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United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

In Reply Refer To:
Mail Stop 953

March 17, 1978

Mr. Christopher B. Gillette
Regional Geologist
Placer Amex Inc.
6920 E. Broadway, Suite H
Tucson, Arizona 85710

Re: DMEA-3379 (Copper-Lead)
Harqua Hala Minerals Corporation
Golden Eagle Mine
Yuma County, Arizona

Dear Mr. Gillette:

Your letter of March 13, 1978, enclosing the undelivered envelope addressed to Mr. Nelson T. Zuver, President, Harqua Hala Minerals Corporation, Los Angeles, California, was received yesterday. Since your letter to Mr. Zuver could not be delivered, and we have no information on the present address of the applicant, we assume responsibility for making the application material available to you.

The material listed on the enclosed sheet may be ordered by contacting:

Cooper-Trent Division
Keuffel & Esser Co.
Wilson Boulevard at Danville Street
Arlington, Virginia 22201
Attention: Mr. Marvin Mundy

Cooper-Trent will contact you regarding the cost of reproductions; the minimum charge per order is $15.00. Upon selecting the material and deciding how many copies you want, send the enclosed copy of this letter and list to Cooper-Trent with your letter of instructions. All future correspondence relating to procurement of copies of the material should be with Cooper-Trent rather than with this office.

We are pleased to be of service to you.

Sincerely yours,

Harold Kirkemo

Harold Kirkemo, Chief
Office of Minerals Exploration

Enclosures

List of available material

Harqua Hala Minerals Corporation
Golden Eagle Mine
Yuma County, Arizona
DMEA-3379

Report of Examination by DMEA Field Team		
Summary, Conclusions, and Recommendations	7 pages	8"x10½"
Reports by examining team		
Geology report	30 pages	8"x10½"
Maps larger than page size		
Fig. 3. Geologic map and sections		16"x30"
Fig. 4. Bonanza mine		24"x24"
Fig. 5. Golden Eagle mine		12"x29"
Engineering report	22 pages	8"x10½"
Map larger than page size		
Figure 2. Claim map		13"x14½"
Application and accompanying material	39 pages	8½"x11"

PLACER AMEX INC.

REGIONAL OFFICE: 6920 E. BROADWAY • SUITE H • TUCSON, ARIZONA 85710 • (602) 296-4781

March 13, 1978

Mr. Harold Kirkemo, Chief
Office of Minerals Exploration
U. S. Geological Survey
Mail Stop 953
Reston, Virginia 22092

Re: DMEA---3379 (Copper-Lead)
Harqua Hala Minerals Corp.
Golden Eagle Mine
Yuma County, Arizona

Dear Mr. Kirkemo:

In compliance with your instructions to locate Mr. Nelson T. Zuver for permission to release certain DMEA application material, I am enclosing the envelope of such a request which indicates that Mr. Zuver is no longer at the address you supplied me nor is there a forwarding address.

I assume this will satisfy your conditions for release of this material. Please advise me of the costs involved so that payment can be forwarded as soon as possible.

Sincerely,

Christopher B. Gillette

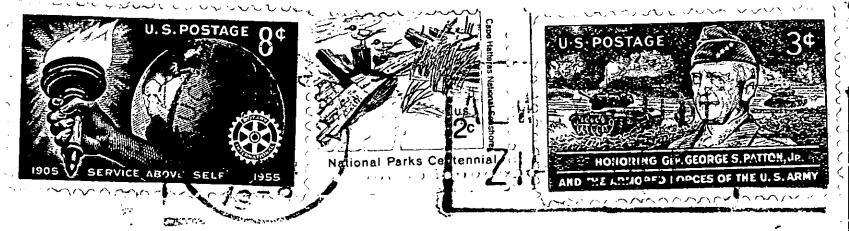
Christopher B. Gillette
Regional Geologist

CBG:mc
Enclosure:

A subsidiary of Placer Development Limited

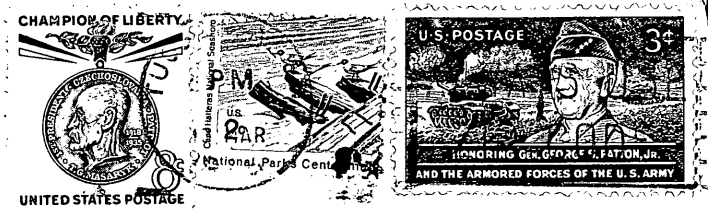
ONE CALIFORNIA BUILDING • SUITE 2500 • SAN FRANCISCO • CALIFORNIA 94111 • (415) 986-0740

SUITE H • 6920 EAST BROADWAY
TUCSON • ARIZONA 85710



Mr. Nelson T. Zuver, President
Harqua Hala Minerals Corp.
Room 1016 Story Building
610 South Broadway
Los Angeles, California 90014

SUITE H • 6920 EAST BROADWAY
TUCSON • ARIZONA 85710



Mr. Harold Kirkemo, Chief
Office of Minerals Exploration
U. S. Geological Survey
Mail Stop 953
Reston, Virginia 22092

March 31

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242.80

17,487.24
7250.00

10,237.24

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

February 16, 1978

In Reply Refer To:
Mail Stop 953

Mr. Christopher B. Gillette
Regional Geologist
Placer Amex, Inc.
6920 E. Broadway, Suite H
Tucson, Arizona 85710

Re: DMEA--3379 (Copper-Lead)
Harqua Hala Minerals Corporation
Golden Eagle Mine
Yuma County, Arizona

Dear Mr. Gillette:

This letter is to confirm our telephone discussion today and to reply to your letter of January 5, 1978, to the Branch of Distribution, U.S. Geological Survey, Arlington, Virginia, requesting information on the availability of DMEA files pertaining to certain mining properties in the Ellsworth mining district, Yuma County, Arizona.

Your letter was referred to us for reply by the Branch of Distribution. We recalled the DMEA file from the Government's Records Storage Center in Suitland, Maryland, and reviewed it. We have the texts, maps, figures, and accompanying tables for the reports by Bryner and Romslo, and the application and supporting material submitted by the Harqua Hala Minerals Corporation. The latter includes a 31-page report prepared for the Applicant by B. M. Snyder and C. C. Thompson, Union Engineering Company. No other unpublished material listed in the examination report by Leonid Bryner is present in the file.

The last letter sent to the Applicant was dated March 10, 1955, and was addressed to:

Mr. Nelson T. Zuver, President
Harqua Hala Minerals Corporation
Room 1016 Story Building
610 South Broadway
Los Angeles 14, California

Material submitted by an Applicant is considered to be company confidential information which can be released only with the permission of the Applicant, or by a successor party. In this instance, I understand that the property has reverted back to the estate of the owner.

However, since the Applicant furnished material which a consultant had prepared for the DMEA application, we suggest that you attempt to contact Mr. Zuver and request permission for us to release the application material to you. Please advise us of the results you have on this.

With respect to the reports by Geological Survey and Bureau of Mines personnel (both deceased), we can make them available to you. Since the reports have not been published, we would ask that they be considered as confidential and their contents not attributed to either the Geological Survey or the Bureau of Mines. We will make these reports available to you upon receipt of a report from you of success or failure in contacting Mr. Zuver.

Sincerely yours,

Harold Kirkemo

Harold Kirkemo, Chief
Office of Minerals Exploration

PLACER AMEX INC.

REGIONAL OFFICE: 6920 E. BROADWAY • SUITE H • TUCSON, ARIZONA 85710 • (602) 296-4781

U. S. Geological Survey
Branch of Distribution
1200 South Eads Street,
Arlington, Va.
22202

January 5, 1978

Dear Sirs:

I am an exploration geologist and presently researching the Bonanza (Harqua Hala), Golden Eagle, and New Yorker properties, Ellsworth mining district, Yuma County, Arizona. I have located a rough draft of a geologic report (without maps, figures, or tables) prepared by a Survey geologist Dr. Leonid Bryner during 1954 in response to an application to the Defense Minerals Exploration Administration (DMEA 3379) by Mr. N. T. Zwer, dated May 28, 1954. An engineering report was prepared by T. M. Romslo of the U. S. Bureau of Mines and contains two figures referred to in the geologic report.

My request is to locate the properagency which would have the data file for this project and to obtain or buy copies of everything available. The geologic draft gives a substancial list of unpublished material referrences which I can only hope are included in that file as they are no longer available from any other source known to me. All this information is important to my investigation and I sincerely hope that a search for an obscure file can turn up something of value.

Any suggestions for other lines of inquiry would be greatly appreciated.

RECEIVED GIG
JAN 11 '78

Sincerely,

JAN 11 1978
U.S. GEOLOGICAL SURVEY

CBG:mc

C. B. Gillette mc
Christopher B. Gillette
Regional Geologist

A subsidiary of Placer Development Limited
ONE CALIFORNIA BUILDING • SUITE 2500 • SAN FRANCISCO • CALIFORNIA 94111 • (415) 986-0740

SUITE H • 6920 EAST BROADWAY
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TUCSON, AZ 857
PM
5 JAN
1978

PROCLAIM LIBERTY THROUGHOUT ALL THE LAND
USA 13c
PLEASE MAIL
EARLY FOR
CHRISTMAS

Branch of Distribution
U. S. Geological Survey
1200 South Eads Street
Arlington, Va. 22202

File Copy
Surname

J. Ad.
Hedges
Kiilsgaard
Selfridge
Johnson

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

MAR 1 0 1955

Mr. Nelson T. Zuver, President
Marqua Hala Minerals Corporation
Room 1016 Story Building
610 South Broadway
Los Angeles 14, California

Re: Docket No. DMEA-3379 (Copper-Lead)
Marqua Hala Minerals Corporation
Golden Eagle Mine
Yuma County, Arizona

Dear Mr. Zuver:

Your application for aid for an exploration project and other reports available to us in Washington relating to your application have been reviewed.

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

Careful study of all our information, although noting a small amount of marginal ore on your lease, indicates to us that the probability of disclosing minable ore reserves by your proposed program is not sufficiently promising to justify Government participation. We regret to advise you, under these circumstances, that your application for exploration assistance is denied.

We wish to thank you for your interest in the Defense Minerals Program and for bringing your property to our attention.

Sincerely yours,

C. O. Mittendorf

Administrator

WRGriswold/er 3/8/55
Copy to: Docket
Admr R. File
Op. Committee
Base Metals
Mr. M. E. Volin, USBM
Mr. Kiilsgaard, USGS
Region III (2)
Chron.

UNITED STATES
DEPARTMENT OF THE INTERIOR 500
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

March 8, 1955

Memorandum

To: The Administrator

From: Chief, Base Metals Division

Subject: Denial of Application, Docket No. DMEA-3379, (Copper-Lead), Harqua Hala Minerals Corporation, Golden Eagle Mine, Yuma County, Arizona

The cited application, dated May 28, 1954, was received by this office on June 2, 1954. On June 25, 1954, the application was referred to Region III for a field examination and recommendation.

The Field Team examined this property in October and again in November 1954 and we received their report on February 1, 1955.

The Applicant proposed a diamond and churn drilling program which was estimated to cost $74,580.00. All drilling, except an 800-foot diamond drill hole from the 4th level of the Bonanza mine to a hypothetical mineralized fault zone below a dry wash, was to be done from the surface.

The Field Team states that from data contained in numerous reports on the properties, and as a result of the field examination Leonide Bryner, USGS, concludes: (1) that the small bodies of copper ore reported to have been found in the Bonanza and Golden Eagle mines are secondary, (2) that only very minor amounts of chalcopyrite are present along veins below the zone of secondary enrichment, (3) that the present workings have reached the bottom of the zone of ore depositions, and (4) that the reserves of copper and lead ore remaining in the Bonanza and Golden Eagle mines or on the New Yorker group of claims are insignificant.

We concur with the recommendations of the Field Team and the Commodity members of the USBM and USGS that this application be denied.

W. R. Griswold

W. R. Griswold

File Copy
Surname
J. Alt.

UNITED STATES
DEPARTMENT OF THE INTERIOR 500
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

March 8, 1955

Memorandum

To: The Administrator

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W. R. Griswold

W. R. Griswold

JWAlt/er
Copy to: Docket
Base Metals
Chron.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

ack Betty

March 3, 1955

Memorandum

To: W. R. Griswold, DMEA

From: Chief, Branch of Base Metals

Subject: DMEA Docket 3379 (copper) Harqua Hala Minerals Corp., Yuma County, Arizona

MAR 4 - 1955

The applicant has applied for an exploration contract in the estimated cost of $74,580.00. The project would consist of exploring the downward continuation of the Bonanza, Golden Eagle and New Yorker deposits below present workings by core and churn drillings.

The Field Team has presented a detailed and comprehensive report on the Harqua Hala Minerals Corporation property based largely on old records because most of the underground workings are now inaccessible. The reasons for the Field Team recommendation of denial of the application are based entirely on geological considerations and I concur with this recommendation as a logical one.

Although the engineering considerations are of secondary importance in judging this application, I would like to point out that the estimates of cost for both churn and core drillings especially in the deep holes are too low, and probably could not be realized in actual practice. The low estimates are due partly to over-optimism on the probable rate of progress in drilling holes over 500 feet deep. It is doubtful if the estimated rate of progress could be realized even in the holes from 300 to 500 feet deep.

It is noted also that proposal calls for the diamond drilling on company account. Past experiences show that this generally brings grief both to DMEA and to the operator and the practice should be discouraged except when the operator has demonstrated ability for satisfactory performance.

It is noted that copies of the reports referred to in the Field Team report are not included in the docket files. It

would seem desirable to have copies of all background data if such are procurable.

It is also noted that the Field Team report includes a geology section and an engineering section with consideral overlap and duplication of information. It seems to me that the Executive Officer of this particular field team would be concerned about the waste of technical manpower in preparing a report in this form.

M. E. Volin

M. E. Volin

Attachment

Copy to - T. H. Kiilsgaard - Room 5227
Division of Minerals
J. H. Hedges - Room 3612
Branch of Base Metals
Files

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

March 3, 1954

Memorandum

To: W. R. Griswold, DMEA

From: Chief, Branch of Base Metals

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M. E. Volin

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MEVolin:ks

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Division of Minerals
J. H. Hedges - Room 3612
Branch of Base Metals
Files

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

February 10, 1955

Re: DMEA Docket 3379
(copper)
Harqua Hala Minerals
Corp.
Yuma County, Arizona

Memorandum

To: Mr. W. R. Griswold, Chief, Base Metals Division, DMEA

From: Thor H. Kiilsgaard, U. S. Geological Survey

Subject: Review of Field Team application report

The Field Team has presented a very detailed and comprehensive report on the Harqua Hala Minerals Corp. property in which they recommend denial of the application.

The applicant has applied for an exploration contract the estimated cost of which amounts to $74,580.00. The project would consist of exploring the downward continuation of the Bonanza, Golden Eagle and New Yorker deposits below present workings by diamond and core drilling.

Field examiners base their recommendations for denial on several reasons, among which are:

1. Geological indications are that the Bonanza and Golden Eagle deposits are essentially bottomed by present workings.

2. Extensive exploration of both the zones of oxidation and enrichment of the above deposits and the mineralogically similar deposits of the New Yorker property have resulted in the discovery of only a few small bodies of copper and lead mineralization.

3. The absence of both relic copper sulfide minerals and significant concentrations of secondary copper minerals indicates that the deposits, prior to leaching, did not contain more than trace amounts of primary copper mineralization. On this basis, significant amounts of copper cannot reasonably be expected in the primary sulfide zones, the zones of proposed exploration.

In reading the report I gather that the Bonanza and Golden Eagle are essentially gold mines, and that there has never been any attempt to recover base metals from the ore, except for a minor quantity of lead. I would interpret this to mean that base metal content of the ore has been negligible. From the geological report, there is no reason to believe the base metal content in the primary zone will improve to a point warranting exploration.

I concur with the field examiners and recommend denial of the application.

Thor H. Kiilsgaard

Thor H. Kiilsgaard

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

February 10, 1955

Re: DMEA Docket 3379
(copper)
Harqua Hala Minerals
Corp.
Yuma County, Arizona

Memorandum

To: Mr. W. R. Griswold, Chief, Base Metals Division, DMEA

From: Thor N. Killingsard, U. S. Geological Survey

Subject: Review of Field Team application report

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I concur with the field examiners and recommend denial of the application.

Thor H. Kiilsgaard

THKiilsgaard:hlm
G-2/10/55

Copy to: Director's reading, 4212
Branch reading, 4212
BMA (3)
Docket file
C. H. Johnson, 3621 Interior

BONANZA (HARQUA HALA), GOLDEN EAGLE, AND NEW YORKER PROPERTIES

ELLSWORTH MINING DISTRICT

YUMA COUNTY, ARIZONA

(COPPER-LEAD)

DMEA 3379

GEOLOGY

By

Leonid Bryner

Geologist, U. S. Geological Survey

Reviewed by
DMEA OPERATING COMMITTEE
1-31-55
(date)

Department of the Interior
Defense Minerals Administration
RECEIVED
JAN 27 1955

BONANZA (HARQUA HALA), GOLDEN EAGLE, AND NEW YORKER PROPERTIES

ELLSWORTH MINING DISTRICT

YUMA COUNTY, ARIZONA

(COPPER-LEAD)

DMEA 3379

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ILLUSTRATIONS

Fig. 1 LOCATION MAP ..... See Engineering Report
Fig. 2 CLAIM MAP ..... See Engineering Report
Fig. 3 GEOLOGIC MAP AND SECTIONS
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Fig. 5 GOLDEN EAGLE MINE ..... Following page 12
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TABLES

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AND GOLDEN EAGLE MINES ..... Page 18
Table II SAMPLES - GOLDEN EAGLE MINE - 180 LEVEL 21

INTRODUCTION

In an application to the Defense Minerals Exploration Administration, dated May 28, 1954, Mr. N. T. Zuver, president of the Harqua-Hala Minerals Corporation, requested government participation in an exploration program estimated to cost $74,580, to explore for copper and lead at the Bonanza (Harqua Hala) and Golden Eagle mines and on the New Yorker group of claims.

The properties of the Harqua Hala Minerals Corporation on which exploratory work was proposed are in Secs. 23 and 27 in unsurveyed T.4 N., R. 13 W., Ellsworth Mining District, Yuma County, Arizona (fig. 1). The Bonanza Mine is accessible from Salome via graded dirt roads by traveling south on the Buckeye road for 0.2 mile to a junction with a road branching to the right, and then on this right-hand branch 8.7 miles. The Golden Eagle Mine and the adjoining New Yorker claims are about one mile northeast of the Bonanza via unimproved dirt roads.

The applicant states that the mining claims on which exploration is proposed are held partly by location and partly under purchase contract with the Bonanza and Golden Eagle Mining Company, Phoenix, Arizona. These claims and the applicant's title to them are shown in figure 2.

The present report summarizes the results of a geologic examination made during the week of October 11 to 15, 1954 by Leonid Bryner, and on November 8, 9, and 10, 1954, by J. N. Faick and Bryner, both of the U. S. Geological Survey. The engineering report is by T. M. Romslo of the U. S. Bureau of Mines, who examined the property with Bryner during October 11 to 15. On this first visit the examiners were assisted by B. M. Snyder of the Union Engineering Company and N. T. Zuver. The

field work was more extended than usual because three properties were included in the application. Also, the large recorded production of the Bonanza Mine indicated an important mining district which warranted an especially careful examination.

Examination of the properties was handicapped by the fact that the lower levels of the mines, where the copper values were reported to be, were inaccessible. However, this handicap was largely compensated for by the availability of a variety of old reports and maps from which it was possible to make a reasonable interpretation of the geology of the lower levels. Also, a microscopic examination for relic copper minerals in selected specimens, by LaMar G. Evans of the Bureau of Mines was a great help in evaluating the nature and probable extent of copper mineralization on the property. In addition to these aids, a detailed geologic map of the area around the Bonanza Mine by Eldred D. Wilson of the Arizona Bureau of Mines made it possible to interpret the complex geologic setting of this mine.

The various sources of information used in this report are listed below:

Published Material

Bancroft, Howland, Reconnaissance of the Ore Deposits in Northern Yuma County, Arizona: U.S.Geol.Survey Bull. 451, 1911.

Walker, H.W., The Mines Handbook, vol. XIII, p. 559, 1918, vol. XIV, p. 407, 1919.

Wilson, E.D., Cunningham, J.B. and Butler, G.M., Arizona Lode Gold Mines and Gold Mining: Arizona Bureau of Mines, Mineral Technology Series No. 37, Bulletin No. 137, 1934.

DeWolfe, W.P., Reopening Old Mines in Arizona: Mining and Engineering World, vol. 45, no. 8, pp. 329-331, 1916.

Unpublished Material

Wilson, E.D., Geologic map of the area around the Bonanza mine; scale: 1 in. equals 200 ft., about 1945.
Map of the fourth level of the Bonanza mine; scale: 1 in. equals 40 ft., April 11, 1945.

Mills, C. E., Report on the Bonanza mine; San Francisco, 1892.

Directors and Mine Managers' Reports for the financial year ending June 30, 1896; The Harquahala Gold Mining Co., Ltd.

Farish, T. E., Report on the Bonanza Mine; Phoenix, 1906.

Olson, E. J., Report on Bonanza and Golden Eagle mines, about 1915.

Norton, F.W., of C.C. Medberry Co., N.Y., Report on the Bonanza and Golden Eagle mines for the Yuma-Warrior Mining Co.; about 1918 (?).

Tovote, W., Report on the Bonanza and Golden Eagle mines for H.W. Stevens, pres. Yuma-Warrior Mining Co., about 1917.

Carpenter, Miles et al, Report on the Bonanza and Golden Eagle mines (quoted in a report by B.M.Snyder), and maps of the levels and surface of the Bonanza mine, 1934.

Colvocoresses, G.M., assisted by C.C. Thompson, engineer and assayer at the mine, Report on the Bonanza and Golden Eagle mines, 1939.

Snyder, B. M. (Union Engineering Co.), Report on the Bonanza, Golden Eagle, and New Yorker group, about 1954.

Wicks, F. R., Report on the Golden Eagle Mine, for the Somind Minerals Corp., March 27, 1952.

C. C. Thompson, formerly assayer at the Bonanza Mine, was interviewed, and offered some interesting information about the lower levels.

GENERAL GEOLOGY

The mineralized area covered in this report is in the south end of the Harqua Hala Mountains, also called the Little Harqua Hala Mountains (fig. 1), a southwest-trending range consisting mainly of pre-Cambrian (?) granite and Paleozoic sediments that have been intensely folded and faulted. The granite basement is exposed mainly in the lower

areas northwest of the mines (fig. 3). Overlying the granite is the late Cambrian Bolsa quartzite. This rock is gray to brown. Its base is coarse-grained to gritty and difficult to distinguish from the underlying granite because of a gradational zone of arkose between the granite and the quartzite. In general the quartzite is distinctly bedded and the beds are on the order of two or three feet in thickness. The top 50 feet, more or less, is shale or siltstone. Thickness of the Bolsa reaches a maximum of about 400 feet in places but generally it appears to be less than this. Trilobites found by Wilson are the basis for his dating this formation as late Cambrian.

The Bolsa is succeeded by dark gray, cherty limestone and dolomite which has been classified by Wilson as Devonian because of the corals found in it. A complete section was not seen, but in the geologic sections based on Wilson's map, the Devonian appears to be at least 400 feet thick.

A crystalline limestone of Pennsylvanian age with local cherty zones succeeds the Devonian. The Pennsylvanian appears to be about as thick as the Devonian.

Next in the stratigraphic column is a series of red beds tentatively classed by McKee and Wilson as the Permian Supai Formation.

The valley fill which lies north and west of the outcrops of the above rocks is a coarse, fairly well-cemented gravel that may be equivalent in age to the Gila Conglomerate. Younger gravels occupy the washes.

The Paleozoic strata in which the Bonanza and Golden Eagle mines are located are overturned and dip moderately to steeply north or northwest. They are part of the upper limb of an overturned syncline

of which the axial plane dips north to northwest. The syncline is cut by reverse and normal faults that are more or less parallel to the axis of the fold, and by other faults that are approximately normal to the axis. Possibly because of the faults normal to the axis, the syncline between the Bonanza and Golden Eagle mines is not continuous but appears to have been dislocated, the Golden Eagle segment being offset toward the north from the Bonanza segment.

The sequence of structural events may have been as follows: (1) folding, (2) overturning of the folds, (3) reverse faulting or overthrusting more or less parallel to the folds, (4) normal faulting more or less parallel to the folds, (5) faulting more or less at right angles to the folds.

The metallization that resulted in the Bonanza and other deposits probably postdates all of the above structural events.

BONANZA (HARQUA HALA) MINE

The Bonanza Mine consists of an inclined shaft, an adit to the 4th level, ten levels spanning a vertical distance of about 300 feet, and extensive stoping between the 5th level and the surface (fig. 4). Only the 4th and 6th levels are readily accessible and the mine is flooded below the 6th level. At the main shaft the water table is about a foot below the floor of the 6th level or about 200 feet below the surface. The mine is in a mesothermal gold deposit that occupies shear zones and fractures mainly in the Bolsa quartzite. The main ore-bearing shear zone is known as the Iron Vein (fig. 3).

Geologic setting.

Two lines of evidence indicate that the Iron Vein occupies a zone of shearing, though actual displacement along the zone was not recognized. First, there are selvages of gouge and local brecciation of quartzite in the zone, and secondly, the dips of the quartzite beds as shown in figure 3 differ rather strikingly on either side of the Iron Vein. Another major structural feature is the thrust fault that trends about east-northeast across the area and corresponds to the main contact between the Devonian and the Bolsa. This fault apparently is offset in at least two places by normal faults more or less parallel to it but dipping in the opposite direction. As a result of this normal faulting the thrust plane is repeated in two places as the contact between the granite and the quartzite. These places are about 350 feet south of the main shaft and about 220 feet north of the main shaft. Because of this offsetting of the thrust fault, all the lower workings of the Bonanza Mine are in the pre-Cambrian granite, and the Bolsa quartzite is in fault contact with the underlying granite. Another reverse fault, in this case trending northwest, and partly covered, separates the two largest outcrops of Bolsa in the Bonanza Mine area.

No intrusives were seen in place in the vicinity of the Bonanza Mine. However on the dump from the Quinn shaft (fig. 3) a rock was seen that possibly corresponds to Tovote's andesite porphyry or Bancroft's vogesite from this area. This rock is fine-grained and greenish. It contains altered hornblende (?) needles and scarce pyrite casts, and seems to be highly chloritized. Very probably this is a dike rock and is connected with an intrusive that underlies the deposit and is genetically related to it.

Mineralogy

Native gold is the ore mineral. The rich deposits of gold that were found in the part of the mine that is in the Bolsa quartzite are described second-hand since this part of the deposit has been worked out to the extent that none of this rich gold ore was in evidence during the examination. Quoting Bancroft (p. 108), "Very rich pockets of gold are reported to have been found in various parts of the mine, and the writer was shown a good part of a large nugget, the original specimen having been reported to be worth $10,000. This particular piece showed large bunches of gold intimately associated with quartz." Bancroft also says "The quantity of silver found in the ore is remarkably small."

Pyrite is the only obvious sulphide in the mine. It occurs in small, scattered cubes, most of which have been oxidized to limonite. The pyrite may be auriferous, because numerous samples cut by previous examiners across the Iron vein in the granite assay at least several dollars per ton in gold, although free gold is not evident. Galena was not seen in place but the writer saw a specimen of rich gold ore reported to be from the mine in which coarse grains of native gold and galena are scattered through coarsely crystalline quartz. Galena specimens were found on the dump of the Harqua Hala Extension about 1400 feet to the southeast. Chalcopyrite was not found in the mine, and the mine dump was searched unsuccessfully for evidence of chalcopyrite and supergene copper sulphides. Several of the reports, however, mention secondary enrichment on the lower levels of the mine,

and on the Golden Eagle dump some chalcopyrite, partly replaced by covellite and chalcocite, was found. This example of supergene enrichment was confirmed by the microscopic work of L. G. Evans of the Bureau of Mines. The main gangue mineral in the ore zone, by all reports, was quartz; probably a coarse-grained variety, devoid of banding or primary cavities. Visible quartz is scarce except at the Cuff Group (Golden Eagle Extension) fifteen hundred feet south of the Golden Eagle Mine; where, on the Cuff dumps some pieces of vein quartz up to 1 foot thick were observed. The scarcity of quartz on the Bonanza property is undoubtedly due to the fact that all of the quartz in the mine was milled as it all carried gold. According to Bancroft (p. 108), the gangue also contains calcite, but it probably is very subordinate to quartz except where the Iron Vein at its south end cuts limestone and dolomite. Bancroft also reports "a little gypsum".

Of the metallic gangue minerals possibly the most significant is specularite since it indicates medium to high temperature conditions. However, only a very small amount was found along fractures in quartzite on the dump. Limonite, hematite and manganese oxides are common along the shear zones and give the mineralized zone its rusty appearance. Much of the iron oxide occurs as pyrite casts. Staining by malachite, azurite, and chalcanthite is rather widespread in the granite in the Iron Vein. In some places, as where USBM Sample No. 11429 was taken on the 6th level (fig. 4), the oxides are abundant, but taking the vein as a whole the copper oxides only occur as scattered traces.

Among the products of hydrothermal alteration, sericite is the most prominent. It occurs abundantly as fine-grained intergrowths with the quartz in the ore zone and it occurs abundantly in the granite surrounding the deposit. Chlorite and, in the granite, kaolin, have been mentioned in other reports as alteration products in the ore zone, but they are subordinate to sericite.

The Ore Deposit

The caved stopes shown in figures 3 and 4 indicate in a general way the surface outcrop of the main ore zone, known as the Iron Vein or No. 1 Vein. This outcrop trends northwest and dips about 45° southwest.

There are many local variations in the attitude of the Iron Vein as shown by the sections in figure 3. At the north end of the deposit the dip flattens at about the quartzite-granite contact. Then it progressively steepens with depth. In some places between the 8th and 9th levels it is vertical and even slightly reversed. At the south end of the Iron Vein the dip appears to be generally much flatter. From north to south along the vein the strike varies from northwest to about due north.

According to Tovote the Iron Vein consists of about 4 more or less parallel veins that converge and connect at depth. A little below the quartzite-granite contact, at the 6th level, there is only one vein (Sections, fig. 3).

The widths of the mineralized zones are reported to range from about 60 feet, presumably near the top of the deposit, to about one foot, in the lower levels. According to Carpenter the average width is 10 feet. On the 6th level, where the Iron Vein is entirely in granite, it is poorly defined since it contains practically no quartz. But the width of the

shear zone and sample widths indicate an average width of about $1\frac{1}{2}$ feet. Samples on the 7th and 8th levels indicate an average vein width of about 3 feet.

Abutting from the west against the Iron Vein is a mineralized zone variously referred to as the Castle Garden, Porphyry, Mill, and No. 2 Vein. This ore zone is entirely within the quartzite. It does not show at the surface and it apparently terminates downward against the Iron Vein. Bancroft and some others call the Castle Garden an easterly dipping vein, but the stoping in it seems to indicate a more or less horizontal, pod-shaped body, localized at the intersection of the Iron and Castle Garden veins. According to Carpenter the Castle Garden Stope has an unbroken length of 300 feet, a width up to 120 feet and an average height of 40 feet. It is impossible to determine whether the Iron Vein Stope or the Castle Garden Stope contributed the most ore. In any case it seems likely that the Castle Garden and Iron Veins represent respectively two rather different bodies in the same deposit, corresponding to two types that Tovote describes from this mine: (1) irregular, roughly lenticular bodies approaching true replacement deposits, and (2) tabular bodies, approaching true fissure fillings.

According to several accounts two bodies of "blue ore" were encountered in the granite on the seventh level. The first of these was found about 10 feet south of the incline connecting the 7th level with the 6th and the 8th levels (fig. 4). It had a length of only about 7 feet along the drift, and was about 4 feet wide. This body apparently was bottomed between the 7th and 8th levels. About 80 feet south of this same incline another similar body was encountered (Section A-A',

fig. 3). According to available engineering reports this body is 45 feet long and 10 feet wide on the 7th level, its width increases down dip for a distance of about 50 feet to about 16 feet on the 8th level, and below the 8th the body bottoms abruptly. The meager indications of copper in the oxidized part of the deposit and the abrupt improvement in grade below the water table both indicate that these are bodies of supergene ore.

Lithologic controls have been important in this deposit. Almost the entire gold production came from ore in the Bolsa quartzite. Vein quartz also is almost entirely confined to the quartzite. On the other hand pyrite and copper oxides seem to have favored the granite; and where the Iron Vein in the granite has a few small pockets of quartz, as on the 6th level, the pyrite is more abundant in the quartz than in the granite. However, pyrite and copper oxides are not highly concentrated anywhere in the deposit. Chalcopyrite is even more scarce, and less is known about its distribution. But the occurrence of copper oxides,together with completely unaltered pyrite on the 6th level and above, suggests that some mineral other than pyrite contributed the copper that is in the copper oxides. That this mineral is most likely chalcopyrite is inferred from the fact that chalcopyrite was found on the Golden Eagle dump. From the relative scarcity of copper oxides in the quartzite as compared to the granite, it is also inferred that chalcopyrite like the pyrite favored the granite more than the quartzite.

The Devonian limestones and dolomites also seem to have exercised some control on metallization, though this apparently was not a strong control and did not result in any important deposits. Bancroft states (p. 108) that "small quantities of galena have been found replacing

dolomite in a shallow shaft located 500 feet southwest of the mine." Likewise, at the Iron Shaft (fig. 3) in the south end of the Iron Vein where it is partly in limestone, indications of lead occur mainly as cerussite.

Ore deposition has apparently favored the quartzite because of its competency as compared to the granite and limestone. The Iron Vein shear zone is quite thin and inconspicuous in the granite in the lower levels of the mine, and the same shear zone at the surface apparently feathers out abruptly where it enters the limestone. On the other hand, the intense deformation resulted in much fracturing in the brittle quartzite, making it relatively accessible to the ore-bearing solutions.

Bancroft explains the free gold in the deposit (p. 108) as follows: "The gold values found in the workings above water level have probably resulted from concentration in the zone of oxidation of the gold content of the pyrite . . . ." To the writer it seems unlikely that such coarse gold would result from the oxidation of auriferous pyrite. It seems more probable that this gold was of hypogene origin.

The lateral limits of the two supergene bodies may be due to some type of fracture control that localized the supergene solutions, especially since no evidence of post-ore faulting was seen.

GOLDEN EAGLE MINE

The Golden Eagle Mine, which is located about a mile northeast of the Bonanza, consists of an inclined shaft about 400 feet long, an adit to the 180-level, a 263 and a 300 level, and stopes mainly above the 180-level. The lowest, or 300, level is inaccessible, and the bottom 60 feet of the shaft is under water. Figure 5 shows the Golden Eagle workings, the location of samples, and the geology on the 180

and 263 levels. This deposit is essentially like the Bonanza deposit, and the geologic setting of both mines is very similar.

It was at the Golden Eagle dump that positive evidence of covellite and chalcocite derived from chalcopyrite was found (p. 8). This same dump material showed pervasive, yellow, iron sulphate stains in much of the pyrite-quartz vein material that probably was obtained from the deepest workings. Near the south end of the mine, the vein passes into Devonian limestone, which was found to be weakly mineralized. Microscopic examination by Evans of specimens of the material from the limestone at the south end of the mine revealed pyrite, galena, cerussite, and a small amount of calamine in a calcite and quartz gangue. Hematite and manganese oxides also are present here. Copper oxides are less in evidence than at the Bonanza Mine.

On the basis of the value of ore removed, the Golden Eagle deposit probably is less than one-tenth the size of the Bonanza. Comparison of the workings of the two mines also suggests that the actual difference in magnitude of the two deposits is on the order of about one to ten.

The veins seen at the Golden Eagle, like those in the lower levels of the Bonanza, are regarded as shear zones. The main vein, corresponding to the main drift on the 180-level dips 40° to 50° east, and trends about north. At the 180-level the vein is about 2 to 5 feet wide. Some of the stopes above this level extend to the surface, and appear to reach a maximum of about 15 feet in width. East and west of the main vein and more or less parallel to it, are one or two smaller, less continuous veins. On the 180-level the veins appear as thin, brown selvages along a zone of rusty-looking, highly fractured or somewhat brecciated quartzite.

Above the 180-level the veins are in Bolsa quartzite except at the south end of the mine where they are in limestone. Between the 180-level and the 263-level the footwall of the main vein changes from quartzite to granite. According to Colvocoresses and Thompson the lower levels of this mine are entirely in granite. However, the relationship of the quartzite to the granite is not as well understood as at the Bonanza Mine. But it appears that this flooring of the quartzite by granite is the main controlling factor in gold deposition as it was at the Bonanza. It also is very likely that this deposit contains small bodies of supergene copper sulphides below or near the present water level. One report, that by F.W.Norton, mentions such a body. However, there is no reason to expect that such supergene enrichment would be any more extensive than it was at the Bonanza mine.

At the south end of the mine where the vein system passed into the Devonian limestone the veins are less regular and persistent than they are in the quartzite. In fact, the surface exposure of these same veins in the limestone shows that the fractures or shears which correspond to the veins die out in the limestone within 150 feet of where they enter the limestone. The persistence in depth of the veins in the limestone below the 180-level is not known because of the inaccessibility of the workings but a 60-foot winze from the 180-level suggests that the main vein extends at least 60 feet below the 180-level.

The ore in the limestone is different from that in the quartzite. It is an oxidized lead ore with some silver, but very little gold or copper. This change in character of deposit corresponds to the change in character of the country rock. But the chance of there being a large replacement deposit in the limestone seems poor. The argument against such a possibility rests on the fact that at the Iron Shaft at the Bonanza, and at the nearby Harqua Hala Extension Mine (fig. 3), ore-bearing structures that pass into the Devonian limestone show the same change in ore as at the Golden Eagle and do not make any significant tonnage of lead or other ores. In other words, the ore solutions were probably deficient in base metals.

Some reports bring up the possibility of the existence of an extension between the Golden Eagle and Bonanza deposits. There is no evidence for continuous metallization between the two mines, or even for a continuous structure between them. The veins at the Bonanza and Golden Eagle are oriented in such a way that the projection of either one would fall several thousand feet wide of the other deposit. There is a suggestion, however, in the distribution of the known deposits in the area, of a belt of mineralized ground along the southwestern flanks of the Little Harqua Hala mountains (fig. 1). However, this is too broad a feature to be of any use in searching for extensions of the known deposits.

The possibility of another vein hidden beneath the wash northeast of the Bonanza mine is advanced by the applicant because of some boulders carrying gold and copper that were extracted from Johnson's well (fig. 4). This wash, however, drains the area that contains the

above-mentioned belt of mineralized ground, including the Bonanza deposit itself. It is not necessary, therefore, to postulate an undiscovered deposit in order to account for these mineralized boulders.

NEW YORKER GROUP

Figure 6 shows the main workings of the New Yorker group. These workings, consisting of three shallow shafts and about half a dozen small pits or trenches, are distributed in a north-trending belt about 1800 feet long. Only the south half of the belt is shown since it contains all the largest workings and comprises the ground which the applicant proposes to explore. The water table is high here: 45 feet below the collar in the most northerly shaft, and 30 feet below the collar in the most southerly shaft.

The country rock is the pre-Cambrian granite that was encountered in the lower workings of both the Bonanza and Golden Eagle mines. A very fine-grained dike, 18 inches wide, was found in the arroyo northeast of the mapped area. This is the only direct evidence of an intrusive that might be genetically related to the sulphide mineralization here.

The mineralogy and alteration is essentially the same as in the granite at the Bonanza Mine, and includes one small showing of specularite. Microscopic examination by Evans of three specimens of the mineralized rock found no sulphide or sulphide relics other than pyrite. However, copper oxide staining was noted in half of the workings.

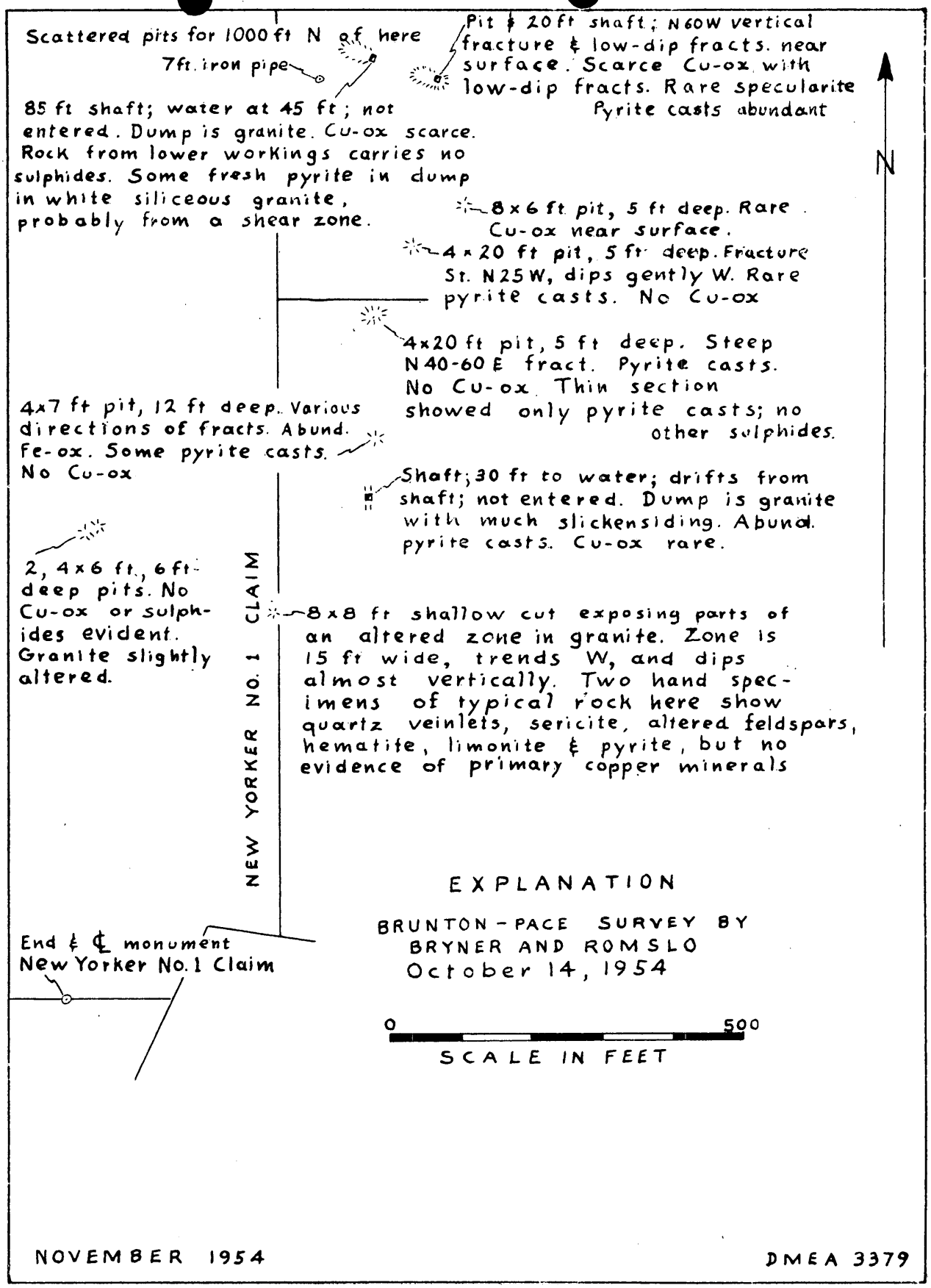

FIGURE 6.- MAIN NEW YORKER WORKINGS, YUMA CO., ARIZ.

