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Div. of Mineral Technology
BUREAU OF MINES
Denver Experiment Station
Denver, Colorado

20th New Customhouse
Denver 2, Colorado

May 20, 1957

Memorandum

To: Secretary to the Operating Committee, DMEA

From: DMEA Field Team, Region III

Subject: Docket No. DMEA 4643 (Copper), General Minerals Corporation (Summitville mine), Rio Grande County, Colorado

Enclosed are the original and three copies of a joint engineering and geologic report of examination, dated May 14, 1957, by D. H. Richter, Geologist, Geological Survey, and E. W. Buel, Mining Engineer, Bureau of Mines, pertaining to the subject application.

The field examiners recommend a combination drilling, drifting, and rehabilitation program, estimated to cost $176,695.70, with Government participation at 50%, amounting to $88,347.46.

This office concurs in the work program and estimated costs as detailed by the field examiners, with the following exceptions and qualifications.

There follows recitation recommended for inclusion in the "General Provisions" section of Exhibit "A":

"Exploration work, consisting generally of diamond drilling, drifting, crosscutting, and drift rehabilitation and incident timbering, will be performed in the Annie-Copper vein area, the Hidden vein area, and the Tuckabury-McDonald vein area on a three-stage basis, as further outlined in Exhibit "A", and as shown on the map, "Figure 5," attached to the contract.

"The Operator shall perform the work outlined under Stage I in each of the three areas and as much of the work outlined under Stages II and III in each area that is approved in writing in advance by the Government.

"All the approved work proposed for the Hidden vein and the Tewksbury-McDonald vein areas, under all stages, will be performed concurrently with the work proposed and approved for the Annie-Copper vein area.

It is apparent that there is some duplication of supervisory time on the work as detailed by the field examiners for the three areas, also duplication of the estimated time required to complete the work.

It is our opinion that all probable work under all three stages in the Tewksbury-McDonald and Hidden vein areas can be performed concurrently with the work under the Annie-Copper vein area. Therefore, the interval of time estimated to complete the work in the latter area should determine the extent of project duration and be the extent of time that should be provided for supervisory personnel, consisting of one engineer-geologist and two foreman-miners.

Because of the diversified nature of the work program, the complex nature of the operation, and resulting uncertainty of work sequence or extent of work that will be approved for performance under Stages II and III in the various areas, it is difficult to apportion incidental costs such as supervision and surface plant operation.

If the contract is prepared on an actual cost basis, the costs of operation of the surface plant and the costs of the operating equipment will have to be prorated to the various items of work. It is difficult, under the circumstances, to determine an equitable basis for the proration when the extent and sequence of work are not known.

It would greatly simplify accounting and general administration of the contract if the work could be performed on a fixed unit cost basis, with supervision deleted from the costs of the various categories of work and set up separately for reporting on Form MP-104A in the same manner as if it was an item of work.

Since it is estimated that work in the Tewksbury-McDonald and Hidden vein areas can be completed while the work in the Annie-Copper vein area is in progress, there follows:

(a) Summary of proposed project work in the Annie-Copper vein area.

(b) Summary of estimated project costs.

(a) Summary of Proposed Project Work in the Annie-Copper Vein Area

Diamond Drilling

Stage I	- 1,000 feet at 25 feet a day =	40 days
Stage II	- 1,400 feet at 25 feet a day =	56 days
Stage III	- 1,100 feet at 25 feet a day =	44 days
Subtotal		140 days 1/

Drifting and Crosscutting

Stage I	- -	
Stage II	- 1,500 feet at 10 feet a day =	150 days
Stage III	- 200 feet at 10 feet a day =	20 days
Subtotal		170 days 2/

Rehabilitation

Stage I	- -	
Stage II	- 840 feet at 20 feet a day =	42 days
Stage III	- -	
Subtotal		42 days 2/

Timbering and Incidental Delays	44 days
Total	396 days

396 days at 22 days a month = 18 months project duration.

1/ Based on one shift a day.
2/ Based on two shifts a day.

(b) Summary of Estimated Project Costs

Diamond Drilling

Independent Contract

3,000 feet non-core drilling at $5.00/foot	$15,000.00
3,000 feet core drilling at $7.00/foot	21,000.00
Stand-by time, 46 hours at $10.00/hour	460.00

Labor

Surface plant operator, 5 months at $455.00/month	2,275.00
Payroll tax and insurance 5%	113.75

Operating Equipment

Rental and depreciation 5 months	$ 2,596.77
Material and supplies	1,300.00

Core boxes and Sample sacks

Core boxes, 75 at $4.55/box	341.25
Sample sacks, 30 at $0.40/sack	12.00

Preparation of drill stations

13 at $100.00/station	1,300.00
Total	$44,398.77

Average drilling cost (rounded)

(a) 3000 feet non-core drilling at $6.30/foot	$18,900.00	
(b) 3000 feet core drilling at $8.43/foot	25,350.00	
Estimated total drilling costs		$44,250.00

Drifting and Crosscutting

Labor

6 miners 9 months at $455.00/month each	$24,573.00
2 surface plant operators 9 months at $455.00/month each	8,190.00
Payroll tax and insurance 5%	1,228.50

Operating equipment, Rental and Depreciation

1 station wagon 9 months at $33.33/month	299.97
1 5-ton truck 9 months at $33.33/month	299.97
1 bulldozer 3/4 month at $386.88/month	290.16
1 battery locomotive 9 months at $86.25/mo.	776.07
4 mine cars 9 months at $8.58/month each	77.22
1 compressor 9 months at $333.33/month	2,999.97
1 air receiver 9 months at $6.25/month	56.25
1 mucking machine 9 months at $85.62/month	770.58
1 blower 9 months at $12.50/month	112.50
1 air drill w/leg 9 months at $85.00/month	765.00

Operating equipment, operation

Material, supplies and contingency	800.00

Operating materials and supplies

All (except timber)	$23,599.00	
Total	$44,891.19	
(a) 2735 feet drifting and crosscutting (rounded) at $23.50/foot		$64,272.50

Rehabilitation

Labor

4 miners, 2 months at $455.00/month each	$ 3,640.00	
2 surface plant operators, 2 months at $455.00/month each	1,820.00	
Payroll tax and insurance 5%	273.00	
Operating equipment		
Rental, depreciation and operating costs (as scheduled by field examiners)	494.25	
Operating material and supplies		
All (as scheduled by field examiners) except timber	5,406.20	
Total	9,633.45	
(b) 840 feet drift rehabilitation (rounded) at $11.50/foot		9,660.00

Timbering (Drift, Crosscut and Drift Rehabilitation)

Labor

4 miners, 2 months at $455.00/month each	$ 3,640.00	
2 surface plant operators, 2 months at $455.00/month each	1,820.00	
Payroll tax and insurance 5%	273.00	
Operating equipment		
Rental, depreciation and operation (as scheduled by field examiners, except reduced to 2 months time)	511.86	
Operating material and supplies		
Miscellaneous fuel, oil, lubricants, power, etc.	350.00	

Timber and timbering supplies (360 sets at $24.85/each) 1800 feet rounded to $5.00 per foot	$ 9,000.00	
Total	$13,594.86	
(e) 1800 feet drift timber rounded at $8.65/foot		$15,570.00

Sampling

46 drill core and cutting samples at $5.00/sample	$ 230.00	
218 drift samples at $5.00/sample	1,090.00	
Samples to be analysed chemically for gold, silver, lead, and copper		
Total	$ 1,320.00	
(f) 264 samples at $5.00/sample		$ 1,320.00

Supervision

1 Engineer-Geologist, 18 months at $700.00/month	$12,500.00	
1 Foreman-miner, 18 months at $500.00/month	9,000.00	
1 Foreman-miner, 13 months at $500.00/month	6,500.00	
(g) Total, Supervision		$28,000.00

Recapitulation

Diamond drilling	$44,250.00
Drifting and crosscutting	64,291.19
Rehabilitation	9,660.00
Timbering	15,570.00
Sampling	1,320.00
Supervision	28,000.00
Total estimated costs	$163,072.50
Government participation-50%	$ 81,536.25

If your decision is to prepare the contract for performance of the work on an actual cost basis, then it is recommended that the drilling also be included on a straight actual cost basis and not under Category 1.

Also, it is recommended that exact schedules of incidental costs, rates, and quantities in Categories 2(c), 3, 4, and 7 be waived.

It is further recommended that the costs of supervisory personnel be set up for reporting separately on Form MF-104A, so that a constant control on such expenditures can be maintained.

Enclosed are nine sets of maps that are included in the field examiners' report for use in conjunction with the proposed contract.

Original signed by
E. N. HARSHMAN
E. N. Harshman
Acting Executive Officer

Enclosures

JWT:prl

cc: Harshman
King
Konselman
Docket
Chron.
} w/copy of enclosed report.

U. S. v. Robert Friedland

Privilege Log BOMSPOK 0010-- Page 1 of 1

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Date	Document Title (type)	Author(s)/Org(s)	Addresee(s)/Org(s)	CC/BCC	Attch	Attch priv?	# Pg inc any attch	Desc.	Type Priv.	Comment
19570520	(MEM)	E.N. Harshman, Acting Executive Office, DMEA Field Team (DOI)	Secretary to the Operating Committee, DMEA (DOI)	Harshman; King; Konselman; Docket; Chron.	N		7	description of proposed Summitville exploration	CBI, statute	
19570514	Report of examination by Field Team Region III (RPT)	D.H. Richter, Geologist, USGS; E.W. Buel, Mining Engineer, BOM (DOI)	not specified	none	Y (4 maps)	Y (statute, CBI)	49	joint engineering and geological report of proposed Summitville project	CBI, statute	

0010

IN REPLY REFER TO:

DMEA
DEPARTMENT OF THE INTERIOR
MAY 16 1957
REGION III
DENVER, COLORADO

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Defense Minerals Exploration Administration
Denver Federal Center
Denver, Colorado

TRANSMITTED
MAY 20 1957

May 16, 1957

Memorandum

To: Acting Executive Officer, DMEA Field Team, Region III

From: A. S. Konselman
F. N. Marshman

Subject: DMEA Docket 4643 (Copper), General Minerals Corporation (Summitville mine), Rio Grande County, Colorado

Enclosed are the original and eight copies of a joint report by D. H. Richter, U. S. Geological Survey, and R. W. Buel, U. S. Bureau of Mines, covering their examination of the subject property.

The applicant revised his original proposal and on March 30, 1957, submitted an exploration program, estimated to cost $266,547, comprising rehabilitation, diamond drilling, drifting and crosscutting.

The Summitville mine has had a significant production, principally from gold ore, and it appears that the copper content of the ore is increasing with increasing depth. The examiners propose a carefully staged program to determine the copper potential of the veins at depths below the old workings.

The applicant is at present rehabilitating the workings from which a part of the DMEA work is proposed. All Stage I exploration will be accomplished from old workings now rehabilitated or to

be rehabilitated by the company at no expense to the Government. Stage II work in the Tewksbury-McDonald vein area and in the Hidden vein area will be done from headings or points made accessible by company rehabilitation. Stage II exploration in the Annie-Copper vein area will involve rehabilitation with Government assistance. Stage III work in the three areas involves no rehabilitation.

The cost analyses are based on the assumption that work on any one stage will not be carried on concurrently with work under any other stage and that drifting will be in heavy ground where timbering and drifting cannot be carried on concurrently.

The program proposed by the examiners appears to be a logical well staged proposal designed to determine the copper ore potential of the Summitville mine at a reasonable cost.

A. S. Kandelman
Mining Engineer

E. N. Harshman
Member, Field Team

Enclosures (9)
FNHarshmanmp

FOR UNITED STATES GOVERNMENT USE ONLY

TRANSMITTED

MAY 20 1957

UNITED STATES
DEPARTMENT OF THE INTERIOR
FRED A. SEATON, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION XII

DMEA 4643

General Minerals Corporation

Sunnyville mine

Rio Grande County, Colorado

Copper

Joint Engineering and Geological Report

by

D. H. Richter, Geologist
Geological Survey

F. W. Boal, Mining Engineer
Bureau of Mines

May 14, 1957

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3. Map showing fractional areas held by unpatented locations, Summitville mine, Rio Grande County, Colorado. DMEA 4643..... 42

4. Surface Geology map showing a part of the underground workings, Summitville mine, General Minerals Corp., Rio Grande County, Colorado. DMEA 4643..... 42

5. Recommended exploration, Summitville mine, General Minerals Corporation, Rio Grande County, Colorado. DMEA 4643..... 42

DMEA 4643

GENERAL MINERALS CORPORATION
SUMMITVILLE MINE
RIO GRANDE COUNTY, COLORADO

SUMMARY

An application for Defense Minerals Exploration Administration assistance (Docket DMEA 4643) was submitted on February 2, 1957, by General Minerals Corporation. It was referred to Region III for field examination on March 6, 1957. The requested assistance consisted of diamond drilling, drifting, crosscutting, and rehabilitation to explore for copper in the Summitville mine, Rio Grande County, Colorado. The applicant's estimated cost of the exploration program was $206,781. The applicant, on March 30, 1957, sent to the DMEA Field Team a revision of exploration and costs. The revised estimated cost is $066,547.

The rocks and ore deposits of the Summitville district are all of volcanic or related shallow-earth origin. Thick Tertiary flows and domes of rhyolite and quartz latite exhibiting varying degrees of leaching and hydrothermal-fumarolic alteration are the host rocks for the ore mineralization. The leaching and alteration, localized in areas of strong fracturing, were continuous processes forming from the primary channelways outward, zones of (1) vuggy quartz,

(2) quartz-alunite rock, (3) argillic-rich rock, and (4) montmorillonite-chlorite-rich rock. The ore minerals, which are generally concentrated in the porous vuggy-quartz zones, were deposited late in the sequence of rock alteration and consist chiefly of gold, auriferous pyrite, enargite, famatinite, and covellite. Although the mines in the district have been chiefly sources of gold, there is evidence that copper minerals are more abundant at depth, and possibly constitute a significant ore deposit.

The Summitville mine has produced ore valued at over 7-1/2 million dollars, of which more than 95 percent was derived from gold, and the remainder principally from silver and copper.

The property contains favorable ore-bearing zones that are known to extend over a vertical distance of 1,000 feet. Copper content appears to increase with depth as indicated by sampling of the lower workings and drill-hole core.

The examiners consider that the probability of discovering significant copper ore bodies in the lower parts of the mine is good.

The Annie-Copper, Hidden, and Tomboy-McDonald vein areas are recommended for exploration by diamond drilling, drifting and cross-cutting, and rehabilitation from the lower Summitville mine workings, namely, the Chandler, Reynolds, and Iron levels. Each area is to be explored under an independent three-stage program. Estimated cost of

this program is $176,695.70, in which the Government would participate to the extent of 50 percent, or $88,347.86.

INTRODUCTION

General Minerals Corporation, P. O. Box 446, Grand Junction, Colorado, applied for Defense Minerals Exploration Administration assistance on February 2, 1957, to explore for copper in the Summitville mine, Rio Grande County, Colorado. The proposed exploration program consists principally of 2,955 feet of drifting and crosscutting and 5,000 feet of diamond drilling. The applicant estimates this program to cost $256,761.

The property was examined on March 30, 1957, by a team composed of Donald H. Richter, U. S. Geological Survey, and Edward W. Buel, U. S. Bureau of Mines. The team was accompanied by Messrs. Stanley Kung, Point IV Trainee from Formosa; Robert L. Jones, manager; and Roy Malcott, foreman.

Following a conference with the examiners, held on March 26, 1957, the applicant's representatives decided to revise the exploration program. In a letter of March 30, 1957, to the DMEA Field Team, the revised program, similar to the one recommended by the examiners, was submitted. The applicant estimated the revised program to cost $266,547.

At the time of the examination only a small part of the mine was accessible from the Reynolds and Chandler levels because most of the workings were caved and flooded. The applicant is currently rehabilitating the Reynolds and Chandler workings, but work had not progressed sufficiently to reach the areas to be explored. Even though the areas could not be seen, adequate geologic data have been obtained from the applicant and from geological reports to evaluate the project.

LOCATION AND ACCESSIBILITY

The Summitville property is principally in sec. 30, T. 37 N., R. 4 E., N.M.P.M., Summitville mining district, Rio Grande County, Colorado (figs. 1, 2, and 3). Several of the claims comprising the property extend into secs. 19, 29, and 31, T. 37 N., R. 4 E., and secs. 24 and 25, T. 37 N., R. 3 E., N.M.P.M. The mine and camp are at Summitville, which is on the north slope of South Mountain, near the Continental Divide.

Summitville is accessible from Del Norte and Monte Vista, Colorado (fig. 1). It can be reached from Del Norte by traveling 26 miles over an improved county road, but the road is not passable throughout the winter months because of heavy snows which close off an 8-mile segment that is above 11,000 feet in altitude. The road

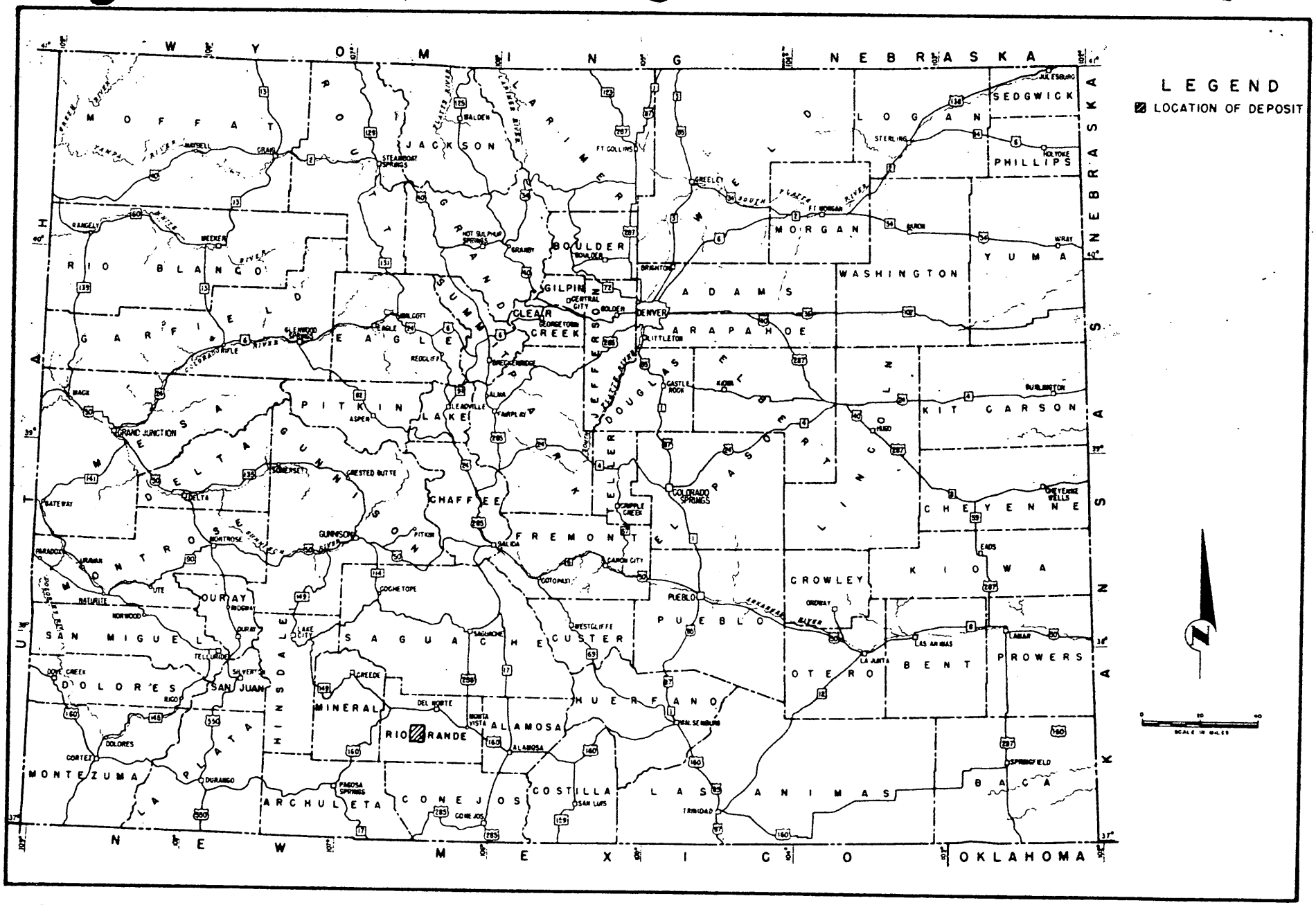

FIGURE 1 - LOCATION MAP OF THE SUMMITVILLE MINE (GENERAL MINERALS CORPORATION), RIO GRANDE COUNTY, COLORADO.
DMEA 4643

was closed during the winter of 1955-56, from the end of October to the beginning of May. To reach the property from Monte Vista, State Highway 15 is followed south for 18 miles, then westward for 26 miles along Alamosa Creek to the Platero-Summitville road fork. From here a steep 7-mile road, having a number of switchbacks, follows Wightman's Fork gulch to the mining camp at Summitville. This road is generally not passable with conventional-type automobiles.

