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PRELIMINARY RECONNAISSANCE EXAMINATION

Date: 3-20-70

Name of Property: Yuma Mine
State: ARIZ. County: Yuma

Location: District:

Date of this Report: By: E. G. H.

Map & Aerial Photo Ref.: SALOME Quad. U. S. G. S.

Extent of Property:

Ownership (Name & Address):

DAN KING

Leased or Optioned to (Name & Address):

N. Coldstream Mines

Facilities:

(a) Accessibilities (Roads, Trails,
road Good paved etc.):

(f) Water: CAN be developed

(b) Air Fields:

(g) Labor: Aguila, Wickenburg, Phoenix

(c) Power:

(h) Climate: DESERT

(d) Telephone: Aguila

(i) Supply Source: Wickenburg, Phoenix

(e) Housing: One primitive

(j) Miscellaneous:

house at site could be fixed up for office

Type of Deposit: (Describe briefly under following headings; Structure, Lithology, Mineralogy, Stratigraphic conditions, Physiographic conditions, Reserves, Possible Extensions, Geology, Geophysics & Drilling):

Mine Workings: (Brief description of methods used, map to be attached if available)

Production Data: (Past, present and possible future)

Sampling and Analysis: (By whom--Results)

Mining Equipment on Property: *None of any value*

Mill Equipment on Property: *None*

Misc. Equipment on Property: *Some track*

Camp Facilities: *Not necessary*

Ore Reserve Estimates:

Recommendations and Conclusions: *The possibilities are good to develop a small mine both in the oxide zone as well as the sulphide zone.*

I recommend the following steps to put the mine into production.

1) Verify the ore reserve estimates of C. King by a detailed sampling program and perhaps some limited short hole underground drilling.

2) Endeavour to extend the reserves on strike

~~References: (Bibliography, Maps, Former Workers or Engineers)~~

by a combined geological & geophysical program & surface drilling

The

416/3641471
362 27 25
NORTH COLDSTREAM MINES LIMITED

SUITE 509, 25 ADELAIDE STREET WEST
TORONTO 1, ONTARIO

Yuma Proj.

March 17, 1970.

↓
Grover Heinrichs,
Heinrichs Geo-exploration Company,
806 - West Grant Road,
Tucson,
Arizona 85703, U.S.A.

HEINRICH
GEOEX
GEOPHYSICAL ENGINEERS
TUCSON, ARIZONA



REC'D MAR 21 1970

BOX 5671 TUCSON, ARIZONA 85703

Phone: (AREA 602) 623-0578

Dear Grover,

Following consultation with our people here,
it was affirmed that North Coldstream was not interested
in the joint venture as proposed in your proffered agree-
ment.

We are of the opinion here that the Yuma prospect
has limited immediately apparent potential with possible
major exploratory hopes at depth. We are unable to currently
provide the personnel to fully evaluate the prospect. It has been
hanging over our heads for some time. With these thoughts
in mind, we wish to offer the property as follows:

- Time Period 3 yrs.
on payment of \$50,000*
- (i) under option for a period up to 6 months subject
to payment of the \$300.00 per month royalty
to Dan King and providing for a work committal
of evaluation with reports to be available for our
perusal.
 - (ii) if interested at the end of this period, we would
assign our lease to you subject to a payment of
\$50,000 U.S. (over time if necessary) and a
future 10% carried interest in the property.

Currently our activity in Arizona has been mounting
and we are hard-pressed to keep abreast.

I shall expect to hear from you re the above proposal.

Sincerely,

W. W. Weber

WWW/jc

W. W. Weber, Ph.D.

TENNECO OIL COMPANY

YUMA COPPER PROJECT, YUMA COUNTY, ARIZONA

FINAL REPORT

SUMMARY

The Yuma Copper Prospect, located near Bouse, Arizona, is a tectite type deposit controlled by a strong east-west fault. A drill test of the down dip extension of the main ore course was made. The results indicated a narrowing of the ore course with sporadic mineralization, averaging 0.40% copper over an interval of 155 feet. It was thought that the indicated mineralization was not encouraging enough to pursue the prospect further at the present time.

INTRODUCTION

History

The Yuma Mine, discovered in the late 1880's, had its greatest periods of production from 1890 to 1900 and 1940 to 1950. Some underground drilling was done in the late 1950's, but the results, although promising, were inconclusive. Total production from the Yuma Mine is estimated to be between 80,000 and 100,000 tons of 1 $\frac{1}{2}$ to 2% copper ore.

Location and Access

The Yuma Mine is located at the intersection of sections 19, 20, 29 and 30, T 6 N, R 15 W, and is most easily reached by going east from McVay Siding off of Arizona Highway 72 between Salome and Parker.

The roads in the area are easily accessible to a pickup truck. (See index map.)

Land Status

All land in the area is federal land managed by the Bureau of Land Management and is open to staking. Valid, unpatented mining claims in the area, including the Yuma Mine are owned by Mrs. Dan M. King and are under option by Mr. and Mrs. Larry R. Drake. These claims were in turn optioned by Tenneco Oil Company from the Drakes on April 17, 1972 (see Claim Map). Tenneco surrounded this block of claims with 69 claims. On July 24, 1972 Tenneco cancelled its option on the King Claims. Other claims in the area, which have questionable validity, are owned by Oliver B. Kilroy of Tucson, Arizona. Three miles west of the Yuma Mine a north-south strip of land has been withheld for the Central Arizona Project.

Origin of Undertaking

Aeromagnetic maps of the Tank, Utting, and Hope areas were made (in 1969 and 1971) and certain anomalies were derived, and among these, there was one, slightly north of the Yuma Mine, which appeared to be the result of tactite mineralization at depth. Also, a large Laramide intrusive was exposed 1 to 2 miles north of the area of interest, which indicated a possible source of the mineralization.

Time Spent on the Evaluation

The evaluation began during the first part of 1972 with reconnaissance mapping. Detailed follow-up mapping began April 1st along with claim staking. A road was built to the drill site starting April 24th and drilling began May 18th. Drilling was completed June 23rd and final map preparation was finished by July 1, 1972.

GEOLOGIC SETTING

The Yuma Mine is located in the Granite Wash Mountains, which are characterized by a thick section of greenschist facies metasediments. These rocks are mainly quartz-chlorite-sericite-schists with many prominent quartzite and phyllite interlayers and a few beds of foliated marble (see General Geologic Map). Another foliated rock which was observed in the area of the Yuma Mine was augen gneiss (see Geologic Map of the Yuma Project). The area has a few quartz-rhyolite dikes trending northwest-southeast, which may be related to the large Laramide intrusive to the north of the Yuma Mine. Also, there are late diabase dikes which trend northwest-southeast, usually following Basin and Range structures or planes of weakness.

A very large east-west fault occurs through the Yuma Mine, paralleling, but 1 to 2 miles south of the contact between the greenschist facies and the Laramide intrusive. The fault is broken into several smaller faults on the east side, most of which sub-parallel the main strand. There is a zone of strong chevron folding 500 to 800 feet wide trending northwest-southeast (see Cross-section) which is observed both in the field and the core.

TARGET OBJECTIVE

The target objective was a high grade, moderate tonnage tactite deposit. The target area was defined as the down dip extension of the main ore course at the Yuma Mine. By use of geological projections it was determined that by stepping out 500 feet in a northeasterly direction and drilling a vertical hole, the main ore course would be intersected between the 1700 and 1800 foot elevations. Because of accessibility problems, the drill site was prepared 1200

feet northeast in a horizontal direction from the last recorded mineralization on the 450 level (elevation 1891 feet) in the Yuma Mine. The hole was angled at 47° from the horizontal in a southwesterly direction with a projected intersection of the main ore course at 600 feet from the last workings in the Yuma Mine.

MINERALIZATION AND ALTERATION

Mineralization occurs along the prominent east-west fault and also in a tactite zone formed in the marble and quartzite (see Underground Map). The tactite displays calc-silicate assemblages with much actinolite, garnet, gypsum, epidote, calcite, quartz, magnetite, and siderite. Oxide copper minerals present are chrysocolla, brochantite, azurite, cuprite, malachite, and neotocite (copper wad). Oxidation occurs down to the 165 level (elevation 1919 feet). Sulfide mineralization mainly occurs as pyrite and chalcopyrite, with very minor bornite. In the Yuma Mine the sulfides usually occur as discrete grains sometimes surrounded by magnetite grains. The copper mineralization occurs in the tactite zone, however it is disseminated out into the wall rocks a short distance, with pyrite occurring well out into the wall rocks.

The first exploration drilling program carried out was underground, searching for an extension of the known ore reserves on the 450 level. Five horizontal exploration holes determined that the ore did extend down dip, however no large intersections of ore were reported. Three of the holes, Nos. 2, 3, and 4, were relogged, which substantiated the reported results.

Tenneco's exploration drilling program intersected the tactite zone at 826 feet (elevation 1880 feet) (see Drill Log). The copper mineralization was chalcopyrite with pyrite and magnetite vein^s which

averaged 155 feet true thickness at 0.40% copper with 1 to 4% total sulfides. The total depth of the hole was 1120 feet which bottomed in a quartz-chlorite schist containing less than 1% disseminated pyrite. The intersection of the mineralization occurred 600 feet down dip from the last reported mineralization in the Yuma Mine.

GEOPHYSICS

Aeromagnetics

The first aeromagnetic survey was flown by Fairchild in the early 1960's at 500 amt which showed a definite positive anomaly approximately 1000 feet N 25 W of the Yuma Mine. The Tenneco survey at 800 amt also showed a center for this anomaly 1000 feet N 25 W of the Yuma Mine. Together these anomalies slope off to the north indicating a possible extension of the anomaly to the north.

I. P.

Several years ago McPhar ran a 1950 foot line with 150 foot dipoles, perpendicular to and centered on the mineralized east-west fault at the Yuma Mine. The I. P. response indicated that the anomaly dipped off to the north-east as was expected from the mineralization along the main ore course in the mine.

CONCLUSIONS AND RECOMMENDATIONS

The exploration program was a geological success. The drill data from Yuma #1 indicated that indeed the mineralization did extend downward along a tactite zone, as originally thought. However, because of the limited mineralization encountered, the prospect was returned to the

the lessor. It is felt that this prospect still has potential in that the mineralization in the ore course is now known to extend 500 feet down dip from the nearest workings and there is a possibility that there could be a widening of the ore course at any point. It is therefore recommended that this prospect be reviewed again in the future.

Ward W. Arendt

Ward Arendt

Geologist

WA/NIC

1913 CO-STAR PROJECT, YUMA COUNTY, ARIZONA
 Drill Hole: Yn-1

	Feet	%Cu	ft. %		
826	.....	2.72	10.85	$\frac{14.40}{12}$	12' = 1.20 %Cu
	1	0	0 (dike)		
	.....7	.56	4.07		9' true thickness
838	2	0	0 (dike)		
	5	.97	.35		
	4	0	0 (dike)		
	.....5	.31	1.70		
854	5	.23	1.15	$\frac{12.97}{80}$	80' = 0.16% Cu
	6	0	0 (dike)		
	6	.16	.84		60' true thickness
	4	.44	1.76		
	11	.11	1.21		
	10	.26	2.60		
	11	.12	1.32		
	3	0	0 (dike)		
	.....8	.24	1.92		
918	7	.64	4.48		
	1	0	0 (dike)		
	7	.52	3.64		
	8	.71	5.68		
	10	.52	5.20		
	6	.50	3.00		
	4	.33	1.32	$\frac{18.29}{100}$	100' = 0.183% Cu
	10	.56	5.60		
	6	.30	1.80		
	9	.83	7.17		75' true thickness
	11	0	0 (dike)		
	9	.50	4.50		
	6	0	0 (dike)		
	.....6	.50	3.00		
1018	10	.33	3.30	$\frac{3.05}{11}$	11' = 0.255% Cu
	5	.11	.55		11' true thickness
1033	.....			
	207 ft.		33.01 ft. %		
		$\frac{33.01}{207}$			207' = 0.160% Cu
					155' true thickness

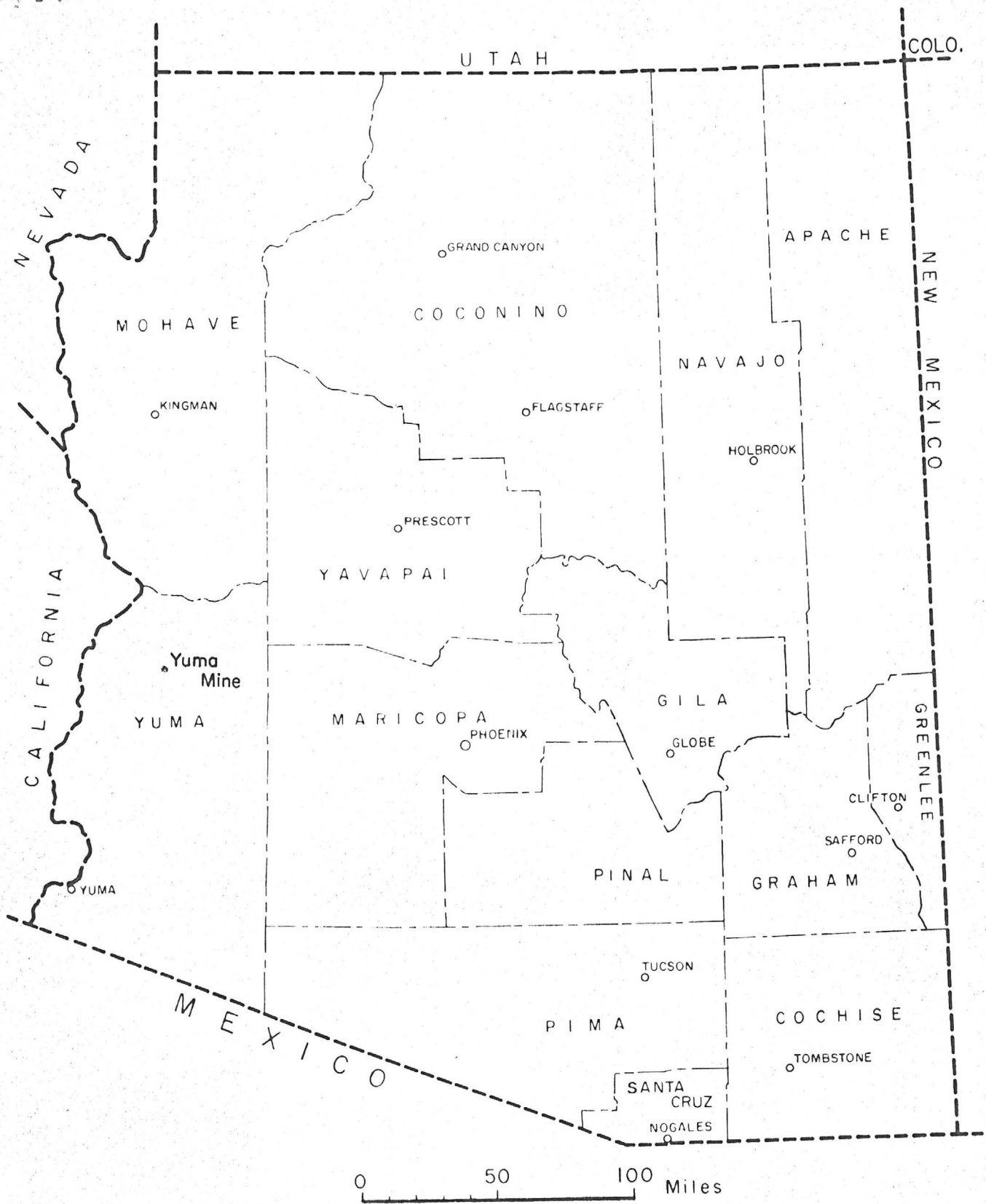
DRILL HOLE NO. Yu-1
COLLAR ELEVATION 2420'YUMA COPPER PROJECT
YUMA COUNTY, ARIZONAPAGE 1 of 3
BY N. Arendt + J. Beeder

COORDINATES

BEARING 53°30'W INCLINATION 47° SCALE 1" = 50 ft.
DEPTH 1120' STARTED 5/23/72 COMPLETED 6/23/72SPOT ASSAYS 0-826
CORE ASSAYS

SPOT ASSAY					CORE ASSAYS										
% Core Recovery	Structure	Alteration	Mineralization	Rock Type	BEARING 530°30'W INCLINATION 47°		SCALE 1" = 50 ft.		INTERVAL		MINERAL				
					DEPTH 1120'	STARTED 5/23/72	COMPLETED 6/23/72	FROM	TO	Cu ppm	Mo ppm	Au ppm	Ag ppm		
GEOLOGY										FROM	TO	Cu ppm	Mo ppm	Au ppm	Ag ppm
99+%	0-1120 ft.				Schist (0-399'); schistosity 60° to core axis. CHLORITE and Qtz. predominate. EPIDOTE common. Pyrite < 1/2%, gyp 17' limonite common.	ALTERATION									
						SERICITE	15	-	34	2	<0.01	1.0			
						FAOLIN	26	-	23	5	<0.01	1.0			
						SILICA									
						CHLORITE									
						GARNET									
						SERPENTINE									
						EPIDOTE	57	-	15	<2	<0.01	0.0			
						MINERALIZATION									
						PYRITE									
						CHALCOPYRITE	89	-	25	<2	<0.01	1.0			
						CHALCOCITE									
						MOLYBDENITE									
						MAGNETITE									
						GALENA									
SPHALERITE	118	-	32	<2	<0.01	4.0									
SPECULARITE															
LIMONITE (GOETHITE)															
GYPSUM															
										</					

COORDINATES								CORE ASSAYS									
Core Recovery	Structure	Alteration	Mineralization	Rock Type	BEARING	INCLINATION	SCALE	INTERVAL		MINERAL							
								DEPTH	STARTED	COMPLETED	FROM	TO	Cu %	Mo %	Au %	Ag %	
G E O L O G Y																	
					900	QUARTZITE (as above) some late gypsum veinlets.											
						TACTITE (918-997) magnetite, qtz, sericite, garnet, anhydrite, gyp.											
						FAULT (937-940) @ 20° C.A. on H.W., 70° C.A. on F.W.											
					950	MIXED ROCK: sheared, mixed slivers + frags of TACTITE, qtzite, marble + gyp (957-961)											
						1 1/2 % total sulfides, cp + py.											
						DIABASE DIKE (986-997)											
					1000	sheared TACTITE (997-1018) magnetite											
						MARBLE (1018-1052) massive, banded, rotated 70-80° to C.A.											
					1050	Quartz-Chlorite SCHIST w/ minor diss. sulfides, some qtz. augen. < 1/2 % sulfides											
					1100												
					T.D. 1120'												
								ALTERATION									
								SERICITE	910	918	0.24	0.061	NONE	0.01			
								HAIRIN	918	925	0.04	0.030	0.01	0.22			
								SILICA	925	926	0.02						
								CHLORITE	926	933	0.52	0.05	0.01	0.06			
								GARNET	933	941	0.7	0.017	0.01	0.16			
								SERPENTINE	941	951	0.5	0.052	0.01	0.13			
								ITIBITE	951	957	0.45	0.04	0.01	0.18			
									957	961	0.23	0.03	0.01	0.10			
								MINERALIZATION									
								PYRITE	971	977	0.80	0.043	0.015	0.21			
								CHALCOPYRITE	977	985	0.83	0.020	0.015	0.13			
								CHALCOPITE	997	1006	0.50	0.02	0.015	0.10			
								MOLYBDENITE	1012	1018	0.50	0.013	0.015	0.17			
								MAGNETITE	1018	1028	0.33	0.011	0.015	0.10			
								GALENA	1028	1033	0.11	0.007	0.01	0.05			
								SPECULARITE									
								MONITE-MONTEITE									
								GALENA									



ARIZONA

YUMA COPPER PROJECT

Yuma Mine

Parapet

KING & KING

MINING ENGINEERS

P.O. BOX 2127, LOS NIETOS, CALIFORNIA OX80 8-8036

CLARENCE R. KING
7648 BOLSA RD.
MIDWAY CITY, CALIF.
TWINOAKS 3-5711

DAN A. KING
11762 MINES BLVD.
WHITTIER, CALIF.
OX80 3-8229

REPORT UPON
THE
YUMA COPPER MINE.
Yuma County, Arizona.

Sept. 1, 1960

Clarence R. King.

KING & KING

MINING ENGINEERS

SUMMARY.

The Yuma Copper properties, consisting of patented and unpatented lode mining claims covering about 800 acres, are situated near Vicksburg, Yuma County, Arizona. Location, climate, transportation and power facilities, water and labor supply, are favorable to low-cost operation. (See pages 1 and 4).

The Yuma orebody is a high-temperature metasomatic replacement deposit in metamorphic rocks of probable Paleozoic age. The strike and dip of the orebody conforms to that of the metamorphic series; ie. - strikes N 70° to N 80°W and dips 15° to 35°N. So far as presently known, the true thickness of the orebody varies from 50 to about 100 ft., and it has been explored in part over a strike length of about 500 ft., with the west end known but the east end still "open". The ore and accessory minerals are chalcopryite, bornite, pyrite, pyrrhotite, tectite and magnetite; with minor marmatite, scheelite, tin minerals, and gold and silver. The ore has been completely oxidized to a gossan to a depth of about 300 ft. below the surface. Below the oxidized ore, a gray, porous, leached material carrying some pyrite and copper is found to the present lowest level of exploration, (about 450 ft. below the surface). (See pages 5 to 9, inc.).

To date, (Sept., 1960), about 3,000 ft. of underground workings prove an estimated 500,000 tons of leached semi-sulfide ore amenable to flotation concentration, averaging 1.572% Cu, 0.0287 oz. Au, and 0.24 oz. Ag. per ton. An additional 500,000 tons at about the same grade is classed as probable ore. (See pages 10 to 12, inc.).

An inferred 1,000,000 tons of oxide ore at about 1.5% Cu occurs above the "sulfide" ore; but exploration is insufficient to class this as blocked ore, nor has research to date shown an economic process for beneficiating this ore.

Present exploration has not penetrated below the present static water table, and it is probable that primary ore averaging about 4% Cu or better will be encountered about 200 feet vertically below present workings; as well as bodies of high-grade secondarily enriched ore within the orebody.

Other areas within and near the properties, and nearby, show outcrops similar to that of the Yuma orebody, but have not been explored to date.

An exploration program within the Yuma orebody is recommended, which will delineate this orebody over a strike length of about 1000 ft. and to a depth sufficient to prove the extent and grade of primary and secondary ore. This program is estimated to cost about \$200,000 and to require about three years to complete. (See pages 14 and 15).

Exploration of the surrounding area by geophysical means and by drilling from the surface is estimated to cost about \$125,000 to the point of proving the existence of other orebodies in the area, if any.

KING & KING

MINING ENGINEERS

LOCATION AND MEANS OF ACCESS.

The Yuma copper claims are located in T5&6N, R14&15W, Gila and Salt River Meridian, Ellsworth mining district, Yuma County, Arizona. (See Map No. 1, Index map, herewith). The mine camp is about five miles by excellent graded road from McVay siding on the Santa Fe railroad. Arizona highway 72 and electric power highline parallels the railroad and are contiguous to its right of way at this point.

McVay siding is 16 miles Salome, 11 miles from Bouse, 60 miles from Blythe, and 40 miles from Parker, by paved highway. Phoenix is about 100 miles, and Los Angeles about 250 miles away, by highway.

The nearest copper smelters are Magma, at Superior, Ariz., and Miami, Ariz., about 190 miles by highway. Other copper smelters, within the same general rail freight radius, are at Douglas, Ariz., El Paso, Tex., Hayden, Ariz., and San Manuel, Ariz.

TITLE AND ACREAGE OF CLAIMS.

The Yuma copper properties consist of three non-contiguous groups of contiguous unpatented and patented lode claims known as the Yuma Copper group, the Kate Waters group about 2 miles south of the Yuma Copper group, and the Yellow Bird group, about midway between the Yuma and Kate Waters groups. The approximate total acreage in the three groups of claims is: Yuma Copper group, 514 acres, Kate Waters group, 226 acres, Yellow Bird group, (Patented), 60 acres; a total of approximately 800 acres in the properties.

Title to all of the above claims rests with T. H. Crawford and C. R. King, by recorded quit claim deeds and by valid mineral lode claim location, as of the date of this report. The Yuma Copper group has been surveyed and a claim plat recorded. The claims in this group are all unpatented. The Kate Waters group are all unpatented full-sized lode claims. No surveyed claim plat of this group is recorded, but claim monuments on the ground are clear. The Yellow Bird group of three patented claims is described in U. S. Mineral Survey No. 1888.

A title search made by the Phoenix Title & Trust Co., Yuma branch, in June of 1958 established a clear chain of title to most of the claims as of that date, (the date the claims were purchased by Crawford & King from the Mineral Corporation of America, by assignment of purchase agreement between this corporation and the estates of C. H. and Kate Waters). As of the date of this report, chain of title to Crawford & King by deed and by duly recorded claim locations and proofs of labor is of record.