The workings generally are in areas where iron and manganese oxide staining is most marked. Within these areas the pyrite and copper oxides show an affinity for small shear zones or fractures in the granite where alteration is more prevalent than in the surrounding rock. The shear zones and fractures are variously oriented and dip vertically to almost horizontally. Many of the fractures and shear zones show slickensiding.

PRODUCTION AND GRADE

All references to production from the Bonanza and Golden Eagle mines are in terms of the old price of gold ($20.67). The values of ore produced are almost entirely due to gold content. No production is recorded for the New Yorker group.

There is quite a remarkable range in the production figures. The highest figure is $4,000,000, given by Tovote. This refers to production as of about 1917. Bancroft in his 1911 report (p. 105) gives a figure of $3,631,000. The Arizona Bureau of Mines figure for production up to 1929 is $2,510,698. This last figure is the total of the year to year figures shown in the following table, reproduced from Arizona Lode Gold Mines and Gold Mining, p. 129.

TABLE I

PRODUCTION-BONANZA (HARQUAHALA) AND GOLDEN EAGLE MINES

(Data compiled by J. B. Tenney).

Year	Price of Lead	Lbs. Lead	Ounces Gold	Gross Value	Remarks
1891-1893	....	.....	77,407	$1,600,000	Hubbard and Bowers (est.)
1893	....	.....	6,410	132,500	Harqua Hala Gold Mining Company, Ltd.
1894	....	.....	13,148	271,775	Harqua Hala Gold Mining Company, Ltd.
1895	....	.....	6,803	140,615	Harqua Hala Gold Mining Company, Ltd.
1896	....	.....	4,053	83,778	Harqua Hala Gold Mining Company and Lessees
1897	....	.....	5,721	118,262	Harqua Hala Gold Mining Company and Lessees.
1898	....	.....	149	3,070	Harqua Hala Gold Mining Company and Lessees.
1899	....	.....	484	10,000	Hubbard (est.)
1907	....	.....	1,449	29,960	Harqua Hala Mining Company
1908	....	.....	1,113	23,000	Harqua Hala Mining Company
1914	....	.....	919	19,000	Yuma Warrior Mining Company
1916	....	.....	1,451	30,000	Yuma Warrior Mining Company
1922-1923	....	.....	726	15,000	Lessees.
1925	.087	55,000	73	6,285	Lessees on Golden Eagle.
1926	.080	53,600	73	5,788	Lessees on Golden Eagle.
1928	.058	14,600	242	13,468	Lessees on Golden Eagle.
1929	.063	19,000	339	8,197	Lessees on Golden Eagle.
Total, 1891-1929	....	142,200	120,560	$2,510,698	

According to Wicks there has been no notable production from the Golden Eagle for about 20 years. He estimates that a total of $200,000 worth of ore was taken from the mine.

The grade of the ore produced from the Bonanza mine was about 1 ounce of gold per ton, as calculated from Colvocoresses' estimate of the tonnage of tailings at the Bonanza and using a production value of $2,500,000. This grade estimate agrees essentially with Norton's figure

for grade derived from a production of 59,875 tons that yielded $9.90 per ton but resulted in tailings that assayed $10 to $20 per ton.

An old assay map furnished by E. D. Wilson shows that gold values persist through most of the 7th and 8th levels. About 100 samples on the 8th level and about 77 on the 7th level are shown. A numerical average of these samples is about $12.33 per ton for the 7th level and about $19.73 per ton for the 8th, and the average width of sample on each level is about 3 feet. The 9th level map shows only two assays, $10.00 and $6.00 per ton, and these are almost under the larger of the two supergene bodies.

According to Colvocoresses the ore at the Bonanza contained about one ounce of silver for each ounce of gold.

Data on which to base grade estimates of the gold ore produced from the Golden Eagle is lacking. But the ore there probably was of about the same grade as at the Bonanza.

There is no recorded copper production from either the Bonanza or the Golden Eagle Mine, and apparently copper was not recovered from the ores. However, the grade in copper of the shear zones in the flooded levels of the Bonanza and Golden Eagle mines probably is good in the zones of supergene enrichment but poor in the underlying hypogene zones. The deepest accessible copper showings are on the 6th level of the Bonanza Mine. Two samples of the vein in the granite on the 6th level were taken by the examiners. These samples were chosen to show the tenor of ore in the most promising looking places on that

level, that is, where the Iron Vein shear zone shows the most copper oxide and the most sulphide (pyrite). The location of these samples is shown in figure 4. The assays were as follows:

Sample	Width	Au.	Ag.	Cu.
U.S.B.M. 11429	10 inches	0.45 oz./ton	0.30 oz/ton	1.22%
U.S.B.M. 11430	36 inches	0.01 oz./ton	0.50 oz./ton	0.20%

Assays are given by Thompson and Carpenter for the two supergene bodies on the 7th and 8th levels of the Bonanza Mine. The body ten feet south of the incline (p. 10) averaged $44.00 Au., 7.4 oz. Ag., and 5.28 percent Cu. on the 7th level where it was sampled. The body on the 7th level 80 feet south of the incline (p. 10) assayed about $12 in gold, but the copper and silver values are not given in any of the reports. Norton's report states that on the 8th level the ore in the larger body assayed $13-35 in gold and 4-5% copper, over a width of 16 feet. Tovote, presumably referring to the 7th and lower levels, estimates an average copper content of 2 percent. However, he does not give any sample data supporting this estimate beyond mentioning that assays as high as 7 and 12 percent copper had been made.

Information on the copper content in the lower levels of the Golden Eagle is even more scant than at the Bonanza. Tovote says: "Base metals are even more pronounced in the Golden Eagle ore, but here, I understand, the copper is not as prominent and in its place more pyrite is found in the lower levels." Bancroft (pp. 108 and 109) reports two samples

(of unspecified width) from the 300 level assayed 0.25 and 4.84 percent copper, 1.32 and 2.88 ounces of silver per ton, and 0.48 and 1.12 ounces of gold per ton.

Since 1925, according to the table on page 18, 142,200 pounds of lead were produced from the Golden Eagle Mine. The grade of this ore is not indicated in any of the reports. Fourteen samples in the lead-bearing part of the mine (fig. 5) by Wicks, Zuver, and Snyder gave a numerical average of 6.38 percent lead. Only two of these samples carried copper and these assayed 0.26 and 0.10 percent copper. The numerical average for silver was 1.33 ounces per ton and for gold 0.05 ounces per ton. The assays of the various samples are as follows:

TABLE II

SAMPLES - GOLDEN EAGLE MINE, 180 LEVEL

W= sampling by Wicks
S= sampling by B.M.Snyder (Union Engineering Co.)
U.S.B.M.=Sampling by U. S. Bureau of Mines.
Z= sampling by N.T.Zuver

No.	Description	Au. Oz.	Ag. Oz.	Cu. %	Total Pb. %	Sulfide Pb. %	Total Zn. %
W-1		0.02	0.22	0.26	4.02	-	-
W-3	4 ft.	0.08	0.42	-	2.96	-	-
W-4	8 ft.	0.03	0.93	-	nil	-	-
W-5		0.09	0.79	-	8.80		
W-7	3 ft.	0.04	0.86	-	2.23		
W-8	Stope Face	0.10	1.00	0.10	11.45		
W-13	Check Sample between W-1 & W-7	0.04	0.64	nil	1.00		
Z-1	Across back	0.07	0.31	-	4.32		
Z-2	Across back	0.05	1.07	-	17.28		
Z-3	8 ft.	0.06	0.52	-	14.04		
Z-3A	6 ft.	0.06	0.86	-	8.42		
Z-4	6 ft.	0.05	0.67	-	6.15		
Z-5	Across back	0.01	10.22	-	2.59		
Z-6	Same as W-5	0.03	nil	-	5.07		
S-1		0.02	0.18	-	1.08		
U.S.B.M. 11431				0.02	0.24	0.14	0.2

There is some doubt as to the reliability of this sampling, because of the discrepancy between U.S.Bureau of Mines sample 11431 and W-1. Also, Z-6 does not check with W-5, and S-1 does not check with W-3. However, since the Golden Eagle Mine has produced lead on a small scale, it is likely that the ore will average at least several percent lead, and probably, by selective mining, rather high grade lead ore can be obtained.

The possibility of uranium reserves at the Bonanza Mine was brought up by N. T. Zuver during the field examination. Zuver claimed that indications of high radioactivity were obtained on the property. To check on this, a sample was taken in a short drift about 30 feet southwest from the Iron Shaft (fig. 4), and about 20 feet below the collar, in the zone where the highest radioactivity had been recorded. This sample, U.S.B.M. 11428, gave a radiometric assay of 0.04 percent equivalent U_3O_8, and a chemical assay of 0.011 percent U_3O_8. The uranium potentialities of the Bonanza Mine appeared insignificant and the investigation was not pursued any further.

Probably not more than a few tons of ore have been produced from the New Yorker group. At the most northerly shaft shown in figure 6 there are signs of an attempt to recover copper by leaching the mined rock. The applicant sampled the dumps of four of the main workings in the New Yorker group. These samples have a numerical average as follows:

Au.	Ag.	Cu.
0.015 oz./ton	0.6 oz./ton	0.38%

These assays probably are representative of the more highly mineralized parts of the New Yorker mineralized belt. But considering the belt as a whole for a large low grade operation, even these assays would be considerably higher than the overall grade of the rock.

EXPLORATION

Exploration work in the lower part of the Iron Vein by the Yuma-Warrior Mining Co. from 1913 to 1918 was abandoned at the 9th level. It was this company that sunk the levels below the 6th and discovered the two supergene ore bodies. An account of these discoveries in Mining and Engineering World before the 9th level had been driven concludes on an optimistic note (p. 331):

> "The work thus far done having demonstrated the presence of extensive ore bodies in the new workings along the strike of the 'Bonanza' vein, the company is planning for more aggressive mining and milling operations. These plans include the sinking of a 3-compartment vertical shaft, and the addition of concentration and flotation units to the 40-stamp mill to reclaim the gold, silver and copper contents of the sulphide ore, as the present amalgamation plant is capable of treating only the oxidized ore exposed in the upper levels."

Several observations suggest that the supergene copper ore as well as the gold ore was bottomed by the 9th level: (1) the lack of any assays showing copper values on the 9th level, (2) only two samples of gold on the 9th level, and these showing low values, (3) the habit in supergene ore of a rather short vertical range, possibly commensurate with the distance between the 7th and 9th levels, (4) the fact that the 9th level parallels the 7th and 8th suggesting that the Iron Vein shear zone was located and followed without, however, finding any appreciable copper or gold ore, (5) the abandonment of the mine after the 9th level had been driven, (6) the continued idleness of the mine after a detailed

examination by Miles Carpenter, C. C. Thompson and others in 1934, when the price of gold had gone up and low labor costs prevailed.

During the early history of the Bonanza Mine an attempt was made to find a southerly extension of the Iron Vein. For this purpose the Quinn shaft (fig. 3) was sunk. It reached a depth of 306 feet. According to Farish three drifts were driven from the bottom of the shaft and one of these, a westerly trending one, cut the Iron Vein, revealing a 20-foot width of vein. A thirty-five foot winze was sunk on the vein. A general sample of the winze gave $6.40 in gold. According to Farish the vein was nearly vertical here. However, since the Quinn shaft was begun west of the apex of the westerly dipping Iron Vein, it would have to pass through the Iron Vein before a westerly drift from the shaft would intersect the vein. So there is good reason to question that the vein cut by the drift from the Quinn shaft is the Iron Vein.

The exploration work proposed by the applicant consists of diamond drilling the Bonanza and Golden Eagle deposits at depth, and churn drilling the New Yorker group. Total estimated footage for diamond drilling was 14,200, and for churn drilling, 1500. Hole depths were estimated as between 500 and 1000 feet.

RESERVES

The reserves of copper ore in the Bonanza Mine are considered here as being confined essentially to the two supergene bodies between the 7th and 8th levels that have already been described (pp.10 and 11). As this ore is inaccessible there is a large element of uncertainty as to its dimension and grade and consequently these two bodies are classed as inferred ore. Together they are estimated to

contain 1500 tons having an average grade of 1/2 ounce per ton gold, 1/2 ounce per ton silver, and 4 percent copper.

There undoubtedly are primary copper minerals in the lower parts of the deposit, but these are thought to be in trace amounts and therefore do not warrant a reserve estimate. Above the 6th level there are traces of copper oxide, and in a few places, as shown by U.S.B.M. sample 11429, the rock may average about one percent in copper. In the oxidized zone, between the 6th and the 4th levels, where the vein is almost entirely in granite, there is possibly one thousand tons of material averaging less than one percent in copper. The highest grade part of this material, averaging perhaps one percent copper and 1/2 ounce of gold and 1/2 ounce of silver per ton, probably does not exceed 100 tons.

The gold in the lower workings appears to be much more generally distributed in the vein than does the copper. However, gold reserves are not pertinent to this report and so no estimate of them is attempted. For the same reason, gold reserves in the oxidized part of the mine are not estimated. However, it is interesting to note that most of the private reports on the Bonanza Mine viewed it as a potential large, low grade gold deposit in which the tonnage would come from open pit mining of the country rock around the mined-out veins in the oxidized zone. Colvocoresses estimated that there are from 300,000 to 4,000,000 tons of rock that averages $2.50 in gold (new price) left in the mine.

There is no basis for reserve estimates of copper in the Golden Eagle Mine. However, considering the similarity between the Bonanza and Golden Eagle deposits, and the smaller size of the Golden

Eagle, it is likely that copper reserves in the Golden Eagle are less than in the Bonanza. The Golden Eagle Mine probably contains some reserves of lead ore, but the erratic results of sampling and the lack of records of the grade of the ore produced greatly limit the reliability of any estimate of the lead content of this deposit. The main vein in the limestone below the 180 level might average 3 feet in width, and attain a depth of 120 feet; the depth to which the vein has been mined in the granite. The vein is exposed along its strike for 110 feet on the 180 level. These dimensions give an inferred reserve of about 4,000 tons of lead ore. This rock might average 3 to 6 percent lead and 1/2 to 1 ounce of silver per ton. Its gold, copper and zinc content are probably very low, as indicated by the sample records on page 21.

The New Yorker group would have to be considered in its entirety to obtain an estimate of any significant tonnage of copper ore. There are perhaps a few hundred tons of rock averaging 0.4 percent copper, but the copper content of the group as a whole would probably be less than 0.1 percent or too low grade to be considered ore or even potential ore.

CONCLUSIONS AND RECOMMENDATIONS

All the evidence points to supergene enrichment as the cause of any appreciable copper values in the lower levels of the Bonanza and Golden Eagle mines. Primary copper, mainly in the form of chalcopyrite, probably existed in the upper parts as well as in the lower parts of the deposits in very low concentrations as indicated by the weak copper oxides now in the oxidized zone. There is

no reason to believe that these primary ores increase at depth. Geological indications as to the nature of the deposits at depth suggest that they have been bottomed by the present workings, an interpretation which is substantiated by the production history of the Bonanza and Golden Eagle mines. The very small copper reserves of the Bonanza Mine and the lead reserves of the Golden Eagle Mine constitute the only strategic potential of these two mines, and this potential is insignificant from the standpoint of tons of reserves. The New Yorker group as a whole contains copper only in trace amounts.

We recommend that government participation in exploration of the Bonanza, Golden Eagle and New Yorker properties be denied because there is no reason to believe that significant amounts of copper or lead would be discovered on these properties.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DOUGLAS McKAY, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

DMEA-3379, (COPPER-LEAD)

Harqua Hala Minerals Corporation

Bonanza (Harqua Hala), Golden Eagle, and New Yorker Properties

Ellsworth Mining District

Yuma County, Arizona

Leonid Bryner, Geologist
U. S. Geological Survey

T. M. Romslo, Mining Engineer
U. S. Bureau of Mines

December 1954

Reviewed by
DMEA OPERATING COMMITTEE
1-31-55
(date)

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

By Leonid Bryner[1/] and T. M. Romslo[2/]

In an application to the Defense Minerals Exploration Administration, dated May 28, 1954, N. T. Zuver, president of the Harqua Hala Minerals Corp., requested government participation in an exploration program estimated to cost $74,580 to explore for (1) copper at the Bonanza (Harqua Hala) mine and an adjacent postulated deposit, (2) for copper and lead at the Golden Eagle mine, and (3) for copper at the New Yorker group of claims, all located 9 miles south of Salome, Yuma County, Ariz. The application was docketed as DMEA-3379.

An examination of these properties was made during October 11-15, 1954 by T. M. Romslo of the U. S. Bureau of Mines and Leonid Bryner of the U. S. Geological Survey. The examiners were assisted by B. M. Snyder of the Union Engineering Company and N. T. Zuver. Another examination of the same properties was made on November 8, 9, and 10 by J. N. Faick and Bryner of the U. S. Geological Survey. The information gained in these examinations was augmented by eleven unpublished and four published descriptions and evaluations of the properties.

The three deposits described in this report are in shear zones or fractures that traverse the pre-Cambrian (?) granite basement rock, the Cambrian Bolsa quartzite, and the Devonian limestone and dolomite. The stratified rocks have been synclinally

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1/ Geologist, Geological Survey
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Reviewed by
DMEA OPERATING COMMITTEE
1-31-55
(date)

folded and the syncline has been overturned to the south. Subsequent reverse faulting has thrust the sedimentary rocks in the upper limb of the syncline over the granite. This thrusting probably accounts for the fact that the upper parts of the Bonanza and Golden Eagle deposits are mainly in quartzite and the lower parts are in granite. In the New Yorker Group the quartzite and limestone apparently have been removed by erosion and only the mineralized granite basement remains.

The Bonanza mine consists of an inclined shaft, an adit to the 4th level, ten levels spanning a vertical distance of about 300 feet, and extensive stoping between the 5th level and the surface. The mine is flooded to immediately below the 6th level. The mine is estimated to have produced gold valued from $2,500,000 to $4,000,000 (old price) between the years 1891 and 1929. Essentially all of this production was from free gold in quartz veims in the sheared and highly fractured Bolsa quartzite. This ore averaged about one ounce of gold and one ounce of silver per ton. The copper content of most of this ore was very low and probably was due to trace amounts of chalcopyrite and to pyrite that possibly was cupriferous as well as auriferous. No base metals were recovered. Between 1913 and 1918 the Yuma-Warrior Mining Company in driving the 9th level extended the Bonanza workings to their present maximum depth. During the course of this work two small bodies of supergene covellite and chalcocite,

probably replacing chalcopyrite, were discovered on the 7th level, but apparently were bottomed above the 9th level. According to early reports, these two bodies averaged about 4 percent in copper and about 0.5 ounce of gold and 0.5 ounce of silver per ton.

After the Yuma-Warrior Mining Company abandoned the Bonanza mine, the mine was re-examined by several parties for its possibilities as a large, low-grade gold mine and as a gold-silver-copper producer. However, none of these examinations led to reactivation of the property. Two samples of the main vein taken on the 6th level by the examiners indicated a maximum grade of copper of about one percent, together with up to 0.5 ounce of gold and 0.5 ounce of silver per ton. The ore consisted of copper oxides associated with pyrite. The possibility of uranium reserves, advanced by the applicant during the field examination, was investigated. A sample from a small and comparatively highly radioactive zone was found to assay 0.011 percent U_3O_8, chemically.

The Golden Eagle mine, which is located about a mile northeast of the Bonanza, consists of an inclined shaft about 400 feet long, an adit to the 180 level, a 263 and a 300 level, and stopes mainly above the 180 level. The lowest, or 300 level is inaccessible, and the bottom 60 feet of the shaft is under water. Data on the production and grade of ore from the Golden Eagle mine is much less complete than in the case of the Bonanza mine. The

total value of ore produced from the Golden Eagle is estimated as $200,000, based on the old price of gold. There is no basis for judging the grade of this ore except its geologic similarity to the Bonanza ore. On this basis most of the Golden Eagle ore contained about the same amount of gold and silver as the Bonanza ore. However, the south part of the Golden Eagle mine where the veins on the 180 level and at the surface intersect and penetrate a short distance into the Devonian beds, produced about 142,000 pounds of oxidized lead ore. The grade of this lead ore likewise is problematical but may have been on the order of 3 to 6 percent lead and 0.5 to 1 ounce of silver per ton. Apparently copper was never recovered from the Golden Eagle mine although supergene copper sulphides are reported on the lower levels.

The New Yorker group consists mainly of three shallow shafts and about half a dozen small pits or trenches about 1,500 feet north of the Golden Eagle mine. Probably not more than a few tons of low grade copper ore, of a type essentially like that in the levels in granite at the other two mines, have been produced from the group, and there are no recorded shipments.

All of these deposits are classified as the mesothermal type. Lithologic control has been important in localizing the ore. Gold deposition was by far the greatest in the quartzite. Primary copper minerals seem to have reached their maximum concentration in the granite. Lead deposits are confined to the Devonian limestones and dolomites. The hypogene solutions were deficient

in base metals judging from the small amounts of copper and lead as compared to gold. Though the deposits probably are genetically related to one or more intrusive bodies, the only evidence of such intrusives near the mines is in a few andesitic fragments in a dump near the Bonanza mine and an 18-inch wide andesitic (?) dike in a wash east of the New Yorker group. The trend of the ore zones is such that their extensions would not be expected in the area of the postulated deposit.

The reserves of copper ore in the Bonanza mine are mainly in the two supergene bodies which are estimated to contain an inferred reserve of about 1,500 tons averaging 4 percent copper, 0.5 ounce per ton gold, and 0.5 ounce per ton silver. In the oxidized zone between the 4th and 6th levels, and in the hypogene zone below the 9th level the highest grade material probably contains on the order of 1 percent copper and ore of this grade probably does not exceed 100 tons. At the Golden Eagle mine copper reserves are of the same type as at the Bonanza, but probably are smaller. At the New Yorker group there are perhaps a few hundred tons of rock averaging 0.4 percent copper, but most of the rock there is considerably lower grade than this. The inferred lead reserves of about 4,000 tons are believed to be confined to the south part of the Golden Eagle deposit. This lead ore might average 3 to 6 percent lead and 0.5 to 1 ounce of silver per ton.

The chief conclusions of the investigation are as follows:

1. The extent of the Bonanza and Golden Eagle deposits decreases with depth and geological conditions indicate that the deposits are essentially bottomed by present workings.

2. Extensive exploration of both the zones of oxidation and enrichment at the above deposits and the mineralogically similar deposits of the New Yorker property have resulted in the discovery of only a few small bodies of copper and lead mineralization.

3. The absence of both relic copper sulfide minerals and significant concentrations of secondary copper minerals indicates that the deposits, prior to leaching, did not contain more than trace amounts of primary copper mineralization. On this basis, significant amounts of copper cannot reasonably be expected in the primary sulfide zones, the zones of proposed exploration.

4. There is no reason to believe that either the degree or extent of lead-silver mineralization at the Golden Eagle mine will attain significance with depth.

5. Other ore bodies that may exist in the area, such as the postulated deposit, probably will be similar to known ones.

6. Uranium mineralization is confined to trace amounts at a few widely acattered points.

For the above reasons, we recommend denial of Governmental participation in exploration of the Bonanza, Golden Eagle, and New Yorker properties.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
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DMEA-3379, (COPPER-LEAD)
HARQUA HALA MINERALS CORPORATION
BONANZA (HARQUA HALA), GOLDEN EAGLE AND NEW YORKER PROPERTIES
ELLSWORTH MINING DISTRICT
YUMA COUNTY, ARIZONA

Engineering Report

By T. M. Romslo
Mining Engineer
U. S. Bureau of Mines

December 1954

Reviewed by
DMEA OPERATING COMMITTEE
1-31-55
(date)

DMEA-3379, (COPPER-LEAD)
HARQUA HALA MINERALS CORPORATION
BONANZA (HARQUA HALA), GOLDEN EAGLE AND NEW YORKER PROPERTIES
ELLSWORTH MINING DISTRICT
YUMA COUNTY, ARIZONA

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ILLUSTRATIONS

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1	Location map	2
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3	Geologic map and sections, Bonanza mine area	See Geologic report
4	Bonanza mine	" " "
5	Golden Eagle mine	" " "
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INTRODUCTION

The Harqua Hala Minerals Corp. applied to the Defense Minerals Exploration Administration for Governmental aid, as authorized by the Defense Production Act of 1950, for exploration of its property in Yuma County, Ariz. The application was reviewed, docketed as DMEA-3379, and sent to the field team of Region IV with a request that the property be examined.

Exploratory work proposed by the applicant consisted of testing for (1) copper and radioactive ores below existing workings of the Bonanza (Harqua Hala) mine, (2) copper and lead mineralization below existing workings of the Golden Eagle mine, (3) copper mineralization at depth on the New York claims, and (4) copper mineralization in a hypothetical fault zone near the Bonanza mine. The total cost of the work, comprising churn and diamond drilling, was estimated at $74,580.00.

Examination of the property with the objectoof determining if the applicant's proposed exploration warranted Governmental assistance first was made on October 12 to 14, 1954 by T. M. Romslo, Bureau of Mines, and L. Bryner, Geological Survey. The engineers were accompanied by N. T. Zuver, President of the Harqua Hala Minerals Corp., and B. M. Snyder, consulting engineer for the corporation. Supplemental geologic data were obtained on November 8 to 10, 1954, when Bryner revisited the property with J. N. Faick, Geological Survey.

ACKNOWLEDGMENTS

The writer wishes to thank N. T. Zuver for cooperating with the examining engineers. He acted as guide and loaned several maps not included with the application. Numerous published and unpublished reports on the Bonanza and Golden Eagle mine that are listed as references in the Geologic Report of these investigations, were the source of much pertinent information.

LOCATION AND ACCESSIBILITY

The properties of the Harqua Hala Minerals Corp. on which exploratory work was proposed are situated in secs. 23 and 27 of unsurveyed T. 4 N., R. 13 W., Ellsworth mining district, Yuma County, Ariz. (figure 1). They include an area at the Bonanza mine and an area at and adjacent to the Golden Eagle mine.

The Bonanza mine is approximately 8 air-miles south of Salome, a village on U. S. HIghway 60, and the Atchison, Topeka and Santa Fe railroad. It is accessible from Salome, by graded dirt roads that contain no excessive grades, by traveling south on the Buckeye road for 0.2 mile to a junction with a road branching to the right, and thence on the latter road 8.7 miles to the Bonanza mine. The Golden Eagle mine and the adjoining New Yorker claims are about 1 mile northeast of the Bonanza by unimproved roads.

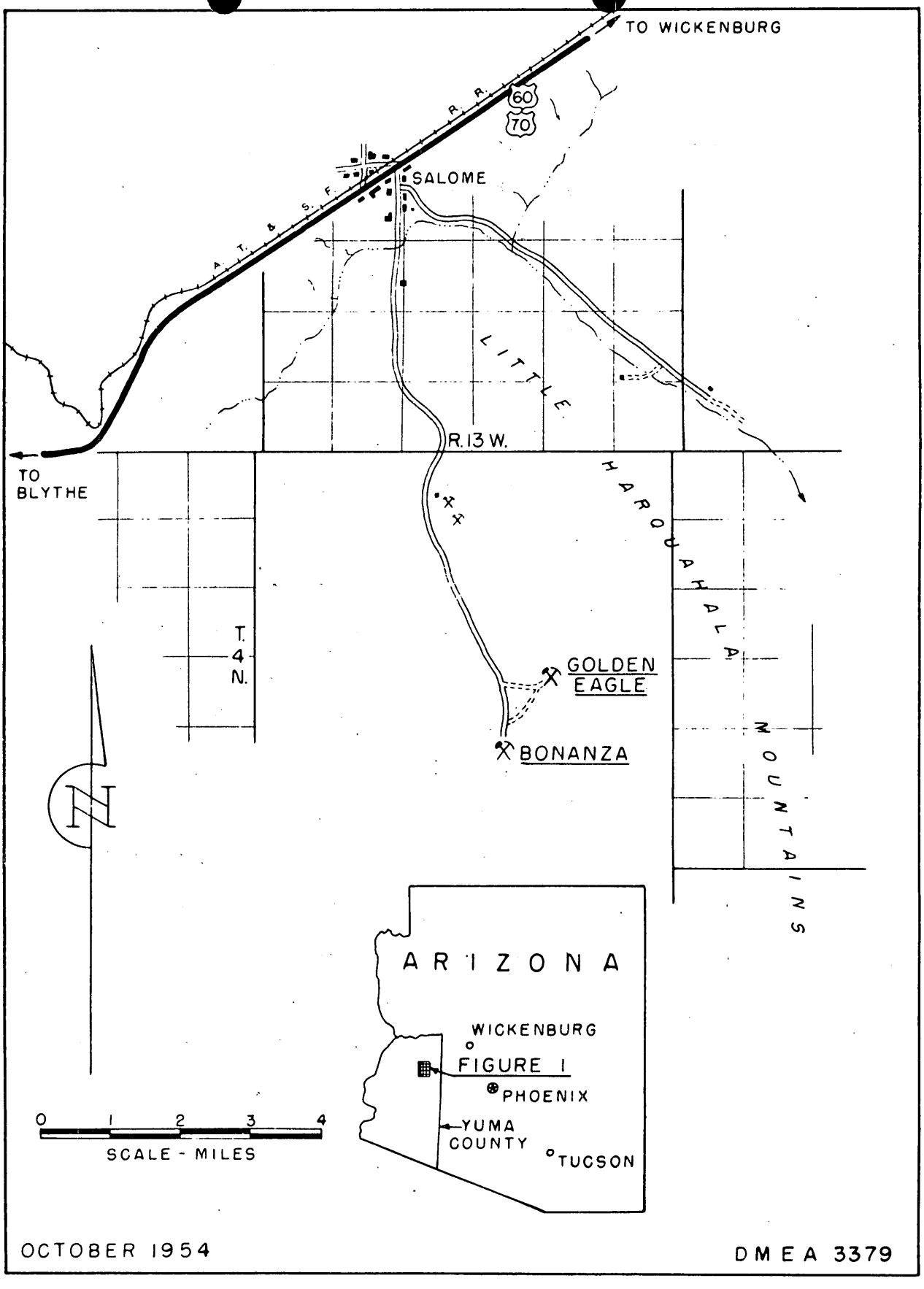

FIGURE 1. - LOCATION MAP - HARQUA HALA MINERALS CORP.
YUMA COUNTY, ARIZONA

PHYSICAL FEATURES AND CLIMATE

The Bonanza and Golden Eagle mines are in the southwestern portion of the Harquahala Mountains. The Bonanza is at the northwestern base of Martin Peak and the Golden Eagle, about 1 mile to the northeast, is at the base of a low ridge. Both mines are at an altitude of about 1,800 feet. The mountains near the mines are small, deeply eroded, and flanked by desert plains.

The climate is characteristic of the lower regions of southern Arizona. Summers are hot with maximum temperatures of 114° F. Fall, winter, and early spring, a period of 6 or 7 months, are pleasant with temperatures seldom falling below 20° F. Precipitation is confined to occasional heavy rainfalls during the summer and infrequent showers during the winter.

Vegetation is sparse, being confined to cacti and desert shrubs except along water courses where a few small trees grow.

There are no permanent streams in the area. Water is obtained from wells and from mine workings at depths of about 200 feet below the surface.

HISTORY AND PRODUCTION

Wilson[1/] says the following about the history and production of the Bonanza and Golden Eagle mines to 1934:

1/ Wilson, E. D., Cunningham, J. B., and Butler, G. M., Arizona Lode Gold Mines and Gold Mining, Arizona Bureau of Mines, Bull. No. 137, pp 128-130.

"The Bonanza and Golden Eagle veins were discovered in 1888 and sold to Hubbard and Bowers who organized the Bonanza Mining Company. It is reported that a clean-up worth $36,000 was made from a week's run of a small amalgamation mill. A 20-stamp amalgamation mill, erected in 1891, made an estimated production of $1,600,000 in bullion within three years.

"In 1893, the Harqua Hala Gold Mining Company, Ltd., a British syndicate, purchased the property for $1,250,000, remodeled the mill, and sank a new shaft. During 1895, a 150-ton cyanide plant was built to treat the accumulated tailings which ran from $3 to $5 per ton. Both the ore body and the tailings dump were exhausted by the end of 1896, and the mine was sold back to Mr. Hubbard in 1899. The total production by the British Company amounted to $750,000 in bullion, of which about $125,000 was profit.

"After a few months' operation, the mines remained idle until 1906 when the Harqua Hala Mining Company was organized. By the end of 1908, this company produced about $53,000 in gold bullion, at little or no profit.

"From 1913 to 1916, the Yuma Warrior Mining Company produced $30,000 from the mines and $19,000 from tailings.

"A small production, chiefly by lessees, was made from 1922 to 1933, * * * *. The total production from the Bonanza and Golden Eagle mines amounts to about $2,500,000.

"Early in 1934, the Bonanza mine was under lease to the Harquahala Gold Mines Company, but no underground work was in progress. W. L. Hart and associates treated about 1,000 tons of the old Harquahala mill tailings by leaching and cyanidation, but suspended operations in April, 1934. Lessees made a small production from the Golden Eagle mine."

The Bulletin from which the above quotation was taken contains the following record of production from the Bonanza and Golden Eagle mines. Values for gold are at $20.67 per ounce.

Year	Price of lead	Lbs. lead	Ounces gold	Gross value	Remarks
1891-1893	- - -	- - -	77,407	$1,600,000	Hubbard and Bowers (est.)
1893	- - -	- - -	6,410	132,500	Harqua Hala Gold Mining Company,Ltd.
1894	- - -	- - -	13,148	271,775	Harqua Hala Gold Mining Company, Ltd.
1895	- - -	- - -	6,803	140,615	Harqua Hala Gold Mining Company, Ltd.
1896	- - -	- - -	4,053	88,778	Harqua Hala Gold Mining Company and lessees.
1897	- - -	- - -	5,721	118,262	Harqua Hala Gold Mining Company and lessees.
1898	- - -	- - -	149	3,070	Harqua Hala Gold Mining Company and lessees.
1899	- - -	- - -	484	10,000	Hubbard (est.)
1907	- - -	- - -	1,449	29,960	Harqua Hala Mining Company
1908	- - -	- - -	1,113	23,000	Harqua Hala Mining Company
1914	- - -	- - -	919	19,000	Yuma Warrior Mining Company
1916	- - -	- - -	1,451	30,000	Yuma Warrior Mining Company
1922-1923	- - -	- - -	726	15,000	Lessees
1925	.087	55,000	73	6,285	Lessees on Golden Eagle
1926	.080	53,600	73	5,788	Lessees on Golden Eagle.
1928	.058	14,600	242	13,468	Lessees on Golden Eagle.
1929	.063	19,000	339	8,197	Lessees on Golden Eagle.
Total, 1891-1929	- - -	142,200	120,560	$2,510,698	

Since 1934, the Bonanza mine has been idle and activity at the Golden Eagle probably has been confined to recently terminated mining and milling operations by the Harqua Hala Minerals Corp. These operations, carried out over a period of several months during 1953 and 1954, consisted of several feet of drifting at the south end of the adit level and the milling of possibly 75 tons of lead oxide ore that had been mined by previous operators. The few tons of lead concentrate produced is stockpiled at the mill which was erected by the corporation.

There has been little or no production from the New Yorker claims which were located recently by the Harqua Hala Minerals Corp. During October 1954, the corporation was sinking a discovery shaft on one of the claims in an area that had previously been explored by numerous shallow pits, trenches and shafts.

PROPERTY AND OWNERSHIP

The applicant, N. T. Zuver, President of the Harqua Hala Minerals Corp., Room 1016, Story Building, 610 S. Broadway, Los Angeles 14, Calif., reported the following mining claims were held under Purchase Contract or Location by the corporation.

Under Purchase Contract from Bonanza and Golden Eagle Mining Company, Phoenix, Ariz.:

Patented claims: Gold Hill, Gold Mountain, Narrow Gauge, Gold Star, Grand View, Golden Eagle, Golden Belt, and Golden Ace.

Unpatented claims: Wedge and North pole.

Under Location by corporation (and included in application):

New Yorker No. 1, New Yorker No. 2, Quinn No. 1, and Quinn No. 2.

Figure 2 shows the locations of the above mentioned claims and other claims reportedly held by the corporation. A probable error in the name of one of the claims was found. Plat of U. S. Mineral Survey No. 1080 identifies the Golden Ace claim of figure 2 as the Golden Ark.

PRESENT STATUS

Bonanza Mine

Mine Workings

The principal exploratory and development workings of the Bonanza mine are an inclined 2-compartment shaft and 9 levels, of which levels 5 and 6 are connected with the shaft (figure 4). The other levels were driven from adits, winzes, and raises. The bottom, or 9th level is said to be a vertidal depth of 350 feet from the surface. Water stands at a few feet below the 6th level.

Exploitation of ore bodies has been by a glory hole and by numerous stopes that were worked by the open-stoping methods. Walls of stopes were supported, where necessary, with timber stulls. Little stoping was done below the 5th level.

Surface Plant and Equipment

The surface plant of the Bonanza mine comprises a headframe, a hoist house and adjoining bunk house, a shop building, a storage building, a powerhouse, and a cook house.

Equipment at the Bonanza mine consists of a 20 KVA generator driven by a 150 HP gasoline engine, a $1\frac{1}{2}$-inch centrifugal pump powered by a 5 HP motor, and a 360 C.F.M. compressor.

Golden Eagle Mine

Mine Workings

The principal exploratory workings comprise a 400-foot inclined shaft, approximately 1,200 feet of drifting on the 180-, 260-, and 300-foot levels, a 1,100-foot adit that crosscuts the 180-foot level at about 180 feet from its portal, and several crosscuts, raises and winzes (figure 5). Ore bodies have been exploited mainly by open stopes in which stulls were used to support the walls. Removal of shaft pillars in the stoping operations has left the shaft in bad condition at many places. The north 260-foot level and workings on the adit level were visited during the examination. Hazardous conditions prevented entry to other places. The present water level in the mine is reportedly at 100 to 150 feet vertically below the adit level.

Surface Plant and Equipment

Buildings at the Golden Eagle mine consist of a headframe, a change house, and a coarse and fine ore bin, each of about 25 tons capacity, located at the shed-like mill building.

Milling equipment consists of a 10-inch by 4-inch jaw crusher, an 18-inch by 6-inchHammermill, conveyors and feeders, 2 double deck vibrating screens, an 18-inch cone-type classifier,

a 6-foot diameter cone thickner, and 3 Gordon and Dunham Economy tables. Power for the mill is furnished by a 50 KVA generator driven by 6-cylinder Waukesha gas engine. Water for milling was hauled from a nearby well and stored in a 2,500-gallon tank. N. T. Zuver reported the mill capacity was less than 1 ton per hour.

Mining equipment consists of a single-stage gasoline-engine-powered compressor, a mine car, 2 jackhammers, a stoper, and installed track and pipe lines. Other equipment items on the property are a front-end tractor loader and 2 trucks.

New Yorker Group

Workings on the New YOrker group of claims consist of 3 shallow shafts and several shallow pits and trenches. Workings in the south half of the explored zone, the zone proposed for exploration, are shown on figure 6. Here the water table is at 45 feet and 30 feet from the collars of the most northerly and southern shafts, respectively. All of the workings are in granite.

There are no buildings on the property.

PROPOSED EXPLORATIONS

The following is the applicant's summary of proposed explorations and estimated maximum costs of work:

Bonanza Mine

Diamond Drilling	Estimated Costs Per foot	Total (Max.)
10 500-foot holes	$3.70	$18,500.00
2 1,000-foot holes	4.00	8,000.00
1 800-foot hole	4.00	3,200.00
		$29,700.00

Golden Eagle Mine

7 500-foot holes	$3.50	$12,500.00
2 1,000-foot holes	4.00	8,000.00
		$20,500.00

New York Claims

Churn drilling

3 500-foot holes	$6.00	$9,000.00

Exploratory Holes

6 150-foot d.d. holes	$3.70	$3,300.00
		$62,980.00

Equipment to be purchased	7,100.00
Rental of equipment furnished by applicant	4,500.00
Estimated total cost of project	$74,580.00

The estimated costs per foot were for churn drilling under contract and for diamond drilling to be done by the applicant with equipment to be purchased and to be furnished by the corporation on a rental basis. All drilling, except an 800-foot hole from the 4th level of the Bonanza mine to a hypothetical mineralized fault zone below a dry wash, was to be done from the surface. Initial drilling at the Bonanza and Golden Eagle mines was to be holes to a maximum depth of 500 feet. The holes were to be designed to test a single horizon at each mine at intervals of

100 feet along the strike. If initial drilling yielded good results, additional holes were provided for testing continuity of deposits at maximum depths of 500 and 1,000 feet. Definite locations of proposed holes were not shown on the applicant's maps.

