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

DOCKET COPY

April 12, 1954

Project Summary Review

By: F. L. Knouse

1. Docket No. DMEA-269X-B (Copper)
Contract No. I-DMA-E33
Property - Copper Glance, Copper Queen, Copper King, and Scorpio Annex claims, located in Sections 1 and 6 in T. 18 S., R. 12 and 13 E. and Sections 31 and 36, T. 17 S., R. 12 and 13 E., G. & S.R.M., Pima Mining District, Pima County, Arizona

Operator - Banner Mining Company
2042 Conner Stravenue
Tucson, Arizona

Operator's property rights -

Lessee. Annex 2 to Exploration Project Contract waived requirement of the lessor's subordination agreement.

2. Contract dated June 30, 1951

Work authorized -

The contract authorized the rehabilitation of 1383 feet of shafts and 3240 feet of drifts, crosscuts, raises, and winzes in the old Copper Queen and Copper Glance mines, the driving of 660 feet of new drifts, crosscuts and raises, and the drilling of 2760 feet of diamond drill holes.

Estimated costs of project:

(1) Power Installation	$5,000.00
(2) Repair, retimber and unwater the 646-Ft. vertical Glance shaft, and install necessary water and air pipe lines and electric cables @ $23 per ft. for first 400 feet and $32 per ft. for remaining 246 ft.	17,072.00
(3) Repair and retimber to make accessible and passable, as a ventilition shaft, the Copper Queen shaft to its 7th level, unwater, repair and make accessible the 130 feet of shaft below the 7th level to its bottom, totaling 737 ft. First 607 ft,:$30, bottom 130 ft.:$35	22,767.00

Estimated costs of project (continued):

(4) Repair headframe and bins at Glance shaft, install sheave wheel and install and repair hoist and repair hoist house	$ 1,600.00
(5) Repair headframe at Queen shaft, install sheave wheel, skip dump, attach motor to hoist, repair hoist and repair bin and fill around collar of shaft	1,600.00
(6) Install compressor at Glance shaft	500.00
(7) Drifting and crosscutting:	
525 ft. level Glance Mine	
605 ft. of drifts and crosscuts at $7 per ft.	4,235.00
1245 ft. of drifts and crosscuts connecting the 525 level of Glance Mine to the 7th level of Queen Mine @ $7 per ft.	8,715.00
7th Level of Queen Mine	
510 ft. of drifts and crosscuts on 7th level of Queen Mine @ $7/ft.	3,570.00
626 ft. level of Glance Mine	
740 ft. of drifts and crosscuts @ $7/ft. and 130 feet of raise @ $10/ft.	6,480.00
9th level of Queen Mine	
450 feet of drifts and crosscuts @ $7 and 250 ft. of raises @ $10/ft.	5,650.00
Repair and retimber to make accessible and unwater the 60-ft. winze below the 626-ft. level of the GlanceMine and the 50-ft. winze below the 9th level of the Queen Mine @ $35/ft.	3,850.00
(8) Diamond Drilling, Drifting and Cross-cutting program as follows:	
7th Level of Queen Mine	
250-ft. crosscut from west end of this level to cut the Copper King fissure about 230 feet below known stopes above, @ $30/ft.	7,500.00
2 - 200 ft. Diamond Drill holes to intersect King fissure 100' below @ $4/ft.	800.00

Estimated costs of project (continued):

525-ft. level Glance Mine From face east drift 250 ft. of drifting on or near contact eastward beneath the favorable garnet outcrop in this area @ $30	$7,500.00
700 feet of diamond drilling to locate ore shoots near the easterly end of above drift @ $4/ft.	3,000.00
Area between Queen and Glance Mines on 525-ft. level	
Test 1000 ft.of unexplored contact zone between Copper Queen and Copper Glance workings by diamond drilling from stations along the above drift at intervals of 100 ft., totaling 10 holes - 1610 at $4/ft.	6,440.00
(9) Sampling and assaying	2,100.00
(10) Geological study (Surveying and Mapping)	1,000.00
(11) Compensation insurance, social security and other taxes	5,300.00
Cost of work	$114,679.00
Additional equipment	21,110.00
Total cost of project	$135,789.00

Amendments -

No number - November 20, 1951

Permitted the use of a 800 cu.ft. capacity compressor owned by the Operator with installation cost, at a depreciation rate of $225/mo. in lieu of purchasing 1 - 500 cu. ft. capacity compressor at a cost of $9,000.

No number - November 20, 1951

Permitted the use of one 6-ton Diamond T truck owned by the Operator for a rental and repair rate of $2.00/hr. for time used; the employment of 2 electricians at $2.00/hr.; and the employment of a bookkeeper at the rate of $65.83 per month.

No. 3, February 16, 1952

Permitted an increase in workmen's wages and salaries of supervision and engineering.

Amendments (continued) -

No. 4, April 11, 1952

Permitted an increase of 7 workmen daily underground for thisproject.

No. 5, August 5, 1952

Permitted drifting around caved area on 525 level, Glance Mine, in lieu of advancing through caved ground.

No. 6, September 26, 1952

Extended completion time of project from 12 to 24 months and permitted the employment of the engineer on half-time basis in lieu of one-quarter time.

No. 7, 1952

Added the Scorpio Annex (unpatented) mining claims to project; permitted 250 feet of crosscut from west end of 7th level, Queen Mine, at $30/ft. and 1270 feet of diamond drilling at $4/ft.; on 525 level of Glance Mine, also permitted 1490 feet diamond drilling at $4/ft., and 250 feet of crosscut to explore Granite-Marble contact.

No. 8, 1953

Deleted work set forth in Amendment No. 7 and in lieu thereof permitted 2760 feet at $4/ft. of diamond drilling and 500 feet of crosscut and/or raising(at $30/ft. at locations approved by the Government.

Work completed -

Project work consisted of rehabilitation of 4,346 lineal feet of shafts, drifts, crosscuts, and winze, geologic mapping and sampling, 181 feet of new drifting, 43 feet of new raising, and 2,297.5 feet of diamond drilling.

Available unit cost information:

Item of Cost	Total Cost	Unit (Ft.)	Unit Cost (Per ft.)
Drifting	$3,255.87	46.0	$70.77
Raising	4,220.05	43.0	98.15
Diamond drilling	12,587.96	2,297.5	5.48
Underground rehabilitation	84,622.88	4,346.0*	-

*Rehabilitation cost for each shaft, raise, drift, or crosscut not available.

The project work started on August 15, 1951, and was terminated on April 30, 1953, when the results of the exploratory program had fulfilled the purpose of the project to the mutual satisfaction of the Banner Mining Company and the Government.

After completion of the project, the Operator continued production of copper ore until the newly discovered deposit was mined out during October, 1953. Some exploratory work also was done during this period.

A formal notice of termination by agreement was executed by the Operator and the Government on October 19, 1953, terminating the exploration contract asof October 1, 1953, which provided that any work prosecuted or costs incurred by the Operator after April 30, 1953, were for the sole account of the Operator, except for (a) such necessary and reasonable costs and expenses as may have been incurred in preserving and disposing of any facilities, buildings, fixtures, equipment, or other items, to the cost of which the Government contributed and in which the Government had an equity, and (b) the costs of any reports, accounts, and winding-up and settlement actions provided for in the contract.

3. Audit Certificate - March 3, 1954

Total cost billed by Contractor	$117,959.19
Lessproceeds from property disposition	6,395.00
Net claimed costs	$111,564.19
Exceptions	504.48
Total Accepted Cost	$111,059.71
Government participation at 50%	$ 55,529.85

4. Certification date - March 19, 1954

Certification of discovery or development was recommended by the Executive Officer, Region IV, on September 22, 1953, and the certification and accompanying letters to the Operator and Acting Director of the Emergency Procurement Service of General Services Administration were prepared by the Rare and Miscellaneous Metals Division and referred to the Operating Committee on October 1, 1953, prior to the receipt of the Field Team's final report. The Committee withheld action on the certification pending receipt of the Operator's and Field Team's final report.

One copy each of the Operator's and Field Team's final engineering reports were received from Region IV on March 15, 1954, and the certificate of discovery of development, dated March 19, 1954, was transmitted to the Operator and Emergency Procurement Service on March 22, 1954.

As of this writing, the Field Team's geologic report has not been received.

A workable ore body was discovered and mined which contained 4,059 tons of 4.95 per cent copper ore. Two other orebodies were disclosed which contain approximately 60,000 tons of 1.6 percent copper ore and are not economically workable under present conditions.

5. Comments -

All phases of the project were conducted in an efficient manner. The Operator forwarded good engineering and geological reports.

The project was established to verify the existence of and extensions of reported partially developed copper ore bodies by reopening and rehabilitating old workings; drifting, crosscutting, raising and diamond drilling for ore body extensions.

Copper ore deposits are of the contact metamorphic type, along a northwest striking contact between granite and limestone. The principal valuable mineral is chalcopyrite.

The results of the project were somewhat disappointing because of the small tonnage of exploitable ore exposed. The discovery was sufficiently significant, however, to warrant a certification of discovery or development, especially in view of the larger tonnage of low-grade ore that may be utilized in the future.

Both the Glance and Queen ore shoots show evidence of bottoming at about the 500-foot level. However, the west extension of the Queen shoot shows promises perhaps at a higher elevation. Additional ore discoveriesmight be made in the area through planned exploratory work, utilizing information obtained from the project work.

F. L. Knouse

F. L. Knouse

cc to: Adm. Reading File
Docket (original)
Code 700 contract file
FLKnouse

[X] Actual [X] Certified

WORK ANALYSIS SHEET - DMEA PROJECT

Analysis as of 12/3/54
Incl. Vouchor for Apr. 1953

[X] Actual Cost [ ] Agreed Unit Costs

Name Banner Mining Company

DMA Docket No. 269XB

State Arizona

Commodity Copper

Idm-E No. 33

OPERATION	AUTHORIZED Units	AUTHORIZED Cost	COMPLETED Units	COMPLETED Cost	NET COST
Drifting & Crosscutting	500	10780 ~~15,000.00~~	181	3255.87	3255.87
Raising	43	4220.	43	4220.05	4220.05
Shafts					
Mizes					
Drilling (Specify) Diamond-Core	2710	10,240.00	2297.5	12,587.96	12 587.96
Surface Excavation					
Underground Excavation					
Roads and Trails					
Operating Equipment Purchased		21,110.00		7400.93	4950.93 *
Surface Rehabilitation & Repairs		500.00		517.23	517.23
Underground Rehabilitation		80,737.00		84118.40	81 823.40 *
New Building, Improvements, etc.		8,200.00		5354.27	3704.27 *
Other (Specify)					
Totals		$135,789.00		$117,454.71	$111,097.71

* Result of purchases by the operator.

Operating equipment	$2,450.00
Physical improvements	1 650.00
Materials.	2 275.00
	$6,375.00

Prepared by J M Murphy

BANNER MINING COMPANY

3042 CONNER STRAVENUE TUCSON, ARIZONA PHONE 6-2071

E. G. BOWMAN, PRESIDENT

W. D. BOWMAN
SUPTD. & GEN. MGR.

OFFICIAL FILE COPY
O. M. E.
RECEIVED JAN 6 1959

DATE	INITIALS	CODE
1/6/59	JLG	558
1/8/59	JLG	500

December 29, 1958

Re: Docket DMEA 269X-B (Copper)
Contract IDm-E33
Banner Mining Company
(Copper Glance, Copper Queen & Copper King claims)
Pima County, Arizona

Mr. J. W. Townsend
Executive Officer
OME Field Team, Region III
224 New Customhouse Bldg
Denver 2, Colorado

Dear Mr. Townsend:

This will acknowledge your letter of December 22nd regarding Docket DMEA 269X-B-Copper Contract IDM-E33.

We are still not in agreement with your contract interpretation that royalties are to be assessed on the concentrates instead of the ore.

The crude ore is too low in grade to be commercial unless it is concentrated in our mill at the Mineral Hill property. To ship this ore direct to a smelter would result in a loss to our company and for this reason it would not even be mined. However, if it were shipped to a smelter we would pay royalty only on the net smelter value of the ore and would result in our paying royalty on the basis of 3% instead of the 5% you are asking.

Instead of shipping the ore direct to a smelter, we concentrated it in our mill in order to reduce smelting and transportation charges on the lesser tonnage of concentrates in an attempt to make the ore commercial. No charge was assessed to the ore for our milling of same. We cannot see why we should pay increased royalties to the government because of our election to beneficiate the ore at no charge.

However, if you insist, we will pay the additional amount of $23.54 which you have assessed because of its being such a minor amount. This

payment will be made with the full understanding that it will not set a precedent for the future when larger amounts might be involved. In other words, we want to leave the matter of future royalty payments and the method of calculating same open for a possible legal interpretation.

As to the amount of $2.34 being assessed as a royalty payment [illegible] on crude ore for the year 1953, we find your audit is correct.

Our check in the amount of $25.38 is enclosed in full payment of the above two items with the understanding that it is being paid according to the conditions we have set forth in this letter.

Yours very truly,

BANNER MINING COMPANY

A. B. Bowman

A. B. Bowman
General Manager

ABB: d

Encl: Check #10175

1/2/59
Chm. (2)
OME/TUC
Finch

OFFICIAL FILE COPY
O. M. E.
RECEIVED DEC 29 1958

DATE	INITIALS	CODE
12/29	C	220
12/29	[illegible]	500

224 New Customhouse
Denver 2, Colorado

CERTIFIED MAIL

December 22, 1958

Mr. A. B. Bowman, General Manager
Banner Mining Company
2042 Conner Stravenue
Tucson, Arizona

Re: Docket DMEA 269X-B (Copper)
Contract Idm-E33
Banner Mining Company
(Copper Glance, Copper Queen and
Copper King claims)
Pima County, Arizona

Dear Mr. Bowman:

We have had no reply to our letter dated October 20, 1958, in which we requested your check for $25.88, which is the balance of royalty due the Government.

We presume that you received the First Report of Royalty Review covering the captioned contract for the period June 30, 1951 through September 8, 1958, showing $25.88 as the balance of royalty due the Government. Will you please forward this office by return mail your check for $25.88.

Very truly yours,

Original signed by
J. W. TOWNSEND

J. W. Townsend
Executive Officer
OME Field Team, Region III

HMC:jy

cc: Chm. Op. Comm. (2)
OME,TUC
Finch
Royalty File E33
Chron.

224 New Customhouse
Denver 2, Colorado

October 20, 1958

10/23 220

Mr. A. B. Bowman, General Manager
Banner Mining Company
2042 Conner Stravenue
Tucson, Arizona

Re: Docket DMEA 269X-B (Copper)
Contract Idm-E33
Banner Mining Company
(Copper Glance, Copper Queen and
Copper King Claims)
Pima County, Arizona

Dear Mr. Bowman:

The First Report of Royalty Review, copy of which was forwarded you, shows the total balance of royalty due to be $25.88.

Will you please forward this office a check for the amount of royalty due.

Very truly yours,

Original signed by
E. N. HARSHMAN

E. N. Harshman
Acting Executive Officer
OME Field Team, Region III

HMC:jy

cc: Chm. Op. Comm. (2)
OME,TUC
Finch
Royalty File E33
Chron.

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
9/15	Talbert	800
9/16	C	220
"	Klug	500

SEP 15 1958

Mr. Donald T. Finch
DMEA Auditor
224 New Customhouse
Denver 2, Colorado

Re: Docket No. DMA-269X-B (Copper)
Banner Mining Company
Contract No. Idm-E33

Dear Mr. Finch:

Your recently submitted Report of Royalty Review of the referenced project is acceptable after addition of the following sentence to the second paragraph of page 2:

"Production subsequent to that included in A.S.&R. settlement no. 2897, August 2, 1956, was from unsobordinated land."

This addition has been made to the Washington copies. After correction of all other copies normal distribution is authorized.

Sincerely yours,

(Signed) E. D. Talbert

E. D. Talbert, Assistant Director
Contract Administration
and Audit Division

EDTalbert/GMcC
September 15, 1958

cc: Docket
Admr. Reading File
Mr. Chambers

8623

9-5 C 22
9-5 ~~[illegible]~~

224 New Customhouse
Denver 2, Colorado

September 3, 1958

Mr. A. B. Bowman, Vice President
Banner Mining Company
2042 Conner Stravenue
Tucson, Arizona

Re: Royalty Payments, Docket DMEA 269XB
(Copper), Contract No. Idm-E33
Banner Mining Company (Copper Glance,
Copper Queen and Copper King claims)
Pima County, Arizona

Dear Mr. Bowman:

Thank you for your letter dated August 30, 1958, in reply to our letter of August 13, 1958, pertaining to royalty payments on 3.58 wet tons of concentrates subject to DMEA royalty which were included in A.S.& R. Smelter Lot #2897 dated August 2, 1956.

The DMEA has consistently held that the provisions of Article 14 of the Exploration Contract provide that royalty shall be paid on the net smelter returns or other net proceeds realized from production in the form sold. In this case, the production subject to DMEA royalty was sold in the form of concentrates. According to data submitted, these concentrates had a wet weight of 3.58 tons and a dry weight of 3.5395 tons.

The A.S.& R. Settlement shows a value net of smelter charges of $164.54 per dry ton. It also shows an average transportation cost paid by the smelter of $5.46 per wet ton for freight, switching, haulage and taxes. In the schedule attached to our letter of August 13, 1958, a net figure per ton was used to save space since the difference in net royalty due was only 1¢.

Perhaps the following summary will better serve to reflect the position of DMEA in this matter: --

3.5395 dry tons of concentrate x $164.54 =	$582.39
Less transportation charges paid by smelter 3.58 wet tons at $5.46	19.55
Net smelter value subject to DMEA royalty	$562.84
Value per dry ton of consentrate sold $562.84 ÷ 3.5395 tons =	$159.02
Royalty rate is therefore 5% of $562.84, or	$ 28.14
Less royalty paid	4.60
Balance of royalty due	$ 23.54

We trust the foregoing explanation clarifies the DMEA position for you.

As soon as the Contract Administration and Audit Division completes its report of royalty audit review of this project, a copy will be mailed to your office.

Very truly yours,

Original signed by
J. W. TOWNSEND

J. W. Townsend
Alternate Acting Executive Officer
DMEA Field Team, Region III

DTF:bh
cc: Chmn. Op. Comm. (2)
DMEA/TUCSON
Finch (2)
Royalty File
Corres. File
Chron.

224 New Customhouse
Denver 2, Colorado

August 13, 1958

K.
DA
8/19 H.G. 225
Hug 508

Mr. A. B. Bowman, Vice President
Banner Mining Company
2042 Conner Stravenue
Tucson, Arizona

Re: Royalty Payments, Docket DMEA-2698
(Copper), Contract No. Idm-E33
Banner Mining Company (Copper Glance,
Copper Queen and Copper King claims)
Pima County, Arizona

Dear Mr. Bowman:

At the present time the Contract Administration and Audit Division of DMEA is engaged in making an audit review of royalty payments received from you on production under Contract Idm-E33.

One question has arisen in connection with your last payment transmitted in your letter dated September 7, 1956. See also your letter dated September 18, 1956, transmitting copies of settlement sheets for A.S.& R. Smelter Lot No. 2897.

The exploration contract at Article 14 provides that royalty shall be paid on the net smelter returns or other net proceeds realized from such ore, concentrates or metal produced.

The royalty schedule submitted with your letter of September 7, 1956, indicates there were 3.58 tons of concentrates involved, which your letter of September 18, 1956 states were included in A.S.& R. Smelter Lot No. 2897. Your royalty payment, therefore, should have been based on the net smelter proceeds from the sale of concentrates rather than on crude ore.

Enclosed with this letter is a tentative schedule of royalty due on this shipment which is based on averages obtained from the smelter statement. Please examine this schedule and if you agree with its conclusions, kindly send us a check for the indicated difference in royalty due.

If you do not agree with the schedule, please submit one of your own preparation based on the sale of concentrates instead of crude ore.

Your early reply will be appreciated.

Very truly yours,

Original signed by
J. W. TOWNSEND

J. W. Townsend
Alternate Acting Executive Officer
DMEA Field Team, Region III

Enc.

DTF:bh

cc: Chem. Op. Comm. (2)
DMEA/MFC
Finch (2)
Royalty File
Corres. File
Chron.

A. S. & R. LIQUIDATION SETTLEMENT SHEET NO. 2897, AUGUST 2, 1956

Copper Concentrates

		POUNDS	TONS
Total Wet Weight		286,980	143.4900
Less: Moisture Content	11.37884	32,655	16.3275
Total Dry Weight		254,325	127.1625

Gross Value Per Ton

Silver	$ 5.56	
Copper	169.90	$175.46
Smelter Charges		10.92
Net Value Per Ton		$164.54
Freight, Switching and Tax (628.53 ÷ 143.49)	$ 4.38	
Haulage and Tax (155.18 ÷ 143.49)	1.08	5.46
Value net of Smelter Charges and Transportation paid by Smelter		$159.08

Data per Royalty Statement, July, 1956

Gross weight of concentrates	7,160	3.5800
Moisture content 11.37884	81	.0405
	7,079	3.5395

$159.08 × 3.5395 = $563.06

Royalty at 5%	$28.15
Royalty paid	4.60
Balance of Royalty Due	$23.55

DMEA
26 1958

2/26 C
2/27 King 220
~~500~~

any went to 800

224 New Customhouse
Denver 2, Colorado

February 24, 1958

Memorandum

To: Chairman, Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket No. DMA-269X-B (Copper), Contract No. I-DMA-E33
Banner Mining Company (Copper Glance, Copper Queen, and Copper King Claims) Pima County, Arizona

Enclosed for your consideration and reply is "Auditor's Verification of Account" from Treadaway Tipescu & Company, which was sent to this office.

Original signed by
W. H. KING

W. H. King

Enc.

MHM:bh

cc: Royalty File E-33
DMEA/TUC - w/copy of encl.
Chron.

TREADAWAY TIPESCU & CO.
CERTIFIED PUBLIC ACCOUNTANTS
64 W. PENNINGTON
TUCSON, ARIZONA

AUDITOR'S VERIFICATION OF ACCOUNT

To Defense Minerals Exploration Administration
224 New Customs Building
Denver 2, Colorado

Gentlemen:

We are making an audit of the books of
Banner Mining Co. 2[illegible] Pennington Avenue, Tucson, Arizona
Address Sec. Contract No. [illegible]

For the purpose of verification only, will you kindly forward to us, in the enclosed stamped envelope, the information requested below?

As of Dec. 31, 1957

(a) What amount, if any, did this company owe you?
Answer, $

(b) What amount, if any, did you owe this company?
Answer, $

(c) Is any of the above indebtedness supported by security or collateral?
Answer yes or no

(d) Please give description of such security or collateral:

(e) Please give below a description of any contingent liabilities that you may hold with the above named company:

Yours very truly,
TREADAWAY TIPESCU & CO.

Approved:
Banner Mining Co.

By

I hereby certify that the above is correct.

By

Date Mailed

DMEA
DEPARTMENT OF THE INTERIOR
[illegible]
REGION II
DENVER, COLORADO

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

RECEIVED
SEP 17 1956

224 New Customhouse
Denver 2, Colorado

September 13, 1956

Mr. A. B. Bowman, Vice President
Banner Mining Company
2042 Conner Stravenue
Tucson, Arizona

Re: Royalty Payments, Docket DMEA 269KB (Copper), Contract Idm-E33, Banner Mining Company (Copper Glance, Copper Queen and Copper King Claims), Pima County, Arizona

Dear Mr. Bowman:

We are in receipt of your check No. 3944 in the amount of $4.60, and four copies of a summary of calculations, covering ore shipped in July, 1956.

Please forward four (4) copies of the smelter settlement sheets, which covers the July shipments, to this office at your earliest convenience.

Yours very truly,

W. M. TRAVER

W. M. Traver
Executive Officer, DMEA
Field Team, Region III

MHM/vj

cc: Royalty File E33
Corres. File E33
Sec. Opr. Comm. (2)
W. R. Storms
Marshall
Chron.

File Copy
Surname

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

September 21, 1955

Memorandum

To: The Administrator

From: Chief, Base Metals Division

Subject: Docket No. DMEA-1526, Vermont Copper Company, Elizabeth Mine, Orange County, Vermont, Contract No. Idm-E94, (Copper).

Docket No. DMA-269X-A, Banner Mining Company, Mineral Hill Copper Mine, Pima County, Arizona, Contract No. I-DMA-E32, Copper.

Docket No. DMA-269X-B, Banner Mining Company, Twin Buttes Copper Mine, Pima County, Arizona, Contract No. I-DMA-E33, Copper.

I have scanned the above dockets relative to any possible change in tonnage setup due to present copper prices.

In the case of Vermont Copper Company, Inc., it would be hard to expand the ore reserve (due to increased price base) with the information we have at hand.

The DMEA drilling extended the known ore zone for a distance of 800 feet northerly. It is quite probable that such ore zone continues northerly beyond the limits of the DMEA drilling, but no data are available other than favorable surface exposures.

The main ore body occurs in the east limb of a synclinal fold. DMEA drilling also indicated mineralized areas within the west limb of the same fold but the intercepts were very low grade, 0.3 to 0.5% copper, which is hardly ore even at present prices. However, it is possible that this west limb may contain commercial ores in some areas.