A contract between Minerals Corporation of America, a Delaware corporation, and Crawford & King is of record, wherein Crawford & King agree to pay to Minerals Corp., a 5% royalty on net smelter returns until \$100,000 has been so paid to Minerals Corp.; but all expenses including exploration, etc., are deducted from the 5% of net smelter returns before Minerals Corp. participates in the royalty, for 5 years from date of contract; ie. -any and all money spent in connection with the properties for 5 years after date of contract is deducted from 5% of sales receipts from mineral products before Mineral Corp. receives any of the 5% royalty.

KING & KING

MINING ENGINEERS

The following lode claims comprize the Yuma Copper properties:

Claim name & group	Mining Records of Yuma County	
	Book	Page
Yuma Copper group:		
Carbonate No. 1	27	2
Carbonate No. 2	27	3
Carbonate No. 3	27	4
Carbonate No. 6	27	5
Carbonate No. 7	27	6
Union	26	258
Arizona No. 1	27	7
Arizona No. 2	40	236
Arizona No. 3	40	237
Arizona No. 4	40	238
Arizona No. 5	27	8
Arizona No. 8	27	9 (page missing)
Arizona No. 8 Relocation) same claim	170	514
May	170	515
Ginka	170	516
Lita	170	520
Fran	170	519
Max	170	518
Elma	170	517
Joiner 2	224	501
Joiner 1	224	509
Strike 1	224	502
Strike 2	224	503
Strike 3	224	504
Strike 4	224	505
Strike 5	224	506
Strike 6	224	507
Strike Fraction	224	508
Kate Waters group:		
Noralie	17	165
Stafford	26	443
Moore	26	444
Western Bell	26	445
Western Bound	26	446
Ora Plata	26	447
Waters	26	448
Edwin B. Jones	26	449
W. J. B.	26	450
Mule	40	223
Go Lucky	40	224
Yellow Bird group, (patented):		
Mendota Lode)		
Coronet Lode)		
Security Placer)		

-----U. S. Mineral Survey No. 1888.

KING & KING

MINING ENGINEERS

HISTORY OF THE PROPERTY.

Between 1885 and 1890, the Atlantic & Pacific, (afterwards Santa Fe) railroad was built from Parker toward Wickenburg and Phoenix. This stimulated prospecting in the Vicksburg area, and resulted in the discovery and/or operation of the Harqua Hala, Glory Hole, Mendota, True Blue, and many other small gold mines in the area; two of which are upon the Yuma Copper properties. The Yuma outcrops were discovered and the first work done upon them about 1890. In the early 1900's, a Mr. McDonald organized the Tres Amigos Mining Company, established a camp near the present Union claim, and under his direction most of the present underground work in the Yuma orebody was done prior to 1905.

Nothing much is known of the operations upon the properties between 1905 and the early 1920's, when the property was acquired by Mr. C. H. Waters, of Vicksburg. Except for sporadic leasing operations, nothing was done upon the properties until about 1943, when the Liberator Mines Co., a closed corporation, took the properties from Mr. Waters on a lease and option to purchase, and, with the help of an R. F. C. loan, unwatered and explored some sections of the workings on the Yuma orebody. The Liberator Mines Co. was underfinanced, and with the prevailing price for copper at that time, was unable to make a profit by shipping ore containing 1.6% copper and not more than \$2.00 in precious metals. During the period this company operated, however, (1943-1947), over 7,000 tons of ore was shipped to smelters, from which the company received about \$43,000 net after freight and smelter charges. This company ceased operations in 1947, with the intention of seeking financing to develop the mine further and build a mill. About 1953, the surface plant and shaft timbering burned; the mine flooded; and the company's lease from Mr. Waters was cancelled. About this time, Mr. and Mrs. Waters died, and the property was offered for sale by the executrix of the Waters estate.

In July of 1956, the properties were sold to the Minerals Corporation of America, a Delaware corporation, by the Probate Court. In June of 1958, the properties were acquired by T. H. Crawford and C. R. King by quitclaim. Since 1958, active exploration and development has been carried on in the Yuma orebody by Crawford & King.

In Rock to Riches, by Chas. Dunning, (a history of mining in Arizona), pg. 386, Mr. Dunning states: " --there seems to be no production recorded from the Yuma Copper previous to 1944. However, it is this writer's personal knowledge that a considerable amount of copper ore was mined by R. R. McDonald during the first part of this century; when I visited the mine in 1920, there was an open stope from which at least 5,000 tons must have been shipped. In 1944 the Liberator Mines Co. acquired a lease on the mine and up to 1948 produced about 9,000 tons-----".

During the years the Liberator Mines Co. was operating, a good deal of engineering work was done thereon by Mr. J. S. Coupal, a competent mining engineer of Phoenix. Much of the data and old reports, and the smelter liquidation sheets on Liberator Mines ore shipments, are in possession of Crawford & King as of the date of this report.

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GENERAL INFORMATION.

The Yuma claims are situated on the south flank of the Granite Wash Hills; a spur of the northeast trending Harcuvar mountains. Salome peak, one of the highest points in this range, lies about 5 miles northeast of the property. This peak is about 4,700 feet elevation above sea level. Elevation of the mine portal is about 2,000 ft.; McVay siding, five miles west of the mine, is about 1,400 ft. elevation.

The TOPOGRAPHY from McVay siding northeast toward the mine is a broad alluvial fan rising gently to the foot of the Granite Wash Hills, about 2 miles from the mine. From this point, (elevation 1,600 ft.), to the mine portal, the slopes are steep and the hills are dissected by narrow, steep-walled canyons trending west or southwest. At the mine portal an abrupt change in slope results in very steep hillsides to the north and east, culminating in the crest of the Granite Wash Hills, which slope steeply northeasterly to a narrow valley separating the Hills from the main Harcuvar range.

The CLIMATE at the property is that of the southern Arizona desert: very hot, dry summers during which the maximum daytime temperature may reach 120°F and the minimum night temperature about 80°; and cool, dry winters with maximum daytime temperatures about 80° and minimum slightly below freezing. Rainfall averages about 15 inches per year, as summer thunder showers and winter rainstorms.

LABOR SUPPLY is derived from the nearest towns and local labor is ample for a small operation. Skilled miners can be recruited within a fifty miles radius, and housing is available at Bouse, Salome, and Vicksburg, all within 20 miles of the mine. No housing other than necessary for a small staff is available at the mine. Wage scale at the mine is presently \$2.25 for miners, \$2.00 for muckers, per hour. Other labor in proportion.

WATER for domestic purposes must be hauled from wells about six miles from the mine, as of the date of this report. Water suitable for domestic use may be had within a mile or so of the mine by developing an existing well on the Yellow Bird claims. Water for milling and mine use may be obtained by using mine water, (flow at present is about 150 g. p. m. when pumping from lowest level); or could be obtained from a large capacity well at McVay, (5 miles from the mine), or by drilling other wells within five miles of the mine. This water is suitable for domestic purposes. The mine water has a pH of 5.5 to 6.5, and carries a great deal of ferrous sulfate and gypsum in solution, as well as some copper.

POWER SUPPLY is presently obtained from diesel prime movers. For power requirements in excess of exploration needs, high-line power furnished by the Arizona Power Co. passes within 4 pole-line miles of the mine portal, (paralling the railroad and highway). A network of power lines from this high-line serves large irrigation wells in the valley close to McVay.

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FUEL, TIMBER AND SUPPLIES must be hauled by truck or rail from Salome, Blythe, Parker, Phoenix, or Los Angeles. Blasting supplies, Diesel fuel, lubricants, and most household supplies can be obtained in Salome, 20 miles from the mine. Both Standard Oil and Shell maintain distribution agencies at Salome.

INVENTORY OF EQUIPMENT on the property is attached hereto as Appendix 1 .

ECONOMIC GEOLOGY.

The Yuma claims are located in a belt of metamorphic rocks of probable Paleozoic age on the southwest flank of the Harcuvar mountains, which range is a complex of Precambrian gneiss, (granitic texture), metasediments, and Tertiary intrusive granitic rocks. The Granite Wash Hills, in which the property is situated, form a spur separated from the main Harcuvar range by a narrow valley approximately following the contact between the granitic rocks and the metamorphics composing the Hills. The metamorphic series has a regional strike nearly east-west and dip north, (toward the granitic rocks), at from 10° to 60° .

The metamorphic rocks on and near the property are bedded gneiss, schist varying from phyllite to actinolite schist, quartzite, and marble lenses and intercalated beds. No petrographic work has been done to classify these metamorphics as to age, or original rock type.

A strong northwest-trending, vertically dipping shearing occurs in the metamorphic rocks, associated with minor shearing trending northeast and of variable dip. Some evidence of strike faulting is noted in the mine workings. The strike faults follow the strike of the bedding closely, but usually dip at steeper angles than the bedding. Displacement is not known but does not appear to be great. In general, the folding of the metamorphic series appears to be gentle except close to strike faults, where local tight folds are noted.

A swarm of diabase dikes varying from a foot or two to thirty feet thick strike and dip concordant with the main shearing, throughout the Granite Wash Hills. These dikes can be traced from the metamorphics into the Tertiary granitic rocks, ie. - are younger than the later granite. The diabase dikes are the only igneous rocks identified in and near the claims, except for the granite found near the extreme northwest corner of the Yuma Copper group of claims. The dikes found within the mine are definitely post-mineral in age relative to the copper mineralization. Dikes found elsewhere on the property, (Kate Waters and Yellow Bird), are associated with quartz-breccia veins, usually narrow and "spotty", which have been mined in a small way for precious metal values.

Prior to the injection of the diabase dikes, the metamorphic series was subjected to high-temperature hydrothermal alteration over most of the area on and near the properties. Sericite, actinolite, kaonlin minerals, tourmaline, and garnet was formed; limestone was converted to marble or dolomite, but was strongly silicated in many areas; and copper minerals, pyrite, pyrrhotite, marmatite, and minor tungsten and tin minerals were deposited in favorable loci.

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Exploration of areas of intense alteration and outcrops favorable to the occurrence of orebodies on and near the claims has been meager except for one favorable location: the Yuma orebody. This orebody is apparently confined to a schistose and a silicified limestone bed or beds within the metamorphic series. Both hanging wall and footwall of this zone are gneiss, so far as known from present exploration. The orebody is a replacement of limestone and of schist by pyrite, pyrrhotite, chalcopyrite, bornite, and marmatite. Abundant primary magnetite and almost complete conversion of limestone to garnet and other calcium silicates accompany the sulfide mineralization.

Oxidation is complete from the surface to a vertical depth of about 300 ft., (dip-slope depth of about 400-450 ft.). Completely oxidized, gossan-type ore changes at nearly a uniform elevation, (regardless of the depth from surface), to a gray, soft, porous, leached mass of tactite, magnetite, and pyrite grains. This material persists to and at least 40 ft. below the present static water level, (present lowest level in the mine).

Evidence is strong that the level of the water table has repeatedly fluctuated over wide limits in recent geological time, and has definitely dropped fifty feet since the mine workings were opened about 1905. The apparent rather sharp cutoff at a level horizon between the completely oxidized ore and the leached material still containing some pyrite marks the top limit of a former water table which remained constant long enough to prevent complete oxidation below that level while allowing formation of gossan, (complete oxidation), above it. The lower limit of the fluctuating water table has not been reached by exploration to date, (the horizon of primary and/or secondary ore). Mineralogical and other evidence indicate that this plane should be about 200 ft. vertically below the present lowest accessible level, (present water table). These data indicate that about half of the copper content of the oxide and leached semi-sulfide ore exposed by present workings probably has been leached, compared with that of the indicated average primary ore, (see Tables 1 and 2 herewith).

The Yuma orebody, so far as known from present exploration, varies from about 50 to over 100 ft. true thickness; strikes N70 to N85°W; dips from 20° to 35°N; and is known to be over 500 ft. long, with the west end apparently delineated and the east end "open". Outcrops would indicate an extension of the orebody to the east at least a thousand feet east of the present most easterly level face.

Within the orebody, little or no unsilicated limestone is found. The hanging and footwalls, (gneissic rock), however, are high in carbonates, (marble and calcite). A halo of partly silicated limestone and/or schist in which sulfides are sparsely disseminated, surrounds the orebody proper. It is probable that the original high sulfide (pyrite and pyrrhotite) content of the orebody, coupled with the complete silication of the limestone within the orebody proper, would result in leaching, and secondary deposition of copper at some point below the then static water table. Precipitation of oxidized copper minerals, however, would take place on and near the carbonate-bearing footwall of the orebody, and in parts of the body where unsilicated carbonates were present. This is evident in the oxide zone.

The peculiar, gray, porous, soft ore found below the gossan zone, still containing some pyrite, is probably the result of repeated flooding and draining of the ore mass due to rapidly fluctuating water level.

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In effect, this semi-sulfide ore has been subjected to the same process practiced in the heap leaching of Rio Tinto (Spain) pyritic copper ore, in which most of the copper is leached by repeated flooding and draining of the ore heaps over a period of years; without oxidation of much of the pyrite, which is sold after removal of most of the copper, for acid manufacture.

The calculated mineralogical composition of the ore at various levels in the Yuma orebody, derived from the analyses of ore shipped to smelters given in Table II; assays of various specimens of unoxidized and unleached ore found here and there within the orebody; and spectrographic analyses; is given in Table I below:

TABLE I.

SUMMARY OF MINERALOGICAL COMPOSITION OF ORE BY LEVELS.

Mineral	125 L. el. 2011'	165 L. el. 1919'	415 L. el. 1891'	450 L. el. 1854'	Probable primary ore.
Malachite, $\text{CuCO}_3 \cdot \text{Cu(OH)}_2$	1.7	0.3	----	----	-----
Cuprite, Cu_2O	0.8	---	----	----	----
Chalcopyrite, CuFeS_2	---	4.4	4.5	6.0	11.6
Sphalerite, ZnS	---	0.4	0.4	0.5	0.9
Pyrite, FeS_2	---	8.0	10.5	12.3	25.0
Gypsum, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	3.4	2.8	2.5	----	----
Calcite, CaCO_3 (secondary)	---	2.9	2.9	2.5	----
Hematite, Fe_2O_3 (secondary)	5.2	---	---	----	----
Magnetite, Fe_3O_4 (primary)	12.0	12.1	10.1	10.9	8.0
Garnet, $3\text{RO} \cdot 3\text{SiO}_2 \cdot \text{R}_2\text{O}_3$	44.7	47.4	47.3	42.8	33.7
Quartz, SiO_2	32.5	18.6	22.1	25.1	19.8
Totals:	100.3	96.8	100.3	100.1	99.0

Notes: The composition of the probable primary ore is taken from the avg. of analyses of specimens of unoxidized ore, (probably more silicious than the average). If pyrite increases at a uniform rate from the averages on the 165, 415, and 450 levels to that of the primary ore, the elevation of the top of the primary zone will be about 200 ft. below the 415 level, ie. - at elevation 1700, approximately. In the above calculations, all sulfide sulphur is distributed between pyrite, chalcopyrite, and sphalerite; no account is taken of pyrrhotite or other copper minerals. The garnet is, by observation, a grossularite type, and the above general formula seems to agree with a reasonable mineralogical "tieup" of the silica and bases available.

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TABLE II.
YUMA OREBODY: SUMMARY OF ORE ANALYSES BY LEVELS.

Level	Elev- ation, Ft.	Tons ship- ped.	Troy oz./ton		Percent-					Al ₂ O ₃		SiO ₂	CaO	Remarks.
			Gold	Silver	Cu	Zn	Fe	S						
125	2011	587.3	0.036	0.273	7.276	0.70	12.6	0.6	---	---	---	41.5	15.9	L6C stope, FW ore.
125	2011	1046.7	0.051	0.260	1.776	----	15.2	0.6	2.0	2.0	50.4	15.6		L8B&D stopes, main orebody
165	1919	1976.7	0.022	0.234	1.675	0.31	17.4	6.6	1.6	1.6	37.6	16.4		Drift & crosscut muck
415	1891	3331.9	0.031	0.286	1.530	0.26	17.4	7.9	1.2	1.2	41.0	16.4		Drift & Gloryhole stope
450	1854	36.7	0.028	0.390	2.060	0.30	18.3	8.8	1.1	1.1	42.3	14.0		Drift muck at face drift
Pri*	1700?	-----	0.020	0.400	4.000	0.60	23.6	17.7	0.9	0.9	33.3	10.3		Probable primary ore

Notes: The above analyses were taken from smelter liquidation sheets, and are the weighted averages of the respective tonnages shipped from the various levels in the mine, as shown.

The analysis of the probable primary ore, (Pri*), is the average of several analyses of unoxidized and unleached ore specimens found as unaltered streaks and small pockets at various places in the orebody. It is possible that these specimens are more silicious than the average ore; hence more resistant to oxidation attack. The specimens ranged from about 1% to over 10% in copper content, and some showed pyrrhotite and bornite as well as chalcopyrite and pyrite.

The L6C stope ore is not representative of the main orebody, in that it is an apparent footwall split at the extreme west end of the main orebody, and the shipments were selectively mined from a thin footwall band of malachite, azurite, and turquoise. The ore shipped from the L8B&D stopes, is, however, representative of the oxide ore in the main orebody.

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The Yuma orebody outcrops on the Carbonate No's. 1, 7, and 3 claims in the form of a nearly buried inconspicuous gossan, with a few masses of primary magnetite protruding. Oxidation and removal of much of the original mass of the ore by solution has evidently weakened the near-surface part of the orebody, resulting in slumping of the hangingwall and partial to complete covering of the outcrop by alluvium. The outcrop of the partially to completely silicated limestone in the areas where sulfide mineralization was of the disseminated type, however, are very conspicuous, especially to the west of the main orebody on Carbonate No. 1 and Strike 1 claims.

On Arizona No. 's 1 and 8 claims, a bold outcrop of massive primary magnetite from 10 to 30 ft. thick and nearly 1,000 ft. long strikes N60°W and dips 25°N. The magnetite contains about 0.5% to 1% copper, and about 0.1 oz. gold. The hangingwall of the magnetite bed, (a replacement of a limestone lens or bed), is highly altered schist with a little copper stain here and there. This favorable area has not been explored at all except for shallow open cuts on the magnetite outcrop. It is probable that the NE end of this outcrop is cut off by or terminates against a NW trending major fault. The SW end of the outcrop is covered by alluvium, and may extend some distance to the SW under this cover.

On the Arizona No. 2 and 3; and the Fran and Lita claims, another favorable area, (or possibly intense alteration of the hangingwall of the possible orebody associated with the massive magnetite outcrop), has not been explored at all. Abundant gypsum, some copper stain, and intense alteration indicate the former presence of sulfides and sulfide copper minerals.

Other areas of alteration and probable mineralization exist both to the southeast and southwest of the Yuma Copper group of claims, parts of which are within the Yellow Bird and Kate Waters groups of claims.

Where outcropping, the later granitic rock of the Harcuvar range does not appear to be mineralized. It is possible, however, that a buried tongue or cupola of this quartz-monzonite may exist at shallow depth beneath the altered metamorphics, and may be mineralized. The structure of the metamorphic rocks, as seen from the air, indicate a doming with the center roughly in Sec. 36, R15W, and Sec. 31, R14W, about midway between the Yuma Copper and Yellow Bird groups of claims.

No detailed geological mapping has been done anywhere in the area to date, however; the only available geology being that shown on the extremely generalized and somewhat inaccurate Geologic Map of Yuma County, published by the Arizona Bureau of Mines, (1960).

The closest known copper deposit of former consequence, to the Yuma properties, is the Swansea, about 20 miles airline to the northwest of the Yuma. This mine is in formations almost identical with those at the Yuma; mineralization is comparable except that the primary iron oxide is specular hematite instead of magnetite; and the type of ore is similar. The Swansea orebody outcrops as an inconspicuous gossan, below which was a leached semi-sulfide zone similar to that in the Yuma orebody. Below the leached zone very high-grade chalcocite and covellite ore was mined, together with primary ore averaging about 4% copper. Due to its proximity to the Bill Williams river, the water flow in the Swansea was very great, and the ground was very heavy, necessitating close timbering.

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PRESENT ORE RESERVES.

Factors upon which ore reserve estimates are based:

1) Sampling methods and accuracy of assays:

The former operators shipped the muck from development headings and stopes to custom smelters without sorting. The location of each car-lot shipment is known from existing progress maps keyed to shipments by smelter and/or shippers lot or car number. Original smelter settlement sheets for each shipment are in the files of Crawford & King, together with the maps and reports upon former sampling by channel methods. Check sampling by C. R. King over the areas from which shipments were made check the smelter settlement assays closely; as do channel samples taken by other engineers whose reports are available. The car-lot assays of muck shipped from headings and stopes are therefor taken as accurate and representative of the areas penetrated by the workings; and channel sampling results are used where car-lot assays are not available, in determination of average grade. All channel samples taken by C. R. King, (and most of the assaying shown in former reports of sampling), were assayed by Arizona Assay Office, Mr. Chas. Diehl, Phoenix, Ariz. In the case of channel samples taken by C. R. King, composites of samples by localities or levels were made, and these composites sent to Hawley & Hawley, Umpire Assayers, Douglas, Ariz. These composite assays checked the calculated average of Mr. Diehl's individual sample assays closely. All channel samples were cut as nearly at right angles to the bedding and dip of the ore as possible, from back to floor of the workings, and the weight of sample per foot of channel averaged about 3 lbs.

2) Within the mineralized zone constituting the orebody classed as sulfide, (responds to normal flotation concentration), from slightly above the 165 level to slightly below the 450 level, (deepest level in the mine), alteration and mineralization is remarkably uniform wherever penetrated by mine workings. Texture and assays do not deviate widely from the average; minimum copper assay being on the order of 0.7% and maximum about 3.0%. On the 415 level, in the Gloryhole stope, copper assays are slightly higher near the hangingwall of the ore zone, but this is the only place in the mine where the hangingwall is opened by present workings. In view of the so-far demonstrated size of the ore zone, and the uniformity of the assays throughout this zone, it is assumed for purposes of ore reserve estimates that the average assays as determined by drifts and a drill hole near the footwall of the orebody will hold for the entire thickness of the orebody over the distance sampled near the footwall.

3) Laboratory metallurgical testing upon composite samples from the 165 and 415 levels by the Arizona Bureau of Mines indicate that "the values will concentrate well by flotation". Bench testing by King & King upon composite samples of the ore from these levels checks this observation, and, upon an ore assaying 1.6% Cu, 0.03 oz. Au and 0.3 oz. Ag, resulting in a recovery of 91% of the copper, and 68% of the gold and the silver, in a concentrate assaying 23% Cu, 0.3 oz. Au and 3.0 oz. Ag, with a ratio of concentration of about 16 into 1. Ore from an arbitrary point 40 ft. above the 165 level to a point 50 ft. below the 450 level is therefor considered amenable to standard flotation procedure and is classed as sulfide ore reserve. Ore above a point 40 ft. above the 165 level is classed as oxide

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ore not amenable to standard flotation concentration, for purposes of estimation of ore reserves.

4) In estimating the average grade of ore from data consisting of smelter settlement assays on car-lot shipments; and channel sample assays; each in different areas; the average assays are weighted in calculating combined averages, in proportion to the tonnage represented by the individual groups of samples. Where car-lot assays are weighted with channel samples, the average of the channel samples is weighted with the car-lot samples by assuming that the channel samples represent six tons of ore per lineal foot of drift so sampled. For example, if 100 ft. of drift averages 1.5% Cu by channel sampling, and 1,000 tons of ore shipped from 160 ft. of drift averages 1.6% Cu from smelter settlements, then the average copper assay of the 260 ft. of drift would be: $600 \times 1.5 + 1000 \times 1.6 / 1600$, or: $2500 / 1600 = 1.565\%$ Cu average for 260 ft. of drift.

5) The specific gravity of the ore, as determined upon representative samples, is 3.1. Allowing an experience factor for voids, a specific gravity, (bulk density), of ore in place of 2.75 is used in ore reserve calculations, ie. - a factor of 12 cu. ft. of ore in place per ton is used.

6) The presence of post-mineral unmineralized dikes within the orebody will affect grade and/or tonnage calculations if not allowed for. Almost all of these dikes would be left as pillars in mining, but some of them would necessarily be mined with the ore. For purposes of ore reserve calculations, a factor of 10% of cubicated tonnage has been deducted for dikes left as pillars, and a factor of 10% of the average copper assay is deducted to allow for dilution due to those dikes mined.

7) Possible secondary enrichment in the ore reserve below the 450 level classed as probable ore cannot be taken into account until the presence and grade of this ore is demonstrated by drilling, at least. Grade of probable ore is therefor assumed to be that shown on the lowest, (450), level, ie. - 2% Cu.

OXIDE ORE RESERVES.

Exploration to date is insufficient to class any oxide ore as proved reserves, especially since metallurgical testing has not progressed to the point of showing a treatment procedure that will result in a profit upon this class of ore.

Indicated and inferred oxide reserves are on the order of a million tons at a probable grade of 1.5% Cu, 0.035 oz. Au, and 0.25 oz. Ag.

SULFIDE ORE RESERVES.

Ore classed as sulfide, (responding to normal flotation concentration), is that extending from a point 40 ft. above the 165 level to a point 50 ft. below the 450 level. Ore between these points, over the length of the orebody, is considered to be proved ore, (see Map No. 2: Yuma Mine, Plan & Section).