Throughout the 1956-57 winter season the county maintained the roads to the Platero-Summitville fork; the applicant has had to maintain the remaining 7 miles of road from the fork to the camp, and maintenance has been difficult, mainly because of heavy snows and mud.

GEOGRAPHY

The Summitville mining district is in the east-central part of the San Juan Mountains--a region which is rugged with peaks that reach heights of more than 12,000 feet. The relief within the district exceeds 1,000 feet. The Summitville mining camp and the Reynolds level (lowest mine working) are at an altitude of about 11,300 feet.

The region is amply covered with timber suitable for mining needs. Included with the mine property leased to the applicant, are

two patented timber tracts of 320 acres from which all mine timber that is needed can be obtained. The applicant, however, has been purchasing his timber from sawmills near Monte Vista.

Sufficient water for domestic and mining needs is available from Wightman's Fork, which passes through Summitville. Water is also present in some of the mine workings.

An alpine climate prevails in the district. The summers are relatively warm with frequent thunderstorms and hailstorms. The winters are severe. The district is noted for its heavy snowfalls which might amount to well over 10 feet throughout the season and which have isolated the Summitville camp for days at a time. Temperatures below -20° F. have been recorded, and have seriously hampered some mining operations.

Minor supplies can be obtained at Del Norte and Monte Vista. Most mining supplies, however, would probably be obtained either from Grand Junction, Pueblo, and Denver, Colorado, or from Salt Lake City, Utah.

The mine and camp are serviced by a Public Service Company of Colorado 22,000-volt, 3-phase transmission line which extends from Del Norte. Present power needs at the mine and camp are supplied by the transmission line and by portable, internal-combustion engines.

Experienced mining personnel is scarce in the area. The nearest sources of skilled mining labor are Creede, Ouray-Silverton, Leadville, and mining districts of the Colorado Plateau. Because of the remoteness of the Summitville camp, the applicant has to pay relatively high wages.

There are no milling facilities close to the property. If a substantial amount of ore can be developed, the applicant will install milling facilities. A number of mills were erected in Summitville by previous operators, but they have all been dismantled or wrecked.

General Minerals Corporation has repaired several buildings; one currently provides office space and boarding and living facilities for about 10 men. Adequate living facilities can be provided in the camp, if additional men are employed.

PROPERTY

The property is a consolidation of a number of smaller properties that are now collectively known as the Summitville mine. Patented and unpatented lode and placer mining claims comprising the property are shown in figures 2 and 3 and are listed by the applicant as follows:

Patented claims

Golden Queen Lode	(Survey No. 61)
Little Annie	(Survey No. 63)
Del Norte	(Survey No. 64)
Margaretta Lode	(Survey No. 65)
Little Ida Lode	(Survey No. 67)
San Juan Placer	(Survey No. 68)
North 600 ft. Little Jessie	(Survey No. 72)
Peterson Placer	(Survey No. 74)
Brandt Placer	(Survey No. 75)
Bobtail Lode	(Survey No. 385)
Oding Lode	(Survey No. 475)
Gray Bank Lode	(Survey No. 604)
Malkie Lode	(Survey No. 607)
Salcombe Lode	(Survey No. 319)
Tunnel Lode	(Survey No. 320)
Rose Lode	(Survey No. 321)
Rick Lode	(Survey No. 713)
Game Cock Lode	(Survey No. 716)
Garfield Lode	(Survey No. 910)
Bay State Lode	(Survey No. 896)
Little Kettie Lode	(Survey No. 977)
Sheridan Lode	(Survey No. 892)
Columbia Lode	(Survey No. 890)
Home Stake Lode	(Survey No. 898)
Eureka	(Survey No. 889)
Jubilee Lode	(Survey No. 891)
Parole Lode	(Survey No. 608)
Fay Streak Lode	(Survey No. 893)
Logan Lode	(Survey No. 897)
Bayard Lode	(Survey No. 894)
Great Independence Lode	(Survey No. 609)
Golden Vault Lode	(Survey No. 610)
Iowa Lode	(Survey No. 895)
Jennie Placer	(Survey No. 1097)
C. B. & Q Placer	(Survey No. 790)

Patented claims

I. & C. C. Placer	(Survey No. 611)
Highland Mary Lode	(Survey No. 606)
Highland Mary No. 2 Lode	(Survey No. 16314)
South Columbia Lode	(Survey No. 16323)
Aurora Lode	(Survey No. 16324)
Vanner Lode	(Survey No. 16324)
Pittsburgh Lode	(Survey No. 16324)
Dexter Lode	(Survey No. 77)
Aztec Lode	(Survey No. 621A)
Gray Eagle (1/6 interest)	(Survey No. 532)
Little Nellie (1/6 interest)	(Survey No. 62)
Spar Placer	(Survey No. 5736)
Rio Grande Placer	(Survey No. 5736)
Denver Placer	(Survey No. 5736)
Electric Placer	(Survey No. 6413)

SE 1/4 of Sec. 17, T. 37 N., R. 4 E.
NE 1/4 of Sec. 29, T. 37 N., R. 4 E.

Unpatented claims		**Book**	**Page**
SCMI Nos. 1 to 30	Rio Grande County Courthouse	80	308-328
No Good Lode	" " " "	80	343
Confusion	" " " "	80	343
G. & P. Lode	" " " "	80	296
G. & P. No. 1 Lode	" " " "	80	297
G. & P. No. 2 Lode	" " " "	80	297
Century of Progress *	" " " "	80	299
Fishbone Placer *	" " " "	80	296
G. & P. Placer *	" " " "	80	296

* Not listed in the applicant's lease.

Records in the Rio Grande County Courthouse disclose that the unpatented claims are owned by Summitville Mines Corporation, Summitville Leasing Company, and the Reynolds-Morse Corporation. According

to a 25-year lease (effective February 1, 1956) held by General Minerals Corporation, the lessors of the above listed claims are the Reynolds-Morse Corporation, and R. T. Fenson, Denver, Colorado. How the claims were acquired by Reynolds-Morse Corporation and R. T. Fenson is not known; it is assumed that they are the rightful owners.

HISTORY AND PRODUCTION

Mining commenced in the Summitville district in 1870, when placer gold was found in Wightman's gulch. Several gold lode deposits were later discovered in 1872, but it was not until 1873 that the significant discoveries were made. The first mill was erected in 1875, and consisted of five stamps. In 1883, nine mills with a total of 155 stamps were in operation.

A number of mines, namely: the Little Ida, Aztec, Odin, Colorado, Golden Vault, Parole, and others produced over $1,000,000, probably before 1900. Very high-grade gold ore was taken from some of the mines, especially the Little Annie. Information on production before 1900 is sketchy. The total net smelter returns from ore shipped during five periods of mining activity extending from 1875 to 1949, are valued at $7,430,334. It is estimated that about 94 percent of this total came from gold, 5 percent from silver, and 1 percent from copper.

A number of mining properties--the Little Annie, Del Norte, Margarette, Summit, Golden Queen, Golden Star, Little Ida, Aztec, Odin, Goleonda, Golden Vault, Parole, San Juan, and others--were consolidated, in 1915, into the property presently known as the Summitville mine. The property has been leased several times since the consolidation.

From 1934 to 1947, the Summitville mine went through its most productive period. Ore was produced which had a value of more than 4 million dollars. Of this amount gold accounted for more than 93 percent, silver 5 percent, copper 1 percent, and lead less than 1 percent.

In 1955, Newmont Mining Company did some preliminary geophysical exploration on the property in an attempt to show the presence of a large low-grade copper ore body. Diamond drilling was undertaken from the surface to intersect the Hidden vein, but this was apparently unsuccessful.

The applicant, General Minerals Corporation, acquired a 25-year lease from the Reynolds-Morse Corporation and B. T. Fenton; effective date of the lease is February 1, 1956. Since June 1956, the applicant has been rehabilitating the Summitville mine workings and surface installations.

There has been no known ore production from the property since 1949.

PRESENT STATUS

Since June 1956, General Minerals Corporation has been engaged principally in rehabilitation of the Gunnitville mine and mine buildings. At the time of the BMA examination the applicant had made accessible about 2,770 feet of the Reynolds level, 500 feet of the Iowa level, and about 720 feet of the Chandler level. In addition, the applicant completed 457 feet of diamond drilling in two holes from the Iowa level. A third hole was started, but because of the severe cold weather, drilling was discontinued.

The property has been extensively developed on 20 levels having more than 40,000 feet of workings. Most of the workings are inaccessible because of caving and flooding. It was noted that about 50 percent of the accessible workings on the Reynolds and Chandler levels require strong support. Rehabilitation is proceeding slowly and extensive, badly caved workings remain to be repaired.

Most of the mine buildings now in use appear to be in relatively good condition, and provide living quarters, office space, housing for equipment, and storage facilities.

The applicant is well equipped to carry on a rather extensive mining operation. Some of the major equipment at the mine is listed as follows:

No.	Item
2	630-c.f.m. Chicago Pneumatic 2-stage stationary compressors
2	Allis Chalmers 125 hp. 2300 V. electric motors
1	600-c.f.m. Gardner-Denver, diesel-driven rotary, portable compressor
1	Eimco 12B mucking machine
1	1-1/2-ton Atlas battery locomotive
1	Caterpillar D-7 bulldozer
1	Allis Chalmers HD-18 bulldozer
1	5-ton Oshkosh dump truck
1	3/4-ton pickup truck
1	FWD Jeep station wagon
1	3/4-ton Jeep pickup truck
2	1-1/2-ton mine cars (4 more cars on order)
1	Boyle's Bros. (BBB) diamond drill, compressed-air driven
	miscellaneous drilling equipment
	miscellaneous mining supplies

The applicant currently employs about 10 men in rehabilitating the lower workings of the mine. It is likely that rehabilitation work will continue, even if a DMEA contract is not approved. It is estimated that since June 1956 the applicant has spent more than $100,000 for rehabilitation and a lesser amount on exploratory work.

GEOLOGY

The Summitville district, in the southeastern San Juan Mountains of Colorado, has had a production of about 7-1/2 million dollars, principally from gold, but with lesser values from silver, copper, and lead. The appraisal of the base-metal potential of the Summitville district was one of the primary objectives of a thorough study conducted by the U. S. Geological Survey during 1952-1956. Inaccessibility of old mine workings, however, precluded any

underground examination and consequently limited the work to a surface investigation of the petrography and hydrothermal alteration. The results 1/ of these investigations by T. A. Steven and J. C. Ratté have been made available to the writers and have been used almost exclusively as a basis for this geologic report.

The consolidated rocks exposed in the vicinity of the Summitville district are all of volcanic or related shallow intrusive origin. The oldest are a series of flat-lying porphyritic rhyodacites belonging to the Conejos group (Potosi volcanic series) of late Tertiary age. Overlying these older Conejos volcanics on an irregular erosion surface are a series of rhyodacitic and quartz latitic lavas known as the Fisher quartz latite. This volcanic group is separable into two units: the lower, which is a complex mass of quartz latite volcanic domes, thick rhyodacite flows, and associated breccias and tuffs; and the upper, which consists of similar quartz latite lavas and related quartz latite dikes. The massive quartz latite domes of the Fisher volcanics are the only rocks exposed in the mine workings and their immediate vicinity.

A northwest-trending fault, which has undergone at least two periods of movement during Fisher time, extends across the Summitville district. The first major movement followed the eruption of

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1/ Steven, T. A., and Ratté, J. C., Geology and Ore Deposits of the Summitville District, San Juan Mountains, Colorado: U.S.G.S. Bull. (in preparation).

the lower Fisher volcanics and preceded the period of hydrothermal activity. The fault was reactivated, in part, during the period of upper Fisher volcanism.

Two periods of hydrothermal activity have been recognized in the region. The older, which preceded the eruption of the Fisher rocks, has affected and altered only a part of the Comejos rocks and is not evident in the immediate vicinity of the Summitville mine. The younger period of hydrothermal activity followed the eruption of the lower Fisher volcanics and is responsible for the large areas of alteration present in the Summitville district and the subsequent gold-copper ore mineralization.

The largest mass of rocks hydrothermally altered during Fisher time is exposed over an irregular area of about 1-1/3 square miles and is generally restricted to an area underlain by lower Fisher quartz latitic lavas. Alteration has not affected all the rocks in the area but was evidently confined to a number of different centers of hydrothermal activity throughout the general zone. The strongest center of activity was apparently in the northern part of the altered zone, corresponding roughly to a postulated quartz latite volcanic dome, and the most intensely altered rocks and related mineralized zones occur near the margin of the coarsely porphyritic core of this structure. Apparently internal stresses (due in large part to

movement by a still fluid core under a solid crust) within the thick volcanic rocks formed areas of strong fracturing that prepared the rocks for the ingress of the hydrothermal solutions. In the mine area, surface geologic mapping and mining indicate that two sets of northwesterly trending fractures controlled most of the alteration and mineralization. One set, which trends N. 25-35° W., is represented by the Tewksbury vein system and a part of the Annie vein, and the other, which strikes roughly N. 55° W., by the Hidden, McDonald, Copper and the southern part of the Annie vein (fig. 4).

The alteration and mineralization present in the Summitville district is characteristic of a shallow volcanic environment (high temperature-low pressure) where escaping volatiles, from the waning volcanic activity, and admixed meteoric waters, changed the original rocks to various aggregates of quartz, sulfates, and clay minerals. The zonal relations now observed in the altered rocks in the district suggest that the alteration and mineralization took place through an essentially continuous process. Near the original fractures (channelways) the rocks were leached of all their more soluble material, by strong acid-sulfate solutions, leaving only a porous skeleton of fine-grained quartz. As the acid solutions progressed outward from the channelways they were enriched in soluble bases, such as potash and soda from the breakdown primarily of feldspathic material, resulting

in a less acid solution and the formation of both quartz and alunite. With continued neutralization, kaolinite and illite formed as thin argillic envelopes around the quartz-alunite bodies. Outward from this argillic zone the solutions were nearly neutral or slightly alkaline and only a relatively minor montmorillonitic and chloritic alteration was active.

The ore minerals, which are generally concentrated in the porous vuggy-quartz zones, were deposited late in the sequence of rock alteration in a generally reducing or alkaline environment. The complex paragenetic relations of the ore minerals, however, and the presence of some hypogene sulfates indicate that partly oxidizing conditions were present intermittently during the period of ore deposition. The primary metal in the upper portion of the veins was gold, which was free and so extremely divided that specimens known to carry 100 oz. per ton seldom had gold visible to the naked eye. Below the zone of surface oxidation auriferous pyrite was the chief ore mineral. At depth, probably due to a temperature-pressure zonal effect, copper minerals became more abundant. In order of abundance these are enargite, luzonite (famatinite ?), covellite, and chalcocite. Pyrite is ubiquitous and occasionally galena has been found in the deeper workings. Tennantite is probably present and may carry the good silver values found with the better-grade copper ores. Other minor "vein" minerals are native sulfur and barite.

The term "vein" is applied very loosely when referring to the ore-bearing zones in the Gunnitville mine. The deposits, in all but one known case, are irregular and discontinuous replacements, dependent in their linearity, on the nature of the original fracture, and the intensity of the leaching and replacement by the early solutions. The exception to this is the fissure-filled Copper vein as exposed in the Reynolds tunnel. This structure, which may be the southeast continuation of the Annie vein, contains lenses of covellite, fluorite, and pyrite in a matrix of a pure white clay mineral. The lenses are stubby, rarely exceeding 4 feet in length, and average 1 foot thick. Thin, 1- to 2-inch mineralized subsidiary veinlets occur along the east side of the vein.

Although the ore-bearing zones in the Gunnitville mine area are irregular and discontinuous, surface mapping indicates some continuity and company mine maps and old geologic reports show that most of the vein zones with ore-grade mineralization extend from the surface to the Reynolds level, the lowest of the mine workings (figs. 4 and 5). Below this level there is no information on which to postulate a continuation of ore values; and actually, if the deposit is similar to those found in the Red Mountain district, Colorado, or the Goldfield district, Nevada, as some workers contend, they may bottom at relatively shallow depths. Unfortunately,

during the DMEA examination, the writers were not able to inspect or sample any of the major vein zones, with the exception of the Copper vein, and consequently our favorable recommendations are based upon the work of Steven and Rattè 1/ and other older investigations. 2/

Briefly, we have used the following criteria as a means of judging the potential of the area and to justify our recommended program:

(1) Favorable ore-bearing zones exhibit some surface continuity and linearity and are known to extend to the lowest mine workings, or a maximum vertical distance of 1,000 feet.

(2) Copper values apparently increase with depth. For example: the Annie vein on the Chandler level (el. 11,496') probably averages around 2 percent Cu, whereas the assumed continuation of the Annie, the Copper vein, does not contain any appreciable copper mineralization on the Narrow Gauge level (el. 11,676') but is very high in copper (approx. 10.7% Cu across a 1.5' width) on the Reynolds level (el. 11,318'); the Hidden vein on the Reynolds level is

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1/ Steven, T. A. and Rattè, J. C., op. cit.

2/ Patten, R. B., Geology and Ore Deposits of the Pinto-Summitville mining district, Colo.: Colo. Geol. Sur. Bull. 15, 1917.

Butler, F. B., Data concerning the Summitville Group Mines: unpublished report, 1928.

Garvey, G. M., Report on the Summitville Mines: unpublished reports, 1931 and 1933.

reported to average 5 percent Cu over a length of 80 feet; and the Tewksbury on the Reynolds level is reported to contain 1.85 percent Cu over a length of 60 feet.

(3) Drilling by the applicant through the Tewksbury vein, 155 feet below the Zown level, indicates the vein at that depth carries 0.11-0.51 oz. Au, 1.71-5.40 oz. Ag, and 2.25-4.40 percent Cu over a true width of 8-17 feet.

(4) A small 1-foot mineralized zone on the Reynolds level, near the Hidden vein, sampled (RB-32) by the examiners assayed: 5.40 percent Cu, 0.1 percent Pb, 0.5 percent Zn, 0.02 oz. Au, and 3.6 oz. Ag.

