property has the following facilities:

(1) Shaft house with headframe.
(2) 15 H.P. electric hoist with 400' rope capacity.
(3) 180 cu. ft. compressor with V belt motor drive and 42" diameter by 6' air receiver.
(4) Stoper and drifter with necessary hose and accessory equipment.

(5) 220' shaft and approximately 800' of drift assessible except for unwatering the 200' level.

Item #15 The ore will be shipped to the Wolf Tongue Mill at Nederland, Colorado, a distance of 2½ miles over a graveled county road. This mill is owned by the Hetzer Mines, Inc. and operated by the Vanadium Company of America under lease. This mill is listed in General Services Administration Information Release GSA-113 of May 10, 1951 as a recognized unit in the tungsten production program.

Item #16 (a) Tungsten ore was first discovered about 1905 on the Vasco #1 Mine which is part of the Rogers Agricultural Patent. The Vascos #1, 2, 4, 5, 7, 8 and 10 are also located on the Rogers Agricultural Patent.

The Patent was purchased in 1915 by the Vanadium Steel Corp. who operated the various mines until 1919, producing approximately $2,000,000 of ore.

In 1925 the Tungsten Production Company purchased the Rogers Patent. Production from operations on the Patent during the period from 1925-1928 exceeded $1,000,000 principally from the Vasco #6 mine.

During World War #2 the Vasco #1 Mine was rehabilitated by a leaser named R. G. Sullivan and some development work was undertaken. Work stopped when the tungsten market dropped in 1953.

The Patent was leased in 1950 by the Hetzer Mines, Inc., of Boulder, Colorado who own the Wolf Tongue Mill at Nederland.

Early in 1951 the Vasco #1 Mine was leased and leasee produced some $15,000 worth of ore. This leasee did no further development work after removing the above ore.

Indicated past production of the Vasco #1 Mine is in excess of 25,000 units of WO_3.

Item #16 (b) The Vasco #1 Mine is adjoined by numerous small producing mines, and three large producers, all of which were discovered at approximately the same time and whose operations history followed the pattern of a fluctuating tungsten market.

1. The Cold Spring Mine 1,000' north and slightly east of Vasco has produced in excess of $2,000,000.
2. The Barker #3 Mine 2,000' south Produced in excess of $1,000,000.
3. The Forest Home 1,000' north and slightly west which produced $75,000 net from 3,200 tons of ore during World War II.

Supplemental Sheet #4

Item 16 (c) No private examination reports are available, however in 1943 the U. S. G. S. made extensive investigations of properties in this area with field work under the direction of Mr. Ogden Tweto. The results, in report form are to be published in the near future. Detail geological maps accompanying this application are from preliminary work performed in the above investigations.

Item #19 At this writing the present operations have rehabilitated the mine to the 150' level and are prosecuting development work on two headings: On the 50' level a drift is being driven southwest on the Vasco #1 Vein. A drift is being run on the 100' level on a vein junctioning with the Vasco #1 Vein in the footwall. This is on the same vein where, in the spring of '51, a leasee extracted some $15,000 worth of ore in the locale of the 50' level. See Item #16 (a).

Item #20 Exploration will be carried on for the development of tungsten (Ferberite) deposits, which occur in this vicinity in lenticular deposits in fissure veins. These deposits are usually associated with vein intersections with aplite or pegmatite dykes, vein junctions or either horizontal or vertical displacement of vein walls accompanying a roll in the vein. Ores in this area range in value from 1% to 60% in grade.

Item #21 The proposed development program covered in this application consists of the following:
(1) 100' drifting and 40' raising on the Henning Vein on the 150' level.
(2) Unwater rehabilitate and sink the main shaft an additional 60'.
(3) Drive east on the main Vasco #1 vein 3000' on the 150' level.
(4) Drive east on the 275' level on the Vasco #1 vein approximately 300'.

Item #22 The proposed development on the 150' level south on the Henning vein will explore that area of this vein underneath the Henning stope and also junctions recently exposed in development work on the 100' level. Where these veins junction, a flat with a dip of approximately 45° and a strike at right angles to the Henning vein was encountered. Small bunches of ferberite have been encountered locally near these junctions and in the flat on the 100' level. The flat dips north east and would be encountered on the 150' level at a point approximately 30' south of where a drift would start on this vein. It is felt that ore may be encountered underneath this flat near these vein junctions.

