400

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

224 New Customhouse
Denver 2, Colorado

June 30, 1954.

See also related [illegible]

Memorandum

To: Administrator, Defense Minerals Exploration Administration
Attention: 200

From: Field Team, Region IV

Subject: Report of Examination - Docket No. DMEA-3374 (Tungsten), Thomas M. Linder and George A. Menger (Cross mine), Boulder County, Colorado.

Enclosed are four copies of the Report of Examination on the subject property, a copy of the letter of denial to the applicant, and two copies of Form 3b.

W H King
W. H. King

A. H. Koschmann
A. H. Koschmann

Enclosures

Reviewed by
DMEA OPERATING COMMITTEE
7-8-54
(date)

COPY

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

224 New Customhouse
Denver 2, Colorado

June 30, 1954.

Mr. Thomas M. Linder
Mr. George A. Menger
Box 416
Nederland, Colorado

Re: Docket No. DMEA-3374

Gentlemen:

Reference is made to your application for Government aid on the Cross mine.

Projects approved by the Defense Minerals Exploration Administration must, in its judgment, show definite promise of yielding material of acceptable grade, and in quantities that will significantly improve the mineral supply position for the National Defense Program.

A careful study of your property and data available to this agency reveals that the probability of disclosing mineable reserves of Tungsten is not considered sufficiently promising to justify Government participation. Under these circumstances, we regret to advise that your application for exploration aid is denied.

Very truly yours,

/s/ W. H. KING
W. H. King
Field Team, Region IV

/s/ A. H. KOSCHMANN
A. H. Koschmann
Field Team, Region IV

RDB:cwm

cc: Docket 3374
Administrator, DMEA
WMTraver
AHKoschmann
Chron.

Reviewed by
DMEA OPERATING COMMITTEE
7-8-54
(date)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Mining Division
Region IV

June 30, 1954.

Memorandum

To: Field Team, Region IV

From: Chief, Mining Division, Region IV

Subject: Engineering Report of Examination - DMEA Docket 3374 (Tungsten), Thomas M. Linder and George A. Menger (Cross mine), Boulder County, Colorado.

Enclosed are the original and eight copies of the Engineering Report of Examination on the subject docket.

The original application requested $29,909.05 to explore the Cross mine by sinking the shaft an additional 100 feet from the 4th to the 5th level and drifting on the 5th level for 400 feet.

The examining team does not believe that the property has enough merit to justify Government participation in an exploration project and recommends denial of the application.

We concur in this recommendation.

W. H. King

Enclosures

Reviewed by
DMEA OPERATING COMMITTEE
7-8-54
(date)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Region IV

Building 20, Room 137
Denver Federal Center
Denver 14, Colorado
June 23, 1954

Memorandum

To: Executive Officer, DMEA Field Team, Region IV

From: Chief, Mineral Resources Branch, Mining Division, Region IV

Subject: DMEA 3374 (Tungsten), Thomas M. Linder and George A. Menger (Cross Mine) Boulder County, Colo.

Transmitted herewith are the original and eight copies of an engineering report by R. L. Bolmer on the subject docket.

Bolmer concludes that the Cross mine ore shoots have shown a tendency to decrease in extent and become more impoverished with depth, have been explored and developed beyond their productive limits, and are probably bottomed at or above the 3rd level. Discoveries beyond the limits, while possible, would not justify the cost of the exploration proposed with Government participation. He recommends denial of the loan application.

I concur with his conclusions and recommendations.

The brochure forwarded with your memorandum of May 21, 1954, instructing us to prepare a report, is returned herewith.

F. D. Everett, for
W. M. Traver

enclosure

WMT/kp

cc 8
DMEA 3374
Chron

Reviewed by
DMEA OPERATING COMMITTEE
7-8-54
(date)

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Defense Minerals Exploration Administration
Denver Federal Center
Denver 2, Colorado

June 18, 1954

To: DMEA Field Team, Region IV

From: A. H. Koschmann

Subject: DMEA Docket 3374, Cross Mine, Boulder County, Colorado

Enclosed are 9 copies of a geologic report by E. N. Harshman of the U. S. Geological Survey covering the above docket.

Although the Cross mine has been a significant producer of tungsten ore, Harshman concludes that the bottom of the known ore horizon has been approached and that exploration on a lower level will not discover significant tungsten ore. He therefore recommends denial of the application for exploration assistance. I concur in this recommendation.