In summary, therefore, we believe that the carefully staged exploration program recommended in this report may disclose significant deposits of copper ore above, along, and/or below the Reynolds level.

APPLICANT'S ORIGINAL EXPLORATION PROGRAM

The applicant's original exploration program consisted of 1,140 feet of rehabilitation, 2,935 feet of drifting and cross-cutting, and 5,000 feet of drilling, distributed semi-staged over three project areas. In a post-examination meeting with the applicant's representatives, on March 26, 1957, their plan

was discussed, and it was mutually agreed that it should be revised and adequately staged in lieu of the meager information available in certain areas of the mine.

RECOMMENDED EXPLORATION PROGRAM

The applicant's revised program was received April 1, 1957. It is acceptable with a few slight modifications, and is recommended for OMTA assistance. This revision carefully stages the exploration program, initiates work in each project area with drilling, and substitutes some drilling for drifting.

Exploration will be undertaken in three general areas, referred to as: (1) the Annie-Copper vein; (2) the Hidden vein; and (3) the Tewksbury-McDonald vein (fig. 5). With one exception which will be discussed later (footnote 1) exploration in each area can be done as a separate project and is not dependent upon activities in other areas. Therefore, several operations can be carried on simultaneously. Upon completion of a work-stage in any designated area, Government approval must be obtained before beginning work in any subsequent stage.

Annie-Copper vein area

The Annie vein is probably the strongest and most intensely mineralized structure in the Summitville area. Ore-grade material

is known to occur on the Chandler level, and unconfirmed reports are that the ore zone, with an increase in copper content, continues downward to the inaccessible Reynolds level. The Copper vein, on trend with the Annie vein, and possibly its southern extension, is exposed as a promising copper-bearing structure in the main Reynolds crosscut. Continuity of the Copper vein with the Annie vein is indicated by their strike, surface-alteration features, and by the fact that a vein was followed along this trend for a distance of 660 feet on the Barrow Gauge level (fig. 4).

The following exploration is recommended in this area:

Stage I. Five inclined drill holes from the Chandler level to explore the Annie vein approximately 150 feet below the Chandler level or just above the Reynolds level. Approximate maximum length of each drill hole would be 200 feet, or a total of 1,000 feet of drilling. Location, bearing, and inclination of the holes are shown in figure 5.

Stage II. (1) Drift 1,500 feet along the Copper vein and connect on grade, if possible, with the Reynolds workings on the

Annie vein. 1/ This drift has the two-fold purpose of exploring the Copper-Annie vein and gaining access to the main Annie vein under the Chandler level. (2) Rehabilitate 840 feet of drift and crosscut. (3) Drive 200 feet of new crosscut for drill stations. (4) Drill approximately 1,400 feet in six inclined holes to explore the Annie at a depth of about 150 feet below the Reynolds level.

1/ Rehabilitation of 1,300 feet of Reynolds drift and 4,100 feet of horizontal drilling to explore the Copper-Annie vein was considered as an alternative to the 1,300 feet of Stage II drifting on the Copper vein. However, inasmuch as the writers do not know the condition of the whole Reynolds drift, thereby precluding their making any satisfactory estimate of rehabilitation costs, they believe that until the Reynolds drift is made accessible, which may be when Stage II work in the Hidden vein area is partly completed, the above drifting should be planned. Therefore, Stage II work in the Copper-Annie vein area should be contingent on Stage I work in the Copper-Annie vein area and Stage II work in the Hidden vein area and may be changed if conditions warrant.

Stage III.(1) Drive 200 feet of new crosscut. (2) Drill a maximum of 1,100 feet in three holes to explore the Annie vein approximately 300 feet below the Reynolds level.

Hidden vein area

The Hidden vein on the Reynolds Level contains good grade copper-gold ore. Therefore, inasmuch as no exploration has been done below this level and very little work has been done to show that the mineralized zone extends to the northwest, the following program is recommended:

Stage I. (1) Drill a maximum of 600 feet in three inclined holes to explore the Hidden vein 150 feet below the Reynolds level. The location, bearing, and inclination of the holes are shown in figure 5.

Stage II. (1) Drift 185 feet northwesterly along the Hidden vein on the Reynolds level. This drift will break into the old Reynolds drift 85 feet beyond its present face and will explore ground 100 feet beyond the old Reynolds drift.

Stage III.(1) Drift an additional 200 feet along the Hidden vein.

Tewksbury-McDonald vein area

The applicant has explored the Tewksbury vein 155 feet below the Iowa level, by two drill holes, which indicates ore continuity

to that depth. The program recommended below will explore this ore zone, down to, and below the Reynolds level.

Stage I. (1) Drill a maximum of 900 feet in two inclined holes from the Iowa level to explore the Tewksbury vein approximately 300 feet below the Iowa level. The location, bearing, and inclination of the holes are shown in figure 5.

Stage II. (1) Drift 500 feet on the Reynolds level, South Tewksbury drift, to explore the Tewksbury vein on the Reynolds level approximately 250 feet below the lowest drill-hole exploration.

(2) Drill a maximum of 850 feet in one or two horizontal holes from the Reynolds level to explore the possible downward extension of the McDonald vein (fig. 5).

Stage III. (1) Drive a crosscut, a maximum of 150 feet, and prepare a drilling station.

(2) Drill a maximum of 750 feet in not more than 3 holes to explore the Tewksbury vein about 150 feet below the Reynolds level.

The following items are included for contract preparation:

(1) The drill holes should be plugged for the first half of their estimated length and cored the remaining half.

(2) The holes should not be drilled more than 10 feet beyond the target zone.

(3) Mineralized core, representing 5-foot sections of hole, should be split and one-half assayed for copper, gold, and silver.

(4) Channel samples should be taken at not greater than 10-foot intervals along mineralized portions of the drifts.

EXPLORATION SUMMARY

Annie-Copper vein area

	Drilling (feet)	Drifting and crosscutting (feet)	Rehabilitation (feet)	Drill stations
Stage I	1,000			3
Stage II	1,400	1,500	840	3
Stage III	1,100	200	—	3
Totals	3,500	1,700	840	9

Hidden vein area

Stage I	600			1
Stage II		185		0
Stage III	—	200		0
Totals	600	385		1

Tewksbury-McDonald vein area

Stage I	900			1
Stage II	250	500		1
Stage III	750	150		1
Totals	1,900	650		3
Grand Total	6,000	2,735	840	13

COST ESTIMATES

It was noted that the unit costs of the applicant's exploration program were excessively high. The applicant was informed that his unit costs were considerably higher than normally allowed under most DMEA contracts. On April 8, 1957, the applicant sent a revised cost analysis to the DMEA Field Team, but from all indications its revised cost figures are still too high for the type of exploration proposed.

The examining team recommends that an actual-cost and fixed-unit-cost contract be prepared from the following data:

Diamond drilling

Cost estimates are based on the following assumed conditions:

(a) Applicant will prepare drill stations.

(b) Applicant will provide compressed-air power.

(c) Mine will be operated 1 shift per day, 25 days per month.

(d) Contractor will operate 2 drills.

(e) Drill holes to have maximum depth of 450 ft.; AX size or larger; be horizontal or inclined.

(f) Average rate for core and non-core drilling will be 25 feet per drill shift.

(g) Time to complete, 5 months

ACTUAL COST

I. Independent Contracts	Cost
A. 3,000 feet, non-core drilling at $5.00/ft. (subject to revision)	$15,000.00
B. 3,000 feet, core drilling at $7.00/ft. (subject to revision)	21,000.00
C. 46 hours--standby time at $10.00/hr.	460.00
Total Independent Contracts	$36,460.00

FIXED COST

II. Incidental Allowances

A. Supervision, Labor, and Technical Services:

1-supervising engineer-geologist at $700.00/mo., 2.5 mos.	$ 1,750.00
1-foreman-miner at $500.00/mo., 2.5 mos.	1,250.00
1-surface man at $455.00/mo., 2.5 mos.	1,137.50
1-cook at $260.00/mo., 2.5 mos.	650.00
Total	$ 4,787.50
Payroll insurance, taxes, etc., at 5 percent	239.38
Total	$ 5,026.88

B. Operating Equipment Depreciation and/or Rental:

1-600c.f.m. G-D, rotary, portable, diesel compressor value $13,589, at $226.48/mo., 5 mos.	$ 1,132.40
1-air receiver value $375, at $6.25/mo., 5 mos.	31.25
1-blower, value $750, at $12.50/mo. 5 mos.	62.50

	Cost
1-air tramper, rental, at $180/mo. 5 mos.	$ 900.00
2-timber cars, value $654, at $10.90/mo. 5 mos.	54.50
1-FWD Jeep station wagon estimated value $2,000 at $33.33/mo., 2.5 mos.	83.33
1-bulldozer w/blade, value $73,213 at $586.50 mo., 0.25 mos.	96.72
	$ 2,360.70
10% Contingency for repair of equipment and/or miscellaneous items	236.07
Total	$ 2,596.77

C. Operating materials and supplies:

Fuel, oil, lubricants, electrical power, etc. at $12.00/shift, 100 shifts	$ 1,200.00
Miscellaneous supplies $100.00	100.00
Total	$ 1,300.00
Total Incidental Costs	$ 8,983.65
Incidental costs per foot	$ 1.487

III. Drill Stations

A. 13-drill stations, size to allow for 10-foot pulls at $100.00/station	$ 1,300.00

ACTUAL COST

IV. Miscellaneous

A. 75-core boxes (5 x 1 ft), wooden at $4.55/box	$ 341.25

	Cost
B. 46-sample analyses at $5.00/sample	$ 230.00
	$ 571.29
Total diamond drilling cost	$47,254.90

Drifting and crosscutting

Cost estimates are based on the following assumed conditions:

(a) No timbering included.

(b) Drifts shall be 5 by 7 feet in the clear.

(c) Advance will be 5 feet per shift.

(d) Work will proceed 2 shifts a day, 25 days a month.

(e) Time of completion, including allowance for delays, 12 months.

FIXED COST

A. Labor, and Supervision and Technical Service:	Cost
1-supervising engineer-geologist at $700.00/mo., 12 mos.	$ 8,400.00
2-foreman-miners at $1,000.00/mo., 11.5 mos.	11,500.00
4-miners at $1,820.00/mo., 12 mos.	21,840.00
4-surface men at $910.00/mo., 11.5 mos.	10,465.00
1-cook at $260.00/mo., 11.5 mos.	2,990.00
	$55,195.00

	Cost
Payroll insurance, taxes, etc. at 5%	$ 2,739.75
Total	$37,954.75
Cost per foot (2,735 feet)	$ 21.130

B. Operating Equipment and Depreciation and/or Rental:

1-Ford Jeep station wagon estimated value $2,000 at $33.33/mo., 11 mos.	$ 366.63
1-5 ton Oshkosh truck estimated value $2,000 at $33.33/mo., 12 mos.	340.00
1-bulldozer w/blade value $23,223 at $386.88/mo., 0.75 mo.	290.16
1-1-1/2 ton battery locomotive w/charger value $5,174 at $86.23/mo., 12 mos.	1,034.76
4-cfm auger, rocker type, value $2,060 at $34.33/mo., 12 mos.	411.96
1- 650 c.f.m. C-F, 2-stage, w/125 hp. electric motor, stationary compressor, estimated value $20,000 at $333.33/mo., 12 mos.	4,000.00
1-air receiver, value $375, at $6.25 mo., 12 mos.	75.00
1-12B mucking machine value $1,537 at $25.62 mo., 12 mos.	307.44
1-blower, value $750 at $12.50 mo., 12 mos.	150.00
1-drill w/leg, hoses, etc., rental at $85/mo., 12 mos.	1,020.00
	$ 7,995.95
10% Contingency for repair of equipment and/or miscellaneous items	799.60
Total	$ 8,795.55
Cost per foot (2,735 feet)	$ 3.216

C. Operating Materials and Supplies:

	Cost
Powder 40% at $11.25/box, 660 boxes	$ 7,425.00
Caps, electric at $17.00/box, 135 boxes	2,295.00
Track, 20 lb. at $200/ton or $1.33/ft., 2,735 ft.	3,637.55
Ties, spikes, fishplates, bolts, etc. at $0.45/ft., 2,735 ft.	1,230.75
2" pipe, airline, w/couplings at $0.60/ft., 2,700 ft.	1,620.00
1" pipe, water, w/couplings at $0.25/ft., 2,700 ft.	675.00
8" pipe, ventilation, w/attachments, rigid at $0.80/ft. 2,550 ft.	2,040.00
drill steel and bits, integral at $0.50/ft., 2,735 ft.	1,367.50
electrical power, fuel, oil, etc. at $5.00/shift, 600 shifts	3,000.00
small tools, estimated at $100.00	100.00
miscellaneous supplies, estimated at $200.00	200.00
Total	$23,590.80
Cost per foot (2,735 feet)	$ 8.626
Total Cost Items A, B, and C	$90,341.10
Cost per foot	$ 33.031

ACTUAL COST

D. Miscellaneous

	Cost
Sample Analyses, 218 at $5.00	$ 1,090.00
Grand Total Cost (2,735 feet)	$91,431.10

Timbering

Cost estimates are based on the following assumed conditions:

(a) Install standard drift sets 5 by 7 feet in the clear, lagged on top and sides, on 5-foot centers.

(b) Rate of installation, 2 sets per shift, 2 shifts per day, 30 shifts per month.

(c) Fifty percent of drifts and crosscuts or 1,367.5 feet to be timbered.

(d) Time consumed in timbering, 3 months.

FIXED COST

A. Labor, and Supervision and Technical Service:

	Cost
1-supervising engineer-geologist at $700.00/mo., 3 mos.	$ 2,100.00
2-foremen-miners at $1,000.00/mo., 3 mos.	3,000.00
4-miners, at $1,080.00/mo., 3 mos.	3,460.00
2-surface men at $910.00, 3 mos.	2,730.00
1-cook at $260.00/mo., 3 mos.	780.00
	$14,070.00

	Cost
Payroll insurance, taxes, etc. at 5%	$ 703.50
Total	$14,773.50
Cost per foot	$ 10.805

B. Operating Equipment Depreciation and/or rental:

1-blower, value $750 at $12.50/mo., 3 mos.	$ 37.50
1-1-1/2-ton locomotive w/charger value $5,174 at $86.23/mo., 3 mos.	258.69
2-timber cars value $654 at $10.90/mo., 3 mos.	32.70
1-FWD Jeep station wagon estimated value $2,000 at $33.33/mo., 3 mos.	99.99
1-bulldozer w/blade value $23,213 at $386.88/mo., 1/4 mo.	96.72
1-5 ton Oshkosh truck estimated value $2,000 at $33.33/mo., 3 mos.	99.99
	$ 685.59
10% Contingency for repair of equipment and/or miscellaneous items	68.56
Total	$ 688.15
Cost per foot	$ 0.503

C. Operating Materials and Supplies:

1-standard set, 350 b.f., $71/M.b.f., 275 sets	$ 6,734.05
fuel, oil, lubricants, electrical power etc. at $2.00/shift, 150 shifts	300.00

	Cost
miscellaneous supplies $50.00	$ 50.00
Total	$ 7,134.05
Cost per foot	$ 5.22
Total Cost Timbering (1,367.5 feet)	$22,595.70
Total Cost per foot	$ 16.523

Rehabilitation

Cost estimates are based on the following assumed conditions:

(a) Install standard drift sets, 5 by 7 feet in the clear on 5-foot centers, lagged top and sides.

(b) Fifty percent of rehabilitated drifts and crosscuts will require timber.

(c) Rate of progress, 10 feet per shift, 2 shifts per day, 50 shifts per month.

(d) Rehabilitation will require 2 months work.

ACTUAL COST

A. Labor, Technical Service, and Supervision:	Cost
1- supervising engineer-geologist at $700.00/mo., 1.5 mos.	$ 1,050.00
2-foremen-miners at $1,000.00/mo., 2 mos.	2,000.00
4-miners at $1,820.00/mo., 2 mos.	3,640.00
2-surface men at $900.00/mo., 2 mos.	1,800.00
1-cook at $260.00/mo., 2 mos.	520.00
	$ 9,010.00

	Cost
Payroll insurance, taxes, etc. at 5%	$ 430.50
Total	$ 9,460.50
Cost per foot	$ 11.263

B. Operating Equipment Depreciation and/or Rental:

1-blower value $750 at $12.50/mo., 2 mos.	$ 25.00
1-1-1/2 ton locomotive w/charger value $5,174 at $86.23/mo., 2 mos.	172.46
2-timber cars value $654 at $10.90/mo., 2 mos.	21.80
1-FWD Jeep station wagon estimated value $2,000 at $33.33/mo., 2 mos.	66.66
1-bulldozer w/blade value $23,213 at $386.88/mo. at 0.25 mo.	96.72
1-5 ton Oshkosh truck estimated value $2,000 at 33.33/mo., 2 mos.	66.66
	$ 449.30
10% Contingency for repair of equipment and/or miscellaneous items	44.93
Total	$ 494.23
Cost per foot	$ 0.588

C. Operating Materials and Supplies:

fuel, oil, lubricants, electrical power, etc. at $5.00/shift, 100 shifts	$ 500.00
track, 20 lb. at $800.00/T or $1.33/ft., 840 ft.	1,117.20
ties, spikes, fishplates, bolts, etc. at $0.45/ft., 840 ft.	378.00

	Cost
2" pipe, airline, w/couplings at $0.60/ft., 840 ft.	$ 504.00
1-standard drift set, 350 b.f., $71/M.b.f., 84 sets	2,087.40
1" pipe, water, w/couplings at $0.25/ft., 840 ft.	210.00
8" pipe, ventilation, w/attachments, rigid at $0.80/ft., 840 ft.	672.00
miscellaneous supplies estimated at $25.00	25.00
Total	$ 5,493.60
Cost per foot	$ 6.540
Total cost of 840 feet of rehabilitation	$15,448.33
Total cost per foot	$ 18.391

Total Estimated Costs

Diamond drilling	$ 47,254.90
Drifting and crosscutting	91,451.10
Timbering	22,595.70
Rehabilitation	15,448.33
Total	$176,750.03

SUMMARY OF RECOMMENDED EXPLORATION AND COSTS

Stage I

Annie-Jagger vein area	Cost
1,000 ft. diamond drilling at $6.00 per ft.	$ 6,000.00
1,000 ft. incidental allowance at $1.49 per ft.	1,490.00
10 hrs. standby time at $10.00 per hr.	100.00
3 drill stations at $100 per station	300.00
13 core boxes at $4.55 a box	59.15
10 sample analyses at $5.00 each	50.00
Total	$ 7,999.15

Hidden vein area	
600 ft. diamond drilling at $6.00 a ft.	$ 3,600.00
600 ft. incidental allowance at $1.49 per ft.	894.00
6 hrs. standby time at $10.00 per hr.	60.00
1 drill station at $100.00 per station	100.00
7 core boxes at $4.55 a box	31.85
6 sample analyses at $5.00	30.00
Total	$ 4,715.85

Tewksbury-McDonald vein area	
900 ft. diamond drilling at $6.00 per ft.	$ 5,400.00
900 ft. incidental allowance at $1.49 per ft.	1,341.00
4 hrs. standby time at $10.00 per hr.	40.00
1 drill station at $100.00 per station	100.00

	Cost
11 core boxes at $4.55 per box	$ 50.05
4 sample analyses	80.00
Total	$ 6,951.05
Total Stage I	$19,666.05
Government participation at 50 percent	$ 9,833.03