The development work north east on the 150' level will prospect ground where numerous intrusives are encountered together with junction of the Vasco vein with three other known veins whose strikes are approximately north and south. It is felt that development in such an area is well justified. In sinking the shaft and driving east below the 200' level, ground would be explored directly underneath the area where the major production of the Vasco #1 Mine came from. On the 200' and 150' levels no ore was encountered in this area, however, a vertical section through the vein at this point indicates a change in the dip of the vein in this locale. Vertical displacement of the walls may have tightened the vein to a point

Supplemental Sheet #5

where deposition of ore was not possible. The vein, however, is straightening up and it is anticipated that development in this area could very readily open up new deposits.

Item #23	(a)	Machine Man (2) @ $2.00/hr 2400 hrs	$4800.00
		Helpers (3) @ 1.50/hr 3600 hrs	5400.00
		Surveying, mapping and sampling.	
	(b)	Hoist man and Supt. (1) @ $2.00/hr 1200 hrs	2400.00
	(c)	Rehabilitate shaft from 150' to 200' level	600.00
	(d)	None	
	(e)	35 H.P. motor & starter (used)	600.00
		600' airlines	600.00
		600' track 16# 4.8 tons @ 1.00	480.00
		300 GPM pump	1100.00
		Rock drill and hoses	550.00
		Electric cable for shaft	500.00
	(f)	None	
	(g)	None	
	(h)	Explosives, caps & fuse	3000.00
		Small tools, steel, etc.	1000.00
		Lumber	600.00
	(i)	Power	1300.00
		Insurance, OAB etc.	900.00
			$24,630.00

Item #24 Month (After approval)

1st	Rehabilitate, secure and install equipment, track, airlines, etc.		$3330.00
2nd	30' sinking shaft	@ $50.00)	2625.00
	45' drifting	@ $25.00)	
3rd	30' sinking shaft	@ $50.00	
	45' drifting	@ $25.00	2625.00
4th	70' drifting	@ $25.00	
	40' raising	@ $20.00	2550.00
5th	110' drifting	@ $25.00	2750.00
6th	110' drifting	@ $25.00	2750.00
7th	110' drifting	@ $25.00	2750.00
8th	110' drifting	@ $25.00	2750.00
9th	100' drifting	@ $25.00	2500.00
			$24,630.00

COPY

LEASE

THIS INDENTURE, Made and entered into this 1st day of August, 1951, between HETZER MINES, INC., a corporation, hereinafter called the Lessor, and P. H. BENNETT, hereinafter called the Lessee,

WITNESSETH: That the Lessor, in consideration of the covenants and agreements of the Lessee hereinafter expressed to be kept and performed by the Lessee, and upon and subject to the conditions hereinafter provided, has leased and demised, and by these presents does lease and demise unto the Lessee, the following described mining property or premises, situate in Boulder County, Colorado, to-wit:

> All that part of the Southwest quarter of Section Eight, Township One South, Range Seventy-two West, described as: Beginning at the intersection of the Vasco Number Five Tunnel with the Vasco Number ~~Five Vein~~ and running North to the North line of said Southwest quarter; thence West to the Northwest corner of said Southwest quarter; thence South along the West line of said quarter to a point West of the point of beginning; thence East to point of beginning; together with the right to use said Vasco Number Five Tunnel jointly with other lessees of the Lessor; excepting from said above described tract all portions of Patented Lode claims in conflict therewith.

TO HAVE AND TO HOLD The said demised premises, only however to the extent necessary for the purpose of mining the same for tungsten ore and for no other purpose, for a term of five years from the date hereof.

IN CONSIDERATION Of this lease, the Lessee covenants and agrees as follows, ~~to-wit:~~

1. To work the said premises in thorough mine-fashion to the end of the safe development and preservation of the same as a workable mine, at all times extracting as much ore therefrom as is possible consistent with safe and prudent mining; and in this connection it is agreed and understood that the Lessor may at its election require the Lessee to produce ore instead of doing development work.