As to the remaining tonnage, these people paid their indebtedness to the Government in May 1954 and we have no subsequent data. DMEA ores were 90,000 tons, 2.5% Cu.

We have two Banner Mining Company projects, DMA-269X-A and DMA-269X-B.

DMA-269X-A

The Field Team gave an estimate of 451,261 tons of 2.8% copper ore.

The Operator's estimate was 529,400 tons with a grade of:

2.61% Cu.
.78oz. Ag.
.05% WO_3
.05% MoS_2

In view of the present price situation, I would be inclined to accept the Operator's estimate.

The company also discovered a promising orebody called The Daisy Mine, some 2,500 feet to the northwest. We have little information on this.

As to ore remaining, the Government received full payment in April 1955, and we have no recent information. A fair guess would be that 225,000 tons have been milled to date, which would leave some 300,000 tons. However, some of the ore milled may have come from the Daisy Mine.

DMA-269X-B

A small DMA orebody of 4,057 tons has already been mined out. However, low-grade ores, totalling 63,800 tons of 1.6% copper, should properly be included if such has not already been done. Such ore should be commercial today.

W. R. Griswold

W. R. Griswold

WRG/er

Copy to: Docket (3)
Base Metals (3)
Chrom.

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

June 29, 1954

Memorandum

To: E. W. Ellis, DMEA

From: C. H. Johnson, Bureau of Mines

Subject: DMEA-269X-B (Copper) Banner Mining Company, Twin Buttes Project

I have just received copies of the engineers' and geologists' final reports on the above-named project and have reviewed them. In my opinion they constitute satisfactory records of the work performed under this contract.

C. H. Johnson

C. H. Johnson

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

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

224 New Customhouse
Denver 2, Colorado

June 9, 1954

Memorandum

To: Secretary to the Operating Committte, DMEA

From: DMEA Field Team, Region IV

Subject: Docket DMA 269X-B (Copper), Contract I-DMA-E33, Banner Mining Company, Pima County, Arizona

Enclosed are the following final reports pertaining to work completed under the subject contract:

1. The original of the operator's final report. /other copy to 700 when rec'd/

2. The original and two copies of the final engineering report by the Bureau of Mines. /other cy rec'd 3/12 & sent to 700./

3. The original and three copies of the final geologic report by the U.S. Geological Survey.

One copy each of the operator's and engineer's final reports were forwarded to the Chairman of the Operating Committee, DMEA, by our memorandum of March 12, 1954.

The work completed was in conformance with the contract and the operator has complied with all contract requirements. Final payment to the operator was processed by this office March 18, 1954, in conformance with the certificate and report of audit by the Contract Administration and Audit Division dated March 3, 1954, which was released to this office March 15, 1954.

The project work completed consisted of the following:

1. Installation of power service; equipment installation; repairs to hoist building; surveying, mapping and sampling.

2. Rehabilitation of 743.5 feet of shaft and 3602.5 feet of underground workings, which involved driving of 181 feet of new drift around an extensively caved portion of an old drift.

3. 46 feet of drifting.

4. 43 feet of raising.

5. 2297.5 feet of diamond drilling.

Reviewed by
DMEA OPERATING COMMITTEE
6-18-54
(date)

Field Team Final Rpt.

The above work was completed at a total accepted cost of $111,059.71, in which the Government participated to the extent of 50% or an amount of $55,529.85.

The contract was terminated as of October 1, 1953, before all of the work authorized in the contract was completed. The exploration work resulted in a discovery of copper ore on which a certification of discovery or development was issued March 19, 1954.

/s/ W. H. King

/s/ E. N. Harshman for
A. H. Koschmann

Enclosures

Mining Division
Date Rec'd
MAR 1 - 1954
BUREAU OF MINES
Denver, Colorado

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

SOUTHWEST EXPERIMENT STATION
Box 4097
UNIVERSITY STATION
TUCSON, ARIZONA

February 24, 1954

Memorandum

To : W. H. King, Chief, Mining Division, Region IV

From : Chief, Mining Methods Br., Mining Div., Region IV

Subject : Final Engineering Report, Contract I-DMA-E33, Docket DMA-269XB, Banner Mining Co.'s Twin Buttes Copper Mines, Pima Mining District, Pima County, Ariz.

Enclosed are original and 8 copies of a final engineering report by T. M. Romslo of the Bureau of Mines for work done under DMEA Exploration Project Contract No. I-DMA-E33. This report has my approval.

Walter R. Storms

Walter R. Storms

CC W. H. King (8)
DMA-269XB
DF

WRStorms:frj

Reviewed by
DMEA OPERATING COMMITTEE
6-18-54
(date)

UNITED STATES
DEPARTMENT OF THE INTERIOR
DOUGLAS McKAY, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

FINAL ENGINEERING REPORT

DMA-269X-B, Contract I-DMA-E33

Banner Mining Co.'s Twin Buttes Copper Mines

Pima Mining District

Pima County, Arizona

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

February 1954

Reviewed by
DMEA OPERATING COMMITTEE
6-18-54
(date)

DMA-269X-B, CONTRACT I-DMA-E33
BANNER MINING CO.'S TWIN BUTTES COPPER MINES
PIMA MINING DISTRICT
PIMA COUNTY, ARIZONA

CONTENTS

Final engineering report — Page

Summary, conclusions and recommendations	1
Introduction	3
Acknowledgments	5
Location, topography, and physical features	6
History and production	7
Ownership and extent	8
Geology and ore reserves	9
Description of the project work	10
Efficiency of operations	14
Expenditures	15
Production	18
Future operations	19
Conclusions	20
Appendix	21

ILLUSTRATIONS

Figure		Following page
1	Location map	6
2	Claim map	8
3	Section through shafts	9
4	Geologic map of Queen and Glance 600 level	10
5	Geologic map of Queen 9th level	10
6	Geologic map of Glance 625 level	10
7	Vertical section through diamond drill holes 20, 22 and 23	14
8	Vertical section through new Queen west stope	14

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The Copper Glance and Copper Queen mines, were reopened and explored in 1951-1953 by the Banner Mining Co., with Governmental aid authorized by the Defense Production Act of 1950. The company's application for aid proposed that the mines be reopened to verify reported reserves in excess of 30,000 tons of 6 percent copper, and to conduct other exploratory work. Following investigation of the application by the Defense Minerals Exploration Administration, under docket DMA-269X-B, the proposed work was authorized by Exploration Project Contract I-DMA-E33. The contract provided for total expenditures estimated to cost $135,789.00, and for maximum Governmental participation of $67,894.50, based on 50 percent of incurred costs.

Mines in the Twin Buttes area have been operated intermittently since 1876. The recorded production from the Copper Glance and Copper Queen mines is 118,066 and 75,186 tons of about 7 percent copper ore, respectively. The Copper King mine, also in the project area, and Copper Queen mine yielded some ore that was credited to one of the other nearby mines.

The ore bodies of the Copper Glance, Copper Queen, and Copper King mines are limestone replacements of the contact metamorphic type. They occur as irregular-shaped bodies along the hanging wall of a limestone-granite contact. Chalcopyrite is the principal ore mineral.

The project was started on August 15, 1951 and was terminated on April 30, 1953 when the results of the exploratory program had fulfilled the purpose of the project to the mutual satisfaction of the Banner

Mining Co. and the Government. Project work consisted of rehabilitation of 4,346 lineal feet of shafts, drifts, crosscuts, and winze, geologic mapping and sampling, 181 feet of drifting, 43 feet of raising, and 2,297.5 feet of diamond drilling.

After completion of the project, the operator continued production of copper ore until a newly discovered deposit was mined out during October 1953. Some exploratory work also was done during this period. Underground activities since October 1953 have been confined to keeping the workings unwatered and repaired. On the surface, preliminary work was completed for a geophysical survey of a portion of the project area, and adjoining claims. In event favorable areas are developed by the survey, they will be tested by diamond drilling. Ore deposits discovered could be developed and exploited from the Copper Glance and Copper Queen mines.

The reserves, as estimated by the operator after the newly discovered deposit containing 4,059 tons of 4.95 percent copper ore had been mined out, were reported as about 50,000 tons of 1.6 percent copper. This low-grade ore is present in a deposit that had been partially developed during previous operations. The ore reserves as estimated by representatives of the Defense Minerals Exploration Administration amount to an indicated 58,800 tons containing 1.6 percent copper and 0.4 ounce silver a ton, and 5,000 tons of inferred ore containing 1 to 2 percent copper.

Certification of a discovery was made by the Defense Minerals Exploration Administration in September 1953. Royalty payments to the Government on ore production have amounted to $2,541.83.

The findings of the project, that was conducted in a workman-like manner, were unfavorable from the standpoint of the small amount of copper ore discovered and exploited. However, the project did result in the localization of previously developed deposits of low-grade ore that may be utilized in the future, and encouraged the operator to continue explorations that have a fair chance of discovering other ore bodies.

INTRODUCTION

This report describes the results of an exploratory project at the Twin Buttes Copper Mine, Pima County, Ariz., that was authorized by the Defense Minerals Exploration Administration under the Defense Production Act of 1950.

On December 12, 1950, the Banner Mining Company applied for Governmental assistance in the reopening and exploration of (1) the Mineral Hill, and Plumed Knight Mines in the Mineral Hill area, and (2) the Copper Glance, Copper Queen, and Copper King group of mines at nearby Twin Buttes. The Copper Commodity Committee of the Defense Minerals Administration investigated the application and decided, with the consent of the applicant, to consider it as 2 exploratory projects. The proposed projects were designated as the Mineral Hill Copper mine, and the Twin Buttes Copper Mines, and were given docket numbers DMA-269X-A and DMA-269X-B, respectively.

The 2 properties were examined on April 16, 1951 by Grant R. Rubly, U. S. Bureau of Mines, and Nels P. Peterson, U. S. Geological Survey. The examinations resulted in favorable recommendations and the awarding of a contract for exploration at each project.

The Twin Buttes project was authorized by Exploration Project Contract I-DMA-E33, dated June 30, 1951. The contract provided for exploratory work costing an estimated $135,789.00, and with maximum Governmental participation of $67,894.50, based on 50 percent of the incurred costs. It specified first, that the Copper Glance and Copper Queen mines be rehabilitated so the 3 lower levels of the Queen mine and the lower 2 levels of the Glance mine could be made accessible for an examination to verify reported ore reserves of about 30,000 tons averaging 6 percent copper in the Copper Glance mine and an unknown amount of the same grade copper ore in the bottom of the Copper Queen mine and also to make an underground geological study on which to base an underground exploration program, provided the examination proves additional exploration advisable. It further specified that the following exploration work be done provided the above was concluded successfully and the geological study indicated this work advisable: Diamond drilling and crosscutting on the 7th level of the Copper Queen mine west of shaft and from the drift on the 525 level connecting the 2 mines; and drifting, crosscutting and diamond drilling on the 525 and 625 levels of the Glance mine. The contract was amended to provide for drifting and raising on the 7th level of the Copper Queen mine west of the shaft.

The project was inspected monthly by an engineer of the Bureau of Mines for the Defense Minerals Administration and later the Defense Minerals Exploration Administration. The engineer submitted Progress Reports to the Field Team of Region IV, Denver, Colo. The operator also submitted monthly reports consisting of a narration of accomplishments and findings, and cost reports. Costs were reviewed by the inspecting engineer and personnel of the Denver office before the Operator was reimbursed for the Government's share of approved costs. The monthly inspection of costs was supplemented by 3 on-site audits of cost accounts, one of which was made after termination of the project work. Reimbursement of the Government's share of costs for the last four months of work was deferred until completion of the final audit and acceptance of the Operator's final report, and a proposal relative to settlement of the Government's interest in property purchased under the contract.

ACKNOWLEDGMENTS

Acknowledgment is due the following members of Banner Mining Co.'s field staff for their cooperation with representatives of the Defense Minerals Exploration Administration: A. B. Bowman, superintendent, B. W. Venable, geologist, E. E. Bray, mine foreman, and E. C. Bowman, clerk. Since completion of the project, A. B. Bowman and B. W. Venable have been named manager, and superintendent, respectively.

Acknowledgment also is due E. S. Bowman, president and W. W. Hardy, secretary, for their cooperation during the audit of project records.

LOCATION, TOPOGRAPHY AND PHYSICAL FEATURES

The Twin Buttes mines are situated in sections 1 and 6 in T. 18 S., R. 12 & 13 E., and sections 31 and 36, T. 17 S., R. 12 & 13 E., Pima Mining District, Pima County, Ariz. They are approximately 27 miles south of Tucson, Ariz. (figure 1). The mines may be reached from Tucson by driving west from U. S. Highway 89 on State Highway 86 to the Mission-Twin Buttes road, and thence southerly about 21 miles on the Mission-Twin Buttes road. All but approximately 9 miles of this route is paved. They also may be reached from Tucson by taking U. S. Highway 89 to the village of Sahuarita, a distance of about 13 miles, thence 7 miles westerly on the Twin Buttes road, and thence 2 miles south. Sahuarita, the nearest railroad shipping point, is served by the Tucson-Nogales branch of the Southern Pacific Railroad. It is the site of Eagle-Picher Mining Co.'s concentrator for its San Xavier mine. This mine is located about 6 miles north of the Twin Buttes mines.

The Twin Buttes mines are on the western piedmont of the Sierrita Mountains. They are at an altitude of about 3,500 feet, in an area of gently rolling surface that drains easterly to the Santa Cruz valley. Vegetation consists of forage grasses and scattered light growths of cacti.

The average annual precipitation is about 11 inches. Rain storms may be heavy during July and August. Other precipitation is confined mainly to light rainfalls and an occasional light snowfall. Mining operations may be conducted on a year-round basis. Temperatures range from 20° F. to 110° F.

GEOLOGY AND ORE RESERVES

Geology

Outcropping rocks in the project area are confined to sedimentaries consisting of Paleozoic limestones, shales and quartzites. They range in age from the Cambrian Bolsa quartzite to the Pennsylvanian limestones and shale of the Naco formation. These rocks have been intruded by granite that has been exposed by underground workings at both the Copper Queen and Copper Glance mines. The contact of granite with the sedimentary rocks strikes N. 60° W. and dips southwest at 45 degrees. It has been off-set at several places by northeasterly trending faults.

The ore bodies of the Copper Glance, Copper Queen, Copper King, and 3 other mines are a geological unit (figure 3). They are limestone replacements of the contact metamorphic type that occur as irregular shaped bodies at widely scattered intervals along the hanging wall of the limestone-granite contact. Metallic minerals of the ore bodies include pyrite, chalcopyrite, and magnetite. Gangue minerals identified include garnet, chlorite, quartz, epidote, and tremolite.

Ore Reserves

The operator's final report divides the reserves into unmined ore found during the rehabilitation operations and the ore mined from a newly discovered deposit. His estimates of unmined ore, about 50,000 tons containing 1.6 percent copper, are confined to a single deposit between the 525 and 625 levels of the Glance mine. The reserves of the newly discovered deposit were depleted during October 1953, after yielding a reported 4,059 tons of ore averaging 4.95 percent copper.

The following are ore reserve estimates prepared for the Defense Minerals Exploration Administration by the writer and J. Faick, U. S. Geological Survey. Calculations and reasoning employed in the estimates will be found in the geological report.

Measured reserves - None. (After exhaustion of the newly discovered ore body, No. 3 of figure 4).

Indicated reserves - 58,800 tons containing 1.6 percent copper and 0.4 ounce of silver per ton. These reserves occur in 2 deposits. Deposit No. 1, shown on figure 6, containing an estimated 57,800 tons assaying 1.57 percent copper, was the only deposit considered in the operator's estimates. Deposit No. 2, shown on figure 5, contains an estimated 1,800 tons of 2.11 percent copper ore.

Inferred reserves - Possibly 5,000 tons of 1 to 2 percent copper ore that occurs as pillars in stopes and scattered small pods and lenses.

Certification of discovery was made by the Defense Minerals Exploration Administration during September 1953.

DESCRIPTION OF THE PROJECT WORK

Work authorized by the contract was started on August 15, 1951 and was terminated on April 30, 1953. The contract was terminated before completion of authorized work when the major portion of the contract funds had been expended and when the results of the exploratory program had fulfilled the purpose of the project to the mutual satisfaction of the Government and the Banner Mining Co.

During the life of the project, the operator did much work and furnished various materials and equipment at no expense to the Government. The following work was done after completion of the project:

1. Drifting - approximately 75 feet in 2 drifts at west end of 7th level, Queen mine.

2. Raising - continued raise of project to 6th level.

3. Stoping - mined out newly discovered ore body during October 1953.

Since October 1953, both the Glance and Queen mines have been kept accessible. This involved dewatering of the mine and repair work that was done one day per week by a crew from the company's nearby Mineral Hill mine.

New Buildings, Improvements, etc.

Work under this category was confined to the installation of a power line and substation by the Rural Electrification Administration. A deposit of $1,765.00 of project funds for this work was fully recovered through monthly rebates on power invoices, and by an audited disallowance.

Initial Rehabilitations and Repairs

Work of this classification was confined to the surface at the Glance mine. It consisted of the following:

1. Headframe repaired and reset on new concrete footings;

2. 75 H.P. electric hoist and 800 C.F.M. compressor installed on new concrete foundations;

3. Hoist house repairs;

4. Installed cable and company-owned cage for hoisting;

5. Electric light and power lines, and compressed air line were installed;

6. Track was installed from shaft to a waste dump and to an ore bin made usable by repairs to an existing structure.

Underground Rehabilitation

This work involved unwatering the mine, and rehabilitation of the Glance shaft, a portion of the Queen shaft, workings on the 525 and 625 levels of the Glance mine, and the 7th and 9th levels of the Queen mine (figures 4, 5, and 6).

Dewatering:

The Glance mine was unwatered from 405 feet to 629.5 feet below the collar of the shaft by an electric sinking pump and electric pumps at stations installed on the 400 and 625-foot levels. This operation also lowered the water level of the Queen mine to its 7th level. The Queen mine then was dewatered to the 9th level by an electric sinking pump with its discharge on the 7th level. Water flowed by gravity to the sump at the pumping station on the 625 level of the Glance shaft. Equipment installed at the pumping stations consisted of a transformer, switchboards with magnetic starters, and 50 H.P. pumps.

Shaft rehabilitations:

A total of 743.5 feet of shafts was rehabilitated. Of this total, 629.5 feet was from the collar to the bottom of the Glance shaft. The remaining 114 feet of shaft rehabilitation was from the 7th to the 9th levels of the Queen shaft. Rehabilitations consisted of repairs to

ladders, platforms, guides, and shaft sets. New timbers were installed in a few places where guides had been supported by stulls, and where existing timbers were in bad condition. Compressed air and water pipes and electric light and power lines also were installed. A company-owned hoist was installed in the 7th level station of the Queen shaft.

Rehabilitation of other workings:

A total of 3,602.5 feet of underground workings, other than shafts, was rehabilitated. Of this total, 1,984.0 feet was in drifts, crosscuts, and raises on the 525 level of the Glance mine and the 7th level of the Queen mine, 803.0 feet was in drifts and crosscuts on the 625 level of the Glance mine, and 755.5 of drifts, crosscuts, and a 60-foot winze on the 9th level of the Queen mine. These rehabilitations included clean-up of debris, timbering of several short sections of heavy ground, repair and replacement of track, and installation of compressed air and water pipes, and electric light and power cables. Natural ventilation, via the Glance workings, was adequate until the Queen mine was reached. To obtain satisfactory ventilation of the Queen workings, compressed air was used until the Queen shaft could be opened for circulation of natural air. This was accomplished by removing about 200 tons of debris from the shaft on the 440 level. This level was reached after cleaning out and repairing a passage through raises and stopes from the 7th level.

Replacement of some pipe and rail due to damage caused by acid mine water was necessary during the first few months of the rehabilitation operations.

Drifting and Raising

A total of 181.0 feet of new drift was completed around a caved area near the 7th level station of the Queen shaft. Raising consisted of 43.0 feet driven in the ore body discovered by diamond drilling (figure 8).

Diamond Drilling

Diamond drilling totalled 2,297.5 feet in 13 holes (figures 4 and 7). The operator prepared the drilling sites, and furnished water and power for the drilling that was done under an independent contract. Logs of all holes drilled and the assays of core and sludge samples are appended to this report.

Surveys and Sampling

The mine workings were mapped from transit and Bruntonsurveys, and geologic maps were prepared. A total of 223 copper, 50 zinc, 50 silver, 3 tungsten, and 2 molybdenum assays were made from channel samples and diamond-drill hole sludge and core samples.

EFFICIENCY OF OPERATIONS

All phases of the project were conducted in an efficient manner under the supervision of Allan B. Bowman, a mining engineer with considerable operating experience. He was assisted by E. E. Bray, a capable mine foreman, and W. W. Venable, geologist. Venable, who was recently promoted to superintendent of the company's operations in the Twin Buttes area, demonstrated his competency by the able manner in which he carried out

geologic mapping, sampling, and diamond drilling operations, and his commendable final geologic report. E. C. Bowman, clerk and warehouseman, carried out his duties in a manner that appeared to be above average.

Considerable savings to both the operator and Government were achieved by building some equipment at the company's shop in Lordsburg, N. Mex., and by purchasing new or slightly used equipment and supplies from non-operating mines and used equipment dealers.

EXPENDITURES

The project accounts were thrice audited by the Defense Minerals Exploration Administration. This included 2 interim audits by Thomas Brading on Nov. 3 to 5, 1952 and Feb. 20, 21, 1953, and the final audit of Feb. 10, 11, 1954 by Donald Finch.

Total costs of the project are indeterminate at this writing because completion of the final audit is dependent upon receipt and approval of bids for jointly owned equipment and supplies.

Tentatively approved charges and the costs of equipment and supplies in which the Government has a 50 percent interest are shown in the following 2 tables:

TABLE 1. - Charges.

Items of Costs	Tentatively Approved Charges
Independent Contract	
Diamond drilling	$6,010.25
Labor and Supervision	
Labor	48,777.54
Supervision	12,265.83
Operating Materials and Supplies	
Timber	2,861.75
Explosives	708.93
Pipe	3,164.03
Track	2,494.58
Other supplies	5,749.52
Power	6,699.00
Operating Equipment	
Purchase	7,400.93
Depreciation	5,703.76
Initial rehabilitation and repairs	5,354.27
New Buildings and improvements	
*Power line deposit	
Miscellaneous	
Repairs to Equipment	950.66
Sampling and analysis	436.25
Payroll taxes	1,971.07
Liability insurance	5,852.35
Accounting salary	1,053.99
Totals	$117,388.45

* Deposit of $1,765.00 fully recovered through rebate on monthly power invoices and an audited disallowance of $450.23 that was recovered by the operator after completion of the project.

The following unit costs are based on a break-down of the operator's total charges before minor corrections in the distribution of allowable costs:

Item of Cost	Total Cost	Unit (Ft.)	Unit Cost(Per ft.)
Drifting	$3,255.87	46.0	$70.77
Raising	4,220.05	43.0	98.15
Diamond drilling	12,587.96	2,297.5	5.48
Underground rehabilitation	84,622.88	-	-
Operating equipment purchased	7,400.93		
Initial rehabilitation and repairs	5,354.27		
New buildings, improvements, etc.	517.23		
Total costs	$117,959.19		

Drifting and raising costs were high, because first, the small footage of drifting and raising required a disproportional amount of preparatory work; second, ore had to be trammed 2,100 feet; and third, overhead costs were high because the two operations could not be conducted simultaneously.

Diamond drilling costs were reasonable. The drilling was carried out under an independent contract between the operator and G. S. Thatcher, Humbolt, Ariz. The operator prepared drilling sites, and furnished compressed air and water. Contract prices per foot of drilling were $2.50 for holes up to 200 feet deep, and $3.00 for drilling holes over 200 feet deep and not over 500 feet.

Underground rehabilitation costs included work performed under varying conditions in shafts, raises and lateral workings. An analysis of the unit costs of these operations does not appear to be in order.

TABLE 2. - Jointly owned equipment and supplies.

Operating equipment		$7,400.93
Initial rehabilitation and repairs		
Timber	$111.34	
Building materials and supplies	1,545.16	
Labor, supervision, etc.	3,697.77	
Total	$5,354.27	5,354.27
Pipe		2,607.67
Pipe accessories		556.36
Track		1,807.87
Track accessories		686.71
Drill steel		459.79
Small tools		328.36
Electric fittings, materials and supplies		1,732.81
Hose and fittings		340.22
Total		$18,692.39

PRODUCTION

Production started during March 1953, and was terminated early in October 1953 when the reserves of direct shipping ore were depleted. All ore was shipped to the American Smelting & Refining Co., El Paso, Texas. Total production was 4,057.4 tons of ore containing 4.91 percent copper, 1.52 ounces of silver a ton, and negligible amounts of zinc and gold; and 1.5 tons of metallics assaying 82.07 percent copper and 0.60 ounce of silver a ton. The metallics represented sections of pipe, rail, and various other iron shapes replaced by copper from mine water, and salvaged during the project. The dollar values of the production were: gross $107,388.31; net smelter, $56,252.62; and per ton, $14.86.