Stage II

Angle-Copper vein area

1,400 ft. diamond drilling at $6.00 per ft.	$ 8,400.00
1,400 ft. incidental allowance at $1.49 per ft.	2,086.00
12 hrs. standby time at $10.00 per hr.	120.00
5 drill stations at $100.00 per station	500.00
18 core boxes at $4.55 per box	81.90
142 sample analyses at $5.00 ea.	710.00
1,500 ft. drifting and crosscutting at $33.03 per ft.	49,545.00
750 ft. timbering at $16.52 per ft.	12,390.00
840 ft. rehabilitation at $18.39 per ft.	15,447.60
Total	$89,080.50

Ridge vein area

185 ft. drifting at $33.03 per foot	$ 6,110.55
90 ft. timbering at $16.52 per foot	1,486.80
18 sample analyses at $5.00 each	90.00
Total	$ 7,687.35

Tombstone-Helvetia vein area	Cost
250 ft. diamond drilling at $6.00 per ft.	$ 1,500.00
250 ft. incidental allowance at $1.49 per ft.	372.50
2 hrs. standby time at $10.00 per hr.	20.00
1 drill station at $100.00 per station	100.00
5 core boxes at $4.55 per box	22.75
52 sample analyses at $5.00 each	260.00
500 ft. drifting at $33.03 per ft.	16,515.00
250 ft. timbering at $16.52 per ft.	4,130.00
Total	$22,920.25
Total cost Stage II	$119,688.10
Government participation at 50 percent	$59,844.05

Stage III

Annie-Copper vein area	
1,100 ft. diamond drilling at $6.00 per ft.	$ 6,600.00
1,100 ft. incidental allowance at $1.49 per ft.	1,639.00
6 hrs. standby time at $10.00 per hr.	60.00
3 drill stations at $100.00 per station	300.00
14 core boxes at $4.55 per box	63.70
6 sample analyses at $5.00 each	30.00
200 ft. crosscutting at $33.03 per ft.	6,606.00
100 ft. timbering at $16.52	1,652.00
Total	$16,930.70

Hidden vein area	Cost
200 ft. drifting at $33.03 per ft.	$ 6,606.00
100 ft. timbering at $16.52 per ft.	1,652.00
20 sample analyses at $5.00 each	100.00
Total	$ 8,358.00

Tewanbury-McDonald area	
750 ft. diamond drilling at 36.00 per ft.	$ 4,500.00
750 ft. incidental allowance at $1.49 a ft.	1,117.50
6 hrs. standby time at $10.00 per hr.	60.00
1 drill station at $100.00 per station	100.00
7 core boxes at $4.55 per box	31.85
6 sample analyses at $5.00 each	30.00
150 ft. crosscutting at $33.03 per ft.	4,954.50
75 ft. timbering at $16.52 per ft.	1,239.00
Total	$12,032.85
Total cost Stage III	$37,341.55
Government participation at 50 percent	18,670.78

Total Cost of Program

Stage	Amount	Government part.
I	$ 19,666.05	$ 9,833.03
II	119,688.10	59,844.05
III	37,341.55	18,670.78
Total	$176,695.70	$88,347.86

CONCLUSIONS AND RECOMMENDATIONS

The property is known to contain favorable ore-bearing zones which exhibit some surface continuity and linearity and are known to extend to the lowest mine workings, or over a vertical extent of 1,000 feet. Copper content appears to increase with depth as indicated by samples taken from the lower workings and from diamond-drill holes drilled by the applicant. These samples indicate that ore containing 1.83 to 10.7 percent copper, 1.5 to 17.0 feet in thickness, occurs in the lower parts of the mine.

The examiners conclude that the possibilities of encountering significant copper deposits in the lower parts of the mine and below the lowest level of the mine are good.

It is recommended that the exploration program outlined above be approved.

U. S. v. Robert Friedland

Privilege Log BOMSPOK 0005 through 0011-- Page 1 of 9

Repository Name: USGS - Spokane
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File Location: Spokane, Washington

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0005	19570514	Report of examination by Field Team Region III (RPT)	D.H. Richter, Geologist, USGS; E.W. Buel, Mining Engineer, BOM (DOI)	not specified	none	Y (4 maps)	Y (statute, CBI)	49	joint engineering and geological report of proposed Summitville project	CBI, statute	same report in other file; this one has notation "Extra Copy do you want this?"
0006	19571101	Exploration Project Contract, General Mineral Corporation, Docket No. DMEA-4643, Amendment No. 1 (CON)	Frank Johnson, Acting Administrator, DMEA (DOI)	S.Y. Guthrie, President, General Minerals Corporation	none	N		2	revised description of work, costs	CBI, statute	
0006	not dated	Exploration Project Contract, General Minerals Corporation, Docket No. DMEA-4643, Exhibit "A" (CON)	not specified	not specified	none	Y (4 maps)	Y (statute, CBI)	12	description of work, ore body	CBI, statute	exhibit A goes with the exploration contract, so it probably has the same date and authors, but nothing is specified on the exhibit itself
0007	19570426	(MEM)	Edward W. Buel (DOI)	John F. Shaw, Supervising Mining Engineer (DOI)	Region III; General; DMEA 4643; Chron.	N		2	description of proposed exploration, ore deposit	CBI, statute	

File Bates # BOMS POK	Date	Document Title (type)	Author(s)/Org(s)	Addresee(s)/Org(s)	CC/BCC	Attch	Attch priv?	# Pg inc any attch	Description	Type Priv.	Comment
0007	19570419	Review of Examination Report (RPT)	D.E. Redmon, BOM (DOI)	not specified	none	N		1	description of proposed exploration, ore body	CBI, statute	
0007	19570419	Summary Report of Minerals Examination (RPT)	not specified, BOM (DOI)	not specified	none	N		2 (1 sheet doubl e sided)	descrption of deposit, location, mine workings	CBI, statute	
0007	19570408	Chemical Laboratory Report (RPT)	H.E. Peterson, BOM (DOI)	Edward W. Buel (DOI)	Shaw; Harshman	N		1	Report of mineral content from Summitville sample	CBI, statute	
0007	19570226	(MEM)	N.F. Nelson (DOI)	W.R. Griswold (DOI)	James Pennington, 3623; W.R. Griswold 4444; DMEA; Chrono file; Docket file; Branch reading, 4212; Director's reading, 4212	N		2	description of proposed drilling, ore body	CBI, statute	
0008	1960315	(MEM)	J.W. Townsend, Executive Officer, OME Field Team (DOI)	J.W. Hasler, T.M. Romslo (DOI)	none	Y	Y (statute, CBI)	5	memos + maps	CBI, statute	
0008	19600303	(MEM)	J.W. Townsend, Executive Officer, OME Field Team (DOI)	J.W. Hasler, T.M. Romslo (DOI)	none	Y	Y (statute, CBI)	5	memos + maps	CBI, statute	

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0008	19580910	(LTR)	E.N. Harshman, Acting Executive Office, DMEA Field Team (DOI)	S.Y. Guthrie III, Vice President, General Minerals Corp.	Chmn. Op. Comm.; Buel, DMEA/DFC; Harshman; Corres. fiel, Reg. III; Cooper; Chron	N		2	description of work, contract applicability	CBI, statute	
0008	19580822	(LTR)	John B. Rigg	J.W. Townsend, Alternate Acting Executive Officer, DMEA (DOI)	none	N		1	description of location of work	CBI, statute	note on document that copies distributed to Harshman; Buel; Corres; Cooper
0008	19580626	(MEM)	H.F. Robertson, Mining Engineer	Acting Executive Officer, DMEA Field Team (DOI)	none	N		4	description of geologic logs from certain holes	CBI, statute	note on document that copies distributed to Harsman; DMEA/OFC; Corres file
0008	19580502	(MEM)	H.F. Robertson, Mining Engineer (DOI)	Acting Executive Officer, DMEA Field Team (DOI)	none	N		2	descrption of core recovered from certain holes	CBI, statute	
0008	19580508	(LTR)	E.N. Harshamn, Acting Executive Officer, DMEA Field Team (DOI)	John B. Rigg, Exploration Superintendent, General Minerals Corp.	Chmn. Op. Comm.; Harshamn; Hasler; DME/DFC; DMEA/G.Jct.; Townsend; Corres. file, Reg. III; Chron	N		2	description of proposed drilling	CBI, statute	
0008	19580429	(MEM)	D.H. Richter, E.W. Buel; through E.N. Harshman(DOI)	Acting Executive Officer, DMEA Field Team (DOI)	none	Y (map)	Y (statute, CBI)	3	description of proposed drilling	CBI, statute	

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0008	19580318	(MEM)	W.H. King, Executive Office, DMEA Field Team (DOI)	E.N. Harshman, DMEA/DFC (Buel) (DOI)	Chmn.Op.Comm; Corres. file; Townsend; Chron.	Y (1 page report)	Y (statute, CBI)	2	report and description of assay report	CBI, statute	
0008	19571106	(LTR)	George C. Selfridge, Chairman, Operating Committee, DMEA (DOI)	E.N. Harshman, Acting Executive Officer, DMEA Field Team (DOI)	none	N		2	description of location of potential discovery	CBI, statute	
0008	19571021	(MEM)	E.N. Harshman, Acting Executive Officer, DMEA Field Team (DOI)	Chairman, Operating Committee, DMEA (DOI)	Harshman; DMEA/DFC-Buel; Corres. file; Townsend; Chron	N		1	description of contract amendment, proposed exploration	CBI, statute	
0008	19571016	(MEM)	Donald H. Richter; Edward W. Buel through E.N. Harshman (DOI)	Acting Executive Officer, DMEA Field Team (DOI)	none	N		3	description of contract amendment, proposed exploration	CBI, statute	two copies of same memo
0008	19571008	(LTR)	Richard V. Gaines, Manager, Western Operators, General Minerals Corp.	J.W. Townsend, Alternate Acting Executive Field Office, DMEA Field Team (DOI)	none	N		1	description of proposed exploration	CBI, statute	
0008	19571010	(LTR)	Richard V. Gaines, Manager, Western Operations, General Minerals Corporation	E.N. Harshman, Acting Executive Officer, DMEA Field Team (DOI)	none	Y (map)	Y (statute, CBI)	2	descripton of work, map	CBI, statute	

File Bates # BOMS POK	Date	Document Title (type)	Author(s)/Org(s)	Addresee(s)/Org(s)	CC/BCC	Attch	Attch priv?	# Pg inc any attch	Description	Type Priv.	Comment
0009	19570208	Application for Aid in an Exploration Project, Pursuant to DMEA Order 1, Under the Defense Production Act of 1950, As Amended (GOV)	Robert L. Jones, General Minerals Corporation	not specified (DOI)	none	Y	Y (statute, CBI)	6	exploration, production, and cost information in response to sections 4-7 of the application, maps	CBI, statute	application, and items in response to sections 2 and 3 of the application not privileged, only attachments in "description" column are
0009	19570330	(LTR)	Richard V. Gaines, Manager, Western Operations, General Minerals Corporation	E.N. Harshman, Acting Executive Officer, DMEA Field Team (DOI)	none	Y (report, map)	Y (statute, CBI)	7	revised description of proposed exploration, maps	CBI, statute	
0010	19570520	(MEM)	E.N. Harshman, Acting Executive Office, DMEA Field Team (DOI)	Secretary to the Operating Committee, DMEA (DOI)	Harshman; King; Konselman; Docket; Chron.	N		7	description of proposed Summitville exploration	CBI, statute	
0010	19570514	Report of examination by Field Team Region III (RPT)	D.H. Richter, Geologist, USGS; E.W. Buel, Mining Engineer, BOM (DOI)	not specified	none	Y (4 maps)	Y (statute, CBI)	49	joint engineering and geological report of proposed Summitville project	CBI, statute	
0011	19571021	Operator's Monthly Report and Voucher, Sept. 1957 (RPT)	J.A. Barnett, Assistant Secretary-Treasurer, General Minerals Corp.	not specified	none	Y (narrative, log)	Y (statute, CBI)	10	monthly report of expenses, exploration work	CBI, statute	
0011	19571024	(MEM)	Edward W. Buel, Mining Engineer (DOI)	Acting Executive Officer, DMEA Field Team (DOI)	6; Idm-E1107; chron	N		1	description of work completed	CBI, statute	
0011	19580109	(MEM)	Edward W. Buel, Mining Engineer (DOI)	Executive Officer, DMEA Field Team (DOI)	6; Idm-E1107; chron	N		1	description of work completed	CBI, statute	

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0011	19580723	(MEM)	Edward W. Buel, Mining Engineer (DOI)	Acting Executive Officer, DMEA Field Team (DOI)	6; ldm-E1107; chron	N		2	description of work completed	CBI, statute	
0011	19580312	Operator's Monthly Report and Voucher, Oct. Nov. Dec. 1957 (RPT)	S.Y. Guthrie III, Vice President, General Minerals Corp.	not specified	none	Y (narrative, invoices, maps, drill log)	Y (statute, CBI)	19	description of work completed, costs	CBI, statute	
0011	19580903	(MEM)	J.W. Townsend, Alternate Acting Executive Officer, DMEA Field Team (DOI)	T.A. Christensen (DOI)	Chmn. Op. Comm; DMEA/DFC; MF-104 file, Reg. III; Harshman; Cooper; Chron	N		3	description of work, costs	CBI, statute	
0011	19580909	Administrative Audit Difference Statement (RPT)	N.E. Stokes, Audit Section, BOM (DOI)	General Minerals Corporation	none	N		2	description of disallwance of costs	CBI, statute	
0011	19580924	(MEM)	E.W. Buel, Mining Engineer (DOI)	Executive Officer, OME	6; ldm-E1107; chron	N		1	description of work	CBI, statute	
0011	19580913	(RPT)	Charles O. Parker & Co.	Jack Rigg	none	N		1	assay report	CBI, statute	
0011	19581007	(RPT)	John B. Rigg	not specified	none	N		1	reasons for suspenion of work	CBI, statute	report is signed w/o a typed name, but looks like Rigg's signature

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0011	195810	Operator's Monthly Report and Voucher, Sept. 1958 (RPT)	John B. Rigg		none	N		4	description of costs, work	CBI, statute	operator did not sign form, so date is estimated from other signatures on form
0011	19581013	(MEM)	E.W. Buel, Mining Engineer (DOI)	Executive Office, OME (DOI)	6; Idm-E1107; chron	N		1	description of work	CBI, statute	
0011	19581014	(MEM)	E.N. Harshman, Acting Executive Officer, OME Field Team (DOI)	T.A. Christensen (DOI)	Chmn. Op. Comm; Buel (OME/DFC); MF-104 file REg. III; Harshman; Cooper; Chron.	Y (report, map)	Y (statute, CBI)	3	description of work, assay map	CBI, statute	
0011	unreadable	Operator's Monthly Report and Voucher, Aug. 1958 (RPT)	John B. Rigg	not specified	none	Y (narrative)	Y (statute, CBI)	5	description of work, costs	CBI, statute	
0011	19580924	(MEM)	E.W. Buel, Mining Engineer (DOI)	Executive Officer, OME (DOI)	6; Edm-E1107; chron	N		1	description of work	CBI, statute	
0011	19581013	(MEM)	E.W. Buel, Mining Engineer (DOI)	Executive Officer, OME (DOI)	6; Idm-E1107; chron	N		1	description of work	CBI, statute	
0011	19591118	Operator's Monthly Report and Voucher, Sept. 1959 (RPT)	John B. Rigg	not specified	none	Y (maps, reports)	Y (statute, CBI)	11	description of costs, work	CBI, statute	
0011	19591124	(MEM)	T.M. Romslo	J.W. Townsend, Executive Officer, OME Field Team (DOI)	6; Chron.	Y		2	analysis of operator's report	CBI, statute	

U. S. v. Robert Friedland

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0011	19580707	(MEM)	J.W. Townsend, Alternate Acting Executive Office, DMEA Field Team (DOI)	DMEA/DFC - E.W. Buel (DOI)	Harshman; Corres. file, Reg. III; Cooper; Chron	Y (3 maps)	Y (statute, CBI)	4	description of work	CBI, statute	

U. S. v. Robert Friedland

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Date	Document Title (type)	Author(s)/Org(s)	Addresee(s)/Org(s)	CC/BCC	Attch	Attch priv?	# Pg inc any attch	Desc.	Type Priv.	Comment
19570514	Report of examination by Field Team Region III (RPT)	D.H. Richter, Geologist, USGS; E.W. Buel, Mining Engineer, BOM (DOI)	not specified	none	Y (4 maps)	Y (statute, CBI)	49	joint engineering and geological report of proposed Summitville project	CBI, statute	same report in other file; this one has notation "Extra Copy do you want this?"

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U.S.v.FRIEDLAND Sealed File
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UNITED STATES
DEPARTMENT OF THE INTERIOR
FRED A. SEATON, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION III

DMEA 4643

General Minerals Corporation

Summitville mine

Rio Grande County, Colorado

Copper

Joint Engineering and Geological Report

by

D. H. Richter, Geologist
Geological Survey

E. W. Buel, Mining Engineer
Bureau of Mines

May 14, 1957

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DMEA 4643

GENERAL MINERALS CORPORATION
SUMMITVILLE MINE
RIO GRANDE COUNTY, COLORADO

SUMMARY

An application for Defense Minerals Exploration Administration assistance (Docket DMEA 4643) was submitted on February 2, 1957, by General Minerals Corporation. It was referred to Region III for field examination on March 6, 1957. The requested assistance consisted of diamond drilling, drifting, crosscutting, and rehabilitation to explore for copper in the Summitville mine, Rio Grande County, Colorado. The applicant's estimated cost of the exploration program was $286,781. The applicant, on March 30, 1957, sent to the DMEA Field Team a revision of exploration and costs. The revised estimated cost is $266,547.

The rocks and ore deposits of the Summitville district are all of volcanic or related shallow-earth origin. Thick Tertiary flows and domes of rhyodacite and quartz latite exhibiting varying degrees of leaching and hydrothermal-fumarolic alteration are the host rocks for the ore mineralization. The leaching and alteration, localized in areas of strong fracturing, were continuous processes forming from the primary channelways outward, zones of (1) vuggy quartz,

(2) quartz-alunite rock, (3) argillic-rich rock, and (4) montmorillonite-chlorite-rich rock. The ore minerals, which are generally concentrated in the porous vuggy-quartz zones, were deposited late in the sequence of rock alteration and consist chiefly of gold, auriferous pyrite, enargite, famatinite, and covellite. Although the mines in the district have been chiefly sources of gold, there is evidence that copper minerals are more abundant at depth, and possibly constitute a significant ore deposit.

The Summitville mine has produced ore valued at over 7-1/2 million dollars, of which more than 95 percent was derived from gold, and the remainder principally from silver and copper.

The property contains favorable ore-bearing zones that are known to extend over a vertical distance of 1,000 feet. Copper content appears to increase with depth as indicated by sampling of the lower workings and drill-hole core.

The examiners conclude that the probability of discovering significant copper ore bodies in the lower parts of the mine is good.

The Annie-Copper, Hidden, and Bewksbury-McDonald vein areas are recommended for exploration by diamond drilling, drifting and cross-cutting, and rehabilitation from the lower Summitville mine workings, namely, the Chandler, Reynolds, and Iowa levels. Each area is to be explored under an independent three-stage program. Estimated cost of

this program is $176,695.70, in which the Government would participate to the extent of 50 percent, or $88,347.86.

INTRODUCTION

General Minerals Corporation, P. O. Box 446, Grand Junction, Colorado, applied for Defense Minerals Exploration Administration assistance on February 8, 1957, to explore for copper in the Summitville mine, Rio Grande County, Colorado. Its proposed exploration program consists principally of 2,935 feet of drifting and crosscutting and 5,000 feet of diamond drilling. The applicant estimates this program to cost $286,781.