2. To work the demised premises continously from October 1, 1951, performing at least 40 shifts of work therein underground during each calendar month during the time this lease shall remain in force and effect; any excess labor performed during any calendar month shall not apply on the work required hereunder in any preceding or following calendar month. The word "shift" is taken and accepted to mean the labor of one man for one day of at least eight hours.

3. To make all shafts and inclines eight feet long by four feet wide in the clear, with bucket ways three and one-half by four feet in the clear, and all drifts seven feet high by four feet wide in the clear, provided that existing shafts, drifts and inclines shall, unless otherwise directed by the Lessor, be continued with their present dimensions. The Lessor reserves the right to change the dimensions of any workings as and whenever in the judgement of the Mining Superintendent of the Lessor the same may be necessary or expedient.

4. To do no underhand stoping, whether for the purpose of taking out ore or for any other purpose whatsoever.

5. To neither mine, extract nor remove the ground to a point nearer than four feet to each side of any working shaft, and always to leave at least four feet of ground, in its original condition, to support each such shaft. To leave more than four feet of ground to support each such shaft if the Mining Superintendent of the Lessor shall so direct and to crib or riprap any shaft at the Lessee's expense, if the said Mining Superintendent shall so request the Lessee.

6. To allow the officers, agents and representatives of the Lessor at all times to enter upon and into the said premises and all parts thereof for the purpose of inspection and sampling, and to make any surveys they may desire, and to render them all the assistance in the power of the Lessee in so doing.

7. To keep and maintain the drifts, shafts, tunnels and other workings in the said premises thoroughly drained and clear of loose rock and rubbish, and in a safe and secure condition, except as prevented by extraordinary mining casualty, and to maintain at all times and leave the floors of all drifts and workings in good, even and unobstructed conditions; to stow no waste underground except with the consent in writing of and under the direction of the Mining Superintendent of the Lessor.

8. To keep posted in conspicuous places on the surface of the said premises all notices which may be furnished by the Lessor for posting thereon.

9. To not assign this lease or any interest, therein, not to sublet the said premises or any part thereof; and to not assign or transfer to anyone any interest in the sums payable by the Lessor, or any other, to the Lessee for ores produced from the demised premises, without the written consent of the Lessor first had and obtained.

10. To pay monthly in advance to the Public Service Company of Colorado its charges for electric power required or to be furnished to the Lessee at the said premises, together with all proper costs of making such power available to the Lessee.

11. The Lessee hereby agrees and promises that on or before the 10th day of each claendar month after the date hereof, the Lessee will make, sign and deliver to the Lessor a written report, in duplicate, of the payroll for all operations under this agreement of lease upon the premises hereinabove described, for the preceding calendar month, on such forms as the Lessor and/or the State Compensation Insurance Fund shall direct from time to time; and the Lessee agrees and promises that each such report shall be in sufficient detail so that the actual payroll may be ascertained for all operations under this lease upon the demised premises during the preceding calendar month, including the Lessee's own time at Lessee's actual wages, but in any event at not less than the minimum rate of pay fixed from time to time by the State Compensation Insurance Fund or the Industrial Commission of Colorado for a Lessee, and including the payroll of his sublessees and employees, if any, and including the payroll on account of contractors and subcontractors and their employees, if any, so that from such report there may be ascertained the amount of premium payable by the Lessor to the State Compensation Insurance Fund or other insurance carrier for compensation insurance covering the Lessee, his employees and sublessees, if any, and all contractors and subcontractors, if any, and the employees thereof, for operations on the said premises under this lease.

The Lessee agrees hereby to pay to the Lessor the cost of such compensation insurance as may be carried by the Lessor on account of or for the Lessee and Lessee's subleasee's and employees, if any, and on account of each contractor with the Lessee and subcontractor, if any, and the employees of each thereof, if any, because of any operations on the demised premises under this lease; and the Lessee agrees to pay the cost of such insurance to the Lessor in cash monthly installments payable on or before the 20th day of each clendar month during the life of this lease for the operations of the preceding calendar month; and the Lessee agrees further that the Lessor, at its option, may withhold and deduct each such monthly installment, and any unpaid monthly installments, if any, from sums otherwise payable to the Lessee upon ore settlements from operations under this lease, or from any other money due or owing or to become due in any fashion to the Lessee from the Lessor.