DESCRIPTION OF THE DEPOSITS

Bonanza Mine

Wilson[2/] says the following about the Bonanza deposit:

"The deposit occurs within a zone of faulting that strikes northward and extends through the limestone, shale, and quartzite into basal granite. Its main shear zone dips 45° W. and is joined by a lesser fault that dips 45° E. The ore shoots that were mined in the "Castle Garden" stope occurred within these two shear zones and ranged from a few inches to many feet in width * * * , the several stopes of the mine occupied an A-shaped area about 500 feet long by some 450 feet wide on the south, all above the fifth or water level, which is 170 feet from the surface. In this part of the mine, the gangue consists of soft red hematite, with quartz, calcite, brecciated country rock, and a little gypsum. In places, large masses of gold occurred intimately associated with quartz. Very little silver was present. Below water level, the ore is pyritic. The granite, which appears on the sixth and seventh levels, shows intense sericitization. * * * * . The stopes are all on the first five levels."

The attitude of the main shear zone, known as the Iron vein, is variable (figure 4). At the north end, its dip flattens at the quartzite-granite contact, then steepens to almost vertical at places between the 8th and 9th levels. The dip at the south end appears to be flatter. The strike of the vein varies from northwest to almost due north. The 4 or more veins that reportedly comprise the main ore zone and converge with depth, intersect

2/ Previously cited in footnote 1.

near the quartzite-granite contact at about the 5th level. Thickness of the vein ranges from a maximum of 60 feet above the 5th level to an average of 1.5 feet on the 6th level, and an average of 3 feet on the 7th and 8th levels. The width of the Iron vein on the 9th level, which closely parallels levels 7 and 8, is not shown on available maps. The lesser shear zone mentioned by Wilson contained deposits variously referred to as the Castle Garden, Porphyry, Mill, and No. 2 vein. The Castle Garden stope is said to have been 300 feet long, and up to 120 feet wide, with an average width of 40 feet. Ore deposits of the zones have been classified as 2 types, replacement and filled fissures. Minerals observed in addition to those mentioned by Wilson were confined to copper oxides that occurred at a few widely scattered places.

Two samples were obtained on the 6th level from the most extensively copper mineralized zone observed. The samples, indicative of the grade of ore in a zone about 50 feet long, assayed as follows:

Sample	Width	Ounces per ton Gold	Ounces per ton Silver	Percent Copper
11429	10 inches	0.45	0.30	1.22
11430	36 inches	0.01	0.50	0.20

These samples and specimens from the Bonanza and Golden Eagle mines and the New Yorker claims were examined by LaMar Evans, petrographer, Bureau of Mines, Tucson, Ariz. His findings for the Bonanza samples and specimens follow: Sample 11429 -

"Microscopic examination reveals that this sample is fine-grained intergrowths of quartz and sericite in which the fracture planes are coated with chalcanthite, limonite, hematite, and sporadic grains of malachite. Qualitative test also indicates that the sample contains trace amounts of bismuth". Sample No. 11430 - "Examination of this sample shows that it is composed predominately of quartz and sericite in which a considerable number of enhedral pyrite crystals were observed. Some of the fracture planes are filled with chalcanthite and hematite. The pyrite crystals show very little alteration and appear to have been deposited contemporaneously with the quartz and sericite. The Chalcanthite is a secondary mineral having been deposited later." Sample No. 3379-A - obtained from 60 west Bonanza shaft on 6th level. This sample was found to be very similar in mineralogical composition to the above samples. Insofar as could be determined, no primary copper minerals or relic casts from copper minerals were observed.

A third type of deposit occurs in the Iron vein below the 6th level. Old reports describe 2 deposits of blue ore found on the 7th level. The deposits are believed to be composed of supergene copper sulfides, covellite and perhaps chalcocite. Maps indicate one of the deposits about 7 feet long and about 4 feet wide was bottomed between the 7th and 8th levels. The other deposit about 45 feet long increases in width from 10 feet on the 7th level to 16 feet on the 8th level. It reportedly bottomed abruptly just below the 8th level.

The possibility of uranium reserves, advanced during the investigations by N. T. Zuver, was investigated. Readings were taken at numerous places with a Geiger counter. Significant

radio activity was found only at one place where Mr. Zuver reported he had obtained his highest reading. It was confined to an area of a few square feet in the back of a short drift from the Iron shaft. A chip sample from this area assayed 0.04 percent equivalent U_3O_8, radiometrically, and 0.011 percent U_3O_8, chemically.

The applicant has assumed that another deposit occurs in the wash northeast of the Bonanza mine. The assumption was based on the occurrence of gold- and silver-bearing boulders in Johnson's Well (figure 4). The wash drains a mineralized belt that includes the Bonanza mine but does not follow the projected trend of known deposits.

Golden Eagle Mine

The principal vein strikes about north-south and dips 40° to 50° eastward (figure 5). It ranges from 2 to 5 feet in width on the 180 level. Above this level, portions of the vein have been stoped to the surface over maximum widths of about 15 feet. The main vein is roughly paralleled on the east and west by discontinuous mineralized shear zones. All veins above the 180 level are in quartzite except at the south end of the mine where the main vein enters limestone. The vein in limestone probably averages about 3 feet in width and 100 feet in length. Ore mineralization on the 260 level was encountered only in the main vein. Here the vein occurs at or near the contact of quartzite with granite. The width of the vein in the unmined zone probably averages less than 2 feet.

Mineralization in the granite is similar to that at the Bonanza except that evidence of copper was confined to a small specimen found on the iron-stained dump. Field evidence indicates that the specimen came from the lower workings. Reports state that 2 samples from the 300 level contained 0.25 and 4.84 percent copper, and some gold and silver. Mr. Evans found that the specimen was composed principally of quartz with some sericite, pyrite, covellite, chalcopyrite, and minor amounts of chalcocite, limonite, and yellow iron sulfate stains. Polished surfaces revealed that both the inclusions of pyrite and chalcopyrite represented primary deposition with the vein quartz. The covellite and minor amounts of chalcocite are secondary in nature, having been derived from the alteration of the chalcocite. Mr. Evans also examined 6 specimens of vein material from the 180 level. They were found to consist of intergrowths of quartz and hematite. Small quartz veinlets in 3 of the specimens contained sporadic grains of pyrite. One of these specimens, obtained near the south end of the mine, contained a small number of fine-grained crystals of calamine.

Examination of a specimen of mineralized limestone from the south end of the 180 level revealed chiefly calcite with some quartz, limonite, and trace amounts of pyrite, galena, and

cerussite. The calcite had a brownish color due to inclusions of limonite. A sample obtained from the mineralized zone assayed 0.2 percent copper, 0.38 percent lead, 0.2 percent zinc, and 0.10 ounce of silver and a trace of gold per ton.

New Yorker Group

The workings are in small widely scattered areas of marked iron and manganese staining. Within these areas, pyrite and copper oxides are confined to weak and discontinuous shear zones and fractures in the more highly altered portions of the granite country rock. The attitudes of the shear zones and fractures have a wide range.

Three specimens of the mineralized rock were examined petrographically. They were composed chiefly of quartz, sericite, altered feldspars, hematite, and limonite. Pyrite was noted in one of the specimens. Most of the hematite material was found to be pseudomorphic after pyrite. No evidence of primary copper mineralization was detected.

ORE RESERVES

Bonanza Mine

Evidence of more than trace amounts of copper mineralization in the Bonanza Mine is confined to the few observed widely scattered small deposits of oxidized ore, and the 2 deposits of sulfide ore presently under water. The indicated reserves, confined to the observed deposits, have been estimated at

possibly a thousand tons of material containing less than 1 percent copper, and 0.1 ounce gold and 0.5 ounce silver per ton. The reserves of sulfide ore are inferred to be about 1,500 tons containing 4 to 5 percent copper, and about one-half ounce of gold and silver per ton. Additional inferred reserves are confined to probable trace amounts of copper minerals that may be present in the lower parts of the deposit.

Uranium mineralization is not present in significant concentrations.

As to reserves of gold ore, it is of interest to note that private reports state that country rock around the mined-out oxidized zone contains from 300,000 to 4,000,000 tons of material containing $2.50 of gold per ton. The possibility of mining the ore by open-pit has been considered.

Golden Eagle Mine

The Golden Eagle mine contains no measured nor indicated reserves of copper ore, and an estimate of inferred copper reserves is not warranted because only trace amounts of copper minerals can be expected to occur at depth. However, the mine does contain an inferred reserve of about 4,000 tons of ore containing 3 to 6 percent lead, and 0.5 to 1.0 ounce of silver per ton.

New Yorker Group

Copper mineralization on the New Yorker group of claims is confined to several small and widely scattered zones, none of which contains more than a few hundred tons of rock assaying about 0.4 percent copper.

CONCLUSIONS AND RECOMMENDATIONS

It can be concluded on the basis of the following evidence that chances are unfavorable for the discovery of significant reserves of strategic minerals:

1. The extent of the Bonanza and Golden Eagle deposits decreases with depth and geological conditions indicate that the deposits are essentially bottomed by present workings.

2. Extensive exploration of both the zones of oxidation and enrichment at the above deposits, and the mineralogically similar deposits of the New Yorker property have resulted in the discovery of only a few small bodies of copper and lead mineralization.

3. The absence of both relic copper sulfide minerals and significant concentrations of secondary copper minerals in the zone of enrichment indicates that the deposits did not contain more than trace amounts of primary copper mineralization. On this basis, significant amounts of copper cannot reasonably be expected in the sulfide zones, the zones of proposed explorations.

4. There is no reason to believe that either the degree or extent of lead-silver mineralization at the Golden Eagle mine will attain significance with depth.

5. Other ore bodies that may exist in the area, such as the postulated deposit, probably will be similar to known ones.

6. Uranium mineralization is confined to trace amounts in widely scattered zones at the Bonanza mine.

For the above reasons, denial is recommended for Governmental participation on explorations at the Bonanza, Golden Eagle, and New Yorker properties.

OF THE INTERIOR
Minerals Administration
RED
JAN 27 1955

224 New Customhouse
Denver 2, Colorado

January 17, 1955

Memorandum

To: Administrator, Defense Minerals Exploration Administration
Attention: 200

From: Field Team, Region III

Subject: Report of Examination, DMEA Docket No. 3379, (Copper-Lead), Harqua Hala Minerals Corporation, Yuma County, Arizona

Enclosed are the original and three copies of the report pertaining to the above application.

We recommend that the subject application in the amount of $74,500.00 be denied because there is small possibility that significant amounts of copper and lead would be discovered as a result of the proposed exploration.

W. M. Traver

W. M. Traver

HMC:pw

E. N. Harshman

E. N. Harshman

Reviewed by
DMEA OPERATING COMMITTEE
1-31-55
(date)

TRANSMITTED

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JAN 27 1955

JAN 17 1955

January 6, 1955

Memorandum

To : W. H. King, Executive Officer, DMA Field Team

From : Superintendent, Southwest Experiment Station

Subject : Report on Docket DMA-3379, Marqua Hala Minerals Corp.'s Bananas (Marqua Hala), Golden Eagle, and New Yorker Copper-Lead Properties, Ellsworth Mining District, Yuma County, Ariz.

Enclosed are original and 8 copies of the section on Summary, Conclusions and Recommendations by L. Bryner of the Geological Survey and T. H. Remsle of the Bureau of Mines, and the section on Engineering by Remsle for the above report. A section on Geology already has been submitted by the Geological Survey.

The Marqua Hala Minerals Corp. applied to the Government for assistance in exploring these three properties for copper and lead ore, so T. H. Remsle of the Bureau of Mines and L. Bryner of the Geological Survey examined the properties in October 1954. As only small parts of the extensive mine workings were accessible and therefore the examiners recommendations would have to depend to a large extent upon geological reasoning, J. N. Faick of the Geological Survey also visited the properties with Bryner in November 1954.

It is the DMA examiners' opinion that no significant amounts of copper or lead ore would be discovered by the applicant's proposed exploration work, so they have recommended denial of any Government assistance. I concur with this recommendation.

Brochure is enclosed.

Walter R. Storms

Walter R. Storms

CC W. H. King (8)
J. N. Faick
DMA-3379
RF

WRStorms:frj

TRANSMITTED

JAN 17 1955

Date Rec'd JAN 7 1955

JAN 27 1955

BUREAU OF MINES
Denver, Colorado

Defense Minerals Exploration Administration
Denver Federal Center
Denver, Colorado

January 6, 1955

Memorandum

To: DMEA Field Team, Region IV

From: E. N. Harshman

Subject: DMEA Docket 3379: (copper-lead) Europa Hale Minerals Corporation, Bonanza, Golden Eagle and New Yorker properties, Mohave County, Arizona

Enclosed are the original and 8 copies of a geologic report by Leonid Bryner of the U. S. Geological Survey concerning the subject docket.

The report describes the geology of 2 mining properties and one claim group in the Kingsworth Mining District, Mohave County, Arizona. A significant gold production, with very minor amounts of copper and lead, has been reported from the Bonanza and Golden Eagle mines; no production is recorded from the New Yorker group of claims.

The principal ore zones are along fissures and shears in granite, quartzite, and limestone. Two small bodies of "blue ore" are reported to have been found between the 6th and 8th levels of the Bonanza mine and Bryner believes that similar bodies of secondary copper ore may exist at and slightly below the water table in the Golden Eagle mine. The lower levels of both mines are flooded and inaccessible. Minor amounts of oxidized lead ore are present along fissures in limestone in the south end of the Golden Eagle mine.

From data contained in numerous reports on the properties, and as a result of the field examination Bryner concludes: 1) that the small bodies of copper ore reported to have been found in the Bonanza and Golden Eagle mines are secondary, 2) that only very minor amounts of chalcopyrite are present along veins below the zone of secondary enrichment, 3) that the present workings have reached the bottom of the zone of ore deposition, and 4) that the reserves of copper and lead ore remaining in the Bonanza and Golden Eagle mines or on the New Yorker group of claims are insignificant.

Bryner recommends that the application for Government participation in an exploration program on the Bonanza, Golden Eagle and New Yorker properties, DMEA Docket 3379, be denied.

I concur in the recommendation.

E. N. Harshman

E. N. Harshman
Member, Field Team

Enclosures (9)

TRANSMITTED

JAN 17 1955

Box 4126 University Station
Tucson, Arizona

DEPARTMENT OF THE INTERIOR
Land Office, Phoenix, Arizona
Received
Date Received
JAN 1 1955
BUREAU OF MINES
Denver, Colorado

December 31, 1954

MEMORANDUM

To: A. H. Koschmann

From: J. H. Faick

Subject: BMEA 3379: Marqua Mala Minerals Corporation's Bonanza (Marqua Mala), Golden Eagle, and New Yorker properties; Ellsworth District, Yuma County, Arizona

Enclosed are the original and 8 copies of an application report of the above subject properties by Leonid Bryner. This report recommends denial of the application because geological conditions indicate that significant amounts of copper-lead ores do not exist in these well-known old gold mines.

I made a field inspection of these properties with Bryner and reviewed his report, and am in agreement with his conclusions.

The report has my approval.

J. H. Faick

JHFaick:ms
cc. Koschmann (8)
Storms

Department of the Interior
Defense Minerals Administration
RECEIVED
JAN 27 1955

UNITED STATES
DEPARTMENT OF THE INTERIOR
DOUGLAS McKAY, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

DMEA-2379, (COPPER-LEAD)

Barnes Hale Minerals Corporation

Barnes (Barnes Hale), Golden Eagle, and New Yorker Properties

Ellsworth Mining District

Yuma County, Arizona

Leonid Bryner, Geologist
U. S. Geological Survey

T. M. Ramsle, Mining Engineer
U. S. Bureau of Mines

December 1954

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

By Leonid Bryner[1] and T. N. Hanna[2]

In an application to the Defense Minerals Exploration Administration, dated May 28, 1954, H. T. Zuver, president of the Morgan Hale Minerals Corp., requested government participation in an exploration program estimated to cost $74,000 to explore for (1) copper at the Bonanza (Morgan Hale) mine and an adjacent porphyry deposit, (2) for copper and lead at the Golden Eagle mine, and (3) for copper at the Ken Korbar group of claims, all located 9 miles south of Kingman, Yuma County, Ariz. The application was docketed as DMEA-2179.

An examination of these properties was made during October 11-18, 1954 by T. N. Hanna of the U. S. Bureau of Mines and Leonid Bryner of the U. S. Geological Survey. The examiners were assisted by R. M. Snyder of the Union Engineering Company and H. T. Zuver. Another examination of the same properties was made on November 8, 9, and 10 by J. H. Feick and Bryner of the U. S. Geological Survey. The information gained in these examinations was augmented by eleven unpublished and four published descriptions and evaluations of the properties.

The three deposits described in this report are in minor zones or fractures that traverse the pre-Cambrian (?) granite basement rock, the Cambrian Bolsa quartzite, and the Devonian limestone and dolomite. The mineralized rocks have been gradually

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[1] Geologist, Geological Survey
[2] Mining Engineer, Bureau of Mines

folded and the syncline has been overturned to the south. Subsequent reverse faulting has thrust the sedimentary rocks in the upper limb of the syncline over the granite. This thrusting probably accounts for the fact that the upper parts of the Bonanza and Golden Eagle deposits are mainly in quartzite and the lower parts are in granite. In the New Yorker group the quartzite and limestone apparently have been removed by erosion and only the mineralized granite basement remains.

The Bonanza mine consists of an inclined shaft, an adit to the 4th level, ten levels spanning a vertical distance of about 300 feet, and extensive stoping between the 5th level and the surface. The mine is flooded to immediately below the 6th level. The mine is estimated to have produced gold valued from $2,500,000 to $4,000,000 (old price) between the years 1882 and 1928. Essentially all of this production was from free gold in quartz veins in the sheared and highly fractured Nolan quartzite. This ore averaged about one ounce of gold and one ounce of silver per ton. The copper content of most of this ore was very low and probably was due to trace amounts of chalcopyrite and to pyrite that possibly was cupriferous as well as auriferous. No base metals were recovered. Between 1913 and 1918 the Yuma-Warrior Mining Company in driving the 9th level extended the Bonanza workings to their present maximum depth. During the course of this work two small bodies of supergene covellite and chalcocite,

probably replacing chalcopyrite, were discovered on the 7th level, but apparently were bottomed above the 9th level. According to early reports, these two bodies averaged about 4 percent in copper and about 0.5 ounce of gold and 0.5 ounce of silver per ton.

After the Texas-Harrier Mining Company abandoned the Bonanza mine, the mine was re-examined by several parties for its possibilities as a large, low-grade gold mine and as a gold-silver-copper producer. However, none of these examinations led to reactivation of the property. Two samples of the main vein taken on the 6th level by the examiners indicated a maximum grade of copper of about one percent, together with up to 0.5 ounce of gold and 0.5 ounce of silver per ton. The ore consisted of copper oxides associated with pyrite. The possibility of uranium reserves, advanced by the applicant during the field examination, was investigated. A sample from a small and comparatively highly radioactive zone was found to assay 0.011 percent U_3O_8, chemically.

The Golden Eagle mine, which is located about a mile northeast of the Bonanza, consists of an inclined shaft about 400 feet long, an adit to the 100 level, a 253 and a 300 level, and stopes mainly above the 100 level. The lowest, or 300 level is inaccessible, and the bottom 60 feet of the shaft is under water. Data on the production and grade of ore from the Golden Eagle mine is much less complete than in the case of the Bonanza mine. The

total value of ore produced from the Golden Eagle is estimated at $200,000, based on the old price of gold. There is no basis for judging the grade of this ore except its geologic similarity to the Bonanza ore. On this basis most of the Golden Eagle ore contained about the same amount of gold and silver as the Bonanza ore. However, the south part of the Golden Eagle mine where the veins on the 100 level and at the surface intersect and penetrate a short distance into the Devonian beds, produced about 142,000 pounds of oxidized lead ore. The grade of this lead ore likewise is problematical but may have been on the order of 3 to 6 percent lead and 0.5 to 1 ounce of silver per ton. Apparently copper was never recovered from the Golden Eagle mine although supergene copper sulphides are reported on the lower levels.

The New Yorker group consists mainly of three shallow shafts and about half a dozen small pits or trenches about 1,500 feet north of the Golden Eagle mine. Probably not more than a few tons of low grade copper ore, of a type essentially like that in the levels in granite at the other two mines, have been produced from the group, and there are no recorded shipments.

All of these deposits are classified as the mesothermal type. Lithologic control has been important in localizing the ore. Vein deposition was by far the greatest in the quartzite. Primary copper minerals seem to have reached their maximum concentration in the granite. Lead deposits are confined to the Devonian limestones and dolomites. The hypogene solutions were deficient

in base metals judging from the small amounts of copper and lead as compared to gold. Though the deposits probably are genetically related to one or more intrusive bodies, the only evidence of such intrusions near the mines is in a few andesitic fragments in a dump near the Bonanza mine and an 18-inch wide andesitic (?) dike in a wash east of the New Yorker group. The trend of the ore zones is such that their extensions would not be expected in the area of the prevalent deposits.

The reserves of copper ore in the Bonanza mine are mainly in the two supergene bodies which are estimated to contain an inferred reserve of about 1,000 tons averaging 4 percent copper, 0.5 ounce per ton gold, and 0.5 ounce per ton silver. In the sulfide zone between the 4th and 6th levels, and in the hypogene zone below the 6th level the highest grade material probably contains on the order of 1 percent copper and ore of this grade probably does not extend 100 feet. At the Golden Eagle mine copper reserves are of the same type as at the Bonanza, but probably are smaller. At the New Yorker group there are perhaps a few hundred tons of rock averaging 0.4 percent copper, but most of the rock there is considerably lower grade than this. The inferred lead reserves of about 4,000 tons are believed to be confined to the north part of the Golden Eagle deposit. This lead ore might average 3 to 4 percent lead and 0.5 to 1 ounce of silver per ton.

The chief conclusions of the investigation are as follows:

1. The extent of the Kenneth and Golden Eagle deposits decreases with depth and geological conditions indicate that the deposits are essentially bottomed by present workings.

2. Extensive exploration of both the zones of oxidation and enrichment at the above deposits and the mineralogically similar deposits of the New Yorker property have resulted in the discovery of only a few small bodies of copper and lead mineralization.

3. The absence of both relic copper sulfide minerals and significant concentrations of secondary copper minerals indicates that the deposits, prior to leaching, did not contain more than trace amounts of primary copper mineralization. On this basis, significant amounts of copper cannot reasonably be expected in the primary sulfide zones, the zones of proposed exploration.

4. There is no reason to believe that either the degree or extent of lead-silver mineralization at the Golden Eagle mine will attain significance with depth.

5. Other ore bodies that may exist in the area, such as the postulated deposit, probably will be similar to known ones.

6. Uranium mineralization is confined to trace amounts at a few widely scattered points.

For the above reasons, we recommend denial of Governmental participation in exploration of the Kenneth, Golden Eagle, and New Yorker properties.

BONANZA (HARQUA HALA), GOLDEN EAGLE, AND NEW YORKER PROPERTIES

ELLSWORTH MINING DISTRICT

YUMA COUNTY, ARIZONA

(COPPER-LEAD)

DMEA 3379

GEOLOGY

By

Leonid Kryner

Geologist, U. S. Geological Survey

BONANZA (MANQUA MALA), GOLDEN EAGLE, AND NEW YORKER PROPERTIES

BELLMONTE MINING DISTRICT

YUMA COUNTY, ARIZONA

(COPPER-LEAD)

BMRA 3379

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ILLUSTRATIONS

Fig. 1 LOCATION MAP ..... See Engineering Report
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Table II SAMPLES - GOLDEN EAGLE MINE - 180 LEVEL 21

INTRODUCTION

In an application to the Defense Minerals Exploration Administration, dated May 28, 1954, Mr. E. T. Luver, president of the Bargun-Hale Minerals Corporation, requested government participation in an exploration program estimated to cost $74,500, to explore for copper and lead at the Bonanza (Bargun Hale) and Golden Eagle mines and on the New Yorker group of claims.

The properties of the Bargun Hale Minerals Corporation on which exploratory work was proposed are in Secs. 23 and 27 in unsurveyed T. 4 N., R. 13 W., Ellsworth Mining District, Yuma County, Arizona (fig. 1). The Bonanza Mine is accessible from Salome via graded dirt roads by traveling south on the Buckeye road for 0.2 mile to a junction with a road branching to the right, and then on this right-hand branch 8.7 miles. The Golden Eagle Mine and the adjoining New Yorker claims are about one mile northeast of the Bonanza via ungraded dirt roads.

The applicant states that the mining claims on which exploration is proposed are held partly by location and partly under purchase contract with the Bonanza and Golden Eagle Mining Company, Phoenix, Arizona. These claims and the applicant's title to them are shown in figure 2.

The present report summarizes the results of a geologic examination made during the week of October 11 to 15, 1954 by Leonid Bryner, and on November 8, 9, and 10, 1954, by J. H. Faick and Bryner, both of the U. S. Geological Survey. The engineering report is by T. M. Rosale of the U. S. Bureau of Mines, who examined the property with Bryner during October 11 to 15. On this first visit the examiners were assisted by B. M. Snyder of the Union Engineering Company and E. T. Luver. The

field work was more extended than usual because three properties were included in the application. Also, the large reported production of the Bonanza Mine indicated an important mining district which warranted an especially careful examination.

Examination of the properties was handicapped by the fact that the lower levels of the mines, where the copper values were reported to be, were inaccessible. However, this handicap was largely compensated for by the availability of a variety of old reports and maps from which it was possible to make a reasonable interpretation of the geology of the lower levels. Also, a microscopic examination for sulfide copper minerals in selected specimens, by Lester G. Evans of the Bureau of Mines was a great help in evaluating the nature and probable extent of copper mineralization on the property. In addition to these aids, a detailed geologic map of the area around the Bonanza Mine by Eldred D. Wilson of the Arizona Bureau of Mines made it possible to interpret the complex geologic setting of this mine.

The various sources of information used in this report are listed below:

<u>Published Material</u>

Bancroft, Howland, Reconnaissance of the Ore Deposits in Northern Yuma County, Arizona: U.S.Geol.Survey Bull. 451, 1911.

Walker, H.W., The Mines Handbook, vol. XXXI, p. 559, 1918, vol. XIV, p. 487, 1919.

Wilson, E.D., Cunningham, J.B. and Butler, G.M., Arizona Lode Gold Mines and Gold Mining: Arizona Bureau of Mines, Mineral Technology Series No. 37, Bulletin No. 137, 1934.

DeWolfe, W.P., Reopening Old Mines in Arizona: Mining and Engineering World, vol. 45, no. 8, pp. 329-331, 1916.

Unpublished Material

Wilson, E.B., Geologic map of the area around the Bonanza mine; scale: 1 in. equals 200 ft., about 1945.
Map of the fourth level of the Bonanza mine; scale: 1 in. equals 40 ft., April 11, 1945.

Mills, C. E., Report on the Bonanza mine; San Francisco, 1892.

Directors and Mine Managers' Reports for the financial year ending June 30, 1896; The Harquahala Gold Mining Co., Ltd.

Parish, T. E., Report on the Bonanza Mine; Phoenix, 1906.

Olson, E. J., Report on Bonanza and Golden Eagle mines, about 1915.

Norton, F.W., of S.C. Mulberry Co., N.Y., Report on the Bonanza and Golden Eagle mines for the Yuma-Warrior Mining Co.; about 1918 (?).

Tovote, W., Report on the Bonanza and Golden Eagle mines for H.W. Stevens, pres. Yuma-Warrior Mining Co., about 1917.

Carpenter, Miles et al, Report on the Bonanza and Golden Eagle mines (quoted in a report by R.M.Snyder), and maps of the levels and surface of the Bonanza mine, 1934.

Calvocoressen, G.M., assisted by C.C. Thompson, engineer and assayer at the mine, Report on the Bonanza and Golden Eagle mines, 1939.

Snyder, R. M. (Union Engineering Co.), Report on the Bonanza, Golden Eagle, and New Yorker group, about 1934.

Wicks, F. R., Report on the Golden Eagle Mine, for the Sunind Minerals Corp., March 27, 1952.

C. C. Thompson, formerly assayer at the Bonanza Mine, was interviewed, and offered some interesting information about the lower levels.

GENERAL GEOLOGY

The mineralized area covered in this report is in the south end of the Harquahala Mountains, also called the Little Harquahala Mountains (fig. 1), a southwest-trending range consisting mainly of pre-Cambrian (?) granite and Paleozoic sediments that have been intensely folded and faulted. The granite basement is exposed mainly in the lower

areas northwest of the mines (fig. 3). Overlying the granite is the late Cambrian Bolsa quartzite. This rock is gray to brown. Its base is coarse-grained to gritty and difficult to distinguish from the underlying granite because of a gradational zone of arkose between the granite and the quartzite. In general the quartzite is distinctly bedded and the beds are on the order of two or three feet in thickness. The top 50 feet, more or less, is shale or siltstone. Thickness of the Bolsa reaches a maximum of about 400 feet in places but generally it appears to be less than this. Trilobites found by Wilson are the basis for his dating this formation as late Cambrian.

The Bolsa is succeeded by dark gray, cherty limestone and dolomite which has been classified by Wilson as Devonian because of the corals found in it. A complete section was not seen, but in the geologic sections based on Wilson's map, the Devonian appears to be at least 400 feet thick.

A crystalline limestone of Pennsylvanian age with local cherty zones succeeds the Devonian. The Pennsylvanian appears to be about as thick as the Devonian.

Next in the stratigraphic column is a series of red beds tentatively classed by McKee and Wilson as the Permian Supai Formation.

The valley fill which lies north and west of the outcrops of the above rocks is a coarse, fairly well-cemented gravel that may be equivalent in age to the Gila conglomerate. Younger gravels occupy the washes.

The Paleozoic strata in which the Bonanza and Golden Eagle mines are located are overturned and dip moderately to steeply north or northwest. They are part of the upper limb of an overturned syncline

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Geologic setting.

Two lines of evidence indicate that the Iron Vein occupies a zone of shearing, though actual displacement along the zone was not recognized. First, there are salvages of gouge and local brecciation of quartzite in the zone, and secondly, the dips of the quartzite beds as shown in figure 3 differ rather strikingly on either side of the Iron Vein. Another major structural feature is the thrust fault that trends about east-northeast across the area and corresponds to the main contact between the Devonian and the Belsa. This fault apparently is offset in at least two places by normal faults more or less parallel to it but dipping in the opposite direction. As a result of this normal faulting the thrust plane is repeated in two places as the contact between the granite and the quartzite. These places are about 330 feet south of the main shaft and about 220 feet north of the main shaft. Because of this offsetting of the thrust fault, all the lower workings of the Bonanza Mine are in the pre-Cambrian granite, and the Belsa quartzite is in fault contact with the underlying granite. Another reverse fault, in this case trending northwest, and partly covered, separates the two largest outcrops of Belsa in the Bonanza Mine area.

No intrusives were seen in place in the vicinity of the Bonanza Mine. However on the dump from the Quinn shaft (fig. 3) a rock was seen that possibly corresponds to Tovote's andesite porphyry or Bunsroft's vogesite from this area. This rock is fine-grained and greenish. It contains altered hornblende (?) needles and scarce pyrite casts, and seems to be highly chloritized. Very probably this is a dike rock and is connected with an intrusive that underlies the deposit and is genetically related to it.

Mineralogy

Native gold is the ore mineral. The rich deposits of gold that were found in the part of the mine that is in the Belen quartzite are described second-hand since this part of the deposit has been worked out to the extent that none of this rich gold ore was in evidence during the examination. Quoting Bancroft (p. 105), "Very rich pockets of gold are reported to have been found in various parts of the mine, and the writer was shown a good part of a large nugget, the original specimen having been reported to be worth $10,000. This particular piece showed large bunches of gold intimately associated with quartz." Bancroft also says "The quantity of silver found in the ore is remarkably small."

Pyrite is the only obvious sulphide in the mine. It occurs in small, scattered cubes, most of which have been oxidized to limonite. The pyrite may be auriferous, because numerous samples cut by previous examiners across the Iron vein in the granite assay at least several dollars per ton in gold, although free gold is not evident. Galena was not seen in place but the writer saw a specimen of rich gold ore reported to be from the mine in which coarse grains of native gold and galena are scattered through coarsely crystalline quartz. Galena specimens were found on the dump of the Marqua Mala Extension about 1400 feet to the southeast. Chalcopyrite was not found in the mine, and the mine dump was searched unsuccessfully for evidence of chalcopyrite and supergene copper sulphides. Several of the reports, however, mention secondary enrichment on the lower levels of the mine,

and on the Golden Eagle dump some chalcopyrite, partly replaced by covellite and chalcocite, was found. This example of supergene enrichment was confirmed by the microscopic work of L. G. Evans of the Bureau of Mines. The main gangue mineral in the ore zone, by all reports, was quartz; probably a course-grained variety, devoid of banding or primary cavities. Visible quartz is scarce except at the Cuff Group (Golden Eagle Extension) fifteen hundred feet south of the Golden Eagle Mine; where, on the Cuff dumps some pieces of vein quartz up to 1 feet thick were observed. The scarcity of quartz on the Bonanza property is undoubtedly due to the fact that all of the quartz in the mine was milled as it all carried gold. According to Bancroft (p. 108), the gangue also contains calcite, but it probably is very subordinate to quartz except where the Iron Vein at its south end cuts limestone and dolomite. Bancroft also reports a little gypsum.

Of the metallic gangue minerals possibly the most significant is specularite since it indicates medium to high temperature conditions. However, only a very small amount was found along fractures in quartzite on the dump. Limonite, hematite and manganese oxides are common along the shear zones and give the mineralized zone its rusty appearance. Much of the iron oxide occurs as pyrite casts. Staining by malachite, azurite, and chalcanthite is rather widespread in the granite in the Iron Vein. In some places, as where USBM Sample No. 11429 was taken on the 6th level (fig. 4), the oxides are abundant, but taking the vein as a whole the copper oxides only occur as scattered traces.

Among the products of hydrothermal alteration, sericite is the most prominent. It occurs abundantly as fine-grained intergrowths with the quartz in the ore zone and it occurs abundantly in the granite surrounding the deposit. Chlorite and, in the granite, kaolin, have been mentioned in other reports as alteration products in the ore zone, but they are subordinate to sericite.

The Ore Deposit

The caved stopes shown in figures 3 and 4 indicate in a general way the surface outcrop of the main ore zone, known as the Iron Vein or No. 1 Vein. This outcrop trends northwest and dips about 45° southwest.

There are many local variations in the attitude of the Iron Vein as shown by the sections in figure 3. At the north end of the deposit the dip flattens at about the quartzite-granite contact. Then it progressively steepens with depth. In some places between the 8th and 9th levels it is vertical and even slightly reversed. At the south end of the Iron Vein the dip appears to be generally much flatter. From north to south along the vein the strike varies from northwest to about due north.

According to Tovote the Iron Vein consists of about 4 more or less parallel veins that converge and connect at depth. A little below the quartzite-granite contact, at the 6th level, there is only one vein (Sections, fig. 3).

The widths of the mineralized zones are reported to range from about 60 feet, presumably near the top of the deposit, to about one foot, in the lower levels. According to Carpenter the average width is 10 feet. On the 6th level, where the Iron Vein is entirely in granite, it is poorly defined since it contains practically no quartz. But the width of the

shear zone and sample widths indicate an average width of about 1½ feet. Samples on the 7th and 8th levels indicate an average vein width of about 3 feet.

Abutting from the west against the Iron Vein is a mineralized zone variously referred to as the Castle Garden, Porphyry, Mill, and No. 2 Vein. This ore zone is entirely within the quartzite. It does not show at the surface and it apparently terminates downward against the Iron Vein. Bancroft and some others call the Castle Garden an easterly dipping vein, but the stoping in it seems to indicate a more or less horizontal, pad-shaped body, localized at the intersection of the Iron and Castle Garden veins. According to Carpenter the Castle Garden Stope has an unbroken length of 300 feet, a width up to 120 feet and an average height of 40 feet. It is impossible to determine whether the Iron Vein Stope or the Castle Garden Stope contributed the most ore. In any case it seems likely that the Castle Garden and Iron Veins represent respectively two rather different bodies in the same deposit, corresponding to two types that Tovote descr bes from this mine: (1) irregular, roughly lenticular bodies approaching true replacement deposits, and (2) tabular bodies, approaching true fissure fillings.

According to several accounts two bodies of "blue ore" were encountered in the granite on the seventh level. The first of these was found about 10 feet south of the incline connecting the 7th level with the 6th and the 8th levels (fig. 4). It had a length of only about 7 feet along the drift, and was about 4 feet wide. This body apparently was bottomed between the 7th and 8th levels. About 30 feet south of this same incline another similar body was encountered (Section A-A',

fig. 3). According to available engineering reports this body is 45 feet long and 10 feet wide on the 7th level, its width increases down dip for a distance of about 30 feet to about 16 feet on the 8th level, and below the 8th the body bottoms abruptly. The meager indications of copper in the oxidized part of the deposit and the abrupt improvement in grade below the water table both indicate that these are bodies of supergene ore.

Lithologic controls have been important in this deposit. Almost the entire gold production came from ore in the Belen quartzite. Vein quartz also is almost entirely confined to the quartzite. On the other hand pyrite and copper oxides seem to have favored the granite; and where the Iron Vein in the granite has a few small pockets of quartz, as on the 6th level, the pyrite is more abundant in the quartz than in the granite. However, pyrite and copper oxides are not highly concentrated anywhere in the deposit. Chalcopyrite is even more scarce, and less is known about its distribution. But the occurrence of copper oxides, together with completely unaltered pyrite on the 6th level and above, suggests that some mineral other than pyrite contributed the copper that is in the copper oxides. That this mineral is most likely chalcopyrite is inferred from the fact that chalcopyrite was found on the Golden Eagle dump. From the relative scarcity of copper oxides in the quartzite as compared to the granite, it is also inferred that chalcopyrite like the pyrite favored the granite more than the quartzite.

The Devonian limestones and dolomites also seem to have exercised some control on mineralization, though this apparently was not a strong control and did not result in any important deposits. Bancroft states (p. 103) that small quantities of galena have been found replacing

dolomite in a shallow shaft located 500 feet southwest of the mine. Likewise, at the Iron Shaft (fig. 3) in the south end of the Iron Vein where it is partly in limestone, indications of lead occur mainly as cerussite.

Ore deposition has apparently favored the quartzite because of its competency as compared to the granite and limestone. The Iron Vein shear zone is quite thin and inconspicuous in the granite in the lower levels of the mine, and the same shear zone at the surface apparently feathers out abruptly where it enters the limestone. On the other hand, the intense deformation resulted in much fracturing in the brittle quartzite, making it relatively accessible to the ore-bearing solutions.

Bancroft explains the free gold in the deposit (p. 108) as follows: "The gold values found in the workings above water level have probably resulted from concentration in the zone of oxidation of the gold content of the pyrite . . . . To the writer it seems unlikely that such coarse gold would result from the oxidation of auriferous pyrite. It seems more probable that this gold was of hypogene origin.

The lateral limits of the two supergene bodies may be due to some type of fracture control that localized the supergene solutions, especially since no evidence of post-ore faulting was seen.

GOLDEN EAGLE MINE

The Golden Eagle Mine, which is located about a mile northeast of the Bessemer, consists of an inclined shaft about 400 feet long, an adit to the 180-level, a 263 and a 300 level, and stopes mainly above the 180-level. The lowest, or 300, level is inaccessible, and the bottom 60 feet of the shaft is under water. Figure 5 shows the Golden Eagle workings, the location of samples, and the geology on the 180

and 263 levels. This deposit is essentially like the Bonanza deposit, and the geologic setting of both mines is very similar.

It was at the Golden Eagle dump that positive evidence of covellite and chalcocite derived from chalcopyrite was found (p. 8). This same dump material showed pervasive, yellow, iron sulphate stains in much of the pyrite-quartz vein material that probably was obtained from the deepest workings. Near the south end of the mine, the vein passes into Devonian limestone, which was found to be weakly mineralized. Microscopic examination by Evans of specimens of the material from the limestone at the south end of the mine revealed pyrite, galena, cerussite, and a small amount of calamine in a calcite and quartz gangue. Hematite and manganese oxides also are present here. Copper oxides are less in evidence than at the Bonanza Mine.

On the basis of the value of ore removed, the Golden Eagle deposit probably is less than one-tenth the size of the Bonanza. Comparisons of the workings of the two mines also suggests that the actual difference in magnitude of the two deposits is on the order of about one to ten.

The veins seen at the Golden Eagle, like those in the lower levels of the Bonanza, are regarded as shear zones. The main vein, corresponding to the main drift on the 180-level dips 40° to 50° east, and trends about north. At the 180-level the vein is about 2 to 5 feet wide. Some of the stopes above this level extend to the surface, and appear to reach a maximum of about 15 feet in width. East and west of the main vein and more or less parallel to it, are one or two smaller, less continuous veins. On the 180-level the veins appear as thin, brown selvages along a zone of rusty-looking, highly fractured or somewhat brecciated quartzite.

Above the 180-level the veins are in Balsa quartzite except at the south end of the mine where they are in limestone. Between the 180-level and the 263-level the footwall of the main vein changes from quartzite to granite. According to Colvocoresses and Thompson the lower levels of this mine are entirely in granite. However, the relationship of the quartzite to the granite is not as well understood as at the Bonanza Mine. But it appears that this flooring of the quartzite by granite is the main controlling factor in gold deposition as it was at the Bonanza. It also is very likely that this deposit contains small bodies of supergene copper sulphides below or near the present water level. One report, that by F.W.Horton, mentions such a body. However, there is no reason to expect that such supergene enrichment would be any more extensive than it was at the Bonanza mine.

At the south end of the mine where the vein system passed into the Devonian limestone the veins are less regular and persistent than they are in the quartzite. In fact, the surface exposure of these same veins in the limestone shows that the fractures or shears which correspond to the veins die out in the limestone within 150 feet of where they enter the limestone. The persistence in depth of the veins in the limestone below the 180-level is not known because of the inaccessibility of the workings but a 60-foot winze from the 180-level suggests that the main vein extends at least 60 feet below the 180-level.

The ore in the limestone is different from that in the quartzite. It is an oxidized lead ore with some silver, but very little gold or copper. This change in character of deposit corresponds to the change in character of the country rock. But the chance of there being a large replacement deposit in the limestone seems poor. The argument against such a possibility rests on the fact that at the Iron Shaft at the Bonanza, and at the nearby Marquam Main Extension Mine (fig. 3), ore-bearing structures that pass into the Devonian limestone show the same change in ore as at the Golden Eagle and do not make any significant tonnage of lead or other ores. In other words, the ore solutions were probably deficient in base metals.