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From Map No. 2, the plan area of the sulfide orebody on the 415 level is 51,200 sq. ft., which, at 12 cu. ft. per ton, gives 4,300 tons per foot of depth, in round numbers. The vertical depth allowed in Block A is 160 ft.; or a total of 688,000 tons is indicated in this block.

Using the sectional area of 24,000 sq. ft.; or 2,000 tons per foot of orebody length, over the allowed length of 400 ft., gives a total of 800,000 tons in Block A.

From the above, the total gross tonnage in Block A is assumed to be 700,000 tons in round numbers.

Deducting 10% for dikes not mined, and an additional 15% for pillars and horses of low-grade not mined, 525,000 tons of ore is indicated in Block A; say 500,000 tons of reasonably assured or proved ore.

The estimated average grade of the 500,000 tons in Block A is calculated as follows, using the factors explained on Page 10 & 11 :

Location of sampling & type	Weighting			
	Factor	% Cu	oz. Au	oz. Ag
Gloryhole stope, carlot shipped.	2.00	1.652	0.027	0.30
165E Stope, carlots shipped	0.39	2.790	0.027	0.30
165 drift muck, carlots shipped	2.00	1.657	0.022	0.23
165 level, channel samples	0.45	1.110	0.033	0.17
415 level, drift muck shipped	1.30	1.395	0.030	0.20
415 level, channel samples	1.00	1.150	0.030	0.20
<u>Weighted averages:</u>	----	<u>1.572</u>	<u>0.0287</u>	<u>-0.24</u>

Total estimated proved sulfide ore is then:

500,000 tons @ 1.572% Cu; 0.0287 oz. Au, and 0.24 oz. Ag per ton.

Estimated probable sulfide ore: Block B, Map No. 2):

This block is assigned to the area deeper than 50 ft. below the 450 level. There is no reason to suppose that the orebody will change in size or developed length for a distance of at least 150 ft. in depth below the assumed bottom of Block A. This assumption results in:

500,000 tons of probable ore at the same grade as the proved ore.

SUMMARY OF ORE RESERVES.

Oxide ore:

Inferred oxide ore: 1,000,000 tons @ 1.5% Cu; 0.035 oz. Au, 0.25 oz. Ag.

Sulfide ore:

Proved: 500,000 tons @ 1.572% Cu; 0.0287 oz. Au, 0.24 oz. Ag.

Probable: 500,000 tons @ 1.6% Cu; 0.03 oz. Au, 0.3 oz. Ag.

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ORE TREATMENT AND MARKETING.

At the present stage in exploration of the Yuma orebody, estimates of costs, methods of treatment and marketing, and returns from sale of products are intelligent guesses. The following is included in this report to show possibilities and probable results, contingent upon further exploration proving the assumptions below.

Assumptions:

- 1) The average price of copper, (E. & M. J. Conn. Valley quote), will be 30¢ per pound during the life of the mine; relative to the present price index.
- 2) The minimum practical scale of operation is 500 tons per day, or 150,000 tons ore mined and treated per year.
- 3) The minimum life of the mine will be 15 years, and capital investment will be amortized over this life.
- 4) Beneficiation will be standard flotation procedure and concentrate will be shipped to custom smelters; ie. - only sulfide ore will be mined, and oxide ore will not be considered at this time.
- 5) Grade of ore mined and treated will average 2% Cu, 0.03 oz. Au, and 0.3 oz. Ag per ton; and a recovery in concentrate of 90% of the Cu and 70% of the precious metals will be made, at a 14 to 1 ratio, in a concentrate assaying 25% Cu, 0.29 oz. Au, and 2.9 oz. Ag.
- 6) The following costs will be attained:

Mining, delivered to mill:	\$2.00 per ton ore.
Milling, conc. on car at McVay:	\$1.50 per ton ore.
All overhead, ins., local taxes:	\$0.75 per ton ore.
- 7) The following capital investment will be required, and will be amortized in 15 years:

Exploration & development:	\$ 250,000.
Mine a/c, production development:	\$ 500,000.
Mill & surface plant, 500 T/day:	\$ 750,000.
Contingency & operating capital:	\$ 500,000.
Total capital requirement:	\$2,000,000.

Results:

A) A minimum proved ore tonnage of 2,250,000 is required to satisfy the assumption of minimum milling rate of 150,000 tons per year for 15 years. This is about 4.5 times the present proved reserve; or about twice the present proved and probable reserve. The odds are good that exploration will prove the required tonnage, as a minimum.

B) Using the present A. S. & R. buying schedule for copper concentrate, and the above assumption (5) recovery and concentrate grade, the concentrate produced will be worth about \$122 per ton net at McVay siding, at 30¢ copper; or about \$8.80 per ton of ore mined and treated.

C) A profit & loss estimate of working a 2,250,000 ton orebody under the above assumptions and results is:

Total cost per ton:	\$4.25 plus \$2.00 capital charge, or :	\$6.25 per ton.
Net sales receipts, at McVay siding, (at mill):		\$8.80 per ton.
Net profit before corporate taxes:		\$2.55 per ton.

Total profit on the minimum orebody before corporate taxes: \$5,737,500; or, allowing 40% federal taxes, a net profit on the venture of \$3,400,000 in round numbers is indicated.

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A second possibility, again contingent upon the results of further exploration, is the direct production of cement copper or cathode copper from both oxide and sulfide ore at or near the mine. Preliminary research shows that the oxide ore can be leached using sulfurous and/or sulfuric acid. A recovery on the order of 80% or better of the copper can be attained by desliming followed by vat leaching; but the acid consumption is on the order of 150 to 200 lbs. per ton of ore.

If, instead of dropping pyrite in the sulfide flotation mill, a bulk sulfide concentrate is made, copper and precious metal recovery would undoubtedly be raised appreciably. The sulfide concentrate would then be calcined in a fluosolids roaster, producing strong SO₂ gas and high-copper calcine. The SO₂ gas would supply all acid requirements for leaching both oxide ore and concentrate calcine, at a very low cost for this acid. The pregnant leach solutions would then be purified and electrolytic cathode copper produced for sale in western markets; or if more economical, cement copper would be produced for sale to refiners or smelters.

The total capital investment might be about doubled over that required by normal milling and sale of concentrate to smelters; but the overall recovery of copper from the oxide plus sulfide orebodies would be more than doubled; and the net price received per pound of copper might be appreciably higher; with an ultimate net profit on the venture on the order of \$10,000,000 instead of perhaps \$3.5 million.

RECOMMENDED EXPLORATION.

At the present time, the immediate objective of an exploration program is to delineate the Yuma orebody in depth and to the east of present workings; and to find possible orebodies in the walls of the presently known orebody.

A secondary objective is to explore other areas within and near the properties for other orebodies, by geophysical means and drilling from the surface.

To explore and block out the Yuma orebody will cost about \$200,000, and require about three years, using a small but optimum crew; as follows:

- | | |
|---|------------|
| 1) Complete preparation to work on the 415 level: | \$ 10,000. |
| 2) Drive HW Xcut 400' N from sta. L33; 415 level: | \$ 12,000. |
| 3) Drill 5 dd. holes from face of Xcut, avg. 500' per hole: | \$ 15,000. |
| 4) Extend face of 415 level east, 500 ft. : | \$ 15,000. |
| 5) Extend 125 level 800 ft. east, (to extended face 415 level): | \$ 24,000. |
| 6) Run 4- raises, 415 level to 125 level: | \$ 48,000. |
| 7) Block ore by close drilling, HW to FW, 5000 ft. of drilling: | \$ 25,000. |
| 8) Deepen east shaft 300 ft. @ 30° incline: | \$ 21,000. |
| 9) Open level from shaft bottom @ el. 1700'; 500' drifting: | \$ 20,000. |

Total cost estimated to explore to el. 1700' & coord. 3000E: \$190,000.
(See maps No. 2 & 5).

The above program will explore and block out the Yuma orebody laterally and in depth over twice the present strike length explored and about twice the present depth. The drilling from the hangingwall crosscut from the 415 level will prove the existence and grade of primary ore and show whether or not appreciable secondary enrichment occurs.

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The probable cost of exploring the areas near the Yuma orebody for other orebodies by geophysical means and by drilling from the surface is estimated as follows:

- | | |
|--|------------|
| 1) Mapping: ground control & aerial, plus geology: | \$ 20,000. |
| 2) Aerial & ground mag. and electromag. surveys: | \$ 25,000. |
| 3) Drilling anomalies found, 10,000 ft. drilling: | \$ 80,000. |

Total preliminary exploration of nearby areas: \$125,000.

The above work would be completed within the three year period estimated as required to explore the main Yuma orebody; no additional time need be required.

Summary of recommended exploration:

1) To explore, block out, and sample the Yuma orebody over a strike length of 1000 ft. and a dip-slope depth of between 700 and 800 ft.; and to prove the existence and grade of primary and/or secondary ore; is estimated to cost about \$200,000 and to require about 3 years to accomplish.

2) To prove the existence of other orebodies upon and near the properties is estimated to cost about \$125,000; but would not necessarily require more time than the three year program outlined above.

3) The probability is strong that the exploration of the Yuma orebody will prove a minimum of 3 to 5 million tons of sulfide ore of an average grade of not less than 3% copper and about \$1.00 per ton in precious metals; if primary ore of expected grade occurs. If appreciable secondary enrichment is found, as seems probable, the average grade may be much higher.

4) The odds are good that geophysical exploration of the nearby areas will find other orebodies comparable to the Yuma; and a possibility exists that mineralization will be found under the alluvial cover to the northwest of the properties.



Clarence R. King

Sept. 1, 1960.

This report consists of:

16- typewritten pages.

5- maps.

3- pages of typewritten appendices.

KING & KING

MINING ENGINEERS

APPENDIX No. 1

INVENTORY OF MACHINERY & EQUIPMENT, as of Sept. 1, 1960.

No.	Item	Fair replacement value.
1 -	Frame house, 28'x16', 2-rm. & bath, good cond.:	\$ 2,500.
	Household furn., inc. Servel ref., butane range, heat. stove:	\$ 500.
1 -	Frame hse., 12'x20', poor cond. ex. roof & walls, no furn.:	\$ 500.
1 -	Change room & shower, w/steel lockers: 12'x20': frame	\$ 800.
1 -	Shop, generator-compressor house, 16'x40', frame & galv. rf.:	\$ 800.
1 -	House trailer, modern, 26', elec. ref., butane rng.:	\$ 1,500.
1 -	100 ton ore bin, serviceable:	\$ 800.
4 -	20cu. ft. roller bearing mine cars, good cond.:	\$ 600.
3 -	18cu. ft. mine cars, fair cond.:	\$ 150.
6 -	40cu. ft. roller bearing Granby type mine cars, 30" ga., good:	\$ 1,200.
1 -	4000# rope pull @ 250 ft./min. mine hoist, w/30 h.p. 440v. 60 cy. hoist motor; accessories & 500 ft. 3/4" new cable:	\$ 1,000.
1 -	Hendy, 10,000# rope pull @ 300 ft./min. mine hoist, w/60h.p., 440v. hoist motor, accessories & 1000 ft. new 3/4" cable:	\$ 2,500.
1 -	New 50cu. ft. skip & 1 - 18cu. ft. skip, fair cond.:	\$ 600.
1 -	5 K.W. diesel-generator, light plant, 110v., 60 cy., new:	\$ 800.
1 -	75 KW Buda diesel-driven generator plant, 440v., 60cy. a.c., w/ switchboard equip. & accessories:	\$ 5,000.
1 -	D.C. motor generator set, 20hp. 440v. drive motor, loco. bat. charging set: w/ switchboard & accessories:	\$ 800.
1 -	365 ft. I. R. skid-mounted compressor, driven by G. M. diesel:	\$ 3,500.
1 -	D. G., 18" ga. mucking machine:	\$ 1,500.
1 -	I. R. slusher, w/ bucket, snatch blocks & access.:	\$ 1,000.
1 -	Joy diamond drill, w/ 300 ft. E rod & accessories, inc. bits & core barrels:	\$ 1,500.
1 -	Baldwin 30" ga. battery locomotive, wt. 5 tons:	\$ 3,500.
1 -	F. M., 2 stage cent. mine pump, dir. con. 40h.p. -440v. motor:	\$ 800.
1 -	I. R., 2 stage cent. mine pump, dir. con. 15h.p., 440v. motor:	\$ 500.
1 -	Copco stoper, new, & 1 - G. D. stoper, bad cond.:	\$ 1,000.
2 -	I. R. 38 jackhammers, w/air legs, fair cond.:	\$ 500.
2 -	3" Cameron sinking pumps & 1 - F. M. 2-st. 40h.p. motor pump, poor conditions or junk:	\$ 300.
	Misc. not installed motors & electrical equipment:	\$ 1,500.
22 -	Tons, 25# mine rail, part installed, part in stock:	\$ 3,960.
	800-lineal ft. misc. 12-14 & 20# rail installed in mine:	\$ 200.
	1400-ft., 3" air pipe, installed in mine:	\$ 420.
	500-ft., 3" & 4" welded pump column, installed in mine:	\$ 250.
	2000-ft., 3/4" & 1/2" water pipe, installed in mine:	\$ 200.
	1 - 3'x6' & 1 - 4'x6' air receivers, installed in mine:	\$ 500.
	1500-ft., No. 2 cable, 3-conductor armored elec. cable, ins. in mine:	\$ 1,000.
	2 - 1000 gal., 1-500 gal., & 1-300 gal. steel tanks, water & fuel:	\$ 500.
	Misc. equipment: gas & elec. welders, & small tools:	\$ 2,000.
Total fair replacement value, not inc. frt. & instal. charges:		\$44,680.

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MINING ENGINEERS

APPENDIX No. 2.

COPY

Log of Diamond Drill Hole No. 5: total 176 ft. @ plus 15°.

This hole located at east end of lowest level above water level, (see map).

Footage from	to	Core	Remarks	Assay, % Cu	
				core	sludge
0	10	none	sandy sulfide, set collar pipe	---	N. S.
10	20	washers	sandy sulfide, very soft	---	1.8
20	30	good	soft sulfide, dike last foot	----	0.7
30	40	good	mixed dike and sulfide	----	0.4
40	50	poor	mixed dike & sulf. -lost circulation	----	N. S.
50	60	none	very soft sandy sulfide, a little dike	----	2.3
60	70	washers	soft sulfide, some hard ribs	----	2.6
70	80	good	mostly dike rock	---	0.1
80	90	none	very soft sandy sulfide, black	---	3.4
90	100	none	very soft sulfide, poor circulation	---	2.7
100	110	none	very soft sulfide, poor circulation	---	1.2
110	120	washers	soft sulfide & hard ribs, stuck bit	---	1.8
120	130	washers	sandy sulfide, dike @ 129'	---	0.9
130	140	some	mostly dike, some sulfide	---	0.3
140	150	none	sandy sulfide, poor circulation	---	2.1
150	160	washers	sandy sulfide, hard ribs, poor circ.	---	2.4
160	170	washers	sandy sulfide, hard ribs, poor circ.	---	N. S.
170	176	some	sulfide & dike bottom hole, stuck bit	---	N. S.

Note: The above copied from log attached to a report, (undated) by George Spry. This hole is shown on a map prepared by L. L. Farnham in July, 1948, with rock log about as above. No assays are given on the map, however, but the assays appear as copied in the report by Spry. Drillers name is not given.

There appear on the map by Farnham two other drill holes, with no other available data except that shown on the map. A map by C. S. Coupal shows five drill holes, but no sampling data is available. These five holes may be identified in the mine as of Aug. 1st, 1956.

C. R. King

APPENDIX NO. 3. (Copy)

EXAMINATION • EVALUATION • PLANT DESIGN • MANAGEMENT

KING & KING

MINING ENGINEERS

CLARENCE E. KING
7648 BOLSA RD.
MIDWAY CITY, CALIF.
WESTMINSTER 8272

DAN M. KING
11762 MINES BLVD.
WHITTIER, CALIF.
OXFORD 44361

LABORATORY CERTIFICATE ORE-DRESSING LABORATORY 7648 BOLSA RD., MIDWAY CITY, CALIF.

Lab. No.: 2621

Date: June 5, 1956

Sample: Yuma Copper ore

Marked:
Composite, 415 Level

Submitted by:

Minerals Corporation of America,
P.O. Box 1297,
Grand Junction, Colo.

Procedure & Reagents

Point of addition	Time, min.	% solids	pH	Pounds per ton, reagents used			Remarks
				CaO	Z-5	MIT	
1 mill	18	60	10.5	5.0	- - -	- - -	0.5% plus 100 mesh
Conditioned	10	25	10.5	5.0	0.1	- - -	
Rougher flot.	10	25	10.0	- -	0.4	0.05	Try more collector
Cleaner flot.	5	10	10.5	3.0	0.05	0.05	Brittle froth

Test was six unit locked test: cleaner tail returned to next rougher flot. Cleaner concentrate combined; final cleaner tail added to combined conc. and combined final tail, 50% to each. A pyrite conc. was not pulled; this could have been done by acidifying after rougher copper flot. and using more collector.

Metallurgical Results.

Product	Tons per 100 tons heads	Assays - -		Content, % of Total - - - -			
		%Cu	Oz. Au	Content, Oz. Ag	% of Total Cu	Au	Ag
Heads	100.0	1.60	0.030	0.300	100.00	100.00	100.00
Concentrate	6.3	23.15	0.340	3.30	91.2	68.8	68.8
Tailing	93.7	0.15	0.005	0.10	8.8	31.2	31.2

Summary: By standard copper flotation practice, using lime to depress pyrite, a 91% recovery of copper can be made with a ratio of concentration about 16 into 1. Recoveries of gold and silver could probably be improved only by pulling a pyrite concentrate of probable doubtful market value for anything other than sulphur and iron. Further tests should be run on copper flot. tailing to

(a) pull a pyrite concentrate for analysis, especially as to tin content; and
(b) research into the possibility of recovering a tungsten concentrate by either flotation or gravity methods.

This certificate is a part of the specific investigation to which it is attached, and the data herein presented bear only upon the specific recommendations made in the report to which this sheet is attached. The data herein are not intended for use in advertising or publicity matter except with our written approval and as part of a complete report.

COORDINATES

Core Recovery	Structure	Alteration	Mineralization	Rock Type	DEPTH	BEARING	INCLINATION	SCALE	STARTED	COMPLETED
					400					
					950					
					1000					
					1050					
					1100					
					T.D. 1120'					

400 QUARTZITE (as above) some late
gypsum veinlets.

- TACTITE (918-997) magnetite, qtz, sericite,
garnet, anhydrite, gyp.
- FAULT (937-940) @ 20° C.A. on H.W., 70°
C.A. on F.W.

950 MIXED ROCK: sheared, mixed slivers + frags
of TACTITE, qtzite, marble + gyp (957-961)

1 1/2 % total sulfides, cp + py.

DIABASE DIKE (986-997)

1000

sheared TACTITE (997-1018) magnetite

MARBLE (1018-1052) massive, banded
rotated 70-80° to C.A.

1050

Quartz-Chlorite SCHIST w/ minor diss. sulfides, some
qtz augen. < 1/2 % sulfides

1100

T.D. 1120'

CORE ASSAYS

INTERVAL		MINERAL		
FROM	TO	Cu %	Mo %	Au %
910	918	0.24	0.26	0.01
918	925	0.04	0.30	0.00
925	926	0.00		
926	933	0.52	0.25	0.01
933	941	0.70	0.07	0.01
941	951	0.50	0.52	0.01
951	957	0.40	0.09	0.01
957	961	0.55	0.19	0.05
961	971	0.50	0.19	0.05
971	977	0.80	0.43	0.05
977	985	0.83	0.20	0.05
987	1006	0.50	0.02	0.05
1012	1018	0.50	0.03	0.05
1018	1028	0.33	0.01	0.05
1028	1035	0.11	0.07	0.01

ALTERATION

SERICITE	910	918	0.24	0.06	0.01	0.01
ANHYDRITE	918	925	0.04	0.03	0.00	0.22
MARBLE	925	926	0.00	0.00	0.00	0.00
CHLORITE	926	933	0.02	0.00	0.01	0.00
GARNET	933	941	0.71	0.017	0.01	0.16
SERPENTINE	941	951	0.01	0.02	0.01	0.13
EPIDOTE	951	957	0.00	0.00	0.01	0.19
	957	961	0.00	0.00	0.00	0.10

MINERALIZATION

PYRITE	971	971	0.00	0.043	0.015	0.21
CHALCOPYRITE	971	977	0.00	0.020	0.015	0.13
CHALCOPRITE	977	985	0.00	0.020	0.015	0.13
MOLYBDENITE	997	1006	0.00	0.002	0.015	0.10
MAGNETITE	1012	1018	0.00	0.013	0.015	0.17
GALENA	1018	1028	0.00	0.011	0.015	0.10
SPICULITE	1028	1033	0.00	0.007	0.01	0.05
SPLICULARITE						
EPIDOTE						
QUARTZ						

YIN-HO-THE PROPERTY, YIN-HO COUNTY, MICHIGAN
Drill Hole No. 70-1

	Feet	Sec	ft.	
826	.....	2.72	10.85	
	1	0	0	(dike)
.....	7	.56	1.07	
832	2	0	0	(dike)
	5	.07	.15	
	4	0	0	(dike)
.....	5	.31	1.70	
854	5	.23	1.15	
	6	0	0	(dike)
	6	.16	.86	
	4	.44	1.76	
	11	.11	1.21	
	10	.26	2.66	
	11	.12	1.32	
	3	0	0	(dike)
.....	8	.24	1.92	
918	7	.64	4.48	
	1	0	0	(dike)
	7	.52	3.64	
	8	.71	5.68	
	10	.52	5.20	
	6	.60	3.60	
	4	.33	1.32	
	10	.56	5.60	
	6	.30	1.80	
	9	.83	7.47	
	11	0	0	(dike)
	9	.50	4.50	
	6	0	0	(dike)
.....	6	.80	3.00	
1012	10	.32	3.20	
	5	.11	.55	
1013	.....		
	207 ft.		33.01 ft.	

$$\frac{14.70}{17} \quad 12' = 1.47 \text{ Cu}$$

9' true thickness

$$\frac{12.97}{86} \quad 60' = 0.151 \text{ Cu}$$

60' true thickness

$$\frac{14.26}{145} \quad 100' = 0.193 \text{ Cu}$$

75' true thickness

$$\frac{3.46}{14} \quad 15' = 0.231 \text{ Cu}$$

11' true thickness

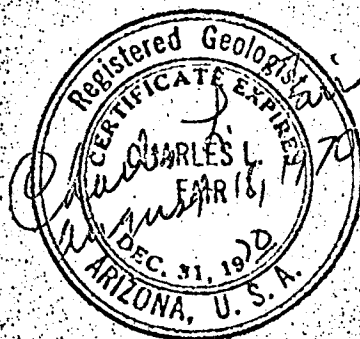
$$\frac{33.01}{207} \quad 207' = 0.160 \text{ Cu}$$

165' true thickness

GEOLOGIC EVALUATION
YUMA MINE
YUMA COUNTY, ARIZONA

by
Charles L. Fair
Geologist

Kinnair Associates
Tucson, Arizona



July, 1970

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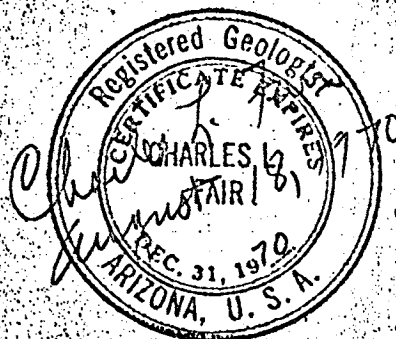
LIST OF ILLUSTRATIONS

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1. Surface Geology	End of Text
2. 125 Level, 1" to 1000'	End of Text
3. 139, 165, & 172 Levels, 1" to 1000'	End of Text
4. 415 Level, 1" to 1000'	End of Text
5. 125-139 Levels, 1" to 20'	In Pocket
6. 165-172 Levels, 1" to 20'	In Pocket
7. 415 Level, 1" to 20'	In Pocket



SUMMARY AND CONCLUSIONS

Mineralization at the Yuma Mine is concentrated along a major shear zone -- probably a thrust fault -- which on average strikes N. 70 W. and dips 30°N.E. Individual ore bodies are localized by porosity created by drag folding, faulting, and to a lesser extent, primary sedimentary deposition. The host rocks are schist and marble which, near the north end of the range, are intruded by Laramide granitic rocks.