12. The Lessee agrees to pay to the Lessor and the Lessor reserves a royalty of fifteen percent of the net proceeds from the sale of any ores produced by the Lessee. The "net proceeds" is agreed to be the net sale price of said ores less the cost of hauling the same to the Lessor's mill at Nederland, Colorado.

IT IS MUTUALLY AGREED By and between the Lessor and Lessee as follows:

(a) The Lessor agrees that as long as it has a market for ore, it will maintain whatit considers a fair schedule of price for tungsten ore produced from properties owned or leased by it. The Lessor shall have the right to purchase and the Lessee agrees to sell to the Lessor all ore produced by the Lessee from the leased premises, provided said schedule of prices maintained by the Lessor is at least equal to the price which may be offered the Lessee by any otherparty. In the event the Lessee is able to sell said ore at a net price higher than offered by the Lessor, the Lessee shall have the right to sell said ore to the buyer offering a higher net price. In the event any of said ore is sold to any one other than the Lessor, said ore shall be shipped in the names of the Lessor and the Lessee, and the royalty reserved by the Lessor shall be paid directly to the Lessor. It is further agreed that no hauling charges in excess of hauling said ore to Lessor's mill shall be deducted in the event said ore is sold to any one other than the Lessor.

(b) It is further mutually understood and agreed that in the event the Lessee delivers to the Lessor shipments or lots of ore of a value less than $100.00 per lot, that the Lessee shall pay to the Lessor the cost of milling such ore and the cost of sampling the same.

(c) It is further mutually understood and agreed that in the event the Lessee fails to pay the royalty herein reserved, or fails to pay compensation insurance premiums, the Lessor shall have the right to terminate this lease immediately and without notice to the Lessee. In the event of the violation of any other term, provision or condition of this lease by the Lessee, the Lessor shall have the right to terminate this lease upon giving thirty (30) days written notice to the Lessee. In the event the Lessee corrects any such defaults within thirty (30) days, said lease shall not be terminated. In the event any default shall not be corrected at the end of said thirty-day period, then said lease shall be terminated as of the end of said thirty-day period. Said notice shall be given in writing, addressed to the Lessee at Nederland, Colorado.

(d) The title to any ores broken or mined on said leased premises at the termination of this lease, shall be the property of the Lessor, and it shall not be liable for the payment to the Lessee for the same before any costs or expenses of breaking or mining said ore.

IN WITNESS WHEREOF, The Lessor has caused its name to be hereunto subscribed by its President and attested by its Secretary and its seal affixed hereunto, and the Lessee has hereunto set their hands and seals the day and year first above written.

HETZER MINES, INC.,

BY ss/Elmer Hetzer
President

ATTEST:

ss/Dudley I. Hutchinson
Secretary

ss/P. H. Bennett

STATE OF COLORADO)
) SS.
COUNTY OF BOULDER)

The foregoing instrument was acknowledged before me this 8th day of August, 1951, by P. H. Bennett, and by Elmer Hetzer, as President and Hudley I. Hutchinson as Secretary of Hetzer Mines, Inc., a Corporation.

My commission expires June 19, 1952. Witness my hand and official seal.

ss/ Reuben E. Olson
Notary Public

COPY

MINING LEASE

THIS AGREEMENT OF L ASE, Made and entered into this 19th day of January, A. D., 1952, by and between EDWARD F. BONELLI of the City and County of Denver, State of Colorado, hereinafter called the lessor, and PAUL H. BENNETT of the County of Boulder, State of Colorado, hereinafter called lessee;

WITNESSETH, That the said lessor for and in consideration of the rents, royalties, covenants and agreements hereinafter expressed to be paid, kept and performed by the said lessee, has leased, let and demised and by these presents does lease, let and demise unto the said lessee the following described mining property and premises, situate in the Grand Island Mining District, Boulder County, Colorado, to-wit:

> Commencing at Corner #3 of the 1905 Mining Claim thence South along the easterly boundary of said claim 316.5 feet; thence North 56° 51' West 184.229 feet to the Northwesterly boundary of said claim; thence North 33° 09' West, 226.772 to place of beginning. Being a part of the 1905 Mining Claim. The intent hereof being to include in this lease only such part of said claim lying North and East, on a vertical plane, of a line drawn at right angles to the north westerly boundry of said claim thru a point being the northernmost part of the Peterson shaft located on said claim to the easterly boundry of said claim including only such lode or lodes discovered on said portion of said claim within the vertical plane of said base line

TO HAVE AND TO HOLD, the above described premises for the purpose of m ning, from the 20th day of January, A. D., 1952, to the 20th day of January, A. D., 1953, unless sooner forfeited or terminated through the violation of any of the covenants and conditions herein contained, with no power to assign this lease or any part thereof or to sublet the whole or any part of said leased premises without the written consent of the said lessor first had and obtained.

The said lessee in consideration of the premises has covenanted, contracted and agreed and by these presents does covenant, contract and agree to and with the said lessor, his executors, administrators and assigns;

1. To enter upon said leased premises and to work the same in mine fashion in manner necessary to good and economical mining, so as to take out the greatest amount of ore possible, with due regard to the development and preservation of said mine or mining premises, as a workable mining property, and to the special covenants herein contained.

2. To work and mine said premises as aforesaid, steadily and continuously during the period of this lease and in doing said work to perform at least 288 shifts of mining labor per year each and every year during the life of this lease.

3. To repair all old timbering wherever it may become necessary, and to well and sufficiently timber said mine and mining premises at all points where proper and necessary in accordance with good and safe mining; continuing the timbering in the working shafts now upon said premises with timber of the same dimensions as heretofore used, unless it becomes necessary for safety to use larger timber, in which event timbers of sufficient size for safety and permanent mining shall be used.

4. To allow the lessor or his agent from time to time to enter upon and descend into all parts of said leased premises, for the purpose of inspection, surveys or taking samples therefrom, and to render to said parties proper assistance in making such inspection, surveys or examination.

5. To occupy and hold as the property of the lessor all cross and parallel lodes, spurs and minerals deposits of every kind which may be uncovered, disclosed or discovered within said leased ground by the said lessee or any person or persons under or in privity with him, with

privilege to said lessee to work and mine the same as part and parcel of said premises.

6. To keep at all times the drifts, shafts, tunnels and other workings, thoroughly drained and clear of loose rock and rubbish, unless prevented by extraordinary mining casualty.

7. To stow no waste underground except with the consent and under the direction of the lessor.

8. To do no underhand stoping below the bottom of any main working level or winze and to do no stoping or breaking of ore or rock within four feet of any working shaft.

9. Not to adulterate or mix any ores broken or mined without the consent of the lessor; it being understood that all ores mined which are too low grade for present shipment shall remain the property of and be subject to the control and disposition of the lessor.

10. To make all working shafts at least four (4) feet by eight (8) feet in the clear; all drifts and tunnels at least three and one-half (3½) feet by six and one-half (6½) feet in the clear, and all winzes and raises at least three and one-half (3½) feet by seven (7) feet in the clear.

11. It is expressly understood and agreed that the lessor reserves the property and right of property in and to all ores extracted from said premises during the period of this lease, and the said lessee covenants and agrees to pay and allow the lessor as royalty upon all ores mined, shipped or sold from said leased premises in any manner during the life of this lease, as follows, to-wit:

Fifteen per centum (15%) of such ores mined, shipped or sold

12. The lessee shall and hereby does assume all responsibility in case of accident to himself or any of his employees in or about said property and agrees to protect the interest of all parties hereto with Workman's Compensation Insurance.

13. All taxes assessed against said demised premises for ores mined and shipped under this lease shall be paid by the lessee.