Some reports bring up the possibility of the existence of an extension between the Golden Eagle and Bonanza deposits. There is no evidence for continuous mineralization between the two mines, or even for a continuous structure between them. The veins at the Bonanza and Golden Eagle are oriented in such a way that the projection of either one would fall several thousand feet wide of the other deposit. There is a suggestion, however, in the distribution of the known deposits in the area, of a belt of mineralized ground along the southwestern flanks of the Little Marquam Main mountains (fig. 1). However, this is too broad a feature to be of any use in searching for extensions of the known deposits.

The possibility of another vein hidden beneath the wash northeast of the Bonanza mine is advanced by the applicant because of some boulders carrying gold and copper that were extracted from Johnson's well (fig. 4). This wash, however, drains the area that contains the

above-mentioned belt of mineralized ground, including the Bonanza deposit itself. It is not necessary, therefore, to postulate an undiscovered deposit in order to account for these mineralized boulders.

NEW YORKER GROUP

Figure 6 shows the main workings of the New Yorker group. These workings, consisting of three shallow shafts and about half a dozen small pits or trenches, are distributed in a north-trending belt about 1500 feet long. Only the south half of the belt is shown since it contains all the largest workings and comprises the ground which the applicant proposes to explore. The water table is high here: 45 feet below the collar in the most northerly shaft, and 30 feet below the collar in the most southerly shaft.

The country rock is the pre-Cambrian granite that was encountered in the lower workings of both the Bonanza and Golden Eagle mines. A very fine-grained dike, 18 inches wide, was found in the arroyo northeast of the mapped area. This is the only direct evidence of an intrusive that might be genetically related to the sulphide mineralization here.

The mineralogy and alteration is essentially the same as in the granite at the Bonanza Mine, and includes one small showing of specularite. Microscopic examination by Evans of three specimens of the mineralized rock found no sulphide or sulphide relics other than pyrite. However, copper oxide staining was noted in half of the workings.

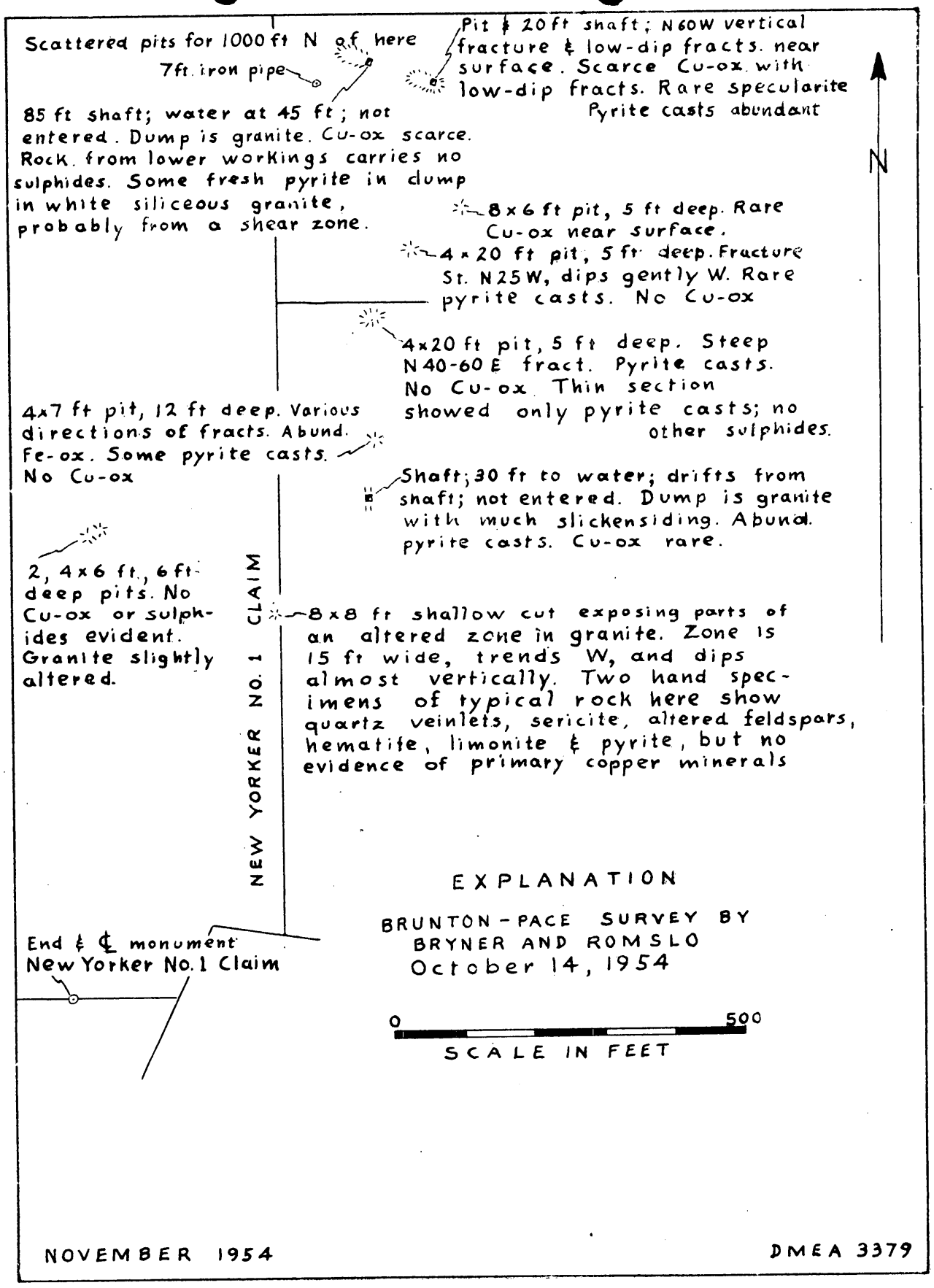

FIGURE 6.- MAIN NEW YORKER WORKINGS, YUMA CO., ARIZ.

The workings generally are in areas where iron and manganese oxide staining is most marked. Within these areas the pyrite and copper oxides show an affinity for small shear zones or fractures in the granite where alteration is more prevalent than in the surrounding rock. The shear zones and fractures are variously oriented and dip vertically to almost horizontally. Many of the fractures and shear zones show slickensiding.

PRODUCTION AND GRADE

All references to production from the Bonanza and Golden Eagle mines are in terms of the old price of gold ($20.67). The values of ore produced are almost entirely due to gold content. No production is recorded for the New Yorker group.

There is quite a remarkable range in the production figures. The highest figure is $4,000,000, given by Tovote. This refers to production as of about 1917. Bancroft in his 1911 report (p. 105) gives a figure of $3,631,000. The Arizona Bureau of Mines figure for production up to 1929 is $2,510,698. This last figure is the total of the year to year figures shown in the following table, reproduced from Arizona Lode Gold Mines and Gold Mining, p. 189.

TABLE I

PRODUCTION-BONANZA (HANGUAKALA) AND GOLDEN EAGLE MINES

(Data compiled by J. B. Tenney).

Year	Price of Lead	Lbs. Lead	Ounces Gold	Gross Value	Remarks
1891-1893	....	.....	77,407	$1,600,000	Hubbard and Bowers (est.)
1893	....	.....	6,410	132,500	Marqua Hala Gold Mining Company, Ltd.
1894	....	.....	13,148	271,775	Marqua Hala Gold Mining Company, Ltd.
1895	....	.....	6,803	140,615	Marqua Hala Gold Mining Company, Ltd.
1896	....	.....	4,053	83,778	Marqua Hala Gold Mining Company and Lessees
1897	....	.....	5,721	118,262	Marqua Hala Gold Mining Company and Lessees.
1898	....	.....	149	3,070	Marqua Hala Gold Mining Company and Lessees.
1899	....	.....	484	10,000	Hubbard (est.)
1907	....	.....	1,449	29,960	Marqua Hala Mining Company
1908	....	.....	1,113	23,000	Marqua Hala Mining Company
1914	....	.....	919	19,000	Yuma Warrior Mining Company
1916	....	.....	1,451	30,000	Yuma Warrior Mining Company
1922-1923	....	.....	726	15,000	Lessees.
1925	.087	55,000	73	6,285	Lessees on Golden Eagle.
1926	.080	53,600	73	5,788	Lessees on Golden Eagle.
1928	.058	14,600	242	13,468	Lessees on Golden Eagle.
1929	.063	19,000	339	8,197	Lessees on Golden Eagle.
Total, 1891-1929	....	148,800	120,560	$2,510,698	

According to Hicks there has been no notable production from the Golden Eagle for about 20 years. He estimates that a total of $800,000 worth of ore was taken from the mine.

The grade of the ore produced from the Bonanza mine was about 1 ounce of gold per ton, as calculated from Colvocoresses' estimate of the tonnage of tailings at the Bonanza and using a production value of $2,500,000. This grade estimate agrees essentially with Norton's figure

for grade derived from a production of 59,875 tons that yielded $9.90 per ton but resulted in tailings that assayed $10 to $20 per ton.

An old assay map furnished by E. D. Wilson shows that gold values persist through most of the 7th and 8th levels. About 100 samples on the 8th level and about 77 on the 7th level are shown. A numerical average of these samples is about $12.33 per ton for the 7th level and about $19.73 per ton for the 8th, and the average width of sample on each level is about 3 feet. The 9th level map shows only two assays, $10.00 and $6.00 per ton, and these are almost under the larger of the two supergene bodies.

According to Colvocoresses the ore at the Bonanza contained about one ounce of silver for each ounce of gold.

Data on which to base grade estimates of the gold ore produced from the Golden Eagle is lacking. But the ore there probably was of about the same grade as at the Bonanza.

There is no recorded copper production from either the Bonanza or the Golden Eagle Mine, and apparently copper was not recovered from the ores. However, the grade in copper of the shear zones in the flooded levels of the Bonanza and Golden Eagle mines probably is good in the zones of supergene enrichment but poor in the underlying hypogene zones. The deepest accessible copper showings are on the 6th level of the Bonanza Mine. Two samples of the vein in the granite on the 6th level were taken by the examiners. These samples were chosen to show the tenor of ore in the most promising looking places on that

level, that is, where the Iron Vein shear zone shows the most copper oxide and the most sulphide (pyrite). The location of these samples is shown in figure 4. The assays were as follows:

Sample	Width	Au.	Ag.	Cu.
U.S.B.M. 11429	10 inches	0.45 oz./ton	0.30 oz/ton	1.25%
U.S.B.M. 11430	36 inches	0.61 oz./ton	0.50 oz./ton	0.80%

Assays are given by Thompson and Carpenter for the two supergene bodies on the 7th and 8th levels of the Bonanza Mine. The body ten feet south of the incline (p. 10) averaged $44.00 Au., 7.4 oz. Ag., and 5.28 percent Cu. on the 7th level where it was sampled. The body on the 7th level 80 feet south of the incline (p. 10) assayed about $12 in gold, but the copper and silver values are not given in any of the reports. Norton's report states that on the 8th level the ore in the larger body assayed $13-35 in gold and 4-5% copper, over a width of 16 feet. Tovote, presumably referring to the 7th and lower levels, estimates an average copper content of 2 percent. However, he does not give any sample data supporting this estimate beyond mentioning that assays as high as 7 and 12 percent copper had been made.

Information on the copper content in the lower levels of the Golden Eagle is even more scant than at the Bonanza. Tovote says: "Base metals are even more pronounced in the Golden Eagle ore, but here, I understand, the copper is not as prominent and in its place more pyrite is found in the lower levels. Bancroft (pp. 108 and 109) reports two samples

(of unspecified width) from the 300 level assayed 0.25 and 4.84 percent copper, 1.32 and 2.88 ounces of silver per ton, and 0.48 and 1.12 ounces of gold per ton.

Since 1925, according to the table on page 18, 142,000 pounds of lead were produced from the Golden Eagle Mine. The grade of this ore is not indicated in any of the reports. Fourteen samples in the lead-bearing part of the mine (fig. 5) by Wicks, Zuver, and Snyder gave a numerical average of 6.38 percent lead. Only two of these samples carried copper and these assayed 0.26 and 0.10 percent copper. The numerical average for silver was 1.33 ounces per ton and for gold 0.05 ounces per ton. The assays of the various samples are as follows:

TABLE IX

SAMPLES - GOLDEN EAGLE MINE, 180 LEVEL

W= sampling by Wicks
Z= sampling by Z.T.Zuver
S= sampling by S.M.Snyder (Union Engineering Co.)
U.S.B.M.=sampling by U. S. Bureau of Mines.

No.	Description	Au. Oz.	Ag. Oz.	Cu. %	Total Pb. %	Sulfide Pb. %	Total Zn. %
W-1		0.01	0.22	0.25	4.82	-	-
W-3	4 ft.	0.08	0.42	-	2.96	-	-
W-4	8 ft.	0.03	0.93	-	nil	-	-
W-5		0.09	0.79	-	8.80		
W-7	3 ft.	0.04	0.86	-	2.23		
W-8	Stope Face	0.10	1.00	0.10	11.45		
W-13	Check Sample between W-1 & W-7	0.04	0.64	nil	1.00		
Z-1	Across back	0.07	0.31	-	4.32		
Z-2	Across back	0.09	1.07	-	17.88		
Z-3	8 ft.	0.06	0.92	-	14.04		
Z-3A	6 ft.	0.06	0.86	-	8.42		
Z-4	6 ft.	0.05	0.67	-	6.15		
Z-5	Across back	0.01	10.22	-	2.59		
Z-6	Same as W-5	0.08	nil	-	5.07		
S-1		0.03	0.18	-	1.08		
U.S.B.M. 11431				0.02	0.24	0.14	0.2

There is some doubt as to the reliability of this sampling, because of the discrepancy between U.S.Bureau of Mines sample 11431 and W-1. Also, Z-6 does not check with W-5, and S-1 does not check with W-3. However, since the Golden Eagle Mine has produced lead on a small scale, it is likely that the ore will average at least several percent lead, and probably, by selective mining, rather high grade lead ore can be obtained.

The possibility of uranium reserves at the Bonanza Mine was brought up by H. T. Zuver during the field examination. Zuver claimed that indications of high radioactivity were obtained on the property. To check on this, a sample was taken in a short drift about 30 feet southwest from the Iron Shaft (fig. 4), and about 20 feet below the collar, in the zone where the highest radioactivity had been recorded. This sample, U.S.B.M. 11468, gave a radiometric assay of 0.04 percent equivalent U_3O_8, and a chemical assay of 0.011 percent U_3O_8. The uranium potentialities of the Bonanza Mine appeared insignificant and the investigation was not pursued any further.

Probably not more than a few tons of ore have been produced from the New Yorker group. At the most northerly shaft shown in figure 6 there are signs of an attempt to recover copper by leaching the mined rock. The applicant sampled the dumps of four of the main workings in the New Yorker group. These samples have a numerical average as follows:

Au.	Ag.	Cu.
0.015 oz./ton	0.6 oz./ton	0.3%

These assays probably are representative of the more highly mineralized parts of the New Yorker mineralized belt. But considering the belt as a whole for a large low grade operation, even these assays would be considerably higher than the overall grade of the rock.

EXPLORATION

Exploration work in the lower part of the Iron Vein by the Yuma-Warrior Mining Co. from 1913 to 1918 was abandoned at the 9th level. It was this company that sunk the levels below the 6th and discovered the two supergene ore bodies. An account of these discoveries in Mining and Engineering World before the 9th level had been driven concludes on an optimistic note (p. 331):

> "The work thus far done having demonstrated the presence of extensive ore bodies in the new workings along the strike of the 'Bonanza' vein, the company is planning for more aggressive mining and milling operations. These plans include the sinking of a 3-compartment vertical shaft, and the addition of concentration and flotation units to the 40-stamp mill to reclaim the gold, silver and copper contents of the sulphide ore, as the present amalgamation plant is capable of treating only the oxidized ore exposed in the upper levels.

Several observations suggest that the supergene copper ore as well as the gold ore was bottomed by the 9th level: (1) the lack of any assays showing copper values on the 9th level, (2) only two samples of gold on the 9th level, and these showing low values, (3) the habit in supergene ore of a rather short vertical range, possibly commensurate with the distance between the 7th and 9th levels, (4) the fact that the 9th level parallels the 7th and 8th suggesting that the Iron Vein shear zone was located and followed without, however, finding any appreciable copper or gold ore, (5) the abandonment of the mine after the 9th level had been driven, (6) the continued idleness of the mine after a detailed

examination by Miles Carpenter, G. C. Thompson and others in 1934, when the price of gold had gone up and low labor costs prevailed.

During the early history of the Bonanza Mine an attempt was made to find a southerly extension of the Iron Vein. For this purpose the Quinn shaft (fig. 3) was sunk. It reached a depth of 356 feet. According to Farish three drifts were driven from the bottom of the shaft and one of these, a westerly trending one, cut the Iron Vein, revealing a 20-foot width of vein. A thirty-five feet winze was sunk on the vein. A general sample of the winze gave $6.40 in gold. According to Farish the vein was nearly vertical here. However, since the Quinn shaft was begun west of the apex of the westerly dipping Iron Vein, it would have to pass through the Iron Vein before a westerly drift from the shaft would intersect the vein. So there is good reason to question that the vein cut by the drift from the Quinn shaft is the Iron Vein.

The exploration work proposed by the applicant consists of diamond drilling the Bonanza and Golden Eagle deposits at depth, and churn drilling the New Yorker group. Total estimated footage for diamond drilling was 14,800, and for churn drilling, 1500. Hole depths were estimated as between 300 and 1000 feet.

RESERVES

The reserves of copper ore in the Bonanza Mine are considered here as being confined essentially to the two supergene bodies between the 7th and 8th levels that have already been described (pp.10 and 11). As this ore is inaccessible there is a large element of uncertainty as to its dimension and grade and consequently these two bodies are classed as inferred ore. Together they are estimated to

contain 1500 tons having an average grade of 1/2 ounce per ton gold, 1/2 ounce per ton silver, and 4 percent copper.

There undoubtedly are primary copper minerals in the lower parts of the deposit, but these are thought to be in trace amounts and therefore do not warrant a reserve estimate. Above the 6th level there are traces of copper oxide, and in a few places, as shown by U.S.B.M. sample 11489, the rock may average about one percent in copper. In the oxidized zone, between the 6th and the 4th levels, where the vein is almost entirely in granite, there is possibly one thousand tons of material averaging less than one percent in copper. The highest grade part of this material, averaging perhaps one percent copper and 1/2 ounce of gold and 1/2 ounce of silver per ton, probably does not exceed 100 tons.

The gold in the lower workings appears to be much more generally distributed in the vein than does the copper. However, gold reserves are not pertinent to this report and so no estimate of them is attempted. For the same reason, gold reserves in the oxidized part of the mine are not estimated. However, it is interesting to note that most of the private reports on the Bonanza Mine viewed it as a potential large, low grade gold deposit in which the tonnage would come from open pit mining of the country rock around the mined-out veins in the oxidized zone. Calvescresce estimated that there are from 300,000 to 4,000,000 tons of rock that averages $2.50 in gold (new price) left in the mine.

There is no basis for reserve estimates of copper in the Golden Eagle Mine. However, considering the similarity between the Bonanza and Golden Eagle deposits, and the smaller size of the Golden

Eagle, it is likely that copper reserves in the Golden Eagle are less than in the Bonanza. The Golden Eagle Mine probably contains some reserves of lead ore, but the erratic results of sampling and the lack of records of the grade of the ore produced greatly limit the reliability of any estimate of the lead content of this deposit. The main vein in the limestone below the 180 level might average 3 feet in width, and attain a depth of 120 feet; the depth to which the vein has been mined in the granite. The vein is exposed along its strike for 110 feet on the 180 level. These dimensions give an inferred reserve of about 4,000 tons of lead ore. This rock might average 3 to 6 percent lead and 1/2 to 1 ounce of silver per ton. Its gold, copper and zinc content are probably very low, as indicated by the sample records on page 21.

The New Yorker group would have to be considered in its entirety to obtain an estimate of any significant tonnage of copper ore. There are perhaps a few hundred tons of rock averaging 0.4 percent copper, but the copper content of the group as a whole would probably be less than 0.1 percent or too low grade to be considered ore or even potential ore.

CONCLUSIONS AND RECOMMENDATIONS

All the evidence points to supergene enrichment as the cause of any appreciable copper values in the lower levels of the Bonanza and Golden Eagle mines. Primary copper, mainly in the form of chalcopyrite, probably existed in the upper parts as well as in the lower parts of the deposits in very low concentrations as indicated by the weak copper oxides now in the oxidized zone. There is

no reason to believe that these primary ores increase at depth. Geological indications as to the nature of the deposits at depth suggest that they have been bottomed by the present workings, an interpretation which is substantiated by the production history of the Bonanza and Golden Eagle mines. The very small copper reserves of the Bonanza Mine and the lead reserves of the Golden Eagle Mine constitute the only strategic potential of these two mines, and this potential is insignificant from the standpoint of tons of reserves. The New Yorker group as a whole contains copper only in trace amounts.

We recommend that government participation in exploration of the Bonanza, Golden Eagle and New Yorker properties be denied because there is no reason to believe that significant amounts of copper or lead would be discovered on these properties.

DUGA-ZEPH, (COPPER-LEAD)
MARQUA HALA MINERALS CORPORATION
BORIANLA (MARQUA HALA), GOLDEN EAGLE AND NEW YORKER PROPERTIES
BILLSBORO MINING DISTRICT
YUMA COUNTY, ARIZONA

Engineering Report

By T. M. Rennie
Mining Engineer
U. S. Bureau of Mines

December 1964

E-MLA-1379, (COPPER-LEAD)
HANGUA HALA MINERALS CORPORATION
DUNANCA (HANGUA HALA), GOLDEN EAGLE AND NEW YORKER PROPERTIES
ELLSWORTH MINING DISTRICT
YUMA COUNTY, ARIZONA

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1	Location map	2
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4	Dunanca mine	" " "
5	Golden Eagle mine	" " "
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INTRODUCTION

The Marquez Dale Minerals Corp. applied to the Defense Minerals Exploration Administration for governmental aid, as authorized by the Defense Production Act of 1950, for exploration of its property in Yuma County, Ariz. The application was reviewed, docketed as DMEA-3378, and sent to the field team of Region IV with a request that the property be examined.

Exploratory work proposed by the applicant consisted of testing for (1) copper and radioactive ores below existing workings of the Donnem (Marquez Dale) mine, (2) copper and lead mineralization below existing workings of the Golden Eagle mine, (3) copper mineralization at depth on the New York claims, and (4) copper mineralization in a hypothetical fault zone near the Donnem mine. The total cost of the work, comprising shaft and diamond drilling, was estimated at $74,500.00.

Examination of the property with the object of determining if the applicant's proposed exploration warranted governmental assistance first was made on October 13 to 14, 1954 by T. M. Kanaly, Bureau of Mines, and L. Heyner, Geological Survey. The engineers were accompanied by M. T. Lever, President of the Marquez Dale Minerals Corp., and D. M. Snyder, consulting engineer for the corporation. Supplemental geologic data were obtained on November 8 to 10, 1954, when Heyner revisited the property with J. H. Feick, Geological Survey.

ACKNOWLEDGMENTS

The writer wishes to thank H. T. Zuver for cooperating with the examining engineers. He acted as guide and loaned several maps not included with the application. Numerous published and unpublished reports on the Bessemer and Golden Eagle mine that are listed as references in the Geologic Report of these investigations, were the source of much pertinent information.

LOCATION AND ACCESSIBILITY

The properties of the Morgan Hale Minerals Corp. on which exploratory work was proposed are situated in secs. 23 and 27 of unsurveyed T. 4 N., R. 13 W., Kilmarth mining district, Yuma County, Ariz. (figure 1). They include an area at the Bessemer mine and an area at and adjacent to the Golden Eagle mine.

The Bessemer mine is approximately 8 air-miles south of Salome, a village on U. S. Highway 60, and the Atchison, Topeka and Santa Fe railroad. It is accessible from Salome, by graded dirt roads that contain no excessive grades, by traveling south on the Bonanza road for 0.2 mile to a junction with a road branching to the right, and thence on the latter road 5.7 miles to the Bessemer mine. The Golden Eagle mine and the adjoining New Yorker claims are about 1 mile northwest of the Bessemer by unimproved roads.

Equipment at the Goodman mine consists of a 20 KVA generator driven by a 150 HP gasoline engine, a 1½-inch centrifugal pump powered by a 5 HP motor, and a 360 C.F.M. compressor.

Golden Eagle Mine

Mine Workings

The principal exploratory workings comprise a 400-foot inclined shaft, approximately 1,200 feet of drifting on the 150-, 250-, and 300-foot levels, a 1,100-foot adit that crosscuts the 100-foot level at about 100 feet from its portal, and several crosscuts, raises and winzes (figure 5). Ore bodies have been exploited mainly by open stopes in which stulls were used to support the walls. Removal of shaft pillars in the stoping operations has left the shaft in bad condition at many places. The north 250-foot level and workings on the adit level were visited during the examination. Hazardous conditions prevented entry to other places. The present water level in the mine is reportedly at 100 to 120 feet vertically below the adit level.

Surface Plant and Equipment

Buildings at the Golden Eagle mine consist of a headframe, a change house, and a coarse and fine ore bin, each of about 25 tons capacity, located at the steel-like mill building.

Milling equipment consists of a 10-inch by 4-inch jaw crusher, an 18-inch by 6-inch hammermill, conveyors and feeders, 2 double deck vibrating screens, an 18-inch cone-type classifier,

a 6-foot diameter cone thickener, and 3 Deister and Dunham Hummer tables. Power for the mill is furnished by a 50 KVA generator driven by 6-cylinder Waukesha gas engine. Water for milling was hauled from a nearby well and stored in a 2,500-gallon tank. M. T. Zuber reported the mill capacity was less than 1 ton per hour.

Mining equipment consists of a single-stage gasoline-engine-powered compressor, a mine car, 3 jackhammers, a stoper, and installed track and pipe lines. Other equipment items on the property are a front-end wheel loader and 2 trucks.

New Hubber Group

Workings on the New Hubber group of claims consist of 3 shallow shafts and several shallow pits and trenches. Workings in the south half of the explored zone, the zone proposed for exploration, are shown on figure 5. Here the water table is at 46 feet and 20 feet from the collars of the south northerly and southern shafts, respectively. All of the workings are in granite.

There are no buildings on the property.

PROPOSED EXPLORATION

The following is the applicant's summary of proposed explorations and estimated minimum costs of work:

Bonanza Mine

Diamond Drilling		Estimated Costs Per Foot	Total (Dem.)
10	500-foot holes	$1.70	$18,500.00
2	1,000-foot holes	4.00	8,000.00
1	800-foot hole	4.00	3,200.00
			$29,700.00

Golden Eagle Mine

7	500-foot holes	$1.70	$12,500.00
2	1,000-foot holes	4.00	8,000.00
			$20,500.00

New York Claims

Chum Drilling

3	500-foot holes	$6.00	$9,000.00

Exploratory Holes

6	150-foot d.d. holes	$1.70	$2,300.00
			$42,500.00

Equipment to be purchased	7,100.00
Rental of equipment furnished by applicant	4,500.00
Estimated total cost of project	$74,500.00

The estimated costs per foot were for chum drilling under contract and for diamond drilling to be done by the applicant with equipment to be purchased and to be furnished by the corporation on a rental basis. All drilling, except an 800-foot hole from the 4th level of the Bonanza mine to a hypothetical mineralized fault zone below a dry wash, was to be done from the surface. Initial drilling at the Bonanza and Golden Eagle mines was to be holes to a maximum depth of 500 feet. The holes were to be designed to test a single horizon at each mine at intervals of

100 feet along the strike. If initial drilling yielded good results, additional holes were provided for testing continuity of deposits at maximum depths of 500 and 1,000 feet. Definite locations of proposed holes were not shown on the applicant's maps.

DESCRIPTION OF THE DEPOSITS

Sonoma Mine

Wilson /2 says the following about the Sonoma deposit:

"The deposit occurs within a zone of faulting that strikes northwest and extends through the limestone, shale, and quartzite into basal granite. Its main shear zone dips 45° W. and is joined by a lesser fault that dips 45° E. The ore shoots that were mined in the "Gayle Garden" stope occurred within these two shear zones and ranged from a few inches to many feet in width * * *, the several stopes of the mine occupied an A-shaped area about 500 feet long by some 450 feet wide on the south, all above the fifth or water level, which is 170 feet from the surface. In this part of the mine, the gangue consists of soft red hematite, with quartz, calcite, brecciated country rock, and a little gypsum. In places, large masses of gold occurred intimately associated with quartz. Very little silver was present. Below water level, the ore is pyritic. The granite, which appears on the sixth and seventh levels, shows intense sericitization. * * * *. The stopes are all on the first five levels."

The attitude of the main shear zone, known as the Iron vein, is variable (figure 4). At the north end, the dip flattens at the quartzite-granite contact, then steepens to almost vertical at planes between the 8th and 9th levels. The dip at the south end appears to be flatter. The strike of the vein varies from northwest to almost due north. The 4 or more veins that reportedly comprise the main ore zone and converge with depth, intersect

/2 Previously cited in footnote 1.

near the quartzite-granite contact at about the 5th level. Thickness of the vein ranges from a maximum of 60 feet above the 5th level to an average of 1.5 feet on the 6th level, and an average of 3 feet on the 7th and 8th levels. The width of the Iron vein on the 9th level, which closely parallels levels 7 and 8, is not shown on available maps. The lesser shear zone mentioned by Wilson contained deposits variously referred to as the Castle Garden, Porphyry, Mill, and No. 2 vein. The Castle Garden stope is said to have been 300 feet long, and up to 120 feet wide, with an average width of 40 feet. Ore deposits of the zones have been classified as 2 types, replacement and filled fissures. Minerals observed in addition to those mentioned by Wilson were confined to copper oxides that occurred at a few widely scattered places.

Two samples were obtained on the 6th level from the most extensively copper mineralized zone observed. The samples, indicative of the grade of ore in a zone about 50 feet long, assayed as follows:

Sample	Width	Ounces per ton Gold	Silver	Percent Copper
11429	10 inches	0.45	0.30	1.22
11430	36 inches	0.01	0.50	0.20

These samples and specimens from the Sonoma and Golden Eagle mines and the New Yorker claims were examined by Lester Evans, petrographer, Bureau of Mines, Tucson, Ariz. His findings for the Sonoma samples and specimens follow: Sample 11429 -

"Microscopic examination reveals that this sample is fine-grained intergrowths of quartz and sericite in which the fracture planes are coated with chalcanthite, limonite, hematite, and sporadic grains of malachite. Qualitative test also indicates that the sample contains trace amounts of bismuth". Sample No. 11436 - "Examination of this sample shows that it is composed predominately of quartz and sericite in which a considerable number of euhedral pyrite crystals were observed. Some of the fracture planes are filled with chalcanthite and hematite. The pyrite crystals show very little alteration and appear to have been deposited contemporaneously with the quartz and sericite. The Chalcanthite is a secondary mineral having been deposited later." Sample No. 3279-A - obtained from 60 west Bonanza shaft on 6th level. This sample was found to be very similar in mineralogical composition to the above samples. Insofar as could be determined, no primary copper minerals or relic casts from copper minerals were observed.

A third type of deposit occurs in the Iron vein below the 6th level. Old reports describe 2 deposits of blue ore found on the 7th level. The deposits are believed to be composed of supergene copper sulfides, covellite and perhaps chalcocite. Maps indicate one of the deposits about 7 feet long and about 4 feet wide was bottomed between the 7th and 8th levels. The other deposit about 46 feet long increases in width from 10 feet on the 7th level to 16 feet on the 8th level. It reportedly bottomed abruptly just below the 9th level.

The possibility of uranium reserves, advanced during the investigations by E. T. Luger, was investigated. Readings were taken at numerous places with a Geiger counter . Significant

radio activity was found only at one place where Mr. Silver reported he had obtained his highest reading. It was confined to an area of a few square feet in the back of a short drift from the Iron shaft. A chip sample from this area assayed 0.04 percent equivalent U_3O_8, radiometrically, and 0.011 percent U_3O_8, chemically.

The applicant has assumed that another deposit occurs in the wash northwest of the Bonanza mine. The assumption was based on the occurrence of gold- and silver-bearing boulders in Johnson's Well (figure 4). The wash drains a mineralized belt that includes the Bonanza mine but does not follow the projected trend of known deposits.

Golden Eagle Mine

The principal vein strikes about north-south and dips 40° to 50° eastward (figure 5). It ranges from 2 to 5 feet in width on the 150 level. Above this level, portions of the vein have been stoped to the surface over maximum widths of about 15 feet. The main vein is roughly paralleled on the east and west by discontinuous mineralized shear zones. All veins above the 150 level are in quartzite except at the south end of the mine where the main vein enters limestone. The vein in limestone probably averages about 3 feet in width and 100 feet in length. Ore mineralization on the 250 level was encountered only in the main vein. Here the vein occurs at or near the contact of quartzite with granite. The width of the vein in the mined zone probably averages less than 2 feet.

Mineralization in the granite is similar to that at the Bessemer except that evidence of copper was confined to a small specimen found on the iron-stained dump. Field evidence indicates that the specimen came from the lower workings. Reports state that 2 samples from the 300 level contained 0.25 and 4.34 percent copper, and some gold and silver. Mr. Evans found that the specimen was composed principally of quartz with some sericite, pyrite, covellite, chalcopyrite, and minor amounts of chalcocite, limonite, and yellow iron sulfate stains. Polished surfaces revealed that both the inclusions of pyrite and chalcopyrite represented primary deposition with the vein quartz. The covellite and minor amounts of chalcocite are secondary in nature, having been derived from the alteration of the chalcopyrite. Mr. Bryan also examined 4 specimens of vein material from the 180 level. They were found to consist of intergrowths of quartz and hematite. Small quartz veinlets in 3 of the specimens contained sporadic grains of pyrite. One of these specimens, obtained near the south end of the mine, contained a small number of fine-grained crystals of calamine.

Examination of a specimen of mineralized limestone from the south end of the 180 level revealed chiefly calcite with some quartz, limonite, and trace amounts of pyrite, galena, and

serpentine. The calcite had a brownish color due to inclusions of limonite. A sample obtained from the mineralized zone assayed 0.3 percent copper, 0.16 percent lead, 0.2 percent zinc, and 0.10 ounce of silver and a trace of gold per ton.

San Xavier Group

The workings are in small widely scattered areas of marked iron and manganese staining. Within these areas, pyrite and copper oxides are confined to weak and discontinuous shear zones and fractures in the more highly altered portions of the granite country rock. The attitudes of the shear zones and fractures have a wide range.

Three specimens of the mineralized rock were examined petrographically. They were composed chiefly of quartz, sericite, altered feldspars, hematite, and limonite. Pyrite was noted in one of the specimens. Most of the hematite material was found to be pseudomorphic after pyrite. No evidence of primary copper mineralization was detected.

ORE RESERVES

Bonanza Mine

Evidence of more than trace amounts of copper mineralization in the Bonanza Mine is confined to the few observed widely scattered small deposits of oxidized ore, and the 2 deposits of sulfide ore presently under water. The indicated reserves, confined to the observed deposits, have been estimated at

possibly a thousand tons of material containing less than 1 percent copper, and 0.1 ounce gold and 0.5 ounce silver per ton. The reserves of sulfide ore are inferred to be about 1,500 tons containing 4 to 5 percent copper, and about one-half ounce of gold and silver per ton. Additional inferred reserves are confined to probable trace amounts of copper minerals that may be present in the lower parts of the deposit.

Uranium mineralization is not present in significant concentrations.

As to reserves of gold ore, it is of interest to note that private reports state that country rock around the mined-out original zone contains from 300,000 to 4,000,000 tons of material containing $3.50 of gold per ton. The possibility of mining the ore by open-pit has been considered.

Golden Eagle Mine

The Golden Eagle mine contains no measured nor indicated reserves of copper ore, and an estimate of inferred copper reserves is not warranted because only trace amounts of copper minerals can be expected to occur at depth. However, the mine does contain an inferred reserve of about 4,000 tons of ore containing 3 to 6 percent lead, and 0.5 to 1.0 ounce of silver per ton.

New Yorker Group

Copper mineralization on the New Yorker group of claims is confined to several small and widely scattered zones, none of which contains more than a few hundred tons of rock averaging about 0.4 percent copper.

CONCLUSIONS AND RECOMMENDATIONS

It can be concluded on the basis of the following evidence that chances are unfavorable for the discovery of significant reserves of strategic minerals:

1. The extent of the Bannerman and Golden Eagle deposits downward with depth and geological conditions indicate that the deposits are essentially intersected by present workings.

2. Extensive exploration of both the zones of oxidation and enrichment at the above deposits, and the mineralogically similar deposits of the New Yorker property have resulted in the discovery of only a few small bodies of copper and lead mineralization.

3. The absence of both relic copper sulfide minerals and significant concentrations of secondary copper minerals in the zone of enrichment indicates that the deposits did not contain more than trace amounts of primary copper mineralization. On this basis, significant amounts of copper cannot reasonably be expected in the sulfide zones, the zones of proposed explorations.

4. There is no reason to believe that either the degree or extent of lead-silver mineralization at the Golden Eagle mine will attain significance with depth.

5. Other ore bodies that may exist in the area, such as the postulated deposit, probably will be similar to known ones.

6. Uranium mineralization is confined to trace amounts in widely scattered zones at the Bonanza mine.

For the above reasons, denial is recommended for Government participation on explorations at the Bonanza, Golden Eagle, and New Yorker properties.

TRANSMITTED

JAN 17 1955

DEPT. OF THE INTERIOR
Defense Minerals Administration
WASH 20

JAN 27 1955
Date Rec'd.

JAN 7 1955
BUREAU OF MINES
Denver, Colorado

Box 4125 University Station
Tucson, Arizona

December 31, 1954

MEMORANDUM

To: A. M. Keschmann

From: J. H. Faick

Subject: DMEA 3379: Marqua Mala Minerals Corporation's Bonanza (Marqua Mala), Golden Eagle, and New Yorker properties; Ellsworth District, Yuma County, Arizona

Enclosed are the original and 3 copies of an application report of the above subject properties by Leonid Bryner. This report recommends denial of the application because geological conditions indicate that significant amounts of copper-lead ores do not exist in these well-known old gold mines.

I made a field inspection of these properties with Bryner and reviewed his report, and am in agreement with his conclusions.

The report has my approval.

J. H. Faick

JHFaick:rm
cc. Keschmann (5)
Storms

Reviewed by
DMEA OPERATING COMMITTEE
1-31-55
(Date)

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

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JAN 27 1955

224 New Customhouse
Denver 2, Colorado

January 17, 1955

Memorandum

To: Administrator, Defense Minerals Exploration Administration
Attention: 200

From: Field Team, Region III

Subject: Report of Examination, DMEA Docket No. 3379, (Copper-Lead), Harqua Hala Minerals Corporation, Yuma County, Arizona

Enclosed are the original and three copies of the report pertaining to the above application.

We recommend that the subject application in the amount of $74,580.00 be denied because there is small possibility that significant amounts of copper and lead would be discovered as a result of the proposed exploration.

W. M. Traver
W. M. Traver

HMC:pw

E. N. Harshman
E. N. Harshman

Reviewed by
DMEA OPERATING COMMITTEE
1-31-55
(date)

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JAN 27 1955

TRANSMITTED

JAN 17 1955

January 6, 1955

Memorandum

To : W. H. King, executive officer, DMEA Field Team

From : Superintendent, Southwest Experiment Station

Subject : Report on Docket DMEA-3379, Marqua Mala Minerals Corp.'s Bonanza (Marqua Mala), Golden Eagle, and New Yorker Copper-Lead Properties, Ellsworth Mining District, Yuma County, Ariz.

Enclosed are original and 8 copies of the section on Summary, Conclusions and Recommendations by L. Bryner of the Geological Survey and T. N. Remsle of the Bureau of Mines, and the section on Engineering by Remsle for the above report. A section on Geology already has been submitted by the Geological Survey.

The Marqua Mala Minerals Corp. applied to the Government for assistance in exploring these three properties for copper and lead ore, so T. N. Remsle of the Bureau of Mines and L. Bryner of the Geological Survey examined the properties in October 1954. As only small parts of the extensive mine workings were accessible and therefore the examiners recommendations would have to depend to a large extent upon geological reasoning, J. N. Faick of the Geological Survey also visited the properties with Bryner in November 1954.

It is the DMEA examiners' opinion that no significant amounts of copper or lead ore would be discovered by the applicant's proposed exploration work, so they have recommended denial of any Government assistance. I concur with this recommendation.

Brochure is enclosed.

Walter R. Storms

Walter R. Storms

cc: W. H. King (8)
J. N. Faick
DMEA-3379
DF

WRStorms:fr

Reviewed by
DMEA OPERATING COMMITTEE
1-31-55
(date)

TRANSMITTED

JAN 17 1955

Date Rec'd.

JAN 1 1955

BUREAU OF MINES
Denver, Colorado

Defense Minerals Exploration Administration
Denver Federal Center
Denver, Colorado

January 6, 1955

Memorandum

Reviewed by
DMEA OPERATING COMMITTEE
1-31-55
(date)

To: DMEA Field Team, Region IV

From: E. N. Harshman

Subject: DMEA Docket 3379: (copper-lead) Marquam Hale Minerals Corporation, Bonanza, Golden Eagle and New Yorker properties, Santa County, Arizona

Enclosed are the original and 8 copies of a geologic report by Leonid Bryner of the U. S. Geological Survey concerning the subject docket.

The report describes the geology of 2 mining properties and one claim group in the Ellsworth Mining District, Santa County, Arizona. A significant gold production, with very minor amounts of copper and lead, has been reported from the Bonanza and Golden Eagle mines; no production is recorded from the New Yorker group of claims.

The principal ore zones are along fissures and shears in granite, quartzite, and limestone. Two small bodies of "blue ore" are reported to have been found between the 6th and 8th levels of the Bonanza mine and Bryner believes that similar bodies of secondary copper ore may exist at and slightly below the water table in the Golden Eagle mine. The lower levels of both mines are flooded and inaccessible. Minor amounts of oxidized lead ore are present along fissures in limestone in the south end of the Golden Eagle mine.