Royalty payments to the Government on the above production amounted to $2,541.83.

FUTURE OPERATIONS

The Banner Mining Co. plans to conduct a geophysical survey of a 60-acre area west of the Copper Queen shaft. The area includes the Copper King, Copper Butte and Minnie Mines, all located along the granite-limestone contact of the Copper Glance and Copper Queen mines. Grid lines have been laid out over a portion of the area and a magnetometer has been purchased for the survey that will be carried out by company engineers. The magnetic method has been selected because it has successfully indicated the presence of Twin Buttes type ore bodies near the company's nearby Mineral Hill mine. Natural potential surveys, such as carried out by the Bureau in 1946, do not appear to be applicable in this area. This is indicated from data secured from the Mineral Hill survey and from the negative results obtained from diamond drill hole No, 6 of figure 4 that was put down by the operator during the life of the project. In event favorable zones are developed by the magnetic survey, the potential ore bodies will be explored by diamond drilling, probably from the surface. If the exploratory program is successful, development and exploitation of ore will probably be carried out from the Queen shaft.

The company does not plan to exploit the lower grade ore found by the project because such an operation would be dependent upon a higher than present copper price. However, these reserves are significant and should be considered as a source of copper during possible future National emergencies.

CONCLUSIONS

The immediate results of the project, ably conducted by the Banner Mining Co. with Governmental financial assistance, must be considered as disappointing from the standpoint of the amount of copper ore discovered and exploited. However, the project did result in the localization of previously developed bodies of low-grade ore that might be utilized in the future. Furthermore, additional ore discoveries might be made in the area through planned exploratory work, utilizing information obtained during the project.

IN REPLY REFER TO:

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

June 7, 1954

Memorandum

To: DMEA Field Team, Region IV

From: A. H. Koschmann

Subject: DMA 269X-B, Contract I-DMA-E33, Banner Mining Company, Twin Buttes Mine (copper), Pima County, Arizona

Enclosed are 9 copies of the final geologic report by John N. Faick of the U. S. Geological Survey covering the above docket.

The project resulted in the discovery of ore and has been certified. Mr. Faick concludes that additional exploration may be warranted.

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

Enclosures (9)

Reviewed by
DMEA OPERATING COMMITTEE
6-18-54
(date)

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Box 4126 University Station
Tucson, Arizona

May 28, 1954

To: A. H. Koschman

From: John N. Faick

Subject: Final Geologic report, DMA-269 X-B, Contract I-DMA-E 33
Banner Mining Company - Twin Buttes Mine (Copper)
Pima County, Arizona

Enclosed are the original and 8 copies of the above final report by John N. Faick of the Geological Survey.

John N. Faick

John N. Faick

JNF:ms

cc. Koschmann (8)

Enclosures

Reviewed by
DMEA OPERATING COMMITTEE
6-18-54
(date)

DEFENSE MINERALS EXPLORATION ADMINISTRATION
REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

FINAL GEOLOGICAL REPORT

BANNER MINING COMPANY

TWIN BUTTES MINE
(Copper)
PIMA COUNTY, ARIZONA

DMA-269 X-B, Contract I-DMA-E 33

by John N. Faick
Geologist, U. S. Geological Survey
May 1954

Reviewed by
DMEA OPERATING COMMITTEE
6-18-54
(date)

BANNER MINING COMPANY
TWIN BUTTES MINE
(Copper)
PIMA COUNTY, ARIZONA

FINAL GEOLOGICAL REPORT

DMA - 209 X-B, Contract I-DMA-E 33

CONTENTS

	Page
INTRODUCTION	1
GENERAL GEOLOGY	2
GEOLOGY AND EXPLORATION OF THE PROJECT AREA	3
THE EXPLORATION PROJECT	7
RESULTS OF EXPLORATION	7
DISCOVERY AND PRODUCTION OF ORE	11
ORE RESERVES	11
EXPLORATION POSSIBILITIES	12
CONCLUSIONS AND RECOMMENDATIONS	13

ILLUSTRATIONS

Figure		
1	Location Map	See Engineering Report
2	Claim Map	" " "
3	Section Through Shafts	" " "
4	Geologic Map of Queen and Glance 600 Level	" " "
5	Geologic Map of Queen 9th Level	" " "
6	Geologic Map of Glance 625 Level	" " "
7	Vertical Section through diamond drill holes 20, 22, and 23	" " "
8	Vertical section through new Queen west stope	" " "

INTRODUCTION

This final geology report describes the results of exploration work done in the Twin Buttes District, Pima County, Arizona by the Banner Mining Company with Government aid from the Defense Minerals Exploration Administration.

The project is designated as DMA 269 X-B, Contract I-DMA-E 33. Under the terms of this contract, which was issued June 30, 1951, the old Copper Glance and Copper Queen mines were rehabilitated and explored. Work under the contract started August 15, 1951 and was terminated April 30, 1953. The contract was terminated prior to completion of all the authorized work because of the satisfactory results obtained, and because it became necessary for the operator to work on other properties.

This report is based principally upon the following:

1. Conferences with the operators,
2. One underground examination of the Copper Glance and Copper Queen mines,
3. Examination of the Surface geology,
4. A Review of the final engineering report,
5. Review of the final operator's report,
6. Review of the monthly progress reports,
7. Review of available literature.

As the operating company has a good working knowledge of the geology of the property and as adequate maps were provided, there was little justification for doing additional field work in connection with this report. This writer's efforts were mostly devoted to analyzing and interpreting the available data in terms of the exploration project. Results of the project are well illustrated by several maps included with the Operator's and Engineer's final reports, and frequent reference will be made to these maps, but no maps are included with this Geological report because of unnecessary duplication.

GENERAL GEOLOGY

In the Twin Buttes area a thick series of sediments have been folded, faulted and intruded by granitic igneous rocks. The sedimentary sequence includes Cambrian quartzite and limestone, Devonian, Mississippian and Pennsylvanian limestones and Permian limestones and gypsiferous beds. The Cretaceous is represented by volcanic rocks and by conglomerate, sandstone and shale. The sedimentary formations occur in isolated blocks, generally less than a square mile in extent, which apparently are remnants of roof pendants in a mass of coarse-grained granitic rock that is the basement rock of the region.

Strong metamorphism and mineralization of the sedimentary rocks suggest that they are intruded by the granite, and near Twin Buttes irregular masses and tongues of granite intrude Bolsa quartzite and Cretaceous beds.

The mineral deposits in the Twin Buttes district are of the contact metamorphic replacement type which have formed in limestone along the granite contact and along faults that intersect the contact. The largest ore bodies are found near the intersections of faults with the granite contact. A massive relatively pure limestone bed in the Mississippian system appears to have been especially favorable for replacement, but beds in the Pennsylvanian Naco and Cambrian Abrigo limestone also contain ore bodies.

The ore bodies contain principally copper and silver, but subordinate amounts of zinc and lead have been found in a few places. Small amounts of scheelite occur in some of the contact areas.

GEOLOGY AND EXPLORATION OF THE PROJECT AREA

This exploration project (DMEA 269X-B) was set up to partly rehabilitate and explore the Copper Glance and Copper Queen mines. Included in the project was the Copper King mine and the Scorpio Annex unpatented claim; however, no work was done upon these two properties.

Several mines, including the above mentioned King, Queen, and Glance, were developed along a mineralized zone which is about 6000 feet long (see Fig. 3, Engineering Report) and which trends west-northwesterly through the Copper King shaft, which is about midway between the east and west ends of the mineralized zone. The portion of the mineralized zone extending east-southeast of the Copper King shaft was explored by this project, and all the work was done through the old workings of the Copper Queen and Copper Glance mines.

These two mines were previously developed on contact metamorphic-type ore deposits which are localized along the contact, with granitic intrusive rocks on the north and limestones on the south side. Along this contact the granite does not crop out, except at a locality a few thousand feet west of the Glance and Queen mines; however, near these mines the granite is probably concealed only by thick alluvium. As revealed by the workings in the Queen and Glance mine the contact strikes about N. 60° W. and dips about 45° southwest.

In the ore bodies, which are localized along the granite-limestone contact, chalcopyrite is the principle ore mineral and this is closely associated with pyrite, sparse sphalerite, magnetite and hematite. These occur in a silicate gangue of garnet, epidote and wollastonite. Wilson[1/] summarizes data which show that the ores display a zoning of minerals which is characteristic of most contact metamorphic deposits. The contact zone nearest the granite intrusive is characterized by garnet and other ferric iron minerals; next outward is a zone containing ferrous iron, marked by hedenbergite; and farther outward sulfides occur associated with little or no contact minerals.

Similar, but less obvious, zoning of the ore apparently takes place with increasing depth of the ores below the surface. In the operator's final report, Venable[2/] states that on the bottom levels of the Queen and Glance mines, considerable magnetite has been found but that sulfide minerals occur only sparingly. Silicate minerals diminished markedly from the 525 to 625 levels of the Glance mine, and this change was accompanied by an increase in magnetite and a decrease in chalcopyrite. Empty stopes above the 600 level must have represented shipping ore containing from 6 to 7 percent copper as shown by production records compiled by Cummings and Romslo,[3/] but samples of pillar and stope remnants immediately

---

1/ Wilson, E.D., Arizona Zinc and Lead Deposits Part 1, Ariz. Bur.Mines Bull. 156, pp. 44, 1950.

2/ Venable, B. W., Superintendent, Banner Mining Co., Pima County, Arizona.

3/ Cummings, J. B. and T. M. Romslo, Investigation of Twin Buttes Copper Mines, Pima County,Arizona; U.S.Bur. of Mines, R.I.4732 p. 3, 1950.

above the 525 level averaged only 2.5 percent copper. The mineralogical changes and impoverishment of the ore values which take place with increasing depth indicate that the ore shoots, which have been mined by previous operators, have definitely been bottomed.

The contact zone, along which the orebodies occur, has been offset in many places by northeasterly trending faults which dip 35 to 75 degrees; some of these faults dip to the northwest and others dip to the southeast. Several of these northeasterly trending faults are exposed in the 600 level drift (see Fig. 4) which connects the Copper Queen and Copper Glance shafts. The prominent Beta fault (at coordinates 19,910 N. and 20,350 E.) ,which crosses 600 level about 300 feet southeast of the Queen shaft, has an apparent horizontal throw of about 250 feet. This is a normal fault which dips steeply to the west and the apparent offset along it is largely accounted for by the southward dip of the contact. Another northeasterly trending fault, located about 800 feet southeast of the Queen shaft, has been mapped on the surface by Wilson (see Fig. 4) but this fault is not evident on the 600 level. This fault could be concealed by a zone of tightly timbered "heavy" ground through which the 600 level drift passes about 500 feet west of the Glance Shaft. Surface maps reveal that another prominent fault, along which there is considerable horizontal throw, must exist beneath the alluvium from 200 to 300 feet northwest of the Glance shaft. This fault has not been recognized on the 600 level; therefore the attitude of the fault is uncertain.

Venable[1] recognized at least two other prominent northeasterly trending, steeply-dipping faults which are designated (see Fig. 4) as the "A" and "B" faults. The "A" fault strikes about N.45° E. and dips about 70° to the S.E. This fault terminates the Queen orebody at its western end and is regarded by Venable to be post ore. The "B" fault lies about 40 feet northwest of the "A" fault and is nearly parallel to it in strike, but dips about 70° to the S.E.

Although Venable regards the northeasterly-trending faults as being post-ore, it is probable that many of them are pre-ore structures, and that post-ore movement may have taken place along several of them. These northeasterly trending faults are probably important to the localization of mineralization and exploration of them near intersections with the limestone-tactite contact should be encouraged. Wilson[2] observed that northeast fissures, dipping from 65° S.E. to vertically, were mineralized in the hanging wall of the ore body in the Copper King mine.

Stratigraphic control is also important in the localization of commercial ore bodies in this district. In the Copper King mine, Wilson[3] reported that "Commercial mineralization apparently was limited to the marble; where the main fissure passes into Naco limestone, at a vertical depth of 225 feet in the shaft, it becomes tight and essentially barren."

1/ Final Report P. 4, 1954.

2/ Op. cit. p. 50

3/ Ibid. p. 50

THE EXPLORATION PROJECT

The exploration work done under this project consisted of unwatering and rehabilitating parts of the Copper Glance and Copper Queen mines, and of drifting, raising, diamond drilling, surveying and sampling from the old mine workings. The total cost of the project was slightly in excess of $117,000.

A total of 743.5 feet of shafts and 3,602.5 feet of underground workings, other than shafts, was rehabilitated during this project.

A total of 181.0 feet of new drift was completed around a caved area near the 7th level station of the Queen shaft. A raise was driven 43 feet in the new ore body which was discovered by diamond drilling.

During the project 13 diamond drill holes, totaling 2,297.5 feet were drilled. The locations of these holes are shown on Figure 4 and Figure 7, and complete logs of the holes are included with both the engineering report and the operator's final report.

The accessible mine workings were surveyed and suitable maps prepared. A total of 223 Copper, 50 Zinc, 50 Silver, 3 Tungsten and 2 Molybdenum assays were made from channel samples, and from diamond drill hole core and sludge samples.

RESULTS OF EXPLORATION

Exploration under the project was done for the purpose of exploring 4 principal objectives which, with the results, are described briefly in the paragraphs below.

Objective 1 was to explore west of the "A" fault to search for a faulted extension of the Queen ore body. Drilling of 8 holes in this area revealed the easterly dipping "B" fault, which is about 40 feet west of the "A" fault on the 600-level (see Fig. 4), and this drilling also revealed a small body of ore between these faults. This ore body, which is designated as No. 3, has been mined out and yielded 4,059 tons of ore which contained 4.95 percent copper.

Venable states that the No. 3 ore body was cut off by the "B" fault, which he regards as being post-ore, and he believes the faulted segment may have been displaced upward about 165 feet on the west side. These results could not be verified by this writer, but should be checked carefully by future exploration. A possible interpretation that needs to be checked is that the faults may be pre-ore and that the faults may have influenced localization of other ore bodies. Also to be checked is the possibility that the "A" and "B" faults served as ore inlets for the ore body in the Copper King mine, which was bottomed in unfavorable beds; in which case future exploration of this area may not result in additional ore discoveries.

Objective 2 was to explore the main contact zone on the 600-level between the old workings of the Glance mine and the Beta fault. Five diamond drill holes (Fig. 4) were drilled, but found only silicates and magnetite on the contact at this elevation.

This zone is regarded by this writer as being very favorable for the occurrence of ore, and future exploration of it may reasonably be expected to result in ore discoveries. The structure in this area is complicated by several faults, about which little is known. Granite is exposed in the 600-level drift from the Beta fault to a point about 600 feet southeast of it, and this granite may be an uplifted fault block. If it is an uplifted block, then there exists a possibility that sulfide ore could be present above the drift. It is possible (but not certain) that the magnetite and pyrite found by drilling holes Nos. 24, 25 and 26 represent the high temperature "roots" of an ore body that might be localized near the intersection of the Beta fault and the contact zone. If the Beta fault is post ore, as stated by Venable, then it is less likely that ore will be found along the fault. Another factor to be considered is the possibility that unfavorable formations may be present in this block, and this possibility is partly suggested by the results of drilling, which revealed the presence of hornstone and gray limestone, but not the more favorable marblized limestone.

Several other faults are present between the Glance shaft and the Beta fault, and all of them should be investigated as possible guides to ore. If the faults can be proven to be pre-ore then the intersection of the faults and the outer edge of the tactite zone should be favorable places to explore.

Objective 3 was exploration of a spontaneous polarization anomaly on the Scorpio Annex claim, and is shown on a map in U. S. Bureau of Mines R. I. #4732, and on Figure 4 of the Operator's report. This objective was not explored because results of diamond drilling for objective 2 indicated that exploration of the anomaly (objective 3) was not justified at this time. It was considered economically inadvisable to continue this part of the project.

Objective 4 was to explore the downward extension of the Copper King fissure as projected from the surface to the 600-level. According to Venable's report "Diamond Drill hole No.16 was extended through the projected extension at depth and disclosed no ore or obvious indication of the fissure."

This writer concludes, from a re-examination of the available data that hole No. 16 accomplished about all that could be expected of it. Results now available indicate that the main contact zone, which is the zone referred to by Venable as the Copper King fissure, has been offset at faults "A" and "B". It is now apparent that hole No. 16 was drilled too far from the mineralized contact zone, although this fact probably could not have been foreseen in advance of drilling. It is also worthy to note that the King ore body bottomed out at a depth of 225 feet (see p. 6, this report); therefore, hole No. 16 may also have been drilled below the maximum depth of the commercial ore bodies.

DISCOVERY AND PRODUCTION OF ORE

The No. 3 ore body (see Fig. 3) was discovered by diamond drilling from the old workings of the Queen Mine. The ore body, when mined out, yielded 4,057.4 tons of ore containing 4.91 percent copper, 1.52 ounces of silver a ton, and negligible amounts of zinc and gold. Also shipped as a result of the operation was 1.492 tons of copper precipitate.

The gross value of the above production was $107,388.31 and the net smelter return was $56,252.62. The Government has received a royalty of $2,541.83 from the ore produced.

ORE RESERVES

There are no measured reserves, because the No. 3 orebody, which was discovered by this project has been mined out, and there are no known bodies of commercial grade ore remaining.

Indicated ore reserves are present in two ore bodies.

The No. 1 ore body (see Fig. 6, Engineering Report) is exposed in the 625-level of the Glance mine, and extends about 140 feet west of the main crosscut from the shaft station and about 100 feet east of it. Indications are that this low-grade ore body may extend 50 feet below the 625 level, and 100 feet above the level, and as the ore is localized along an inclined contact, the dip length of the ore body is about 185 feet. The cross section area of the ore body, normal to the dip, is 3390 square feet. It is conservatively assumed that 11 cubic feet of this ore weigh one ton. Thus it can be calculated that this block of ore contains about 57,000 tons of ore, and samples indicate that it contains 1.57 percent copper.

The No. 2 ore body (see Fig. 5, Engineering Report) is estimated to contain 1800 tons of ore containing 2.11 percent copper. This ore body was under water at the time this writer visited the mine, but the ore body was partly sampled by the operators and was reported by T. M. Romslo, U.S. Bureau of Mines. The ore body has a strike length of 106 feet and a thickness of 3.75 feet normal to the vein. The ore body probably extends about 50 feet along the dip of the contact zone, and lies mostly below the 700 (9th) level. It is partly exposed by the level and by a winze below the level. The depth to which the ore extends in this block is unknown, but is probably not great because the ore body apparently is near the bottom of the zone of sulfide mineralization.

EXPLORATION POSSIBILITIES

The Banner Mining Company plans to do additional exploration in the Twin Buttes area in the near future. Exploration will be preceded by geophysical surveys, and followed by diamond drilling, especially in the area west of the Copper Queen shaft. The strongly mineralized contact zone appears to be a favorable place to search for additional ore, and future discoveries may be expected.

In the preceding pages was mentioned the possibility of incorrectly interpreting the age of the numerous northeasterly-trending faults, with respect to the age of the ore. Many of the northeasterly-trending faults, and other faults which intersect the metamorphic zones are important ore controlling structures, and should be carefully examined as possible guides to ore.

The presence of abundant magnetite and other high temperature gangue minerals near the bottom of the ore shoots indicates that the commercial ore bodies are relatively shallow and may not extend more than a few hundred feet below the present erosion surface. The existence of deep seated deposits is not indicated, at least in the vicinity of the King, Queen and Glance mines.

CONCLUSIONS AND RECOMMENDATIONS

This project has resulted in the production of ore and copper precipitate, having a total gross value of $107,388, which is only slightly less than the $117,000 which the project cost. The ore discovered and mined as a result of the project was certified as a discovery, and the project is considered as having been successful.

It is probable that other ore bodies remain to be discovered in the Twin Buttes area, and additional exploration is warranted.

DMA-269X-B, Contract I-DMA-E33

Banner Mining Co.'s Twin Buttes Copper Mines

Pima Mining District

Pima County, Arizona

APPENDIX

Logs and Assays for Diamond Drill Holes

Nos. 12 to 16, 18 to 20, and 22 to 26, inclusive.

February 1954

DIAMOND DRILL HOLE LOG
HOLE #12 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA Docket #269-X-B

Note: This is the first Diamond Drill Hole that is being drilled on this project

Underground hole from Queen-Glance 600 level crosscut. Headed south to cut the Glance Contact projected west from the Glance Mine. Several pyrite-quartz fissures head out into this general area, and there is a natural-potential anomaly over here on the surface. The granite-limestone contact was expected at about 200' but was found at 110'. Contact was in quartzite at this point.

Collar co-ordinates- Latitude 19,791.63 Departure 20,536.98.

Collar elevation- 2,930.77

Course hole- S22° 52'W.

Dip hole- Flat (up 1°25')

Driller- Ed Shandley

Size core-EX

Average Core recovery- 69.0%

Total depth- 184.0'

Started 11-26-52, Finished 12-4-52

Logged by B. W. Venable

Average core recovery through the contact zone- 110-129½ 91.3%
****

From	To	Core Description	Core Recovery
0'	5'	Granite	3.4'
5'	9.5'	Granite	2.9'
9.5'	14.5'	Granite	4.9'
14.5'	19.5'	Granite	3.1'
19.5'	24.5'	Granite	3.7'
24.5'	29.5'	Granite	3.8'
29.5'	34.5'	Granite	4.0'
34.5'	39.5'	Granite	4.4'
39.5'	44.5'	Granite 3" quartz & pyrite at 45° with core axis, at 40'	4.6'
44.5'	49.5'	Granite. Drilled part way along a fault face making about 5° with the core axis, having striations at about 70° with the core axis	3.2'

From	To	Core Description	Core Recovery
49.5'	55.0'	Granite	4.35'
55'	65'	Granite	8.4'
65'	75'	Granite	7.8'
75'	85'	Granite	5.5'
85'	90'	Granite	2.1'
90'	100'	Granite, partly silicified	5.1'
100'	110'	Granite, partly silicified, last 4" contains a small amount of chalcopyrite and disseminated pyrite	4.5'
110'	115'	First 6" is pyrite & quartz at 10° with the core axis, and the last foot is dark gray quartzite. The rest is green garnet, actinolite & quartz. Banding makes about 50° with core axis. 3/4" pyrite at 113½'	4.8'
115'	120'	Hard, dense, fine grained dark gray quartzite.	4.0
120'	125'	Gray quartzite. Scattered small pyrite & Green garnet stringers at 60° with core axis in last 3' of core.	4.7'
125'	129.5'	Gray quartzite. Last 1" is dark green chlorite containing some tiny crystals of chalcopyrite and other copper minerals	4.3'
129.5'	135'	Mostly dark green epidote, some gray quartzite.	1.1'
135'	138'	Gray quartzite.	2.7'
138'	143.5'	Light gray quartzite- slightly calcareous.	1.5'
143.5'	148.5'	Light gray quartzite- slightly calcareous.	4.8'
148.5'	158.5'	Gray limestone.	3.5'
158.5'	164'	Gray limestone. Last 1½' mostly altered to crumbly talc along fractures making 60° with core axis	5.2'
164'	174'	Gray limestone. First 2' soft & broken.	6.6'
174'	180'	Gray limestone. 3" green garnet at 178' making 70° with core axis.	4.3'
180'	184'	Pale gray to brown crystalline limestone.	3.8'
184'		End of Hole.	

****

SAMPLE ASSAYS

110'	115'	Core #634- 0.44% Copper.
110'	115'	Sludge #653 Trace of Copper.
125	129½'	Sludge #652 0.02 Copper.

DIAMOND DRILL HOLE LOG
HOLE #13 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Queen-Glance 600 level crosscut. Same location & Purpose as Hole #12 on a divergent course.

Collar Co-ordinates- Latitude 19,791.62 Departure 20,535.62.

Collar Elevation- 2,930.84

Course Hole- S37° 18' W.

Dip Hole- Flat.

Driller - Ed Shandley

Size Core- EX

Average Core Recovery- 81.9%
Average Core Recovery Through Contact Area- 88.6%

Total Depth- 172.5'.

Started 12-5-52, Finished 12-13-53.

Logged by B. W. Venable.