Joint Summary, Conclusions, and Recommendations are also enclosed.

E. N. Harshman
for A. H. Koschmann
Supervising Geologist
Colorado-Wyoming

Enclosures (18)

Reviewed by
DMEA OPERATING COMMITTEE
7-8-54
(date)

CROSS MINE
BOULDER COUNTY, COLORADO

DMEA DOCKET 3374

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

By E. N. Harshman, U. S. Geological Survey
and
R. L. Bolmer, U. S. Bureau of Mines

Reviewed by
DMEA OPERATING COMMITTEE
7-8-54
(date)

CROSS MINE
BOULDER COUNTY, COLORADO

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Thomas M. Linder and George A. Menger have applied for assistance to explore for tungsten ore in the Cross mine, 2 miles northeast of Nederland, Boulder County, Colorado. The proposed exploration consists of 100 feet of shaft sinking, from the fourth to the fifth levels, and 400 feet of drifting on the Cross vein. The applicants estimate the total cost of the project to be $24,909.05.

The Cross Mine is located in one of the more productive areas of the Boulder tungsten district. Ferberite ore occurs along a series of steeply dipping northeast-trending fissures in pre-Cambrian Boulder Creek granite and related intrusive dikes.

The Cross mine has an excellent production from several intersecting veins. It has been developed to a depth of 359 feet on 3main levels and a short sub-level has recently been driven 43 feet below the fourth or bottom level.

Most of the ore produced in the Cross mine has been extracted from stopes on or above the third level and it appears that the bottom of the known ore horizon has been reached or approached by work on the fourth sub-level.

The program of exploration proposed by the applicants is far more extensive than warranted by the ore potential of the ground to be explored.

It is concluded that exploration below the fourth level of the Cross mine will not lead to the discovery of significant amounts of tungsten ore and denial of the application for exploration assistance is recommended.

CROSS MINE

BOULDER COUNTY, COLORADO

DMEA DOCKET 3374

Geologic Report

By E.N. Harshman
U. S. Geological Survey

Reviewed by
DMEA OPERATING COMMITTEE
7-8-54
(date)

CROSS MINE
BOULDER COUNTY, COLORADO

INTRODUCTION

Thomas M. Linder and George A. Menger, both of Nederland, Colorado, have applied to the Defense Minerals Exploration Administration for assistance to explore for tungsten ore in the Cross mine, 2 miles northeast of Nederland, Boulder County, Colorado. The applicants lease, from Hetzer Mines Inc., the property described as follows: a tract of ground 150 feet wide and 1300 feet long, being 75 feet on each side of what is known as the Cross No. 1 vein, and extending 300 feet west along said vein from the Cross No. 1 shaft, and 1,000 feet east along said vein from said Cross No. 1 shaft.

The applicants propose to explore by sinking the Cross No. 1 shaft from the fourth to the fifth level (100 feet) and by drifting on the Cross No. 1 vein 150 feet southwest and 250 feet northeast from the bottom of the shaft. The estimated cost of this program is $24,909.05.

The property was examined on June 2, 1954, in company with R. L. Bolmer, U. S. Bureau of Mines, and George A. Menger, one of the applicants. It is concluded that although small shoots of tungsten ore may be discovered by exploration on the Cross No. 1 vein below the fourth level, discovery of significant deposits is improbable. Denial of the application for exploration assistance therefore is recommended.

GEOLOGY

The Cross mine is located in one of the more productive areas of the Boulder tungsten district. Ferberite ore occurs along a series of

northeast-trending steeply dipping fissures in pre-Cambrian Boulder Creek granite and associated pegmatite and aplite dikes. The principal minerals of the veins are ferberite and horn quartz although pyrite, barite, magnetite, scheelite, and several clay minerals are present in some of the ore. The ore shoots appear to have resulted primarily from filling of open spaces rather than by replacement of the wall rocks. Thus the location and size of ore shoots is customarily controlled by competence of the wall rocks and changes in the dip and strike of the mineralized fissures.

The Cross mine has an excellent production record, estimated to be 40,000 units of WO_3 for the period 1907 through 1953. The ore was mined from several intersecting, steeply dipping veins that strike northeasterly. From data on available maps and an examination of the fourth level workings, it is concluded that most of the ore was extracted from ground along and above the third level.