The property was examined on March 20, 1957, by a team composed of Donald H. Richter, U. S. Geological Survey, and Edward W. Buel, U. S. Bureau of Mines. The team was accompanied by Messrs. Stanley Kung, Point IV Trainee from Formosa; Robert L. Jones, manager; and Roy Walcott, foreman.

Following a conference with the examiners, held on March 26, 1957, the applicant's representatives decided to revise the exploration program. In a letter of March 30, 1957, to the DMEA Field Team, the revised program, similar to the one recommended by the examiners, was submitted. The applicant estimated the revised program to cost $266,547.

At the time of the examination only a small part of the mine was accessible from the Reynolds and Chandler levels because most of the workings were caved and flooded. The applicant is currently rehabilitating the Reynolds and Chandler workings, but work had not progressed sufficiently to reach the areas to be explored. Even though the areas could not be seen, adequate geologic data have been obtained from the applicant and from geological reports to evaluate the project.

LOCATION AND ACCESSIBILITY

The Summitville property is principally in sec. 30, T. 37 N., R. 4 E., N.M.P.M., Summitville mining district, Rio Grande County, Colorado (figs. 1, 2, and 3). Several of the claims comprising the property extend into secs. 19, 29, and 31, T. 37 N., R. 4 E., and secs. 24 and 25, T. 37 N., R. 3 E., N.M.P.M. The mine and camp are at Summitville, which is on the north slope of South Mountain, near the Continental Divide.

Summitville is accessible from Del Norte and Monte Vista, Colorado (fig. 1). It can be reached from Del Norte by traveling 26 miles over an improved county road, but the road is not passable throughout the winter season because of heavy snows which close off an 8-mile segment that is above 11,000 feet in altitude. The road

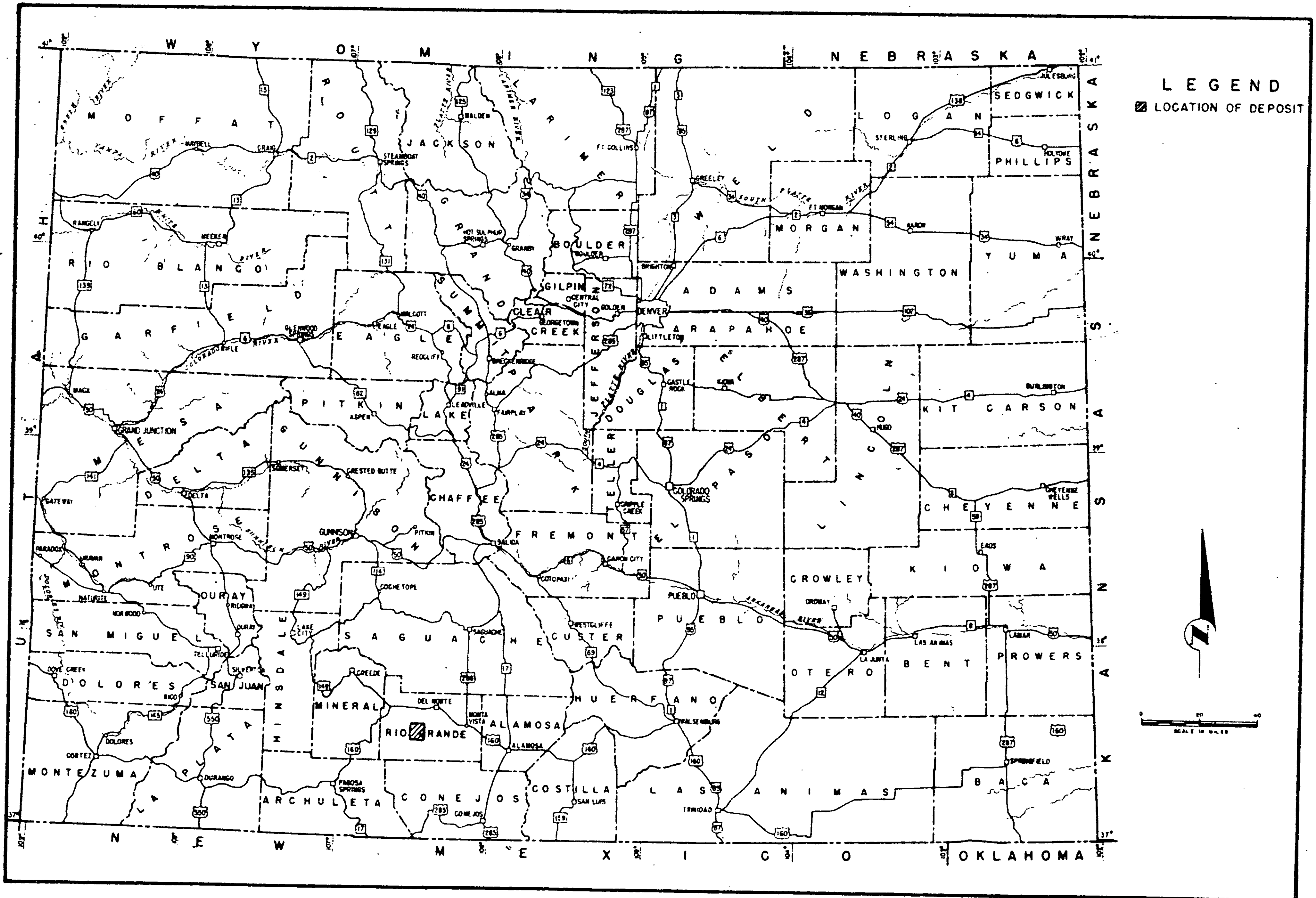

FIGURE 1 - LOCATION MAP OF THE SUMMITVILLE MINE (GENERAL MINERALS CORPORATION), RIO GRANDE COUNTY, COLORADO.
DMEA 4643

was closed during the winter of 1955-56, from the end of October to the beginning of May. To reach the property from Monte Vista, State Highway 15 is followed south for 12 miles, then westward for 26 miles along Alamosa Creek to the Platoro-Summitville road fork. From here a steep 7-mile road, having a number of switchbacks, follows Wightman's Fork gulch to the mining camp at Summitville. This road is generally not passable with conventional-type automobiles.

Throughout the 1956-57 winter season the county maintained the roads to the Platoro-Summitville fork; the applicant has had to maintain the remaining 7 miles of road from the fork to the camp, and maintenance has been difficult, mainly because of heavy snows and mud.

GEOGRAPHY

The Summitville mining district is in the east-central part of the San Juan Mountains--a region which is rugged with peaks that reach heights of more than 12,000 feet. The relief within the district exceeds 1,000 feet. The Summitville mining camp and the Reynolds level (lowest mine working) are at an altitude of about 11,320 feet.

The region is amply covered with timber suitable for mining needs. Included with the mine property leased to the applicant, are

two patented timber tracts of 320 acres from which all mine timber that is needed can be obtained. The applicant, however, has been purchasing his timber from sawmills near Monte Vista.

Sufficient water for domestic and mining needs is available from Wightman's Fork, which passes through Summitville. Water is also present in some of the mine workings.

An alpine climate prevails in the district. The summers are relatively warm with frequent thunderstorms and hailstorms. The winters are severe. The district is noted for its heavy snowfalls which might amount to well over 10 feet throughout the season and which have isolated the Summitville camp for days at a time. Temperatures below -20° F. have been recorded, and have seriously hampered some mining operations.

Minor supplies can be obtained at Del Norte and Monte Vista. Most mining supplies, however, would probably be obtained either from Grand Junction, Pueblo, and Denver, Colorado, or from Salt Lake City, Utah.

The mine and camp are serviced by a Public Service Company of Colorado 22,000-volt, 3-phase transmission line which extends from Del Norte. Present power needs at the mine and camp are supplied by the transmission line and by portable, internal-combustion engines.

Experienced mining personnel is scarce in the area. The nearest sources of skilled mining labor are Creede, Ouray-Silverton, Leadville, and mining districts of the Colorado Plateau. Because of the remoteness of the Summitville camp, the applicant has to pay relatively high wages.

There are no milling facilities close to the property. If a substantial amount of ore can be developed, the applicant will install milling facilities. A number of mills were erected in Summitville by previous operators, but they have all been dismantled or wrecked.

General Minerals Corporation has repaired several buildings; one currently provides office space and boarding and living facilities for about 10 men. Adequate living facilities can be provided in the camp, if additional men are employed.

PROPERTY

The property is a consolidation of a number of smaller properties that are now collectively known as the Summitville mine. Patented and unpatented lode and placer mining claims comprising the property are shown in figures 2 and 3 and are listed by the applicant as follows:

Patented claims

Golden Queen Lode	(Survey No. 61)
Little Annie	(Survey No. 63)
Del Norte	(Survey No. 64)
Margaretta Lode	(Survey No. 65)
Little Ida Lode	(Survey No. 67)
San Juan Placer	(Survey No. 68)
North 800 ft. Little Jessie	(Survey No. 71)
Peterson Placer	(Survey No. 74)
Brandt Placer	(Survey No. 75)
Bobtail Lode	(Survey No. 325)
Oding Lode	(Survey No. 475)
Snow Bank Lode	(Survey No. 604)
Moltke Lode	(Survey No. 607)
Golconda Lode	(Survey No. 319)
Tunnel Lode	(Survey No. 320)
Ross Lode	(Survey No. 321)
Nick Lode	(Survey No. 713)
Game Cock Lode	(Survey No. 716)
Garfield Lode	(Survey No. 910)
Bay State Lode	(Survey No. 896)
Little Hattie Lode	(Survey No. 977)
Sheridan Lode	(Survey No. 892)
Columbia Lode	(Survey No. 890)
Home Stake Lode	(Survey No. 898)
Eureka	(Survey No. 889)
Jubilee Lode	(Survey No. 891)
Parole Lode	(Survey No. 608)
Pay Streak Lode	(Survey No. 893)
Logan Lode	(Survey No. 897)
Bayard Lode	(Survey No. 894)
Great Independence Lode	(Survey No. 609)
Golden Vault Lode	(Survey No. 610)
Iowa Lode	(Survey No. 895)
Jennie Placer	(Survey No. 1097)
C. B. & Q Placer	(Survey No. 798)

Patented claims

I. & C. C. Placer	(Survey No. 611)
Highland Mary Lode	(Survey No. 606)
Highland Mary No. 2 Lode	(Survey No. 16314)
South Columbia Lode	(Survey No. 16323)
Aurora Lode	(Survey No. 16324)
Vanmer Lode	(Survey No. 16324)
Pittsburgh Lode	(Survey No. 16384)
Dexter Lode	(Survey No. 77)
Aztec Lode	(Survey No. 621A)
Gray Eagle (1/6 interest)	(Survey No. 532)
Little Nellie (1/6 interest)	(Survey No. 62)
Spar Placer	(Survey No. 5736)
Rio Grande Placer	(Survey No. 5736)
Denver Placer	(Survey No. 5738)
Electric Placer	(Survey No. 6413)

SE 1/4 of Sec. 17, T. 37 N., R. 4 E.
NE 1/4 of Sec. 29, T. 37 N., R. 4 E.

Unpatented claims		Book	Page
SCMI Nos. 1 to 30	Rio Grande County Courthouse	80	308-322
No Good Lode	" " " "	80	343
Confusion	" " " "	80	343
G. & P. Lode	" " " "	80	296
G. & P. No. 1 Lode	" " " "	80	297
G. & P. No. 2 Lode	" " " "	80	297
Century of Progress *	" " " "	80	299
Pichens Placer *	" " " "	80	298
G. & P. Placer *	" " " "	80	298

* Not listed in the applicant's lease.

Records in the Rio Grande County Courthouse disclose that the unpatented claims are owned by Summitville Mines Corporation, Summitville Leasing Company, and the Reynolds-Morse Corporation. According

to a 25-year lease (effective February 1, 1956) held by General Minerals Corporation, the lessors of the above listed claims are the Reynolds-Morse Corporation, and B. T. Fonson, Denver, Colorado. How the claims were acquired by Reynolds-Morse Corporation and B. T. Fonson is not known; it is assumed that they are the rightful owners.

HISTORY AND PRODUCTION

Mining commenced in the Summitville district in 1870, when placer gold was found in Wightman's gulch. Several gold lode deposits were later discovered in 1872, but it was not until 1873 that the significant discoveries were made. The first mill was erected in 1875, and consisted of five stamps. In 1883, nine mills with a total of 155 stamps were in operation.

A number of mines, namely: the Little Ida, Aztec, Odin, Golconda, Golden Vault, Parole, and others produced over $1,000,000, probably before 1900. Very high-grade gold ore was taken from some of the mines, especially the Little Annie. Information on production before 1900 is sketchy. The total net smelter returns from ore shipped during five periods of mining activity extending from 1873 to 1949, are valued at $7,430,334. It is estimated that about 94 percent of this total came from gold, 5 percent from silver, and 1 percent from copper.

A number of mining properties--the Little Annie, Del Norte, Margaretta, Summit, Golden Queen, Golden Star, Little Ida, Aztec, Odin, Golconda, Golden Vault, Parole, San Juan, and others--were consolidated, in 1915, into the property presently known as the Summitville mine. The property has been leased several times since the consolidation.

From 1934 to 1947, the Summitville mine went through its most productive period. Ore was produced which had a value of more than 4 million dollars. Of this amount gold accounted for more than 95 percent, silver 3 percent, copper 1 percent, and lead less than 1 percent.

In 1955, Newmont Mining Company did some preliminary geophysical exploration on the property in an attempt to show the presence of a large low-grade copper ore body. Diamond drilling was undertaken from the surface to intersect the Hidden vein, but this was apparently unsuccessful.

The applicant, General Minerals Corporation, acquired a 25-year lease from the Reynolds-Morse Corporation and B. T. Poxson; effective date of the lease is February 1, 1956. Since June 1956, the applicant has been rehabilitating the Summitville mine workings and surface installations.

There has been no known ore production from the property since 1949.

PRESENT STATUS

Since June 1956, General Minerals Corporation has been engaged principally in rehabilitation of the Summitville mine and mine buildings. At the time of the DMEA examination the applicant had made accessible about 2,770 feet of the Reynolds level, 500 feet of the Iowa level, and about 720 feet of the Chandler level. In addition, the applicant completed 457 feet of diamond drilling in two holes from the Iowa level. A third hole was started, but because of the severe cold weather, drilling was discontinued.

The property has been extensively developed on 20 levels having more than 40,000 feet of workings. Most of the workings are inaccessible because of caving and flooding. It was noted that about 50 percent of the accessible workings on the Reynolds and Chandler levels require strong support. Rehabilitation is proceeding slowly and extensive, badly caved workings remain to be repaired.

Most of the mine buildings now in use appear to be in relatively good condition, and provide living quarters, office space, housing for equipment, and storage facilities.

The applicant is well equipped to carry on a rather extensive mining operation. Some of the major equipment at the mine is listed as follows:

No.	Item
2	650-c.f.m. Chicago Pneumatic 2-stage stationary compressors
2	Allis Chalmers 125 hp. 2300 V. electric motors
1	600-c.f.m. Gardner-Denver, diesel-driven rotary, portable compressor
1	Eimco 12B mucking machine
1	1-1/2-ton Atlas battery locomotive
1	Caterpillar D-7 bulldozer
1	Allis Chalmers HD-18 bulldozer
1	5-ton Oshkosh dump truck
1	3/4-ton pickup truck
1	FWD Jeep station wagon
1	3/4-ton Jeep pickup truck
2	1-1/2-ton mine cars (4 more cars on order)
1	Boyle's Bros. (EBU) diamond drill, compressed-air driven
	miscellaneous drilling equipment
	miscellaneous mining supplies

The applicant currently employs about 10 men in rehabilitating the lower workings of the mine. It is likely that rehabilitation work will continue, even if a DMEA contract is not approved. It is estimated that since June 1956 the applicant has spent more than $100,000 for rehabilitation and a lesser amount on exploratory work.

GEOLOGY

The Summitville district, in the southeastern San Juan Mountains of Colorado, has had a production of about 7-1/2 million dollars, principally from gold, but with lesser values from silver, copper, and lead. The appraisal of the base-metal potential of the Summitville district was one of the primary objectives of a thorough study conducted by the U. S. Geological Survey during 1952-1956. Inaccessibility of old mine workings, however, precluded any

underground examination and consequently limited the work to a surface investigation of the petrography and hydrothermal alteration. The results 1/ of these investigations by T. A. Steven and J. C. Ratté have been made available to the writers and have been used almost exclusively as a basis for this geologic report.

The consolidated rocks exposed in the vicinity of the Summitville district are all of volcanic or related shallow intrusive origin. The oldest are a series of flat-lying porphyritic rhyodacites belonging to the Conejos group (Potosi volcanic series) of late Tertiary age. Overlying these older Conejos volcanics on an irregular erosion surface are a series of rhyodacitic and quartz latitic lavas known as the Fisher quartz latite. This volcanic group is separable into two units: the lower, which is a complex mass of quartz latite volcanic domes, thick rhyodacite flows, and associated breccias and tuffs; and the upper, which consists of similar quartz latite lavas and related quartz latite dikes. The massive quartz latite domes of the Fisher volcanics are the only rocks exposed in the mine workings and their immediate vicinity.

A northwest-trending fault, which has undergone at least two periods of movement during Fisher time, extends across the Summitville district. The first major movement followed the eruption of

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1/ Steven, T. A., and Ratté, J. C., Geology and Ore Deposits of the Summitville District, San Juan Mountains, Colorado: U.S.G.S. Bull. (in preparation).

the lower Fisher volcanics and preceded the period of hydrothermal activity. The fault was reactivated, in part, during the period of upper Fisher volcanism.

Two periods of hydrothermal activity have been recognized in the region. The older, which preceded the eruption of the Fisher rocks, has affected and altered only a part of the Conejos rocks and is not evident in the immediate vicinity of the Summitville mine. The younger period of hydrothermal activity followed the eruption of the lower Fisher volcanics and is responsible for the large areas of alteration present in the Summitville district and the subsequent gold-copper ore mineralization.

The largest mass of rocks hydrothermally altered during Fisher time is exposed over an irregular area of about 1-1/3 square miles and is generally restricted to an area underlain by lower Fisher quartz latitic lavas. Alteration has not affected all the rocks in the area but was evidently confined to a number of different centers of hydrothermal activity throughout the general zone. The strongest center of activity was apparently in the northern part of the altered zone, corresponding roughly to a postulated quartz latite volcanic dome, and the most intensely altered rocks and related mineralized zones occur near one margin of the coarsely porphyritic core of this structure. Apparently internal stresses (due in large part to

movement by a still fluid core under a solid crust) within the thick volcanic rocks formed areas of strong fracturing that prepared the rocks for the ingress of the hydrothermal solutions. In the mine area, surface geologic mapping and mining indicate that two sets of northwesterly trending fractures controlled most of the alteration and mineralization. One set, which trends N. 25-35° W., is represented by the Tewksbury vein system and a part of the Annie vein, and the other, which strikes roughly N. 55° W., by the Hidden, McDonald, Copper and the southern part of the Annie vein (fig. 4).