****

From	To	Core Description	Core Recovery
0'	12'	Granite	2.5'
12'	20'	Granite	6.7'
20'	30'	Granite. Rust stained fractures at 10° with core axis. At 26'-29' core shattered.	7.0'
30'	40'	Granite.	7.6'
40'	45'	Granite.	4.4'
45'	55'	Granite. 1" massive pyrite at about 45° with core axis at 50'	7.5'
55'	62.5'	Granite.	5.7'
62.5'	67.5'	Granite.	5.0'
67.5'	74'	Granite	4.5'
74'	79.5'	Granite.	3.8'
79.5'	84'	Granite.	2.9'
84'	89.5'	Granite.	3.5'
89.5'	94.5'	Granite.	6.9'
94.5'	99'	Granite. 6" cut by numerous small slips of pyrite up to 1/4" wide at various angles at 95'.	3.4'

From	To	Core Description	Core Recovery
99'	108.5'	Granite.	9.1'
108.5'	113'	Granite to 112'. 1/4" pyrite at 70° with core axis at 112'. 112-113' is quartzite.	4.1'
113'	115'	First 9" of core is quartzite. Then 1½' of green slightly calcareous garnetite, then 3" quartzite.	2.0'
115'	120'	First 2½' is brown garnetite, then 1' green garnetite, all slightly calcareous, then 1½' of Quartzite at end. 1/4" pyrite at 119.7'.	4.9'
120'	122.5'	Garnet, Looks like about 5" of ore (Pyrite, green garnet, chalcocite?) at 121' at 45° with core axis.	2.5'
122.5'	127.5'	Green garnetite, about 4" of massive magnetite at 127½'	5.0'
127.5'	130.5'	Strongly altered rock. Soft & Chloritized, mostly dark green. Some magnetite.	1.6'
130.5'	132.5'	Same as 127½' to 130½'.	1.1'
132.5'	137.5'	Mottled, altered limestone, pyritic & chloritic from 132½ to 136½', unaltered gray limestone from 136½ to 137½'	4.6'
137.5'	142.5'	Limestone. Last 3" chloritized, with a fault slip at 45° with core axis, striae on the dip.	5.0'
142.5'	152.5'	Limestone. About 2' of black quartzite at 148'	10.0
152.5'	162.5'	Limestone.	10.0
162.5'	172.5'	Limestone.	10.0
172.5'		End of Hole.	

****

SAMPLE ASSAYS

113' - 115'	Core sample #648-	
113' - 120'	Sludge sample #654-	.03 Copper.
115' - 120'	Core sample #649-	
120' - 122½'	Core Sample #660-	Trace copper.
122½' - 127½'	Core Sample #661-	.22 Copper.
120' - 127½'	Sludge sample #655-	Trace Copper.
127½' - 130½'	Core sample #662-	.66 Copper.
130½' - 132½'	Core sample #663-	.48 Copper.
127½' - 132½'	Sludge sample #656-	1.15 Copper.
132½' - 137½'	Core sample #664-	.21 Copper.
132½' - 137½'	Sludge sample #657	.48 Copper.

DIAMOND DRILL HOLE LOG
HOLE #14 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Queen west crosscut face west to locate the contact where faulted, and possibly find the displaced section of ore. Granite was struck at 63'.

Collar CO-ordinates- Latitude 20,231.14 Departure 20,032.63.
Collar Elevation- 2,934.31.
Course Hole- N66° 18' W.
Dip Hole- Flat (up 40')
Driller-Ed Shandley.
Size Core- EX
Average Core Recovery- 90.7%.
Average Core Recovery through Contact Area- 97.8%.
Total Depth- 78.5'
Started 12-13-52 Finished 12-17-52.
Logged By- B. W. Venable.

****

From	To	Core-Description	Core Recovery
0'	10'	White marble.	9.9'
10'	17'	White marble slightly discolored and fractured in the last 2'.	6.8'
17'	30'	White limestone. First foot is soft & crumbly. Last 2' is mottled & partially altered to black silicates.	12.4'
30'	34.5'	Black, red & green contact minerals, No discernable sulfides, but core is very magnetic.	4.3'
34.5'	44.5'	Massive aphanitic magnetite.	9.3'
44.5'	49.5'	Same.	5.0'
49.5'	59.5'	Same to 56'. Then light green chlorite to 59½'.	10.0'
59.5'	63'	First 1½' of core is black magnetite. The rest is light green chlorite with some pyrite. Very broken up.	3.7'
63'	68'	Broken granite.	0.6'
68'	73'	Granite.	4.1'
73'	78.5'	Granite	5.1'
78.5'		End of Hole.	

****

SAMPLE ASSAYS

59½' - 63'	Sludge sample #658-	.03 Copper.
63' - 68'	Sludge sample #659-	.29 Copper.
30' - 34½'	Core Sample #747 -	Trace Copper.
34½' - 44½'	Core Sample #748-	Trace copper.
44½' - 49½'	Core sample #749-	0.42 Copper.
49½' - 59½'	Core sample #751-	0.11 Copper.
59½' - 63'	Core sample #752-	0.46 Copper.

DIAMOND DRILL HOLE LOG
HOLE #15 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole, same general location and purpose as holes #14. The granite contact appears to be on a fault, as no contact metamorphism is present.

Collar Co-Ordinates- Latitude 20,225,72, Departure 20,028.60.
Collar Elevation- 2,935.03
Course Hole- N 88° 45' W.
Dip Hole- Flat (up 2°).
Driller- Ed Shandley
Size Core- EX
Average Core Recovery 94.2%
Total Depth- 130.0'
Started 12-17-52, Finished 12-23-52.
Logged by- B. W. Venable

****

From	To	Core Description	Core Recovery
0'	10'	White Marble	10.0'
10'	20'	White Marble	10.0'
20'	23'	White Marble	3.0'
23'	33'	White Marble	10.0'
33'	43.5'	White Marble slightly mottled & fractured in the last 3'	10.0'
43.5'	53.5'	Limestone. Numerous fracture planes making 25° with core axis, showing slicken sides at right angles to major axis of fracture oval.	10.0'
53.5'	64'	White Limestone	10.0'
64'	74'	White Limestone	9.0'
74'	79'	White Limestone. A little Pyrite at 74'	5.0'
79'	89'	White Limestone	10.0'
89'	93'	White Limestone	3.5'
93'	103'	Limestone, mottled & discolored starting at about 97'. Numerous slips making about 45° with core axis.	9.9'
103'	113.5'	The first foot is soft, soapy gouge, the rest is granite, gradually changing from altered to fresh.	8.0'
113.5'	120'	Granite. About 9" of pyritic quartz at 113.5'	4.4'
120'	130'	Granite	9.6'
130'		End of Hole	

****

HOLE #15 TWIN BUTTES PROJECT

Note:- This hole was extended to 199' starting 1-19-53.
Purpose- To see if the granite in the hole is a projecting nose. If so this hole should drill through the granite at not more than 200' total depth.
Emerged from granite at 156'.
Driller- Ralph Carrera
Size Core- EX
Average Core Recovery- 55.6%
Total Depth of Extension- from 130' to 199'
Started- 1-19-53 Finished- 1-22-53
Logged By- B. W. Venable.

From	To	Core Description	Core Recovery
130'	140'	Granite	6.0'
140'	146'	Granite	3.0'
146'	156'	Granite	3.7'
156'	166'	First hole is pyritic quartz with some chalcopyrite. The last foot is garnet and other contact silicates. The rest is silicified granite. slightly pyritic.	4.2'
166'	169'	Soft Hornfels, pale green.	1.8'
169'	179'	Hard Hornfels.	8.3'
179'	189'	Hornfels	7.8'
189'	199'	First $1\frac{1}{2}$' of core is hornfels. Thenabout a foot of limestone containing banded magnetite garnet and minor chalcopyrite at about 45° with core axis. Gray limestone at the end.	3.6'
199'		End of Hole.	

****

SAMPLE ASSAYS

113.5' - 114.5' Core #800- 0.03 Copper
156' - 166' Core #740- 0.42 Copper

DIAMOND DRILL HOLE LOG
HOLE #16 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole, Queen West 600, same general purpose as holes #14 and #15, and also to prospect the King Fissure at depth. Granite was not cut, and no Mineralization found in King Fissure. (Fissure not positively found).

Collar Co-Ordinates- Latitude 20,224.16 Departure- 20,027.61
Collar Elevation- 2,935.05
Course Hole- S62°00'W.
Dip Hole- Flat (up 2½°)
Driller-Ed Shandley
Size Core- EX
Average Core Recovery- 95.0%
Total Depth- 304'
Started- 12-26-52 Finished- 1-9-53
Logged by- B. W. Venable

****

From	To	Core Description	Core Recovery
0'	10'	White Limestone. A ¼" stringer of garnet at 6", and a ¼" stringer of magnetite and pyrite at 4' to 5' make about 5° with core axis.	9.4'
10'	15'	White Limestone. 1/16" stringers magnetite & Pyrite parallel with core axis.	5.0'
15'	25'	White Limestone. 1/2" green garnet running at about 5° with core axis at 24'.	9.9'
25'	30'	White Limestone. Faint banding, looks like it might be bedding throughout at 45° with core axis.	5.0'
30'	37.5'	White Limestone	6.5'
37.5'	43'	White Limestone	5.0'
43'	49'	White Limestone	5.7'
49'	54'	White Limestone. About 1/2" of garnet at 5° with core axis at 49.5'	5.0'
54'	64'	Limestone	10.0'
64'	69'	Limestone	4.8'
69'	78.5'	Limestone	9.0'
78.5'	83.5'	Limestone	4.8'
83.5'	92.5'	Gray Limestone	9.0'
92.5'	102.5'	Limestone. Discolored by partial alteration to a greenish tinge at about 65° with core axis from 95' to 100'. Several slips through this section, making 2° to 10° with core axis.	10.0'

HOLE #16 TWIN BUTTES PROJECT
CONTINUED

FROM	TO	CORE DESCRIPTION	CORE RECOVERY
102.5'	113'	Limestone. Fault gouge from 111' to 113'. Solid gouge for about a foot at 112'. Angle of faulting is not very obvious, but several planes of movement show in core making 5° to 30° with core axis.	9.0'
113'	123'	113-114.5' is white marble. 114.5-115' is garnetite. Slip at 114.5' makes 40° with core axis. 115-123' is white marble	9.6'
123'	133'	Gray Limestone. Banding thought at 70° with core axis. Slips here & there at about 10° with core axis.	9.9'
133'	143'	Gray Limestone. Banded at approximately 70° with core axis. Small drusy openings at 138'.	9.0'
143'	150'	Gray to Pale Green Limestone	6.4'
150'	160'	Gray Limestone'	9.8'
160'	170'	Gray Limestone.	9.9'
170'	180.5'	Gray Limestone.	10.0'
180.5'	191'	Gray Limestone.	10.0'
191'	197'	Gray Limestone. Some ground calcite with a few tiny (1/64") Xls chalcopyrite in it at 196' and 197'.	5.7'
197'	206'	Gray Limestone. Banded at about 40° with core axis.	9.0'
206'	216.5'	Limestone. Mottled & slightly discolored green & brown. Chalky in spots. About ½" of gouge at 199' making about 10° with core axis. A slip at 215' makes 10° with core axis.	10.0'
126.5'	227'	Gray Limestone	10.1'
227'	237'	Banded (60°) Gray Limestone.	10.0'
237'	247'	" " " "	9.4'
247'	256'	" " " " . Core shattered at 252½' with slips making 5° - 20° with core axis.	9.0'
256'	262.5'	Gray Limestone.	6.6'
262.5'	268.5'	Gray Limestone.	6.0'
268.5'	278.5'	Gray Limestone	10.0'
278.5'	283.5'	Gray Limestone.	4.9'
283.5'	293.5	Gray Limestone. Tiny XLs pyrite in slipes 293½'	9.5'
293.5'	300'	Gray limestone. Slightly discolored by alteration. Several Knife edge slips at 45° with core axis scattered throughout.	2.3'

HOLE #16 TWIN BUTTES PROJECT
CONTINUED

From	TO	CORE DESCRIPTION	CORE RECOVERY
300'	304'	Gray Limestone	3.7'
304'		End of Hole	

****

SAMPLE ASSAYS

NONE

DIAMOND DRILL HOLE LOG
HOLE #18 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269_X-B

Underground hole, Queen West 600, to locate the contact between holes 15 & 16. Granite contact not found.

Collar Co-Ordinates- Latitude 20,224.33, Departure 20,027.65.
Collar Elevation- 2,934.94
Course Hole- S78° 55' W.
Dip Hole- Flat (up 35')
Driller- Ed Shandley
Size Core- EX
Average Core Recovery- 94.8%
Total Depth- 199.5'
Started 1-10-53- Finished 1-17-53
Logged By- B. W. Venable

****

From	To	Core Description	Core Recovery
0'	13'	White marble. ½" green garnet stringer at 10° with core axis at 0.5', Ditto at 3'.	12.4'
13'	23'	Pale Gray Limestone	9.9'
23'	28'	White Marble.	4.5'
28'	38'	White marble	9.8'
38'	43'	White Marble.	4.9'
43'	49'	White marble.	5.8'
49'	54'	White marble. Slightly altered in spots.	5.0'
54'	59.5'	White marble. about 3" of pink stain at 59.5'.	5.3'
59.5'	65'	Gray limestone to 64'. A 2" breccia zone at 60' making 20° with core axis. Garnet starting at 64' on a slip making 20° with core axis. No Gouge.	4.7'
65'	70'	Garnet, A little chalcopyrite & magnetite at 67'. Core shattered at 70'.	5.0'
70'	76.5'	Limestone. White to gray. all more or less altered. Slips make about 10° with core axis.	6.2'
76.5'	81.5'	Mixed white limestone & garnet. Some magnetite. No visible sulphides.	5.0'
81.5'	87'	First 1.5' is green garnet with tiny crystals. Visible sulphides. The rest is gray limestone, fresh.	5.0'
87'	92'	6" of Gray limestone, then limestone with garnet bands at about 25° with core axis, the rest of the distance. Slickensides at 90.5', on 2 slips making 25° with core axis, striae parallel to core axis, when viewed in plane of fracture. Last foot is quartzite.	4.9'
92'	102'	First 2½' is quartzite. Last 7½' is limestone	10.0'
102'	111'	Limestone in all but last 1½'. Last 1.3' is garnetite with magnetite, pyrite, and very small amounts of chalcopyrite. Banding at about 10° with core axis.	9.0'
111'	116.5'	Gray limestone	3.4

HOLE #18 TWIN BUTTES PROJECT

From	To	Core Description	Core Recovery
116.5'	126.5'	Gray limestone. A 5" calcite stringer at 80° with core axis at 117'. A 1/8" veinlet of pyrite, quartz andchalcopyrite cuts across at122', making 35° with core axis.	10.0'
126.5'	137'	Gray Limestone.	10.2'
137'	147'	Gray limestone	10.0'
147'	151.5'	White limestone.	4.3'
151.5'	162'	First foot is white gouge. The rest is green contact silicate with small amount of magnetite.	9.1'
162'	168'	First 3' is talcy limestone, then about a foot of green silicates, then 2' of gray limestone.	5.2'
168'	174'	Gray limestone.	4.8'
174'	179.5'	Gray limestone.	4.9'
179.5'	184.5'	Gray limestone.	5.0'
184.5'	189.5'	Gray limestone. 6" of chlorite-pyrite banding at 45° with core axis at 194'.	5.0'
189.5'	199.5'	Gray limestone	9.9'
199.5'		End of Hole.	

****

SAMPLE ASSAYS

102'	111'	Sludge #741-	0.02 copper.	
65'	70'	Sludge #750-	1.97 copper.	
65'	70'	Core #822-	1.56 copper.	
76.5'	81.5'	Core #823-	0.04 copper.	
81.5'	83'	Core #828-	0.04 copper.	
152'	162'	Core #836-	0.03 copper.	
162'	164'	Core #837-	0.04 copper.	
194'	199.5'	Core #861-	0.03 copper.	0.1 Zinc.

DIAMOND DRILL HOLE LOG
HOLE #19 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Queen west stope end up approximately 50° to investigate the granite- limestone contact west of the two west Queen normal step-faults. This hole was intended to pick up a possible up-faulted extension of the Queen orebody. Hole was too high. A little chalcopyrite was found, however granite was never penetrated.

Collar Co-Ordinates-Latitude 20,259.44, Departure 20,077.80.
Collar Elevation- 2,944.57
Course Hole- N31° 03' W.
Dip Hole- Up 50°
Driller- Ralph Carrera
Size Core- EX
AVerage Core Recovery- 89.9%
Total Depth- 229'
Started- 1-24-53, Finished 2-11-53
Logged by- B. W. Venable

****

From	To	Core Description	Core Recovery
0'	10'	Brown garnet. A little Sphalerite.	9.4'
10'	20'	Same	8.2
20'	30'	Same. Some Smithsonite (?)	3.2'
30'	46'	Garnet with heavy sphalerite 30-40. A sort of calcite cemented breccia with considerable Smithsonite and a little rhodocrosite from 40-46	16.0'
46'	56'	Barren appearing brown garnet.	10.0'
56'	66'	Same. Fault gouge from 62 to 66, with planes of slickensides at angles of 5° to 60° with core axis.	10.0'
66'	76'	First 2' is fault material, same as 62'-66'. Then 5' of crystalline gray limestone, then the rest in hornfels.	10.0'
76'	84'	Brown garnet, coarsely crystalline.	5.0'
84'	89'	Brown garnet, coarsely crystalline. Some Smithsonite in seams. Core broken.	1.5'
89'	99'	First 4½' is flinty green garnet. The rest is crystalline gray limestone.	10.5'
99'	109'	Gray Xline limestone.	10.0'
109'	119'	Gray Xline limestone.	10.0'
119'	129'	Xline white marble.	6.7'
129'	139'	White marble.	10.0'
139'	149'	Gray marble.	10.0'
149'	159'	Gray marble.	10.0'
159'	169'	Gray marble. 2' of garnet at 10° with core axis at 166.5'-168.5', with one ½" band of chalcopyrite and pyrite making about 8° with core axis at 166.5'.	9.9'

HOLE #19 TWIN BUTTES PROJECT
CONTINUED

From	To-	Core Description	Core Recovery
169'	179'	White marble. A 3/4" band of pink Wollastonite runs through core almost parallel to core axis from 175 to 179'.	8.3'
179'	181'	White marble, Wollastonite band 179' to 180'	1.7'
181'	191'	White marble. $\frac{1}{2}$" garnet-wollastonite band at 3° with core axis at 190'-191'.	10.0'
191'	201'	White marble, very coarsely crystalline.	10.0'
201'	210'	Same.	9.0'
210'	220'	$1\frac{1}{2}$' brown garnet at about 3° with core axis at start, the rest in white marble.	6.5'
220'	229'	White marble. About 3" of core shattered at 228', and again at 229'.	9.0'
229'		End of Hole.	

****

SAMPLE ASSAYS

10'	20'	Core #764-	Trace copper-	0.2 Zinc.
30'	36'	Core #765-	Trace copper-	1.9 Zinc.
36'	41'	Core #767-	Trace Copper-	17.52 Zinc.
0'	10'	Core #862-	.04 Copper-	0.1 Zinc.
0'	20'	Core #863-	.03 Copper-	0.1 Zinc.
40'	46'	Core #881		2.5 Zinc.
46'	56'	Core #882-		0.2 Zinc.
84'	89'	Core #886-		0.3 Zinc.
89'	94'	Core #887-	.39 Copper-	0.3 Zinc.

DIAMOND DRILL HOLE LOG

HOLE #20 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA Docket #269-X-B

Underground hole from Queen 600 West end stope, same general purpose as Hole #19, on a slightly different course and flatter angle. Granite still not found.

Collar- Co-ordinates- Latitude 20,259.00, Departure 20,075.95.
Collar Elevation- 2,944.89
Course Hole- N58° 59'W
Dip Hole- Up 42°
Driller- Ralph Carrera
Size Core- EX
Average Core Recovery- 79.3%
Total Depth- 120.0'
Started 2-12-53 Finished 2-17-53
Logged By- B. W. Venable

From	To	Core Description	Core Recovery
0'	6'	Garnet. 3" chalcopyrite at 5'.	2.6'
6'	16'	Garnet	6.6'
16'	20'	Garnet. With some Smithsonite	3.7'
20'	30'	Garnet from 20' to 25'. Gouge at 24.5', making 30° with core axis. White limestone from 25' to 30'.	10.0'
30'	40'	White limestone.	8.1'
40'	50'	White limestone.	5.7'
50'	60'	White limestone.	9.4'
60'	65'	1½' of white limestone core, then about a foot of broken core consisting mostly of actinolite, garnet and quartz, with a little of finely disseminated pyrite. Strong slickensides in broken section, making 5° with core axis.	2.6'
65'	75'	Fine grained garnetite 65' to 71'. Coarser grained pyritic garnetite 71'.	9.7'
75'	85'	Unmineralized green garnetite. Slickensides at 76½' making 30° with core axis.	10'
85'	95'	85' to 89' is unmineralized green garnet. 89 to 94' is gray hornsfels. 94 to 95' is heavily pyritic garnetite with a little unidentified sooty black nonmagnetic material. Slickensides at 5° with core axis in pyritic material.	10'
95'	104'	First 4½' is pyritic material as above, with a few brown bands of sphalerite. The rest is white limestone.	8.6'
104'	110'	Gray limestone	6.0'
110'	120'	Gray limestone. Last foot of core shattered.	5.2'
120'		End of Hole.	

HOLE #20 TWIN BUTTES PROJECT
CONTINUED

SAMPLE ASSAYS

65'	75'	Sludge #783 -	0.23	Copper		
75'	85'	Sludge #784 -	0.81	Copper		
85'	95'	Sludge #785 -	0.44	Copper	0.82	Zinc
95'	104'	Sludge #786 -	4.62	Copper	7.90	Zinc
65'	75'	Core #894 -	0.07	Copper	0.22	Zinc
75'	85'	Core #898 -	0.04	Copper	0.2	Zinc
85'	95'	Core #901 -	0.41	Copper	0.4	Zinc
95'	100'	Core #902 -	1.68	Copper	11.6	Zinc

Weighted average assay 95' to 104' 9.0' average 3.62% Copper and 9.16% Zinc.

DIAMOND DRILL HOLE LOG
HOLE #22 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E33, DMA DOCKET #269-X-B

Underground hole from Queen 600 West and stope. Same purpose and course as hole #20, but on a flatter angle of inclination. Ore was penetrated between "A" and "B" faults. From the results of hole #23, it appears that "B" fault was not crossed and the hole was extended, and granite found.

Collar Co-Ordinates- Latitude 20,259.63 Departure 20,074.95.
Collar Elevation- 2,944.05
Course Hole- N58° 59' W. Dip Hole- Up 30°
Driller- Ralph Carrera
Size Core- EX
Average Core Recovery- 70.2%
Total Depth- 111' - Extended to 175'
Started 2-18-53 Finished- 2-21-53
Extension Started- 3-2-53 Extension Finished- 3-4-53
Total Final Depth- 175'
Logged By- B. W. Venable

****

From	To	Core Description	CORE RECOVERY
0'	5'	Garnetite	3.5'
5'	10'	Garnetite	3.2'
10'	15'	Garnetite	5.0'
15'	20'	Garnetite	3.5'
20'	30'	20 to 24' unmineralized garnetite. 24 to 28½' in garnet. 28½ to 30' is white limestone. Abrupt change of garnet-limestone at 28½' at 20° with core axis.	sphalerite 10.0'
30'	40'	First 3.3' is white limestone. The rest is pyrite, chlorite, spongy quartz and a little chalcopyrite, mostly in the quartz.	5.2'
40'	50'	Pyrite, chlorite, spongy quartz and a little chalcopyrite.	2.9'
50'	60'	Heavy pyrite & chlorite from 50 to 56', with some black chalcocite coating on pyrite & a little chalcopyrite. From 56' to the end is strong chalcopyrite with small amounts of pyrite.	9.7'
60'	70'	Strong Chalcopyrite at 60' to 69'. Very massive 64½' to 66'. Last foot is hard dense blue slate. Chalcopyrite banding at about 12°.	10.0'
70'	80'	First foot is blue slate. Last 2 feet is gray limestone. The rest garnet.	10.0'
80'	90'	Shaly limestone.	10.0'
90'	93'	Shaly limestone. Core broken in last 6".	1.8'
93'	103'	White limestone. 1" garnet band at 101' at 10° with core axis.	10.0

HOLE #22 TWIN BUTTES PROJECT
CONTINUED

From	TO	CORE DESCRIPTION	CORE RECOVERY
103'	111'	Gray limestone	7.8'
111'	121'	Gray limestone	10.0'
121'	131'	White & gray limestone.	9.7'
131'	141'	About 6" of gray limestone core., The remaining core is pale green metamorphosed material, appears to have been breccia before alteration. Considerable pale green chlorite.	1.3'
141'	150'	Gouge, with some crumbly garnetite and some soft magnetite. Core mostly crumbled.	5.2'
150'	155'	Crumbled chloritic gouge. Last few inches altered granite.	1.7'
155'	165'	Shattered granite, partially altered	1.8'
165'	175'	Granite	0.5'
175'		END of Hole	

****

SAMPLE ASSAYS

20' to 30'	Sludge #787-	0.41 Copper	9.1 Zinc
30' to 40'	Sludge #788-	3.02 Copper	0.7 Zinc
40' to 50'	Sludge #789-	3.91 Copper	1.0 Zinc
50' to 60'	Sludge #808-	4.34 Copper	0.4 Zinc
60' to 70'	Sludge #805-	14.22 Copper	0.6 Zinc
70' to 80'	Sludge #806-	0.17 Copper	0.2 Zinc
80' to 90'	Sludge #809-	0.04 Copper	
90' to 100'	Sludge #807-	0.06 Copper	

Sludge averages 30'-70' 6.37 Copper 0.67 Zinc

20' to 30'	Core #903-	0.33 Copper	9.3Zinc
30' to 40'	Core #904-	1.37 Copper	0.4 Zinc
40' to 50'	Core #905-	4.45 Copper	0.8 Zinc
50' to 60'	Core #913-	9.06 Copper	0.3 Zinc
60' to 70'	Core #914-	11.25 Copper	1.1 Zinc
70' to 80'	Core #915-	0.03 Copper	0.2 Zinc

Core average 30'-70' 6.53 copper 0.65 Zinc

Weighted Averages

30' - 40'	10'	2.72 Copper
40' - 50'	10'	3.97 Copper
50' - 60'	10'	5.96 Copper
60' - 70'	10'	13.17 Copper

Average 6.45% Copper

DIAMOND DRILL HOLE LOG
HOLE #23 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Queen 600 west and stope. Same purpose and course as holes 20 & 22 but on a flatter inclination. Granite was found west of "B" fault. Ore was penetrated between "A" & "B" faults.
Collar Co-Ordinates- Latitude 20,260.18 Departure 20,074.18
Collar Elevation- 2,943.13
Course Hole- N58° 59'W. Dip Hole- Up 21°
Driller- Ralph Carrera
Size Core- EX
Average Core Recovery- 72.9%
Total Depth- 128' Started- 2-23-53 Finished- 2-28-53
Logged by B. W. Venable

****

From	To	Core Description	Core Recovery
0'	3'	Garnetite in blue limestone.	3.0'
3'	8'	Coarse Grained Garnet.	2.0'
8'	20'	Coarse Grained Garnet.	11.9'
20'	30'	Garnet, unmineralized, first 5' of core. Then fault gouge, the rest in pyrite and magnetite.	7.3'
30'	35'	Pyritic garnet. A little chalcopyrite. Core quite porous & quartzy.	3.5'
35'	40'	Pyrite & chalcopyrite in garnet.	4.1'
40'	50'	Pyrite & chalcopyrite in garnet.	5.9'
50'	60'	Pyrite & chalcopyrite in garnet.	3.4'
60'	70'	Pyrite & chalcopyrite in chlorite 60 to 64'. Predominate chalcopyrite 64 to 70'.	9.9'
70'	80'	Garnetite. Chalcopyrite disseminated in first foot, gradually diminishing to nothing.	10.0'
80'	82'	Black rock. Non-magnetic slickensides at 20° with core axis.	1.2'
82'	92'	Garnetite. Some scheelite noted under U.V. Lamp.	10.0'
92'	102'	First 4' is garnetite, the rest is granite gouge, with slips at 10° with core axis. Striae not plain.	5.6'
102'	112'	Granite.	3.6'
112'	118'	Granite.	3.1'
118'	128'	Granite.	8.8'
128'		End of Hole.	