Figure 2, taken from maps prepared by Ogden Tweto, shows the fourth level geology of the Cross mine. Workings west of the shaft have developed the Cross No. 3 and Pump veins but no ore is exposed on the level in either structure. Both veins occupy a well defined fracture or fracture zone, 6 inches to 2 feet wide, containing considerable clay gouge, some horn quartz, and little or no ferberite. The Cross No. 3 vein continues strong to the west face of the drift along this structure, but the Pump vein breaks up into several minor splits and loses its identity before the west face of the Pump vein drift is reached.

East of the shaft on the fourth level a drift has developed the Cross vein for a distance of 325 feet. The vein occupies a fracture in somewhat altered granite intruded by pegmatite and hornblende monzonite prophyry. The vein is as much as 10 inches wide and consists of silicified

wall rock, clay gouge, and minor amounts of horn quartz and ferberite.

Three diamond drill holes are shown on figure 2. They were drilled from a station 245 feet east of the shaft and explored the Cross vein below the fourth level. Ore was cut in Diamond Hole No. 2a between a depth of 24.6 and 25.5 feet. The results of the drilling are shown in the table on figure 2.

The applicants sank a winze on the Cross vein at a point 225 feet east of the shaft in an attempt to develop the ore cut in Drill Hole No. 2a. The winze is 45 feet deep and at a point 43 feet below the fourth level, a drift (the fourth sub-level) was driven 45 feet northeasterly along the vein (figure 2). The drift follows a shear zone in granite ranging in width from a few inches to about 4 feet. Several silicified stringers are present in the shear zone and although now mined out entrace of horn quartz and ferberite is reported to have been exposed along this drift between a point 14 and 19 feet northeast of the winze. A small, irregular stope, 5 to 15 feet long and extending from the fourth sub-level to within 7 or 8 feet of the fourth level has been mined. The ore shoot appears to have been from 1 to 10 inches wide. The applicant reports the mill returns on this ore to be about $3,000.

PROPOSED EXPLORATION PROGRAM

The applicant proposes to explore the Cross vein by deepening the shaft 100 feet and driving a fifth level drift, from the bottom of the shaft, a distance of 150 feet southwesterly and 250 feet northeasterly along the vein(figure 2). There is little reason to believe that drifting southwesterly on the fifth level will find ore. The Cross vein on the fourth level contains no ore although the country rock and the vein structure are favorable for its deposition. There is no reason to assume