The alteration and mineralization present in the Summitville district is characteristic of a shallow volcanic environment (high temperature-low pressure) where escaping volatiles, from the waning volcanic activity, and admixed meteoric waters, changed the original rocks to various aggregates of quartz, sulfates, and clay minerals. The zonal relations now observed in the altered rocks in the district suggest that the alteration and mineralization took place through an essentially continuous process. Near the original fractures (channelways) the rocks were leached of all their more soluble material, by strong acid-sulfate solutions, leaving only a porous skeleton of fine-grained quartz. As the acid solutions progressed outward from the channelways they were enriched in soluble bases, such as potash and soda from the breakdown primarily of feldspathic material, resulting

in a less acid solution and the formation of both quartz and alunite. With continued neutralization, kaolinite and illite formed as thin argillic envelopes around the quartz-alunite bodies. Outward from this argillic zone the solutions were nearly neutral or slightly alkaline and only a relatively minor montmorillonitic and chloritic alteration was active.

The ore minerals, which are generally concentrated in the porous vuggy-quartz zones, were deposited late in the sequence of rock alteration in a generally reducing or alkaline environment. The complex paragenetic relations of the ore minerals, however, and the presence of some hypogene sulfates indicate that partly oxidizing conditions were present intermittently during the period of ore deposition. The primary metal in the upper portion of the veins was gold, which was free and so extremely divided that specimens known to carry 100 oz. per ton seldom had gold visible to the naked eye. Below the zone of surface oxidation auriferous pyrite was the chief ore mineral. At depth, probably due to a temperature-pressure zonal effect, copper minerals become more abundant. In order of abundance these are enargite, luzonite (famatinite ?), covellite, and chalcocite. Pyrite is ubiquitous and occasionally galena has been found in the deeper workings. Tennantite is probably present and may carry the good silver values found with the better-grade copper ores. Other minor "vein" minerals are native sulfur and barite.

The term "vein" is applied very loosely when referring to the ore-bearing zones in the Summitville mine. The deposits, in all but one known case, are irregular and discontinuous replacements, dependent in their linearity, on the nature of the original fracture, and the intensity of the leaching and replacement by the early solutions. The exception to this is the fissure-filled Copper vein as exposed in the Reynolds tunnel. This structure, which may be the southeast continuation of the Annie vein, contains lenses of covellite, famatinite, and pyrite in a matrix of a pure white clay mineral. The lenses are stubby, rarely exceeding 4 feet in length, and average 1 foot thick. Thin, 1- to 2-inch mineralized subsidiary veinlets occur along the east side of the vein.

Although the ore-bearing zones in the Summitville mine area are irregular and discontinuous, surface mapping indicates some continuity and company mine maps and old geologic reports show that most of the vein zones with ore-grade mineralization extend from the surface to the Reynolds level, the lowest of the mine workings (figs. 4 and 5). Below this level there is no information on which to postulate a continuation of ore values; and actually, if the deposit is similar to those found in the Red Mountain district, Colorado, or the Goldfield district, Nevada, as some workers contend, they may bottom at relatively shallow depths. Unfortunately,

during the DMEA examination, the writers were not able to inspect or sample any of the major vein zones, with the exception of the Copper vein, and consequently our favorable recommendations are based upon the work of Steven and Ratté 1/ and other older investigations. 2/

Briefly, we have used the following criteria as a means of judging the potential of the area and to justify our recommended program:

(1) Favorable ore-bearing zones exhibit some surface continuity and linearity and are known to extend to the lowest mine workings, or a maximum vertical distance of 1,000 feet.

(2) Copper values apparently increase with depth. For example: the Annie vein on the Chandler level (el. 11,498') probably averages around 2 percent Cu, whereas the assumed continuation of the Annie, the Copper vein, does not contain any appreciable copper mineralization on the Narrow Gauge level (el. 11,676') but is very high in copper (approx. 10.7% Cu across a 1.5' width) on the Reynolds level (el. 11,518'); the Hidden vein on the Reynolds level is

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1/ Steven, T. A. and Ratté, J. C., op. cit.

2/ Patton, H. B., Geology and Ore Deposits of the Platore-Summitville mining district, Colo.: Colo. Geol. Sur. Bull. 13, 1917.

Butler, P. B., Data concerning the Summitville Group Mines: unpublished report, 1928..

Garrey, G. H., Report on the Summitville Mines: unpublished reports, 1931 and 1953.

reported to average 5 percent Cu over a length of 80 feet; and the Tewksbury on the Reynolds level is reported to contain 1.25 percent Cu over a length of 60 feet.

(3) Drilling by the applicant through the Tewksbury vein, 155 feet below the Iowa level, indicates the vein at that depth carries 0.11-0.31 oz. Au, 1.71-5.40 oz. Ag, and 2.23-4.40 percent Cu over a true width of 8-17 feet.

(4) A small 1-foot mineralized zone on the Reynolds level, near the Kidden vein, sampled (EB-32) by the examiners assayed: 5.40 percent Cu, 0.1 percent Pb, 0.5 percent Zn, 0.02 oz. Au, and 3.6 oz. Ag.

In summary, therefore, we believe that the carefully staged exploration program recommended in this report may disclose significant deposits of copper ore above, along, and/or below the Reynolds level.

APPLICANT'S ORIGINAL EXPLORATION PROGRAM

The applicant's original exploration program consisted of 1,140 feet of rehabilitation, 2,935 feet of drifting and cross-cutting, and 5,000 feet of drilling, distributed semi-staged over three project areas. In a post-examination meeting with the applicant's representatives, on March 26, 1957, their plan

was discussed, and it was mutually agreed that it should be revised and adequately staged in lieu of the meager information available in certain areas of the mine.

RECOMMENDED EXPLORATION PROGRAM

The applicant's revised program was received April 1, 1957. It is acceptable with a few slight modifications, and is recommended for DMEA assistance. This revision carefully stages the exploration program, initiates work in each project area with drilling, and substitutes some drilling for drifting.

Exploration will be undertaken in three general areas, referred to as: (1) the Annie-Copper vein; (2) the Hidden vein; and (3) the Tewksbury-McDonald vein (fig. 5). With one exception which will be discussed later (footnote 1) exploration in each area can be done as a separate project and is not dependent upon activities in other areas. Therefore, several operations can be carried on simultaneously. Upon completion of a work-stage in any designated area, Government approval must be obtained before beginning work in any subsequent stage.

Annie-Copper vein area

The Annie vein is probably the strongest and most intensely mineralized structure in the Summitville area. Ore-grade material

is known to occur on the Chandler level, and unconfirmed reports are that the ore zone, with an increase in copper content, continues downward to the inaccessible Reynolds level. The Copper vein, on trend with the Annie vein, and possibly its southern extension, is exposed as a promising copper-bearing structure in the main Reynolds crosscut. Continuity of the Copper vein with the Annie vein is indicated by their strike, surface-alteration features, and by the fact that a vein was followed along this trend for a distance of 680 feet on the Narrow Gauge level (fig. 4).

The following exploration is recommended in this area:

Stage I. Five inclined drill holes from the Chandler level to explore the Annie vein approximately 150 feet below the Chandler level or just above the Reynolds level. Approximate maximum length of each drill hole would be 200 feet, or a total of 1,000 feet of drilling. Location, bearing, and inclination of the holes are shown in figure 5.

Stage II. (1) Drift 1,300 feet along the Copper vein and connect on grade, if possible, with the Reynolds workings on the

Annie vein. 1/ This drift has the two-fold purpose of exploring the Copper-Annie vein and gaining access to the main Annie vein under the Chandler level. (2) Rehabilitate 840 feet of drift and crosscut. (3) Drive 200 feet of new crosscut for drill stations. (4) Drill approximately 1,400 feet in six inclined holes to explore the Annie at a depth of about 150 feet below the Reynolds level.

1/ Rehabilitation of 1,300 feet of Reynolds drift and 4,100 feet of horizontal drilling to explore the Copper-Annie vein was considered as an alternative to the 1,300 feet of Stage II drifting on the Copper vein. However, inasmuch as the writers do not know the condition of the whole Reynolds drift, thereby precluding their making any satisfactory estimate of rehabilitation costs, they believe that until the Reynolds drift is made accessible, which may be when Stage II work in the Hidden vein area is partly completed, the above drifting should be planned. Therefore, Stage II work in the Copper-Annie vein area should be contingent on Stage I work in the Copper-Annie vein area and Stage II work in the Hidden vein area and may be changed if conditions warrant.

Stage III.(1) Drive 200 feet of new crosscut. (2) Drill a maximum of 1,100 feet in three holes to explore the Annie vein approximately 300 feet below the Reynolds level.

Hidden vein area

The Hidden vein on the Reynolds level contains good grade copper-gold ore. Therefore, inasmuch as no exploration has been done below this level and very little work has been done to show that the mineralized zone extends to the northwest, the following program is recommended:

Stage I. (1) Drill a maximum of 600 feet in three inclined holes to explore the Hidden vein 150 feet below the Reynolds level. The location, bearing, and inclination of the holes are shown in figure 5.

Stage II. (1) Drift 185 feet northwesterly along the Hidden vein on the Reynolds level. This drift will break into the old Reynolds drift 85 feet beyond its present face and will explore ground 100 feet beyond the old Reynolds drift.

Stage III.(1) Drift an additional 200 feet along the Hidden vein.

Tewksbury-McDonald vein area

The applicant has explored the Tewksbury vein 155 feet below the Iowa level, by two drill holes, which indicates ore continuity

to that depth. The program recommended below will explore this ore zone, down to, and below the Reynolds level.

Stage I. (1) Drill a maximum of 900 feet in two inclined holes from the Iowa level to explore the Tewksbury vein approximately 300 feet below the Iowa level. The location, bearing, and inclination of the holes are shown in figure 5.

Stage II. (1) Drift 500 feet on the Reynolds level, South Tewksbury drift, to explore the Tewksbury vein on the Reynolds level approximately 250 feet below the lowest drill-hole exploration.

(2) Drill a maximum of 250 feet in one or two horizontal holes from the Reynolds level to explore the possible downward extension of the McDonald vein (fig. 5).

Stage III. (1) Drive a crosscut, a maximum of 150 feet, and prepare a drilling station.

(2) Drill a maximum of 750 feet in not more than 3 holes to explore the Tewksbury vein about 150 feet below the Reynolds level.

The following items are included for contract preparation:

(1) The drill holes should be plugged for the first half of their estimated length and cored the remaining half.

(2) The holes should not be drilled more than 10 feet beyond the target zone.

(3) Mineralized core, representing 5-foot sections of hole, should be split and one-half assayed for copper, gold, and silver.

(4) Channel samples should be taken at not greater than 10-foot intervals along mineralized portions of the drifts.

EXPLORATION SUMMARY

Annie-Copper vein area

	Drilling (feet)	Drifting and crosscutting (feet)	Rehabilitation (feet)	Drill stations
Stage I	1,000			5
Stage II	1,400	1,500	840	3
Stage III	1,100	200		5
Totals	3,500	1,700	840	9

Hidden vein area

Stage I	600			1
Stage II		185		0
Stage III		200		0
Totals	600	385		1

Tewksbury-McDonald vein area

Stage I	900			1
Stage II	250	500		1
Stage III	750	150		1
Totals	1,900	650		3
Grand Total	6,000	2,735	840	13

COST ESTIMATES

It was noted that the unit costs of the applicant's exploration program were excessively high. The applicant was informed that his unit costs were considerably higher than normally allowed under most DMEA contracts. On April 8, 1957, the applicant sent a revised cost analysis to the DMEA Field Team, but from all indications its revised cost figures are still too high for the type of exploration proposed.

The examining team recommends that an actual-cost and fixed-unit-cost contract be prepared from the following data:

Diamond drilling

Cost estimates are based on the following assumed conditions:

(a) Applicant will prepare drill stations.

(b) Applicant will provide compressed-air power.

(c) Mine will be operated 1 shift per day, 25 days per month.

(d) Contractor will operate 2 drills.

(e) Drill holes to have maximum depth of 450 ft.; AX size or larger; be horizontal or inclined.

(f) Average rate for core and non-core drilling will be 25 feet per drill shift.

(g) Time to complete, 5 months

ACTUAL COST

I. Independent Contracts	Cost
A. 3,000 feet, non-core drilling at $5.00/ft. (subject to revision) ?	$15,000.00
B. 3,000 feet, core drilling at $7.00/ft. (subject to revision) ?	21,000.00
C. 46 hours--standby time at $10.00/hr.	460.00
Total Independent Contracts	$36,460.00

FIXED COST

II. Incidental Allowance

A. Supervision, Labor, and Technical Services:

1-supervising engineer-geologist at $700.00/mo., 2.5 mos.	$ 1,750.00
1-foreman-miner at $500.00/mo., 2.5 mos.	1,250.00
1-surface man at $455.00/mo., 2.5 mos.	1,137.50
1-cook at $260.00/mo., 2.5 mos.	650.00
Total	$ 4,787.50
Payroll insurance, taxes, etc., at 5 percent	239.38
Total	$ 5,026.88

B. Operating Equipment Depreciation and/or Rental:

1-600c.f.m. G-D, rotary, portable, diesel compressor value $13,589, at $226.48/mo., 5 mos.	$ 1,132.40
1-air receiver value $375, at $6.25/mo., 5 mos.	31.25
1-blower, value $750, at $12.50/mo. 5 mos.	62.50

	Cost
1-air trammer, rental, at $180/mo. 5 mos.	$ 900.00
2-timber cars, value $654, at $10.90/mo. 5 mos.	54.50
1-FWD Jeep station wagon estimated value $2,000 at $33.33/mo., 2.5 mos.	83.33
1-bulldozer w/blade, value $23,213 at $386.88 mo., 0.25 mos.	96.72
	$ 2,360.70
10% Contingency for repair of equipment and/or miscellaneous items	236.07
Total	$ 2,596.77

C. Operating materials and supplies:

fuel, oil, lubricants, electrical power, etc. at $12.00/shift, 100 shifts	$ 1,200.00
miscellaneous supplies $100.00	100.00
Total	$ 1,300.00
Total Incidental Costs	$ 8,923.65
Incidental costs per foot	$ 1.487

III. Drill Stations

A. 13-drill stations, size to allow for 10-foot pulls at $100.00/station	$ 1,300.00

ACTUAL COST

IV. Miscellaneous

A. 75-core boxes (5 x 1 ft), wooden at $4.55/box	$ 341.25

	Cost
B. 46-sample analyses at $5.00/sample	$ 230.00
	$ 571.25
Total diamond drilling cost	$47,254.90

Drifting and crosscutting

Cost estimates are based on the following assumed conditions:

(a) No timbering included.

(b) Drifts shall be 5 by 7 feet in the clear.

(c) Advance will be 5 feet per shift.

(d) Work will proceed 2 shifts a day, 25 days a month.

(e) Time of completion, including allowance for delays, 12 months.

FIXED COST

A. Labor, and Supervision and Technical Service:	Cost
1-supervising engineer-geologist at $700.00/mo., 12 mos.	$ 8,400.00
2-foreman-miners at $1,000.00/mo., 11.5 mos.	11,500.00
4-miners at $1,820.00/mo., 12 mos.	21,840.00
2-surface man at $910.00/mo., 11.5 mos.	10,465.00
1-cook at $260.00/mo., 11.5 mos.	2,990.00
	$55,195.00

	Cost
Payroll insurance, taxes, etc. at 5%	$ 2,759.75
Total	$57,954.75
Cost per foot (2,735 feet)	$ 21.190

B. Operating Equipment and Depreciation and/or Rental:

1-FWD Jeep station wagon estimated value $2,000 at $33.33/mo., 11 mos.	$ 366.63
1-5 ton Oshkosh truck estimated value $2,000 at $33.33/mo., 12 mos.	340.00
1-bulldozer w/blade value $23,213 at $386.88/mo., 0.75 mo.	290.16
1-1-1/2 ton battery locomotive w/charger value $5,174 at $86.23/mo., 12 mos.	1,034.76
4-ore cars, rocker type, value $2,060 at $34.33/mo., 12 mos.	411.96
1- 650 c.f.m. C-P, 2-stage, w/125 hp. electric motor, stationary compressor, estimated value $20,000 at $333.33/mo., 12 mos.	4,000.00
1-air receiver, value $375, at $6.25 mo., 12 mos.	75.00
1-12B macking machine value $1,537 at $25.62 mo., 12 mos.	307.44
1-blower, value $750 at $12.50 mo., 12 mos.	150.00
1-drill w/leg, hoses, etc., rental at $85/mo., 12 mos.	1,020.00
	$ 7,995.95
10% Contingency for repair of equipment and/or miscellaneous items	799.60
Total	$ 8,795.95
Cost per foot (2,735 feet)	$ 3.216

C. Operating Materials and Supplies:

	Cost
Powder 40% at $11.25/box, 660 boxes	$ 7,425.00
Caps, electric at $17.00/box, 135 boxes	2,295.00
Track, 20 lb. at $200/ton or $1.33/ft., 2,735 ft.	3,637.55
Ties, spikes, fishplates, bolts, etc. at $0.45/ft., 2,735 ft.	1,230.75
2" pipe, airline, w/couplings at $0.60/ft., 2,700 ft.	1,620.00
1" pipe, water, w/couplings at $0.25/ft., 2,700 ft.	675.00
8" pipe, ventilation, w/attachments, rigid at $0.80/ft. 2,550 ft.	2,040.00
drill steel and bits, integral at $0.50/ft., 2,735 ft.	1,367.50
electrical power, fuel, oil, etc. at $5.00/shift, 600 shifts	3,000.00
small tools, estimated at $100.00	100.00
miscellaneous supplies, estimated at $200.00	200.00
Total	$23,590.80
Cost per foot (2,735 feet)	$ 8.626
Total Cost Items A, B, and C	$90,341.10
Cost per foot	$ 33.031

ACTUAL COST

D. Miscellaneous	Cost
Sample Analyses, 218 at $5.00	$ 1,090.00
Grand Total Cost (2,735 feet)	$91,431.10

Timbering

Cost estimates are based on the following assumed conditions:

(a) Install standard drift sets 5 by 7 feet in the clear, lagged on top and sides, on 5-foot centers.

(b) Rate of installation, 2 sets per shift, 2 shifts per day, 50 shifts per month.

(c) Fifty percent of drifts and crosscuts or 1,367.5 feet to be timbered.

(d) Time consumed in timbering, 3 months.

FIXED COST

A. Labor, and Supervision and Technical Service:	Cost
1-supervising engineer-geologist at $700.00/mo., 3 mos.	$ 2,100.00
2-foreman-miners at $1,000.00/mo., 3 mos.	3,000.00
4-miners, at $1,880.00/mo., 3 mos.	5,460.00
2-surface men at $910.00, 3 mos.	2,730.00
1-cook at $260.00/mo., 3 mos.	780.00
	$14,070.00

	Cost
Payroll insurance, taxes, etc. at 5%	$ 705.50
Total	$14,773.50
Cost per foot	$ 10.803

B. Operating Equipment Depreciation and/or rental:

1-blower, value $750 at $12.50/mo., 3 mos.	$ 37.50
1-1-1/2-ton locomotive w/charger value $5,174 at $86.23/mo., 3 mos.	258.69
2-timber cars value $654 at $10.90/mo., 3 mos.	32.70
1-FWD Jeep station wagon estimated value $2,000 at $33.33/mo., 3 mos.	99.99
1-bulldozer w/blade value $23,213 at $386.88/mo., 1/4 mo.	96.72
1-5 ton Oshkosh truck estimated value $2,000 at $33.33/mo., 3 mos.	99.99
	$ 625.59
10% Contingency for repair of equipment and/or miscellaneous items	62.56
Total	$ 688.15
Cost per foot	$ 0.503

C. Operating Materials and Supplies:

1-Standard set, 350 b.f., $71/M.b.f., 275 sets	$ 6,784.05
fuel, oil, lubricants, electrical power etc. at $2.00/shift, 150 shifts	300.00

	Cost
miscellaneous supplies $50.00	$ 50.00
Total	$ 7,134.05
Cost per foot	$ 5.22
Total Cost Timbering (1,367.5 feet)	$22,595.70
Total Cost per foot	$ 16.523

Rehabilitation

Cost estimates are based on the following assumed conditions:

(a) Install standard drift sets, 5 by 7 feet in the clear on 5-foot centers, lagged top and sides.