About 3550 feet of underground workings are present on four principal levels. Slightly over 100,000 tons are estimated to have been removed in the past, with an average grade of between 1.5% and 2.0% Cu. Estimates of remaining tonnage at this grade are:

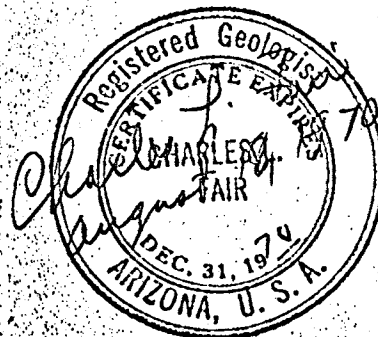
Probable ore . . .	555,000 tons
Possible ore . . .	665,920
Projected ore . . .	460,525
Total	<u>1,681,445 tons</u>

A recommended program to firm up these projections and increase the Probable Ore category would consist of the following:

1. Underground drifting and crosscutting, 2180 feet . . \$65,400 (est.cost)
2. Underground drilling, 2250 feet 27,000
3. Bulk and channel sampling 2,000
4. Surface drilling, 1000' 16,500
- Total \$110,900 (est.cost)

Further exploration in the Granite Wash Mountains, surrounding the Yuma Mine, is also recommended. This would consist of three steps, each one week in duration:

a) field check of other magnetic high areas, b) mapping of the thrust fault for one mile east and west of the Yuma mine, and c) reconnaissance mapping of the remainder of the mountain range. Total cost is estimated at \$5745.



INTRODUCTION

This examination was conducted at the request of Mr. William Trethewey, Primer Group Minerals, Ltd., Vancouver, B.C., Canada. Local contact was with Mr. Jerome Willis, Alaska Metal Mines, Tucson, Arizona. The purpose of the investigation was to compile geologic data on the old Yuma Mine to be used as a part of the consideration in a merger agreement between these two companies. It was specified by the clients that this examination should concentrate primarily on the geologic character of the deposit, in particular its size and shape, and that metallurgical and mining estimates would be prepared primarily by others, using this geologic report as a base.

A one day preliminary examination was made by the author, accompanied by John E. Kinnison, on June 12, 1970. This was followed by four days devoted to mapping, assisted by Peter I. Beery, on July 13-15, 17, 1970.

LOCATION AND PROPERTY DESCRIPTION

The Yuma Mine is located approximately nine airline miles northwest of the town of Salome, Arizona, in the Granite Wash Mountains (see Figure 1). The area is unsurveyed, but the mine is situated approximately in the northeast corner of section 30, T.6N., R.14W. It is reached by driving west from Salome on U.S. Highway 50-70 to the Junction at Hope, Arizona, thence northwest on Arizona state highway 72 for approximately 9 miles to the railroad siding of McVay. From McVay a dirt road leads eastward into the Granite Wash Mountains for a distance of approximately 6 miles, ending at the Yuma Mine.

The mine workings are on two claims which are part of a block of 26 claims optioned by Alaska Metal Mines. Two other claim groups are also optioned, but these are not contiguous with the claim group under discussion, and form no part of this report.

The property is in the heart of the Granite Wash range, at approximately 2100 feet elevation. The area falls within the Basin and Range province, with climate and vegetation typical of southern Arizona: hot summers, with temperatures in excess of 100°F., and mild winters. Rainfall averages less than 8", and most of this falls during the rainy season in July and August.

PREVIOUS WORK

The general geology of the Granite Wash Mountains was studied by Eldred Wilson and published as part of the geologic map of Yuma County, Arizona, in 1960. Earlier, a reconnaissance description of the ore deposits of the Granite Wash range, including the Yuma Mine property, appeared in U.S.G.S. Bulletin 451, Reconnaissance of the Ore Deposits in North Yuma County, Arizona, by Bancroft in 1911.

There are a number of specific engineering evaluation reports on the property. Those available to the author include reports by Hillard (1928), Holt (1943), Pratt (1943), Spry (1948), Coupal (1950), McHugh (1957), and by King (1960, 1961, and 1962 (?)). These reports are listed in more detail in the Bibliography of this report.

There was production from the Yuma Mine during three periods: a) prior to 1920, b) during the early 1940's and c) in 1957-1958. Smelter settlement sheets for the 1957-1958 production were made available to the author. These shipments were from the 125 and 165 (315) levels, and totaled 8000 tons of approximately 1.7% copper.

GENERAL GEOLOGY

The geology of the Granite Wash Mountains, as shown on the geologic map of Yuma County, consists of a series of metamorphosed shales, sandstones, conglomerates and limestones, thought by Wilson to be Mesozoic in age. About one mile west of the Yuma Mine, he also shows a section of shale, quartzite, and limestone which he classifies as undivided Paleozoic and Mesozoic. He gives the general attitude of these sediments as N. 30° - 40°W. in strike, with dips of approximately 15°N.E. Bancroft described the metamorphosed sediments of the Granite Wash Mountains as follows:

"medium to fine grained quartz mica schist and arenaceous shales, intruded in an irregular manner by acidic and basic dikes which usually follow but occasionally cut directly across the plane of schistosity."

He says further, "The partial replacement of a ledge of yellow crystalline limestone by magnetite in the vicinity of the camp is the most conspicuous part of the section exposed on the property. This replacement, though not

entirely regular, is several feet thick and of considerable length. ...The replacement of the limestone by magnetite may be one of the results of the metamorphic action produced by the intrusion of the granite in this general vicinity."

The north end of the range is intruded by a series of granites and related crystalline rocks, which Wilson considers to be of Laramide age.

The general geologic setting, therefore, is encouraging: it consists of a section of metamorphosed sediments, now mostly schist and marble, which have been intruded by Laramide intrusive rocks. This is the general geologic setting of several major copper deposits in Arizona.

The surface geology in the mine area is shown on Plate 1. It consists of a thick section of schist, which appears originally to have been mostly sandstone with minor amounts of conglomerate and limestone. These beds strike N.45°-80°W. and dip on the average about 45°-50°N-NF. The section is cut by a series of faults, one being a northwest trending irregular shear zone which has acted as the major control of the mineralization. This shear is in turn cut by a series of northeast trending faults which probably are normal in character but may have some strike-slip movement. The structural blocks which are formed as a result of this faulting do not appear to have been rotated because the overall attitude of the schist is little affected. Local drag effects, however, are very noticeable underground in the vicinity of fault surfaces.

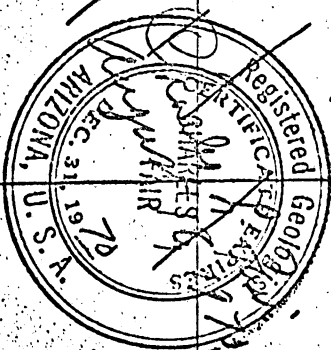
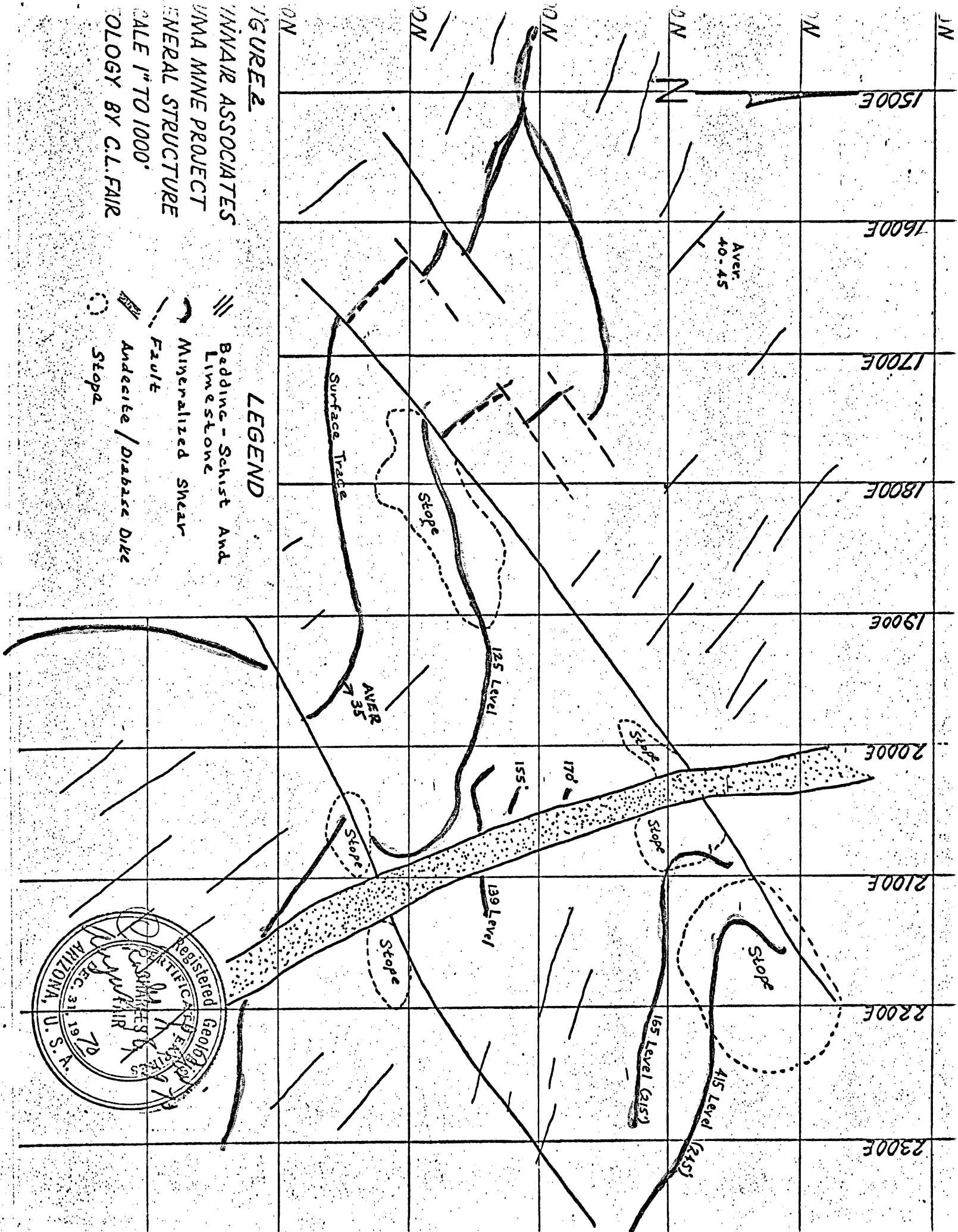
A number of northwest trending andesite or diabase dikes also occur. These apparently have entered along tension joints, because no observable offset can be seen on either side of these dikes. On the contrary, a number of structures, including the northeast faults, line up on either side of these dikes without deviation.

The shear zone along which the mineralization occurs, shown in red on Plate 1, is not only offset by later faulting but also has a sinuous character to its strike which suggests folding. This is best illustrated in Figure 2, which shows the trace of the shear zone in successive levels of the mine and portrays its character to best advantage. Structural attitudes of the non-mineralized schist, however, do not support the concept that the shear zone has been folded; its sinuous nature may be its original character, accentuated by drag folding along cross faults. In any event, as shown on Figure 2, the mineralized shear zone

FIGURE 2
 FAIR ASSOCIATES
 IMA MINE PROJECT
 GENERAL STRUCTURE
 SCALE 1" TO 1000'
 LOGGED BY C.L. FAIR

LEGEND

- Bedding - Schist And Limestone
- Mineralized Shear
- Fault
- Andesite / Diabase Dike
- Stop



forms a definite mapable unit, with sub-parallel traces appearing on successive levels. In areas away from drag folding it dips at an average of 30° from level to level. Because of its low dip, sinuous character, and--in many places--knife-like contact, this shear zone is here interpreted as a thrust fault. Supporting the thrust fault interpretation is the singular distribution of limestone, which outcrops at the surface beneath the shear zone in only one bed 15 to 20 feet thick, but which is found extensively underground, almost always, however, occurring in the lower plate beneath the shear zone.

MINERALIZATION

As described above, mineralization in the Yuma Mine is controlled by and concentrated primarily along a shear zone, interpreted to be a thrust fault. Primary mineralization consists of sulfides and magnetite, the sulfides being pyrite, chalcopyrite, and some bornite, with trace amounts of secondary covellite and chalcocite.

Although the shear zone forms the main controlling feature of the mineralization, higher grade pods are formed locally by increased porosity caused by cross faulting, drag folding, or by original coarse-grain bedding. Because of this the sectional shape of the mineralized zone taken in any plane is irregular, pinching and swelling along both strike and dip. This is illustrated by Figure 3 which is a generalized plan view of the mineralized zone on the 125, 165 and 415 levels and by Figure 4, which is a diagrammatic cross-section of the mineralized zone taken along a N45°E direction through the L6C, 165E, and Glory Hole stopes.

An "envelope" or zone of lower grade disseminated sulfides apparently occurs for an undetermined depth below the mineralized shear, in particular below higher-grade pods. This was noted on both the 172 and 415 levels. It is not known if this "envelope" is also present above the shear, although part of the 125 level penetrates this upper block. The grade of this "envelope", which resembles protore, is not known, but it may constitute a valuable addition to the observable tonnage which is present.

Because of variability in porosity along the shear zone and because the water table seems to have fluctuated over a wide range in elevation, as King suggests, oxidation of primary sulfides is not confined to a definite zone at a certain elevation, but on the contrary, penetrates into

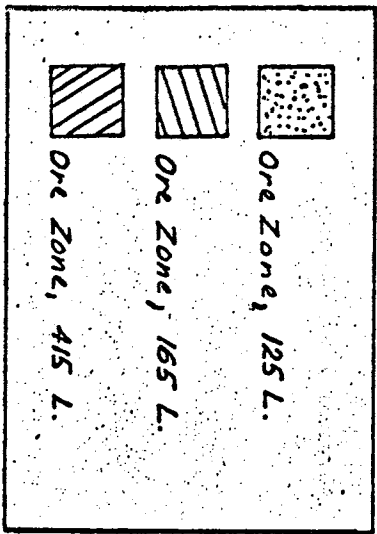
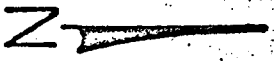
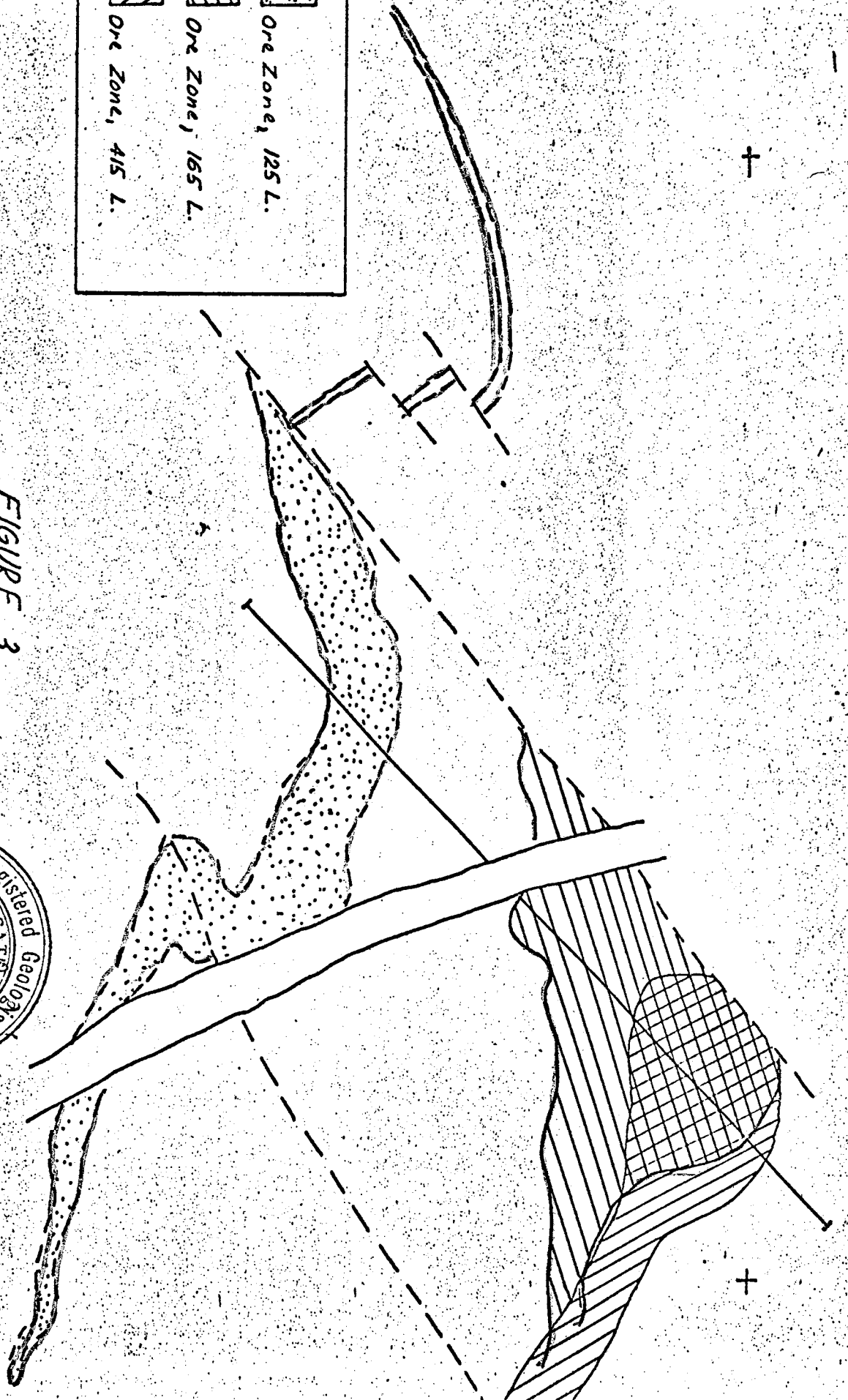


FIGURE 3
SHAPE OF ORE ZONE
YUMA MINE
SCALE APPROX. 1" TO 100'



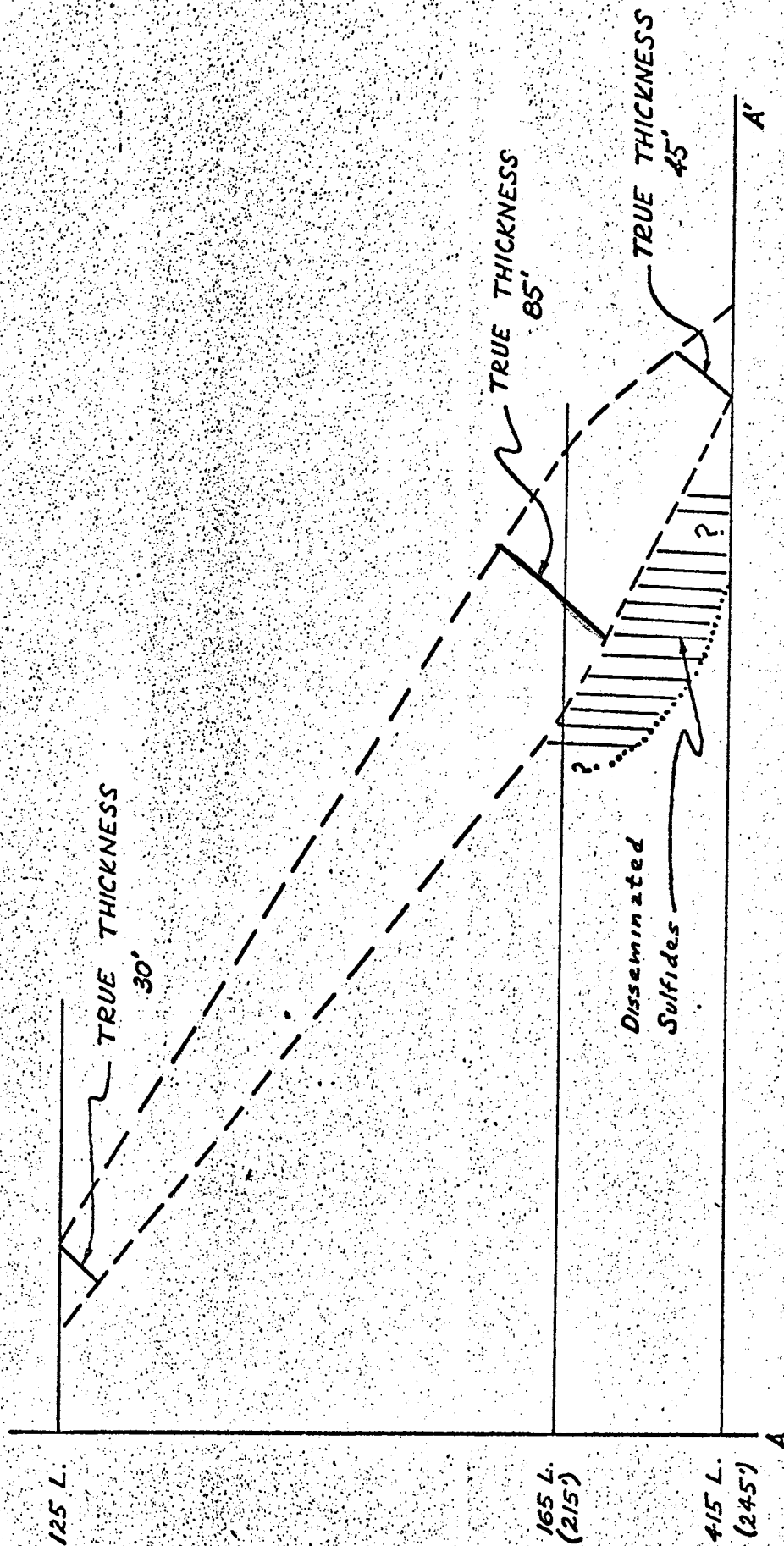


FIGURE 4
 DIAGRAMMATIC CROSS SECTION OF ORE BODY, LINE A-A'
 (NOT TO SCALE)



the lower levels in areas where porosity is great, creating a mineralized zone which in a vertical section exhibits interpenetrating fingers of sulfides and oxides. This condition is found in all levels of the mine, with some sulfides still present on the 125 level, especially near the Tres Amigos shaft, and some oxides present in the 415 level. The percentage of oxidized material decreases with depth, however, but is mixed enough in all levels to require that any mining and milling method which is used must treat both types of ore.

LEVEL DESCRIPTIONS

125-139 Levels, Plate 5. Beginning at the portal of the 125 level, approximately at coordinates 2900N, 1500E, the main mineralized shear zone can be traced for approximately 230 feet, to a point just beyond the cross cut at coordinates 2950N, 1750E. Throughout this distance, the drift coincides with the strike of the shear zone, beginning approximately N70E at the portal and curving to almost E-W at the crosscut, with a dip of 30° - 40° to the north. The shear zone itself ranges from a few inches in thickness at the portal to over 5 feet in thickness at the crosscut. Both hanging wall and footwall along this interval are in limestone, and outside on the surface the shear can be traced some 30 or 40 feet west of the portal, still in the limestone. One of the interesting features along this interval of the drift is the termination within the shear zone of small andesite dikes which cut through the footwall section, but do not continue into the hanging wall. This is illustrated by the andesite dike occurring at coordinate 2940N, 1610E, and by two small andesite dikes a few feet outside the portal on the surface. These dikes cut through the footwall or the bottom plate of the shear zone but do not cross the shear zone itself. The dike at 2940N, 1610E, actually spreads out along the shear zone in the back of the drift.

The shear zone in the interval between the portal and the cross cut consists of gouge which looks very much like sheared phyllite, heavily stained red with hematite, and containing some copper oxides and carbonates. Planar structure within the gouge zone looks very similar to bedding but it is interpreted to be structure created by fault movement. The limestone in the footwall is thin bedded, although coarsely recrystallized, and locally shows intense crumpling and flow folding which is probably drag folding caused by movement along the fault. Just beyond the crosscut the strike of the shear zone abruptly swings to almost

N.-S., dipping 30° E., and disappears into the south wall. Forty feet to the south in the crosscut, at coordinates 2900 N, 1750 E, in a small room on the west side of the crosscut, the shear zone is exposed again with an attitude conformable to that last seen in the main drift,--a north strike and a dip of 30° E. The remainder of the crosscut is mostly in schist with attitudes that are at right angles to that of the shear zone. From information obtained on the lower levels, discussed later in this section, two faults are inferred as passing through the crosscut. Both of these faults strike approximately N. 45° E. and are apparently vertical in dip. The first fault intersects the crosscut approximately 20 feet south of the main drift, and the second fault intersects the crosscut approximately 60 feet south of the main drift. These faults account for the apparent displacement of the shear zone in the small room halfway along the crosscut and also account for its non-appearance within the remainder of the crosscut.

The next 150 feet in the main part of the 125 level, from the crosscut almost to the entrance to the L6C stope, appears to be about half in schist and half in limestone. Only traces of hematite and copper oxides were seen in this interval.

The L6C stope represents mineralization which has spread into the bedding of the schist. It extends from coordinates 2775 N, 1750 E, to 2850 N, 1900 E, and has a maximum observable thickness of some 20-25 feet.

The shape of the shear zone as shown on Plate 5 suggests that the more intense mineralization at this point developed as a result of drag folding. It is probably due to higher porosity caused by the folding and small scale fracturing along a northeast vertical fault, projected from observations in lower levels and parallel to the two faults discussed above. Original or primary porosity in the schist may also be partly responsible for localization of ore in this area, because a rather thick section of the schist appears to be mineralized in an interval from the L6C stope east along the 125 level to the point where the 125 level splits into branches. The strike of the mineralized zone along this part of the level is roughly parallel to the 125 level itself--N. 70° W. A raise in the 125 level, marked R on Plate 5, at coordinates 2850 N, 1950 E, is reported by Larry Drake to penetrate 80 feet of mineralized rock. If this is the case, the mineralized zone would be at least 65 feet thick at this point. This seems somewhat high, however, since the widest horizontal mapped thickness within the L6C stope is about 70 feet, which would calculate to a true thickness of only 35 feet.