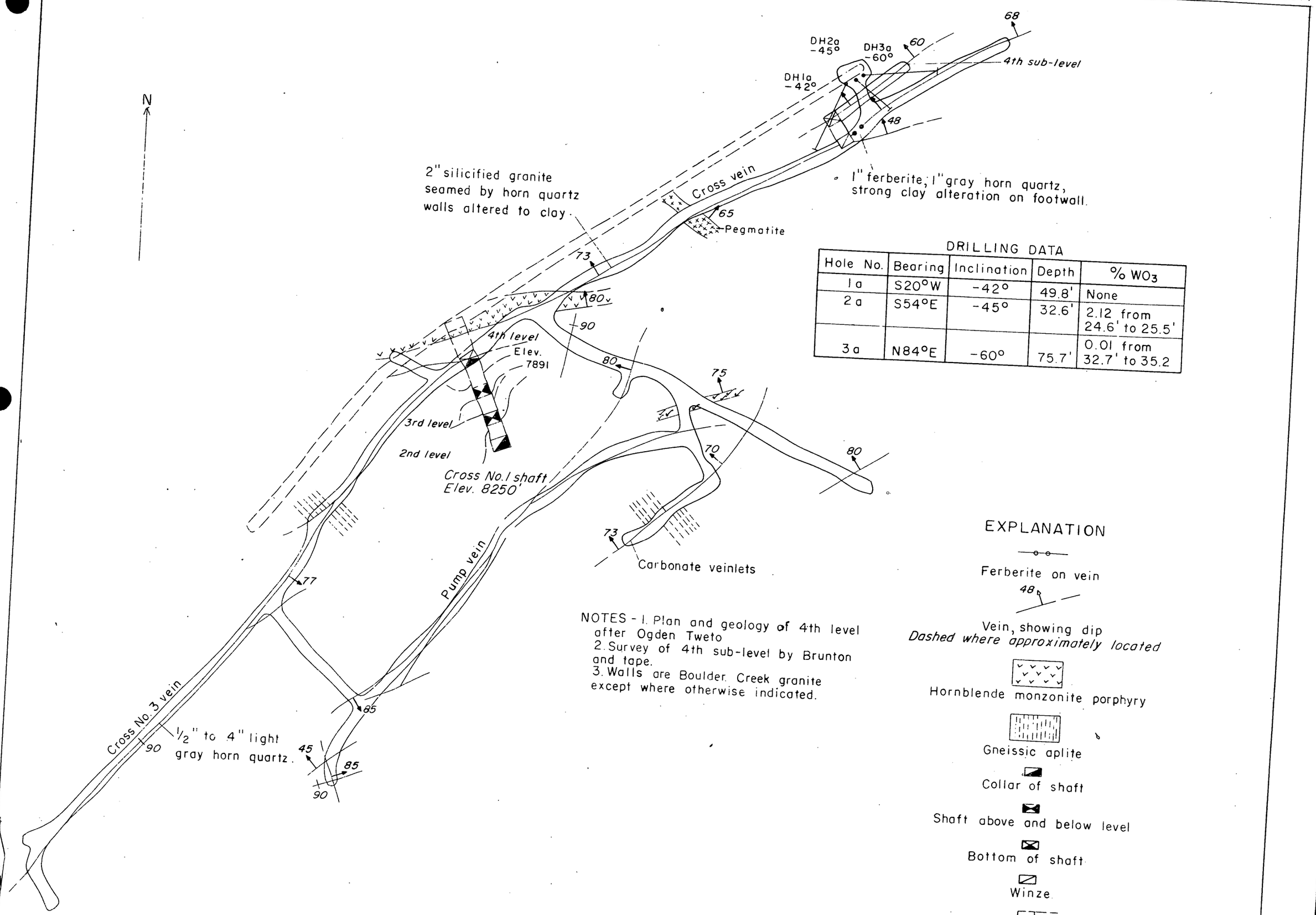
that conditions on the fifth level are more favorable for ore deposition than on the fourth level and it appears that in the area southwest of the shaft the bottom of the known zone of ore deposition has been reached.

Northeast of the shaft small ore shoots may be discovered by deeper exploration although here too it appears that the bottom of the known zone of ore deposition has been reached or approached by development and mining on the fourth sub-level.

CONCLUSIONS AND RECOMMENDATIONS

The program of exploration proposed by the applicants is far more extensive than is warranted by the very limited ore potential of the block of ground along the Cross vein below the fourth level. Exploration pursued by the applicant indicates that small irregular ore shoots may lie below the fourth level in the area northeast of the shaft but production of ore from these shoots will be insignificant.

For the reasons outlined above, it is recommended that the application for exploration assistance, DMEA Docket 3574, be denied.



DRILLING DATA

Hole No.	Bearing	Inclination	Depth	% WO_3
1a	S20°W	-42°	49.8'	None
2a	S54°E	-45°	32.6'	2.12 from 24.6' to 25.5'
3a	N84°E	-60°	75.7'	0.01 from 32.7' to 35.2

NOTES - 1. Plan and geology of 4th level after Ogden Tweto
2. Survey of 4th sub-level by Brunton and tape.
3. Walls are Boulder Creek granite except where otherwise indicated.

E.N. Harshman June, 1954

FIGURE 2.-GEOLOGIC MAP OF 4TH LEVEL AND 4TH SUB-LEVEL, CROSS MINE, BOULDER COUNTY, COLORADO

50 0 50 100 Feet

Datum is ma...

DMEA 3374

CROSS MINE
THOMAS M. LINDER AND GEORGE A. [illegible]
BOULDER COUNTY, COLO.

Engineering Report

By R. L. Bolmer
Mining Engineer
Bureau of Mines

Reviewed by
DMEA OPERATING COMMITTEE

7-8-54
(date)

IMBA 3374

CROSS MINE
THOMAS M. LINDER AND GEORGE A. MENGER
BOULDER COUNTY, COLO.

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ILLUSTRATIONS

Figure	Follows page
1. Location map, Cross mine, Boulder County, Colo.	2
2. Geological map of 4th level, Cross mine, Boulder County, Colo.	*

*See figure with geologic report.