(b) Fifty percent of rehabilitated drifts and crosscuts will require timber.

(c) Rate of progress, 10 feet per shift, 2 shifts per day, 50 shifts per month.

(d) Rehabilitation will require 2 months work.

ACTUAL COST

A. Labor, Technical Service, and Supervision:	Cost
1- supervising engineer-geologist at $700.00/mo., 1.5 mos.	$ 1,050.00
2-foreman-miners at $1,000.00/mo., 2 mos.	2,000.00
4-miners at $1,820.00/mo., 2 mos.	3,640.00
2-surface men at $900.00/mo., 2 mos.	1,800.00
1-cook at $260.00/mo., 2 mos.	520.00
	$ 9,010.00

	Cost
Payroll insurance, taxes, etc. at 5%	$ 450.50
Total	$ 9,460.50
Cost per foot	$ 11.263

B. Operating Equipment Depreciation and/or Rental:

1-blower value $750 at $12.50/mo., 2 mos.	$ 25.00
1-1-1/2 ton locomotive w/charger value $3,174 at $86.23/mo., 2 mos.	172.46
2-timber cars value $654 at $10.90/mo., 2 mos.	21.80
1-FWD Jeep station wagon estimated value $2,000 at $33.33/mo., 2 mos.	66.66
1-bulldozer w/blade value $23,213 at $386.88/mo. at 0.25 mo.	96.72
1-5 ton Oshkosh truck estimated value $2,000 at 33.33/mo., 2 mos.	66.66
	$ 449.30
10% Contingency for repair of equipment and/or miscellaneous items	44.93
Total	$ 494.23
Cost per foot	$ 0.588

C. Operating Materials and Supplies:

fuel, oil, lubricants, electrical power, etc. at $5.00/shift, 100 shifts	$ 500.00
track, 20 lb. at $200.00/T or $1.33/ft., 840 ft.	1,117.20
ties, spikes, fishplates, bolts, etc. at $0.45/ft., 840 ft.	378.00

	Cost
2" pipe, airline, w/couplings at $0.60/ft., 840 ft.	$ 504.00
1-standard drift set, 350 b.f., $71/M.b.f., 84 sets	2,087.40
1" pipe, water, w/couplings at $0.25/ft., 840 ft.	210.00
8" pipe, ventilation, w/attachments, rigid at $0.80/ft., 840 ft.	672.00
miscellaneous supplies estimated at $25.00	25.00
Total	$ 5,493.60
Cost per foot	$ 6.540
Total cost of 840 feet of rehabilitation	$15,448.33
Total cost per foot	$ 18.391

Total Estimated Costs

Diamond drilling	$ 47,254.90
Drifting and crosscutting	91,431.10
Timbering	22,595.70
Rehabilitation	15,448.33
Total	$176,730.03

SUMMARY OF RECOMMENDED EXPLORATION AND COSTS

Stage I

Annie-Copper vein area	Cost
1,000 ft. diamond drilling at $6.00 per ft.	$ 6,000.00
1,000 ft. incidental allowance at $1.49 per ft.	1,490.00
10 hrs. standby time at $10.00 per hr.	100.00
3 drill stations at $100 per station	300.00
13 core boxes at $4.55 a box	59.15
10 sample analyses at $5.00 each	50.00
Total	$ 7,999.15
Hidden vein area	
600 ft. diamond drilling at $6.00 a ft.	$ 3,600.00
600 ft. incidental allowance at $1.49 per ft.	894.00
6 hrs. standby time at $10.00 per hr.	60.00
1 drill station at $100.00 per station	100.00
7 core boxes at $4.55 a box	31.85
6 sample analyses at $5.00	30.00
Total	$ 4,715.85
Tewksbury-McDonald vein area	
900 ft. diamond drilling at $6.00 per ft.	$ 5,400.00
900 ft. incidental allowance at $1.49 per ft.	1,341.00
4 hrs. standby time at $10.00 per hr.	40.00
1 drill station at $100.00 per station	100.00

	Cost
11 core boxes at $4.55 per box	$ 50.05
4 sample analyses	80.00
Total	$ 6,951.05
Total Stage I	$19,666.05
Government participation at 50 percent	$ 9,833.03

Stage II

Annie-Copper vein area

1,400 ft. diamond drilling at $6.00 per ft.	$ 8,400.00
1,400 ft. incidental allowance at $1.49 per ft.	2,086.00
12 hrs. standby time at $10.00 per hr.	120.00
3 drill stations at $100.00 per station	300.00
18 core boxes at $4.55 per box	81.90
142 sample analyses at $5.00 ea.	710.00
1,500 ft. drifting and crosscutting at 33.03 per ft.	49,545.00
750 ft. timbering at $16.52 per ft.	12,390.00
840 ft. rehabilitation at $18.39 per ft.	15,447.60
Total	$89,080.50

Hidden vein area

185 ft. drifting at $33.03 per foot	$ 6,110.55
90 ft. timbering at $16.52 per foot	1,486.80
18 sample analyses at $5.00 each	90.00
Total	$ 7,687.35

Tewksbury-McDonald vein area

	Cost
250 ft. diamond drilling at $6.00 per ft.	$ 1,500.00
250 ft. incidental allowance at $1.49 per ft.	372.50
2 hrs. standby time at $10.00 per hr.	20.00
1 drill station at $100.00 per station	100.00
5 core boxes at $4.55 per box	22.75
52 sample analyses at $5.00 each	260.00
500 ft. drifting at $33.03 per ft.	16,515.00
250 ft. timbering at $16.52 per ft.	4,130.00
Total	$22,920.25
Total cost Stage II	$119,688.10
Government participation at 50 percent	$59,844.05

Stage III

Annie-Copper vein area

1,100 ft. diamond drilling at $6.00 per ft.	$ 6,600.00
1,100 ft. incidental allowance at $1.49 per ft.	1,639.00
6 hrs. standby time at $10.00 per hr.	60.00
3 drill stations at $100.00 per station	300.00
14 core boxes at $4.55 per box	63.70
6 sample analyses at $5.00 each	30.00
200 ft. crosscutting at $33.03 per ft.	6,606.00
100 ft. timbering at $16.52	1,652.00
Total	$16,950.70

Hidden vein area	Cost
200 ft. drifting at $33.03 per ft.	$ 6,606.00
100 ft. timbering at $16.52 per ft.	1,652.00
20 sample analyses at $5.00 each	100.00
Total	$ 8,358.00
Tewksbury-McDonald area	
750 ft. diamond drilling at $6.00 per ft.	$ 4,500.00
750 ft. incidental allowance at $1.49 a ft.	1,117.50
6 hrs. standby time at $10.00 per hr.	60.00
1 drill station at $100.00 per station	100.00
7 core boxes at $4.55 per box	31.85
6 sample analyses at $5.00 each	30.00
150 ft. crosscutting at $33.03 per ft.	4,954.50
75 ft. timbering at $16.52 per ft.	1,239.00
Total	$12,032.85
Total cost Stage III	$37,341.55
Government participation at 50 percent	18,670.78

Total Cost of Program

Stage	Amount	Government part.
I	$ 19,666.05	$ 9,833.03
II	119,688.10	59,844.05
III	37,341.55	18,670.78
Total	$176,695.70	$88,347.86

CONCLUSIONS AND RECOMMENDATIONS

The property is known to contain favorable ore-bearing zones which exhibit some surface continuity and linearity and are known to extend to the lowest mine workings, or over a vertical extent of 1,000 feet. Copper content appears to increase with depth as indicated by samples taken from the lower workings and from diamond-drill holes drilled by the applicant. These samples indicate that ore containing 1.25 to 10.7 percent copper, 1.5 to 17.0 feet in thickness, occurs in the lower parts of the mine.

The examiners conclude that the possibilities of encountering significant copper deposits in the lower parts of the mine and below the lowest level of the mine are good.

It is recommended that the exploration program outlined above be approved.

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Defense Minerals Exploration Administration
Denver Federal Center
Denver, Colorado

May 16, 1957

Memorandum

To: Acting Executive Officer, DMEA Field Team, Region III

From: R. S. Kenselman
F. N. Marshman

Subject: DMEA Docket 4643 (Copper), General Minerals Corporation (Summitville mine), Rio Grande County, Colorado

Enclosed are the original and eight copies of a joint report by D. H. Richter, U. S. Geological Survey, and E. W. Buel, U. S. Bureau of Mines, covering their examination of the subject property.

The applicant revised his original proposal and on March 30, 1957, submitted an exploration program, estimated to cost $266,547, comprising rehabilitation, diamond drilling, drifting and crosscutting.

The Summitville mine has had a significant production, principally from gold ore, and it appears that the copper content of the ore is increasing with increasing depth. The examiners propose a carefully staged program to determine the copper potential of the mine at depths below the old workings.

The applicant is at present rehabilitating the workings from which a part of the DMEA work is proposed. All Stage I exploration will be accomplished from old workings now rehabilitated or to

be rehabilitated by the company at no expense to the Government. Stage II work in the Tewksbury-McDonald vein area and in the Hidden vein area will be done from headings or points made accessible by company rehabilitation. Stage II exploration in the Annie-Copper vein area will involve rehabilitation with Government assistance. Stage III work in the three areas involves no rehabilitation.

The cost analyses are based on the assumption that work on any one stage will not be carried on concurrently with work under any other stage and that drifting will be in heavy ground where timbering and drifting cannot be carried on concurrently.

The program proposed by the examiners appears to be a logical well staged proposal designed to determine the copper ore potential of the Summitville mine at a reasonable cost.

A. A. Kamselman
Mining Engineer

E. N. Hawkinson
E. N. Hawkinson
Member, Field Team

Enclosures (9)
EHHawkinson:mg

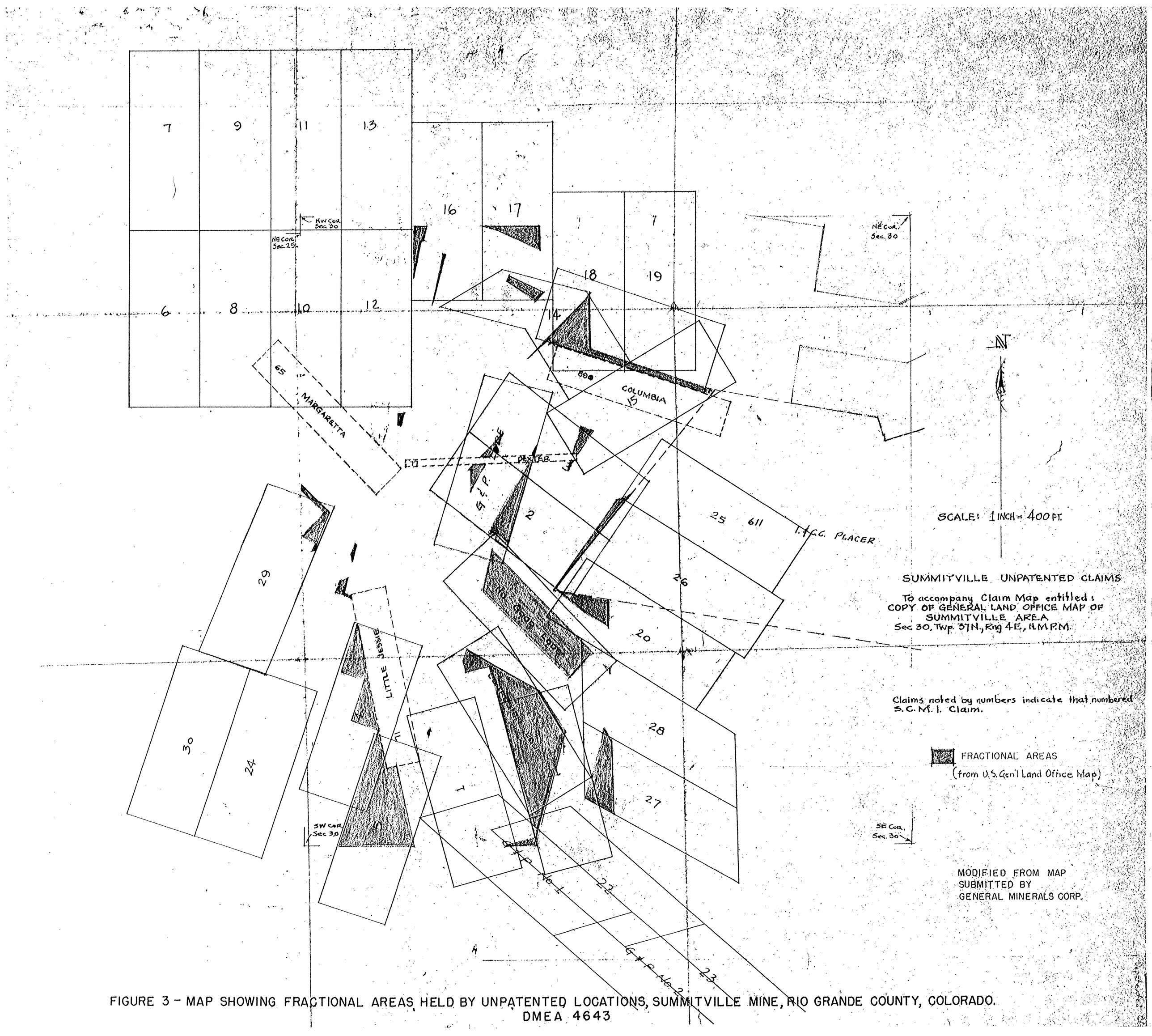


FIGURE 3 – MAP SHOWING FRACTIONAL AREAS HELD BY UNPATENTED LOCATIONS, SUMMITVILLE MINE, RIO GRANDE COUNTY, COLORADO.
DMEA 4643

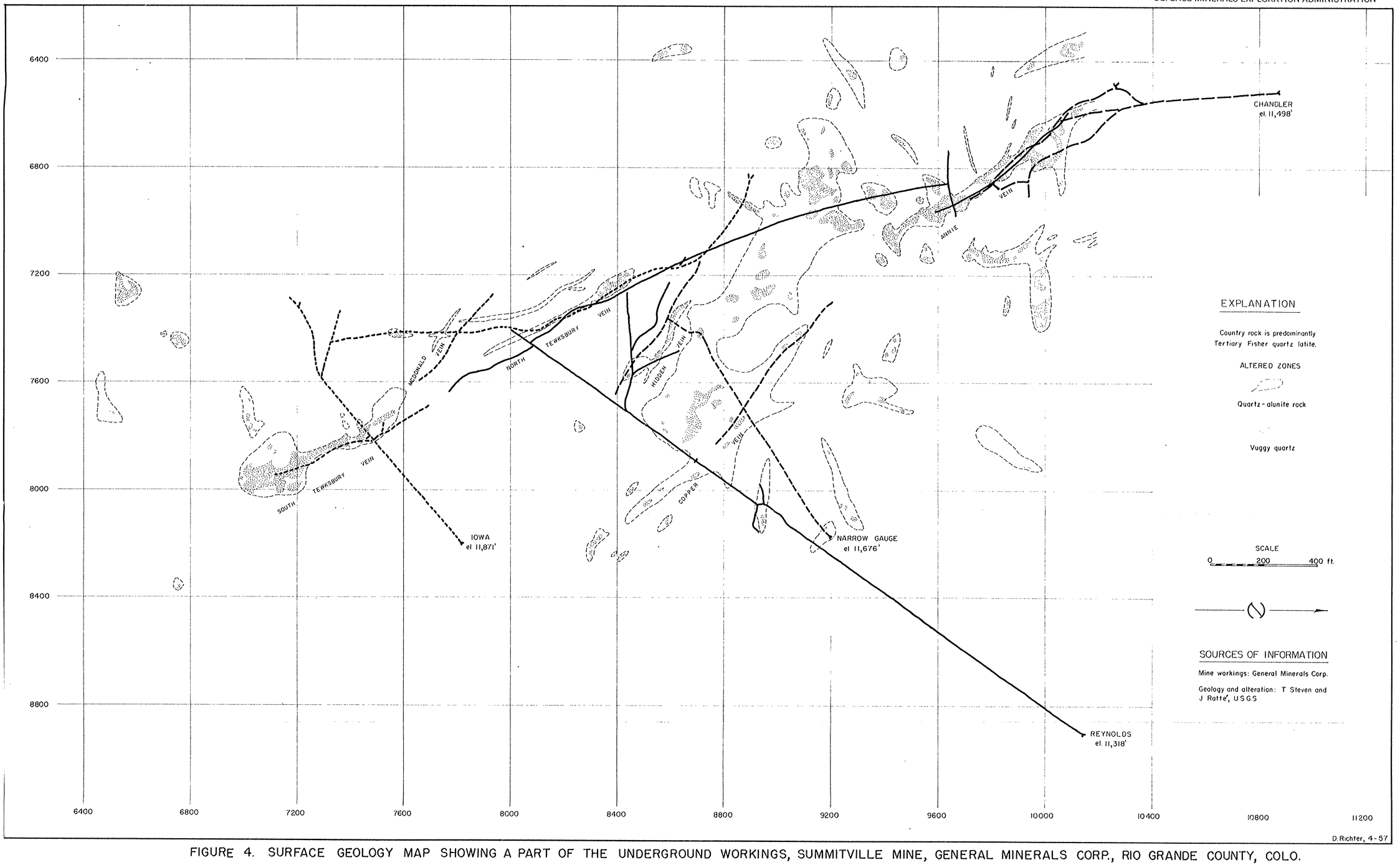


FIGURE 4. SURFACE GEOLOGY MAP SHOWING A PART OF THE UNDERGROUND WORKINGS, SUMMITVILLE MINE, GENERAL MINERALS CORP., RIO GRANDE COUNTY, COLO.