Further east within the 125 level, the J8B stope, at coordinates 2750N, 2050E, exhibits characteristics very similar to the L6C stope--a zone of crumpling which is thought to be drag folding along a northeast cross-fault. The present stope opening is approximately 20 feet high and the calculated thickness, based on width of the zone in plan view, is approximately 25 feet.

A large vertical andesite dike, one of the major structural features underground, strikes N.70W. and is located within the 125 level at coordinates 2810N, 2090E; 2770N, 2100E; and from 2700N, 2150E, to 2750N, 2100E. The dike is similar in composition to the andesite dikes previously described, except that its thickness has allowed a coarser texture to develop, being more truly a diabase than an andesite. This dike cuts both the shear zone and the country rock and is clearly one of the latest geological events within the mine. Attitudes of the shear zone on both sides of the diabase dike appear to be roughly parallel. There is no evidence of relative movement on either side of the dike.

The 139 level, only 14 feet vertically below the 125 level, is open only for a short distance on both sides of the West (inclined) Winze. Where accessible, it shows the downward continuation on one limb of the drag fold mapped on the 125 level.

165-172 Levels, Plate 6. The 165 (315) level, which in true vertical depth is 215 feet below the collar of the Tres Amigos shaft, is developed completely within the mineralized zone. Much of it, in fact, has been stoped out. The structure within the mineralized zone on the 165 level, which consists of planar shear structure and bedding within the schist, reflects in part the effect of drag folding along the northeast fault shown in coordinate block 3000N, 2000E, but away from the fault structural attitudes swing closer to the E.W. or slightly N.W. structure which is typical of the mineralized zone.

Mineralization on the 165 level is predominantly sulfides, with lenses and streaks of oxides intermixed. The thickness of the mineralized zone on this level is the maximum observable anywhere within the mine. The calculated true thickness, beginning at the diabase dike and running in a line northeast to the intersection of coordinate 3000N, 2100E, on the far side of the Glory Hole Stope, is 85 feet. (A horizontal distance of 180 feet with an average dip of 35°.)

In relation to the mineralized zone on the 165 level, the 172 level, which was driven west and northwest from coordinates 3000 N, 2000 E, is on the opposite side of two northeast trending faults. Because of the relative displacement of the shear zone along these faults the entire 172 level lies within the footwall or lower plate. Most of the 172 level is driven in limestone, with occasional traces of copper found in the walls.

415 Level, Plate 7. This level is 245 vertical feet below the collar of the Tres Amigos shaft. It is entered from the West (inclined) Winze at coordinates 3075 N, 2000 E. The first 30 feet in the drift penetrates diabase dike. Ten feet further there is both a north and a south crosscut leading from the main drift. These crosscuts are in non-mineralized limestone which strike northwest, with dips of from 25° to 40° to the northeast. These attitudes prevail through the entire length of the south crosscut and 50 feet into the north crosscut where one of the northeast faults is encountered. This fault zone is at least 5 feet wide. Bedding in the limestone shows drag effects along this fault. A small easterly crosscut at this point discloses a northwest trending andesite dike which crosses the northeast fault without any deviation.

Eastward from the crosscuts along the main drift, limonite and hematite staining increases in the limestone to a point past coordinate 2300 E. Twenty five feet beyond that point is another northeast fault, with the main mineralized shear developed in schist to the east. The shear shows drag effects along the northeast fault near the fault plane, but swings around to a N.W. to E.W. strike farther east in the drift as it did in the upper levels. From this point eastward to the end of the level, structural attitudes in the shear zone are generally parallel to the drift. Mineralization is predominantly sulfides throughout the 415 level.

One point of extreme interest was an area of finely disseminated sulfides in the footwall at the end of a crosscut leading from the 415 level to the East (inclined) Winze, at coordinates 2320 E, 3010 N. These disseminated sulfides were found in both the crosscut and the East Winze. They extended below the water level at this point, and as near as could be determined, they occur upward through the rock in a raise from the East Winze to the 165 level, a vertical distance of at least 30 feet. Overlying these disseminated sulfides is a calculated thickness in the main mineralized shear zone of approximately 45 feet. There is no way to tell if these combined thicknesses continue eastward on this level.

ORE CONTROLS

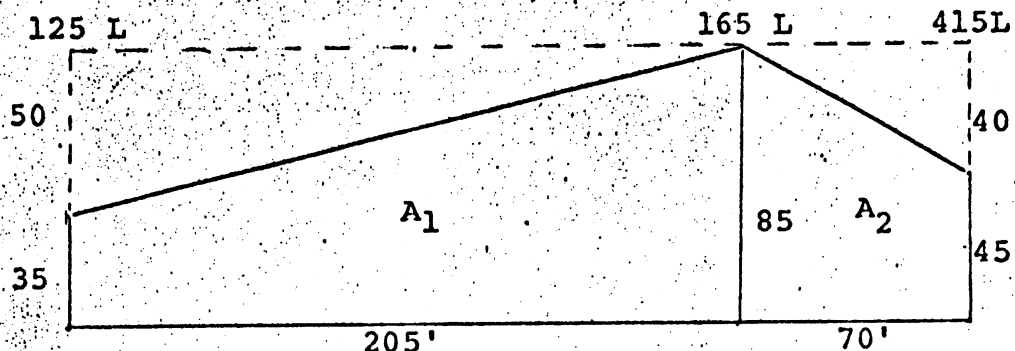
Reference to Figures 2 and 3 leave little doubt that the principal ore controls are the northeast cross faults. Since the stopes are developed in most cases on only one side of these northeast faults, it appears that the northeast faulting occurred after the thrusting and prior to the mineralization.

As discussed above, the ore appears to be localized in areas or zones of porosity, whether this be due to cross-faulting, drag folding or primary porosity.

TONNAGE ESTIMATES

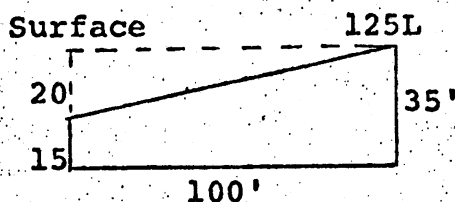
Probable Ore. Study of Figures 3 and 4 indicates that the ore body cannot be considered a regular tabular body as was done by King and others. The ore body pinches and swells, with a maximum thickness, both horizontally and vertically, in the fault block forming the central part of the mine area, approximately from 2700N, 1700E, northeast to 3000N, 2300E.

Within this block, the ore body has the approximate dimensions shown in Figure 4. For easier computation, however, the shape of the ore body can be considered in the following form:



$$\begin{aligned}\text{Area } A_1 &= (205 \times 85) - \frac{1}{2}(205 \times 50) = 12,300 \text{ ft}^2 \\ \text{Area } A_2 &= (70 \times 85) - \frac{1}{2}(70 \times 40) = 4,250 \text{ ft}^2 \\ \text{Total area, } A_1 + A_2 &= 16,550 \text{ ft}^2 \\ \text{Strike length of the ore zone} &= 400 \text{ ft} \\ \text{Volume} &= (A_1 + A_2) \times 400 = 6,620,000 \text{ cu ft} \\ \text{Division by a factor of 11.4} &= 580,700 \text{ sh. tons} \\ &\quad (\text{assume 10\% of rock is magnetite})\end{aligned}$$

In addition, the same block contains an ore zone from the 125 level to the surface with the following approximate dimensions:



$$\begin{aligned} \text{Area} &= (100 \times 35) - \frac{1}{2} (100 \times 20) = 2500 \text{ ft}^2 \\ \text{Strike length of the ore zone} &= 400 \text{ ft} \\ \text{Volume} &= \text{area} \times 400 = 1,000,000 \text{ cu ft} \\ \text{Division by a factor of 11.4} &= 87,720 \text{ short tons} \end{aligned}$$

Totaling the two gives 635,000 tons from the surface to 415 level. Some of this, however, has already been mined:

Estimated tonnage mined, Glory Hole	- 82,500 tons
165 E-W	- 8,330 tons
L6C	- 20,840 tons
L8B-D	- 1,750 tons
Total	113,420 tons

This leaves 555,000 short tons of ore (+1.5% Cu) probable within this block. This estimate is made with a high degree of confidence because of the persistence of the mineralization.

Possible or Indicated Ore. The persistent character of the mineralization within the block described above gives a soundness not often encountered when dealing with possible ore projections. This mineralization is strong and open in the down-dip and east-strike directions. Because of this, where one dimension is known, I am classifying such ore as possible or indicated.

In the down dip direction, one hole drilled by King (1961) encountered mineralization for 425 feet. Using an estimated minimum thickness of 30", and a strike length of 400 feet, possible ore estimates are:

$$\begin{aligned} (425 \times 30 \times 400) &= 5,100,000 \text{ cu ft.} \\ \text{divided by factor of 11.4} &= 447,368 \text{ short tons} \end{aligned}$$

In the east-strike direction, mineralization visually comparable with that in the probable block is found in the

125 level for 200 feet and in the 415 level for 100 feet. Using a trapezoidal block 200 feet wide at the upper end, 100 feet wide at the lower end, 30 feet thick, and 275 feet long (dip length) gives the following:

$$\begin{aligned} (100 \times 275) + 1/2 (100 \times 275) &= 41250 \times 30 = 1,237,500 \text{ ft}^3 \\ \text{divided by } 11.4 &= 108,552 \text{ short tons} \end{aligned}$$

This does not include oxide ore between the 125 level and the surface. Without topographic profiles, these are difficult to estimate, but probably amount to at least 110,000 tons.

In summary, therefore, tonnage estimates as follows:

Category	Area	Amount (S.tons)
Probable Ore	Main Block	555,000
Possible Ore	Main Block	447,368
(below 125 level)	Down dip	
Possible Ore	East of Main block	108,552
(below 125 level)		
Oxide (above 125 level)	East of Main block	110,000
<u>Total Possible Ore</u>		<u>1,220,920 tons</u>

In addition, since there is no reason to consider that the mineralization stops abruptly beyond the present openings, further projections of 300 feet downdip and 200 feet eastward are felt to be conservative. These would add:

Down dip	-	315,790 tons
East Strike	-	144,735 tons
Total Projected Ore -		
(below the 125 level)		460,525 tons

RECOMMENDATIONS

Yuma Mine Proper. The probable tonnage presently outlined (555,000 tons) precludes operation until more ore is in the probable or proven category or unless a cheap mining and milling technique can be applied. Phil Allen's suggestion that the ore might be upgraded by magnetic methods is one such possibility (see appendix).

Exploration probably can be done most economically underground. Much of the drifting will be in ore which can be stockpiled while exploration proceeds. The 125, 165 and 415 levels should be extended eastward, with a

series of regular short crosscuts to the north which will be used as drill stations for short southward inclined holes to cut the mineralized zone perpendicular to the plane of dip.

To firm up the possible and the projected ore east of the main block, an estimated 1900 feet of drifting and cross-cutting would be required. This would extend the three levels eastward 500 feet beyond the northeast fault, and would provide for seven crosscuts spaced 200 feet along the drifts. At \$30 per foot, this work would total \$57,000.

An estimated 1500 feet of underground drilling would be required. At \$12 per foot, this would total \$18,000.

The following steps also should be taken to open the best potential areas still remaining within the mine:

1. Continue the small crosscut at coordinates 3150N, 2060E, on the 415 level, eastward. This would test for an ore body across the northeast fault from the Glory Hole. The distance would be approximately 150 feet. Estimated cost would be \$4500.
2. Drive a new drift from the West Incline westward on the 170 foot level (see Plates 3 and 5, coordinates 2910N, 2020E) to intersect the northeast fault approximately at coordinates 2910N, 1880E. The distance would be approximately 130 feet. Estimated cost, \$3900.

The potential for increased grade and tonnage down dip can be tested in two ways:

- a) Determination of the extent and grade of the possible "envelope" of disseminated sulfides, part of which is present beneath the 165 level in the East shaft. It also may be present above the main shear zone. It can be tested by:
 - 1) Channel or bulk sampling. Hanging wall test on the 125 level, between coordinates 2950N, 1750E, and 2890N, 1890E. Footwall test, all of the 172 level and the 415 level crosscut at the East Winze. Total estimated cost, \$2000.

2) Drilling. suggested 15 vertical or southwest inclined D.D. holes regularly spaced along both inclined winzes and the 165 (315) and 415 levels. Estimated 750' @ \$12/ft = \$9,000.

b) A diamond drill hole is also recommended from the surface to test the ore body below the water table. Since much of the present ore is developed in schist, with some indications of leaching in the upper levels, chalcocite enrichment is possible, either in the main shear zone, or in the disseminated sulfide zone below the shear.

This hole should be spotted at coordinates 3300N, 2500E, which is at a surface elevation of approximately 2350'. The mineralized zone should be encountered at about 1640 feet - a depth of 710 feet. Drilling should continue through disseminated sulfides - if any - beneath the main zone. For purposes of estimation, this hole will be considered as going to 1,000'. Cost estimates are: 1,000' @ \$14/ft = \$14,000 for drilling. Site preparation estimated at \$2,500, giving a total of \$15,500.

Area Surrounding the Yuma Mine. The shear zone or thrust along which the mineralization occurs must be a major structural feature of the Granite Wash Mountains. As such, it should be followed and mapped on the surface, paying particular attention to any mineralization, cross-faults and intrusives which are associated with it. In places where the trace of the zone is difficult to follow on the surface, short cross lines of geochemical samples will probably delineate it. Any other thrust faults within the range should be identified and studied in the same way.

The Yuma Mine is located on the flank of a magnetic high. Much of the ore from the mine is magnetic. All magnetic highs in the Granite Wash Mountains should be examined for similarities in structure and mineralization to the Yuma Mine occurrence. In particular, magnetic highs along thrust faults (where they can be identified) should receive first priority for study.

A reconnaissance program to accomplish these ends could be done in several steps:

1. Magnetic highs could be checked relatively easily. There are several of these, and the work could be accomplished in approximately one week. Estimated cost (if I did the work):

a) CLF - 5 days @ \$175/day	\$875.00
b) Non-technical assistant @ \$25/day	125.00
c) Expenses \$45/day (2 men)	225.00
d) Vehicle \$15/day - 6 days	90.00
e) Report/Drafting	300.00
f) Assays	200.00
g) Misc.	100.00
Total	<u>\$1,915.00</u>

2. Mapping of the thrust in the vicinity of the Yuma Mine. Surface mapping for approximately 1 mile on each side of the mine to search for further ore occurrences on the same structure. One week = \$1,915.00.

3. Reconnaissance mapping of the Granite Wash Mountains to search for other mineralized thrusts or shear zones. All other prospects and mines not examined in steps 1 and 2 would be studied. Work would require about one week, depending on complexity. Estimated costs - \$1,915.00.

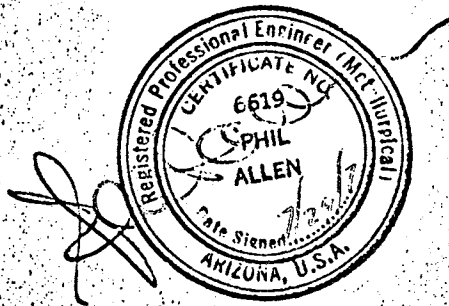
If necessary, these three steps could be concentrated into a one-week reconnaissance program although at a considerable decrease in effectiveness.

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APPENDIX

PROJECT - 119.1
SAMPLE PREPARATION AND
GROSS MICROSCOPY OF SAMPLES
FOR
CHARLES FAIR



July 28, 1970

METCON RESEARCH, INC.
Post Office Box 50225
1796 West Grant Road
Tucson, Arizona 85703

PROJECT 119.1

FOR

CHARLES FAIR

Sample Preparation and Gross Microscopy of Samples

SUMMARY

The amount of magnetics may provide a method for upgrading the non-sulfide mineral bearing rock.

PROCEDURE

Six samples were presented to METCON Research for study. These were split, run through Sturtevant Rolls and after further splitting, pulverized and prepared for assay.

Assay results follow:

Sample Number

<u>METCON</u>	<u>Original</u>	<u>Total Copper</u>	<u>Non-sulfide Copper</u>
4689	41515	2.71	1.65
4690	12556	0.41	0.35
4691	35065	1.04	0.11
4692	12578	0.85	0.82
4693	12569	1.26	1.11
4694	41510	1.03	0.10

Only two (2) samples, Nos. 35065 and 41510 had sufficient quantity to allow flotation tests if desired and then only enough for no more than two (2) tests. This would very probably not provide adequate answers as it is almost impossible to optimize an ore without extensive bench work.

At Mr. Fair's suggestion no flotation work was accomplished.

It was requested that we make a gross mineralogical examination. Our only microscope for this work is an Olympus Binocular Microscope with maximum magnification of 80X.

Only three samples were examined in relative detail and results follow herewith.

LOW POWER MINERAL IDENTIFICATION

Sample No. 35065

Total Copper assay 1.04%, Non-sulfide 0.11%

Magnetics

Less than 4% (estimate)

Contains some middling with pyrite.
(nearly 30%)

Less than 5% attached gangue material other than pyrite

Non-Magnetics

Somewhat granular

Considerable pyritic material some altered

Silica and feldspar are in the finer sizes

Copper Minerals

Chalcopyrite

Bornite

Little cuprite

Very little chalcocite

Non-sulfide copper not in great evidence--seems to be mostly stain.

SAMPLE NO. 41510

Total Copper assay 1.03%, non-sulfide 0.10%

Magnetics

About 30% magnetics of which 20% is only moderately magnetic

Non-magnetics

Parent rock appears to be fairly quartzitic

The feldspar particles appear to be plagioclase

Dark mineral is difficult to identify. Possibly ilmenite, spinel, or hematite. Not enough depth of red to be garnet.

Copper not readily identifiable, probably chalcopyrite and bornite.

SAMPLE NO. 41515

Total copper assay 2.71%, Non-sulfide 1.65%

Magnetics

Approximately 45% is magnetic

Some trapped copper mineral in middling

Non-magnetics

Needle-like crystals throughout look like magnesium salts or spodumene.

Some stained material quite powdery which effervesces and decrepitates rapidly with H_2SO_4 .

Copper mineral appears to be predominantly copper sulfate, readily dissolving in water leaving transparent, needle xtals.

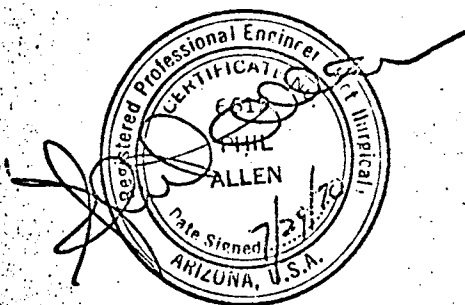
CONCLUSIONS

In the case of Sample No. 41515 if 45% of the material can be removed magnetically and then cleaned in the same manner this would indicate a possible upgrading of nearly two to one or a potential of nearly 5.4% total copper and a non-sulfide copper assay of 3.3%.

One factor too is that most of the non-sulfide copper mineral being water soluble could be leached prior to flotation if desired. This would present a feed material to flotation that would run better than 1% sulfide copper.

ADDENDA

This is strictly a preliminary study and certainly it must be recognized that more work is necessary to establish any certainty of results.



Phil Allen, President
METCON Research, Inc.

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July 28, 1970

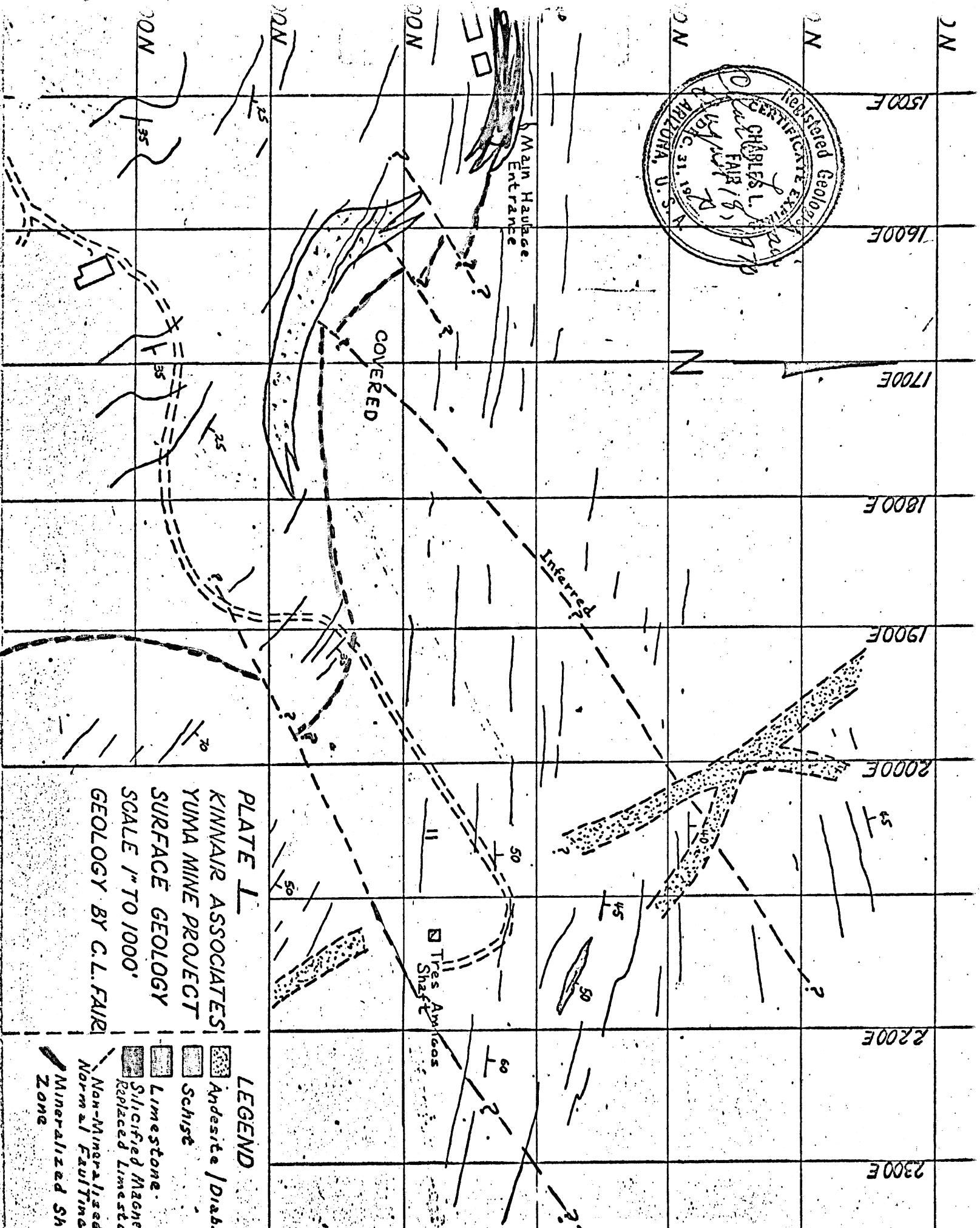


PLATE 1
KINNIAIR ASSOCIATES
YUMA MINE PROJECT
SURFACE GEOLOGY
SCALE 1" TO 1000'
GEOLOGY BY C.L. FAIR

- LEGEND
- Andesite / Diabase
 - Schist
 - Limestone
 - Silicified Magnitude
 - Replaced Limestone
 - Non-Mineralized Normal Faulting
 - Mineralized Shear Zone