DMEA 3374

CROSS MINE
THOMAS M. LINDER AND GEORGE A. MENGER
BOULDER COUNTY, COLO.

ENGINEERING REPORT

By R. L. Bolmer

INTRODUCTION

Thomas M. Linder and George A. Menger, P. O. Box 416, Nederland, Colo., made application for aid in an exploration project pursuant to DMEA Order-1, under the Defense Production Act of 1950, as amended (Docket No. DMEA 3374). The applicants, lessees of the Cross mine in Boulder County, Colo., proposed to explore that property for tungsten. Specifically, the applicants proposed deepening the Cross No. 1 shaft by 100 feet and drifting a total of 400 feet along the Cross vein on a newly established 5th level of the mine. They estimated the total cost of the proposed work as $29,909.05.

A field examination and report on the property were requested by the Defense Minerals Exploration Administration Field Team, Region IV. The Cross mine was examined June 2, 1954, with E. N. Harshman of the Geological Survey and G. A. Menger, one of the applicants. This report is based on the field examination of the property and is submitted, with the examining engineer's conclusions and recommendations, for the purpose of aiding the Field Team in evaluating the applicants' proposal.

LOCATION

The Cross mine is located in the NW1/4 sec. 8, T. 1 S., R. 72 W., sixth principal meridian, Boulder County, Colo. (fig. 1). It is about 3-1/2 miles northeast of Nederland, Colo., via state and county roads which are maintained and accessible all year. The elevation of the property is about 8,250 feet. The mine is connected to the electrical transmission lines of the Public Service Company of Colorado. The nearest custom mill for tungsten ore is located at Nederland. Boulder, Colo., the nearest supply and labor center and a shipping point on the Union Pacific railroad, is 19 miles east of the property. Ballinaville, Colo., a shipping point on the Denver and Rio Grande railroad, is 5 miles south of Nederland via State Highway 119.

OWNERSHIP AND EXTENT

The property under lease by the applicants is owned by Hetzer Mines, Inc. of 850 Pearl St., Boulder, Colo. The applicants' lease with Hetzer Mines, dated January 15, 1954, and for a term of 3 years, describes the property as a tract of ground 150 feet wide and 1,300 feet long, being 75 feet on each side of what is known as the Cross No. 1 vein and extending 300 feet west along said vein from the Cross No. 1 shaft, and 1,000 feet east along said vein from the Cross No. 1 shaft.

The lease calls for a royalty of 16 percent of the net proceeds from the sale of any ores produced from the property. Hetzer Mines retains a right to purchase all ores produced from the premises provided its schedule of prices is at least equal to the price offered by any other party.