****

HOLE #23 TWIN BUTTES PROJECT
CONTINUED

SAMPLE ASSAYS

25' to 35'	Sludge #811	3.02 Copper	0.2 Zinc
35' to 45'	Sludge #817	2.96 Copper	
45' to 55'	Sludge #818	2.28 Copper	
55' to 65'	Sludge #819	8.54 Copper	
65' to 75'	Sludge #820	1.83 Copper	

Sludge Average 25'-75' 50' average 3.73% Copper.

20' to 30'	Core #935	0.47 Copper
30' to 35'	Core #936	1.05 Copper
35' to 40'	Core #937	3.96 Copper
40' to 45'	Core #938	4.89 Copper
45' to 50'	Core #939	2.91 Copper
50' to 60'	Core #940	3.03 Copper
60' to 70'	Core #942	11.78 Copper

Core average 30'-70' 40' average 5.28% Copper

DIAMOND DRILL HOLE LOG
HOLE #24 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Queen-Glance 600 level crosscut, horizontal to the south to prospect the Glance Contact West Extension near its western extremity at a major northeast-southwest normal fault, probably postmineral in age. No ore was found.

Collar Co-Ordinates- Latitude 19,878.13 Departure 20,369.09
Collar Elevation 2,932.13
Course Hole- S52° 41' W Dip Hole- Flat (up 45')
Driller- Ralph Carrera
Size Core- EX
Average Core Recovery- 83.8%
Total Depth - 162'
Started 3-5-53 Finished 3-14-53
Logged By- B. W. Venable

From	To	Core Description	Core Recovery
0'	8'	Granite.	3.9'
8'	11'	Granite.	1.6'
11'	21'	Granite.	9.0'
21'	32'	Granite.	8.8'
32'	37'	Granite.	5.0'
37'	47'	Granite.	10.0'
47'	57'	Granite.	9.4'
57'	69'	Granite.	7.5'
69'	75'	Granite.	4.8'
75'	85'	Granite. Last 2' shows brecciation, slickensides & a little pyrite. Core shattered in last 2'.	4.0'
85'	90.5'	Granite.	4.4'
90.5'	95.5'	Granite.	5.0'
95.5'	103'	Granite. ¼" pyrite at 40° with core axis at 103'	6.3'
103'	104'	Granite.	0.8'
104'	114'	First 5' is granite fading into, with no sharp line of distinction, a hard, dense material, mostly silica, which could be either a dense quartzite, silicified granite, or aphanitic contact phase of granite.	10.0'
114'	124'	Hornfels. Scattered garnet, magnetite & pyrite in slips in latter portion. About one foot of magnetite at 123'.	10.0'
124'	134'	Pyritic, garnetose, magnetitic hornfels. 6" chlorite gouge at 15° with core axis at 131'. Last 1½' is gray limestone.	10.0'
134'	142'	Partially metamorphosed limestone. Banding at 45° with core axis.	8.0'
142'	145.5'	Broken core. Mostly magnetite.	1.7'

HOLE #24 TWIN BUTTES PROJECT
CONTINUED

From	To	Core Description	Core Recovery
145.5'	156'	Hornfels. $1\frac{1}{2}$" of soft magnetite at 148'.	10.0'
156'	162'	Hornfels	5.5'
162'		End of Hole	

****

SAMPLE ASSAYS

124' to 134'	Core Sample #977	0.26 Copper	0.3Zinc.
142' to $143\frac{1}{2}$'	Core Sample #978	Trace Copper	0.2 Zinc.
$143\frac{1}{2}$' to $145\frac{1}{2}$'	Core Sample #979	1.06 Copper	0.3 Zinc.
$145\frac{1}{2}$' to 156'	Core Sample #980	0.12 Copper	0.2 Zinc.

DIAMOND DRILL HOLE LOG
HOLE #25 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Glance-Queen 600 level Crosscut, inclined upward to the south, same general purpose as hole #24, No ore was found.

Collar Co-Ordinates- Latitude 19,878.78 Departure 20,368.86
Collar Elevation- 2,934.99
Course Hole- S 55° 02' W Dip Hole- Up 22°
Driller- Ralph Carrera
Size Core- EX
Average Core Recovery- 77.2%
Total Depth- 156.0'
Started- 3-14-53 Finished 3-21-53
Average Recovery Through Contact Zone-
Logged By- B. W. Venable

****

FROM	TO	CORE DESCRIPTION	CORE RECOVERY
0'	5.5'	Granite.	5.2'
5.5'	12.5'	Granite.	5.0'
12.5'	19'	Granite.	6.5'
19'	23'	Granite.	2.6'
23'	32'	Granite.	7.9'
32'	40.5'	Granite.	5.7'
40.5'	49.5'	Granite. A little pyrite in seams at 35° with the core axis at 49' to 50'.	2.7'
49.5'	58'	Granite.	8.5'
58'	64'	Granite.	4.8'
64'	70'	Granite. 3/4" pyrite in a seam at 45° with core axis at 65'.	4.8'
70'	79'	Granite.	8.7'
79'	81.5'	Granite.	1.8'
81.5'	84'	Granite.	2.5'
84'	89'	Granite.	4.8'
89'	93'	Granite.	2.3'
93'	103'	Partly silicified granite.	10.0'
103'	108'	Partly silicified granite 103-105'. At 105' there is 2" of chlorite material containing heavy pyrite and a small amount of chalcopyrite. The rest of the core is garnetite of a type observed to result from the garnetization of shale or hornfels. Slightly pyritic core.	5.0'
108'	114'	Soft pale green silicates. Apparently partly talc or chlorite.	5.1'
114'	118'	Pale green talc. Core shattered. 3" of dark green pyritic chlorite at 117.5'.	2.7'

HOLE #25 TWIN BUTTES PROJECT
CONTINUED

From	To	Core Description	Core Recovery
118'	125'	Green Garnetite. Garnet banding at 122', makes 50° with core axis.	5.0'
125'	131'	Soft crumbly green contact silicates.	5.4'
131'	137'	Barren garnetite.	5.4'
137'	142'	Gray Limestone.	5.0'
142'	148.5'	First foot is gray limestone. The rest is hornfels.	3.1'
148.5'	156'	Porous, white non-calcareous rock with a few tiny black specks in it. Unidentified.	
156'		End of Hole.	

****

SAMPLE ASSAYS

114' to 118'	Sludge #877	0.03 Copper.
118' to 125'	Sludge #878	0.14 Copper.
125' to 131'	Sludge #879	0.06 Copper.
131' to 137'	Sludge #880	0.04 Copper.

DIAMOND DRILL HOLE LOG
HOLE #26 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Glance-Queen 600 Level Crosscut. Flat hole with same general purpose as holes 24 and 25, but designed to penetrate the contact closer to the Alphas fault than Hole 24. No ore was found.

Collar Co-Ordinates- Latitude 19,879.58, Departure 20,367.09
Collar Elevation- 2,892.00
Course Hole- S 71° 15' W, Dip Hole- Flat.
Driller-Ralph Carrera
Size Core- EX
Average Core Recovery- 76.9%
Total Depth 190.0'
Started- 3-24-53, Finished 4-1-53
Average core recovery through contact zone- 86.5%
Logged By- J. G. Cazort Jr.

FROM	TO	CORE DESCRIPTION	CORE RECOVERY
0'	5.5'	Granite.	5.2'
5.5'	12.5'	Granite.	6.4'
12.5'	21'	Granite.	4.7'
21'	27'	Granite.	5.4'
27'	35'	Granite.	8.0'
35'	39'	Granite.	2.9'
39'	41'	Granite.	2.0'
41'	48'	Granite.	6.6'
48'	59'	Granite	2.8'
59'	65.5'	Granite.	4.8'
65.5'	71'	Granite.	4.3'
71'	75'	Granite. Small amount disseminated pyrite.	3.4'
75'	82'	Granite. Dike at 79' at 35° with core axis.	6.4'
82'	85.5'	Granite. Small amount of pyrite.	1.7'
85.5'	90'	Granite. ½" pyrite at 89' at 30° with core axis.	4.5'
90'	96'	Granite. 1/8" pyrite at 30° with core axis at 90.3'. Disseminated pyrite throughout.	4.4'
96'	100'	Granite. 3/8" pyrite at 35° with core axis at 99.6'. Disseminated pyrite throughout.	4.0'
100'	108'	Granite. Irregularly distributed pyrite present.	4.4'
108'	116'	Granite. Slight alteration of granite visible. Pyrite present in stringers and as disseminated particles.	2.9'
116'	122.5'	Granite. Irregular patches of pyrite.	6.5'
122.5'	125'	Granite. 1/8" pyrite vein at 35° with core axis at 122.6'. Disseminated pyrite throughout granite.	2.5'
125'	134'	Granite. Hornfels contact at 133.8'.	2.8'

HOLE #26 TWIN BUTTES PROJECT
CONTINUED

From	To	Core Description	Core Recovery
134'	141.5'	Hornfels to 135.1'. Calcareous garnet with irregular sections which are pyrite rich from 135' to 139'. Heavy dike with pyrite from 139' to 139.4'. Calcareous garnet from 139.4' to 141.5'.	7.1'
141.5'	145.5'	Garnet. No Lime.	2.5'
145.5'	155.5'	Garnet. No lime.	10.0
155.5'	163'	Garnet. Becomes slightly calcareous with disseminated pyrite at 157.2'. Altered dike from 158.5' to 159.8', slight pyrite in dike. Brecciated light colored non-calcareous material showing fault gouge and possible slickensides from 159.8' to 162'. Altered dike with slight pyrite from 162 to 163'.	6.2'
163'	175'	Contact silicate with lime stringers. Moderate magnetism at 163', increasing to strong magnetism at 166.1'. Magnetism ends at 166.1'. Siliceous garnet breccia at 166.1'. Slight magnetism at 166.8'. Slight gouge. Magnetism increases with increas of black material in rock. Garnet breccia at 167.8'. Black magnetic micaceous silicate with little pyrite at 169.2'. White non-magnetic micaceous garnet silicate at 170.5'. Black micaceous magnetic silicate at 171.2'. Slight pyrite.	9.7'
175'	185'	Garnet breccia with lime stringers. Slickensides at 175.3' at 45° with core axis. Striae perpendicular to core axis when viewed perpendicular to plane of movement. Contact of breccia with gray limestone along slickensides with mullion structure at 30° with core axis at 175.8'. Stria at 75° with core axis when viewed perpendicular to plane of movement. Gray limestone with silicate stringers, crystallinity increases with depth of hole.	9.2'
185'	190'	Gray Limestone with silaceous stringers.	4.5'
190'		End of Hole	

****

SAMPLE ASSAYS

157' to 165'	Sludge #932	0.03 Copper	0.2 Zinc
165' to 170'	Sludge #933	0.04 Copper	0.3 Zinc
170' to 175'	Sludge #934	0.52 Copper	0.4 Zinc
134' to 141.5'	Core #1003	0.07 Copper	
155.5' to 163'	Core #1004	0.11 Copper	
163' to 175'	Core #1005	0.36 Copper	

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

224 New Customhouse
Denver 2, Colorado

June 9, 1954

Memorandum

To: Secretary to the Operating Committee, DMEA

From: DMEA Field Team, Region IV

Subject: Docket DMA 269X-B (Copper), Contract I-DMA-E33, Banner Mining Company, Pima County, Arizona

Enclosed are the following final reports pertaining to work completed under the subject contract:

1. The original of the operator's final report.

2. The original and two copies of the final engineering report by the Bureau of Mines.

3. The original and three copies of the final geologic report by the U.S. Geological Survey.

One copy each of the operator's and engineer's final reports were forwarded to the Chairman of the Operating Committee, DMEA, by our memorandum of March 12, 1954.

The work completed was in conformance with the contract and the operator has complied with all contract requirements. Final payment to the operator was processed by this office March 18, 1954, in conformance with the certificate and report of audit by the Contract Administration and Audit Division dated March 3, 1954, which was released to this office March 15, 1954.

The project work completed consisted of the following:

1. Installation of power service; equipment installation; repairs to hoist building; surveying, mapping and sampling.

2. Rehabilitation of 743.5 feet of shaft and 3602.5 feet of underground workings, which involved driving of 181 feet of new drift around an extensively caved portion of an old drift.

3. 46 feet of drifting.

4. 43 feet of raising.

5. 2297.5 feet of diamond drilling.

The above work was completed at a total accepted cost of $111,059.71, in which the Government participated to the extent of 50% or an amount of $55,529.85.

The contract was terminated as of October 1, 1953, before all of the work authorized in the contract was completed. The exploration work resulted in a discovery of copper ore on which a certification of discovery or development was issued March 19, 1954.

W. H. King

W. H. King

for E. N. Haushman

A. H. Koschmann

Enclosures

Mining Division
Denver
FEB 23 1954
BUREAU OF MINES
Denver, Colorado

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

SOUTHWEST EXPERIMENT STATION
BOX 4097
UNIVERSITY STATION
TUCSON, ARIZONA

February 18, 1954

Register

Memorandum

To : W. H. King, Chief, Mining Division, Region IV

From : Chief, Mining Methods Br., Mining Div., Region IV

Subject : Operator's Final Report, Contract I-DMA-E33, Docket DMA-269XB, Banner Mining Co.'s Twin Buttes Copper Mines, Pima Mining District, Pima County, Ariz.

Enclosed are original and 4 copies of the operator's final report for Contract I-DMA-E33. This report seems adequate.

Walter R. Storms

Walter R. Storms

CC W. H. King (6)
DMA-269XB
DF

WRStorms:frj

BANNER MINING COMPANY

2042 CONNER STRAVENUE TUCSON, ARIZONA PHONE 6-2971

A. B. BOWMAN
VICE-PRES. & GEN. MGR.

E. S. BOWMAN, PRESIDENT

February 15, 1954

Defense Minerals Exploration Administration
224 New Customhouse Building
Denver, Colorado

Re: Contract #I-DMA-E-33
Pertaining to the Twin Buttes Mines South of Tucson, Arizona

Gentlemen:

Banner Mining Company, a Nevada Corporation, applied for an exploration project on a portion of the claims held by it under lease and option an December 18, 1950. The patented claims which come under this contract are as follows: Copper Queen, Copper King and Copper Glance. In October 1952 our contract was amended to take in the Scorpio Annex unpatented claim.

Banner Mining Company controls 47 claims in the Twin Buttes area of the Pima Mining District mostly by lease and options.

On June 30, 1951 we were granted an Exploration Project, contract #I-DMA-E-33; DMA Docket #269-X-B. The total amount of this contract was for $135,789.00. Of this total the government and Banner Mining Company were to participate on a 50% - 50% basis on costs incurred as per contract.

On August 15, 1951, we commenced work on this project. Work proceeded continuously thereafter until April 30, 1953 when the project was terminated by mutual agreement between the contracting parties. The project was stopped because our varied work program made necessary elaborate accounting and cost breakdowns, which would have involved conflicts with allowable costs under the Exploration Project. A small orebody averaging about 5% copper had been discovered by exploration under the project and we felt that this should be mined and shipped while the price of copper was still at its peak.

A total of $117,959.19 had been expended on the project as of April 30, 1953. However, Banner Mining Company continued work at these mines on its own account until October 17, 1953 when the mines were put on a standby basis.

During the period of March 1953 to October 17, 1953 we shipped a total of 4059.041 tons of crude ore from the Queen Mine having a gross value of

$107,398.33. Of this amount $2,541.83 was returned to the government as royalty under the DMEA contract. This ore averaged 4.95 percent copper.

The following is a list of work completed in the period August 15, 1951 to April 30, 1953. This work is also tabulated on an attached sheet which also lists the costs of each particular job heading.

(1) Initial rehabilitation and repairs on existing facilities were completed at a cost of $5,354.27. This work is broken down as follows:

(a) Repairing and installing hoist and motor at the Glance shaft together with repairs to the hoist building and headframe totalled $3,638.46

(b) Power installation from the power company substation to our switchhouse cost a total of $564.84.

(c) The installation of the Chicago Pneumatic 125 HP Y type compressor cost a total of $1,150.97.

Banner Mining Company advanced to the Trico Electric Company a total of $1,765.00 in order to get power service at the Copper Glance Mine. Under our contract with the Trico Company they were to discount our monthly power bills by 20 percent until the $1,765.00 was returned to us. As of April 30, 1953 $450.23 remained of the original deposit.

(2) The cost of surveying, mapping and sampling on this project came to a total of $1,962.45.

(3) A total of 743.5 feet of shaft was rehabilitated. Of this total 629.5 feet was in the Glance shaft and 114 feet in the Queen shaft. 3542.5 feet of drifts were rehabilitated a 60 feet of winze was rehabilitated on the east side of the Queen Mine below the 9th level. The cost of all this rehabilitation work came to a total of $78,263.00. Total footage rehabilitated 4,346.0

(4) 2,297.5 feet of diamond drilling were completed at a total cost of $6,010.25. This did not take into account the cost of cutting diamond drill stations. This excavation work totalled 3400 cubic feet and cost $4,967.37.

(5) A total of 181.0 feet of new drift was completed around the caved portion of the old stopes plus 43 feet of raise in the Queen mine at a total cost of $12,263.10.

(6) Repairs to the bins on the surface at the Glance mine totalled $1,287.59.

Attached hereto is a sheet marked Exhibit A which breaks down the total costs on the various types of work under the project.

Equipment purchased under the contract on which the government participated on a 50 percent basis totalled $7,400.93.

A total of 223 copper, 50 zinc, 50 silver, 3 tungsten and 2 molybdenum assays were made of samples taken from these mines at a total cost of $437.50. This amount is included in the overhead items.

The work completed under this project disclosed only 4059 tons of commercial ore and about 50,000 tons of low grade ore averaging about 1.6 percent copper which cannot be mined under present price-cost conditions.

During the period March to October 1953 we mined out the available commercial ore (4059 tons) and shipped it to the American Smelting and Refining Company at El Paso, Texas. This ore contained a total of 402,475.76 pounds of copper. The copper paid for by the smelter amounted to 351,014 pounds. We also shipped 1.492 tons of copper precipitate found in the mine which contained a total of 2456.86 pounds of copper. A total of 6,252.34 ounces of silver were contained in the above ore.

A geological report and an ore estimate covering the area under the contract prepared by our Mine Superintendent, B. W. Venable, are attached hereto and made a part of this report.

Plan maps of the Glance and Queen 600 level, the Queen 700 level, and Glance 625 foot levels are attached hereto. These maps show the geology , diamond drill holes and location of assays.

A claim map of the district is attached which shows the location of the claims under this contract and also those controlled by Banner Mining Company.

A section map showing diamond drill holes #20, 22 and 23 is also attached.

Banner Mining Company has been keeping these mines pumped out since October 17, 1953 to date. As soon as our plant at Mineral Hill is in operation we plan to do further work at Twin Buttes, mainly west of the present workings of the Queen Mine and possibly at a higher elevation than the work completed in this project. The faulting west of the Queen orebody indicates that the favorable horizon is higher on the West side of the fault. Our plans are to first do some surface geophysical work followed by surface diamond drilling if the geophysical work is favorable.

This report together with attached maps, geologic report and other data is intended as our final report covering this contract.

Respectfully submitted,

Banner Mining Company

A. B. Bowman
General Manager

ABB:d

Encl: 8

TWIN BUTTES PROJECT

DMEA CONTRACT #1 - DMA-E-33
SUMMARY OF WORK COMPLETED AND RELATED COSTS

		LABOR COST	SUPPLIES COST	OVERHEAD COST	TOTAL COST
1-	Initial Rehabilitation and repairs to existing facilities				
	(a) Repairs to Hoist Building and installing Hoist and Motor at Glance Shaft	$1,001.15	$ 993.32	$ 1,643.99	$ 3,638.46
	(b) Power Installation from Sub-station to Switch House	178.17	362.62	24.05	564.84
	(c) Installation of Compressor	735.16	300.56	115.25	1,150.97
2-	Rehabilitation Work				
	743.5' Shaft) 3542.5 Drifts (60' - Wings)	38,210.59	11,306.74	28,745.67	78,263.00
3-	Drifting & Raising				
	181 Feet Drifts 43' Raise	5,808.71	2,087.96	4,366.43	12,263.10
4-	Repairs to Bins	540.44	383.28	363.87	1,287.59
5-	Surveying, Mapping and Sampling	1,102.07	132.64	727.74	1,962.45
6-	Diamond Drilling Preparation Excavation - 3400 Cu. Ft.	2,532.70	251.45	2,183.22	4,967.37
	Total	$50,108.99	15,818.57	38,170.22	104,097.78
7-	Contract Diamond				

EXHIBIT - A

GEOLOGIC REPORT-COPPER QUEEN AND COPPER GLANCE MINES

TWIN BUTTES SUBDISTRICT
PIMA MINING DISTRICT, PIMA COUNTY, ARIZONA
BANNER MINING COMPANY

Prepared: November 18, 1953 by B. W. Venable

Docket No. DMEA 269-X-B

Beginning August 15, 1951 and ending April 30, 1953 the Banner Mining Company has been engaged in unwatering, reopening and examining the Copper Glance and Copper Queen mines at Twin Buttes in the Pima Mining District, Pima County, Arizona. In addition, diamond drilling and a limited amount of drifting, crosscutting and raising has been done.

This work has been done with government participation under Defense Minerals Administration Contract #I-DMA-E-33. This final geologic report at the conclusion of the project is in partial fulfilment of the terms of that contract.

INTRODUCTION

The Copper Glance and Copper Queen mines are located about 27 miles south of the city of Tucson, Arizona at the settlement of Twin Buttes in the Pima Mining District of Pima County. The site can be reached by driving west on Ajo road from the Tucson-Nogales highway to the San Xavier Mission road, then 21 miles south on the Mission-Twin Buttes-Continental road to the two mines, which are prominently visible close to and on opposite sides of the road. The Queen is on the west side and the Glance on the east. The north twelve miles of this route is hard-surfaced. The mines can also be reached by way of Sahuarita, a crossroads cotton settlement with freight-loading facilities about 18 miles south of Tucson on the paved Tucson-Nogales highway and Southern Pacific railroad. The route goes west from Sahuarita seven miles to the Mission-Twin Buttes road, then south two miles to Twin Buttes settlement and the Queen and Glance mines. This route is all graded dirt from Sahuarita to the mines.

The area covered by this report comprises the patented Copper Glance, Copper Queen, and Copper King Claims, all patent survey #2643, and the following unpatented lode claim: Scorpio Annex.

The Section of this report entitled Geography and Geology of the Pima District is quoted verbatim (with certain omissions) from E. D. Wilson's chapter on the Pima Mining District in University of Arizona Bulletin #156 (Bibliography #2, this report). The remainder of the report is based on data collected from various sources, including Bureau of Mines Surface Geologic maps, and data collected by Banner Mining Company staff.