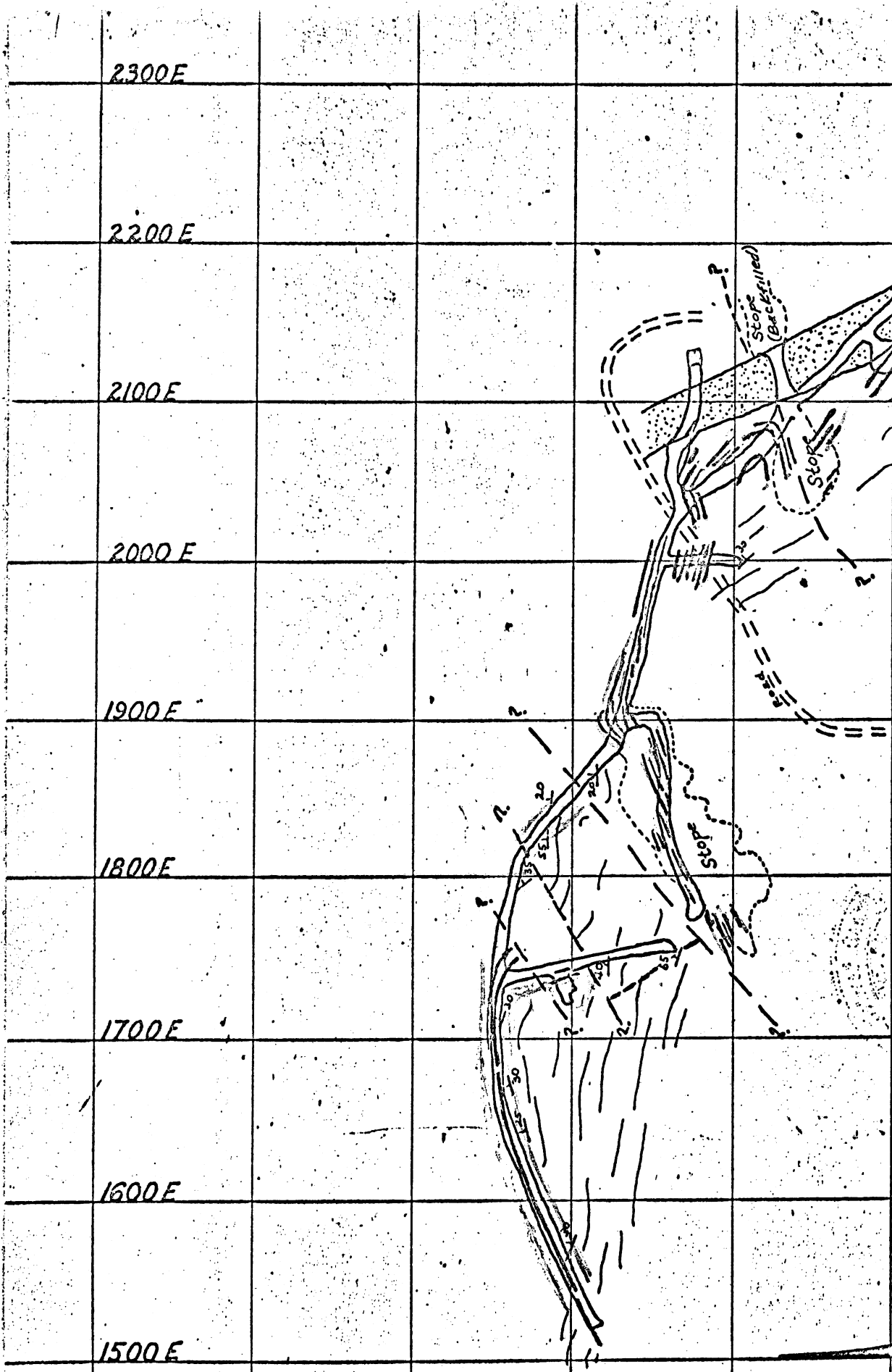
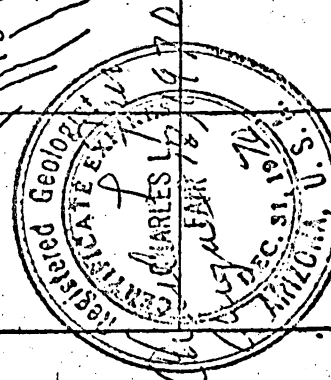


PLATE 2
 KINNAIR ASSOCIATES
 YUMA MINE PROJECT
 125 LEVEL
 SCALE 1" TO 1000'
 GEOLOGY BY C.L. FAIR

LEGEND

	Andesite / Diabase
	Schist
	Limestone
	Faulting Non-Mineralized
	Red Shear



2300E

2200E

2100E

2000E

1900E

1800E

1700E

1600E

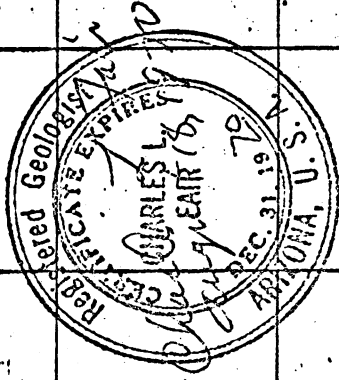
1500E

Stope

East Incline

West Incline

OPEN



LEGEND

- Andesite / Diabase
- Schist
- Limestone
- Faulting
- Non-Mineralized
- Mineralized Shear Zone

PLATE 3

KINNAIR ASSOCIATES
YUMA MINE PROJECT
139, 165, 172, LEVELS
SCALE 1" TO 1000'
GEOLOGY BY C.L. FAIR

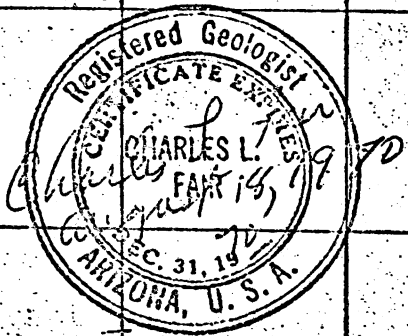
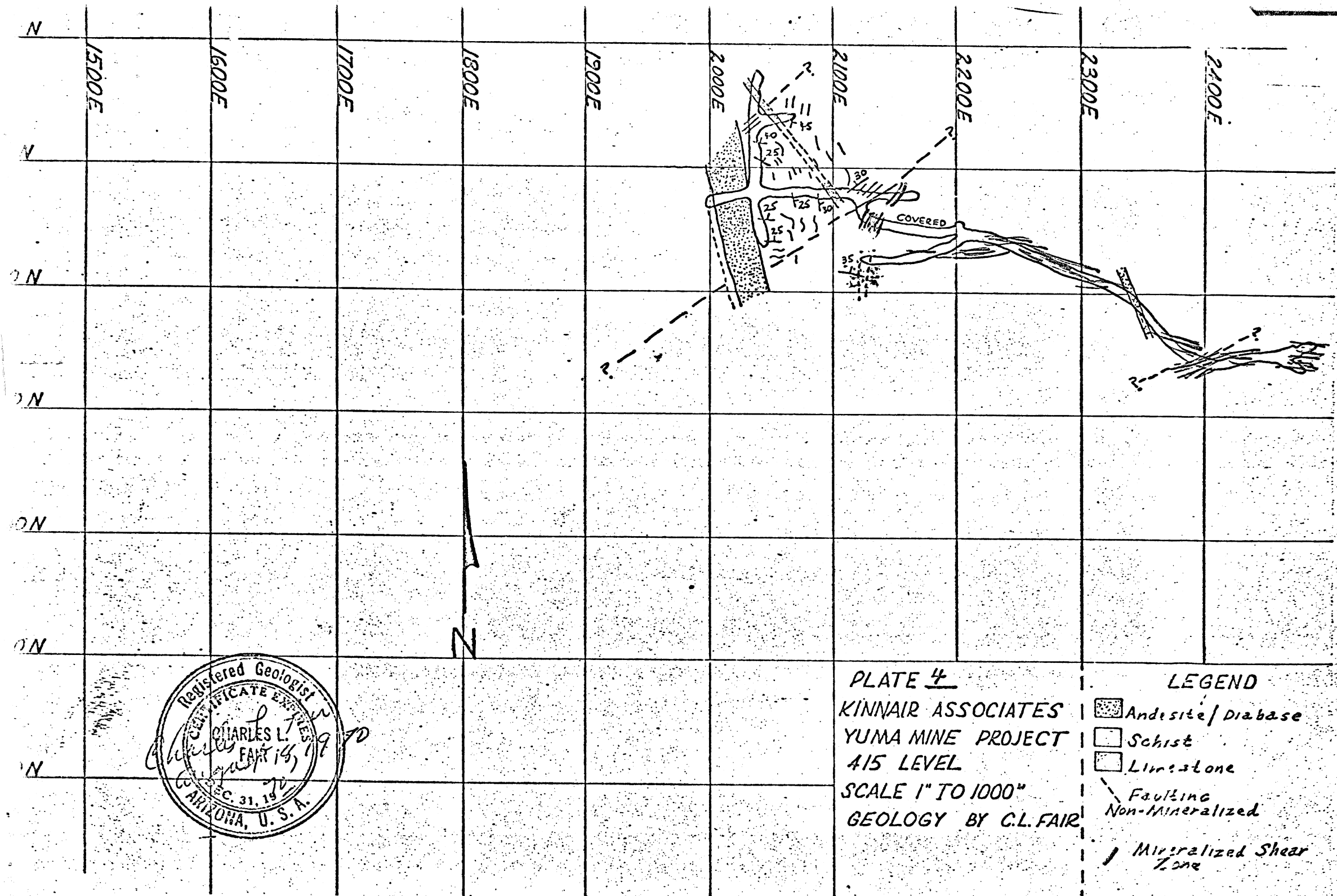








PLATE 4
KINNAIR ASSOCIATES
YUMA MINE PROJECT
415 LEVEL
SCALE 1" TO 1000"
GEOLOGY BY C.L. FAIR

LEGEND

-  Andesite/Diabase
-  Schist
-  Limestone
-  Faulting
-  Non-Mineralized
-  Mineralized Shear Zone

DATA ON WEST WINZE, FROM OLD REPORTS:

1) From report of Elgin B. Holt, to J. S. Coupal, (both of Arizona Bureau of Mines at that time), dated Feb. 3, 1943; Holt quotes Louis T. Derwin, of Oracle, Ariz., who was mine supt. for the "old Yuma Copper Co. from 1906 to 1909", as stating:

"a vertical double compartment shaft was sunk to 135 ft., where vein was encountered and drifts run thereon east and west, --and the shaft continues on down at an inclination of 36 degrees in the footwall of the zone, to the 500 ft. level of the mine. On the 135 ft. level west drift, 78 ft. west of the vertical shaft, a working winze was sunk on the vein to a total depth of 390 ft. below the 135 ft. level." ----- "at a point 25 ft. above the bottom of the winze, a drift was run in sulfide ore west 125 ft. and diamond drilling started. As the water flow became troublesome, coming in at about 50 gal./min., the company abandoned this level and backed up in the winze 50 ft. where another drift was driven on the vein about 100 ft. east. From this drift a number of diamond drill holes were run to determine the extent of sulfide ore in this area."

2) From report by C. P. Hilliard, July, 1928: (Under History of Property):

"The company had the claims under option in the middle '90's, and sunk a domestic water well and also one for freight teams. A 3-compartment shaft was started on the Fraction claim. At a depth of 68 ft. a dike was encountered and the shaft abandoned, the work being transferred to the Carbonate claim where a new shaft was sunk close to the side line of the Asbestos claim ----- at a vertical depth of 135 ft. a zone was encountered with rich streaks of azurite and carbonates and a drift driven east and west in this zone. In the west drift at 90 ft. a 40 ft. dike was cut. On the west side ~~nd~~ of the dike an incline winze was sunk following the ore to a depth of 365 ft. At the bottom of the vertical shaft another winze was sunk 365 ft. at an incline of about 50 degrees. Considerable diamond drilling was done in these winzes, and drifts, but no record is available. Water now stands at about 180 ft. below the collar of the winze."

Notes: Holt's quotes of Derwin check actual measurements better than Hilliard's distances, so far as we have been able to survey and measure. Assuming Derwin is reasonably correct; and in view of the fact that the water level in the west winze drops almost in agreement with dropping level in east shaft when pumping, (a quite porous connection must exist between the two winzes somewhere below the bottom of the east shaft); it is quite possible that the west winze bottom enters the sandy sulfide ore. So far as we have pumped down to date, (7/'59), we have not got to the level of the west drift mentioned by Derwin. If the east drift he mentioned is the 415 level, then the depth is not as great as he stated, (east drift 50 ft. above west drift). If the 415 is not the east drift Derwin mentioned, then both an east and west drift exist below the water level as of 7/'59; and the west winze should be unwatered to explore these drifts. Rock in west winze at water level 7/'59 is a hard tactite and marble carrying disseminated chalcopyrite and covellite, but does not look like ore grade, (looks below 1% Cu).

Plotting the data we have on sections, the water level in west winze when east shaft is unwatered to the 450 level, stands about 10' above the 450 level in elevation, but since we didnt keep the 450 unwatered for any length of time, this is understandable. If Derwin is correct in his measurements as remembered, then the west drift he mentions, (25 ft. above bottom), is about 5 to 10 ft. below the level of the 450 level of the east shaft, and the east drift about the same distance (vertically) above the 450.

Also worthy of note is the nature of the ore itself. As has been said, this is a garnetized limestone. The structure is such that in many instances holes for blasting have been made with a blow-pipe instead of steel, and each round of holes has brought down at least a hundred tons. Despite this soft semi-disintegration of the ore, it holds its structure without timbering except in cases of extensive stoping. Added to this advantage from the mining standpoint is the asset to a milling operation, since about 90% of the ore will pass through a 16-mesh screen, thus eliminating any major crushing problem. These two assets should not be minimized, since they are advantages peculiar to this particular ore, and are prime economic factors favorably affecting the mining and milling costs. Careful computations have determined a probable mining and milling cost of \$2.85 per ton, arrived at by competent engineers as part of their official report.

Another considerable factor is that cheap hydro-electric power may be made available through a tie-in with the Parker power line, which is about 5 miles from the property.

SHIPPING RECORD: A summary of shipping records from January 1, 1944, to May 31, 1947, is included in this outline, and shows shipments from the oxide ores. It should be noted that a very large percentage of this ore was shipped when the price of copper was 11 7/8¢ per pound. This was practically a break-even operation, and all of the proceeds were expended to further the development work in the mine.

Negotiations with the operating company are facilitated by the fact that it is a small closed company, and can readily be contacted for any business dealings. It is felt that the reputable members of the company have amply demonstrated their faith in the future of the property, and they are disposed to deal fairly and liberally with any investor.

There are few, if any, properties that have the natural assets of this one, and its development to its present stage presents a most attractive offer of far better than average remuneration.

A thorough investigation of these foregoing conclusions and recommendations is most heartily invited, without misgivings as to their being substantiated.

Respectfully submitted:

S/Loyde Edmondson
Sept. 15, 1947

(Copied, 5/1/56 -)

REPORT
and
PARTIAL SAMPLING
of the
TRES AMIGOS MINE
Ellsworth Mining District
VICKSBURG
YUMA COUNTY ARIZONA.

*C. P. 4233
July 1923*

COPY

LOCATION: The property of this company consists of a group of 36 claims in the Ellsworth Mining District, in S.6 N.R. 14 W.G. & S.R. Meridian, 9 miles N.W. of the town of Vicksburg, Arizona, in a spur of the Harcuvar Mts., known as the Granite Wash Hills.

TRANSPORTATION: The mines are accessible by good dirt road from Vicksburg and from McVey, a pumping station and side track on the Parker cut-off branch of the A.T. & S.F. railway.

ELEVATION: The elevation of the mineral area ranges from 1600 ft. to 2400 ft.

HISTORY: Records show that these claims were under option in the middle nineties. A domestic water well was sunk also one for freight teams. The company started a three compartment shaft in the line belt on the fraction claim. At a depth of 68 ft. a dyke was encountered and the shaft was abandoned, the work was then transferred to the Carbonate claim where a new shaft was sunk close to the side line of the Asbestos claim. Surface exposures here reveal the existence of four mineralized zones. Evidently the shaft was started with the intention of striking the largest of the mineralized zones. At a vertical depth of 135 ft.. A zone was encountered with rich strikes of Azurite and Carbonates and a drift was driven both east and west in this zone. In the west drift at 90ft. a 40ft. dyke was encountered. On the west side of the dyke an incline winze was sunk following the ore to a depth of 365 ft.. Water now stands about 150 ft. below the collar of the winze. At the bottom of the vertical shaft another winze was sunk 365 feet (total depth 500ft.) on an incline of about 50 degrees. Considerable diamond drilling was done in these winzes and drifts, but no record is available.

**PROPERTY
HOLDINGS:**

ARIZONA -1 to 10 inc.
UTAH COFFE-1 to 5 inc.
NEWFOUNDLAND -1 to 5 inc.
CALIFORNIA- 1 to 5 inc.
CARBONATE-1 to 10 inc.
OVERSIGHT-
UNION-

The southwestern end of the Harcuvar Mts. in which this group is located is made up of rocks belonging to the pre-cambrian metamorphosed sediments.

The main range to the north of the mineral deposits is a granite intrusion, to which undoubtedly is due the metamorphism of the beds forming the lower portion of the range.

The altitude of the main range is approximately 3200 ft. that at the Carbonate shaft house 2300 feet.

The metamorphosed series consists of fine and coarse grained quartz-mica-schist and arenaceous shales, intermingled with low grained limestone. In the quartz-mica-schist areas Amphibolite is frequently present.

LOCATION: The property of this company consists of a group of 36 claims in the Ellsworth Mining District, in S.6N.R. 14 W.G. & S.R. Meridian, 9 miles N.W. of the town of Vicksburg, Arizona in a spur of the Harcuvar Mts., known as the Granite Wash Hills.

TRANSPORTATION: The mines are accessible by good dirt road from Vicksburg and from McVey, a pumping station and side track on the Parker cut-off branch of the A.T. & S.F. railway.

ELEVATION:

The occurrence of the mineral deposit is found in the following relation of rocks. Underlying, or forming the foot wall, the igneous limestone, next above being the ore bearing zone consisting of the schist-shales and mixed limestone, above which lies a quartzite cap. The latter closely resembles a quartz monzonite.

The ore bearing zones are cut at times by dikes or diabase of later date. but these so far have not interfered with the ore deposits, in the way of faulting. In every case, the vein has been picked up on the further side of the dyke, maintaining its true course.

There are three main ore-bearing zones, which so far have been partially developed. The first approached in a north and south zone running through the Arizona 1 and 7 claims. The main zone an easterly westerly course through the Arizona 5 and 6, Carbonate 1-2 and 3 and Newfoundland 1 and 2. Also a small zone running easterly-westerly, coursing through the California 2-3 and 4.

:: DEVELOPMENT ::

The early development of the camp was first confined to the Stonewall Jackson, where a strong dyke of limestone partially replaced by Magnetite occurs. The workings are shallow, but so far as they go in depth (the incline being about 50) show mineralization of copper. Fourteen tons of ore are reported to have been shipped by selection from the dump, which gave the following:

	GOLD	19.80	COPPER	10.2%
Incline sample 4 cuts, 5 ft. each	Gold	\$1.40	Copper	3.9%
Open cut " south of incline 6 ft.	Gold	\$2.20	Copper	3.8%

The width of the dyke is about 30 ft. the samples were taken from the foot wall. The dip of the dyke is about 30 N.W.

The main workings are located on the Carbonate claim. A shaft has been sunk vertically 135 feet. Commencing on the hanging wall formation of quartzite at a depth of 75 feet, the shaft enters a mineralized zone, from this point to the bottom the schistose formation shows evidence of copper in the carbonate form, at the 135 ft. level a more pronounced strata was encountered, being from 5 to 7 ft. wide showing a heavy Calcareous Limonite with numerous streaks and bunches of copper carbonate and oxides. A station was cut and drifts run east and west on this strata, which like the surface showing is still much leached.

The drift east is 125 feet long, the ore is continuous except for appearance of a diabase dyke about 4 ft. wide, near the east end of the drift. The breast of the drift beyond the dyke is again in the vein matter showing: Gold \$1.25 Copper 2.7%

A sampling along the east drift, cutting samples of from 5 to 6 ft. and making composite samples of three cuts in each 30 ft. of drift gave the following:

	GOLD	COPPER
First 30 ft. back from breast	\$1.40	2.6%
Second " " " " "	1.75	2.7%
Third " " " " "	1.75	2.4%

The west drift is 200 feet long and has followed the strata, is all in ore except for about 26 ft. west of the shaft. This 26 ft. is another diabase dyke coursing N. W. & S. E., which has cut the vein without faulting it. Sampling in the same manner the following results.

	Gold	Copper
First 30 ft. back from the breast	\$1.75	2.5%
Second " " " " " "	1.74	2.8%
Third " " " " " "	1.75	2.3%

At this point a winze was sunk on the vein and along side of it on the west, from the collar of the winze down to the water level the strata shows steady improvement in copper content. Azurite appears in several streaks and from the ore removed from the winze and on the dump, there was later some sorting done and a shipment made (reported to have run 19% in copper).

The sampling down the winze to water level gave the following results.

	Copper
Shaft above Linonite	1.3%
15 ft. down winze	1.8
75 ft. " " "	2.3
100 ft. " " 3 cuts	2.6
150 ft. " " 2 "	3.3
175 ft. " " 1 "	5.9
188 ft. " " 1 "	6.6

It is said that from the 260 ft. level to the 315 ft. the winze passed through 40 feet of sulphide material. In the dump I found sulphide ore containing Bornite and Chalcopyrite. At the foot of the shaft an incline has been sunk stated to be 360 feet; the water level here is 135 ft. below the collar of the shaft. at about 100 ft. the vein passes out through the roof on this account no sampling was done on the incline. The incline toward the bottom, from the appearance of ore on the dump penetrated an area impregnated with pyrite, which the samples showed
Gold \$2.45 Silver \$1.54 Copper 2.4%

The result of this working shows 375 ft. along the vein E. and W. a leached condition with copper content, 2.6%.

THE NEW ADIT: On the carbonate # 3 claim which lies to the west of the carbonate # 1. a tunnel has been started driving east on the line dyke this is running on a brown limonite strata similar to the ore in the 135 ft. drift, this tunnel is in 144 ft. and work is being done until the the 135 ft. intervening between it and the west drift on the 135 ft. level has been opened up. There will be a difference of 25 ft. in the elevation of the tunnel and that of the drift, but is proposed to take advantage of this for ore bins.

Between the tunnel and the shaft, copper croppings are visible over the entire distance, promising a continuous ore shoot over 500 feet in length.

CARBONATE CLAIM:

Further development to the eastward of the vertical shaft consists of several tunnels these are driven just below the outcrop and show a mineralized area 50 to 60 feet in width, with the foot wall as yet undetermined.

The mineral formation passes eastward from the carbonate through the azurite into the newfoundland, splitting into an upper and lower belt, but plainly visible and opened up in several places on each claim.

CARBONATE #2.

On the lower belt a cut and tunnel have been run in on the formation for 35 feet. This shows Gold \$1.45 Silver .5 Copper 2.4%

On the upper belt a cut and tunnel 25 feet a 7 ft. sample Gold \$6.40 Copper 3.7% dump 20 tons Gold \$2.80 Copper 3.1%

NEWFOUNDLAND #1.

This next claim east the belt being continuous and shows mineral all the way. a 12ft. shaft with 10ft. cut south, sample across 12ft.

Gold \$3.40 Copper 2.6%

Next 7 ft. south Gold \$5.60 Copper 2.2%

CALIFORNIA #3

This claim shows a strong vein from 5 to 8 feet wide, with an east and west course, has been opened by several workings a tunnel in 25ft. an open cut crossing the vein at the surface gave a fair opportunity for a general sample, which for a width of 8 feet gave, Gold \$12.10 Copper 6.9%

CARBONATE # 4-5

On the junction of these claims a 3 compartment shaft has been started and is down 68 feet. To the west a new shaft has been started down 20ft.

WATER;

Two wells have been developed, One on the Roosevelt 150 feet deep another on the Oversight claim. A further supply of water for leaching or milling would be obtained from the mine itself.

ORE RESERVES:

The tonnage of ore developed to the bottom of the winze admitting a length of 300ft. of drifting and depth on the pitch of the vein of 500 feet would approximate 70,000 tons, however the lower 200 feet would show 28,000 tons.

FINAL SUMMARY:

The value of this property can soon be determined with a small expenditure for the size of the property. The water level has been reached and work below this level should soon determine if there is a zone of secondary enrichment.

Respectfully submitted.

C. P. Hillard

C O P Y

DATA ON WEST WINZE, FROM OLD REPORTS:

1) From report of Elgin B. Holt, to J. S. Coupal, (both of Arizona Bureau of Mines at that time), dated Feb. 3, 1943; Holt quotes Louis T. Derwin, of Oracle, Ariz., who was mine supt. for the "old Yuma Copper Co. from 1906 to 1909", as stating:

"a vertical double compartment shaft was sunk to 135 ft., where vein was encountered and drifts run thereon east and west, --and the shaft continues on down at an inclination of 36 degrees in the footwall of the zone, to the 500 ft. level of the mine. On the 135 ft. level west drift, 78 ft. west of the vertical shaft, a working winze was sunk on the vein to a total depth of 390 ft. below the 135 ft. level. " ----" at a point 25 ft. above the bottom of the winze, a drift was run in sulfide ore west 125 ft. and diamond drilling started. As the water flow became troublesome, coming in at about 50 gal./min., the company abandoned this level and backed up in the winze 50 ft. where another drift was driven on the vein about 100 ft. east. From this drift a number of diamond drill holes were run to determine the extent of sulfide ore in this area. "

2) From report by C. P. Hilliard, July, 1928: (Under History of Property):

"The company had the claims under option in the middle '90's, and sunk a domestic water well and also one for freight teams. A 3-compartment shaft was started on the Fraction claim. At a depth of 63 ft. a dike was encountered and the shaft abandoned, the work being transferred to the Carbonate claim where a new shaft was sunk close to the side line of the Asbestos claim ----- at a vertical depth of 135 ft. a zone was encountered with rich streaks of azurite and carbonates and a drift driven east and west in this zone. In the west drift at 90 ft. a 40 ft. dike was cut. On the west side ~~nd~~ of the dike an incline winze was sunk following the ore to a depth of 365 ft. At the bottom of the vertical shaft another winze was sunk 365 ft. at an incline of about 50 degrees. Considerable diamond drilling was done in these winzes, and drifts, but no record is available. Water now stands at about 180 ft. below the collar of the winze. "

Notes: Holt's quotes of Derwin check actual measurements better than Hilliard's distances, so far as we have been able to survey and measure. Assuming Derwin is reasonably correct; and in view of the fact that the water level in the west winze drops almost in agreement with dropping level in east shaft when pumping, (a quite porous connection must exist between the two winzes somewhere below the bottom of the east shaft); it is quite possible that the west winze bottom enters the sandy sulfide ore. So far as we have pumped down to date, (7/'59), we have not got to the level of the west drift mentioned by Derwin. If the east drift he mentioned is the 415 level, then the depth is not as great as he stated, (east drift 50 ft. above west drift). If the 415 is not the east drift Derwin mentioned, then both an east and west drift exist below the water level as of 7/'59; and the west winze should be unwatered to explore these drifts. Rock in west winze at water level 7/'59 is a hard tactite and marble carrying disseminated chalcopyrite and covellite, but does not look like ore grade, (looks below 1% Cu).