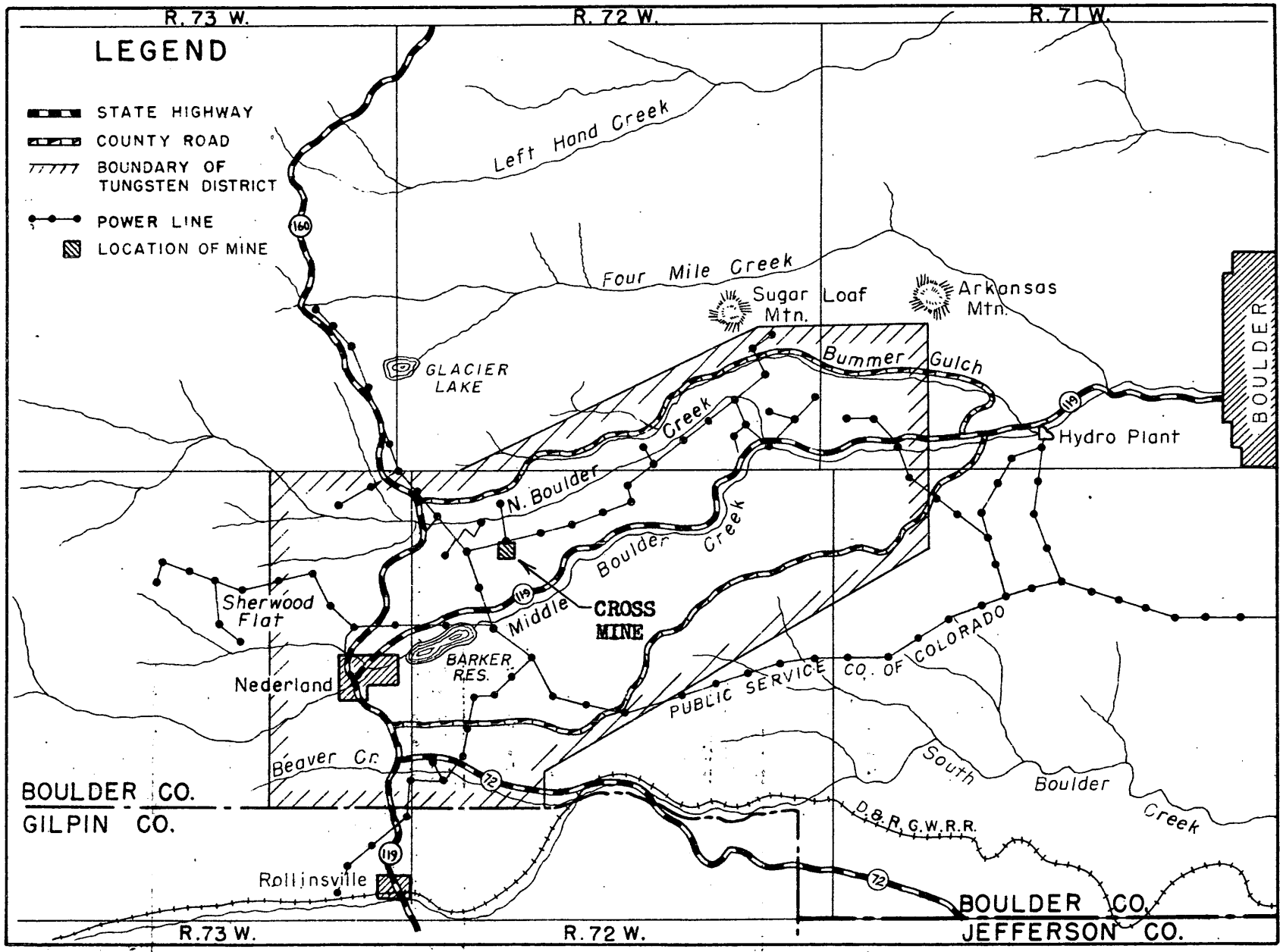

FIGURE 1-LOCATION MAP, CROSS MINE, BOULDER COUNTY, COLO. (DMEA 3374)

HISTORY AND PRODUCTION

The property is part of the old Trevarton ranch, an agricultural patent owned for many years by the Wolf Tongue Mining Co. This company, a subsidiary of the Firth Stirling Steel and Carbide Corp., sold all its Boulder County properties to Hetzer Mines in 1950. The Cross mine, with a recorded total output since 1907 of more than 40,000 short-ton units of tungsten trioxide, is one of the more productive properties in the Boulder County tungsten district. The Cold Spring mine, the second largest total producer in the district, is located just southeast of the Cross property.

The Cross veins were productive from the surface down to the 3rd level of the No. 1 shaft. The main ore shoots bottomed at about the 3rd level and lower development of the veins generally was unproductive. Diamond drilling by the Bureau of Mines during World War II indicated ore at one locality below the 4th level of the mine. In 1954, the present lessees sunk a 45-foot winze to develop this showing. The lens of ore encountered by this work was very limited in extent and had been extracted by the date of inspection.

The recorded past production of the property is summarized below. Most of the recent production shown was derived from old stope fill and the old Cross dumps.

Year	Weight (pounds)	Average grade (percent WO_3)	WO_3 content (pounds)
1907-50	6,661,233	11.63	774,551.70
1951	26,712	17.49	4,671.81
1952	315,923	7.07	22,331.83
1953	160,086	5.85	9,378.79
1954 (4 months)	80,120	2.33	1,863.01
Total	7,244,014	11.22	812,797.14

DESCRIPTION OF THE DEPOSIT

A branching system of narrow fissure veins has been developed to a depth of 400 feet and for an overall length of about 800 feet in the Cross mine. The northeasterly striking fissures dip steeply in granite. Most of the fissure filling consists of fine-grained quartz. Along certain sections of the veins, the ore mineral, ferberite (ferrous tungstate), occurs either as thin seams of nearly pure mineral in the quartz or as the matrix of a breccia of country rock and early vein quartz. The mineral varies from a nearly pure, finely crystalline form of massive ferberite to a low-grade, non-crystalline variety intimately associated with silica (horn ore).