It is necessary to explain differences in nomenclature used for mine levels. On the old Glance Mine maps the levels are designated by the vertical distance in feet of the level floor below the shaft collar; i.e. 525 level, 625 level, etc. On the old Queen Mine maps the levels are designated in numerical sequence thus: 6th level, 7th level and so on. The bottom level of the Glance is the 625, and the corresponding level of the Queen is the 9th. The crosscut connecting the two mines extends from the Glance 525 to the Queen 7th, whose station floor is about 575 feet lower in elevation than the collar of the Queen shaft. All exploration and nearly all rehabilitation has been done on three lower levels of the two mines. For convenience we usually refer to them as the 500, 600 and 700 levels,

although the actual elevations differ from these amounts and the level interval is irregular.

Correlation is as follows:

400 level	=	Glance 400	=	Queen 4th
500 level	=	Glance 450	=	Queen 6th
600 level	=	Glance 525	=	Queen 7th
700 level	=	Glance 625	=	Queen 9th

SUMMARY

Copper ore deposits are of the contact metamorphic type, formed along a northwest striking contact between granite and limestone. The principal valuable mineral is chalcopyrite, with oxidized copper minerals in small concentrations at various localities.

Unwatering and rehabilitation of the Copper Queen and Copper Glance mines disclosed no important reserve of unmined ore, but indicated a possible 50,000 tons of low grade protore in the Glance averaging about 1.6% copper. This material is considered to be too low grade to mine at a profit.

Exploration at the 600 level on the western extensions of the Glance and Queen "contacts" disclosed a small orebody in a fault block in the west extension of the Queen "contact". This block produced 4059 tons of ore averaging 4.95% copper. No new ore was found on the west extension of the Glance "contact".

Both the Glance and Queen ore shoots show evidence of bottoming at about the 700 foot level. However the west extension of the Queen shows promise of future possibilities, perhaps at a high elevation.

GEOGRAPHY AND GEOLOGY OF THE PIMA DISTRICT

"The Pima District is on the eastern margin of the Sierrita Mountains. As generally considered, it comprises the Mineral Hill, San Xavier, Olive Camp and Twin Buttes areas. From the foot of the Sierrita Mountains a pediment slopes gently eastward toward the Santa Cruz River. Topography of the district is shown on the Twin Buttes quadrangle sheet, published by the U. S. Geological Sruvey.

"Because of faulting, igneous intrusions, and alluvial cover, few if any of the sedimentary rock units are exposed in their original entire thickness. Over much of the area structural relations are obscure, and many features of the igneous bodies are not revealed.

"The following sequence for sedimentary rocks in the district has been proposed:

Upper Cretaceous
- Arkose with shale and thin limestone
- Recreation red beds
- Undifferentiated volcanics and sedimentary beds

Permian
- Snyder Hill Limestone
- Quartzite

Limestone
Quartzite
Limestone
Shale, limestone, marl and gypsum

Pennsylvanian
Naco limestone

Mississippian
Escabrosa limestone

Devonian
Martin limestone

Cambrian
Abrigo formation
Bolsa quartzite

"Bolsa quartzite: The oldest exposed formation, the Bolsa quartzite, crops out in the Twin Buttes and Mineral Hill areas.

"Southwest of Twin Buttes camp, the Bolsa attains a maximum thickness of approximately 600 feet. Its upper half characteristically weathers darker brown than does its lower half.

"At Mineral Hill the formation appears to be 600 feet thick.

"Abrigo formation: Silicified limestone, correlated with the Abrigo formation, occurs on Mineral Hill. It ranges from brown to light green and is estimated to be 350 feet thick.

"Martin limestone: Limestone containing Devonian Martin fossils is present at Mineral Hill, Twin Buttes, and west of the Contention Mine. Its exposed thickness ranges from 100 to 350 feet.

"Escabrosa limestone: Massive, cliff-forming granular limestone containing Lower Mississipian fossils occurs in the Mineral Hill, San Xavier Extension, and Twin Buttes areas. Characteristically, this limestone is relatively pure except for scattered chert nodules. Its apparent thickness is 350 feet at Mineral Hill and 375 feet at Twin Buttes.

"Naco limestone: The Naco, in contrast to the Escabrosa, consists largely of thin-bedded cherty limestone interstratified with thin shale. Commonly the shale has been metamorphosed to hornfels which stands out in relief on weathered surfaces. The Naco contains Pennsylvanian fossils. It is estimated to be 750 feet thick at Mineral Hill, 900, feet west of San Xavier, and possibly 1200 feet at Twin Buttes.

"Permian beds: A series of shale, limestone, marl, and gypsum lies stratigraphically above the Naco. Its apparent thickness amounts to a few hundred feet.

"Above the gypsiferous series are beds of quartzite and limestone. They in turn are overlaid by the Snyder Hill limestone, which forms Helmet Peak.

"Cretaceous beds: The Cretaceous in this district includes undifferentiated volcanics, conglomerate, arkosic sandstone, shale, and quartzite; red shale, arkose and conglomerate similar to the Recreation Red Beds of the Tucson Mountains; and light colored arkose with local shale and limestone. The stratigraphic relation and thickness of these members is not clearly revealed."

GEOLOGY OF THE COPPER QUEEN AND COPPER GLANCE MINES

Sedimentaries

Sedimentary beds exposed in the vicinity of the Queen and Glance mines consist of Paleozoic limestones, shales and quartzites, ranging from Bolsa quartzite of Cambrian age to the interbedded impure limestone and shales of the Naco formation of Pennsylvanian age. Most of the limestone has been altered to crystalline white marble, and the shales to pale colored hornfels, which stands out in bold relief on weathered surfaces. Ore exposed in mine workings is in metamorphic areas composed of contact silicates, magnetite and sulphides enclosed by white crystalline marble.

Bedding planes strike NW and SE and dip steeply with inclinations ranging from vertical to 75 degrees NE.

Igneous Rocks

Granite is exposed on the footwall of the "contact" fault underlying the mineralized areas of both mines.

Faults

Contact Fault

The contact fault runs on an approximate average course of about N 60 degrees W and dips at about 45 degrees to the SW. It is offset in several places by northeasterly trending faults, of which the Beta, A & B faults are examples. All known major orebodies from which important production has come in the past have an obvious genetic connection with this contact fault. Everywhere observed, the contact fault has granite on the footwall and contact silicates on the hangingwall, with contact silicates and other accessory contact minerals giving way to unaltered sedimentaries as greater distances from the contact fault are reached.

Beta Fault

A prominent fault striking northeast and southwest and dipping to the northwest offsets the contact of the Glance and Queen Mines is normal and apparently postmineral. An apparent 300 foot horizontal offset of the contact is due to the approximate 45 degree dip of the contact. This fault is herein described as the Beta fault. It is exposed on the surface and on the 600 level in the crosscut connecting the Glance and Queen mines. It is shown at coordinates 19,910 N 20,350 E on the 600 level map.

A Fault

Another northeast striking normal fault terminates the Queen orebody at its western end. This fault strikes about N 45 degrees E on the average and dips at 70 degrees to the SE. This fault is also post mineral. It is herein designated as the "A" fault.

"B" Fault

The "B" fault lies about 40 feet northwest of the "A" fault on the 600 level, subparallel to it in strike but flatter - dipping about 50 degrees. Normal throw on "B" fault is estimated as 90 feet.

OREBODY CHARACTERISTICS

The orebodies of the Glance and Queen mines are limestone replacements of the contact metamorphic type, all found in the hangingwall of the contact fault. Metallic minerals found in the ore zone include pyrite, chalcopyrite, and magnetite. Gangue minerals identified include garnet, chlorite, quartz, epidote and tremolite. Scheelite is present in the ore in small quantities, and a little sphalerite is found occasionally. There appears to have been a definite sequence of mineralization out from the contact, starting with barren massive flinty garnet on the contact, then magnetite, then pyrite and chlorite, then chalcopyrite then other silicates as the distance from the contact increases.

On the bottom level of both mines considerable magnetite has been found but few sulphides. Possibly the ore shoots have bottomed between the 600 and 700 ft levels. The ore bodies of these mines have evidently been localized along the contact fault by some structural control which remains obscure and ore shoots which have been stoped out in the past appear to have definitely bottomed. However, no reason is known why other ore shoots could not be found at a greater depth.

REHABILITATION UNDER THE PROJECT

Unwatering and drift rehabilitation disclosed the geologic information shown on the accompanying maps. The "contact" between the Glance and Queen mines was found to be offset by faulting to a location south of the 600 level Glance-Queen crosscut, instead of north as had been previously thought, and proposed diamond drilling plans were amended accordingly.

No large blocks of unmined ore were found. Such mineralized remnants as remained were mainly pyrite, and under 3% in copper assay. The only substantial block of this nature lay between the Glance 525 (600) and 625 (700) levels. It amounted to about 50,000 tons average approximately 1.62% copper and 0.4 ounces per ton silver according to 625 level cut samples.

The ore shoots showed definite evidence of bottoming between the 600 and 700 levels at both the Glance and Queen mines. Occurence of garnet and other contact minerals was markedly diminished from the 525 to the 625 levels of the Glance with apparently corresponding impoverishment in commercial values, judging from empty stopes above the 600 level which must have represented shipping grade copper ore. Pillars and stope remnants sampled immediately above the 525 level averaged about 2½% copper. On the bottom level of the Queen the chalcopyrite appears to have been replaced by magnetite.

EXPLORATION UNDER THE PROJECT

Exclusive of the initial rehabilitation for examination and mapping, exploration under the project was done with four general objectives in mind as follows:

(1) To prospect west of the A fault to find a possible faulted extension of the Queen orebody. Eight diamond drill holes in this west Queen area disclosed the existence of the flat easterly dipping B fault west of A fault, which made further drilling from available sites difficult due to the end on approach to the projected favorable block. The last four holes of this group penetrated a small drag block of sulphide copper ore between A and B faults. This block of ore was then opened up by drifting and raising and later stoped out. Upon completion of diamond drilling the block was estimated to contain 80 tons of ore per vertical foot, or 5200 tons in the 65 feet between the 500 and 600 levels averaging 4.8 percent copper. Later work showed that the orebody was confined approximately to the vertical span between these levels and final production as mined to commercial exhaustion was 4,059 tons averaging 4.95 percent copper. The west side of the orebody was cut off by B fault. Normal displacement on A and B faults would apparently throw the faulted extension of the west Queen orebody upward about 165 feet. It is therefore concluded that because of this displacement toward the surface, and the previously mentioned difficulty in pinpointing the objective formation end-on from the 600 level, that further diamond drilling toward this objective should most economically and effectively be done from the surface. No further prospecting has been done in this area to date.

(2) To prospect the west extension of the Glance "contact" on the 600 level west of the Glance mine workings. This west extension terminates to the west on the Beta fault. Five diamond drill holes were drilled, but found only silicates and magnetite on the contact at this elevation.

(3) To prospect under a spontaneous polarization anomaly shown on C.S. Sandberg's map in U.S.B.M. Report of Investigations #4732. This would be done by extending the same holes drilled for objective (2). At the start of the work the "contact" and several known pyritic fissures as projected seemed to center under this anomaly. However the "contact" was shown by the holes to make a turn out from under the anomaly, and in view of the leanness of mineralization shown at the contact, and the known depth limitations of this geophysical method, it was considered economically inadvisable to extend the holes on out under the anomaly, and this objective was not reached.

(4) To prospect the downward extension of the known mineralized Copper King fissure as projected from the surface to the 600 level. Diamond drill hole #16 was extended well through the projected extension at depth, and disclosed no ore, nor no obvious indication of the fissure.

BIBLIOGRAPHY

(1) 1922 -F. L. Ransome, Ore Deposits of the Sierrita Mountains, Pima County, Arizona U.S. Geological Survey Bulletin 725

(2) 1950 -Eldred D. Wilson, Chapter IV - Pima District, Univ Ariz. Bulletin No.156, Ariz. Bureau of Mines Geol. Series No. 18, Arizona Zinc and Lead Deposits, Part I

(3) 1950 -Investigation of Twin Buttes Copper Mines, Pima County, Arizona, J. B. Cummings & T. M. Romslo, U.S. Bureau of Mines Report of Investigations 4732.

ENCLOSURES

(1) Geologic Plan Map of Queen & Glance 600 level, 50 feet to the inch

(2) Geologic and Assay Plan Map of Queen 9th level, 20 feet to the inch

(3) Geologic and Assay Plan Map of Glance 625 level, 50 feet to the inch

(4) Vertical Section through diamond drill holes 20, 22 and 23.

(5) Generalized Vertical Section through new Queen west stope

(6) Twin Buttes Claim Map

DIAMOND DRILL HOLE LOG
HOLE #12 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA Docket #269-X-B

Note:- This is the first Diamond Drill Hole that is being drilled on this project.

Underground hole from Queen-Glance 600 level crosscut. Headed south to cut the Glance contact projected west from the Glance Mine. Several pyrite-quartz fissures head out into this general area, and there is a natural-potential anomaly over here on the surface. The granite-limestone contact was expected at about 200' but was found at 110'. Contact was in quartzite at this point.

Collar coordinates - Latitude 19,791.63 Departure 20,536.98

Collar elevation - 2,930.77

Course hole - S 22 degrees 52'W

Dip hole - Flat (up 1 degree 25')

Driller - Ed Shandley

Size core - EX

Average core recovery - 69.0%

Total depth - 184.0'

Started 11-26-52, Finished 12-4-52

Logged by B. W. Venable

Average core recovery through the contact zone - 110-129½ 91.3%

From	To	Core Description	Core Recovery
0'	5'	Granite	3.4'
5'	9.5'	Granite	2.9'
9.5'	14.5'	Granite	4.9'
14.5'	19.5'	Granite	3.1'
19.5'	24.5	Granite	3.7'
24.5	29.5'	Granite	3.8'
29.5'	34.5'	Granite	4.0'
34.5'	39.5'	Granite	4.4'
39.5'	44.5'	Granite 3" quartz & pyrite at 45 degrees with core axis, at 40'	4.6'
44.5'	49.5'	Granite. Drilled part way along a fault face making about 5 degrees with the core axis, having striations at about 70 degrees with the core axis	3.2'
49.5'	55.0'	Granite	4.35
55'	65'	Granite	8.4'
65'	75'	Granite	7.8'
75'	85'	Granite	5.5'
85'	90'	Granite	2.1'
90'	100'	Granite, partly silicified	5.1'

From	To	Core Description	Core Recovery
100'	110'	Granite, partly silicified, last 4" contains a small amount of chalcopyrite and disseminated pyrite	4.5'
100'	115'	First 6" is pyrite & quartz at 10 degrees with the core axis, and the last foot is dark gray quartzite. The rest is green garnet, actinolite & quartz. Banding makes about 50 degrees with core axis. 3/4" pyrite at 113½'	4.8'
115'	120'	Hard, dense, fine grained dark gray quartzite	4.0'
120'	125'	Gray quartzite. Scattered small pyrite & green garnet stringers at 60 degrees with core axis in last 3' of core	4.7'
125'	129.5'	Gray quartzite. Last 1" is dark green chlorite containing some tiny crystals of chalcopyrite and other copper minerals	4.3'
129.5'	135'	Mostly dark green epidosik, some gray quartzite	1.1'
135'	138'	Gray quartzite	2.7'
138'	143.5'	Light gray quartzite - slightly calcareous	1.5'
143.5'	148.5'	Light gray quartzite - slightly calcareous	4.8'
148.5'	158.5'	Gray limestone	3.5'
158.5'	164	Gray limestone. Last 1½' mostly altered to crumbly talc along fractures making 60 degrees with core axis	5.2'
164'	174'	Gray limestone. First 2' soft and broken	6.6'
174'	180'	Gray limestone. 3" green garnet at 178' making 70 degrees with core axis	4.3'
180'	18 4'	Pale gray to brown crystalline limestone	3.8'
184'		End of Hole	

SAMPLE ASSAYS

110'	115'	Core 634 -	0.44 % copper
110'	115'	Sludge 653	Trace of copper
125	129½'	Sludge #652	0.02 copper.

DIAMOND DRILL HOLE LOG
HOLE #13 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Queen-Glance 600 level crosscut. Same location & purpose as Hole #12 on a divergent course.

Collar coordinates - Latitude 19,791.62 Departure 20,535.62

Collar Elevation - 2,930.84

Course Hole - S37 degrees 18' W

Dip Hole - Flat

Driller - Ed Shandley

Size Core - EX

Average Core Recovery - 81.9%
Average Core Recovery through Contact Area - 88.6%

Total Depth - 172.5'

Started 12-5-52, Finished 12-13-53

Logged by B. W. Venable

From	6To	Core Description	Core Recovery
o'	12'	Granite	2.5'
12'	20'	Granite	6.7'
20'	30'	Granite. Rust stained fractures at 10 degrees with core axis. At 26'-29' core shattered	7.0'
30'	40'	Granite	7.6'
40'	45'	Granite	4.4'
45'	55'	Granite. 1" massive pyrite at about 45 degrees with core axis at 50'	7.5'
55'	62.5	Granite	5.7'
62.5'	67.5'	Granite	5.0'
67.5'	74'	Granite	4.5'
74'	79.5'	Granite	3.8'
79.5'	84'	Granite	2.9'
84'	89.5'	Granite	3.5'
89.5'	94.5'	Granite	6.9'
94.5'	99'	Granite 6" cut by numerous small slips of pyrite up to ¼" wide at various agles at 95'	3.4'
99'	108.5'	Granite	9.1'
108.5'	113'	Granite to 112'. ¼" pyrite at 70° with core axis at 112'. 112-113' is quartzite	4.1'
113'	115'	First 9" of core is quartzite. Then 1½' of green slightly calcareous garnetite, then 3" quartzite	2.0'

From	To	Core Description	Core Recovery
115'	120'	First 2½' is brown garnetite, then 1' green garnetite, all slightly calcareous, then 1½' of quartzite at end. ¼" pyrite at 119.7'.	4.9
120'	122.5'	Garnet. Looks like about 5" of ore (pyrite, green garnet, chalcocite?) at 121' at 45° with core axis	2.5'
122.5'	127.5'	Green Garnetite, about 4" of massive magnetite at 127½'	5.0'
127.5'	130.5'	Strongly altered rock. Soft & chloritized, mostly dark green. Some magnetite	1.6'
130.5'	132.5'	Same as 127½' to 130½'	1.1
132.5'	137.5'	Mottled, altered limestone, pyritic & chloritic from 132½ to 136½', unaltered gray limestone from 136½ to 137½'	4.6
137.5'	142.5'	Limestone. Last 3" chloritized, with a fault slip at 45° with core axis, striae on the dip	5.0'
142.5'	152.5'	Limestone. About 2' of black quartzite at 148'	10.0'
152.5'	162.5'	Limestone	10.0'
162.5'	172.5'	Limestone	10.0'
172.5'		End of Hole	

SAMPLE ASSAYS

113' - 115'	Core sample #648	
113' - 120'	Sludge sample #654 -	.03 copper
115' - 120'	Core Sample #649	
120' - 122½'	Core Sample #660	Trace copper
122½' - 127½'	Core Sample #661 -	.22 copper
120' - 127½'	Sludge sample #655	Trace copper
127½ - 130½'	Core sample #662	.66 copper
130½ - 132½'	Core sample #663 -	.48 copper
127½'- 132½'	Sludge sample #656	1.15 copper
132½'- 137½'	Core sample #664	.21 copper
132½' -137½'	Sludge sample #657	.48 copper

T

DIAMOND DRILL HOLE LOG
HOLE #14 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Queen west crosscut face west to locate the contact where faulted, and possibly find the displaced section of ore. Granite was struck at 63'.

Collar coordinates - Latitude 20,231.14 Departure 20,032.63
Collar Elevation - 2,934.31
Course Hole - N 66° 18' W
Dip Hole - Flat (up 40')
Driller - Ed Shandley
Size Core - EX
Average Core Recovery - 90.7%
Average Core Recovery through Contact Area - 97.8%
Total Depth - 78.5'
Started 12-13-52 Finished 12-17-52
Logged by - B. W. Venable

From	To	Core Description	Core Recovery
0'	10'	White marble	9.9'
10'	17'	White marble slightly discolored and fractured in the last 2'	6.8'
17'	30'	White limestone. First foot is soft & crumbly Last 2' is mottled & partially altered to black silicates.	12.4'
30'	34.5'	Black, red & green contact minerals. No discernable sulfides, but core is very magnetic	4.3'
34.5	44.5'	Massive aphanitic magnetite	9.3'
44.5'	49.5'	Same	5.0'
49.5'	59.5'	Same to 56'. Then light green chlorite to 59½'.	10.0'
59.5'	63'	First 1½' of core is black magnetite. The rest is light green chlorite with some pyrite. Very broken up.	3.7'
63'	68'	Broken granite	0.6'
68'	73'	Granite	4.1'
73'	78.5'	Granite	5.1'
78.5'		End of Hole	

SAMPLE ASSAYS

59½' - 63	Sludge sample #658	- .03 copper
63' - 68'	Sludge sample #659	- .29 copper
30' - 34½'	Core sample #747	- Trace copper
34½' - 44½'	Core sample #748	- Trace copper
44½' - 49½'	Core sample #749	- 0.42 copper
49½ - 59½'	Core sample #751	- 0.11 copper
59½' - 63'	Core sample #752	- 0.46 copper

DIAMOND DRILL HOLE LOG
HOLE #15 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA Docket #269-X-B

Underground hole, same general location and purpose as holes #14. The granite contact appears to be on a fault, as no contact metamorphisom is present.

Collar coordinates - Latitude 20,225.72, Departure 20,028.60.
Collar Elevation - 2,935.03
Course Hole - N88° 45' W
Dip Hole - Flat (up 2°).
Driller - Ed Shandley
Size Core - EX
Average Core Recovery 94.2%
Total Depth - 130.0'
Started 12-17-52 Finished 12-23-52
Logged by - B. W. Venable

From	To	Core Description	Core Recovery
0'	10'	White marble	10.0'
10'	20'	White Marble	10.0'
20'	23'	White Marble	3.0'
23'	33'	White Marble	10.0'
33'	43.5'	White Marble slightly mottled & fractured in the last 3'	10.0'
43.5	53.5'	Limestone. Numerous fracture planes making 25° with core axis, showing slicken sides at right angles to major axis of fracture oval	10.0'
53.5'	64'	White Limestone	10.0'
64'	74'	White Limestone	9.0'
74'	79'	White Limestone. A little pyrite at 74'.	5.0'
79'	89'	White Limestone	10.0'
89'	93	White Limestone	3.5'
93'	103'	Limestone, mottled & discolored starting at about 97'. Numerous slips making about 45° with core axis	9.9'
103'	113.5'	The first foot is soft, soapy gouge, the rest is granite, gradually changing from altered to fresh	8.0'
113.5'	120	Granite. About 9" of pyritic quartz at 113.5'	4.4'
120'	139'	Granite	9.6'
130'		End of Hole	9.6'

Note:
This hole was extended to 199' starting 1-19-53.
Purpose: To see if the granite in the hole is a projecting nose. If so, this hole should drill through the granite at not more than 200' total depth. Emerged from granite at 156'
Driller: Ralph Carrera
Size Core: E X
Average Core Recovery: 55.6%
Total Depth of Extension: From 130' to 199'
Started: 1-19-53 Finished 1-22-53
Logged By: B. W. Venable

HOLE #15 TWIN BUTTES PROJECT - CONTINUED

From	To	Core Description	Core Recovery
130'	140'	Granite	6.0'
140'	146'	Granite	3.0'
146'	156'	Granite	3.7'
156'	166'	First foot is puritic quartz with some chalcopyrite The last foot is garnet and other contact silicates. The rest is silicified granite, slightly pyritic	4.2'
166'	169'	Soft Hornfels, pale green	1.8'
169'	179'	Hard Hornfels	8.3'
179'	189'	Hornfels	7.8'
189'	199'	First 1½' of core is hornfels. Then about a foot of limestone containing banded magnetite, garnet and minor chalcopyrite at about 45° with core axis. Gray limestone at the end.	3.6'
199'		End of Hole	

SAMPLE ASSAYS

113.5'	114.5'	Core #800	0.03 copper
156'	166'	Core #740	0.42 copper

DIAMOND DRILL HOLE LOG
HOLE #16 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole, Queen West 600, same general purpose as holes #14 and #15, and also to prospect the King Fissure at depth. Granite was not cut, and no MN[1] 2N found in King Fissure. (Fissure not positively found).