Plotting the data we have on sections, the water level in west winze when east shaft is unwatered to the 450 level, stands about 10' above the 450 level in elevation, but since we didnt keep the 450 unwatered for any length of time, this is understandable. If Derwin is correct in his measurements as remembered, then the west drift he mentions, (25 ft. above bottom), is about 5 to 10 ft. below the level of the 450 level of the east shaft, and the east drift about the same distance (vertically) above the 450.

UNIVERSITY OF ARIZONA
ARIZONA BUREAU OF MINES
ORE TESTING SERVICE

March 31, 1947

The sample which the Arizona Bureau of Mines received by express assayed 0.91 per cent copper.

One flotation test was made on the material as received without grinding. The reagents used are given in Table 1 and the results in Table 2. The concentrate amounted to 3.1 tons per 100 tons of heads, assayed 0.44 oz. gold and 5.5 oz. silver per ton, and 18.7 per cent copper and contained 67.6 per cent of the total copper. The middling amounted to 1.0 ton per 100 tons of heads, and assayed 3.3 per cent copper and contained 3.9 per cent of the total copper. The tailing amounted to 95.9 tons per 100 tons of heads, assayed 0.25 per cent copper and contained 28.5 per cent of the total copper.

I will try another test with different reagents.

Yours very truly,

G.H. Roseveare
Metallurgist.

Mr. George Spry
Liberator Mines Company
128 N. First Ave.
Phoenix, Arizona

COPY

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine: YUMA COPPER MINE

District: Ellsworth, Yuma Co., Arizona.

Subject: R E P O R T

Date: February 11, 1943

Engineer: Elgin B. Holt

OWNER: C. H. Waters, Vicksburg, Arizona

LESSEES: Roy R. MacDonald, Robert Douglas, and George Spry, Vicksburg, Arizona

METALS: Copper

LOCATION: This property is located at the western end of the Granite Wash Hill, about 11 miles northwest of Vicksburg, and is reached by a good desert road from a loading ramp located at McVay siding, on the Santa Fe Railroad, 5.5 miles from mine. The group is composed of 12 unpatented mining claims.

EXAMINATION: This property was visited by me on February 7, 1943, in company with George Spry and his associates. At this time the mine was being operated with a crew of 8 men and ore was being extracted and shipped to smelters. Also the working shaft had been cleaned out and retimbered and a gasoline hoist had been installed. I went down on the mine bucket with Mr. Spry and we inspected the underground workings of the property. I found these workings in excellent condition, and operations were being conducted in a business-like manner. It might be well to note here that all three of the said lessees are skilled miners and are working right along with their men.

GEOLOGY: The main ore-bearing zone consists of a limestone strata, or roof, striking east and west and dipping about 30 degrees north. On the hanging wall side of the roof there is a band of quartzite from 12 to 14 feet thick. Also, the adjacent rocks, found on the north and south sides of the ore zone mentioned, presumably consist of quartzite and quartz-porphry.

VEINS: Within the ore zone, which at mine workings is at least 100 feet wide, are four parallel veins, from 3 to 15 feet thick, with the same strike and dip as the zone under discussion. These veins were probably caused by shearing action, as the gangue material thereof is composed of brecciated and altered limestone, which has been changed into copper ore by ascending thermal solutions, carrying that metal. Above the water level of the mine, the ores are oxidized, consisting of copper carbonates; while below the water level, later to be discussed, the ore is sulphide material, consisting of chalcopyrite, bornite, etc. Also there is a stockwork of veinlets in the ore zone running in various and sundry directions. Furthermore, the zone is cut in numerous places in the mine workings by basic intrusive dikes from a few inches to 30 feet in width. Again, the ore-bearing zone, showing copper in outcroppings, is traceable on the surface a total distance of 4500 feet, per Mr. Spry. Hence, the geologic conditions are most pleasing, and the property has all the ear-marks of a large copper mine in the making.

MINE WORKINGS: A vertical double compartment shaft was sunk to a depth of 135 feet, where a vein was encountered and drifts run thereon in an easterly and westerly direction. Thence, the vertical shaft goes on down 20 feet to a loading pocket. Thence, the shaft continues on downward at an inclination of 36 degrees, in the foot wall of zone, to the 500-foot level of the mine.

2/11/43

On the said 135 foot level, a drift was run west from shaft 160 feet, following a vein running from 3 to 8 feet in width. Also, a drift was run east from shaft 165 feet on the same vein. The oxidized ores found in these drifts average about 2 percent copper, per, Mr. Spry.

WINZE: A working winze is located 78 feet west of shaft, and was sunk on vein to a total depth of 390 feet, below the said 135-foot level. Water now stands in this winze at a point 215 feet below the 135-foot level, mentioned.

OXIDIZED AND SULPHIDE ORE ZONES: The oxidized ore zone goes down from the surface, to a point in the winze mentioned, 130 feet below the 135-foot level, below which point the vein was found to be leached and barren of values for an additional depth of 60 feet, where massive sulphide copper ore came in. This information was recently furnished to Mr. Spry by Louis T. Derwin, of Oracle, Arizona. Derwin was mine superintendent for the old Yuma Copper Company, 1906-1909, during which period all of the mining work in property was carried out by people residing in Michigan.

Derwin stated that at a point 25 feet above the bottom of the winze, a drift was run in sulphide ore west 125 feet, and diamond drilling was then started from this level. As the water flow became troublesome, coming in at about 50 gallons per minute, the company abandoned this level, and backed up in the winze 50 feet where another drift was driven on the vein about 100 feet in an easterly direction. From this latter drift a number of diamond drill holes were run with a view to determining the extent of sulphide ore reserves in this area.

Derwin also stated, per Spry, that the sulphide ore vein was proven to be, by the drilling mentioned, from 30 to 50 feet wide; also that the granulated material from the drill holes averaged from 2.8 per cent to 3 percent copper; but that bands of sulphide ore were encountered by the drill holes assaying from 10 to 30 percent copper.

The above statement is partly verified by the fact that some sulphide copper ore is now found on the mine dumps, consisting of chalcopyrite and bornite material. Also, within recent years several short lots of sulphide ore, said to assay around 10 percent copper, have been shipped from these dumps by chloriders.

PRODUCTION: Lessees have opened a stope, in oxidized ore, on the 320 foot level in the winze. Here the vein is 10 feet in width, and all vein material has been shipped. Six car loads of ore have been marketed, to the Clarkdale, Magma and Hayden smelters; but, at the time of visit, there were only five liquidation sheets available. These are tabulated as follows:

Tons	Cu-%	Au-oz.	Ag-Oz.	Zn-%	CaO-%	SiO ₂ -%	Fe-%
31.1835	5.75	.015	.24	.3	20.5	35.2	16.4
34.3935	5.52	.010	.24	.8	20.5	33.8	16.4
42.7130	4.39	.010	.24	.6	17.3	38.8	16.8
43.2385	4.88	.030	.30	—	20.6	38.0	15.7
35.0000	5.06	.010	.35	—	18.6	40.3	11.5

NOTE: The above car lots of ore were shipped from property between October 10, 1942, and Jan. 4, 1943. No ore is now in transit; but there are now 200 tons of broken ore on dump, of same grade material as noted above, ready to be shipped,

2/11/43

as soon as the loading ramp at McVay siding can be completed. Also a loading bin, is being built at the mine in order to facilitate loading trucks at that end.

Lessees are now planning to ship at least 4 car loads of ore from the mine monthly.

OPERATIONS: PLANNED:

Lessees are planning to raise capital sufficient to defray the cost of cleaning out, timbering where necessary and unwatering the winze referred to in order to uncover the sulphide ore discussed above. They are of the opinion, once the sulphide ore is opened up, they will be able to produce, by selective mining, somewhat higher grade ore than is now being mined and shipped from the oxidized zone above water level. Also, when and if ample sulphide ore reserves can be blocked out, such ores can be concentrated easily by flotation and thereby a high grade shipping product produced.

Signed: ELGIN B. HOLT
Field Engineer

COPY

COPY

YUMA COPPER MINE

To: J. S. Coupal

Feb. 11, 1943

From: Elgin B. Holt

I am herewith enclosing my report on the old Yuma Copper Mine, now being operated by George Spry and associates.

I spent a very interesting day last Sunday, February 2nd, looking this mine over. I went over this property some two years ago with Mr. C. H. Waters, owner, of Vicksburg. Was well impressed then with the surface showings; but at that time the mine was idle and I could not get under ground.

Briefly, this property has all the earmarks of a sizeable copper mine in the making. If this ore occurrence were in granite or schist, I would not think so much of it. But the main ore zone consists of a huge upturned strata of limestone, flanked by quartzites and other sedimentary rocks; and this whole sedimentary series is intruded with basic dike material at frequent intervals.

Also the ore bearing zone, with copper in the outcroppings, is traceable for 4,500 feet, the width of zone being much wider up on the mountain one-half mile to the east of main workings.

Again, the veins in the limestone reef consist of altered brecciated porous limestone material, the vein being or having been produced originally by shearing action; hence copper can "live" in this kind of a vein. Copper can also be leached and can migrate downward in this kind of a vein; and this is exactly what happened; we have two or three hundred feet of oxidized copper ore in the surface veins with a secondary enrichment of copper sulphide ore below water level - bornite, chalcopryrite etc. I would rather thin, it likely that the entire zone, from 100 feet wide to much wider in places, would turn into milling ore below water; also with bands of shipping ore, as has been reported.

This is the best showing for a copper mine in my district, not even excluding Emerald Isle - for Emerald Isle is merely a surface deposit - mine that out and the ¹ is finished. The Yuma Copper Mine has the earmarks, as stated. It will make a large producing mine, copper producer, if adequately developed. Also, it is in good hands, as all the lessees, three of them are miners, with splendid production records. Roy R. MacDonald shipped silicious gold ores from the Congress mine area for many years.

Lessees are drawing up an application for a \$5000 "C" loan. I recommend strongly that it be granted.

s/ ELGIN B. HOLT

~~(The loan of \$5,000 was granted by the R.F.C. One of the three lessees mentioned has withdrawn from the operation, and the control now rests with George Spry, although MacDonald is working with him.~~

Nov. 27, 1943)

Magma Copper Company

SUPERIOR, ARIZONA

March 20, 1953

Mr. F.E. Haskell
455 Hotel Adams
Phoenix, Arizona

Dear Mr. Haskell:

This is in reply to your inquiry of March 20th regarding the shipments of ore from the Yuma Copper Company.


The capacity of our smelter is at this time more than taken-up by the production from our own mine, so we are able to accept outside ores only in very limited quantities and of only two types--high lime or high silica. Unfortunately, the average of the past shipments, shipped under Mr. George Spry, were 17.4% lime and 39.8% silica. This analysis, as a lime flux, compares poorly with our own 55% lime flux, and if your silica should exceed 40.0%, you would get no lime credit at all.

If you wish, we will accept one car per week with no guarantee of continuation. We cannot guarantee freight until after the first car has been received in order to make certain the values are commensurate with past values. I am sorry that we cannot do any better than this, but under the duress of our present tonnage we can make no definite commitments.

I am enclosing a copy of our smelter schedule, and I am sure you will understand that this may be changed at any time as soon as the price of copper is determined and the refining charge adjusted accordingly.

Please advise me of your wishes in this matter.

Yours very truly,


Edward J. Caldwell
Smelter Superintendent

Enc. 1

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Lessees are drawing up an application for a \$4000 "C" loan. I recommend strongly that it be granted.

/s/ ELGIN B. HOLT.

(The loan of \$5,000 was granted by the R.F.C. One of the three lessees mentioned has withdrawn from the operation, and the control now rests with George Spry, although MacDonald is working with him.

Nov. 27, 1943.

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DEPARTMENT OF MINERAL RESOURCES
State of Arizona
Field Engineers Report

Mine: YUMA COPPER MINE

Date February 11, 1943

District: Ellsworth, Yuma Co., Arizona.

Engineer Elgin B. Holt

R E P O R T

OWNER: C. H. Waters, Vicksburg, Arizona.

LESSEES: Roy, R. MacDonald, Robert Douglas, and George Spry, Vicksburg, Arizona.
(Lease taken over by George Spry in 1943.)

METALS: Copper.

LOCATION: This property is located at the Western end of the Granite Wash Hills, about 11 miles northwest of Vicksburg, and is reached by a good desert road from a loading ramp located at McVay siding on the Santa Fe Railroad, 5.5 miles from mine. The group is composed of 12 unpatented mining claims.

EXAMINATION: This property was visited by me on February 7, 1943, in company with George Spry and his associates. At this time the mine was being operated with a crew of 8 men and ore was being extracted and shipped to smelters. Also the working shaft had been cleaned out and retimbered and a gasoline hoist had been installed. I went down on the mine bucket with Mr. Spry and we inspected the underground workings of the property. I found these workings in excellent condition, and operations were being conducted in a business-like manner. It might be well to note here that all three of the said lessees are skilled miners and are working right along with their men.

GEOLOGY: The main ore-bearing zone consists of a limestone strata, or reef, striking east and west and dipping about 30 degrees north. On the hanging wall side of the reef there is a band of quartzite from 12 to 14 feet thick. Also the adjacent rocks, found on the north and south sides of the ore zone mentioned, presumably consist of quartzite and quartz-porphry.

VEINS: Within the ore zone, which at mine workings is at least 100 feet wide, are four parallel veins, from 3 to 15 feet thick, with the same strike and dip as the zone under discussion. These veins were probably caused by shearing action, as the gangue material thereof is composed of brecciated and altered limestone, which has been changed into copper ore by ascending thermal solutions, carrying that metal. Above the water level of the mine, the ores are oxidized, consisting of copper carbonates; while below the water level, later to be discussed, the ore is sulphide material, consisting of chalcopyrite, bornite, etc. Also there is a stockwork of veinlets in the ore running in various and sundry directions. Furthermore, the zone is cut in numerous places in the mine workings by basic intrusive dikes from a few inches to 30 feet in width. Again, the ore-bearing zone, showing copper in outcroppings, is traceable on the surface a total distance of 4500 feet, per Mr. Spry. Hence, the geologic conditions are most pleasing, and the property has all the ear-marks of a large copper mine in the making.

2/11/43

MINE WORKINGS: A vertical double compartment shaft was sunk to a depth of 135 feet, where a vein was encountered and drifts run thereon in an easterly and westerly direction. Thence the vertical shaft goes on down 20 feet to a loading pocket. Thence the shaft continues on downward at an inclination of 36 degrees, in the foot-wall of zone, to the 590-foot level of the mine. On the said 135-foot level a drift was run west from shaft 160 feet, following a vein running from 3 to 8 feet in width. Also a drift was run east from shaft 165 feet on the same vein. The oxidized ores found in these drifts average about 2% copper, per Mr. Spry.

WINZE: A working winze is located 78 feet west of shaft, and was sunk on vein to a total depth of 390 feet, below the said 135-foot level. Water now stands in this winze at a point 215 feet below the 135-foot level mentioned.

OXIDIZED AND SULPHIDE ORE ZONES: The oxidized ore zone goes down from the surface to a point in the winze mentioned, 180 feet below the 135-foot level, below which point the vein was found to be leached and barren of values for an additional depth of 60 feet, where massive sulphide copper ore came in. This information was recently furnished to Mr. Spry by Louis T. Derwin of Oracle, Arizona. Derwin was mine superintendent for the old Yuma Copper Company, 1906 - 1909, during which period all of the mining work in property was carried out, by people residing in Michigan.

Derwin stated that at a point 25 feet above the bottom of the winze, a drift was run in sulphide ore west 125 feet, and diamond drilling was then started from this level. As the water flow became troublesome, coming in at about 50 gallons per minute, the company abandoned this level, and backed up in the winze 50 feet where another drift was driven on the vein about 100 feet in an easterly direction. From this latter drift a number of diamond drill holes were run with a view of determining the extent of sulphide ore reserves in this area.

Derwin also stated, per Spry, that the sulphide ore vein was proven to be, by the drilling mentioned, from 30 to 50 feet wide; also that the granulated material from the drill holes averaged from 2.8 per cent to 3 per cent copper; but that bands of sulphide ore were encountered by the drill holes assaying from 10 to 30 percent copper.

The above statement is partly verified by the fact that some sulphide copper ore is now found on the mine dumps, consisting of chalcopyrite and bornite material. Also within recent years several short lots of sulphide ore, said to assay around 10 percent copper, have been shipped from these dumps by chloriders.

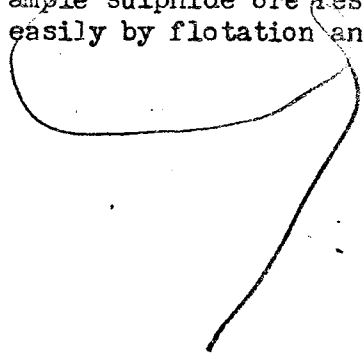
PRODUCTION: Lessees have opened a stope in oxidized ore on the 300-foot level in the winze. Here the vein is 10 feet in width, and all vein material has been shipped. Six car loads of ore have been marketed, to the Clarkdale, Magma and Hayden Smelters; but at the time of visit there were only five liquidation sheets available. These are tabulated as follows:

Tons	Cu. %	Au. Oz.	Ag. Oz	Zn. %	CaO. %	SiO ₂ . %	Fe. %
31.1835	5.75	.015	.24	.3	20.5	35.2	16.4
34.3985	5.52	.010	.24	.8	20.5	33.8	16.4
42.7130	4.39	.010	.24	.6	17.3	38.8	16.8
43.2385	4.88	.030	.30	-	20.6	38.0	15.7
35.0000	5.06	.010	.35	-	18.6	40.3	11.5

NOTE: The above car lots of ore were shipped from property between October 10, 1942, and Jan. 4, 1943. No ore is now in transit; but there are now 200 tons of broken ore on dump, of same grade material as noted above, ready to be shipped, as soon as the loading ramp at McVay siding can be completed. Also a loading bin is being built at the mine in order to facilitate loading trucks at that end.

Lessees are planning to ship at least 4 car loads of ore from the mine monthly.

OPERATIONS PLANNED: Lessees are planning to raise capital sufficient to defray the cost of cleaning out, timbering where necessary and unwatering the winze referred to in order to uncover the sulphide ore discussed above. They are of the opinion, once the sulphide ore is opened up, they will be able to produce, by selective mining, somewhat higher grade ore than is now being mined and shipped from the oxidized zone above water level. Also, when and if ample sulphide ore reserves can be blocked out, such ores can be concentrated easily by flotation and thereby a high-grade shipping product produced.



Signed: ELGIN B. HOLT.
Field Engineer.

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Yuma Copper

University of Arizona
Tucson.

August 29, 1946

Mr. Charles G. Berls,
Allison Steel Company,
P.O. Box 2151,
Phoenix, Arizona.

Dear Mr. Berls:

The sample which the Arizona Bureau of Mines received by express, August, 16, assayed 0.86 per cent copper, 0.04 oz. gold, and 0.15 oz. silver per ton. One flotation test was made on this sample, although it was low grade.

A sample was ground in a ball mill to 0.9 per cent on 100-mesh and treated by flotation. The reagents used are given in Table 1 and the results in Table 2. The concentrate produced amounted to 3.14 tons per 100 tons of heads, assayed 22.8 per cent copper, 0.80 oz. gold and 3.2 oz. silver per ton, and contained 76.6 and 62.3 per cents of the total copper and gold respectively. The middling amounted to 2.8 tons per 100 tons of heads, assayed 4.6 per cent copper, 0.22 oz. gold and 2.0 oz. silver per ton and contained 13.8 and 15.3 percents of the total copper and gold respectively. The rougher flotation tailing assayed 0.095 per cent copper and 0.01 oz. gold per ton.

The metallurgical results indicate the values will concentrate well by flotation. Only one test was made on the sample as I am not sure this is representative of the ore to be milled. If it is not, I will be glad to do further work on one which is of higher grade and representative of the ore body.

Yours very truly,

(signed) Geo. H. Roseveare
Metallurgist.

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UNIVERSITY OF ARIZONA
Arizona Bureau of Mines
Ore Testing Service

Ore. No. 1024

Test No. 1

Conditions and Reagents

Table I.

Point of Addition	Conditions			Reagents Lbs. per Ton		
	Time Mins.	Solids	pH	CaO	Z-3	P.O.
Ball Mill	15	60		4.0	0.06	0.03
Conditioner	10	25	10.4	6.0	0.05	0.03
Rougher Cell	8	25	10.1			
Cleaner Cell	4		10.3	3.0		

Remarks: CaC - Lime
Z-3 - Potassium ethyl Xanthate Grind 0.8 per cent on 100-mesh.
P.O - Pine Oil

Metallurgical Products

Table II

Product	Tons in 100	Assays			% of Total	
	Tons Feed.	: Cu. %	oz. Au.	oz. Ag.	Cu	Ag
Heads	100.0	0.86	0.04	0.15		
Concentrate	3.14	22.3	0.50	3.2	76.6	62.3
Middling	2.80	4.6	0.22	2.0	13.8	15.2
Rougher Tailing	94.06	0.095	0.01	50	9.6	22.4
Calculated Heads		0.934	0.04		100.0	100.0

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DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine: YUMA COPPER - Cu

Date: February 22, 1943

District: Ellsworth

Engineer: Earl F. Hastings

Subject: Reconstruction Finance Corporation
Preliminary Development Loan

DOCKET NO.

Date of Application Received

Date of Field Examination

Date of Report

Phoenix C-139

February 15, 1943

February 11, 1943 (Holt)

February 22, 1943

1. Name and address of applicant (correspondent):
George Spry (a partner) Vicksburg, Arizona.
2. Character of project and estimated cost thereof:
Unwater and re-enter workings from the 320 foot level to and including the 500 foot level. \$5000.00.
3. Location of property:
Ellsworth Mining District, Yuma County, Arizona.
4. Applicant is partnership (correspondent is major partner with power-of-attorney) holding lease and option. Option price is \$200,000.00 royalty 10% with a monthly minimum of \$100.00. The option agreement was apparently not prepared by an attorney.
5. Loan requested:
\$5,000.00
6. Loan recommended:
\$5,000.00
7. Comments:

(A) Added to the docket is a report and a memorandum by Elgin B. Holt, Field Engineer for the Department of Mineral Resources dated February 11, 1943.

(B) The property is developed at some depth by a vertical 135 foot shaft and thence 365 feet of inclined shaft and a 390 foot winze from the 135 foot level. The winze is sunk on ore and shipments made represent carbonate ore from the 320 foot level stope. These shipments assayed from 4.39% to 5.7% cu. on a stope width of 10 feet. The ore is not ideal fluxing ore as SiO2 content is only 40.0% and less. Iron and lime are the other major constituents.

The property is currently in operation that is, according to our field engineer, being conducted in an intelligent fashion. The operators (applicants) are experienced mining men.

2/22/43

(C) There are four parallel veins within the ore zone. The ore upon which development has been accomplished is visibly persistent to the 320 foot level, and sulphide fragments on the mine dump indicate the proximity of the transition zone within development limits.

The upper oxidized levels are of little commercial importance as the ore, claimed to assay up to 3% copper, is too low for shipment. The lower oxidized levels from which shipments are being made are not highly profitable, but the value and width are such that appreciable production is possible.

(D) Lateral limits of extent have not been reached. The 135 foot level is developed to a greater lateral distance, a length of 300 feet, than any of the lower levels. The vein here is 3 to 8 feet in width, and at the 320 foot level is 10 feet in width at the stope (though the average will no doubt be less over the lateral extent of the shoot as the 10 ft. width is local).

(E) Values of sulphide ores are ⁿupoven though the applicant states an 11% grade of sulphide ore was shipped by the owner of the property.

It is reasonable to assume that secondary enrichments below the barren zone or careful sorting of ore could qualify this claim.

(F) The property is partially equipped thereby limiting the necessity for major capital expenditures.

The location is such, in relation to railroads and smelter, that trucking and freight rates are favorable.

An economic balance between costs and returns can be anticipated.

(G) There then appears to be an ore body, or bodies, of lateral and vertical extent of promise, as well as a copper content permitting an appreciable production at limited profit. This loan can therefore be recommended for the purpose requested.