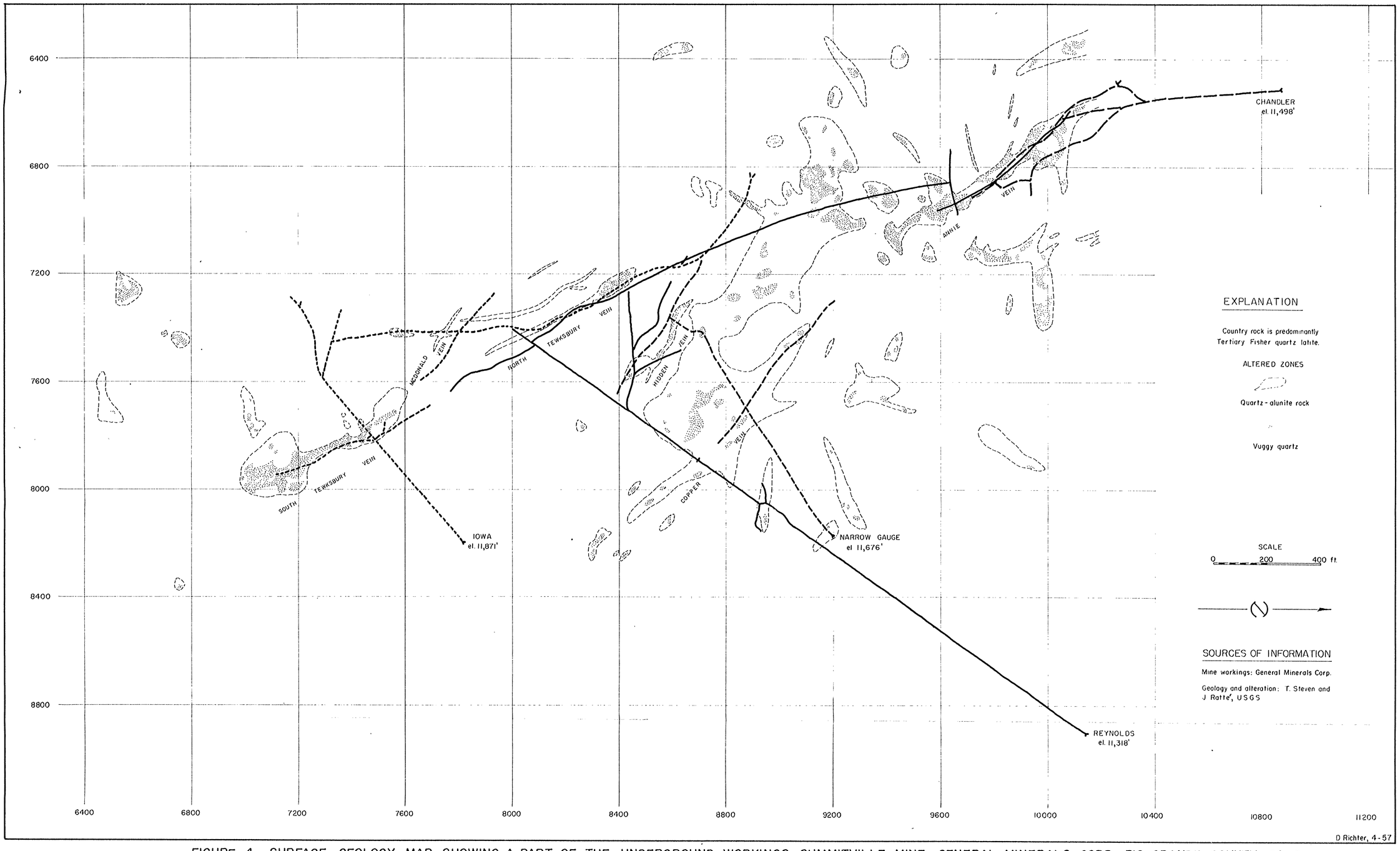


FIGURE 4. SURFACE GEOLOGY MAP SHOWING A PART OF THE UNDERGROUND WORKINGS, SUMMITVILLE MINE, GENERAL MINERALS CORP., RIO GRANDE COUNTY, COLO.

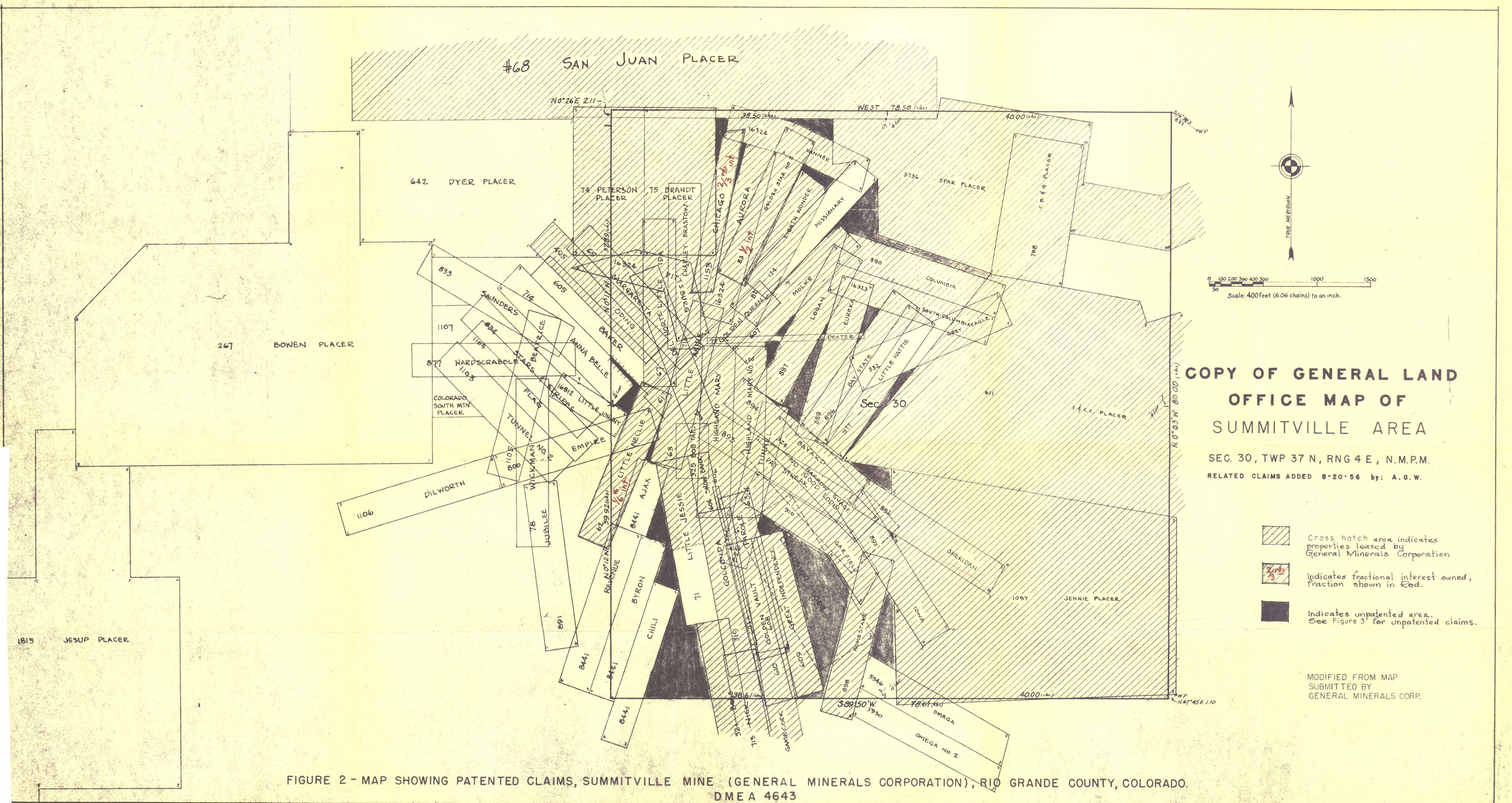


FIGURE 2 - MAP SHOWING PATENTED CLAIMS, SUMMITVILLE MINE (GENERAL MINERALS CORPORATION), RIO GRANDE COUNTY, COLORADO.

DMEA 4643

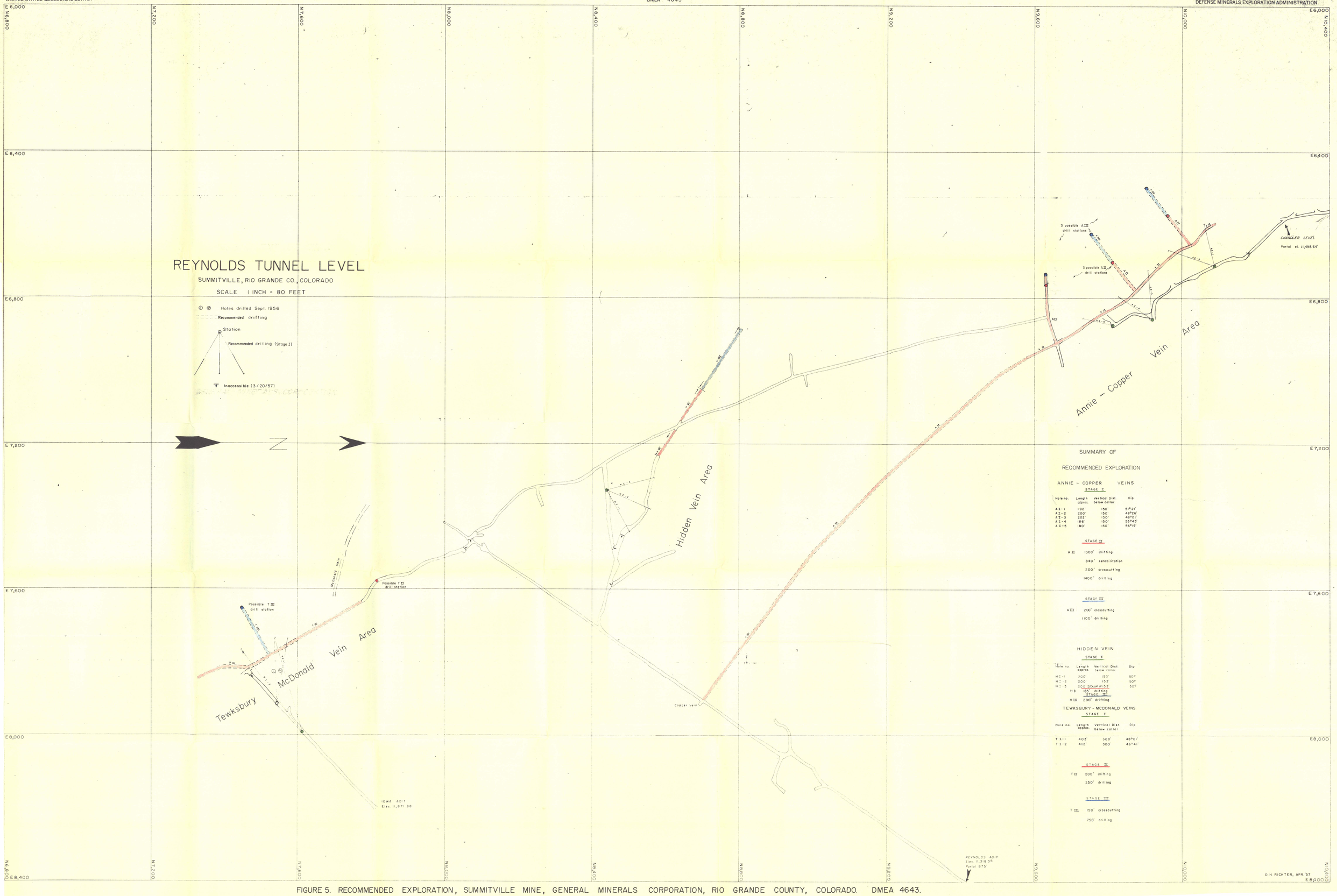
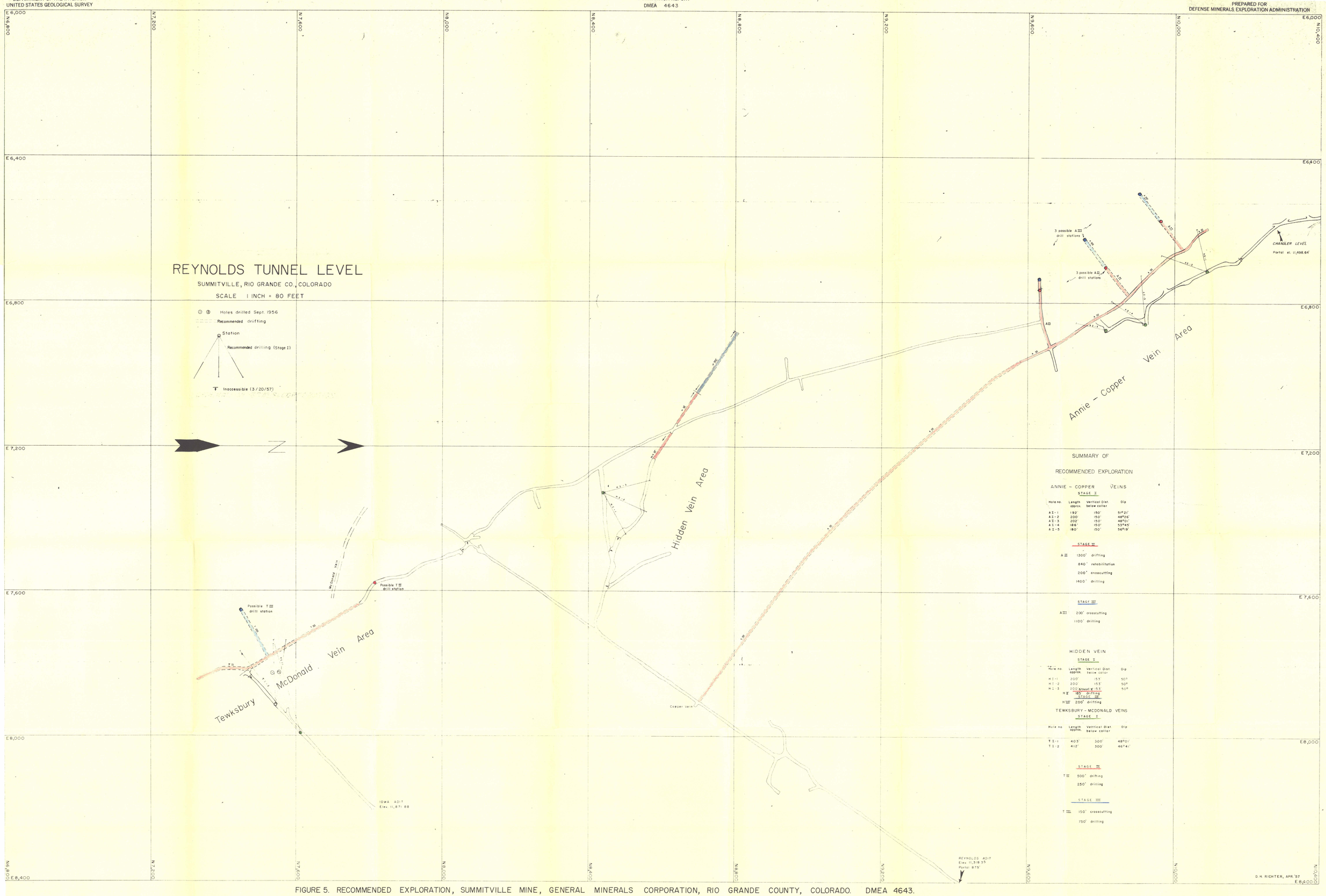


FIGURE 5. RECOMMENDED EXPLORATION, SUMMITVILLE MINE, GENERAL MINERALS CORPORATION, RIO GRANDE COUNTY, COLORADO. DMEA 4643.



SUMMARY OF

RECOMMENDED EXPLORATION

ANNIE - COPPER VEINS

STAGE I

Hole no.	Length approx.	Vertical Dist. below collar	Dip
A I-1	192'	150'	51°21'
A I-2	200'	150'	48°26'
A I-3	202'	150'	48°01'
A I-4	186'	150'	53°45'
A I-5	180'	150'	56°19'

STAGE II

A II 1300' drifting
840' rehabilitation
200' crosscutting
1400' drilling

STAGE III

A III 200' crosscutting
1100' drilling

HIDDEN VEIN

STAGE I

Hole no.	Length approx.	Vertical Dist. below collar	Dip
H I-1	200'	153'	50°
H I-2	200'	153'	50°
H I-3	200 (STAGE II)	153'	50°

H II 185' drifting

STAGE III

H III 200' drifting

TEWKSBURY - MCDONALD VEINS

STAGE I

Hole no.	Length approx.	Vertical Dist. below collar	Dip
T I-1	403'	300'	48°01'
T I-2	412'	300'	46°41'

STAGE II

T II 500' drifting
250' drilling

STAGE III

T III 150' crosscutting
750' drilling

FIGURE 5. RECOMMENDED EXPLORATION, SUMMITVILLE MINE, GENERAL MINERALS CORPORATION, RIO GRANDE COUNTY, COLORADO. DMEA 4643.

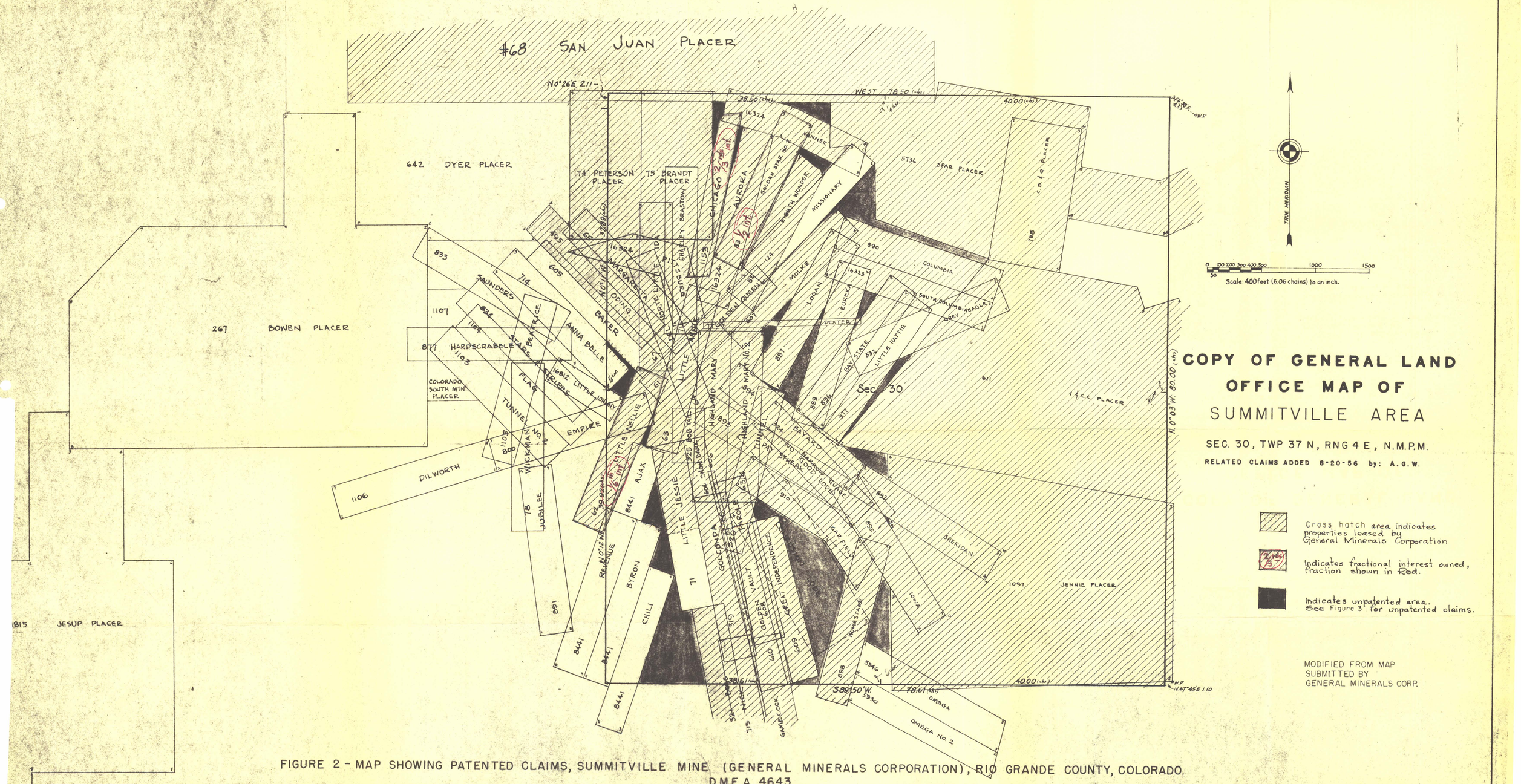


FIGURE 2 - MAP SHOWING PATENTED CLAIMS, SUMMITVILLE MINE (GENERAL MINERALS CORPORATION), RIO GRANDE COUNTY, COLORADO.
DMEA 4643