14. All bills and expenses incurred by the lessee or those in privity with him shall be promptly paid by the lessee, and by such prompt payment said lessee shall prevent the filing of any and all liens of miners, mechanics or material men, against said demised premises; and, if by reason of the failure of said lessee to pay such bills or expenses, any lien or liens shall be filed against said premises the said lessor may forthwith pay off and discharge the same, and the said lessee hold himself bound to pay to said lessor all sums so advanced or paid to clear said premises from liens which may be filed as aforesaid, and the said lessor may also at his election declare a forfeiture of this lease.

15. Said lessee further covenants that no person not in privity with the parties hereto shall be allowed to hold possession of said premises or any part thereof under any pretext whatever.

16. Further, that he will deliver to said lessor quiet and peaceable possession of said demised premises in good order and condition with all drifts, tunnels and other passages thoroughly drained and cleared of loose rock and rubbish and said premises ready for immediate continued working, without demand or further notice, on the 20th day of January, A. D., 1953, at noon, or at any time previous thereto, upon demand for forfieture, and it is mutually understood that all machinery and tools which may be placed upon said premises by the said lessee may be removed therefrom within ten days after the termination of this lease, provided, however, thatno such tools or machinery shall be so removed while the said lessee may be in any manner indebted to the said lessor under any obligation incurred under this lease.

COPY

17. Upon the violation of any covenant or condition herein contained, this lease shall at the option of said lessor expire, and terminate, and the said premises with the appurtenances and all buildings and other improvements shall become forfeited to the lessor, and the said lessor or his agent may thereupon, after demand in writing for possession, enter upon said premises and dispossess all persons occupying the same, with or without fource, and with or without process of law, or at the option of the lessor the said lessee and all persons found occupying said premises or any part thereof may be proceeded against as guilty of unlawful detainer.

18. Lessee shall have the option to renew this lease for a further term of one year upon the same terms and conditions as herein set forth by notice in writing to said lessor on or before December 20, 1952.

Provided that said lessee shall perform at least 288 shifts of mining labor during the first term of this lease upon the 1905 Mining Claim or on property adjacent thereto which results or accrues to the benefit or development of the said 1905 Mining Claim.

This is of the essence of this agreement, and each and every clause of this indenture and all the covenants and conditions contained herein expressed or implied shall extend to the successors, heirs, executors, administrators and lawful assigns of all of the parties hereto.

IN WITNESS WHEREOF, the parties hereto have hereunto subscribed their names the day and year first above written.

ss/Edward F. Bonelli
Lessor

ss/Paul H. Bennett
Lessee

COPY

January 22, 1952

Mr. P. H. Bennett
Boulder, Colorado

Dear Sir:

You now hold a lease, dated August 1, 1951, between the undersigned, Hetzer Mines, Inc., a corporation, as Lessor, and you, as Lessee, covering a part of Section 8, Township 1 South, Range 72 West, Boulder County, Colorado, which lease is for a term of five years from the date thereof.

We hereby agree that there shall be added to the lease that part of the Loach Lode Mining Claim, Survey Lot No. 19049, lying east of the road now laid out and traveled across said lode. Said portion of the Loach Lode Mining Claim shall be operated by you subject to the terms of the forementioned lease and shall be considered a part thereof the same as if originally included therein.

We wish to call your attention to the fact that the question has arisen as to the conflict of said Loach Lode Mining Claim with the 1905 Lode Mining Claim, Survey Lot No. 19559, and we are only leasing to you that portion of the Loach Lode Mining Claim east of said road which is owned by us and included in our patent; and we exclude therefrom any portion thereof included within the patent for the said 1905 claim and excluded from the Loach patent.

We are writing this letter in duplicate and, if it is agreeable with you, will you please sign your acceptance on the line provided of one copy of this letter and return it to us.