From data contained in numerous reports on the properties, and as a result of the field examination Bryner concludes: 1) that the small bodies of copper ore reported to have been found in the Bonanza and Golden Eagle mines are secondary, 2) that only very minor amounts of chalcopyrite are present along veins below the zone of secondary enrichment, 3) that the present workings have reached the bottom of the zone of ore deposition, and 4) that the reserves of copper and lead ore remaining in the Bonanza and Golden Eagle mines or on the New Yorker group of claims are insignificant.

Bryner recommends that the application for Government participation in an exploration program on the Bonanza, Golden Eagle and New Yorker properties, DMEA Docket 3379, be denied.

I concur in the recommendation.

E. N. Harshman

E. N. Harshman
Member, Field Team

Enclosures (9)

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

224 New Customhouse
Denver 2, Colorado

Defense Minerals Administration
RECEIVED
OCT - 4 1954

September 30, 1954

Memorandum

To: Chairman, Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket DMEA 3379 (Copper-Lead), Harqua Hala Minerals Corporation, Golden Eagle Mine, Yuma County, Arizona.

Reference is made to your memorandum dated September 27, 1954, in which you state that you did not receive copies of the quitclaim deeds and the lease and option.

We are enclosing copies of two quitclaim deeds and lease and option to purchase which were forwarded to this office by the applicant.

W H King
W. H. King

Enclosures

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

RECEIVED
OCT - 4 1954

224 New Customhouse
Denver 2, Colorado

September 30, 1954

Memorandum

To: Chairman, Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket DMEA 3379 (Copper-Lead), Harqua Hala Minerals Corporation, Golden Eagle Mine, Yuma County, Arizona.

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We are enclosing copies of two quitclaim deeds and lease and option to purchase which were forwarded to this office by the applicant.

W. H. King

W. H. King

Enclosures

Defense Minerals Administration
RECEIVED
OCT - 4 1954

QUITCLAIM DEED

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged, the SOMIND MINERALS CORPORATION, a Nevada Corporation, do hereby remise, release and forever quitclaim to HARQUAHALA MINERALS CORPORATION, an Arizona corporation, all our right, title and interest in and to all of the following described unpatented lode mining claims situate in Ellsworth Mining District, County of Yuma, State of Arizona, to wit:

Queen of Fortune #1, as recorded in Book 41, Page 182.
Queen of Fortune #2, #4 and #5, as recorded in Book 41, Pages 183, 184 and 185.

Marble Queen, as recorded in Book 41, Page 178.

New Yorker, as recorded in Book 41, Page 179.

New Yorker Nos. 2 to 15, inclusive, as recorded in Book 41, Pages 368 to 381, inclusive.

Lead King, as recorded in Book 41, Page 253.

Lead King #2, as recorded in Book 41, Page 339.

Lead King #3, as recorded in Book 41, Page 367.

Bashor #1, #2 and #3, as recorded in Book of Mines, Pages 481, 482, and 609.

Bashor #4, as recorded in Book of Mines 35, Page 2.

Palo Verde, as recorded in Book of Mines 35, Page 142.

Road Side Mine, as recorded in Book of Mines 37, Page 514.

Jack Pot #1 and #2, and Road Side #2.

Jones #1, as recorded in Book 41, Page 181.

Nelson #1, as recorded in Book 41, Page 180.

Big Al #1, as recorded in Book 4, Page 284.

All of the above mentioned Mining Claims are Recorded in the Office of Yuma County Recorders Office, Court House, Yuma County, Arizona.

IN WITNESS WHEREOF the parties hereto have caused these presents to be executed by its duly authorized officers this 10th day of Sept., 1954.

SOMIND MINERALS CORPORATION

Nelson T. Guver
President

Alfred N. Johanson
Secretary

Lucille Allen Benedict
NOTARY PUBLIC
In and for the County of Los Angeles, State of California

My Commission Expires Nov. 22, 1957

DEPARTMENT OF THE INTERIOR
Bureau Minerals Administration
OCT - 4 1954

QUITCLAIM DEED

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged, the SOMIND MINERALS CORPORATION, a Nevada corporation, do hereby remise, release and forever quitclaim to MARQUAHALA MINERALS CORPORATION, an Arizona corporation, all our right, title and interest in and to that lease and option to purchase, entered into the 25th day of January, 1949, between the Bonanza and Golden Eagle Mining Co., an Arizona corporation, and Somind Minerals Corporation, a Nevada corporation, a copy of which is attached and made a part of this Deed.

IN WITNESS WHEREOF the parties hereto have caused these presents to be executed by its duly authorized officers this 16th day of Sept., 1954.

SOMIND MINERALS CORPORATION

Nelson T. Guvey
President

Alfred N. Johanson
Secretary

Lucille Allen Benedict
NOTARY PUBLIC
In and for the County of Los Angeles, State of California

My Commission Expires Nov. 22, 1957

C
O
P
Y

Salome, Ariz.
Jan. 24, 1953.

Bonanza and Golden Eagle Mining Co.
44 N. First St.
Phoenix, Arizona.

Dear Sirs:

Confirming our conversation of recent date. We wish to notify you that we desire to exercise the option to purchase the Golden Eagle and Harqua Hala mining claims under the terms granted us on page six of our lease and option to purchase, dated the 25th of January, 1949.

Very Sincerely yours,

SOMIND MINERALS CORPORATION

By (Signed) NELSON T. ZUVER, Pres.

Accepted Bonanza & Golden Eagle Mining Co.

By: (Signed) DONALD M. MARTIN, Pres.

OCT 4 1954

LEASE AND OPTION TO PURCHASE

THIS AGREEMENT entered into this 25th day of January, 1949, between BONANZA AND GOLDEN EAGLE MINING COMPANY, a corporation organized and existing under and by virtue of the laws of the State of Arizona, and having its principal place of business at Phoenix, Maricopa County, Arizona, hereinafter termed the Lessor, and SOMIND MINERALS CORPORATION, a Nevada corporation, duly authorized to transact business in the State of Arizona, hereinafter termed the Lessee,

W I T N E S S E T H :

WHEREAS, the Lessor is the owner of the following patented lode mining claims, situate in the Ellsworth Mining District, Yuma County, Arizona, described as follows:

> THE CONSOLIDATED BONANZA MINING CLAIM, consisting of the Gold Mountain, Gold Hill, and Gold Star lode claims, and the Consolidated Bonanza Millsite*, said Consolidated Bonanza Mining Claim being designated in the office of the United States Surveyor General for the Territory of Arizona as Survey No. 1081 "A" and "B"; and in the United States Land Office at Phoenix, Arizona, as Mineral Entry No. 548, the same having been patented by the United States to the Harqua Hala Bonanza and Golden Eagle Mining and Milling Company on April 5, 1894. Said patent was recorded in the office of the County Recorder of Yuma County, Arizona, on August 14, 1899, and together with the record thereof is hereby referred to for all particulars therein contained.
>
> *Millsite is survey 1081-B.
>
> THE SUMMIT LODE MINING CLAIM, being designated in the office of the United States Surveyor General as Survey No. 1079, and in the United States Land Office at Phoenix, Arizona, as Mineral Entry No. 550, the same having been patented by the United States to the Harqua Hala Bonanza and Golden Eagle Mining and Milling Company, December 4, 1893; said patent was recorded in the office of the County Recorder of Yuma County, Arizona, on August 14, 1899, and together with the record thereof is hereby referred to for all the particulars therein contained.

THE NARROW GAUGE PLACER MINING CLAIM, being designated in the Office of the United States Surveyor General for the Territory of Arizona as Survey No. 1097 and in the United States Land Officeat Phoenix, Arizona, as Mineral Entry No. 552, the same having been patented by the United States to the Harqua Hala Bonanza and Golden Eagle Mining and Milling Company, January 17, 1894; said patent was recorded in the office of the County Recorder of Yuma County, Arizona, on August 14, 1899, and together with the record thereof is hereby referred to for all the particulars therein contained.

THE GRAND VIEW LODE MINING CLAIM, designated by the Surveyor General for the Territory of Arizona as Lots 1116 and 1183 Amended; and in the United States Land Office at Phoenix, Arizona, as Mineral Entry No. 569, the same having been patented by the United States to Henry Bratnober, June 9, 1896; said patent was recorded in the office of the County Recorder of Yuma County, Arizona, on August 14, 1899, and together with the record thereof is hereby referred to for all the particulars therein contained.

GOLDEN EAGLE, GOLDEN ARK AND GOLDEN BELT LODE CLAIMS, designated in the office of the United States Surveyor General, for the State of Arizona as Survey No. 1080, and in the United States Land Office, at Phoenix, Arizona, as Mineral Entry No. 549, the same having been patented by the United States to the Harqua Hala Bonanza and Golden Eagle Mining and Milling Company on December 4, 1893. Said patent being recorded in the office of the County Recorder of Yuma County, Arizona, on August 14, 1899, and together with the record thereof is hereby referred to for all particular therein contained.

Also the unpatented mining claims described as follows:

THE NORTH POLE MINING CLAIM, located January 1, 1910, the location notice of which is recorded in the Recorder's Office of Yuma County, Arizona, in Book 5 at Page 237, by John B. Martin, situated in a northerly direction from the Harqua Hala Store Building, the Southeastern corner of said claim being about 100 feet in a northerly direction from said Harqua Hala Store Building and said claim being a relocation of the ground formerly covered by the Gladdies Mining Claim.

THE WEDGE MINING CLAIM, located by John B. Martin on March 7, 1908, the location notice of which is recorded in the Recorder's Office of Yuma County, Arizona, in Book "Y" of Mining Claims, at page 342. Also the well situate upon the Consolidated Bonanza Millsite (Survey #1081-B) herinbefore described, the pipe-line conducting water from said well to the mines and Milling claims hereinbefore described and all water derived from said well.

This agreement shall also cover all other privileges, franchises and easements now owned, held, used or enjoyed by the first party in connection with any of the properties hereinbefore described. Also all tailings and dumps and all buildings, structures and other improvements now situate on the above described claims including such mining, pumping and milling equipment as belongs to Lessor.

and

WHEREAS, the Lessee is desirous of leasing the above described premises for a period of five (5) years fromthe date hereof and to obtain an option to purchase said mining claims during the termof said lease;

NOW, THEREFORE, in consideration of One Hundred Dollars ($100.00) in hand paid and of the mutual covenants and conditions hereinafter set forth to be kept and performed by the parties hereto, it is agreed as follows:

That Lessor hereby leases to the Lessee the above described mining claims for a period of five (5) years from the date hereof at the following rental:

Beginning six (6) months after the date hereof, Lessee shall pay a royalty on all ores or concentrates shipped to a smelter or on all bullion shipped to the mint, as follows:

Five (5%) per cent of the net returns received from the sale of bullion, ores, concentrates or other products for each calendar month when the average of these returns represent a value of not to exceed Ten ($10.00) Dollars per ton.

Ten (10%) per cent of the net returns received fromthe sale of bullion, ores, concentrates or other products for each calendar month when the average of these returns exceeds Ten ($10.00) Dollars but does not exceed Twenty ($20.00) Dollars per ton.

Twelve and one-half (12-1/2%) per cent of the net returns received from the sale of bullion, ores, concentrates or other products for each calendar month when the average of these returns exceeds Twenty ($20.00) Dollars per ton but does not exceed Thirty ($30.00) Dollars per ton.

Fifteen (15%) per cent of the net returns received from the sale of bullion, ores, concentrates or other products for each calendar month when the average of these returns is in excess of Thirty ($30.00) Dollars per ton.

The term "net returns" shall mean the balance remaining after deducting all railroad freight from Salome to the smelter, plus smelter charges on ores, or concentrates shipped, or express charges from Salome to the mint, plus mint charges on bullion shipped to the mint, together with the cost of milling or concentrating such ore.

Such rental shall for the first six (6) months in which rental is paid be not less than One Hundred ($100.00) Dollars per month, and beginning one year after the date hereof, such rental shall not be less than Two Hundred ($200.00) Dollars per month, during the remaining term of the lease.

All royalties are to be paid not later than the 10th day of the month succeeding the month such shipments were made.

It is further agreed by the parties hereto that notwithstanding the fact that royalties may cause the Lessee to pay a greater amount of rental during any one month than the minimum required hereunder, the Lessee shall nevertheless be obligated to pay the minimum rental monthly.

Lessee shall be given immediate possession of the premises upon execution of these presents and after the Lessor has had an opportunity to post No Lien notices on the premises as required by law, and Lessee agrees to keep the leased premises and every part thereof free and clear of liens for labor or material furnished to the Lessee while in possession of said premises, and agrees to keep and save Lessor harmless from all costs, loss or damage which may arise by reason of injury to any persons employed by the Lessee in or upon said property or any part thereof, or which may arise by reason of injury to any persons, livestock or other property as the result of any work or operations of the premises while in the possession and occupancy of the Lessee.

Fifteen (15%) per cent of the net returns received from the sale of bullion, ores, concentrates or other products for each calendar month when the average of these returns is in excess of Thirty ($30.00) Dollars per ton.

The term "net returns" shall mean the balance remaining after deducting all railroad freight from Salome to the smelter, plus smelter charges on ores, or concentrates shipped, or express charges from Salome to the mint, plus mint charges on bullion shipped to the mint, together with the cost of milling or concentrating such ore.

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All royalties are to be paid not later than the 10th day of the month succeeding the month such shipments were made.

It is further agreed by the parties hereto that notwithstanding the fact that royalties may cause the Lessee to pay a greater amount of rental during any one month than the minimum required hereunder, the Lessee shall nevertheless be obligated to pay the minimum rental monthly.

Lessee shall be given immediate possession of the premises upon execution of these presents and after the Lessor has had an opportunity to post No Lien notices on the premises as required by law, and Lessee agrees to keep the leased premises and every part thereof free and clear of liens for labor or material furnished to the Lessee while in possession of said premises, and agrees to keep and save Lessor harmless from all costs, loss or damage which may arise by reason of injury to any persons employed by the Lessee in or upon said property or any part thereof, or which may arise by reason of injury to any persons, livestock or other property as the result of any work or operations of the premises while in the possession and occupancy of the Lessee.

That the work on said property shall be carried on in the manner necessary to good and economical mining, so as to take out the greatest amount of ore possible with due regard to the safety, development and preservation of said premises as a working mine. That it will remove all muck or waste from the mine workings.

Lessee further agrees to keep posted at the collar of each shaft or mouth of any tunnel and at the door of each boarding house No Lien notices during the life of this agreement.

Lessee further agrees to pay all taxes levied and assessed against the patented mining claims and all personal property thereon subsequent to the 31st day of December, 1948 and falling due during the termof this lease, and shall pay all taxes levied and assessed against the personal property of the Lessee placed upon said premises.

Lessee further agrees to pay all sales tax imposed upon all ore, minerals, concentrates or other products produced and sold during the life of this agreement; to carry Workmen's Compensation insurance on all of its employees; to pay all withholding tax, social security and old age pension contributions, and will perform the necessary assessment work upon the unpatented mining claims included in this lease required by law in order to protect the title of the Lessor to said claims.

Lessee further agrees to furnish Lessor quarterly, during the term of this lease, logs of all drill holes sunk on the property and such samples and assay maps as may be made showing the position of such drill holes and of any new workings with assay values of samples taken on said property; and shall cause the smelter or mint to which any ore, concentrate or bullion produced from said premises is shipped to supply the Lessor with a copy of all settlement sheets covering the sale of such products.

It is further agreed by the parties hereto that the duly authorized officers and agents of the Lessor shall be permitted to enter upon the property covered by this lease and the workings thereon at all reasonable times for the purpose of inspection, and such officers and agents of the Lessor may be permitted to examine the books and records of account of production of ores and minerals produced from such premises.

It is further agreed by the parties hereto that Lessor grants unto the Lessee an exclusive option to purchase all of the above described mining claims at a total price of Two Hundred Thousand ($200,000.00) Dollars, which sum shall be payable on the same basis as the rental hereinabove set forth, and in the event the Lessee desires to exercise the option herein granted it shall notify the Lessor not later than forty-eight (48) months after the date hereof of its election to exercise such option and all rental theretofore paid under the terms of the lease herein shall be applied on the purchase price of said premises.

It is further agreed by the parties hereto that time is of the essence of this agreement and that failure on the part of the Lessee to do or perform any of the things herein required in the manner and at the times as herein set forth shall constitute a breach of this agreement and the Lessor shall, at its election, have the right to terminate this lease and to remove the Lessee, its officers, agents, and employees fromthe premises if after a thirty (30) day notice said defaults are not corrected.

In the event it is necessary for either party to serve the other with a notice, such mail shall be addressed to the Lessor at 44 North First Avenue, Phoenix, Arizona, and to the Lessee at 308 South Maple Drive, Beverly Hills, California.

In the event the lease herein granted shall terminate by its own terms and the Lessee shall not be indebted to the Lessor in any sum or sums whatsoever, said Lessee shall have, and it is hereby granted, sixty (60) days after the termination of said lease to remove from said premises all personal

property, machinery and equipment placed upon said premises by said Lessee with the exception of all mining timbers placed underground, all mine tracks and pipe lines installed in the workings of said mine and any and all permanent improvements attached to the soil of said mining claims.

It is agreed by the parties hereto that the Lessee shall have the right to assign this lease and option provided that said Lessee shall have first given Lessor a written notice of its intention to make such assignment thirty days in advance, and shall confirm the said notice when such assignment is actually made effective. However, thereafter there shall be no further assignments without the written consent of the Lessor first had and obtained.

This agreement shall be binding upon the successors and assigns of the parties hereto.

In the event the Lessee shall fully perform all of the terms and conditions herein required of it and shall pay the full purchase price of said mining claims. Lessor agrees to deliver to said Lessee a mining deed to said premises, subject only to the paramount lien of the United States of America to the unpatented mining claims and subject to any and all taxes levied and assessed against the premises subsequent to the31st day of December, 1948 and as against all liens and encumbrances placed against said premises subsequent to the date hereof.

IN WITNESS WHEREOF the parties hereto have caused these presents to be executed by its duly authorized officers the day and year first above written.

BONANZA AND GOLDEN EAGLE MINING COMPANY

By (Signed) Donald M. Martin

Attest:

(Signed) Walter T. Martin

SOMIND MINERALS CORPORATION

By (Signed) Nelson T. Zuyer

Attest:

(Signed) Alfred N. Johanson

STATE OF ARIZONA)
) SS.
County of Maricopa)

On this, the 28th day of January, 1949, before me, the undersigned Notary Public, personally appeared Donald M. Martin and Walter T. Martin who acknowledged themselves to be the President and Secretary respectively of the BONANZA AND GOLDEN EAGLE MINING COMPANY, a corporation, and that they, as such President and Secretary, being authorized so to do, executed the foregoing instrument by signing the name of the corporation by themselves as President and Secretary for the purposes therein contained.

In witness whereof I hereunto set my hand and official seal.

(Signed) J. L. Irwin
Notary Public

My Commission Expires:

Feb. 18, 1952

File Copy
Surname
J.W. Alt
Original
Selfridge
Johnson
Mitterdorf

UNITED STATES
DEPARTMENT OF THE INTERIOR 500
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

SEP 27 1954

Mr. R. H. King, Executive Officer
DMEA Field Team, Region IV
224 New Customhouse Building
Denver 2, Colorado

Re: Docket No. DMEA-3379 (Copper-Lead)
Harqua Hala Minerals Corporation
Golden Eagle mine
Yuma County, Arizona

Dear Mr. King:

In reference to your memorandum of September 14, 1954, regarding the cited application, we wish to advise you that to date we have not received the copies of the two quitclaim deeds and the lease and option to purchase.

Sincerely yours,

George C. Selfridge, by ESJ
Chairman, Operating Committee

APPROVED:

J. H. Hedges

Member, Bureau of Mines

Thor H. Kiilsgaard

Member, Geological Survey

JWAlt:er 9/23/54

Copy to: Docket
Admr. R. File
Op. Committee
Base Metals
Mr. Kiilsgaard, Rm 5227
Mr. C. H. Johnson, USBM
Chron.

R

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

224 New Customhouse
Denver 2, Colorado

September 14, 1954

Docket

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. DMEA 3379, Harqua Hala Minerals Corporation.

We have received a letter dated September 10, 1954, from the Harqua Hala Minerals Corporation, to which were attached copies of two quitclaim deeds and a copy of a lease and option to purchase. The transmittal letter indicated that copies of these documents were sent to the Washington office. Please advise us if you have not received them.

John F. Shaw
For W. H King

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
SEP 13 1954

Los Angeles 14, Calif.
Sept. 10, 1954

Mr. W.H.King, Executive Officer,
DMEA Field Team, Region IV,
224 New Customhouse Bldg.
Denver 2, Colorado.

Docket

Alt Betty

Docket No. DMEA-3379

Dear Mr. King:-

Mr. Mittendorf of the Washington office asked for a copy of the transfer of the Harqua Hala properties and purchase contract from Somind Minerals Corporation, a Nevada corporation, to the Harqua Hala Minerals Corporation, an Arizona corporation recently formed.

This transfer has just been completed and we enclose herewith a copy of same, duly signed. After you have read it you may wish to forward on to your Agency's Washington office.

We believe you now have evrything required and an examination of the extensive holdings of the Company is next in order. The writer can meet you at the property anytime you suggest, provided a few days notice is given.

Very truly,

Harqua Hala Minerals Corp.

N.T. Zuver

by N.T. Zuver, President.
Room 1016, Story Bldg.
610 So. Broadway,
Los Angeles 14, Calif.

c/c to DMEA Washington office

File Copy
Surname
J. W. Alt.
Gunnoel
Jarratt
Hedges
Selbridge
Johnson

500

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

Mr. Nelson V. Zuver, President
Harqua Hala Minerals Corporation
Room 1016 Story Building
610 S. Broadway
Los Angeles 14, California

JUN 25 1954

Re: Docket No. DMEA-3579 (Copper-Lead)
Harqua Hala Minerals Corporation
Golden Eagle Mine
Yuma County, Arizona

Dear Mr. Zuver:

Your application for Government assistance to explore the cited property has been reviewed by the Base Metals Division of the Defense Minerals Exploration Administration, and has been referred for a field examination to:

Mr. W. H. King, Executive Officer
DMEA Field Team, Region IV
224 New Customhouse Building
Denver 2, Colorado

The application submitted to this office contained only one copy of a report by E. M. Snyder. It is requested that you furnish Mr. King with a copy of this report.

It will also be necessary for you to furnish us with a copy of the instrument that transferred the Lease and Option to Purchase from the Somind Minerals Corporation to the Harqua Hala Minerals Corporation.

It is essential that you inform us as to the Section, Range, and Township for the location of your property.

The Regional Office will contact you at an early date as to when the examination is to be made. Any assistance that you may give the members of the Field Team during the examination will be appreciated.

JWAlt/bjl (6/25/54)

Sincerely yours,

C. O. Mittendorf (fw)
Administrator

Copy to: Docket
Admr. R. File
Op. Committee
Base Metals
Mr. C. H. Johnson
Mr. Gildersleeve
Chron.
Region IV (2)

R.C.S.

File Copy
Surname
J.W. Alt
Selfridge
H. Johnson

UNITED STATES 500
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

JUN 25 1954

Mr. W. H. King, Executive Officer
DMEA Field Team, Region IV
224 New Customhouse Building
Denver 2, Colorado

Re: Docket No. DMEA-3379 (Copper-Lead)
Harcum Hale Minerals Corporation
Golden Eagle Mine
Yuma County, Arizona

Dear Mr. King:

A review of the cited application, a copy of which has been sent to you, indicates than an examination of the property is necessary. Will you please make such an examination at your earliest convenience.

The Applicant proposes to do the diamond drilling on company account and to purchase equipment to do this drilling. The work, if possible, should be done on a unit cost basis, and an allowance should be made for a specified number of assays at a definite amount per assay.

Enclosed are copies of memoranda, dated June 10 and 16, from the commodity members, giving their comments and recommendations for a Field Team examination.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee (GCS)

Enclosures 2

JWAlt/bjl (6/25/54)

APPROVED:

J. H. Hedges

Member, Bureau of Mines (GCS)

D. M. Larrabee

Member, Geological Survey (GCS)

Copy to: Docket
Admr. R. File
Op. Committee
Base Metals
C. H. Johnson
Mr. Gildersleeve
Chron.

R.C.G.

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

June 16, 1954

Memorandum

To: Mr. W. R. Griswold, DMEA

From: E. L. Newcomb, USGS

Subject: Review of application

Re: DMEA-3379
Golden Eagle Mine
Ellsworth District
Yuma County, Arizona
$74,580
Copper-lead

The applicant proposes to churn and diamond drill on the New Yorker, Harqua Hala, and Golden Eagle claims. Though many of the proposed holes are located on the claims and topographic maps submitted by the applicant, it is not possible to relate this work to the geology of the veins in the area.

Apparently the Harqua Hala mine has been developed on 9 levels, but below 200 feet vertically the mine is flooded. The Golden Eagle mine is also flooded, at least in its lower workings. The New Yorker claims are reported to have copper mineralization showing at the surface and in a 50-foot prospect shaft.

Past production from the Harqua Hala and Golden Eagle mines was obtained largely from shallow, underground workings. Substantial amounts of gold are reported to have been mined from the oxidized zone to a depth of about 200 feet. The applicant states that old reports mention the presence of considerable sulfide mineralization in the lower workings of the Harqua Hala and Golden Eagle mines. The proposed drilling is planned to test the sulfide zone at depths of 300-500 feet.

We do not have any available information on the properties.

I note that churn drilling would be done by contract, but that diamond drilling would be done by the Company with equipment purchased for the project. For the amount of drilling proposed, it would seem much better to also contract the diamond drilling.

I recommend the application be referred to the field team for their recommendations.

E. L. Newcomb

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

June 10, 1954

Memorandum

To: W. R. Griswold, DMEA

From: C. H. Johnson, Base Metals Branch

Subject: DMEA-3379 (Copper), Harqua Hala Minerals Corporation, (Harquahala, etc., mines), Ellsworth District, Yuma County, Arizona

I have reviewed the above-named application, which is returned herewith. I shall be glad to concur in a referral to the Field Team for investigation.

Some reports are referred to in the application of which no copies accompanied the copy of the application sent me for review. However, the information submitted is such as to justify a field investigation.

It is noted the proposal calls for diamond drilling on company account. This should be discouraged, as the job is not big enough to justify the purchase of equipment and the recruiting of a crew, besides which the initial performance is usually unsatisfactory. The same comment applies to assaying, unless Applicant has a going assay office.

I am requesting any reports we may have in our Mt. Weather file (including a DMA report on the Bonanza) and will let you know if anything of interest turns up.

C. H. Johnson

C. H. Johnson

Attachment

Copy to - Mr. Newcomb, USGS
Minerals Division
Mr. Johnson
Files

Harqua Hala Minerals Corp.
Rm. 1016, Story Bldg.
610 S. Broadway
Los Angeles 14, Calif.

June 2, 1954
Subject: DMEA-3379
Re: Exploration Assistance

Gentlemen:

The receipt of your application dated May 28, 1954 for exploration assistance under the Defense Production Act of 1950, as amended, is hereby acknowledged.

Your application has been assigned Docket Number DMEA-3379 and referred to the Base Metals Division.

Kindly refer to in any future correspondence relating to your application.

Sincerely yours,

HARQUA HALA MINERALS CORPORATION
610 S. Broadway, Room 1016
Los Angeles 14, Calif.

May 29, 1954

Defense Minerals Exploration Administration,
Department of the Interior,
Washington 25, D. C.

Gentlemen:

Herewith enclosed two bound copies of application for a DMEA loan for exploration of copper and lead veins in the Harqua Hala Minerals Corporation property near Salome, Arizona, two additional copies are being mailed under separate cover.

There are also enclosed a copy of the Lease and Purchase Contract covering twelve claims shown in red on the attached map, and also report of Union Engineering Co. on the whole property, as shown on map of claims.

We believe this property, which has had large production in gold, silver and lead, but is essentially a copper property at depth, fully warrants exploration to determine the depth possibilities. All the ore carries some gold, which adds to its value, but we believe the lower levels will show the copper values to be the principal ones except in the lead ore-shoot on the Golden Eagle where both lead and copper will be found at depth.

The total estimated drilling cost is about $75,000.00 of which this Company would bear one-half so that the maximum loan from the DMEA would be $37,500.00.

If additional information is desired please write the Company at the address given.

Very truly,

HARQUA HALA MINERALS CORP.

By N. T. Zuver s.
N. T. Zuver, Pres.

Enclosures

MF-103
(Revised April 1952)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Form Approved.
Budget Bureau No. 42-R1035.2.

APPLICATION FOR AID IN AN EXPLORATION PROJECT, PURSUANT TO DMEA ORDER 1, UNDER THE DEFENSE PRODUCTION ACT OF 1950, AS AMENDED

Not to be filled in by applicant

Docket No. ~~[illegible]~~ 3379
Metal or Mineral Copper & Lead
Date Received
Estimated Cost $74,580
Participation (Government %)

INSTRUCTIONS

1. *Name of applicant.*—(*a*) State here your full legal name, in the form in which you will wish to contract, and your mailing address: Harqua Hala Minerals Corporation, Room 1016 Story Bldg.,
Officers are: Melson T. Zuver, President 610 S. Broadway, L.A. 14, Calif.
222½ S. Westlake Ave., Los Angeles 4, Calif.
A.N. Johanson, Sec.-Treas., 563 La Mirada, San Marino, Calif.

(*b*) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized. Incorporated in Arizona.

(*c*) If a corporation, add to above statement, titles, names and addresses of officers.

(*d*) If a partnership, add to the above statement the names and addresses of all partners.

2. *General.*—Read DMEA Order 1, "Government Aid in Defense Exploration Projects," before completing this application. Submit this application and all accompanying papers in quadruplicate (four copies), with your name and address on each sheet of the application and on all accompanying papers. Where sufficient space is not provided on the form for all required information, state it on an accompanying paper, with a reference in each case to the instruction to which it refers by number. Comply with all applicable instructions; or, if not applicable, so state. File the application with Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., or with the nearest field executive officer thereof.

3. *Applicant's property rights.*—(*a*) State the legal description of the land upon which you wish to explore, including all land which you possess or control that may be benefited by the exploration, and excluding any land or interest in land which is not to be included in the exploration project contract
see attached papers for all data on this and other questions.

(*b*) State any mine name by which the property is known.

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise

(*d*) If you are not the owner, submit with this application a copy of the lease, contract, or other document under which you control the property.

(*e*) If you own the land, describe any liens or encumbrances on it

(*f*) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice.

4. *Physical description.*—(*a*) Describe in detail any mining or exploration operations which have been or now are being conducted upon the land, including existing mine workings and production facilities. State your interest, if any, in such operations. Also describe accessibility of mine workings for examination purposes. (see report)

(*b*) State past and current production, and ore reserves, if any, giving quantities and grades. (see report)

(*c*) Describe the geologic features of the property, including mineralization, type of deposit (vein, bedded, etc.), and your reasons for wishing to explore. Illustrate with maps or sketches. Send with your application (but not necessarily as a part of it) any geologic or engineering report, assay maps, or other technologic information you may have, indicating on each whether you require its return to you.

(*d*) State the facts with respect to the accessibility of the project: Access roads, distances to shipping, supply and residence points.

(*e*) State the availability of manpower, materials, supplies, equipment, water, and power.

5. *The exploration project.*—(*a*) State the mineral or minerals for which you wish to explore _____

(*b*) Describe fully the proposed work, including a map or sketch of the property showing a plan (and cross sections if needed) of any present mine workings, and the location of the proposed exploration work as related to such features as contacts, veins, ore-bearing beds, etc.

(*c*) The work will start within 60 days and be completed within 12 months from the date of an exploration project contract.

(*d*) State the operating experience and background of the applicant with relation to the ability to carry out such exploration project, and also that of the person or persons who will supervise the operations.

6. *Estimate of costs.*—Furnish a detailed estimate of the costs of the proposed work (you will have to use a separate sheet), under the following headings. Add the totals under all headings to give the estimated total cost of the project:

(*a*) *Independent contracts.*—(Note.—If the applicant does not intend to let any of the work to contractors, write "none" after this item. To the extent that the work is to be contracted, do not repeat the cost of the contract-work in subsequent items.) State the cost of any proposed independent contracts for the performance of all or any part of the work, expressed in terms of units of work (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, per cubic yard of material moved, etc.).

(*b*) *Labor, supervision, consultants.*—Include an itemized schedule of numbers, classes and rates of wages, salaries or fees for necessary labor, supervision and engineering and geological consultants.

(*c*) *Operating materials and supplies.*—Furnish an itemized list, including items of equipment costing less than $50 each, and power, water and fuel.

(*d*) *Operating equipment.*—Furnish an itemized list of any operating equipment to be rented, purchased, or which is owned and will be furnished by the Operator, with the estimated rental, purchase price, or suggested use-allowance based on present value, as the case may be.

(*e*) *Rehabilitation and repairs.*—Furnish a detailed list showing the cost of any necessary initial rehabilitation or repairs of existing buildings, installations, fixtures, and movable operating equipment, now owned by the Operator and which will be devoted to the exploration project.

(*f*) *New buildings, improvements, installations.*—Furnish a detailed list showing the cost of any necessary buildings, fixed improvements, or installations to be purchased, installed or constructed for the benefit of the exploration project.

(*g*) *Miscellaneous.*—Furnish a detailed list showing the cost of repairs to and maintenance of operating equipment (not including initial rehabilitation or repairs of the Operator's equipment), analytical work, accounting, workmen's compensation and employers' liability insurance, and payroll taxes.

(*h*) *Contingencies.*—Give an estimate of any necessary allowances for contingencies not included in the costs stated above.

NOTE.—No items of general overhead, corporate management, interest, taxes (other than payroll and sales taxes), or any other indirect costs, or work performed or costs incurred before the date of the contract, should be included in the estimate of costs.

7. (*a*) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation (Sec. 7, DMEA No. 1)?

(*b*) How do you propose to furnish your share of the costs?

[X] Money & [X] Use of equipment owned by you [ ] Other

Explain in detail on acompanying paper.

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief.

Dated May 28, 1954

HARQUA HALA MINERALS CORPORATION
(Applicant)

By N. T. Zuver
N.T.Zuver, President

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

U. S. GOVERNMENT PRINTING OFFICE 16—66551-1

HARQUA HALA MINERALS CORPORATION

Answers to questions, Form MF-103

3. (a) The mining claims held by the applicant Company are as follows:

Under Purchase Contract from Bonanza & Golden Eagle Mining Company, of Phoenix, Arizona,

Patented:
Gold Hill, Gold Mountain No. 1, Narrow Gauge, Gold Star, Grand View, Golden Eagle, Golden Belt, and Golden Ace.

Unpatented:
Wedge and North Pole.

Under Location by Company (and included in application.)
New Yorker No. 1, and New Yorker No. 2, Quinn No. 1 and Quinn No. 2.

The mines are known as:

3. (b) The Harqua Hala or Bonanza Mine

The Golden Eagle Mine

The New Yorker Group.

3. (c) The names of the claims are listed above under 3(a)

3. (d) Copy of Purchase Contract is attached hereto. The option to purchase was exercised in January, 1953.

3. (e) There are no liens or encumbrances on the land.

4. (a) The Harqua Hala mine is extensively developed within the shallow gold zone down to 200 ft. vertically and below that to 3 levels known as 7, 8 and 9, (all under water.) These lower levels follow what is believed to be the Iron vein, which produced gold ore above the sixth level. At the surface this vein is heavily iron stained and carries a little oxidized copper, and on the 7th and 8th levels copper is reported showing as sulphides.

The report made by W. Tovote, (now deceased) stated, in part: Referring to the ores in lower levels of Harqua Hala workings, "Residual pyrite and pyrite replaced by chalcocite are found more and more frequent and the copper values in the ore are often an important item.

Assays as high as 7% and even 12% have been made and the average of all the ore in sight will show possibly 2% copper".

He also expressed the opinion that another vein will be found beneath the gulch to the east, where for a quarter mile the formation is covered with gravel and boulders to a depth of 100 ft. as shown by the Johnson's wall (see map), from which some good boulders carrying gold and copper were obtained. It is quite possible that a parallel vein structure exists under the wide valley so well covered with gravels, and which doubtless represents a fault zone. A diamond drill hole from the fourth level under this detritus would show this and might lead to a vein of gold-copper ore at depth. This exploratory D.D. hole is included in the summary of drilling proposed.

The assay map of 7th level workings shows an ore-shoot 260 ft. long (width not given) averaging $19.90 per ton in gold with additional copper values. On the 8th level the maps show an average of $33.57 in gold for a length of 320 feet. The widths of vein are not given nor the copper content, which is said to average 2% with one shoot 45 ft. long carrying 5.28% copper. (see pages 12 and 13 of report by Union Engineering Co.)

The Quinn shaft is reported to be 310 ft. in depth and is a vertical single compartment shaft now partly filled with water. It is about 650 ft. south of the Harqua Hala main shaft and the vein hit near the bottom corresponds to the Iron vein and lines up with the vein showing on the deeper levels. The Quinn vein is reported to be 20 ft. wide and to carry $10.81 in gold with copper additional.

See report and general map of Harqua Hala mine.

The Golden Eagle mine is reported by several engineers as containing copper, lead and zinc sulphides at depth below the gold ore-shoot that was stoped out many years ago. Bancroft of the U.S.Geological Survey is quoted in the Arizona Bureau of Mines Bulletin 137, re the depth possibilities in the following paragraph:

> "Iron oxide is abundant above the water or the 300 ft. level on the incline, below which pyrite, chalcopyrite and galena occur. .....As indicated by the stopes, the ore-shoots on both veins were numerous and pockety. Some of them apparently were more than 15 feet wide. Bancroft states that two samples of sulphide ore from the lower levels contained 0.25 and 4.84% copper, 1.32 and 2.88 ounces silver, and 0.48 and 1.12 ounces of gold per ton."

The other ore-shoot on the Golden Eagle has oxidized lead-silver ore and is reported to have galena at depth. Both shoots should be drilled to determine depth possibilities. Mr. Martin (owner of Golden Eagle) states that the ore on the lower levels had widths up to 30 ft.

The Golden eagle Mine is nearly a mile north of the Harqua Hala (or Bonanza) mine, and has two known ore-bodies, one of which produced about $200,000.00 in gold and the other shows an ore-shoot of lead-silver-gold ore from which several thousand tons has been shipped to the mill. Some good lead carbonate ore is still left in the mine and recently over a hundred tons of this ore was milled in the pilot mill erected by the applicant Company at the Golden Eagle.

The Golden Eagle is reported to have a copper ore-shoot on the bottom level (now under water) and diamond drilling is contemplated to prove this at depth. The lead ore-shoot also is to be drilled at depth, where galena is reported to be showing. These ore-bodies if found could be worked from the inclined shaft, which, however, is needing some repairs.

See report covering Golden Eagle mine.

The New Yorker claims listed, No. 1 and No. 2, show an orebody of copper carbonate ore at and near the surface, with sulphides of iron and copper showing in a shaft at about fifty ft. depth. It is proposed to churn drill this deposit to about five hundred feet depth to prove or disprove the value of this copper showing. If the first hole shows results, two other holes are planned, all as shown on map of claims.

4. (b) Past production of the Harqua Hala or Bonanza mine is given as approximately $5,000,000.00 in gold, the ore being remarkably rich, averaging an ounce to the ton as milled. The figure given is at $35.00 gold and is probably low. No recovery of copper was made.

The Golden Eagle has produced about $200,000.00 in gold and lead. Most of the production of both properties was in the early days of the mines, from 1891 to 1897.

Ore reserves are shown in the report attached. Take note that practically all the production has come from workings in the metamorphic rocks above 200 ft. vertical depth.

4. (c) The geologic features are shown in the reports. The veins heretofore worked for gold show copper coming in at depth, according to all reports.

It is proposed to diamond drill both properties cutting the known veins at a depth of 300 to 500 ft. to determine values and width of ore-shoots. Location of the holes to be drilled are indicated approximately on the maps attached.

The geologic features can be summarized briefly as follows:

The underlying Pre-cambrian formation is exposed at places and is largely granite. Above this is a series of metamorphic rocks made up of quartzites, schists and limestones, all of sedimentary origin, Within the latter series the large ore-bodies of gold values were found, all showing some copper or lead in oxidized form. The Harqua Hala mountains show extensive erosion of the metamorphic rock.

The veins go down into the underlying granite and show sulphides at this depth, pyrite and chalcopyrite (and galena at the Golden Eagle.) The source of the mineralizing solutions was very likely a monzonite intrusive, which was possibly deep-seated at the Harqua Hala, though showing at places in the district. Evidently the solutions were scattered over a wide area within the quartzites and limestones, forming irregular veins along fault planes. In the underlying formation the maps indicate a more regular vein dipping steeply, and still carrying gold and copper values.

4. (d) The property is ideally situated with respect to accessibility, being only nine miles from the Santa Fe Railway line, and from the town of Salome, on Hiways 60 and 70. A good dirt road nine miles in length leads from Salome to the mine. Supplies are available at Salome or Phoenix, with daily delivery from the latter, and Los Angeles is distant about 300 miles.

There is ample housing on the ground for a number of men and Salome also has housing accommodations and restaurants available.

4. (e) Labor is available in this section or in Phoenix, in ample supply at the high wages paid for miners and laborers.

Materials, supplies and equipment are available locally, or from Phoenix or Los Angeles, by rail or truck.

Water for drilling is available in the Harqua Hala mine, where a pump has been installed to supply water to the pilot mill. The old mill used water from a tract of land about 5½ miles northeast of the mine, and the 3" pipe line is still usable. The well has caved however and was only 30 ft. deep. A new deep well would be required if water were to be brought thru this line. It is believed that ample water for a mill can be had by deep wells (600 ft.) nearer the mine, as there are several ranches pumping water for irrigation between the mine and Salome.

Power for a large mill can be had by bringing in a power line from the Arizona Power Co. line, distant less than nine miles. This power comes from the Colorado River and is reasonable in cost. Natural gas could be had for power purposes by piping it from the Texas-California main line near Salome.

Operating conditions are good the year round, though summers are hot.

5. (a) The metals for which exploration is planned are principally copper and lead, though gold and silver values will no doubt follow these metals. Scintillometer readings show radio activity over part of the Harqua Hala ground.

5. (b) The proposed work consists of diamond drilling the Harqua Hala and Golden Eagle veins at depth, and churn drilling the New Yorker copper deposit.