Collar coordinates Latitude 20,224.16 Departure - 20,027.61
Collar Elevation - 2,935.05
Course Hole - S62° 00'W
Dip Hole - Flat (up 2½°)
Driller - Ed Shandley
Size Core - E X
Average Core Recovery - 95.0%
Total Depth - 304'
Started - 12-26-52 Finished - 1-9-53
Logged by: B. W. Venable

From	To	Core Description	Core Recovery
0'	10'	White Limestone. A¼" stringer of garnet at 6", and a ¼" stringer of magnetite and pyrite at 4' to 5' make about 5° with core axis	9.4'
10'	15'	White Limestone. 1/16" stringers magnetite and pyrite parallel with core axis.	5.0'
15'	25'	White Limestone. ½" green garnet running at about 5° with core axis at 24'.	9.9'
25'	30'	White Limestone. Faint banding, looks like it might be bedding throughout at 45° with core axis	5.0'
30'	37.5'	White Limestone	6.5'
37.5'	43	White Limestone	5.0'
43'	49'	White Limestone	5.7'
49'	54'	White Limestone. About ½" of garnet at 5° with core axis at 49.5'	5.0'
54'	64'	Limestone	10.0'
64'	69'	Limestone	4.8'
69'	78.5'	Limestone	9.0'
78.5'	83.5'	Limestone	4.8'
83.5'	92.5'	Gray Limestone	9,0'
92.5'	102.5'	Limestone. Discolored by partial ateration to a greenish tinge at about 65° with core axis from 95' to 100'. Several slips through this section, making 2° to 10° with core axis.	10.0'
102.5'	113'	Limestone. Fault gouge from 111' to 113'. Solid gouge for about a foot at 112'. Angle of faulting is not very obvious, but several planes of movement show in core making 5° to 30° with core axis.	9.0'
113'	123'	113-114.5' is white marble. 114.5-115' is garnetite. Slip at 114.5' makes 40° with core axis. 115-123' is white marble.	9.6'

Diamond Drill Hole #16(Cont'd)

From	To	Core Description	Core Recovery
123'	133'	Grey Limestone. Banding thought at 70° with core axis. Slips here & there at about 10° with core axis	9.9'
133'	143'	Grey Limestone. Banded at approximately 70° with core axis. Small drusy openings at 139'.	9.0'
143'	150'	Gray to pale green limestone	6.4'
150'	160'	Grey Limestone	9.8'
160'	170'	Gray Limestone	9.9'
170'	180.5'	Gray Limestone	10.0'
180.5'	191'	Gray Limestone	10.0'
191'	197'	Gray Limestone. Some ground calcite with a few tiny (1/64") Xls chalcopyrite in it at 196' and 197'	5.7'
197'	206'	Gray Limestone. Banded at about 40° with core axis	9.0'
206'	216.5'	Limestone. Mottled & slightly discolored green & brown. Chalky in spots. About ½" of gouge at 199' making about 10° with core axis. A slip at 215' makes 10° with core axis.	10.0'
216.5'	227	Gray Limestone	10.1'
227'	237'	Banded (60°) Gray Limestone	10.0'
237'	247'	Banded " " "	9.4'
247'	256'	Banded " " " Core shattered at 252½' with slips making 5° - 20° with core axis.	9.0'
256'	262.5'	Gray Limestone	6.6'
262.5'	268.5'	Gray Limestone	6.0'
268.5'	278.5'	Gray Limestone	10.0'
278.5'	283.5'	Gray Limestone	4.9'
283.5'	293.5'	Gray Limestone. Tiny Xls pyrite in slips at 293½'	9.5'
293.5	300'	Gray Limestone. Slightly discolored by alteration. Several knife edge slips at 45° with core axis scattered throughout.	2.3'
300'	304'	Gray Limestone	3.7'
304'	End	End of Hole	

SAMPLE ASSAYS

None

Y

DIAMOND DRILL HOLE LOG
HOLE #18 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole, Queen West 600, to locate the contact between holes 15 and 16. Granite contact not found.

Collar coordinates - Latitude 20,224.33 Departure 20,027.65
Collar Elevation - 2,934.94
Course Hole - S78° 55' W
Dip Hole - Flat (up 35')
Driller - Ed Shandley
Size Core - EX
Average Core Recovery - 94.8%
Total Depth - 199.5'
Started - 1-10-53 Finished 1-17-53
Logged by: B. W. Venable

From	To	Core Description	Core Recovery
0'	13'	White marble. ½" green garnet stringer at 10° with core axis at 0.5', Ditto at 3'	12.4'
13'	23'	Pale Gray Limestone	9.9'
23'	28'	White Marble	4.5'
28'	38'	White Marble	9.8'
38'	43'	White Marble	4.9'
43'	49'	White Marble	5.8'
49'	54'	White Marble. Slightly altered in spots	5.0'
54'	59.5'	White marble. About 3" of pink stain at 59.5'.	5.3'
59.5'	65	Gray limestone to 64'. A 2" breccia zone at 60', making 20° with core axis. Garnet starting at 64' on a slip making 20° with core axis. No gouge	4.7'
65'	70'	Garnet. A little chalcopyrite & magnetite at 67'. Core shattered at 70'.	5.0'
70'	76.5'	Limestone. White to gray, all more or less altered. Slips make about 10° with core axis.	6.2'
76.5'	81.5'	Mixed white limestone, garnet, some magnetite. No visible sulphides	5.0'
81.5'	87'	First 1.5' is green garnet with tiny crystals Visible sulphides. The rest is gray limestone, fresh.	
87'	92'	6" of Gray limestone, then limestone with garnet bands at about 25° with core axis, the rest of the distance. Slickensides at 90.5', on 2 slips making 25° with core axis, striae parallel to core axis, when viewed in plane of fracture. Last foot is quartzite.	4.9'
92'	102'	First 2½' is quartzite. Last 7½' is limestone	10.0'
102'	111'	Limestone in all but last 1½'. Last 1.3' is garnetite with magnetite, pyrite, and very small amounts of chalcopyrite. Banding at about 10° with core axis	9.0'
111'	116.5'	Gray Limestone	3.4'
116.5'	126.5'	Gray limestone. A 5" calcite stringer at 80° with core axis at 117'. A 1/8" veinlet of pyrite, quartz and chalcopyrite cuts across at 122', making 35° with core axis.	10.0'
126.5'	137'	Gray Limestone	10.2'
137'	147'	Gray Limestone	10.0'

Hole #18 Twin Buttes Project (Cont'd)

From	To	Core Description	Core Recovery
147'	151.5'	White limestone	4.3'
151.5'	162'	First foot is white gouge. The rest is green contact silicate with small amount of magnetite.	9.1'
162'	168'	First 3' is talcy limestone, then about a foot of green silicates, then 2' of gray limestone	5.2'
168'	174'	Gray limestone	4.8'
174'	179.5'	Gray limestone	4.9'
179.5'	184.5'	Gray limestone	5.0'
184.5'	189.5'	Gray limestone. 6" of chlorite-pyrite banding at 45° with core axis at 194'	5.0'
189.5'	199.5'	Gray limestone	9.9'
199.5'		End of Hole	

SAMPLE ASSAYS

102'	111'	Sludge	#741	-	0.02	copper
65'	70'	Sludge	#750	-	1.97	copper
65'	70'	Core	#822	-	1.56	copper
76.5'	81.5'	Core	#823	-	0.04	copper
81.5'	83	Core	#828	-	0.04	copper
152'	162'	Core	#836	-	0.03	copper
162'	164'	Core	#837	-	0.44	copper
194'	199.5'	Core	#861	-	0.03	copper. 0.1 Zinc

DIAMOND DRILL HOLE LOG
HOLE #19 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Queen west stope end up approximately 50° to investigate the granite-limestone contact west of the two west Queen normal step-faults. This hole was intended to pick up a possible up-faulted extension of the Queen orebody. Hole was too high. A little chalcopyrite was found, however, granite was never penetrated.

Collar coordinates - Latitude 20,259.44 Departure 20,077.80.
Collar Elevation - 2,944.57
Course Hole - N31° 03'W
Dip Hole - Up 50°
Driller - Ralph Carrera
Size Core - EX
Average Core Recovery - 89.9%
Total Depth - 229'
Started: 1-24-53 Finished 2-11-53
Logged by: B. W. Venable

From	To	Core Description	Core Recovery
0'	10'	Brown garnet. A little sphalerite	9.4'
10'	20'	Same	8.2'
20'	30'	Same. Some Smithsonite (?)	3.2'
30'	46'	Garnet with heavy sphalerite 30-40. A sort of calcite cemented breccia with considerable Smithsonite and a little rhodocrosite from 40-46	16.0'
46'	56'	Barren appearing brown garnet	10.0'
56'	66'	Same. Fault gouge from 62 to 66, with planes of slickensides at angles of 5° to 60° with core axis	10.0'
66'	76'	First 2' is fault material, same as 62'-66'. Then 5' of crystalline gray limestone, then the rest in hornfels	10.0'
76'	84'	Brown garnet, coarsely crystalline	5.0'
84'	89'	Brown garnet, coarsely crystalline. Some Smithsonite in seams. Core broken.	1.5'
89'	99'	First 4½' is flinty green garnet. The rest is crystalline gray limestone	10.5'
99'	109'	Gray Xline limestone	10.0'
109'	119'	Gray Xline limestone	10.0'
119'	129'	Xline White marble	6.7'
129'	139'	White marble	10.0'
139'	149'	Gray marble	10.0'
149'	159'	Gray marble	10.0'
159'	169'	Gray marble. 2' of garnet at 10° with core axis at 166.5'-168.5', with one ½" band of chalcopyrite and pyrite making about 8° with core axis at 166.5'.	9.9'
169'	179(	White marble. A 3/4" band of pink Wollastonite runs through core almost parallel to core axis from 175 to 179'.	8.3'
179'	181'	White marble, Wollastonite band 179' to 180'	1.7'
181'	191'	White marble. ½" garnet-wollastonite band at 3° with core axis at 190'-191'	10.0'
191'	201'	White marble, very coarsely crystalline	10.0'
201'	210'	Same	9.0'
210'	220'	1½' brown garnet at about 3° with core axis at start. The rest in white marble.	6.5'

Hole #19 Twin Buttes Project (Cont'd)

From	To	Core Description	Core Recovery
220'	229'	White marble. About 3" of core shattered at 228' and again at 229'.	9.0'
229'		End of Hole	

SAMPLE ASSAYS

10'	20'	Core #764 -	Trace copper -	0.2 Zinc
30'	36'	Core #765 -	Trace copper -	1.9 zinc
36'	41'	Core #767 -	Trace copper -	17.52 zinc
0'	10'	Core #862 -	.04 copper -	0.1 zinc
0'	20'	Core #863 -	.03 copper	0.1 zinc
40'	46'	Core #881 -		2.5 zinc
46'	56'	Core #882		0.2 zinc
84'	89'	Core #886 -		0.3 zinc
89'	94'	Core #887 -	.39 copper	0.3 zinc

DIAMOND DRILL HOLE LOG
HOLE #20 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Queen 600 West end stope, same general purpose as Hole #19, on a slightly different course and flatter angle. Granite still not found.

Collar coordinates - Latitude 20,259.00 Departure 20,075.95
Collar Elevation - 2,944.89
Course Hole N58° 59'W
Dip Hole - Up 42°
Driller - Ralph Carrera
Size Core - EX
Average Core Recovery - 79.3%
Total Depth - 120.0'
Started 2-12-53 Finished 2-17-53
Logged by: B. W. Venable

From	To	Core Description	Core Recovery
0'	6'	Garnet. 3" chalcopyrite at 5'	2.6'
6'	16'	Garnet	6.6'
16'	20'	Garnet. With some Smithsonite	3.7'
20'	30'	Garnet, from 20' to 25'. Gouge at 24.5' making 30° with core axis. White limestone from 25' to 30'.	10.0'
30'	40'	White limestone	8.1'
40'	50'	White Limestone	5.7'
50'	60'	White Limestone	9.4'
60'	65'	1½' of white limestone core, then about a foot of broken core consisting mostly of actinolote, garnet and quartz, with a little of finely disseminated pyrite Strong slickensides in broken section, making 5° with core axis.	2.6'
65'	75'	Fine grained garnetite 65' to 71'. Coarser grained pyritic garnetite 71'.	9.7'
75'	85'	Unmineralized green garnetite. Slickensides at 76½' making 30° with core axis	10.'
85'	95'	85' to 89' is unmineralized green garnet. 89 to 94' is gray hornsfels. 94 to 95' is heavily pyritic garnetite with a little unidentified sooty black non-magnetic material. Slickensides at 5° with core axis in pyritic material	10.'
95'	104'	First 4½' is pyritic material as above, with a few brown bands of sphalerite. The rest is white limestone	8.6'
104'	110'	Gray limestone	6.0'
110'	120'	Gray limestone. Last foot of core shattered	5.2'
120'		End of Hole	

SAMPLE ASSAY

65'	75'	Sludge #783 - 0.23 copper		
75'	85'	Sludge #784 - 0.81 copper		
85'	95'	Sludge #785 - 0.44 copper	0.82	zinc
95'	104'	Sludge #786 - 4.62 copper	7.90	zinc
65'	75'	Core #894 - 0.07 copper	0.22	zinc
75'	85'	Core #898 - 0.04 copper	0.2	zinc
85'	95'	Core #901 - 0.41 copper	0.4	zinc
95'	100'	Core #902 - 1.68 copper	11.6	zinc

Weighted average assay 95' to 104' 9.0' average 3.62% copper and 9.16% zinc

DIAMOND DRILL HOLE LOG
HOLE #22 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Queen 600 West end stope. Same purpose and course as hole #20, but on a flatter angle of inclination. Ore was penetrated between "A" and "B" faults. From the results of hole #23, it appears that "B" fault was not crossed and the hole was extended, and granite found.

Collar coordinates - Latitude 20,259.63 Departure 20,074.95
Collar Elevation - 2,944.05
Course Hole - N58° 59' W Dip Hole Up 30°
Driller - Ralph Carrera
Size Core - EX
Average Core Recovery - 70.2%
Total Depth - 111' Extended to 175'
Started 2-18-53 Finished 2-21-53
Extension started 3-2-53 Extension finished 3-4-53
Total Final Depth 175'
Logged by: B. W. Venable

From	To	Core Description	Core Recovery
0'	5'	Garnetite	3.5'
5'	10'	Garnetite	3.2'
10'	15'	Garnetite	5.0'
15'	20'	Garnetite	3.5'
20'	30'	20 to 24' unmineralized garnetite. 24 to 28½' sphalerite in garnet. 28½ to 30' is white limestone. Abrupt change of garnet-limestone at 28½' at 20° with core axis.	10.0'
30'	40'	First 3.3' is white limestone. The rest is pyrite, chlorite, spongy quartz and a little chalcopyrite, mostly inthe quartz.	5.2'
40'	50'	Pyrite, chlorite, splongy quartz and a little chalcopyrite.	2.9'
50'	60'	Heavy pyrite & chlorite from 50 to 56', with some black chalcocite coating on pyrite & a little chalcopyrite From 56' to the end is strong chalcopyrite with small amounts of pyrite	9.7'
60'	70'	Strong chalcopyrite at 60' to 69'. Very massive 64½' to 66'. Last foot is hard dense blue slate. Chalcopyrite banding at about 12°	10.0'
70)	80'	First foot is blue slate. Last 2 feet is gray limestone. The rest garnet.	10.0'
80'	90'	Shaly limestone	10.0'
90'	93'	Shaly limestone. Core broken in last 6".	1.8'
93'	103'	White limestone. 1" garnet band at 101' at 10° with core axis.	10.0'
103'	111'	Gray limestone	7.8'
111'	121'	Gray limestone	10.0'
121'	131'	White & gray limestone	9.7'
131'	141'	About 6" of gray limestone core. The remaining core is pale green metamorphosed material, appears to have been breccia before alteration. Considerable pale green chlorite.	1.3'
141'	150'	Gouge, with some crumbly garnetite and some soft magnetite Core mostly crumbled.	5.2'
150'	155'	Crumbled chloritic gouge. Last few inches altered granite.	1.7'

Diamond Drill Hole #22 Twin Buttes

155'	165'	Shattered granite, partially altered	1.8'
165'	175'	Granite	0.5'
175'		End of Hole	

SAMPLE ASSAYS

20' to 30'	Sludge #787	0.41 copper	9.1 Zinc
30' 40'	Sludge #788	3.02 copper	0.7 Zinc
40' 50'	Sludge #789	3.91 copper	1.0 Zinc
50' 60'	Sludge #808	3.34 copper	0.4 Zinc
60' 70'	Sludge #805	14.22 copper	0.6 Zinc
70' 80'	Sludge #806	0.17 copper	0.2 Zinc
80' 90'	Sludge #809	0.04 copper	
90' 100'	Sludge #807	0.06 copper	

Sludge averages 30'-70' 6.37 copper 0.67 Zinc

20' to 30'	Core #903	0.33 Copper	9.3 Zinc
30' to 40'	Core #904	1.37 Copper	0.4 Zinc
40' to 50'	Core #905	4.45 Copper	0.8 Zinc
50' to 60'	Core #913	0.06 Copper	0.3 Zinc
60' to 70'	Core #914	11.25 Copper	1.1 Zinc
70' to 80'	Core #915	0.03 Copper	0.2 Zinc

Core average 30' - 70' 6.53 Copper 0.65 Zinc

Weighted Averages

30' - 40'	10'	2.72 Copper
40' - 50'	10'	3.97 Copper
50' - 60'	10'	5.96 Copper
60' - 70'	10'	13.17 Copper

Average 6.45% Copper

DIAMOND DRILL HOLE LOG
HOLE #23 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-I-B

Underground hole from Queen 600 west end stope,. Same purpose and course as holes 20 & 22, but on a flatter inclination. Granite was found west of "B" fault. Ore was penetrated between "A" & "B" faults.
Collar coordinates - Latitude 20,260.18 Departure 20,074.18
Collar Elevation - 2,943.13
Course Hole - N58° 59'W Dip Hope up 21°
Driller - Ralph Carrera
Size Core - EX
Average Core Recovery - 72.9%
Total Depth - 128' Started 2-23-53 Finished 2-28-53
Logged by: B. W. Venable

From	To	Core Description	Core Recovery
0'	3'	Garnetite in blue limestone	3.0'
3'	8'	Coarse Grained Garnet	2.0'
8'	20'	Coarse Grained Garnet	11.9'
20'	30'	Garnet, unmineralized, first 5' of core. Then fault gouge, the rest in pyrite and magnetite	7.3
30'	35'	Pyrite garnet. A little chalcopyrite, Gore quite pourous quartzy.	3.5'
35'	40'	Pyrite & chalcopyrite in garnet	4.1'
40'	50'	Pyrite & chalcopyrite in garnet	5.9'
50'	60'	Pyrite & chalcopyrite in garnet	3.4'
60'	70'	Pyrite & chalcopyrite in chlorite 60 to 64'. Predominate chalcopyrite 64 to 70'	9.9'
70'	80'	Garnetite. Chalcopyrite disseminated in first foot, gradually diminishing to nothing	10.0'
80'	82'	Black rock. Nonmagnetic slickensides at 20° with core axis	1.2'
82'	92'	Garnetite. Some scheelite noted under UV lamp	10.0'
92'	102'	First 4' is garnetite, the rest is granite gouge, with slips at 10° with core axis. Striae not plain	5.6'
102'	112'	Granite	3.6'
112'	118'	Granite	3.1'
118'	128'	Granite	8.8'
128'		End of Hole	

SAMPLE ASSAYS

25' to 35'	Sludge #811	3.02 copper	0.2 zinc
35' to 45'	Sludge #817	2.96 copper	
45' to 55'	Sludge #818	2.28 copper	
55' to 65'	Sludge #819	8.54 copper	
65' to 75'	Sludge #820	1.83 copper	

Sludge average 25' - 75' 50' average 3.73% copper

20' to 30'	Core #935	0.47 copper
30' to 35'	Core #936	1.05 copper
35' to 40'	Core #937	3.96 copper
40' to 45'	Core #938	4.89 copper
45' to 50'	Core #939	2.91 copper
50' to 60'	Core #940	3.03 copper
60' to 70'	Core #942	11.78 copper

Core average 30' - 70' 40' average 5.28% copper

DIAMOND DRILL HOLE LOG
HOLE #24 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Queen-Glance 600 level crosscut, horizontal to the south to prospect the Glance Contact West Extension near its western extremity at a major north-east-south-west normal fault, probably postmineral in age. No ore was found.

Collar coordinates - Latitute 19,878.13 Departure 20,369.09
Collar Elevation - 2,932.13
Course Hole - S52° 41'W Dip Hole - Flat (up 45')
Size Core - EX
Average Core Recovery - 83.8%
Total Depth - 162'
Started 3-5-53 Finished 3-14-53
Driller - Ralph Carrera
Logged by: B. W. Venable

From	To	Core Description	Core Recovery
0'	8'	Granite	3.9'
8'	11'	Granite	1.6'
11'	21'	Granite	9.0'
21'	32'	Granite	8.8
32'	37'	Granite	5.0'
37'	47'	Granite	10.0'
47'	57'	Granite	9.4'
57'	69'	Granite	7.5'
69'	75'	Granite	4.8'
75'	85'	Granite. Last 2' shows brecciation, slickensides & a little pyrite. Core shattered in last 2'.	4.0'
85'	90.5'	Granite	4.4'
90.5'	95.5'	Granite	5.0'
95.5'	103'	Granite. ¼" pyrite at 40° with core axis at 103'	6.3'
103'	104	Granite	0.8'
104'	114'	First 5' is granite fading into, with no sharp line of distinction, a hard, dense material, mostly silica, which could be either a dense quartzite, silicified granite, or aphanitic contact phase of granite	10.0'
114'	124'	Hornfels. Scattered garnet, magnetite & pyrite in slips in latter portion, about one foot of magnetite at 123'.	10.0'
124'	134'	Pyritic, garnetose, magnetitic hornfels. 6" chlorite gouge at 15° with core axis at 131'. Last 1½' is gray limestone.	10.0'
134'	142'	Partially metamorphosed limestone. Banding at 45° with core axis	8.0'
142'	145.5'	Broken core. Mostly magnetite	1.7'
145.5'	156'	Hornfels. 1½" of soft magnetite at 148'	10.0'
156'	162'	Hornfels	5.5'
162'		End of Hole	

SAMPLE ASSAYS

124' to 134'	Core Sample #977	0.26 copper	0.3 zinc
142' to 143½'	Core Sample #978	Trace copper	0.2 zinc
143½' to 145½'	Core sample #979	1.06 copper	0.3 Zinc
145½' to 156'	Core Sample #980	0.12 Copper	0.2 Zinc

DIAMOND DRILL HOLE LOG
HOLE #25 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Glance-Queen 600 level crosscut, inclined upward to the south, same general purpose as hole #24. No ore was found.

Collar coordinates - Latitude 19,878.78 Departure 20,368.86
Collar Elevation - 2,934.99
Course Hole - S 55° 02' W Dip Hole - Up 22°
Driller - Ralph Carrera
Size Core - EX
Average Core Recovery
Total Depth - 156.0'
Started - 3-14-53 Finished 3-21-53
Average Recovery Through Contact Zone
Logged by: B. W. Venable

From	To	Core Description	Core Recovery
0'	5.5'	Granite	5.2'
5.5'	12.5'	Granite	5.0'
12.5'	19	Granite	6.5'
19'	23'	Granite	2.6'
23'	32'	Granite	7.9'
32'	40.5'	Granite	5.7'
40.5'	49.5'	Granite. A little pyrite in seams at 35° with the core axis at 49' to 59'	2.7'
49.5'	58	Granite	8.5'
58'	64'	Granite	4.8'
64'	70'	Granite. 3/4" pyrite in a seam at 45° with core axis at 65'	4.8'
70'	79'	Granite	8.7'
79'	81.5'	Granite	1.8'
81.5'	84'	Granite	2.5'
84'	89'	Granite	4.8'
89'	93'	Granite	2.3'
93'	103'	Partly silicified granite	10.0'
103'	108'	Partly silicified granite 103-105'. At 105' there is 2" of chlorite material containing heavy pyrite and a small amount of chalcopyrite. The rest of the core is garnetite of a type observed to result from the garnetization of shale or hornfels. Slightly pyritic core.	5.0'
108'	114'	Soft pale green silicates. Apparently partly talc or chlorite.	5.1'
114'	118'	Pale green talc. Core shattered. 3" of dark green pyritic chlorite at 117.5'	2.7
118'	125'	Green Garnetite. Garnet banding at 122', makes 50° with core axis	5.0'
125'	131'	Soft crumbly green contact silicates	5.4'
131'	137'	Barren garnetite	5.4'
137'	142'	Gray limestone	5.0'
142'	148.5'	First foot is gray limestone. The rest is hornfels	3.1'
148.5'	156'	Porous, white non-calcareous rock with a few tiny black specks in it. Unidentified.	2.0'
156'		End of Hole.	

SAMPLE ASSAYS

114' to 118'	Sludge #877	0.03 Copper
118' to 125'	Sludge #878	0.14 Copper
125' to 131'	Sludge #879	0.06 Copper
131' to 137'	Sludge #880	0.04 Copper

DIAMOND DRILL HOLE LOG
HOLE #26 TWIN BUTTES PROJECT
DMA CONTRACT #I-DMA-E-33, DMA DOCKET #269-X-B

Underground hole from Glance-Queen 600 level crosscut, Flat hole with same general purpose as holes 24 and 25, but designed to penetrate the contact closer to the Alpha fault than Hole 24. No ore was found.