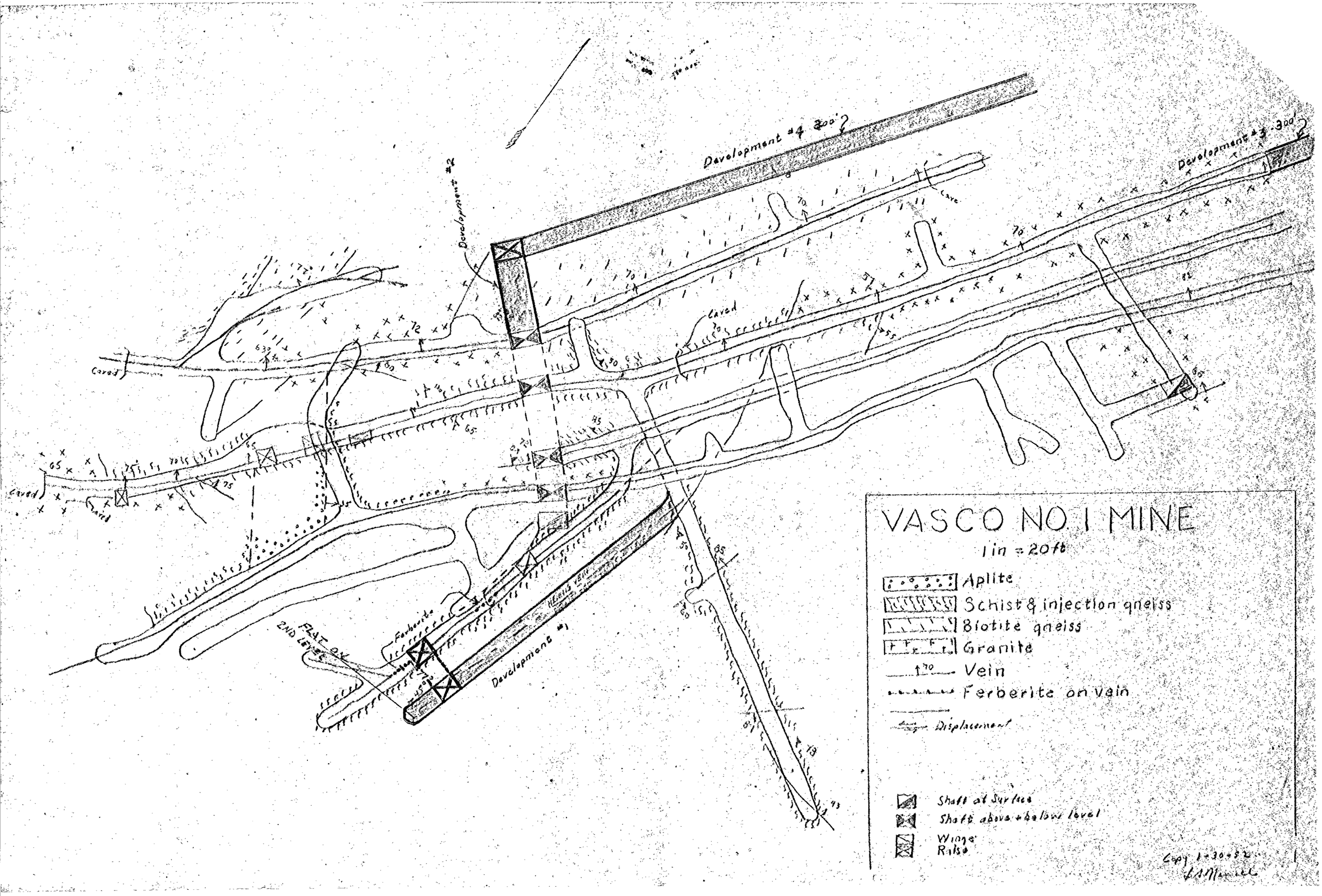
Yours very truly,

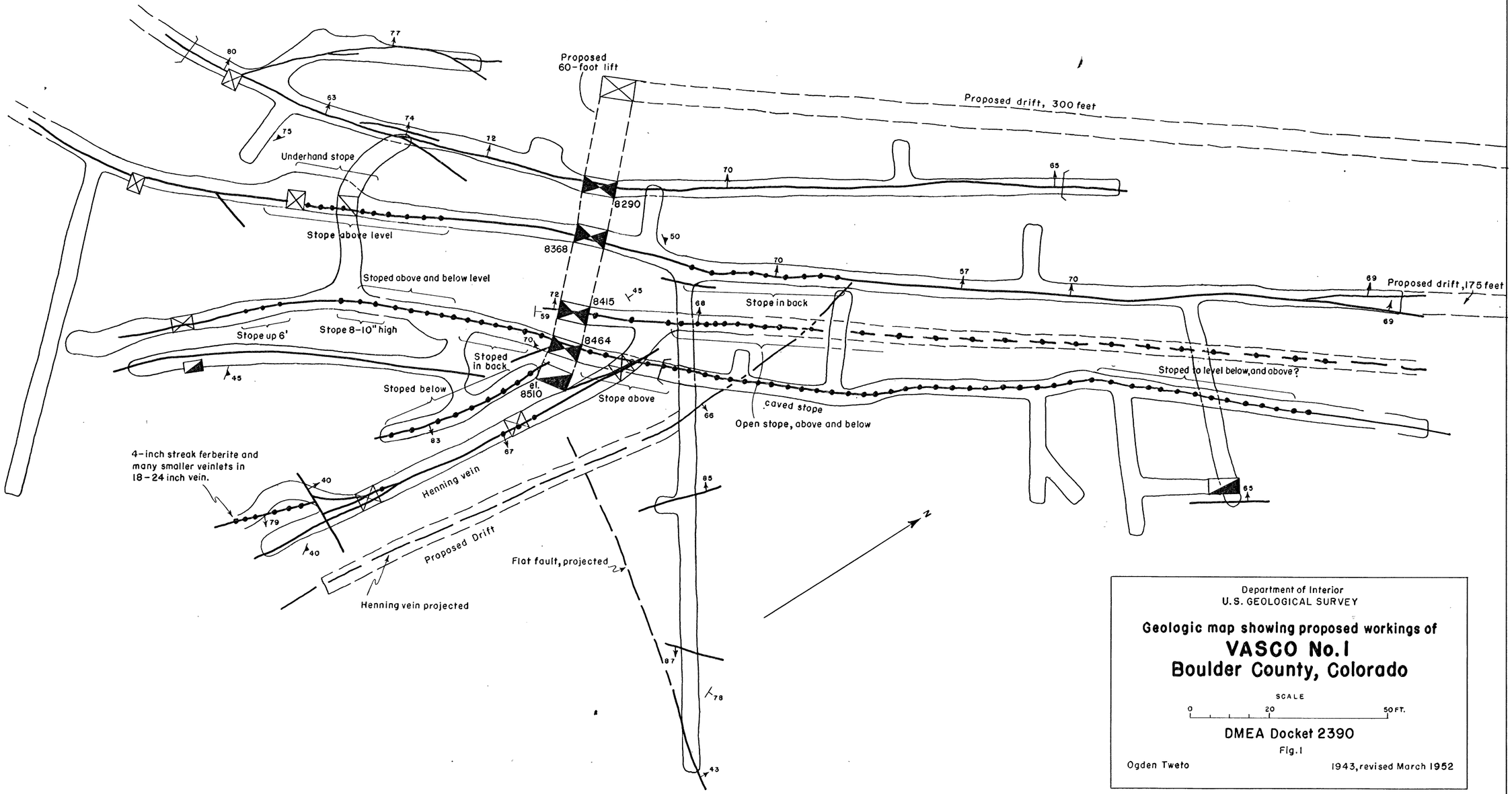
HETZER MINES, INC.

By (signed) Dudley I Hutchenson
Secretary

I hereby accept the above and agree to the same this 24th day of January, 1952.

(signed) P. H. Bennett


VASCO NO. 1 MINE
1 in = 20 ft
Aplite
Schist & injection gneiss
Biotite gneiss
Granite
Vein
Ferberite on vein
Displacement
Shaft at Surface
Shaft above + below level
Winze
Raise
Development #4 300'
Development #3 300'
Development #2
Development #1
Caved
Ferberite
FLAT OUT
2ND LEVEL



Department of Interior
U.S. GEOLOGICAL SURVEY

Geologic map showing proposed workings of

VASCO No. 1
Boulder County, Colorado

SCALE
0 20 50 FT.

DMEA Docket 2390

Fig. 1

Ogden Tweto

1943, revised March 1952