5. (c) The work will start within 60 days and be completed within 12 months from the date of an exploration project contract.

5. (d) The President of the applicant Company has had many years experience in mining and oil production work. Supervision as consulting engineers will be in the hands of Union Engineering Co., (610 So. Broadway, Los Angeles, Calif.) and the personnel of the Company includes B. M. Snyder and Edward Thornton, both engineers of 40 years experience, largely in non-ferrous metal mining work.

6. <u>Estimate of Costs</u>:

The following is our estimate of costs to do the work:

6. (a) Churn drilling of the New Yorker copper deposit is to be done by contract, and may amount to 1500 ft. total.
1500 ft. at $6.00 per ft. $9,000.00

6. (b) The diamond drilling of the Harqua Hala and Golden Eagle properties is planned to be done by the Harqua Hala Minerals Corp. itself. Most of the equipment required and the buildings to house men are available on the ground. The cost of this equipment would be over $30,000.00 but we have figured a rental charge of $4,500.00.

Labor required: To operate 1 diamond drill - 2 shifts:

		Daily
2 drill runners,	@ $16.00	$32.00
2 helpers	@ 12.00	24.00
1 superintendent	@ 18.00	18.00
Consultant, (part time on engineering and geology)		14.00
	Total daily	88.00
Compensation and S.S.taxes,		9.00
	Total labor	97.00

6. (c) Materials and Supplies:

Repairs and supplies, inc. diamond bits,	$40.00
Power, gas engine or air driven,	5.00
Water, (pumped from mine)	2.00
Assaying, labor and supplies	18.00
Contingencies, trucking, travel, etc.	6.00
Total daily,	168.00

Estimated footage drilled daily, 2 shifts, 50 ft.

$168. divided by 50 = $3.36 per ft. Add 10% for delays and unforseen, gives an estimated cost on force account of $3.70 per ft. of drilling. As the formation is medium hard this cost is above average cost, but is less than contract estimates.

6. (d) The equipment to be furnished by applicant Company is:

Air Compressor driven by Butane Engine.
Butane Engine and Generator (power for pumping water.)
Cent. pump and motor and water lines from mine.
Buildings for men, equipped for six men.
Building for assay office, partly equipped.
Jeep and 2 ton truck.
Tools and miscellaneous.

All above installed at this date and in good condition.

6. (f) To purchase the diamond drills and other equipment not now owned by the applicant Company will cost as follows:

Diamond drill, gasoline driven,	$4,000.00
" " air driven,	1,200.00
Diamond bits,	1,000.00
Assay equipment,	900.00
	7,100.00

6. (g) Items under this heading included in costs.

6. (h) Contingencies not figured.

7. (a) Yes.

7. (b) Equipment rentals $4,500.00 - balance money.

Summary of Proposed Drilling Costs	Estimated Maximum
New Yorker Group	
3 Churn drill holes to 500' max. = 1500' @$6.00 ft. (contracted)	$ 9,000.00
Harqua Hala Group - Diamond Drilling	
D.D.holes (see map) on copper vein	
(a) 10 X 500' = 5000' @ 3.70	$18,500.00
(b) 2 X 1000' = 2000'@ 4.00	8,000.00
(c) 1 X 800' = 800' @ 4.00	3,200.00
	29,700.00
Golden Eagle - Diamond Drilling	
(a) 7 X 500' = 3500'@ 3.70	$12,950.00
(b) 2 X 1000' = 2000'@ 4.00	8,000.00
	20,950.00
Exploratory Holes, (not definitely located)	
6 holes @150' = 900' @ 3.70	3,330.00
Total Operating Costs	$62,980.00
Equipment Costs as given	11,600.00
Estimated Total for Project	$74,580.00

Note (a) First holes to a maximum of 500' depth.
(b) If good results on (a) then two deep holes to 1000' depth.
(c) 1 inclined hole from 4th level on a northerly course, to determine if a vein exists under the gulch, as indicated.

Diamond drilling at 100' intervals on Harqua Hala copper vein and if results warrant then holes between, or at 50' intervals.

The above figures cover the maximum footage contemplated and will probably be reduced somewhat.

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SUMMARY OF REPORT

The Marqua Hala Mine near Salome, Arizona, was one of the richest gold mines the State has had; its production is estimated at $3,500,000.00 to $5,000,000.00 at the old price of gold ($20.67 per ounce). The ore milled yielded over an ounce of gold per ton, from all accounts.

The Golden Eagle Mine produced over $200,000.00 in gold, silver and lead.

The extensive property of the Marqua Hala Minerals Corporation consists of 47 mining claims, part under purchase contract and the remainder held by location, according to information supplied by M. T. Zuver, President.

The properties warrant diamond drilling and it is recommended for the Marqua Hala and Golden Eagle claims, particularly, as a first step. Despite the splendid prospects, no diamond drilling to extend the proven ore bodies has ever been done, as far as determined. Much virgin territory remains unproven.

The New Yorker copper showing warrants a few holes to water level or below, to determine if secondary enrichment of copper has taken place.

The report gives a description of the intersecting geologic features of the property, an estimate of probable ore that may be proven by drilling and an estimate of costs and profits based on a large low grade tonnage operation. The method of treatment proposed is cyanidation, using a modified Chapman process with simultaneous granular carbon precipitation of dissolved gold.

Conditions are favorable for open-cut, mechanized mining of Marqua Hala gold ores, and underground mining of the higher grade copper-gold ores reported on the lower levels. The latter will require flotation, and a unit of this type can later be added to the cyanide plant. It will also be required for sulphide ores of the Golden Eagle Mine.

We believe the property fully warrants the expenditure of $100,000.00 for drilling and engineering expense, and if results are favorable, the initiation of a large tonnage operation.

UNION ENGINEERING CO.

By B. M. Snyder.
B. M. Snyder

REPORT OF PROPERTIES

of

MARQUA HALA MINERALS CORP.
Marqua Hala, Yuma Co., Arizona

LOCATION:

The extensive properties of the Company are located in the Ellsworth Mining District, Yuma County, Arizona, about 8 miles south of the town of Salome, which is 100 miles west of Phoenix, on paved U.S. Highways Nos. 60 and 70. The Los Angeles-Phoenix branch of the Santa Fe Ry. passes thru Salome, and several truck and bus lines use the Highway, so that transportation facilities are excellent.

From Salome a good dirt road nine miles in length gives easy access to the mine.

The mine properties cover about 800 acres at the southwest end of the Little Marqua Hala Mts. The elevation at the properties is from 1000 to 2400 ft. above sea level. The location is almost ideal for low cost operation.

MINING CLAIMS:

The total number of claims under lease to or owned by the Company is 47. They are shown on the map of claims hereto attached, and include the old Bonanza and Golden Eagle Mines, and a number of other contiguous claims.

The claims are largely within the limits of Township 4 North, Range 13 West, Gila & Salt River Meridian.

The Mining Claims held under lease by the Company or owned by location are:

Marqua Hala Group (Bonanza Mine)

Patented: (7 claims)

Gold Mountain, Gold Star & Gold Hill, Min. Survey No. 1081A
Narrow Gage, Mineral Survey No. 1097
Grand View " " No. 1103
Summit Claim, the reservoir claim, Min. Survey No. 1079
Bonanza Millsite, a water claim, Min. Survey No. 1081-B

Unpatented: (2 claims)

Dodge Lode, Recorded in Book V, page 342
North Pole " " " 9, page 297

Golden Eagle Group

Patented (3 claims)

Golden Eagle, Golden Ark and Golden Belt
Mineral Survey No. 1000.

New Yorker Group

Unpatented (13 claims)

New Yorker No. 1, recorded Book 41, page 179.
New Yorker Nos.2 to 13 inc., recorded in Book, 41,
pages 300 to 301 inc.

Queen of Fortune Group

Unpatented (4 claims)

Queen of Fortune Nos. 1, 2, 4 and 5 inc., recorded in
Book 41, pages 102 to 105, inc.

Lead Ring Group

Unpatented (3 claims)

Lead Ring No. 1, recorded Book 41, page 299.
" " No. 2, " " 41, " 309.
" " No. 3, " " 41, " 307.

Deshor Group

Unpatented (4 claims)

Deshor No. 1, recorded Book 33, page 401.
" No. 2, " " 33, " 402.
" No. 3, " " 33, " 609.
" No. 4, " " 33, " 2.

Miscellaneous Claims

Roadside Mine, Recorded Book 33, page 314.
" No. 2 -
Jackpot No. 1 Recorded Book 36, page 350.
" No. 2 -
Marble Queen, Recorded Book 41, page 170.
Nelson No. 1, Recorded Book 41, page 180.
Jones No. 1 " " 41, page 181.
Jones No. 2
Jones No. 3

The Books of Mines referred to are those of the Yuma County Recorder. The properties have not been checked as to titles by the writer, but they are reported as above given. Some are held

under lease and some of the unpatented claims were located by H. T. Zuver and others, and later deeded to the Company, Sonind Minerals Corporation, a Nevada Company. This Company has turned over its assets, subject to its liabilities to the newly formed Arizona corporation, Marqua Hala Minerals Corporation.

CLIMATE

This part of Arizona, Northern Yuma County, is desert and the mean annual precipitation is about seven inches. However, deep wells, 600 to 1500 ft. in depth, have shown a large underground storage of water and not far away a number of irrigated farms are being established.

The weather is hot in summer but pleasant for six or seven months in fall, winter and early spring. Rains fall occasionally in summer and infrequently in winter. Vegetation is sparse except along water courses. Temperatures never fall below 20° F. and 114° F. is the extreme limit in summer. Year round operation can be depended upon.

WATER SUPPLY

Both Marqua Hala and Golden Eagle shafts make a little water, perhaps ten gallons per minute for the two. The water level in the Marqua Hala shaft is just above the sixth level, or at about 210 ft. depth vertically.

The Marqua Hala has a claim known as Bonanza Millsite, about 6½ miles from the old mill, from which water was pumped thru a 3" pipe line. This line is in place and requires only minor repairs. The well, now caved, had water at 26 ft. depth.

This water was reported ample for milling, but the water table will perhaps be lowered somewhat by deep wells, recently sunk for irrigation water. It is believed that the necessary water supply can be had from deep wells closer than the old Bonanza well. This matter calls for further investigation at a later time.

There is a storage reservoir on the Summit Claim (see map) but this may need enlarging if used.

POWER

Power for mining, milling and pumping is at present provided by two butane engines driving generators and by one driving a compressor.

It will no doubt pay to bring in a power line from the present high voltage line at Harrisburg if larger scale operations are commenced. The distance will be about 6 miles.

HISTORY OF THE MINES

The following description of the historical events in connection with the operation of the rather famous old gold producer is from a 1934 report by Miles Carpenter, an engineer of good standing, now deceased. Reference is to the Harqua Hala (or Bonanza) Mine.

"This mine was discovered in 1888, and due to the quantity of rich gold ore found at and near the surface, jumped into prominence overnight, and still must be ranked in the first half-dozen of Arizona's famous gold mines.

The original locators sold out early and the property came under the control of one Hubbard, a capable mining man, who erected a ten-stamp amalgamation mill, to which he added an additional ten stamps and recovered close to $1,500,000.00 in gold before selling to an English company, the Harqua Hala Gold Mining Co., Ltd., in 1893.

The English company remodeled the milling plant, adding twenty stamps, and installed a cyanide leaching plant to treat the tailing from the amalgamation plant. The cyanide plant, which had a capacity of 150 tons daily, was one of the first in the United States.

The English company operated for about three years, and then Hubbard again secured the property. Records indicate that the English company quit when it became difficult to find ore in the oxidized zone (above the Sixth Level) that would hold up to $13.00 per ton, and their milling plant could not handle successfully the sulphide ores that were found below this level.

Since the days of the English company, forty years ago, the mine has been explored to some extent by a number of concerns, with varying results, but none of them were adequately equipped and financed to undertake a work of such magnitude as reopening this old mine.

It is impossible to ascertain the total gold yielded by this mine. Rowland Bancroft, in U. S. Geological Survey Bulletin No. 481, states that he found records of production of $3,631,000.00 up to 1911. Inasmuch as the gold was sold at various places in the early days and records loosely kept, and since in mines with pockets of very rich metallic gold, substantial amounts are always "high-graded", it is probable that an estimate of $5,000,000.00 would be more nearly correct."

PRODUCTION:

The Harqua Hala Mine has had a large production of gold, nearly all before the turn of the century. It is variously estimated from $2,500,000. up. (at $20.67 gold). A reliable estimate by a good

engineer indicates total production of gold from the properties, at 200,000 ounces gold, worth @ $30.00 gold, $7,000,000. He gives the tonnage milled as 127,000 tons, and all reports agree that the ore milled averaged over 1 ounce gold.

In addition there was some production of silver and lead. Lead produced at the Golden Eagle Mine by lessees during the years 1925-29 is given by the Arizona Bureau of Mines (Bul. #137) as 142,200 lbs. Golden Eagle also produced gold and silver from the gold vein, on which the 400 ft. inclined shaft was sunk; total estimated value $200,000.00 (probably included in totals above given, as ore was milled in Marqua Hala mill).

It is noteworthy that practically all the Marqua Hala production came from above 210 ft. vertical depth.

GEOLOGY

The structural geology of the section in which these mines are found, is very complex, and the faulting extensive.

The mountain range (Marqua Hala) consists of low, highly eroded mountains, flanked by desert plains. The basal rock is a coarse grained granite, overlain by quartzite, limestone and shale, with thin conglomerate covering, all sediments now metamorphosed.

The ore deposits of both Marqua Hala and Golden Eagle mines are epigenetic and of the intermediate depth type (meso-thermal) that is, deposition of ore was by mineralizing super-heated solutions derived from intrusives and carrying gold in pyrite and chalcopyrite, at depths of possibly several thousand feet. Erosion has been extensive thru the ages and the sedimentaries have been largely removed. Near the Golden Eagle the basal granite is exposed over a considerable area, and in the Marqua Hala workings it appears at about the 6th level or 200 ft. vertical depth, one of the veins continuing down into it to the 9th level.

The Marqua Hala mine is near the base of Martin Peak. It is in a zone of faulting striking northward, and the rich ore body was largely contained between two shears, one of which dips 45° W. and the other 45° E.

However, much low grade ore and several veins are found outside this zone, and the 6th to 9th levels show a well defined vein, (it is reported) largely in sericitized granite, with sulphides coming in and values in copper as well as gold and silver. It is stated that the vein was 6 feet wide on the 7th level, 12 ft. on the 8th, and 16 ft. on the 9th level, but the assay maps show narrow widths of samples taken on the 7th and 8th levels, except for about 45' length where widths are 3' to 10'. Water below the 6th level makes these levels inaccessible.

The basal rock is a granite, probably Pre-Cambrian in age and the overlying sediments were Cambrian and early Paleozoic deposits. The oldest were the sandstones, (quartzites) and shales, above which are the limestones.

The quartzite has been greatly faulted and fractured and the rich gold deposition took place in this rock down to the granite, which may have acted as a barrier for the mineralizing solutions. However ore has now been proven in both the underlying granite and the limestone formations; the lower levels (7th & 6th) show sulphide ore, carrying copper as well as gold, and it is possible the mineralizing solutions may have come from depths up thru the fissures in the granite. On the other hand intrusive dykes that are possibly quartz monzonite (though generally called andesite) are found and may have been the mineral carriers. Diamond drilling at depth and across the formation should tell the story and important ore bodies are likely to be found.

Miles Carpenter in his report says:

> "Along the lines of weakness, resulting from the uplift, came intrusions of porphyry rocks, one of which, a quartz-monzonite porphyry, appears to have broken through the underlying granitic mass and come in irregular contact with the sedimentary rocks. The latter movement is believed to have been in Tertiary times, the period when practically all of the great gold mines of the Southwest had their origin. Later came faulting, complex to a bewildering degree, which ruptured both the sedimentary and the porphyry rocks, making an ideal locus for ore deposition. This was accompanied by and probably followed by the hydro-thermal agency that altered the rocks beyond recognition and deposited the gold. The abundance of pyrite casts and occasional grain of unaltered sulphide indicates that the gold was originally deposited in pyrite.
>
> There has unquestionably been a strong concentration of gold in the upper reaches of the mine.
>
> The sedimentary rocks were certainly not the source of the gold. The quartz-monzonite porphyry may have been, or the metals may have come from a deeper source and were precipitated in the porphyry and overlying sedimentaries. Certain it is that the ore was directly connected with the faulting, the major ore bodies following the lines of major movements."

There are two apparent veins, the No. 1 or Bonanza, and the No. 2 vein both north-south in general.

Two main fracture systems are recognized in the Marquo Mola mine, the north-south gold bearing veins and the east-west fractures which are probably post mineral.

The north-south fissures are called No. 1 (or Bonanza) and No. 2 (or Iron Vein) and both are mineralized, particularly where the shattered quartzite or the dyke rock is the host rock. No. 1 vein dips west and the Iron Vein also, but dips vary greatly and faulting is common.

The veins are not well defined but are a series of fractures, forming ore shoots along their course and across from one to the other in a complex manner.

Quoting Miles Carpenter again:

> "The Iron Vein strikes northerly, dips to the west at angles 20 degrees to 30 degrees, and has a width probably averaging more than ten feet. The Castle Garden or Porphyry Stope has an unbroken length of 300 feet, a width up to 120 feet, and a height averaging some 40 feet. In the Iron Vein the gangue is principally quartz, with minor amounts of feldspathic material, the whole strongly stained with iron oxide.
>
> The Castle Garden Stope has a predominance of quartz, but the greater portion of this stope is in monzonite porphyry, and the alteration is to sericite, impure kaolin and chlorite. The richer ore is metallic gold in quartz and is usually found at the intersection of faults, which in this mine are numerous.
>
> Smaller ore bodies occur within the mineralized area without any regular order, system or regularity. Many of these have been found and stoped, but others undoubtedly are yet to be opened.
>
> Practically speaking, no "waste" was mined from the Iron Vein or the Castle Garden Stope, the entire vein filling going to mill. It was only when exploration work was started below the Sixth Level that the waste deep appeared.
>
> Undoubtedly, most of the ore mined averaged $30.00 (old price) per ton or better, just as broken."

The Iron Vein is apparently the one on which the deeper levels have been opened in the granite. Here the ore is quartz and sericitized granite, with pyrite and chalcopyrite in small percentage. Gold values are good as reported and copper is said to average 2%, but the great widths of ore stoped in the quartzite are unlikely to be found. The latter are irregular replacements extending out from ore fissures. It is doubtless true that many of the rich seams of gold ore remain untouched, within the Marque Hale low grade ore body.

The rich ores of the mine showed free gold and iron oxide in a gangue of quartz, calcite and brecciated quartzite. Sulphides

did not show up until about the sixth level and they are pyrite, chalcocite and chalcopyrite largely, in a gangue of altered, sericitized granite and quartz. The zone of secondarily enriched copper ore is shallow and the primary ore at depth may be low grade. However, many things can happen and diamond drilling at depth may surprise everyone.

To the west the Quinn shaft is reported to have cut a 20 ft. lode of gold ore at 300 ft. depth, on what may be the Iron Vein on its western dip. As this lines up with the vein found in the granite on the 7th and 8th levels to the north, it may prove to be the same fracture and should be tested at depth.

East of the knoll on which the Glory Hole and the ore bodies are found, there is a wide, flat gulch of gravel and boulders which may have followed a north-south fault parallel to the No. 1 fissuring. A well has been dug in this gulch to a depth of 100 ft. and is in gravel and broken rock, some boulders reported carrying good gold values. To test the theory that another ore body occurs here, drilling is fully warranted. Part of this work could be done from the eastern workings of the fourth level.

At the Golden Eagle the geologic conditions are similar but the rocks are less broken and the mineralization of less extent. There are two parallel veins with a gold ore-shoot and a lead gold-silver shoot, both of which have produced good ore and apparently go down.

The lead vein is largely in limestone, while the gold vein is in quartzite and granite. The original sulphides of iron, lead and copper have been oxidized in the upper levels and are now oxides or carbonates of the metals. Copper enrichment can be expected at permanent water level, about 400 ft. depth, and if the veins continue down in the basal granite, primary ore may be of commercial value. Drilling is warranted to determine conditions at depth.

There is a distance of 4000 ft. from Marqua Hala Mine to Golden Eagle and this section also should be drilled. Some of the claims between the two mines are owned by others but could be optioned prior to drilling.

DEVELOPMENT

MARQUA HALA MINE

The large maps of the Marqua Hala and Golden Eagle workings indicate total footage of nearly 3 miles of underground work. One of the Marqua Hala maps (No. 101) shows the topography and location of shafts and buildings, and is included in this report.

At the Marqua Hala much ore was produced by the Glory Hole method, and underground by large stopes, as much as 70 ft. in width, all above the sixth level (210' vertical). Two veins are recognized,

the Iron Vein and the Bonanza Vein.

The Marqua Mala workings at start of operations were a shallow shaft and an adit, with drifts and stopes therefrom. Later an inclined shaft was sunk on a dip of 57° to what is now the 6th level and ore was hoisted in a skip to bins at surface. This shaft is in good condition and can be used at any time. It dips away from the Iron Vein, and it will be noted that it is planned to hoist ore, under the proposed quarry operation, by inclined belt conveyor.

The lower workings are reached thru a winze from the 6th level and a better way of handling the sulphide ores may have to be provided at a later time. The various mine maps show the levels clearly and are available for reference.

Other shafts are:

The Iron Shaft, on the Iron vein is 580 ft. southeast of the main working shaft and its dump of red ore carries about $6.00 in gold.

The Quinn Shaft, is 310 ft. deep vertically, single compartment. It is about 630 ft. south of the working shaft. Several other shallow shafts and cuts are shown on the attached map, nearly all in low grade ore.

On the Grand View claim, east of the Quinn Shaft, there are several cuts and tunnels on ore bodies in the limestone. These ore bodies are low to medium grade in gold and silver, and with a large mill could be mined by leasers to advantage.

Miles Carpenter made a report with very complete maps, and many assays shown thereon. His estimate of tonnage (grade not stated) is shown in the appendix. As to values, a reliable engineer who has examined the mine on various visits, thinks there is a possible tonnage of 4 million, with values of $2.00 to $3.00, which will be sweetened to $4.00 by pillars and bunches of higrade encountered in mining the large ore-bodies by open cut or glory hole methods. Cyanidation will recover over 90% of the gold and 60% of the silver, he estimates. As costs would be low, under the conditions obtaining, $3.00 average recovery would show a good profit if operated on a scale of 1,000 to 2,000 tons daily.

The appendix also gives an estimate by C. C. Thompson, E.M., former engineer and assayer at the mine.

GOLDEN EAGLE

While under the same present ownership, Golden Eagle was largely operated by other interests and leasers than Marqua Mala operators. Its total production of gold, silver and lead is stated to have been $200,000.00 or more, much of the ore having been milled in the Marqua Mala stamp mill and cyanide plant.

Two shoots of ore are found, one of gold-silver ore and one of gold-lead ore, the latter in carbonate form. Both shoots lack continuity as far as explored, but warrant exploration at depth, preferably by diamond drilling. The incline shaft is 400 ft. in depth on the incline of 57°, and has levels at the Adit or 100' level, 260' and 300' level.

The principal work has been on the Adit or Main Level, which extends south to the lead ore shoot. As the shaft has had pillars removed in places, it is in bad condition and requires some timbering for safety.

A winze has been sunk about 60 ft. in depth on the lead ore and a sample taken of the ore removed therefrom showed good values in gold, silver and lead.

The lead ore shoot has been partially sampled by N. F. Zuver, Frank Wickes, E.M., and the writer.

Numerical averages of assays by above:

	No. Samples	Average Gold oz.	Silver oz.	Lead oz.
N. F. Zuver	11	.067	1.49	8.44
Frank Wickes	11	.07	.82	9.92
D. M. Snyder	8	.030	.4	9.00
Average (numerical)		.050 oz.	.00 oz.	6.35%

Average width sampled by the writer, 9. ft. This ore is medium grade, of fair width and in a large mill would show a profit. The present small mill is to be considered a pilot plant only.

Diamond drilling at depth on both ore shoots is likely to show good results. It is claimed there is a wide vein of copper-gold ore in the bottom drift, at present under water.

NEW YORKER CLAIMS

On the large New Yorker group there is a copper showing of considerable extent, believed by some to be the outcrop of a porphyry copper, but which I consider doubtful. However, the showing is good enough to warrant putting down one or two churn drill holes at a later time, possibly using the churn drill required for drilling at Marqua Hala.

There are a number of shafts and cuts in this area, extending over several acres, which show copper carbonates and small gold values. Four samples of the dumps at four of the shafts are shown in the appendix; average copper content was 0.30%.

One of these shafts, known as the sulphide shaft is about 85 ft. in depth vertically. At 40 ft. depth a drift has been run 40 ft. in length. Water comes in below this depth and sulphide ore is encountered there. The average of a 40 ton dump of disseminated sulphide ore gave 1.40 oz. silver and 0.75% copper, very close to ore grade if extensive enough.

Water level here is nearer the surface than at any shaft on the property, indicating a possible fault or dyke damming the water above it.

MARQUA HALA ORE BODIES

The Marqua Hala Mine has produced a substantial tonnage of an excellent grade of ore, leaving mainly low grade and waste in the mine as far as now exposed. There are some very good faces of ore but due to cost of getting them out and shipping to distant mill or smelter no one has tackled them in recent years. Lessors produced a fair tonnage many years ago before wages were so high.

As an example of the values that formerly existed in the mine, the assay map of the fourth level shows 89 samples averaging $32.50 gold per ton in the northern part of the workings. Part of this ore has been mined by lessers since the map was made, but some good ore is still available.

On the sixth level the map shows a tonnage of ore assaying $12.52 for Section 1 and $10.36 for Section 2. The vein here is narrow and lower grade than on the upper levels. It will be readily seen that these medium grades, of which there is doubtless a considerable tonnage, cannot be mined by the usual underground methods at a profit, but if removed in the course of quarrying the whole deposit, they would "sweeten" the grade of ore materially.

It is interesting to note that a drift on the 6th level nearly 200' vertically under the "glory hole" gave an average for 22 samples of $1.67 per ton, indicating that mineralization of the entire formation continues to this depth. At the glory hole and in cuts near the surface, the maps show for 85 samples, an average of $4.29 gold per ton, along a length of 400 ft.

The Principal Assets of the Marqua Hala Mine today are:

1. Sulphide ores at depth below the sixth level. The old assay maps show good gold values on both the 7th and 8th levels with some copper present.

The sulphide ores opened on Levels 7 and 8 have been sampled and results are shown on the assay maps (no widths given). The results are averaged as follows:

		Gold Values
7th Level - 200' length of ore shoot		$19.90 per ton
6th Level - 320' " " "		33.57 " "
The 9th Level map shows only 2 assays -		$ 17.50 " "
	and	$ 10.50 " "

The vein on these levels is in basal granite and is apparently well defined, the dip is from 45° west to 90°, whereas on the upper levels in the quartzite the dip of veins is flatter, from 20° to 40° west. Sulphides come in at the permanent water level, which is at or a little above the 6th level. The ore on that level shows pyrite in places, with some chalcopyrite. It is altogether likely that the veins in the granite will be lower in gold but higher in copper than on the upper levels, where malachite (copper carbonate) is often seen in places.

In this connection it is reported that there is a copper ore body shown on the 6th level, carrying a 5.2% copper, $44.00 in gold and 7.4 oz. silver. This is shown on one assay map, but the width and length are not shown.

R. N. Dickman reported in 1914 on this showing on the 6th level where work was then in progress, as follows:

> "The south sulphide ore body on this level is by far the most important discovery as yet made in your work on the Bonanza Mine. Development has not proceeded far enough to prove any definite tonnage, but an ore body 45 feet long on Level 7, with a width of 10 ft. at that point, a width of 12 feet in the intermediate level and of 16 feet on Level 6 must prove of considerable size. Aside from the high grade ore the body seems to have a value of $12.00 per ton in gold($ 020.67) and the concentrates will have a commercial copper value."

It appears probable that the mineralizing solutions came up from considerable depth along the fractures or shear zones and spread out in the brecciated metamorphic rocks, particularly in the quartzite, making the large and rich ore bodies stoped out down to the fifth or sixth level. At this depth the shear enters the underlying Pre-Cambrian granite and it is reasonable to surmise that the mineralization came from a buried intrusive, possibly a monzonite. Certainly the mineralization could have come only from a buried intrusive or from the dykes of igneous rock that are found in or near the ore body.

For the above reasons and to prove the existence of a good vein for copper-gold ore at depth, we are recommending diamond drilling below the 9th level, as well as laterally along the vein at the 9th level.

2. Quinn Shaft. The Quinn Shaft is about 650 ft. south of the Marqua Hale inclined shaft. It was sunk in early days to a depth of 310 feet and is a vertical single compartment shaft, at present inaccessible at depth because of water.

It has a drift and cross-cut near the bottom that cut the Iron vein 20 ft. in width; said to have good gold values. T. E. Parish, an engineer of good reputation stated in his report dated Jan. 29, 1906:

> "On a claim owned by Quinn Bros. and near the side line of the south line of the Gold Mountain claims a vertical shaft was sunk 306 feet deep; at the bottom a drift was run to the quartzite to the east, and one to the south in which nothing was found. They then drifted west to the line of this Company's ground and cut the Iron Ledge on its dip from the Golden Star claim 20 feet wide, they then came back and sunk a winze 20 ft. from the end of the drift in the ledge 35 feet. The end of the drift is filled with material taken from the winze. A general sample of the winze taken across the winze 0 ft. from the bottom every few feet, to within 6 feet of the top, assayed $6.40 (equivalent to $10.01 at $35. gold). The entire winze is in ore and the ledge seems to stand nearly vertical.
>
> The drift run from the bottom of the Quinn Shaft is 70 ft. lower than any workings in the Bonanza ground. It disclosed a large ledge of good ore, having its apex in the Bonanza claim, and consequently the property of that Company."

It would not be an expensive job to make the Quinn Shaft accessible for examination and this is recommended, as all accounts indicate an ore body at depth on this ground.

East of the Quinn Shaft on the Grand View claim, there are several tunnels and shafts showing ore of good widths.

3. The main attraction of the Marqua Hale at present is the large indicated ore body of low grade ore surrounding the rich pockets and veins that were mined many years ago. Gold values are found over a large area at the surface, averaging over $2.00 as indicated by the old assay maps, and if the whole structure had been mined by open-cut quarry the average would have been more than double that value per ton, it seems sure.

It would appear that the first step to confirm the tonnage and values of this large low-grade ore body should be the drilling of the structures, partly by diamond drilling and in the workings long-hole drilling could be used to some advantage as it is cheaper than diamond drilling.

On the assumption that drilling will show the results claimed by C. C. Thompson and others, and using the maps prepared by Miles Carpenter after careful survey of the property, with several engineers collaborating, the following estimates are tentatively submitted:

ORE TONNAGE ESTIMATES - MARQUA HALA MINE
(based on maps made by Miles H. Carpenter, M.E., 1934)

	Ore Tonnage	Average value, gold.
Zone A, (420' x 200' x 100' depth)	900,000	$1.70 per ton
Zones B-1, B-2, & B-3 (to 60' depth)	630,000	2.07 " "
Zone C (82' x 400' x 80' depth)	200,000	2.31 " "
Zone D, south (363' x 110' x 80' depth)	246,000	2.62 " "
Equalized Average		2.29 " "
Zone E, (339' x 22/7 x 130 x 4/3	2,900,000	
Total Tonnage	4,476,000	

NOTE: Values given are averages of all assays shown on maps, except that assays over $10.00 have been eliminated. Zone D shows $4.45 average including assays over $10.00.
Zone E is a circular area under the other zones extending to the 6th level, where basal granite begins to come in.

In addition to the above tonnage, there are the following:

Mill tailing (unworked) estimated 40,000 tons, $4.20 gold.
Ore dump at Marqua Hala " 20,000 tons, $5.00 gold.

This estimate of tonnage and values covers ore within the zones to the depth of the 6th level, or about 300 ft. vertical depth. I consider the tonnage estimate on the high side and am using the figure of 3,000,000 tons.

As to the values of such tonnage the assay maps show surface values averaging $2.29 gold per ton, which checks with my average for 3 large tonnage samples of $2.42 per ton. However, all engineers consider and I agree, that the high grade and medium grade veins within the ore bodies would make an average close to $4.00 per ton. As an example, I took a sample across 3 ft. of ore on the 4th level and it assayed $14.00 per ton in gold.

For this reason, I am estimating, subject to later confirmation by drilling as recommended herein, that Marqua Hala can produce by open cut work, 3,000,000 tons of ore averaging $3.60 gold per ton mill run with minor values in silver. This would be a ten year supply of ore for a mill of 1,000 ton daily capacity.

Carpenter's and Thompson's tonnage estimates are shown in the appendix and are much higher than this, it is to be noted.

This estimate does not take into consideration the substantial tonnage of ore that may be found by drilling the Golden Eagle

Mine, and other tonnages likely to be developed on other veins and outcrops on the property, and on nearby claims owned by others that have done some development work and made shipments in the past. A mill located within a few miles would encourage lessors and owners of nearby prospects to start work again.

The estimated tonnage of tailing on the property seems low, considering that about 120,000 tons of ore was reported milled in the stamp mills at various times, but much of these tailings have been re-worked and scattered. The values in the tailings are high, indicating a rich mill head, probably $35. or more (@ $35.00 gold). The average of all gold assays on the tailings is approximately $4.20 per ton. I checked a dump of about 9,000 tons said to be the highest grade and my carefully taken sample showed for this one dump $3.80 gold and $ .17 silver per ton.

T. E. Parish, who reported on the mine in 1906, estimated 100,247 tons of tailings at that time, with average values of $2.49 per ton (@ $20.67 gold) equivalent to $4.20 per ton at the present price, which checks closely with later samplings.

The estimated tonnage of low grade ore on the dump at Marqua Hale is 20,000, - average value as sampled by Mr. Zuver close to $3.00 per ton.

PROPOSED METHOD OF MINING AND MILLING

Assuming that the drilling program recommended confirms the size and values of the large indicated ore body on the Marqua Hale group of claims, we believe open-cut or quarrying operation of the property would be the only economical method for mining this large ore reserve. Mechanized mining and handling of ore is a "must" in present day operations.

The use of churn drills and wagon drills are indicated for drilling and breaking the ore, following practice in some porphyry coppers using quarrying methods. Forty foot benches of hard monzonite are drilled in this way at New Cornelia and costs in 1943 were 4.23 cts. per ton for drilling and breaking, using 40% powder and primacord for firing. To compensate for lesser tonnage and increased costs in recent years we have tripled this cost, based on mining at the rate of 1,200 tons daily.

It is proposed to install a large jaw crusher on the 6th level of the mine with 2 branching upraises to surface for ore delivery and storage. The crushed ore would be brought to surface near the mill by an inclined (10°) belt conveyor, about 600' in length.

The broken ore in the quarry after breaking boulders, would be pushed to the raises by a bulldozer, or when too far away picked up by a 2½ yd. shovel and loaded into ten yard dump trucks. Waste and overburden removal would be handled in the same way by shovel and truck, probably on the afternoon shift. It is believed

that 1,200 tons daily can be delivered to the crusher chutes with one-shift operation, at a cost of less than 10¢ per ton of ore. This does not cover waste removal, which is figured to be 1 ton for each 4 tons ore, and to cost 40¢ per ton of waste broken and hauled to dump.

Crushing in the underground crusher to 4" ring and delivery by belt conveyor to secondary crusher on the surface should not exceed 7¢ per ton, based on crushing 1,200 tons in 8 hrs., with one man operating the equipment. Apron feeders would feed the crusher automatically.

Secondary crushing to a size (3/4" ring) suitable for ball mill grinding is estimated to cost 6¢ per ton, and grinding and classification, to 65% minus 200 mesh 16¢ per ton of ore.

From the classifier, the overflow will go to cyanidation tanks, using the improved Chapman process (see appendix for details). In this process gold is dissolved by agitation with weak cyanide solution, with simultaneous and rapid precipitation of gold on activated carbon held in a screen container in the agitation tank. The gold precipitates when built up to 40 to 50 ozs. gold per ton of charcoal, is dissolved by Caustic Sodium Sulphide and precipitated on cathodes, by electrolysis, or by solution of the gold with hot cyanide solution and electrolytic precipitation of gold and silver. These two methods of carbon desorption have been developed by the U. S. Bureau of Mines.

This method of recovering the gold is much improved over Chapman's original method, using powdered charcoal, which after loading with gold, is floated out and dried and burned. In this connection Chapman & Winters operated a pilot plant on Marque Hale tailing, with results as given in the appendix. It is estimated that 90% net recovery of gold can be made.

It should be stated that coarse gold in the ore will be recovered by use of a mineral jig in the grinding circuit, and amalgamation of hutch product.

We estimate, subject to confirmation by later testing, cyanidation costs of 60¢ per ton ore, with an additional cost of 8¢ per ton ore to cover recovery and melting of gold.

The Company operating the mines many years ago had reported costs of $3.00 per ton for mining and milling. This covered underground mining, stamp milling and other operating expenses. Profit margins were high with the rich ores mined, and such low costs.

Summarising above estimates, we have:

PRELIMINARY ESTIMATE OF COSTS

Mining and Milling
1,000 Tons Daily

Open Cut Mining to 100' Depth		Per Ton Ore
Drilling and breaking		$ .120
Delivery to underground crusher		.15
Removing waste and overburden (40¢ ton) (est. @ 25% of ore)		.10
Coarse crushing underground and delivery to mill by belt conveyor		.07
Secondary crushing and screening in mill		.06
Ball mill grinding and classification		.16
Cyanidation, using modified Chapman process, as described		.60 *
Recovery, melting and marketing of gold and silver		.08
Water supply, pumping, etc.		.035
General overhead, incl. management, engineering, taxes, etc.		.19
		1.930
Add 5% for delays and unforeseen		.09
Total Estimated Operating Cost - -		1.61
Royalty, 5% of $3.24 recovery		.16
Amortization of Plant	$1,000,000. / 3,500,000 =	.29
Total - - -		$2.06

* In absence of exact figures derived from costs on ores this cost is tentative, and is probably high.

ESTIMATED PROFIT PER TON - HARQUA HALA ORE

Based on data and estimated costs given on preceding pages and assuming that diamond drilling proves the ore body to be as expected, both as to size and grade, we estimate the profit per ton and per operating month as follows:

1,000 tons daily mined by open cut, crushed and milled in a cyanide plant using the improved Chapman process described herein:

	Per Ton Ore
Estimated Recovery, gold (90% of $3.60 per ton)	$3.24
Estimated costs as given herein	2.06
Estimated Profit, before Depletion and Income Tax	$1.18
30,000 Tons monthly @ $1.18 =	$35,400.00

PRESENT VALUE OF EQUIPMENT AND DEVELOPMENT

The equipment and buildings, as listed in the appendix have an estimated replacement value of $ 75,000.00
- nearly all usable for future operations.

Development work including adits, shafts and other workings, have a potential value for future operations of at least $100,000.00

Total Value of Equipment and Development is thus estimated at $175,000.00.

CAPITAL REQUIREMENTS

For drilling the various showings on the property, particularly on the Marqua Mala and Golden Eagle claims, there should be provided $100,000.00.

This will cover engineering, assaying and drilling expense, using diamond drills for long holes and ordinary drills with extension rods for short holes.

If favorable results are secured, then mile and mill equipment and other required expenditures are preliminarily estimated to cost as follows:

Mine equipment, installed - Churn drills air drills, power shovel, bulldozer, 2 trucks and crusher.	$200,000.00
Power line and transformers - 6 mile hi-tension line, with step down transformers, etc.	50,000.00
Mill, 1,000 ton, cyanide plant - Chapman modified process, completely installed.	600,000.00
Water Supply - wells, pumps, and water lines, etc.	40,000.00
Office and Laboratory equipped -	35,000.00
Shop Equipment -	25,000.00
Housing and Equipment -	50,000.00
Total Plant Expense	$1,000,000.00
Working Capital	100,000.00
Total Capital -	$1,100,000.00

NOTE: Mine equipment on the ground at present includes 2 compressors, some drills, mine cars, etc.

The estimated cost of a thousand ton a-day cyanide mill, including crushing and grinding equipment, tanks, etc., may seem low but the plant is to use a modified Chapman process (with activated carbon precipitation of gold) which is much cheaper to build than the usual plant. Tailing is discharged as a sludge from a thickener, recovering 75% of the water and cyanide, no filtration or washing required.

The new water required will not exceed 200 gals. per ton ore, or 170 gal. per min.

Housing required is in addition to the seven buildings now at Marqua Mala, all usable with slight repairs.

RECOMMENDED WORK:

Unquestionably the first work to be done at the mine is to drill the Marqua Mala and Golden Eagle sections of the property, and later the New Yorker copper showing.

Drilling will determine the extent of the payable ore in the large low grade Marqua Mala ore body and also extensions of the veins laterally and at depth as to widths and values.

Drilling of the Golden Eagle Mine at depth will prove up value at the reported wide copper-gold vein, as well as the extent of the lead-silver-gold ore chute.

To do this work there will be required $100,000.00 and the outlook is favorable that a large tonnage of commercial ore will be proven by this work.

When completed, an appraisal of the mines can then be definitely figured, and size and character of plant and equipment determined.

Respectfully submitted,

UNION ENGINEERING CO.