The Cross system of fissures was developed from the surface by the 400-foot, inclined Cross No. 1 shaft. The 2nd, 3rd, and 4th level drifts were turned northeasterly and southwesterly on the vein at depths of 160, 260, and 375 feet. The 1st level has been obliterated by stoping.

Northeast of the shaft, the fissure system is represented by the main Cross vein. Most of the upper levels are inaccessible but the old maps indicate that fairly continuous ore shoots were mined above the 2nd level for a distance of 350 feet northeast of the shaft. These ore bodies probably extended farther northeasterly along the 1st level and at the surface. Although the Cross vein was developed for considerable distances northeasterly on the 3rd level, ore was not encountered beyond 50 feet from the shaft. The vein was weak and essentially barren of ferberite throughout its northeasterly development on the 4th level (fig. 2). A minor occurrence of mineral was encountered along the

4th level drift about 225 feet northeast of the shaft. At this location, the applicants sank a 45-foot winze on the vein and drove a sublevel 45 feet northeasterly under and beyond the ore shoot. Subsequent mining disclosed the lens of ore to be 15 to 20 feet in length and to extend about 35 feet below the 4th level.

Southwest of the shaft, the main Cross fissure splits into four principal branch fissures referred to as the Cross No. 1, Cross No. 2, Cross No. 3, and Pump veins. Most of these branch fissures contained fairly continuous mineral and were stoped for considerable distances along the upper levels of the mine. The ore shoots on the various branch fissures extended about 450 feet southwest of the shaft on the 2nd level and about 350 feet southwest on the 3rd level. The ore on this side of the shaft also bottomed at or near the 3rd level. The various branch fissures, where exposed by the development southwesterly on the 4th level, were narrow, tight, and barren of ferberite.

PRESENT STATUS

The mine has been operated intermittently during 1954. It is fully equipped for a small tonnage operation. Its equipment, for the most part, is old but adequate and serviceable. A frame building at the collar of the No. 1 shaft houses an electric-powered hoist and air compressor. It also serves as a work shop and warehouse. The two-compartment No. 1 shaft is well timbered and in serviceable condition. One compartment is provided with skids for hoisting by means of a bucket; the second compartment serves as a manway. The shaft is equipped with a serviceable, four-post, wooden headframe. A trommel for screening hoisted ore is located adjacent to the shaft collar.

The applicants have been pulling stope fill from along the 3rd level and mining from the winze below the 4th level; most of the old development on these levels is accessible. The mine makes a small amount of water, which is pumped to the surface from a sump below the 4th level.

PROJECT PROPOSALS

The applicants propose to deepen the No. 1 shaft by 100 feet and to drift 250 feet northeasterly and 150 feet southwesterly from the shaft on a new 5th level (fig. 2). The northeast drift probably would be on the main Cross vein. The main structure splits in the vicinity of the shaft and it is unknown which of the branches the applicants propose exploring in the southwesterly direction. The applicants have detailed their estimated costs in their application. A total cost of $10,082.55, or $100.83 per foot, has been estimated for the proposed sinking. A total cost of $14,886.50, or $37.07 per foot, is estimated for the proposed drifting. The cost estimates by the applicants, while not too far out of line, are somewhat higher than have been experienced for similar work elsewhere in the district.

CONCLUSIONS

The productive ore shoots on the Cross system of fissure veins were longest near the surface. They shortened somewhat with increasing depth and bottomed at or near the 3rd level of the Cross No. 1 shaft. The veins have been developed for considerable distances, both laterally and with depth, beyond the limits of these productive bodies. Such development has indicated that the fissures outside the productive areas are weak and unmineralized.

One isolated and very limited lens of ore has been found beyond and below the limits of the main ore shoots. It is possible that deeper exploration, such as the applicants propose, would result in the discovery of one or more similar occurrences. Such a discovery would not be significant and could not justify the cost of the proposed exploration. Exploration, as is proposed, easily could miss such small targets.

The fact that the ore bottomed near the 3rd level and that lower development disclosed a weakened, unmineralized structure indicates the improbability of making a significant discovery through exploration with greater depth.

RECOMMENDATIONS

It is recommended that the applicants' request for assistance to explore the Cross vein with greater depth be denied.

fkp