Collar coordinates - Latitude 19,879.58 Departure 20,367.09
Collar Elevation - 2,892.00
Course Hole - S70° 15' W Dip Hole - Flat
Driller - Ralph Carrera
Size Core - EX
Average Core Recovery - 76.9%
Total Depth 190.0'
Started 3-24-53 Finished 4-1-53
Average Core recovery through contact zone 86.5%
Logged by: J. C. Cazort Jr

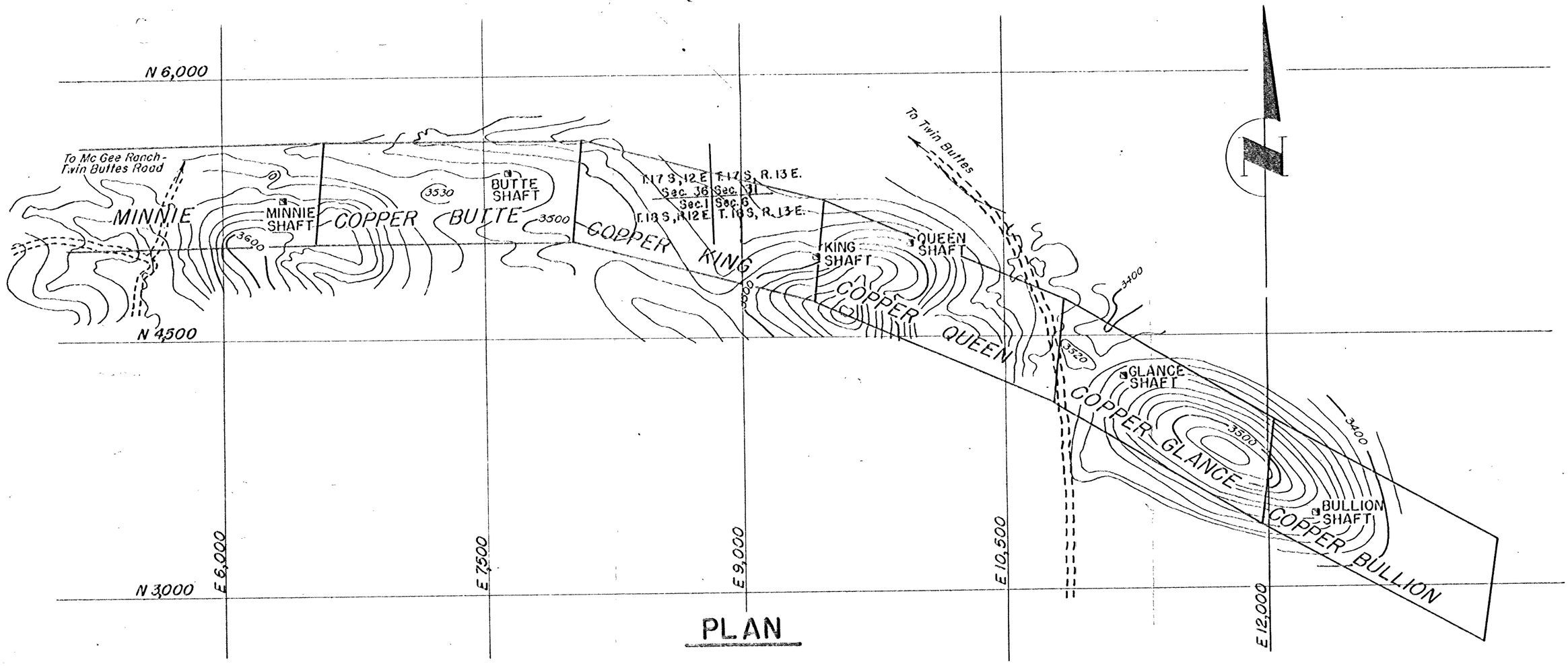
From	To	Core Description	Core Recovery
0'	5.5'	Granite	5.2'
5.5'	12.5'	Granite	6.4'
12.5'	21'	Granite	4.7'
21'	27'	Granite	5.4'
27'	35'	Granite	8.0'
35'	39'	Granite	2.9'
39'	41'	Granite	2.0'
41'	48'	Granite	6.6'
48'	59'	Granite	2.8'
59'	65.5'	Granite	4.8'
65.5'	71'	Granite	4.3'
71'	75'	Granite. Small amount disseminated pyrite	3.4'
75'	82'	Granite. Dike at 79' at 35° with core axis	6.4'
82'	85.5'	Granite. Small amount of pyrite	1.7'
85.5'	90'	Granite. ½" pyrite at 89' at 30° with core axis	4.5'
90'	96'	Granite. 1/8" pyrite at 30° with core axis at 90.3', disseminated pyrite throughout	4.4'
96'	100'	Granite. 3/8"pyrite at 35° with core axis at 99.6', disseminated pyrite throughout	4.0'
100'	108'	Granite. Irregularly distributed pyrite present	4.4'
108'	116'	Granite. Slight alteration of granite visible. Pyrite present in stringers and as disseminated particles.	2.9'
116'	122.5'	Granite. Irregular patches of pyrite	6.5'
122.5'	125'	Granite. 1/8" pyrite vein at 35° with core axis at 122.6'. Disseminated pyrite throughout granite	2.5'
125'	134'	Granite. Hornfels contact at 133.8'.	2.8'
134'	141.5'	Hornfels to 135.1'. Calcareous garnet with irregular sections which are pyrite rich from 135' to 139'. Heavy dike with pyrite from 139' to 139.4'. Calcareous garnet from 139.4' to 141.5'	7.1'
141.5'	145.5'	Garnet. No lime	2.5'
145.5'	155.5'	Garnet. No lime	10.0'
155.5'	163	Garnet. Becomes slightly calcareous with disseminated pyrite at157.2'. Altered dike from 158.5' to 159.8', slight pyrite in dike. Brecciated light colored non-calcareous material showing fault gouge and possible slickensides from 159.8' to 162'. Altered dike with slight pyrite from 162 to 163'	6.2'

Diamond Drill Hole #26 Log (Cont'd)

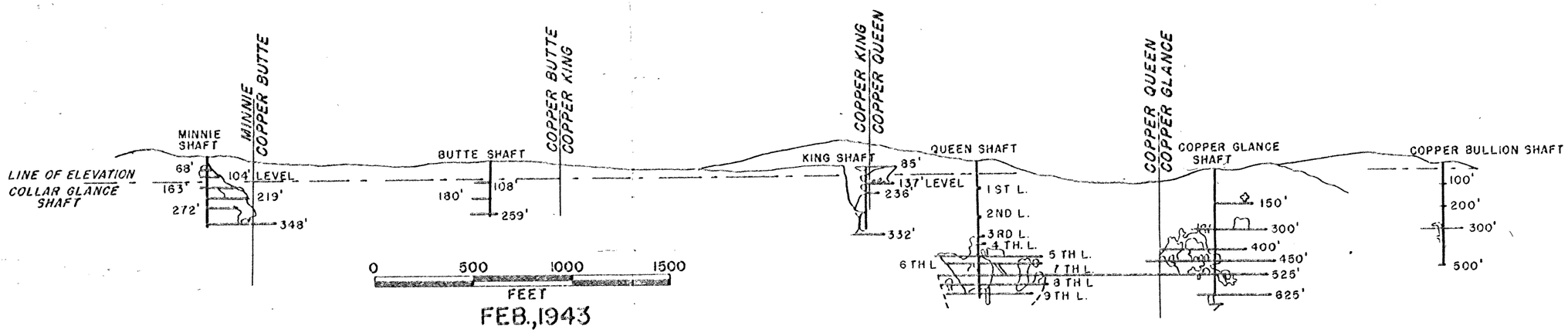
From	To	Core Description	Core Recovery
163'	175'	Contact silicate with lime stringers. Moderate magnetism at 163', increasing to strong magnetism at 166.1'. Magnetism ends at 166.1'. Siliceous garnet breccia at 166.1'. Slight magnetism at 166.8'. Slight gouge. Magnetism increases with increase of balck material in rock. Garnet breccia at 167.8'. Black magnetic micaceous silicate with little pyrite at 169.2'. White non-magnetic micaceous garnet silicate at 170.5'. Black micaceous magnetic silicate at 171.2'. Slight pyrite.	9.7'
175'	185'	Garnet breccia with lime stringers. Slickensides at 175.3' at 45° with core axis. Striae perpendicular to core axis when viewed perpendicular to plane of movement. Contact of breccia with gray limestone along slickensides with mullion structure at 30° with core axis at 175.8'. Striae at 75o with core axis when viewed perpendicular to plane of movement. Gray limestone with silicate stringers, crystallinity increases with depth of hole.	9.2'
185'	190'	Gray limes with silaceous stringers.	4.5
190'		End of Hole	

SAMPLE ASSAYS

157' to 165'	Sludge #932	0.03 Copper	0.2 Zinc
165' to 170'	Sludge #933	0.04 Copper	0.3 Zinc
170' to 175'	Sludge #934	0.52 Copper	0.4 Zinc
134' to 141.5'	Core #1003	0.07 Copper	
155.5' to 163'	Core #1004	0.11 Copper	
163' to 175'	Core #1005	0.36 Copper	



PLAN



FEB., 1943

DMA 269 X-B

SECTION THROUGH SHAFTS

FIGURE 3. - BANNER MINING COMPANY - TWIN BUTTES MINE

PIMA COUNTY, ARIZONA

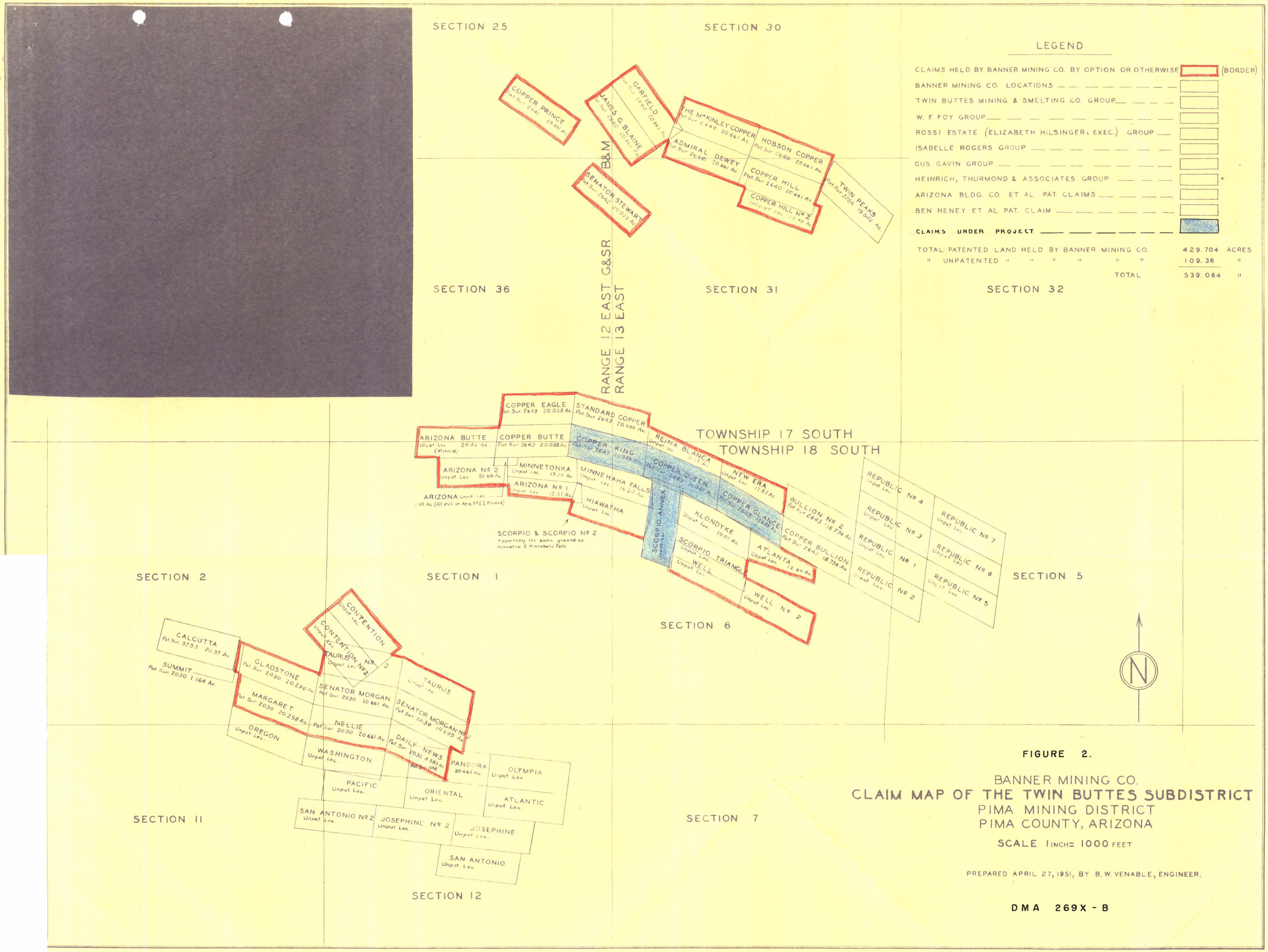


FIGURE 2.

BANNER MINING CO.

CLAIM MAP OF THE TWIN BUTTES SUBDISTRICT

PIMA MINING DISTRICT

PIMA COUNTY, ARIZONA

SCALE 1 INCH = 1000 FEET

PREPARED APRIL 27, 1951, BY B. W. VENABLE, ENGINEER.

DMA 269X - B

DOCKET NO DMEA 269X-B

FINAL REVISION 1-19-54

FIGURE 4.

BANNER MINING CO.

GEOLOGIC PLAN OF THE 600 LEVEL

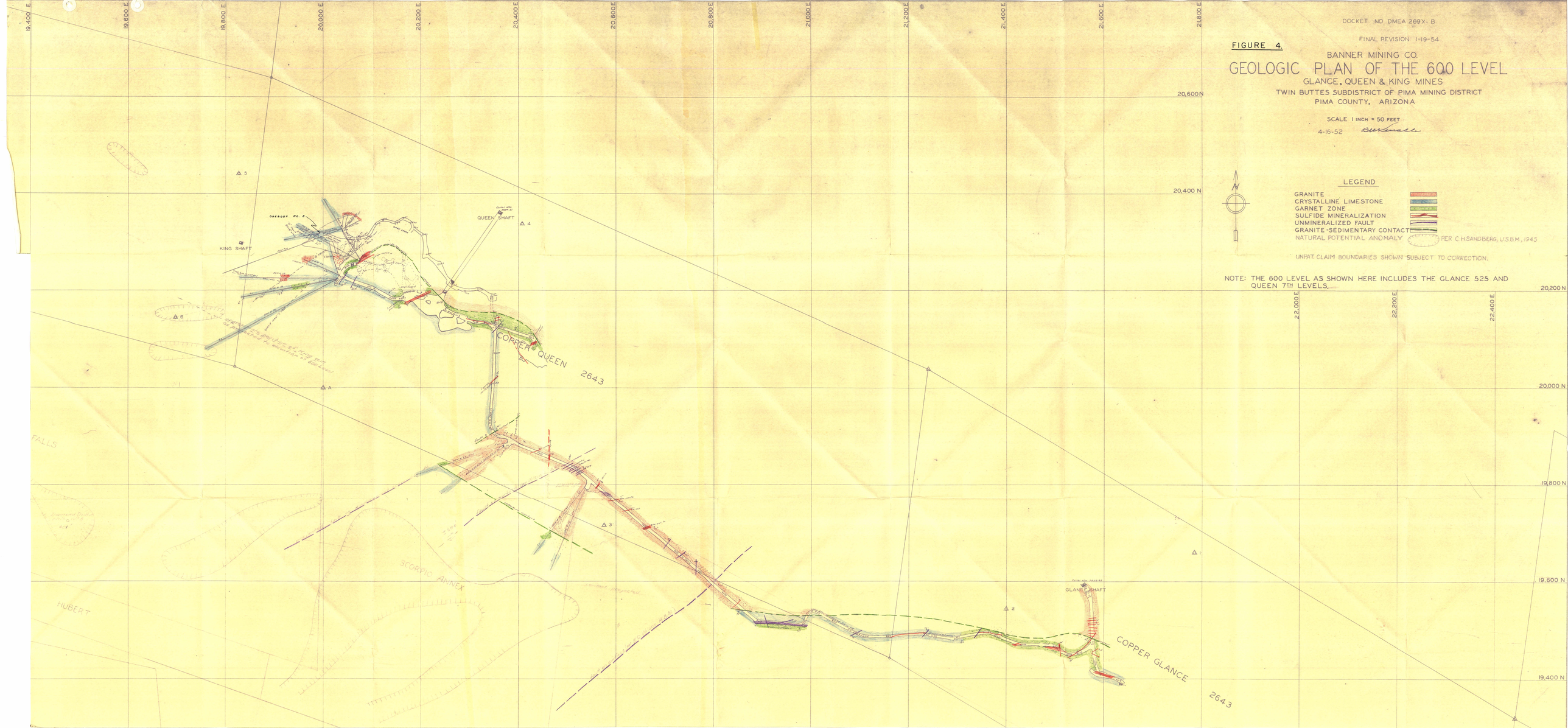
GLANCE, QUEEN & KING MINES

TWIN BUTTES SUBDISTRICT OF PIMA MINING DISTRICT

PIMA COUNTY, ARIZONA

SCALE 1 INCH = 50 FEET

4-16-52 [illegible]



DOCKET Nº DMEA 269X-B

FINAL REVISION 1-19-54

BANNER MINING CO.
QUEEN MINE - TWIN BUTTES, ARIZ.
700 (9TH) LEVEL
GEOLOGIC PLAN SKETCH MAP

SCALE 1 IN. = 20 FT. 12-4-52

B.W. VENABLE

Based on Brunton-tape traverse control.

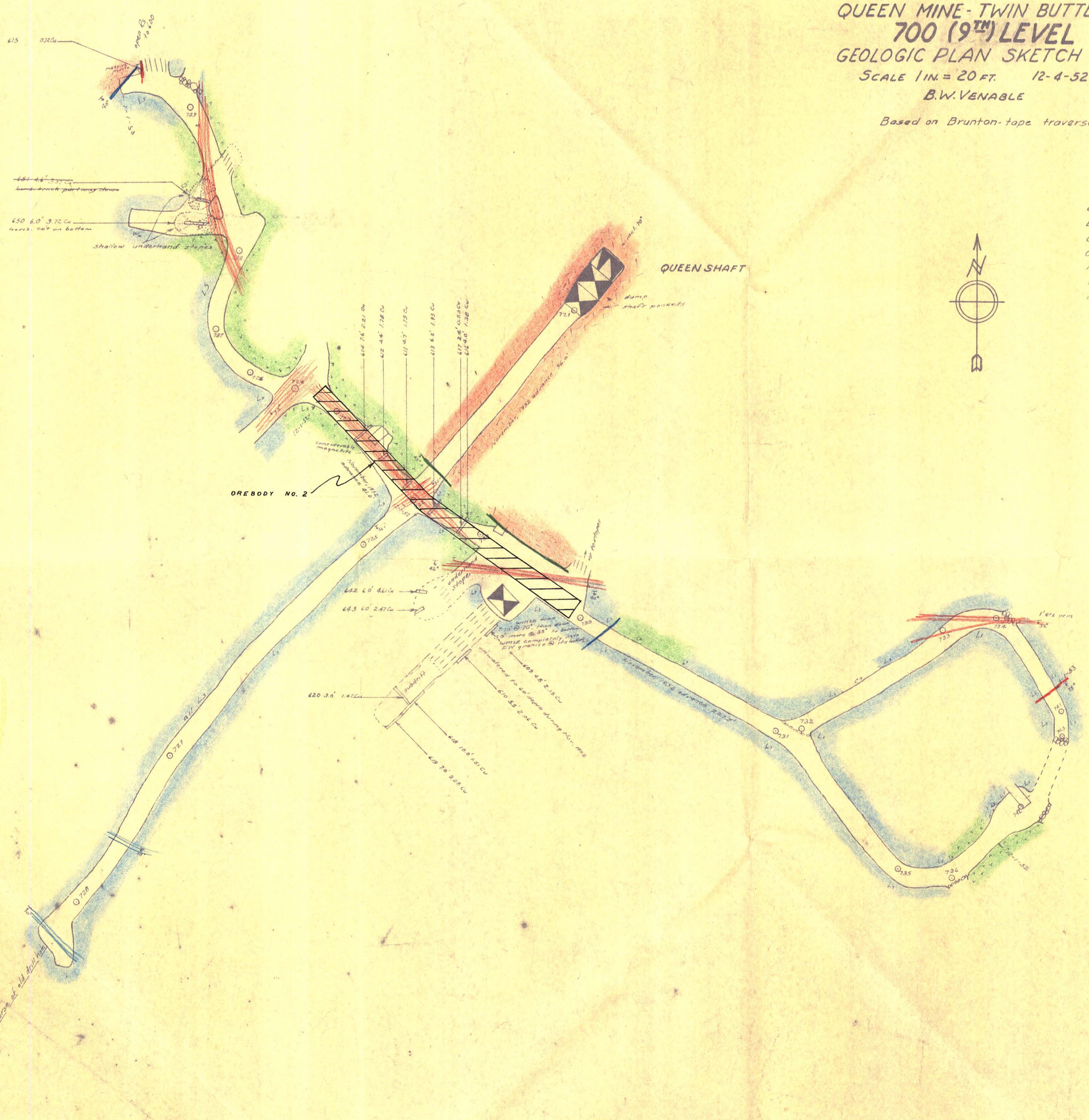


FIGURE 5. - TWIN BUTTES COPPER MINE - DMA 269 X - B

PIMA COUNTY, ARIZONA

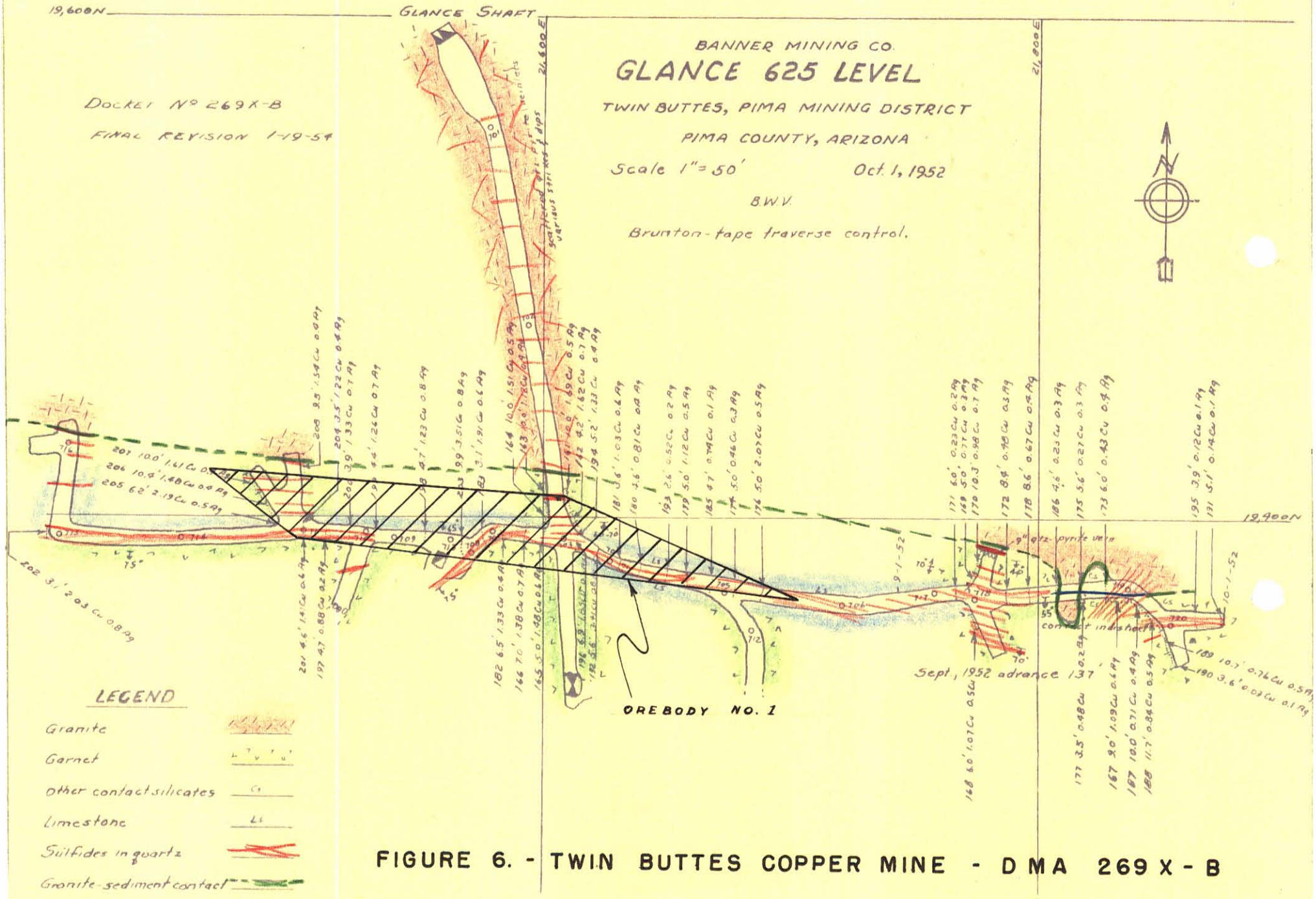


FIGURE 6. - TWIN BUTTES COPPER MINE - DMA 269 X - B