By B. M. Snyder
B. M. Snyder

Los Angeles, California
December 1, 1933

ASSAY SHEET

LAPIN ASSA MINE

No.	Description	Width ft.	ASSAY Gold oz.	Silver oz.	Value per Ton
20.	Across 5' above FW at edge of small stope on 6th level.	5.0	.40	.11	$16.00
21.	1 inch streak iron oxide on 6th level.		.03	.11	1.75
22.	Gen. ave. of 300 tons broken ore and waste in old Castle Garden Stope.	30 to 60 ft.	.05	.11	2.10
23.	Gen. ave. of broken ore west half of Glory hole at north end. (Est. 900 tons)		.06	.03	2.18
24.	Gen. ave. of est. 600 tons broken ore, east side of Glory hole at north end (100' width of Glory hole)		.03	.2	2.26
	Average of #22-23-24				$ 2.42
35.	Average of broken ore in stope on 6th level.	Tonnage 0.30	.15	None	$ 5.25
6.	Gen. ave. of M. M. tailing pile below shaft. (Tonnage under 10,000).		.16	.19	$ 5.77

ADAM [illegible]

SAMPLES FROM [illegible]

No.	Description	Width ft.	Gold oz.	Silver oz.	Lead %
	Lead Vein				
S-1 South Drift	Across face of South drift on adit level.	4.0	.02	.13	1.03
S-2	Average of broken ore in stope above adit.	6.0	.12	.52	6.10
S-3	Across roof of drift at 8' from face, at S. edge of stope.	7.0	.05	.50	2.27
S-6	Across slashed drift at 36' from S. face.	7.5	.02	.6	10.50
S-7	Across north face of drift from 15' winze at 50' from S. face of main level.	4.0	.02	.43	1.35
S-8	2 cuts across black ore in same drift.	1.0	.02	.53	5.54
S-9	Across 5 ft. at S. edge of stope.	5.0	.02	Nil	4.0
S-10	Com. av. of 500 tons fill from lead vein, partly from 60' winze.		.02	.5	7.34
	Numerical Average		.038	0.4	5.08
4.	Concentrate from over-size of Cottrell screen.		.10	.65	6.43
	Gold Vein				
S-11	Com. av. of broken ore in old stope, vein 15' to 20' wide.	15'	.04	0.55	

ASSAY SHEET

MAY TONNES CROP

No.	Description	ASSAYS Gold oz	Silver oz.	Copper %	Total Value per Ton
31.	Av. 10 ton dump from 20' shaft near line between M. Y. #1 and #2.	0.05	0.69	0.30	$4.11
32.	Av. of 40 ton dump at "Sulphide Shaft" 83' deep and 40' drift.	Trace	1.48	0.75	$5.68
33.	Av. of 100 ton dump from 25' shaft and 30' open cut to shaft	0.01	0.19	0.32	$2.37
34.	Avg. of 20 tons on dump of 8' shaft	Trace	None	0.14	$0.01
	Numerical Average	0.015 oz.	0.6 oz.	0.35	$3.27

ORE TONNAGE ESTIMATE - [illegible] MINE

(from Miles Carpenter map)

					APPROXIMATE TONNAGE
Zone (A)	420 x 280 x 100	= 11,760,000 cu.ft.	=	904,615 tons	900,000
Zone B_1)	170 x 160 x 40 +1/2 x 210 x 90 x 172.5	= 1,993,625 " "	=	153,355 "	153,000
Zone B_2)	222.5 x 160 x 40 x 2	= 1,780,000 " "	=	136,923 "	137,000
Zone (B_3)	63200 x 40 +1/3 x 63200 x 90	= 4,424,000 " "	=	340,307 "	340,000
Zone (C)	82 x 400 x 80	= 2,624,000 " "	=	201,846 "	200,000
Zone (D)	4/5 x 508 x 400 x 80	= 13,004,800 " "	=	1,000,369 "	1,000,000
Zone (E)	335^2 x 22/7 x 190 x 4/5	= 36,681,450 " "	=	2,821,650 "	2,500,000
Zone (F)	335 x 22/7 x 155 x 4/5	= 43,735,573 " "	=	3,364,275 "	3,000,000
Zone (G)	Tailings				150,000
				Total	8,350,000 Tons

ORE TONNAGE ESTIMATE - [illegible] MINE

(as given by C. C. Thompson, E.M.
former Assayer and Engineer at the
Mine).

(See following page).

G. G. [illegible]
Mining Engineer
U.S. Mineral Surveyor
P. O. Box 36
Bisbee, Arizona

Marguerite, Arizona
December 19, 1934

Marguerite Gold Mines Co., Inc.
Solomo, Arizona

Gentlemen:

For purposes of ore blocking, assay and appraisal, the hill in which the present Bonanza Mine is located was divided into a multiple of zones, each of which is given a letter, as (A), (B), (C), etc., for purposes of identification.

The valley floor, from which the hill, in part, protrudes, is at a variable elevation of from 1,650 to 1,800 feet above sea level. It was decided to take this lower level (1,650 ft.) as datum or as a so-called "basal plane," and from the outset to divide the hill into two major sections: that portion above the basal plane to be divided into four sections, or zones, as (A), (B), (C) and (D) and each to be analyzed separately; and, that portion below the basal plane (1,650 ft.) to be divided into two great zones, (E) and (F), each to be similarly treated.

ZONE (A) is that section west of base line through Glory Hole and having as its north and south dimensions 440 feet and as its east and west dimensions 220 feet. It has as its central point, Station A200+220. The east side line is some 10 to 20 feet west of west edge of Glory Hole. The west side line is 200 feet to the west. The north end line strikes east and west through main shaft collar. The south end line is some 30 feet north of the Manganese Shaft collar. These surface lines are projected down to the basal plane (elev. 1,650 ft.).

ZONE (B) is that section being represented in surface area as all of that area east of base line and within contour elevation 1,650 and projected downward to basal plane (elev. 1,650 ft.).

ZONE (C) is that section in Glory Hole west of base line and projected downward to basal plane (elev. 1,650 ft.).

ZONE (D) is that section west of base line and not included in Zones (A) or (C), and otherwise known as the fringe or outside zone, and all within contour elevation 1,650, and in such zone projected downward to the basal plane (1,650 ft.).

ZONE (A) is a circular-shaped area projected downward from the basal plane (elev. 1,650 ft.) to a depth of 150 feet. (Elev. 1,720 ft. being the floor of the Sixth Level.) Such area having a radius of 335 feet and as its pivotal or central point, a point vertically under Station A2000120.

ZONE (B) is a continuation of Zone (A) extended downward 155 feet to the bottom of the mine (bottom of Ninth Level, elev. 1,965 ft.)

ZONE (C) embraces all mill tailings piles.

As an appraisal, for purposes of estimating size of plant, kind of operation, available tonnage, life or duration of proposed operation, tailings disposal requirement, water in and out of mine, physical investment required, working capital required, and the numerous other factors, the following table is thought to be sufficiently conservative for all requirements and to allow, in addition, an appreciable factor of safety:

ZONE ZONE TONS IN SHORT AND VALUE

Zone (A)	1,000,000	tons	average	$3.22	total	$ 3,220,000
Zone (B)	960,000	"	"	4.40	"	4,312,000
Zone (C)	100,000	"	"	6.58	"	658,000
Zone (D)	1,000,000	"	"	3.22	"	3,220,000
Zone (E)	2,803,000	"	"	3.16	"	8,875,280
Zone (F)	3,921,440	"	"	3.16	"	10,011,790
Zone (G)	273,400	"	"	3.70	"	1,011,580
	9,582,840			$3.92		$32,106,610

All of the foregoing takes into consideration not to exceed two-thirds of the mineralized areas of the Gold Star, Gold Mountain and Gold Hill properties, all patented. Other properties of the company, patented and unpatented, and contiguous to those properties blocked out and assayed for purposes of this appraisal, contain valuable ore that can be brought to mill and the same kept working almost indefinitely.

Respectfully submitted,

G. G. THOMPSON, E. M.

Supporting data
submitted herewith.

[illegible] PROCESS PILOT PLANT

[illegible] PARA [illegible]

In 1941 Chagnon & Winters operated a small pilot plant (for Anglo-Pacific Mining Co.) to test the process on a gold ore. They used unground tailing in small concrete cyanide tanks with powdered activated charcoal as precipitant, which when loaded with gold ore floated, dried and burnt to recover gold. Average results of 9 tank runs were published as follows:

	Tons	Assay Gold ozs.	Assay Total Gold ozs.	Assay Recovery Gold
Barqua Dala Tailing (Heads)	139.	.039	16.759	100.0
Carbon Concentrates	0.5744	21.76	12.499	74.7
Barren Solution	796.	.0009	0.68	4.1
Tailing	138.4	.019	3.56	21.2

Cyanide solution was made alkaline with lime and contained 0.5 lb. cyanide per ton of tailing. Note that these tailings were not reground from original stamp mill crushing and were too coarse to free all the gold.

At Sahuarita other tests were conducted using coarser carbon in a container and desorbing the enriched carbon by use of hot cyanide solution under pressure. This gave the following results:

With Container for Carbon 63 hr. test.

	Weight lbs.	Tons per 100 W. Heads	Assay oz. Gold	Percent Recovered
Heads	3780	100.0	0.036	100.0
Carbon	6.65	0.219	41.65	92.7
Barren Sol.	6365	170.0	0.0012	2.1
Tailing	3780	100.0	.005	5.2

The desorption of gold from the carbon in Test 11 (above) showed a recovery of 98.4% of the gold, and the carbon was clean enough to use again. These results indicate 98% recovery or more of the gold can be made by the process on Porgua Bole low grade ore.

APPENDIX

Extracts from Bulletin 491 of United States Geological Survey. (1911)

Margua Dolo mine is located in the central part of the Ellsworth or Hancock District.

Total production has been $3,631,000.00 (0.920.67 gold). Margua Dolo Mining Co. reports a cost of $3.00 for mining and milling.

GEOLOGY

Basal rock, not exposed at the mine, is a coarse grained granite and has the composition of granite. It is highly impregnated with pyrite at Golden Eagle 1 mile east of north from the Bonanza. The eroded surface of this granite appears to dip southeast.

The sedimentary rocks in which the deposit occurs, have a few feet of reddish quartzitic grits for a base, and over this 100 ft. or more of intercalated lime and argillaceous shale, above which is a thin conglomerate, capped by several hundred feet of schists and gray lime. The series is tilted in varying directions and dip near top is 20° to 60° north.

The whole series is intersected by dark colored basic dykes, and veinlets of quartz and calcite are found.

As viewed underground the ore shoots seem to have occupied zones of shearing extending through the sedimentary series of intercalated limestone, shale and quartzite into the basal granite formation. This is exposed in places in lower workings on the 6th and 7th levels, and is a coarse grained granitic rock, severely crushed and fractured, and pyrite deposited along brecciated zones which are now filled with sericite derived from decomposition of feldspars.

EQUIPMENT AT MARGUA DOLO MINE

1 - Hercules gasoline (butane used) engine, 150 HP 6 cyl., portable on skids, with radiator and V-drive pulley: driving 20 KVA generator, with Westinghouse D.C. exciter.

1 - Butane Tank. (Rocky Mtn. Co.) 1946 - Ser. 15570, 250# max. pressure. 1/2" steel plate, 42" diam & 8' long.

1 - Centrifugal pump 1-1/2" dia. (in shaft) driven by 3 HP motor.

Pipe line from mine to Reservoir and to Golden Eagle mill, with 3" canvas hose to 3" water line, reduced to 2" std. pipe.

1 - Hand frame, heavy timber, 32' to sheave wheel 18" diam, overall height 35 ft. with ore pocket, 9' x 9' area. 30 tons capacity. Skip dump over bin.

1 - Chicago, 360 cu. ft. Air Compressor.

[illegible] EQUIPMENT

1 - Compressor, Worthington 1 stage. Feather valve type, 8½" x 9", with 20" x 60" receiver. Ser. [illegible]-31027. Driven by 4 cyl. [illegible] engine 6 V-belts from clutch pulley to comp. flat pulley.

1 - Dodge 1 ton truck, 1936, weight 5160#. Eng. [illegible]-166195. Ser. [illegible]9,261,886.
1 - Chevrolet 5-ton Dump Truck.
1 - Front end loader and tractor.

Mine cars, trackage, drills, etc.

[illegible] EQUIPMENT

Ore Bins

Upper Bin (coarse ore) 8.5' x 8', 30 deg. sloping bottom
Fine Ore Bin, 10' x 10' x 10' deep, 45 deg. " "
25 tons capacity.

Crushing

Blake crusher, 10" x 4" opening, Blake Crusher Co., Lfrs. driven by G.E. motor 10 HP, 870 RPM, 220 v. 60 cy. 3 ph. 4" V-belt pulley with 6 V-belts to 18" flat pulley. Speed of crusher 250 RPM. Ser. No. motor 8108513.

Hammermill, no nameplate. 16" x 6", driven by reconditioned motor No. WD 222371, no details.

Ball Mill, no nameplate, 24" x 43" long, inside dimen. driven by U.S. 5 HP motor 1200 RPM thru gear reducer and gear and pinion. Pinion 5½" pitch diam. and gear 29". Serial No. of motor 24998.

Conveyors and Feeders

Belt conveyor, 12" x 17' centers, no idlers. Syntron Feeder, vari-flow, Type C-22, 10" x 36", 220 v. 60 cy. 4 amps. Ser.No. AGS D-230483.

Screens

Overstrom single deck Vibrating Screen, 18" x 60", Type SS-123, Ser. No. 351, driven by 2 HP Charlcraft motor, 1750 RPM, Style AV 1522 UG.

Cottrell dd. deck Vibrating Screen, 18" x 72" driven by 1 HP motor no nameplate. The Ajax-Dolor Shaker, S-HP. Ser. 9726.

Tables

3 Gordon & Dunham Economy Tables, 48" x 12' deck, driven by Fairbanks Morse 1 HP motors, 1155 RPM thru Rotc-Cone belts. Ser. Nos. of motors, D-151792 - D162655 and D-162877.

Miscellaneous

Classifier, 18" cone type, underflow to table, over to Cone Thickener, 6' diam. x 5'-6" depth.

Miscellaneous (cont'd)

Chain bucket elevator, 4" x 3" buckets, 12' lift, driven by 5 HP Ster El. motor 1675 RPM thru gear red. unit. Type AH-13.

Water tank, 7' diam. x 7' high, light steel.

Water piping throughout mill.

Power Equipment

Kohler Generator, 50 KVA, 60 cy. 220/440 v. 3 ph. Type AO Ser. 6L-215, 1200 RPM, driven by Waukesha gas engine, (using butane) Type RKB-20-1, Ser. 387244, six cyl. 1200 RPM. Complete with switchboard and 7 starters, etc.

Butane tank 42" x 19'.

BUILDINGS

MAIN MILL BLDG Buildings wood frame, galv. cor. iron

Hoist House, 13'-6" x 33'.
Bunk House adjoining 13'-6" x 30'.
Drop Building 14' x 56'.
Store Room 12' x 16'.
Power House 50' x 34' x 18' high.
steel pipe frame, galv. cor. iron.
Cook House and Refrigerator.
Adobe brick building (repairs needed)

CONCENTRATOR MILL

Mill building, steel pipe, cor. iron roof.
Change House at Adit.

MF-103
(Revised April 1952)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Form Approved.
Budget Bureau No. 42-R1035.2.

APPLICATION FOR AID IN AN EXPLORATION PROJECT, PURSUANT TO DMEA ORDER 1, UNDER THE DEFENSE PRODUCTION ACT OF 1950, AS AMENDED

Not to be filled in by applicant

Docket No. 3379
Metal or Mineral Copper-Lead
Date Received
Estimated Cost $74,580
Participation (Government %)

INSTRUCTIONS

1. *Name of applicant.*—(*a*) State here your full legal name, in the form in which you will wish to contract, and your mailing address: Harqua Hala Minerals Corporation, Room 1016 Story Bldg., Officers are: Melson T. Zuver, President 610 S. Broadway, L.A. 14, Calif. 222½ S. Westlake Ave., Los Angeles 4, Calif. A.N. Johanson, Sec.-Treas., 563 La Mirada, San Marino, Calif.

(*b*) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized. Incorporated in Arizona.

(*c*) If a corporation, add to above statement, titles, names and addresses of officers.

(*d*) If a partnership, add to the above statement the names and addresses of all partners.

2. *General.*—Read DMEA Order 1, "Government Aid in Defense Exploration Projects," before completing this application. Submit this application and all accompanying papers in quadruplicate (four copies), with your name and address on each sheet of the application and on all accompanying papers. Where sufficient space is not provided on the form for all required information, state it on an accompanying paper, with a reference in each case to the instruction to which it refers by number. Comply with all applicable instructions; or, if not applicable, so state. File the application with Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., or with the nearest field executive officer thereof.

3. *Applicant's property rights.*—(*a*) State the legal description of the land upon which you wish to explore, including all land which you possess or control that may be benefited by the exploration, and excluding any land or interest in land which is not to be included in the exploration project contract see attached papers for all data on this and other questions.

(*b*) State any mine name by which the property is known.

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise

(*d*) If you are not the owner, submit with this application a copy of the lease, contract, or other document under which you control the property.

(*e*) If you own the land, describe any liens or encumbrances on it

(*f*) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice.

4. *Physical description.*—(*a*) Describe in detail any mining or exploration operations which have been or now are being conducted upon the land, including existing mine workings and production facilities. State your interest, if any, in such operations. Also describe accessibility of mine workings for examination purposes. (see report)

(*b*) State past and current production, and ore reserves, if any, giving quantities and grades. (see report)

(*c*) Describe the geologic features of the property, including mineralization, type of deposit (vein, bedded, etc.), and your reasons for wishing to explore. Illustrate with maps or sketches. Send with your application (but not necessarily as a part of it) any geologic or engineering report, assay maps, or other technologic information you may have, indicating on each whether you require its return to you.

(*d*) State the facts with respect to the accessibility of the project: Access roads, distances to shipping, supply and residence points.

(*e*) State the availability of manpower, materials, supplies, equipment, water, and power.

5. *The exploration project.*—(*a*) State the mineral or minerals for which you wish to explore _____

(*b*) Describe fully the proposed work, including a map or sketch of the property showing a plan (and cross sections if needed) of any present mine workings, and the location of the proposed exploration work as related to such features as contacts, veins, ore-bearing beds, etc.

(*c*) The work will start within 60 days and be completed within 12 months from the date of an exploration project contract.

(*d*) State the operating experience and background of the applicant with relation to the ability to carry out such exploration project, and also that of the person or persons who will supervise the operations.

6. *Estimate of costs.*—Furnish a detailed estimate of the costs of the proposed work (you will have to use a separate sheet), under the following headings. Add the totals under all headings to give the estimated total cost of the project:

(*a*) *Independent contracts.*—(Note.—If the applicant does not intend to let any of the work to contractors, write "none" after this item. To the extent that the work is to be contracted, do not repeat the cost of the contract-work in subsequent items.) State the cost of any proposed independent contracts for the performance of all or any part of the work, expressed in terms of units of work (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, per cubic yard of material moved, etc.).

(*b*) *Labor, supervision, consultants.*—Include an itemized schedule of numbers, classes and rates of wages, salaries or fees for necessary labor, supervision and engineering and geological consultants.

(*c*) *Operating materials and supplies.*—Furnish an itemized list, including items of equipment costing less than $50 each, and power, water and fuel.

(*d*) *Operating equipment.*—Furnish an itemized list of any operating equipment to be rented, purchased, or which is owned and will be furnished by the Operator, with the estimated rental, purchase price, or suggested use-allowance based on present value, as the case may be.

(*e*) *Rehabilitation and repairs.*—Furnish a detailed list showing the cost of any necessary initial rehabilitation or repairs of existing buildings, installations, fixtures, and movable operating equipment, now owned by the Operator and which will be devoted to the exploration project.

(*f*) *New buildings, improvements, installations.*—Furnish a detailed list showing the cost of any necessary buildings, fixed improvements, or installations to be purchased, installed or constructed for the benefit of the exploration project.

(*g*) *Miscellaneous.*—Furnish a detailed list showing the cost of repairs to and maintenance of operating equipment (not including initial rehabilitation or repairs of the Operator's equipment), analytical work, accounting, workmen's compensation and employers' liability insurance, and payroll taxes.

(*h*) *Contingencies.*—Give an estimate of any necessary allowances for contingencies not included in the costs stated above.

NOTE.—No items of general overhead, corporate management, interest, taxes (other than payroll and sales taxes), or any other indirect costs, or work performed or costs incurred before the date of the contract, should be included in the estimate of costs.

7. (*a*) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation (Sec. 7, DMEA No. 1)?

(*b*) How do you propose to furnish your share of the costs?

[X] Money & [X] Use of equipment owned by you [ ] Other

Explain in detail on acompanying paper.

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief.

Dated May 28, 1954

HARQUA HALA MINERALS CORPORATION
(Applicant)

By N. T. Zuver
N.T.Zuver, President

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

U. S. GOVERNMENT PRINTING OFFICE 16—66551-1

HARQUA HALA MINERALS CORPORATION

Answers to questions, Form MP-103

3. (a) The mining claims held by the applicant Company are as follows:

Under Purchase Contract from Bonanza & Golden Eagle Mining Company, of Phoenix, Arizona,

Patented:
Gold Hill, Gold Mountain No. 1, Narrow Gauge, Gold Star, Grand View, Golden Eagle, Golden Belt, and Golden Ace.

Unpatented:
Wedge and North Pole.

Under Location by Company (and included in application.)
New Yorker No. 1, and New Yorker No. 2, Quinn No. 1 and Quinn No. 2.

The mines are known as:

3. (b) The Harqua Hala or Bonanza Mine

The Golden Eagle Mine

The New Yorker Group.

3. (c) The names of the claims are listed above under 3(a)

3. (d) Copy of Purchase Contract is attached hereto. The option to purchase was exercised in January, 1953.

3. (e) There are no liens or encumbrances on the land.

4. (a) The Harqua Hala mine is extensively developed within the shallow gold zone down to 200 ft. vertically and below that to 3 levels known as 7, 8 and 9, (all under water.) These lower levels follow what is believed to be the Iron vein, which produced gold ore above the sixth level. At the surface this vein is heavily iron stained and carries a little oxidized copper, and on the 7th and 8th levels copper is reported showing as sulphides.

The report made by W. Tovote, (now deceased) stated, in part: Referring to the ores in lower levels of Harqua Hala workings, "Residual pyrite and pyrite replaced by chalcocite are found more and more frequent and the copper values in the ore are often an important item.

Assays as high as 7% and even 12% have been made and the average of all the ore in sight will show possibly 2% copper".

He also expressed the opinion that another vein will be found beneath the gulch to the east, where for a quarter mile the formation is covered with gravel and boulders to a depth of 100 ft. as shown by the Johnson's wall (see map), from which some good boulders carrying gold and copper were obtained. It is quite possible that a parallel vein structure exists under the wide valley so well covered with gravels, and which doubtless represents a fault zone. A diamond drill hole from the fourth level under this detritus would show this and might lead to a vein of gold-copper ore at depth. This exploratory D.D. hole is included in the summary of drilling proposed.

The assay map of 7th level workings shows an ore-shoot 260 ft. long (width not given) averaging $19.90 per ton in gold with additional copper values. On the 8th level the maps show an average of $33.57 in gold for a length of 320 feet. The widths of vein are not given nor the copper content, which is said to average 2% with one shoot 45 ft. long carrying 5.28% copper. (see pages 12 and 13 of report by Union Engineering Co.)

The Quinn shaft is reported to be 310 ft. in depth and is a vertical single compartment shaft now partly filled with water. It is about 650 ft. south of the Harqua Hala main shaft and the vein hit near the bottom corresponds to the Iron vein and lines up with the vein showing on the deeper levels. The Quinn vein is reported to be 20 ft. wide and to carry $10.81 in gold with copper additional.

See report and general map of Harqua Hala mine.

The Golden Eagle mine is reported by several engineers as containing copper, lead and zinc sulphides at depth below the gold ore-shoot that was stoped out many years ago. Bancroft of the U.S.Geological Survey is quoted in the Arizona Bureau of Mines Bulletin 137, re the depth possibilities in the following paragraph:

> "Iron oxide is abundant above the water or the 300 ft. level on the incline, below which pyrite, chalcopyrite and galena occur. .....As indicated by the stopes, the ore-shoots on both veins were numerous and pockety. Some of them apparently were more than 15 feet wide. Bancroft states that two samples of sulphide ore from the lower levels contained 0.25 and 4.84% copper, 1.32 and 2.88 ounces silver, and 0.48 and 1.12 ounces of gold per ton."

The other ore-shoot on the Golden Eagle has oxidized lead-silver ore and is reported to have galena at depth. Both shoots should be drilled to determine depth possibilities. Mr. Martin (owner of Golden Eagle) states that the ore on the lower levels had widths up to 30 ft.

The Golden eagle Mine is nearly a mile north of the Harqua Hala (or Bonanza) mine, and has two known ore-bodies, one of which produced about $200,000.00 in gold and the other shows an ore-shoot of lead-silver-gold ore from which several thousand tons has been shipped to the mill. Some good lead carbonate ore is still left in the mine and recently over a hundred tons of this ore was milled in the pilot mill erected by the applicant Company at the Golden Eagle.

The Golden Eagle is reported to have a copper ore-shoot on the bottom level (now under water) and diamond drilling is contemplated to prove this at depth. The lead ore-shoot also is to be drilled at depth, where galena is reported to be showing. These ore-bodies if found could be worked from the inclined shaft, which, however, is needing some repairs.

See report covering Golden Eagle mine.

The New Yorker claims listed, No. 1 and No. 2, show an orebody of copper carbonate ore at and near the surface, with sulphides of iron and copper showing in a shaft at about fifty ft. depth. It is proposed to churn drill this deposit to about five hundred feet depth to prove or disprove the value of this copper showing. If the first hole shows results, two other holes are planned, all as shown on map of claims.

4. (b) Past production of the Harqua Hala or Bonanza mine is given as approximately $5,000,000.00 in gold, the ore being remarkably rich, averaging an ounce to the ton as milled. The figure given is at $35.00 gold and is probably low. No recovery of copper was made.

The Golden Eagle has produced about $200,000.00 in gold and lead. Most of the production of both properties was in the early days of the mines, from 1891 to 1897.

Ore reserves are shown in the report attached. Take note that practically all the production has come from workings in the metamorphic rocks above 200 ft. vertical depth.

4. (c) The geologic features are shown in the reports. The veins heretofore worked for gold show copper coming in at depth, according to all reports.

It is proposed to diamond drill both properties cutting the known veins at a depth of 300 to 500 ft. to determine values and width of ore-shoots. Location of the holes to be drilled are indicated approximately on the maps attached.

The geologic features can be summarized briefly as follows:

The underlying Pre-cambrian formation is exposed at places and is largely granite. Above this is a series of metamorphic rocks made up of quartzites, schists and limestones, all of sedimentary origin. Within the latter series the large ore-bodies of gold values were found, all showing some copper or lead in oxidized form. The Harqua Hala mountains show extensive erosion of the metamorphic rock.

The veins go down into the underlying granite and show sulphides at this depth, pyrite and chalcopyrite (and galena at the Golden Eagle.) The source of the mineralizing solutions was very likely a monzonite intrusive, which was possibly deep-seated at the Harqua Hala, though showing at places in the district. Evidently the solutions were scattered over a wide area within the quartzites and limestones, forming irregular veins along fault planes. In the underlying formation the maps indicate a more regular vein dipping steeply, and still carrying gold and copper values.

4. (d) The property is ideally situated with respect to accessibility, being only nine miles from the Santa Fe Railway line, and from the town of Salome, on Hiways 60 and 70. A good dirt road nine miles in length leads from Salome to the mine. Supplies are available at Salome or Phoenix, with daily delivery from the latter, and Los Angeles is distant about 300 miles.

There is ample housing on the ground for a number of men and Salome also has housing accommodations and restaurants available.

4. (e) Labor is available in this section or in Phoenix, in ample supply at the high wages paid for miners and laborers.

Materials, supplies and equipment are available locally, or from Phoenix or Los Angeles, by rail or truck.

Water for drilling is available in the Harqua Hala mine, where a pump has been installed to supply water to the pilot mill. The old mill used water from a tract of land about 5½ miles northeast of the mine, and the 3" pipe line is still usable. The well has caved however and was only 30 ft. deep. A new deep well would be required if water were to be brought thru this line. It is believed that ample water for a mill can be had by deep wells (600 ft.) nearer the mine, as there are several ranches pumping water for irrigation between the mine and Salome.

Power for a large mill can be had by bringing in a power line from the Arizona Power Co. line, distant less than nine miles. This power comes from the Colorado River and is reasonable in cost. Natural gas could be had for power purposes by piping it from the Texas-California main line near Salome.

Operating conditions are good the year round, though summers are hot.

5. (a) The metals for which exploration is planned are principally copper and lead, though gold and silver values will no doubt follow these metals. Scintillometer readings show radio activity over part of the Harqua Hala ground.

5. (b) The proposed work consists of diamond drilling the Harqua Hala and Golden Eagle veins at depth, and churn drilling the New Yorker copper deposit.

5. (c) The work will start within 60 days and be completed within 12 months from the date of an exploration project contract.

5. (d) The President of the applicant Company has had many years experience in mining and oil production work. Supervision as consulting engineers will be in the hands of Union Engineering Co., (610 So. Broadway, Los Angeles, Calif.) and the personnel of the Company includes B. M. Snyder and Edward Thornton, both engineers of 40 years experience, largely in non-ferrous metal mining work.

6. <u>Estimate of Costs</u>:

The following is our estimate of costs to do the work:

6. (a) Churn drilling of the New Yorker copper deposit is to be done by contract, and may amount to 1500 ft. total. 1500 ft. at $6.00 per ft. $9,000.00

6. (b) The diamond drilling of the Harqua Hala and Golden Eagle properties is planned to be done by the Harqua Hala Minerals Corp. itself. Most of the equipment required and the buildings to house men are available on the ground. The cost of this equipment would be over $30,000.00 but we have figured a rental charge of $4,500.00.

<u>Labor required:</u> To operate 1 diamond drill - 2 shifts:

		Daily
2 drill runners,	@ $16.00	$32.00
2 helpers	@ 12.00	24.00
1 superintendent	@ 18.00	18.00
Consultant, (part time on engineering and geology)		14.00
	Total daily	88.00
Compensation and S.S.taxes,		9.00
	Total labor	97.00

6. (c) <u>Materials and Supplies:</u>

Repairs and supplies, inc. diamond bits,	$40.00
Power, gas engine or air driven,	5.00
Water, (pumped from mine)	2.00
Assaying, labor and supplies	18.00
Contingencies, trucking, travel, etc.	6.00
Total daily,	168.00

Estimated footage drilled daily, 2 shifts, 50 ft.

$168. divided by 50 = $3.36 per ft. Add 10% for delays and unforseen, gives an estimated cost on force account of $3.70 per ft. of drilling. As the formation is medium hard this cost is above average cost, but is less than contract estimates.

6. (d) The equipment to be furnished by applicant Company is:

Air Compressor driven by Butane Engine.
Butane Engine and Generator (power for pumping water.)
Cent. pump and motor and water lines from mine.
Buildings for men, equipped for six men.
Building for assay office, partly equipped.
Jeep and 2 ton truck.
Tools and miscellaneous.

All above installed at this date and in good condition.

6. (f) To purchase the diamond drills and other equipment not now owned by the applicant Company will cost as follows:

Diamond drill, gasoline driven,	$4,000.00
" " air driven,	1,200.00
Diamond bits,	1,000.00
Assay equipment,	900.00
	7,100.00

6. (g) Items under this heading included in costs.

6. (h) Contingencies not figured.

7. (a) Yes.

7. (b) Equipment rentals $4,500.00 - balance money.

Summary of Proposed Drilling Costs	Estimated Maximum
New Yorker Group	
3 Churn drill holes to 500' max. = 1500' @6.00 ft. (contracted)	$ 9,000.00
Harqua Hala Group - Diamond Drilling	
D.D.holes (see map) on copper vein	
(a) 10 X 500' = 5000' @ 3.70	$18,500.00
(b) 2 X 1000' = 2000' @ 4.00	8,000.00
(c) 1 X 800' = 800' @ 4.00	3,200.00
	29,700.00
Golden Eagle - Diamond Drilling	
(a) 7 X 500' = 3500' @ 3.70	$12,950.00
(b) 2 X 1000' = 2000' @ 4.00	8,000.00
	20,950.00
Exploratory Holes, (not definitely located)	
6 holes @150' = 900' @ 3.70	3,330.00
Total Operating Costs	$62,980.00
Equipment Costs as given	11,600.00
Estimated Total for Project	$74,580.00

Note (a) First holes to a maximum of 500' depth.
(b) If good results on (a) then two deep holes to 1000' depth.
(c) 1 inclined hole from 4th level on a northerly course, to determine if a vein exists under the gulch, as indicated.

Diamond drilling at 100' intervals on Harqua Hala copper vein and if results warrant then holes between, or at 50' intervals.

The above figures cover the maximum footage contemplated and will probably be reduced somewhat.

Note - This is a copy of Lease + Option to Purchase, made to Sonnind Minerals Corp., now assigned to Harqua Hala Minerals Corp. an Arizona Corp. Option to Purchase was exercised in 1953.

LEASE AND OPTION TO PURCHASE

THIS AGREEMENT entered into this 25th day of January, 1949, between BONANZA AND GOLDEN EAGLE MINING COMPANY, a corporation organized and existing under and by virtue of the laws of the State of Arizona, and having its principal place of business at Phoenix, Maricopa County, Arizona, hereinafter termed the Lessor, and SOMIND MINERALS CORPORATION, a Nevada corporation, duly authorized to transact business in the State of Arizona, hereinafter termed the Lessee,

W I T N E S S E T H :

WHEREAS, the Lessor is the owner of the following patented lode mining claims, situate in the Ellsworth Mining District, Yuma County, Arizona, described as follows:

THE CONSOLIDATED BONANZA MINING CLAIM, consisting of the Gold Mountain, Gold Hill, and Gold Star lode claims, and the Consolidated Bonanza Millsite*, said Consolidated Bonanza Mining Claim being designated in the office of the United States Surveyor General for the Territory of Arizona as Survey No. 1081 "A" and "B"; and in the United States Land Office at Phoenix, Arizona, as Mineral Entry No. 548, the same having been patented by the United States to the Harqua Hala Bonanza and Golden Eagle Mining and Milling Company on April 5, 1894. Said patent was recorded in the office of the County Recorder of Yuma County, Arizona, on August 14, 1899, and together with the record thereof is hereby referred to for all particulars therein contained.

*Millsite is survey 1081-B.

THE SUMMIT LODE MINING CLAIM, being designated in the office of the United States Surveyor General as Survey No. 1079, and in the United States Land Office at Phoenix, Arizona, as Mineral Entry No. 550, the same having been patented by the United States to the Harqua Hala Bonanza and Golden Eagle Mining and Milling Company, December 4, 1893; said patent was recorded in the office of the County Recorder of Yuma County, Arizona, on August 14, 1899, and together with the record thereof is hereby referred to for all the particulars therein contained.

THE NARROW GAUGE PLACER MINING CLAIM, being designated in the Office of the United States Surveyor General for the Territory of Arizona as Survey No. 1097 and in the United States Land Officeat Phoenix, Arizona, as Mineral Entry No. 552, the same having been patented by the United States to the Harqua Hala Bonanza and Golden Eagle Mining and Milling Company, January 17, 1894; said patent was recorded in the office of the County Recorder of Yuma County, Arizona, on August 14, 1899, and together with the record thereof is hereby referred to for all the particulars therein contained.

THE GRAND VIEW LODE MINING CLAIM, designated by the Surveyor General for the Territory of Arizona as Lots 1116 and 1183 Amended; and in the United States Land Office at Phoenix, Arizona, as Mineral Entry No. 569, the same having been patented by the United States to Henry Bratnober, June 9, 1896; said patent was recorded in the office of the County Recorder of Yuma County, Arizona, on August 14, 1899, and together with the record thereof is hereby referred to for all the particulars therein contained.

GOLDEN EAGLE, GOLDEN ARK AND GOLDEN BELT LODE CLAIMS, designated in the office of the United States Surveyor General, for the State of Arizona as Survey No. 1080, and in the United States Land Office, at Phoenix, Arizona, as Mineral Entry No. 549, the same having been patented by the United States to the Harqua Hala Bonanza and Golden Eagle Mining and Milling Company on December 4, 1893. Said patent being recorded in the office of the County Recorder of Yuma County, Arizona, on August 14, 1899, and together with the record thereof is hereby referred to for all particular therein contained.

Also the unpatented mining claims described as follows:

THE NORTH POLE MINING CLAIM, located January 1, 1910, the location notice of which is recorded in the Recorder's Office of Yuma County, Arizona, in Book 5 at Page 237, by John B. Martin, situated in a northerly direction from the Harqua Hala Store Building, the Southeastern corner of said claim being about 100 feet in a northerly direction from said Harqua Hala Store Building and said claim being a relocation of the ground formerly covered by the Gladdies Mining Claim.

THE WEDGE MINING CLAIM, located by John B. Martin on March 7, 1908, the location notice of which is recorded in the Recorder's Office of Yuma County, Arizona, in Book "Y" of Mining Claims, at page 342. Also the well situate upon the Consolidated Bonanza Millsite (Survey #1081-B) herinbefore described, the pipe-line conducting water from said well to the mines and Milling claims hereinbefore described and all water derived from said well.

This agreement shall also cover all other privileges, franchises and easements now owned, held, used or enjoyed by the first party in connection with any of the properties hereinbefore described. Also all tailings and dumps and all buildings, structures and other improvements now situate on the above described claims including such mining, pumping and milling equipment as belongs to Lessor.

and

WHEREAS, the Lessee is desirous of leasing the above described premises for a period of five (5) years fromthe date hereof and to obtain an option to purchase said mining claims during the termof said lease;

NOW, THEREFORE, in consideration of One Hundred Dollars ($100.00) in hand paid and of the mutual covenants and conditions hereinafter set forth to be kept and performed by the parties hereto, it is agreed as follows:

That Lessor hereby leases to the Lessee the above described mining claims for a period of five (5) years from the date hereof at the following rental:

Beginning six (6) months after the date hereof, Lessee shall pay a royalty on all ores or concentrates shipped to a smelter or on all bullion shipped to the mint, as follows:

Five (5%) per cent of the net returns received from the sale of bullion, ores, concentrates or other products for each calendar month when the average of these returns represent a value of not to exceed Ten ($10.00) Dollars per ton.

Ten (10%) per cent of the net returns received fromthe sale of bullion, ores, concentrates or other products for each calendar month when the average of these returns exceeds Ten ($10.00) Dollars but does not exceed Twenty ($20.00) Dollars per ton.

Twelve and one-half (12-1/2%) per cent of the net returns received from the sale of bullion, ores, concentrates or other products for each calendar month when the average of these returns exceeds Twenty ($20.00) Dollars per ton but does not exceed Thirty ($30.00) Dollars per ton.

Fifteen (15%) per cent of the net returns received from the sale of bullion, ores, concentrates or other products for each calendar month when the average of these returns is in excess of Thirty ($30.00) Dollars per ton.

The term "net returns" shall mean the balance remaining after deducting all railroad freight from Salome to the smelter, plus smelter charges on ores, or concentrates shipped, or express charges from Salome to the mint, plus mint charges on bullion shipped to the mint, together with the cost of milling or concentrating such ore.

Such rental shall for the first six (6) months in which rental is paid be not less than One Hundred ($100.00) Dollars per month, and beginning one year after the date hereof, such rental shall not be less than Two Hundred ($200.00) Dollars per month, during the remaining term of the lease.

All royalties are to be paid not later than the 10th day of the month succeeding the month such shipments were made.

It is further agreed by the parties hereto that notwithstanding the fact that royalties may cause the Lessee to pay a greater amount of rental during any one month than the minimum required hereunder, the Lessee shall nevertheless be obligated to pay the minimum rental monthly.

Lessee shall be given immediate possession of the premises upon execution of these presents and after the Lessor has had an opportunity to post No Lien notices on the premises as required by law, and Lessee agrees to keep the leased premises and every part thereof free and clear of liens for labor or material furnished to the Lessee while in possession of said premises, and agrees to keep and save Lessor harmless from all costs, loss or damage which may arise by reason of injury to any persons employed by the Lessee in or upon said property or any part thereof, or which may arise by reason of injury to any persons, livestock or other property as the result of any work or operations of the premises while in the possession and occupancy of the Lessee.

That the work on said property shall be carried on in the manner necessary to good and economical mining, so as to take out the greatest amount of ore possible with due regard to the safety, development and preservation of said premises as a working mine. That it will remove all muck or waste from the mine workings.

Lessee further agrees to keep posted at the collar of each shaft or mouth of any tunnel and at the door of each boarding house No Lien notices during the life of this agreement.

Lessee further agrees to pay all taxes levied and assessed against the patented mining claims and all personal property thereon subsequent to the 31st day of December, 1948 and falling due during the termof this lease, and shall pay all taxes levied and assessed against the personal property of the Lessee placed upon said premises.

Lessee further agrees to pay all sales tax imposed upon all ore, minerals, concentrates or other products produced and sold during the life of this agreement; to carry Workmen's Compensation insurance on all of its employees; to pay all withholding tax, social security and old age pension contributions, and will perform the necessary assessment work upon the unpatented mining claims included in this lease required by law in order to protect the title of the Lessor to said claims.

Lessee further agrees to furnish Lessor quarterly, during the term of this lease, logs of all drill holes sunk on the property and such samples and assay maps as may be made showing the position of such drill holes and of any new workings with assay values of samples taken on said property; and shall cause the smelter or mint to which any ore, concentrate or bullion produced from said premises is shipped to supply the Lessor with a copy of all settlement sheets covering the sale of such products.

It is further agreed by the parties hereto that the duly authorized officers and agents of the Lessor shall be permitted to enter upon the property covered by this lease and the workings thereon at all reasonable times for the purpose of inspection, and such officers and agents of the Lessor may be permitted to examine the books and records of account of production of ores and minerals produced from such premises.

It is further agreed by the parties hereto that Lessor grants unto the Lessee an exclusive option to purchase all of the above described mining claims at a total price of Two Hundred Thousand ($200,000.00) Dollars, which sum shall be payable on the same basis as the rental hereinabove set forth, and in the event the Lessee desires to exercise the option herein granted it shall notify the Lessor not later than forty-eight (48) months after the date hereof of its election to exercise such option and all rental theretofore paid under the terms of the lease herein shall be applied on the purchase price of said premises.

It is further agreed by the parties hereto that time is of the essence of this agreement and that failure on the part of the Lessee to do or perform any of the things herein required in the manner and at the times as herein set forth shall constitute a breach of this agreement and the Lessor shall, at its election, have the right to terminate this lease and to remove the Lessee, its officers, agents, and employees fromthe premises if after a thirty (30) day notice said defaults are not corrected.

In the event it is necessary for either party to serve the other with a notice, such mail shall be addressed to the Lessor at 44 North First Avenue, Phoenix, Arizona, and to the Lessee at 308 South Maple Drive, Beverly Hills, California.

In the event the lease herein granted shall terminate by its own terms and the Lessee shall not be indebted to the Lessor in any sum or sums whatsoever, said Lessee shall have, and it is hereby granted, sixty (60) days after the termination of said lease to remove from said premises all personal

property, machinery and equipment placed upon said premises by said Lessee with the exception of all mining timbers placed underground, all mine tracks and pipe lines installed in the workings of said mine and any and all permanent improvements attached to the soil of said mining claims.

It is agreed by the parties hereto that the Lessee shall have the right to assign this lease and option provided that said Lessee shall have first given Lessor a written notice of its intention to make such assignment thirty days in advance, and shall confirm the said notice when such assignment is actually made effective. However, thereafter there shall be no further assignments without the written consent of the Lessor first had and obtained.

This agreement shall be binding upon the successors and assigns of the parties hereto.

In the event the Lessee shall fully perform all of the terms and conditions herein required of it and shall pay the full purchase price of said mining claims. Lessor agrees to deliver to said Lessee a mining deed to said premises, subject only to the paramount lien of the United States of America to the unpatented mining claims and subject to any and all taxes levied and assessed against the premises subsequent to the 31st day of December, 1948 and as against all liens and encumbrances placed against said premises subsequent to the date hereof.

IN WITNESS WHEREOF the parties hereto have caused these presents to be executed by its duly authorized officers the day and year first above written.

BONANZA AND GOLDEN EAGLE MINING COMPANY

By (Signed) Donald M. Martin

Attest:

(Signed) Walter T. Martin

SCMIND MINERALS CORPORATION

By (Signed) Nelson T. Zuver

Attest:

(Signed) Alfred N. Johanson

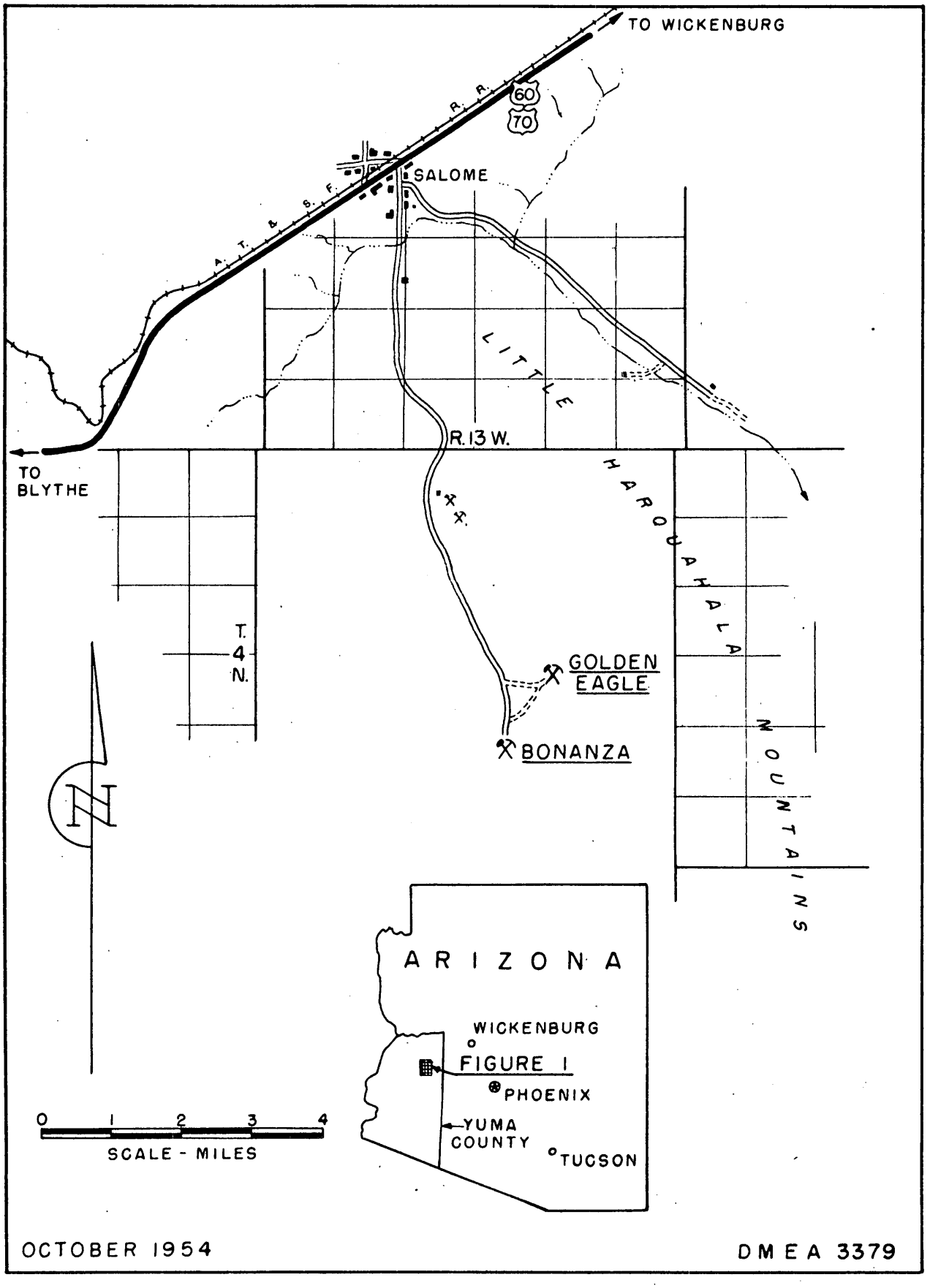

FIGURE 1. - LOCATION MAP - HARQUA HALA MINERALS CORP.
YUMA COUNTY, ARIZONA

PHYSICAL FEATURES AND CLIMATE

The Bonanza and Golden Eagle mines are in the southeastern portion of the Harquahala Mountains. The Bonanza is at the northeastern base of Martin Peak and the Golden Eagle, about 1 mile to the northeast, is at the base of a low ridge. Both mines are at an altitude of about 1,800 feet. The mountains near the mines are small, deeply eroded, and flanked by desert plains.

The climate is characteristic of the lower regions of southern Arizona. Summers are hot with maximum temperatures of 110° F. Fall, winter, and early spring, a period of 6 or 7 months, are pleasant with temperatures seldom falling below 32° F. Precipitation is confined to occasional heavy rainfalls during the summer and infrequent showers during the winter.

Vegetation is sparse, being confined to cacti and desert shrubs except along water courses where a few small trees grow.

There are no permanent streams in the area. Water is obtained from wells and from mine workings at depths of about 200 feet below the surface.

HISTORY AND PRODUCTION

Wilson[1] says the following about the history and production of the Bonanza and Golden Eagle mines to 1934:

[1] Wilson, E. D., Cunningham, J. S., and Butler, G. M., Arizona Lode Gold Mines and Gold Mining, Arizona Bureau of Mines, Bull. No. 137, pp 129-130.

"The Bonanza and Golden Eagle veins were discovered in 1888 and sold to Hubbard and Bowers who organized the Bonanza Mining Company. It is reported that a clean-up worth $35,000 was made from a week's run of a small amalgamation mill. A 20-stamp amalgamation mill, erected in 1892, made an estimated production of $1,600,000 in bullion within three years.

"In 1893, the Morgan Hale Gold Mining Company, Ltd., a British syndicate, purchased the property for $1,200,000, remodeled the mill, and sunk a new shaft. During 1895, a 150-ton cyanide plant was built to treat the accumulated tailings which ran from $3 to $5 per ton. Both the ore body and the tailings dump were exhausted by the end of 1898, and the mine was sold back to Mr. Hubbard in 1899. The total production by the British Company amounted to $735,000 in bullion, of which about $135,000 was profit.

"After a few months' operation, the mines remained idle until 1906 when the Morgan Hale Mining Company was organized. By the end of 1908, this company produced about $51,000 in gold bullion, at little or no profit.

"From 1913 to 1916, the Fern Mortier Mining Company produced $30,000 from the mines and $18,000 from tailings.

"A small production, chiefly by lessees, was made from 1922 to 1931, * * * *. The total production from the Bonanza and Golden Eagle mines amounts to about $2,500,000.

"Early in 1934, the Bonanza mine was under lease to the Marguerite Gold Mines Company, but no underground work was in progress. W. L. Hart and associates treated about 1,800 tons of the old Marguerite mill tailings by leaching and cyanidation, but suspended operations in April, 1934. Lessees made a small production from the Golden Eagle mine."

The Bulletin from which the above quotation was taken contains the following record of production from the Bonanza and Golden Eagle mines. Values for gold are at $20.67 per ounce.

Year	Price of lead	Lbs. lead	Ounces gold	Gross value	Remarks
1891-1893	---	---	77,407	$1,600,000	Hubbard and Masters (est.)
1893	---	---	6,610	136,[illegible]	Morgan Hale Gold Mining Company, Ltd.
1894	---	---	13,148	271,775	Morgan Hale Gold Mining Company, Ltd.
1895	---	---	6,803	140,635	Morgan Hale Gold Mining Company, Ltd.
1896	---	---	4,[illegible]	88,770	Morgan Hale Gold Mining Company and lessees.
1897	---	---	5,721	118,262	Morgan Hale Gold Mining Company and lessees.
1898	---	---	149	3,070	Morgan Hale Gold Mining Company and lessees.
1899	---	---	494	10,000	Hubbard (est.)
1907	---	---	1,440	29,760	Morgan Hale Mining Company
1908	---	---	1,113	23,[illegible]	Morgan Hale Mining Company
1914	---	---	969	19,000	Twin Mountain Mining Company
1916	---	---	1,451	30,000	Twin Mountain Mining Company
1922-1923	---	---	736	15,000	Lessees
1925	.097	56,000	73	5,[illegible]	Lessees on Golden Eagle
1926	.090	33,640	73	5,[illegible]	Lessees on Golden Eagle.
1928	.085	14,000	542	11,466	Lessees on Golden Eagle.
1929	.063	16,000	320	6,197	Lessees on Golden Eagle.
Total, 1891-1929	---	140,[illegible]	130,[illegible]	$1,[illegible]	

Since 1934, the Bonanza mine has been idle and activity at the Golden Eagle probably has been confined to recently terminated mining and milling operations by the Morgan Hale Minerals Corp. These operations, carried out over a period of several months during 1953 and 1954, consisted of several feet of drifting at the south end of the adit level and the milling of possibly 75 tons of lead oxide ore that had been mined by previous operators. The few tons of lead concentrate produced is stockpiled at the mill which was erected by the corporation.

There has been little or no production from the New Yorker claims which were located recently by the Morgan Hale Minerals Corp. During October 1954, the corporation was sinking a discovery shaft on one of the claims in an area that had previously been explored by numerous shallow pits, trenches and shafts.

PROPERTY AND OWNERSHIP

The Applicant, H. T. Auer, President of the Morgan Hale Minerals Corp., Room 1016, Story Building, 610 S. Broadway, Los Angeles 14, Calif., reported the following mining claims were held under Purchase Contract or Location by the corporation.

Under Purchase Contract from Bonanza and Golden Eagle Mining Company, Phoenix, Ariz.:

Patented claims: Gold Hill, Gold Mountain, Narrow Gauge, Gold Star, Grand View, Golden Eagle, Golden Belt, and Golden Ace.

Unpatented claims: Wedge and North pole.

Under location by corporation (and included in application):

New Yorker No. 1, New Yorker No. 2, Union No. 1, and Union No. 2.

Figure 2 shows the locations of the above mentioned claims and other claims reportedly held by the corporation. A probable error in the name of one of the claims was found. Plat of U. S. Mineral Survey No. 1883 identifies the Golden Age claim of figure 2 as the Golden Ark.

PRESENT STATUS

Bonanza Mine

Mine Workings

The principal exploratory and development workings of the Bonanza mine are an inclined 2-compartment shaft and 9 levels, of which levels 5 and 6 are connected with the shaft (figure 4). The other levels were driven from adits, winzes, and raises. The bottom, or 9th level is said to be a vertical depth of 320 feet from the surface. Water stands at a few feet below the 6th level.

Exploitation of ore bodies has been by a glory hole and by numerous stopes that were worked by the open-stoping methods. Walls of stopes were supported, where necessary, with timber stulls. Little stoping was done below the 5th level.

Surface Plant and Equipment

The surface plant of the Bonanza mine comprises a headframe, a hoist house and adjoining bunk house, a shop building, a storage building, a powerhouse, and a cook house.

of which the axial plane dips north to northwest. The syncline is cut by reverse and normal faults that are more or less parallel to the axis of the fold, and by other faults that are approximately normal to the axis. Possibly because of the faults normal to the axis, the syncline between the Bonanza and Golden Eagle mines is not continuous but appears to have been dislocated, the Golden Eagle segment being offset toward the north from the Bonanza segment.

The sequence of structural events may have been as follows: (1) folding, (2) overturning of the folds, (3) reverse faulting or overthrusting more or less parallel to the folds, (4) normal faulting more or less parallel to the folds, (5) faulting more or less at right angles to the folds.

The mineralization that resulted in the Bonanza and other deposits probably postdates all of the above structural events.

BONANZA (MARGUA MALA) MINE

The Bonanza Mine consists of an inclined shaft, an adit to the 4th level, ten levels spanning a vertical distance of about 300 feet, and extensive stoping between the 5th level and the surface (fig. 4). Only the 4th and 6th levels are readily accessible and the mine is flooded below the 6th level. At the main shaft the water table is about a foot below the floor of the 6th level or about 200 feet below the surface. The mine is in a mesothermal gold deposit that occupies shear zones and fractures mainly in the Bolsa quartzite. The main ore-bearing shear zone is known as the Iron Vein (fig. 3).

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Gail Wregand	703 928-6681	

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953 Nat'l Ctr
Reston Va. 22092

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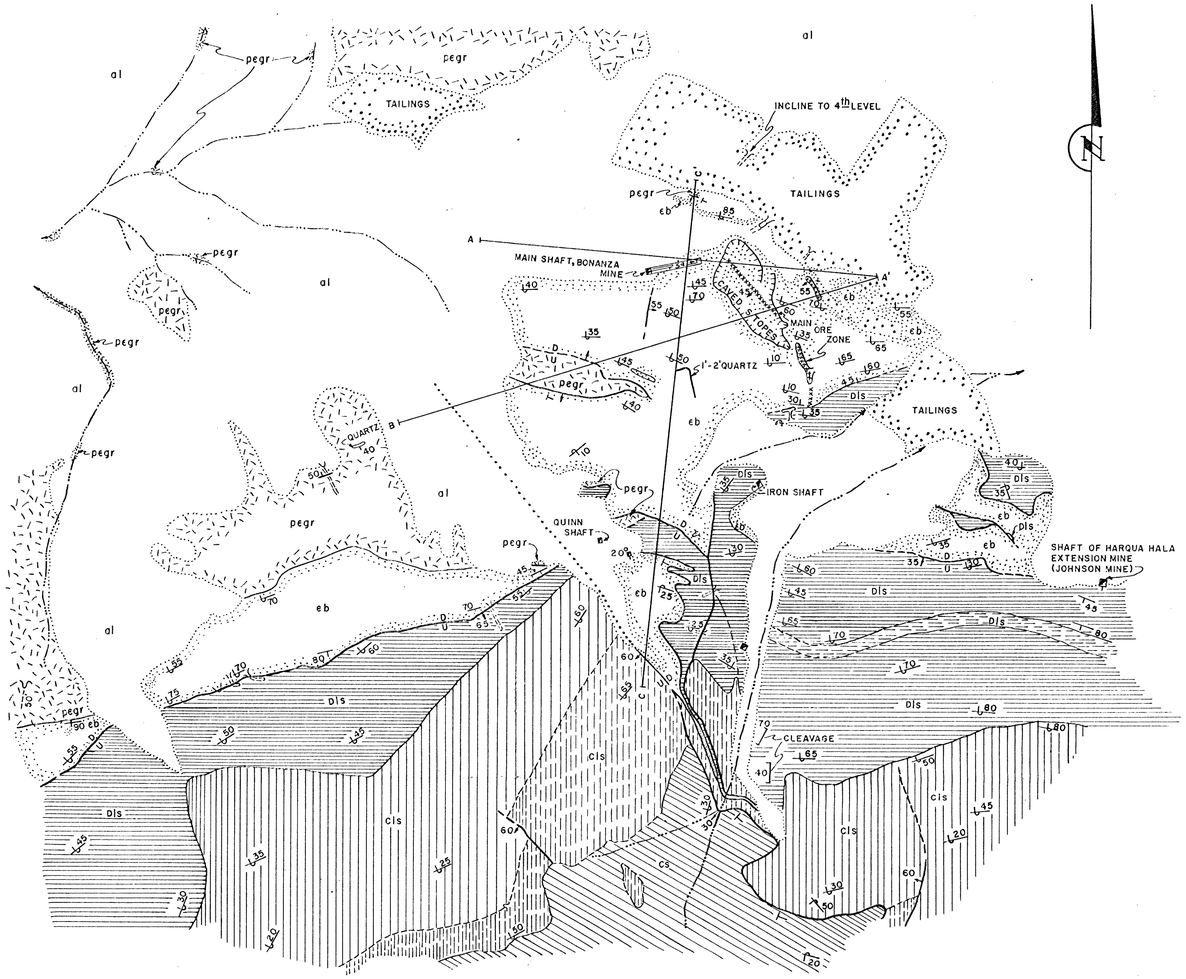
REFERENCE REQUEST — FEDERAL RECORDS CENTERS
RECORDS CHARGE OUT COPY



EXPLANATION OF MAP

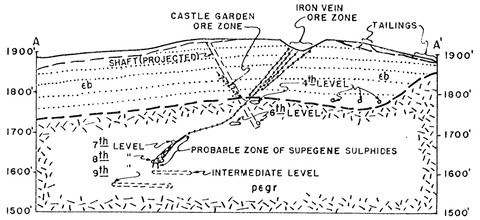
- al — CENOZOIC OR RECENT ALLUVIUM
- Ss — SUPAI(?) FORMATION
- Cls — PENNSYLVANIAN LIMESTONE (Dashed lines for cherty phase)
- Dls — DEVONIAN LIMESTONE & DOLOMITE (Dashed lines for shaley phase)
- eb — BOLSA QUARTZITE
- pegr — PRE-CAMBRIAN (?) GRANITE
- 45, — — —, ... CONTACT, SHOWING DIP; DASHED OR DOTS WHERE APPROXIMATELY LOCATED.
- 60, U/D, T, — FAULT, SHOWING DIP, DASHED WHERE APPROX. LOCATED; U, UPTHROWN SIDE; D, DOWNTHROWN SIDE; T, UPPER PLATE OF THRUST FAULT; DOTTED WHERE COVERED
- 60 — STRIKE & DIP OF OVERTURNED BEDS

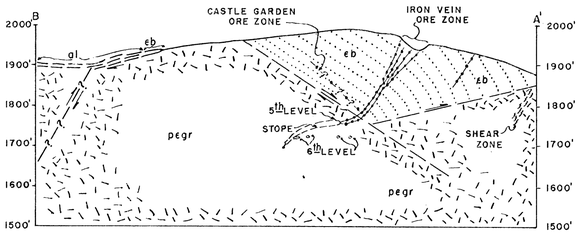
NOTE

GEOLOGY FROM AN UNPUBLISHED MAP BY ELDRED D. WILSON, ARIZONA BUREAU OF MINES.
GEOLOGIC SECTIONS BY LEONID BRYNER

200 0 200 400 600
SCALE IN FEET

DATUM LINE IS APPROXIMATELY SEA LEVEL





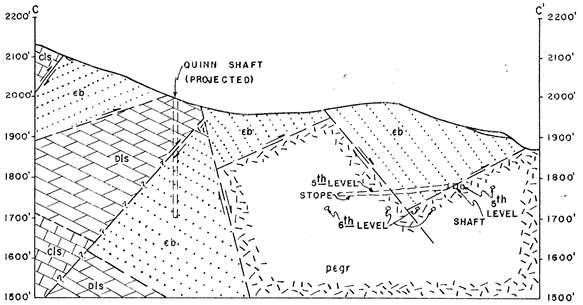


FIGURE 3 — GEOLOGIC MAP AND SECTIONS — BONANZA MINE AREA — YUMA COUNTY, ARIZONA

NOVEMBER, 1954 DMEA 3379

EXPLANATION OF MAP

24 STRIKE AND DIP OF VEIN.

NOTE:

WORKINGS COMPILED FROM U.S.G.S. BULLETIN 451 AND FROM UNPUBLISHED MAPS BY MILES M. CARPENTER AND OTHERS, DATED 1934.

4th LEVEL FROM AN UNPUBLISHED MAP BY E. D. WILSON, ARIZONA, BUREAU OF MINES.

1st, 3rd, AND 5th LEVELS NOT SHOWN.

SECTIONS: SEE FIGURE 3

100 0 100 200 300

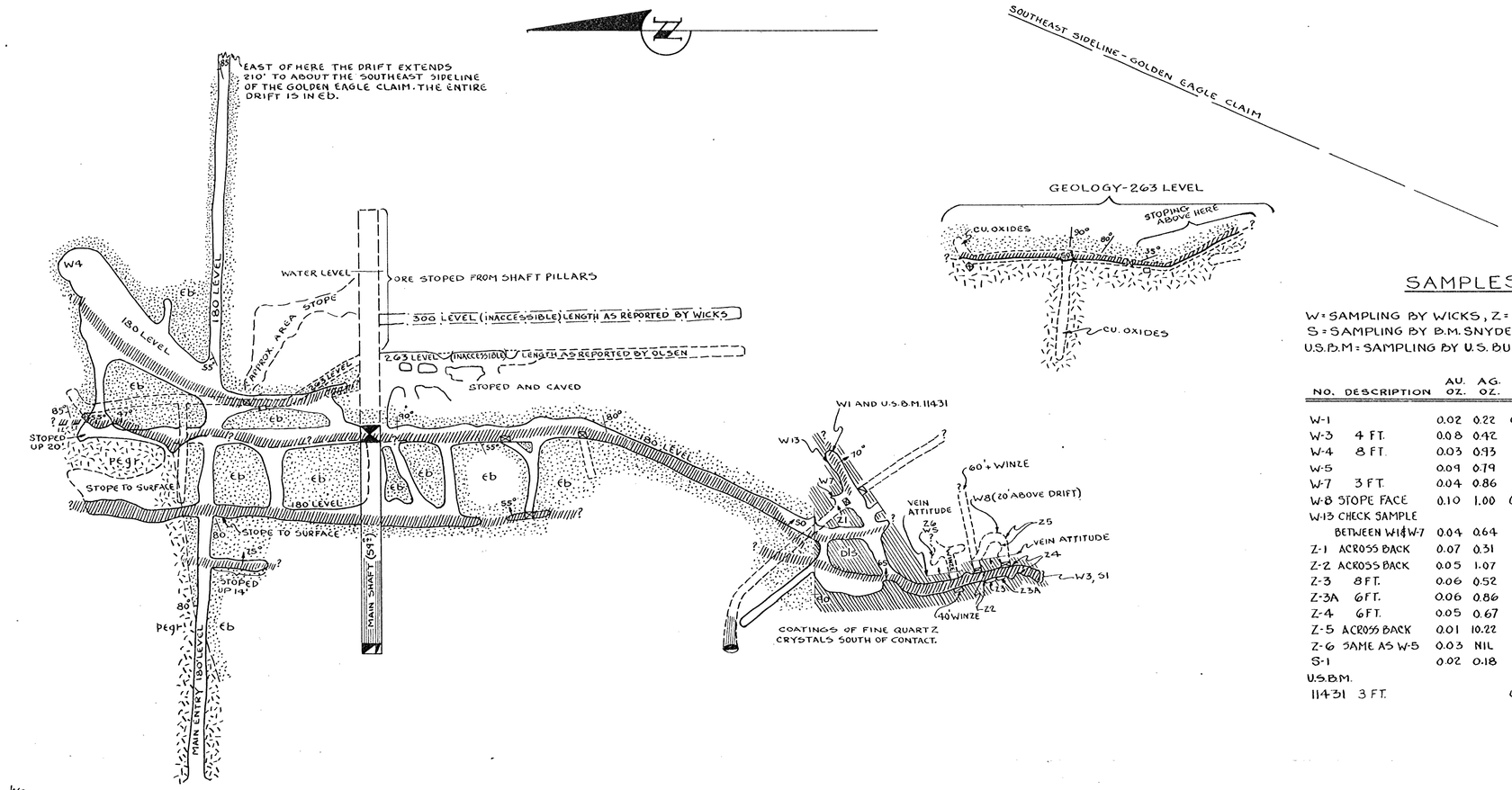
SCALE IN FEET

DATUM LINE IS APPROXIMATELY SEA LEVEL

FIGURE 4 - BONANZA MINE - YUMA COUNTY, ARIZONA

NOVEMBER, 1954

DMEA 3379



EXPLANATION

- DEVONIAN LIMESTONE AND DOLOMITE
- BOLSA QUARTZITE
- PRE-CAMBRIAN (?) GRANITE
- SHEAR ZONE; INCLUDES VEIN MATERIAL. ORE IS IN OR NEAR THESE ZONES. ARROW INDICATES DIP OF ZONE.
- CONTACT, SHOWING DIP; DASHED WHERE APPROXIMATELY LOCATED
- STRIKE AND DIP OF BEDDING
- FAULT: QUESTION MARKS AND DASHES WHERE DOUBTFUL

GEOLOGY SHOWN HERE APPLIES ONLY TO 180 & 263 LEVELS

- COLLAR OF SHAFT; LINES INDICATE DIRECTION OF INCLINATION.
- SHAFT THAT PASSES ABOVE AND BELOW LEVEL.
- BOTTOM OF RAISE OR WINZE
- TOP OF RAISE OR WINZE
- BOTTOM OF CHUTE

OUTLINE OF WORKINGS FROM A COMPASS SURVEY BY F.R. WICKS, MARCH 1952. LEVEL NUMBERS REFER TO INCLINED DISTANCES IN FEET.

GEOLOGY BY LEONID BRYNER

SAMPLES

W = SAMPLING BY WICKS, Z = SAMPLING BY N.T. ZURER
S = SAMPLING BY B.M. SNYDER (UNION ENGINEERING CO.)
U.S.B.M = SAMPLING BY U.S. BUREAU OF MINES.

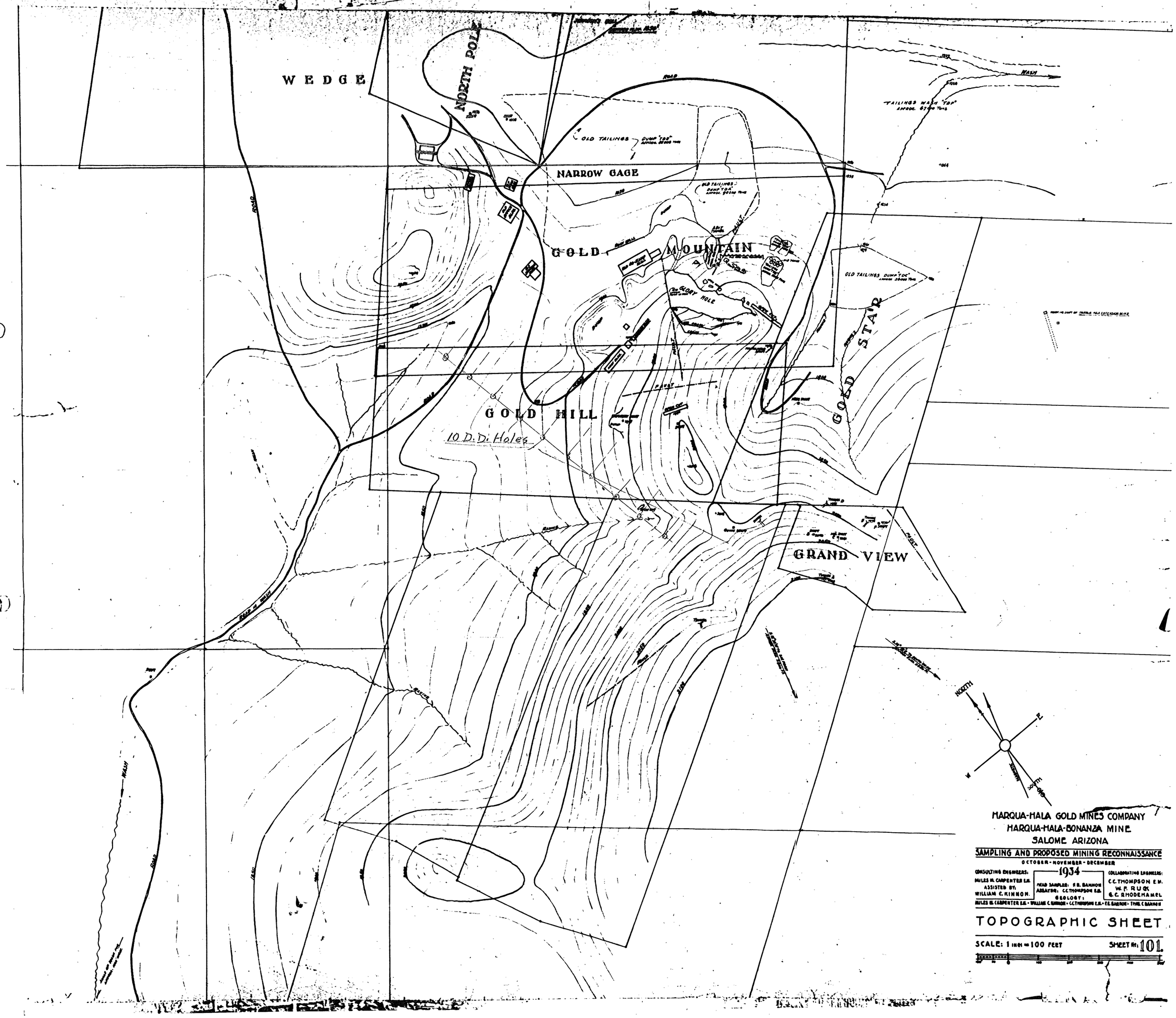
NO.	DESCRIPTION	AU. OZ.	AG. OZ.	CU. %	Pb %	Pb (SULPH)	ZN %
W-1		0.02	0.22	0.26	4.02	–	–
W-3	4 FT.	0.08	0.42	–	2.96	–	–
W-4	8 FT.	0.03	0.93	–	NIL	–	–
W-5		0.09	0.79	–	8.80		
W-7	3 FT.	0.04	0.86	–	2.23		
W-8	STOPE FACE	0.10	1.00	0.10	11.45		
W-13	CHECK SAMPLE BETWEEN W1 & W-7	0.04	0.64	NIL	1.00		
Z-1	ACROSS BACK	0.07	0.31	–	4.32		
Z-2	ACROSS BACK	0.05	1.07	–	17.28		
Z-3	8 FT.	0.06	0.52	–	14.04		
Z-3A	6 FT.	0.06	0.86	–	8.42		
Z-4	6 FT.	0.05	0.67	–	6.15		
Z-5	ACROSS BACK	0.01	10.22	–	2.59		
Z-6	SAME AS W-5	0.03	NIL	–	5.07		
S-1		0.02	0.18	–	1.08		
U.S.B.M. 11431	3 FT.			0.02	0.24	0.14	0.2

0 40 80 120 160
SCALE IN FEET

DATUM IS APPROXIMATELY SEA LEVEL

FIGURE 5 - GOLDEN EAGLE MINE, YUMA COUNTY, ARIZONA

NOVEMBER, 1954 DMEA 3379


WEDGE
NORTH POLE
NARROW GAGE
GOLD MOUNTAIN
GOLD HILL
GOLD STAR
GRAND VIEW
OLD TAILINGS
OLD TAILINGS DUMP "TOP"
OLD TAILINGS DUMP "TOC"
TAILINGS WASH "TOP"
WASH
ROAD
ADIT
GLORY HOLE
10 D.D. Holes
NORTH
SOUTH
E
W
MARQUA-HALA GOLD MINES COMPANY
MARQUA-HALA-BONANZA MINE
SALOME ARIZONA
SAMPLING AND PROPOSED MINING RECONNAISSANCE
OCTOBER - NOVEMBER - DECEMBER
1934
CONSULTING ENGINEERS:
MILES M. CARPENTER E.M.
ASSISTED BY:
WILLIAM C. KINNON.
HEAD SAMPLER: F.B. BANNON
ASSAYER: C.C. THOMPSON E.M.
GEOLOGY:
MILES M. CARPENTER E.M. · WILLIAM C. KINNON · C.C. THOMPSON E.M. · F.B. BANNON · THOS. C. BANNON
COLLABORATING ENGINEERS:
C.C. THOMPSON E.M.
W. P. RUCK
G.C. RHODEHAMEL
TOPOGRAPHIC SHEET
SCALE: 1 INCH = 100 FEET
SHEET No: 101.

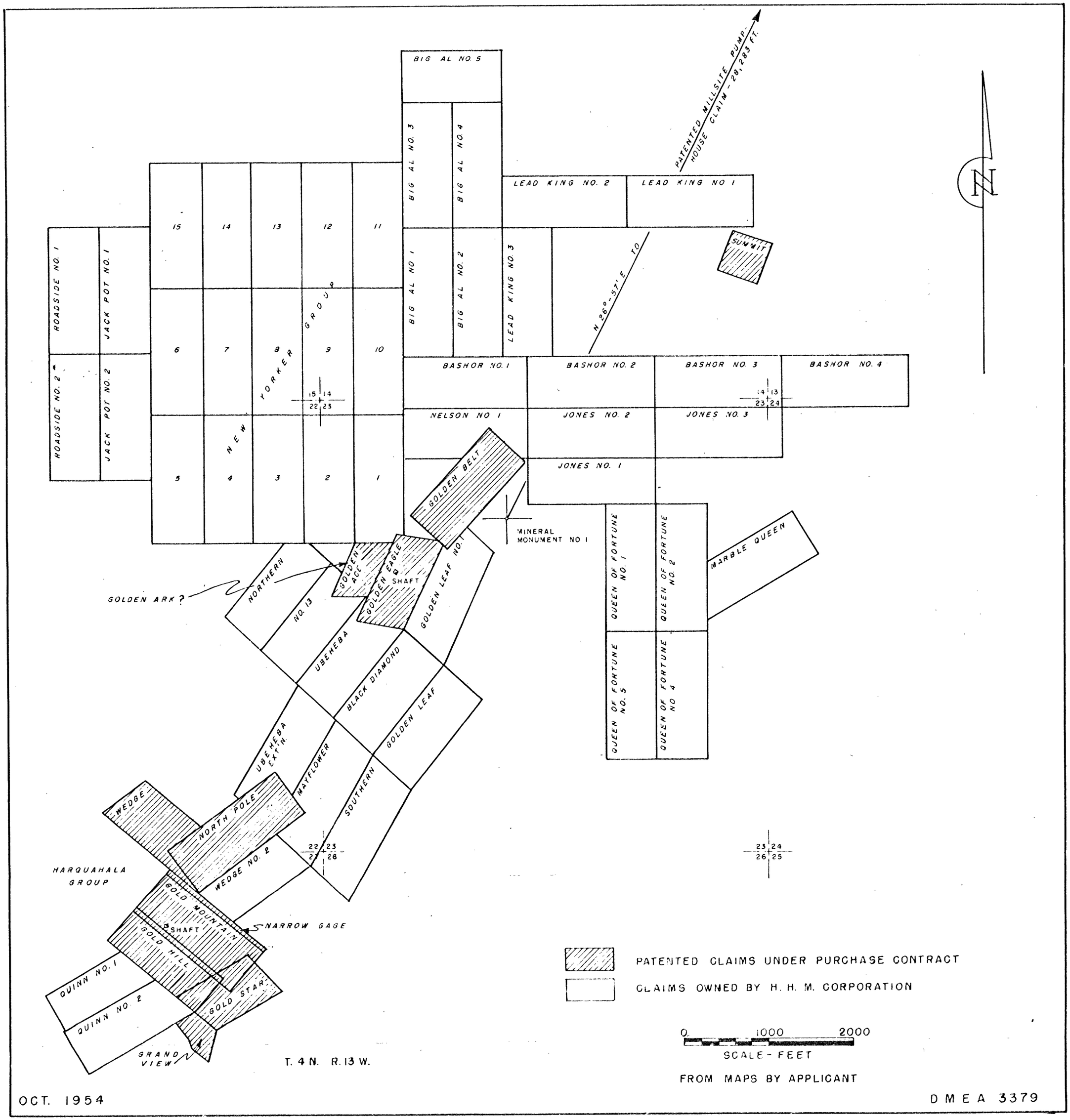
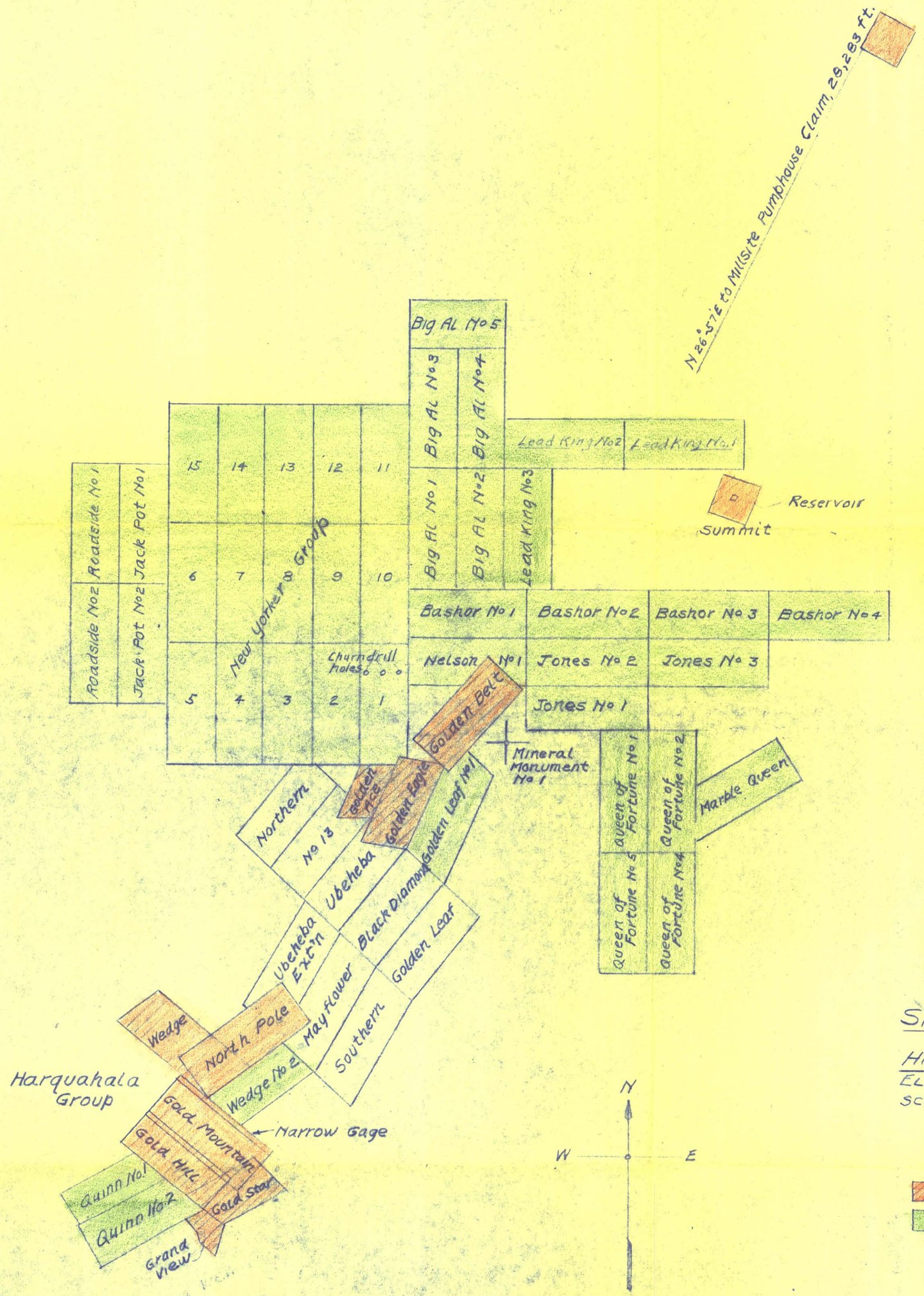
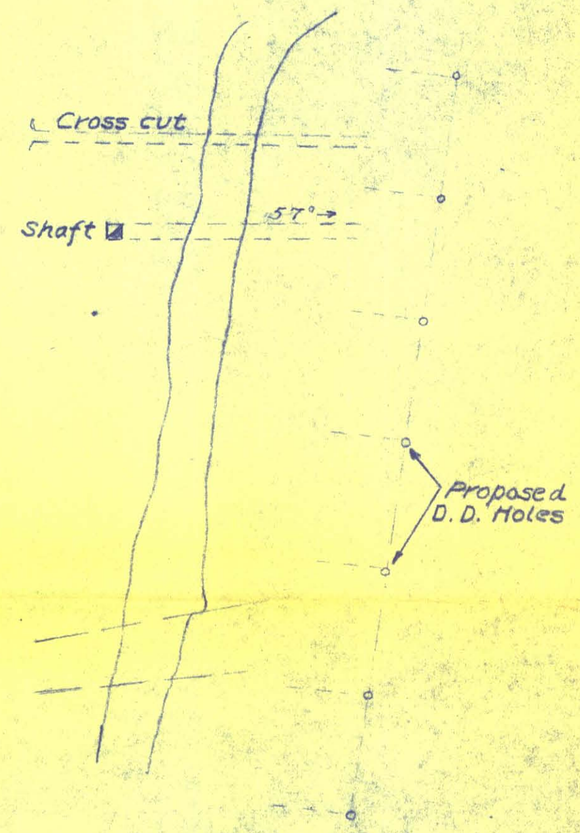


FIGURE 2. – CLAIM MAP – HARQUA HALA MINERALS CORPORATION – YUMA COUNTY, ARIZONA





Sketch Map of Golden Eagle Veins
Scale 1" = 100 ft.

SKETCH MAP OF MINING CLAIMS
OWNED OR CONTROLLED BY
HARQUA HALA MINERALS CORP.
ELLSWORTH MINING DISTRICT, YUMA CO., ARIZ.
SCALE 1" = 1000'
MAY 26, 1954

UNION ENGINEERING CO.
LOS ANGELES, CALIF.

CLAIMS UNDER PURCHASE CONTRACT
CLAIMS OWNED BY H. H. M. CORP.