(H) The option agreement is not particularly suitable for operation under an R.F.C. loan but can possible be altered, or monthly minimum payments assumed, by the applicant.

ARIZONA DEPARTMENT OF MINERAL
RESOURCES

Earl F. Hastings
Project Engineer

YUMA COPPER MINE:

Production, Jan. 1, 1944, to May 31, 1947.

7,731 Tons of Ore shipped.

327,469 lbs. copper produced

Value of 287,065 lbs. copper @	\$0.1175	\$33,801.89
" " 17,331 " "	@ \$0.19275	3,340.55
" " 9,331 " "	@ \$0.19350	1,805.54
" " <u>13,742</u> " "	@ \$0.21225	<u>2,916.74</u>

327,469 lbs. copper - total value \$

\$41,864.72

Gold content of ore as reported by smelters

7,353.70

\$49,218.42

Smelter charges and deductions - \$37,937.50

Freight 13,618.06

51,555.56

Deficit

\$ 2,337.14

Premiums

44,429.02

Total Receipts

\$42,091.88

Tests made by the Arizona Bureau of Mines show that the ore can be concentrated on a ratio of 30 to 1, which would mean that the smelter and freight charges can be reduced to 1/30 of their present amount, or in the case of the above charges, the sum of \$51,555.56 would have been reduced to approximately \$1,718.50.

Above shipments represent 18 carloads shipped to Magma Copper Company's smelter, Superior, Arizona, and 64 carloads shipped to Phelps-Dodge smelter at Clarksdale, Arizona.

Preliminary Report on YUMA COPPER MINE

Engineer: MORTON E. PRATT

Date: Nov. 5-6, 1943.

LOCATION: In the western end of the Harcuvar Mountains, about 11 miles north-east of Vicksburg, and 5 $\frac{1}{2}$ miles from McVay siding on the Santa Fe Railway, which is the point of rail shipment. The property is accessible by paved road and not more than 6 miles of dirt road of easy gradient.

PROPERTY: 12 lode locations, not patented.

OWNER AND LESSEES: The property is owned by Mr. H. C. Waters of Vicksburg, and is under lease to Roy R. MacDonald and George Spry, who now make their headquarters at the property.

LEASE AND OPTION TO PURCHASE: The undersigned has not seen this document, but the basic details are said to be a monthly payment of \$100 and a royalty of 10% on the net smelter returns from all ore shipped. No time limit has been placed, so long as the above requirements are fulfilled. Purchase price, \$200,000. Royalty payments applicable on purchase price. Royalties are reckoned on the base price of 12¢ per pound, but not on premiums.

Since the above agreement was signed, the lessees obtained a loan of \$5,000 from the Reconstruction Finance Corporation, and at that time the owner agreed to remit the monthly payments due him until this debt had been paid.

ORE OCCURRENCE: The ore is found in a compressed sheared limestone bed, considerably altered, silicized, and marbled in part. The outcrop of this bed is traceable for a long distance, and varies from 100' to nearly 200' in width, with strike east and west and dip to the north at 30 to 60 degrees from the horizontal. This bed is flanked by other sedimentaries, principally quartzite and schist, and on the upper or north side is a highly silicious gneiss that is thought to be of probably igneous origin. The ore is found in shear zones in the limestone, of which there are three or possibly four, varying in width from 3' to 20'.

The leached outcrop of the limestone shows copper mineralization at shallow depths in many places, and as near as can be judged, the extent of the more pronounced mineralization is about 2,000' in length. The principal point where this has been explored to any depth is the present mine workings, which are to the westerly end of this outcrop.

EXPLORATORY WORK: A vertical shaft, collared a few feet above the limestone bed, extends through the limestone to a depth of 135' and into an altered, highly silicious bed (quartzite) a distance of 90'. From the 135-foot level of the vertical shaft, drifts extend 165 feet to the east and 160 feet to the west. From the vertical shaft at the 135-foot level, or immediately under the limestone bed, an incline at 35 degrees extends to the water level 140', and is said to extend at least 150' below the water level. In the 135-foot level, about 80' west of the shaft, an inclined winze extends to water level, 200', and is said to extend an additional 100' below water level. This winze follows the footwall shear-zone for about 50' at 30 degrees, and is in oxidized ore, the samples from which run 4% to 4 $\frac{1}{2}$ % copper, whence it extends about 90' at 15 degrees to 20 degrees slope, where it enters another zone of shearing higher up in the limestone bed, and follows that about 60' at 30 degrees to water level. From this part of the winze, which is only a few feet above the permanent water level, 10 car loads of about 300 tons have been mined and shipped.

Smelter returns on 6 of the above cars (the returns from the other 4 cars had been misplaced) average 4.9% copper.

On the 135' level at about 40' east of the shaft, one car of 35 tons was mined and shipped, and gave a return of 2 $\frac{1}{2}$ % copper. Other samples from the ore on this level ran from 1.6% to 3.8% copper.

At a point about 1000' west of the shaft, a drift adit extending to the east, and on a shear-zone near to the upper side of the limestone bed, is within 255' of the west drift on the 135' level as shown by existing surveys.

There is some question regarding this survey, particularly the detail of the relative elevation of the drift adit and the 135' level from the vertical shaft. The drift adit was intended as a mine entry that would eliminate the vertical shaft, so this detail of relative elevation is of considerable importance.

Judging from appearances, there is some ore of commercial value in this drift adit. A number of surface pits and cuts show a considerable amount of copper mineralization, but it seems doubtful that any ore of commercial value is to be found at the small depth attained.

A few months since, the lessees unwatered the winze on the 135' level to an old drift about 90' slope distance below the water level. They found this drift accessible with very little difficulty, and mined 180 tons of sulphide ore (pyrite with chalcopyrite) and a very little bornite) of an average of 2.08% copper. At the time that this part of the mine was unwatered, representatives of the Reconstruction Finance Corporation made an examination and sampled same; samples, particularly from a cross-cut over a width of 32', gave an average return of 1.7% copper.

CONCLUSIONS: From the foregoing, it would seem that there has been no appreciable increase in copper values immediately below the water level in this ore-body, or on entering the sulphide zone, which is common and rather to be expected in copper mines. While it is still possible that some enrichment might be found at slightly greater depth below the water level or zone of sulphide mineralization, that seems improbable in this particular instance. There is some increase in the copper content of the ore in the lower part of the oxidized zone, probably for 100' or more above the permanent water level.

In the winze below the 135' level, and down to the permanent water level, it is safe to estimate there is now available 4,000 tons of 4.25% copper. The principal copper minerals are malachite and azurite. The mine is so developed that a comparatively small amount of development work would prove this zone laterally for some distance, and a large volume of ore is to be expected. The ore of this zone can be mined at low cost, and the possibility of profitable operation is considerably above the common.

The cost is estimated as follows, based on mining and shipping to a smelting works:

Mining,	\$2.00 per ton
Trucking to railroad	.50 " "
Freight to smelter	1.50 " "
Smelter treatment charges	2.50 " "
Total	\$6.50 per ton.

On the above basis, 2% copper ore at 17¢ or 1% copper ore at 27¢ would meet operating costs. At this time it is rather difficult to determine just what price can be secured on copper within these two limits, but it is understood that the price of 17¢ is assured to July, 1945. At the present time, the maximum price that can be secured will be between 17¢ and 27¢ per pound.

From the ore shipments made, the following are smelter analyses:

Tons	Cu.%	Au.Oz.	Ag. Oz.	Zn.%	CaO-%	SiO ₂ -%	Fe.%
31.1835	5.75	.015	.24	.3	20.95	35.2	16.4
34.3985	1.52	.010	.24	.8	20.5	33.8	16.4
42.7130	4.39	.010	.24	.6	17.3	38.8	16.8
43.2365	4.88	.030	.30	-	20.6	38.0	15.7
33.0350	5.06	.010	.35				
39.9630	4.70						

RECOMMENDATIONS: That the consideration of any exploration at depth or in the sulphide zone be dropped at this time.

That further consideration be given to possible production from ore above the water level.

Before going into any determination regarding the ore in the oxidized zone, definite information as to the rights and validity of the lease should be assured.

Following this, a definite business agreement with the lessees as to the Arizona-Eastern Gold Mines Company entering into this operation should be reached.

On conclusion of a satisfactory business agreement, a more detailed examination of the surface and particularly careful sampling of all mineralized exposures is of first importance.

A study as to practical operation, the equipment available, and particularly an estimate of the amount of capital and time that would be required to get into a profitable operation, should be prepared in detail.

A limited survey is quite necessary.

The work of further examination, sampling, etc., as set forth above, will take about ten days of time.

Respectfully submitted.

/s/ M. E. PRATT.

Phoenix, Arizona.
November 9, 1943.

Lot No	Dry Tons	Place	% Cu	% Zn	% S	Letel O ₂ Au	Ship Ag	(Oxide) Fe	CaO	Cu	Ag	Ag	
5	58.2	dr	1.35	0.7	0.5	.025	.36	13.2	29.2	20.6	.786	.01452	.2095
6	54.1	dr	1.50	0.7	0.1	.04	.27	18.1	47.2	10.5	.811	.02162	.1450
68	47.0	dry w. wmp	5.07	1.1	0.3	.01	.16	15.2	40.6	18.3	2.381	.00470	.0752
70	21.5	X w. wmp L6C St.	8.08	0.6	0.2	.005	.10	11.9	44.2	16.2	1.734	.00108	.0218
84442	52.7	L6C Stope	7.65	—	0.4	.02	.20	12.6	40.7	17.5	4.030	.01050	.1050
83747	43.5	"	9.78	—	0.6	.03	.50	10.8	43.6	14.2	4.260	.01305	.2180
83717	31.0	"	9.17	—	0.7	.02	.40	11.8	41.5	15.2	2.841	.06200	.1240
83373	49.5	"	7.15	—	0.3	.02	.20	12.4	42.8	17.4	3.540	.00910	.0990
82152	38.1	"	11.48	—	1.7	.06	.40	9.8	41.8	14.2	4.375	.02290	.1523
172808	53.0	"	8.80	—	0.4	.02	.50	12.2	43.2	16.2	4.665	.01060	.2450
173707	52.1	"	8.52	—	0.4	.02	.30	12.4	41.2	16.9	4.440	.01042	.1560
171804	42.6	"	11.15	—	1.3	.03	.10	11.2	42.1	14.2	4.745	.01278	.0450
172783	44.0	"	9.38	—	0.7	.04	.20	12.2	42.2	15.2	4.125	.01760	.0850
Total	587.3										42.733	.21167	.1623
Avg		L6C St.	7.27%	0.7±	0.56	.036	.273	12.58	41.50	15.9			
82490	48.8	L8B Stope	1.74	—	0.4	.04	.20	16.4	50.1	14.6	85.00	1.952	.976
83087	102.3	"	1.75	—	0.5	.05	.10	17.3	50.1	15.2	179.20	5.120	1.023
83088	102.3	"											
70011	90.9	"	1.73	—	0.4	.05	.10	16.3	50.6	15.1	157.20	4.550	.909
85667	51.5	"	1.60	—	0.5	.05	.20	14.4	52.4	15.6	82.50	2.575	1.030
81121	101.1	"	1.32	—	0.3	.04	.10	13.2	56.2	14.3	139.60	4.040	1.011
83942	157.5	"	1.63	—	0.7	.06	.50	14.3	53.2	16.2	256.50	9.450	2.480
85632	157.5	"											
84778	90.5	"	1.61	—	0.3	.04	.20	14.7	53.2	16.2	145.80	3.620	1.810
82240	101.0	"	1.92	—	1.7	.04	.20	14.3	50.2	18.3	194.00	4.040	2.020
172635	112.1	"			5.3			12.7	41.7	12.6	1239.8	35.347	18229
173584	112.1	"											
173900	112.1	"											
172950	112.1	"											
Total	714.36			—									
Avg		L8B St.	1.667	N.S.	0.66	.0475	.246	15.2	52.3	15.8			
172358	47.9	L8D Stope	1.95	—	0.3	.05	.20	15.2	50.2	15.1	93.5	2.395	.958
183225	57.1	"	1.95	—	0.3	.05	.20	15.2	54.2	15.2	111.4	2.855	1.142
173211	46.9	"	2.00	—	0.9	.06	.40	15.8	53.2	15.8	93.8	2.815	1.879
81547	172.30	"											
172130	95.1	"	2.10	—	0.6	.06	.40	14.3	52.1	14.3	199.8	5.710	3.220
174267	56.1	"	2.02	—	0.5	.05	.20	13.7	53.2	15.4	113.2	2.805	1.122
Total	303.1			—	2.6			75.3	263.2	76.3	611.7	16.580	8921
Avg		L8D St.	2.018	NS	0.52	.0547	.294	15.28	52.7	15.37			

415 & 450 much & stapes

415L - Much

Lot	Dry Trans	Place	% Cu	% Zn	% S	OZ. Au Ag	% Fe	% SiO ₂ + Al ₂ O ₃	% CaO	% x tons	Cu	Au	Ag
36	110.8	dr	1.45	0.3	8.2	.02 .25	21.7	38.6	16.0	1.607	.0222	.277	
37	90.2	"	1.48	0.1	7.3	.03 .27	17.8	44.8	16.2	1.335	.0281	.243	
38	98.9	"	1.52	0.1	7.2	.025 .25	18.4	41.2	17.1	1.502	.0248	.248	
39	102.9	"	1.14	0.4	7.7	.02 .25	17.6	38.2	19.6	1.172	.0206	.257	
40	100.8	GH	1.23	0.0	7.5	.022 .24	15.9	42.2	17.6	1.240	.0262	.242	
41	155.7	dr	1.29	0.3	7.3	.027 .24	14.2	32.2	19.3	2.004	.0422	.373	
42	104.9	"	1.37	0.4	7.3	.035 .27	13.2	38.5	14.1	1.438	.0367	.272	
43	53.6	"	1.37	1.2	9.1	.042 .25	15.2	39.2	16.2	0.745	.0215	.134	
44	107.2	"	1.53	0.2	8.4	.028 .27	16.2	45.1	16.1	1.650	.0272	.303	
45	98.1	GH	1.64	0.2	6.6	.03 .28	15.2	43.2	17.2	1.610	.0294	.275	
46	51.5	"	1.61	0.3	7.0	.03 .28	16.4	44.2	17.2	0.829	.0155	.144	
47	148.9	"	1.71	0.2	8.6	.03 .29	15.2	41.2	17.1	2.541	.0447	.432	
48	95.8	"	1.77	0.6	7.4	.03 .30	15.2	45.2	14.2	1.698	.0288	.272	
49	97.2	"	1.76	0.2	7.6	.03 .29	17.2	45.2	15.2	1.710	.0272	.272	
50	97.7	"	1.77	0.2	7.2	.032 .31	16.2	44.1	16.2	1.729	.0312	.302	
51	104.4	"	1.25	0.6	7.4	.03 .30	15.9	46.2	16.2	1.932	.0314	.314	
52	100.1	"	1.70	0.0	6.7	.03 .30	16.1	39.2	17.2	1.702	.0302	.302	
53	97.9	"	1.74	0.0	7.0	.032 .29	17.2	42.2	16.2	1.704	.0314	.284	
54	102.6	"	1.71	0.1	7.2	.04 .27	15.1	42.2	16.2	1.754	.0410	.272	
55	106.8	"	1.71	0.1	7.1	.033 .31	16.2	44.2	16.2	1.826	.0406	.231	
56	99.7	"	1.64	0.0	7.1	.03 .27	16.1	41.2	17.2	1.635	.0277	.277	
57	100.2	dr	1.41	0.2	9.4	.03 .26	18.2	39.2	17.2	1.420	.0202	.262	
58	104.6	GH	1.78	0.4	9.2	.035 .30	18.2	43.2	14.2	1.862	.0366	.312	
59	112.2	"	1.53	0.2	8.2	.032 .26	18.2	42.2	16.2	1.811	.0378	.302	
60	117.2	dr	1.41	0.2	9.4	.035 .26	20.1	40.2	15.2	1.652	.0410	.232	
61	116.0	GH	1.62	0.1	9.6	.03 .37	19.2	40.2	15.2	1.861	.0346	.421	
62	120.2	dr	1.45	0.2	9.6	.03 .26	19.2	43.1	14.2	1.744	.0361	.312	
63	117.2	"	1.46	0.1	8.7	.033 .27	19.2	42.1	14.2	1.720	.0388	.272	
64	116.7	"	1.37	0.1	9.0	.032 .24	19.0	41.2	16.2	1.592	.0373	.282	
65	241.3	GH	1.31	0.1	10.4	.032 .23	20.4	38.2	14.2	3.160	.0675	.532	
66	(36.7)	450L	2.06	0.3	2.8	.028 .37	18.3	42.2	14.2				
67	57.3	dr	1.36	0.1	9.0	.025 .22	12.2	43.2	14.2	0.780	.0143	.161	
Tot.	3331.9			7.9	25.4		535.6	138.7	507.3	50972	.10207	.9165	
Avg.	—		1.530	0.255	7.9	.0308 .286	17.36	42.2	16.35	1.530	0.0308	.286	

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REPORT OF YUMA COPPER MINE

By J.S. Coupal, Registered Mining Engineer, Phoenix, Arizona

FORWARD:

The Yuma Copper Mine has a sizeable deposit of low grade copper ore, proven by extensive underground workings. During the course of development, several thousand tons of sulphide ore were mined on which smelter returns averaged 1.7% copper and approximately \$1.00 gold. Test have shown the ore to be amenable to simple flotation, with 98% recovery and a high ratio of concentration.

Conditions are favorable for low cost mining and milling, with ample water supply on the property, and truck line electric power available within 5½ miles. Geologic conditions indicate that a higher grade zone of enrichment may be found within comparatively slight increased depth.

In order to avoid excessive costs of transportation and smelting of crude ore, an adequate milling plant is necessary.

Sufficient ore is now exposed to reasonable assure the return of the capitol investment needed to install a milling plant, pay for further development, and show a good profit, with indications that increased depth will make it one of the big, profitable mines of the State of Arizona.

Details follow:

PROPERTY:

The property consists of 12 unpatented mining claims, approximately 240 acres, located in the Ellsworth Mining District, Yuma County, Arizona, about nine miles northwest of Vickburg, in the foothills of a spur of the Harcuvar Mountain, known as Granite Wash Hill, which are known and recorded in the County Recorder's office, at Yuma, Arizona as follows:

<u>NAME OF CLAIM</u>	<u>BOOK OF MINES</u>	<u>PAGE</u>
Carbonate No.1	27	2
" 2	27	3
" 3	27	4
" 6	27	5
" 7	27	6
Arizona No.1	27	7
" 2	40	236
" 3	40	237
" 4	40	238
" 5	27	8
" 8		
Union	27	558

The relative location of the claims is shown on the attached map.

ROAD FACILITIES:

The nearest rail point is McVay, a pumping station and sidetrack on the Parker cut-off branch of the Santa Fe Railway, about 56 miles southeast from Parker, on State Highway 72. At McVay is a loading ramp for shipping ore, and from McVay to the mine, a practically level dirt road 6½ miles northeast. McVay is about 127 miles from Phoenix.

NATURAL CONDITIONS:

The elevation on the property ranges from about 1600 feet above sea level at the portal of the adit tunnel and camp to about 2400 feet at the high point on the claims. The vegetation is typical of the semi-arid area of the southwest, and consists of cactus, greasewood, etc., sparse and with no large growths. Rainfall is slight and no snow occurs. Domestic water supply is from shallow wells, and an ample flow for milling purposes may be had from the lower workings of the mine. Good camp site is available on the property, and a good road to mine and camp.

HISTORY:

The claims were located in the early 90s, and the major development done during the next decade. The operators were seeking high grade shipping ore, and no mill was erected on the property. After many years of idleness, the property was acquired under lease. An R.F.C. loan was obtained to unwater and examine the property. The Liberator Mines Company was formed in 1944 to operate the property. In the course of development they shipped about 6,000 tons of ore; about 400 tons were oxidized ore, shipped by sub-
lessors, averaging 9% copper, and the balance sulphides from development work which averaged 1.7% copper and \$1.00 plus in gold.

The development work in the sulphide zone indicated a large body of mill ore, but of a grade that could not be mined and shipped at a profit without concentration. Pending the erection of a mill, the mine has been kept unwatered.

ORE BODIES:

There are two prominent ore bodies on the property; one a heavy iron gossan, about 40 feet in width, exposed on Arizonas No. 1, 2, 3, 4, and 7. Only minor development work has been done on this ore body, but it is known to carry good values in gold, and indications are that good values in copper should occur in depth.

The major ore body outcrops on Carbonate claims, No. 2 and 3, and on those claims the major developments have been made. See sketch map of the Tres Amigos Development Company.

DEVELOPMENT WORK:

The major developments are on a lode which strikes north 78 degrees west, and which dips 30 degrees from the horizontal to the north. Developments consist of a vertical shaft which enters the mineralized zone at a depth of 75 feet below the collar of the shaft and the footwall of the mineralized zone at a depth of 140 feet; at the bottom of the shaft, levels were driven southeasterly 125 feet on ore, and westerly 150 feet, and an inclined shaft, 260 feet in slope distance, sunk in the footwall, just below the mineralized zone. This was evidently sunk as a working shaft, as it is of ample width and height and straight. At a point about 60 feet east of the bottom of the vertical shaft, and on what is called the 140 foot level, another inclined winze was sunk on ore which dipped 26 degrees from the horizontal to a slope depth of 420 feet. This was evidently the exploration shaft, as it follows the footwall of the mineralized zone and a prominent, practically vertical, diabase dike. From the inclined winze levels have been driven easterly for a distance of 220 feet and on what is called the 350 foot level; and 475 feet easterly on the so-called 415 foot level. An adit was driven east for 680 feet at a point 125 feet lower than the collar of the vertical shaft, and connections made between it and a raise from the collar of the inclined winze for temporary hoisting purposes.

Two stopes from the adit level have been made in oxidized ores. A small stope has been made on the 140 foot level on oxidized ore, and another stope to the west of the inclined shaft at the 350 foot level, all on oxidized ore. Another stope to the east of the inclined winze has been made on oxidized ore.

Some exploration work, not yet productive of ore, has been done west of the inclined winze from the 350 foot level, hunting for the extension of ore exposed on the adit level.

The major stoping has been done at a point about 150 feet east of an inclined winze on the 350 foot level, and this stope has been connected with the 415 foot level. The stope at this point shows a thickness of mineralized area about 80 feet in thickness normal to the dip of the ore body.

Apart from the development mentioned, there have been several attempts at diamond drilling from the underground workings, to prove continuation and extent of the ore showings. The ore zone is in a disintegrated garnetized limestone, and no cores were obtainable, even though ore was indicated.

TONNAGE:

Due to the irregularity of the underground workings in the sulphide ore body, it is impossible to make any positive statement as to the tonnage technically blocked out on four sides. The ore has been opened up on the 415 foot level for a distance of about 400 feet along the strike of the ore body. The cross-hatching on the 1"-equals 40' scale map of the workings show that all ore extracted in the development work was shipped. The stope between the 350' level and the 415' level, shows the ore body to have a thickness at this point of about 80' normal to the dip. The extreme east end of the 415' sulphide level and the end of the 176 foot drill hole, indicates a horizontal distance of 140 feet in ore, or an approximate thickness of ore normal to the dip of 80 feet at this point. The drift and drill hole on the north crosscut, 25 feet east of the incline winze on the 415 foot level, indicates a horizontal distance of 100 feet on ore, which is equivalent to thickness normal to the dip of 50 feet. This would give an average thickness of 70 feet, a length of 400 feet, and the measured slope depth in sulphides of approximately 130 feet. 70×400 equals 3,200,000* cubic feet, or on this ore, of approximately 300,000 tons. This is a calculation of the possible ore indicated, but not conclusively proven, due to the limited extent and irregularity of the workings.

~~*In checking these figures, I find the result of the multiplication should be 3,640,000 cubic feet, which would add considerably to the tonnage.~~

PROBABILITIES IN DEPTH:

There are indications that the lower workings are approaching a zone of enrichment where higher grade ore may be reasonably assumed, and also that a higher grade primary ore will be encountered at greater depth.

The ore on the 415 foot level is higher grade than the ore on the 350 foot level. The ore in drift at the bottom of the inclined shaft is higher grade than the ore in the 415 foot level. The ore has been decomposed and leached, and shows increased value as greater depth is obtained. It is a safe assumption that the ore will continue to increase in value until a maximum value will be obtained in the zone of enrichment. There is nothing to indicate when the zone of enrichment will be reached, but it should occur within the next 200 feet in depth.

In addition to this, the ore is cut by numerous dense post-mineral vertical diabase dikes, which do not displace the ore body. Near several of these dikes, in areas which have been protected from the more extensive leaching action, remnants of massive, garnetized limestone occur, showing chalcopyrite ore of 5% to 6% copper content. This massive ore grades off within a foot of the dike, into the low-grade disintegrated and leached ore zone. This has been found in several places, and creates a strong belief that the primary ore which will be encountered below the enriched zone, will prove to be a higher grade chalcopyrite ore. The copper in the leached zone is the secondary ore covellite.

MINING METHODS:

The structural conditions of the disintegrated garnetized limestone ore body and its thickness - 80 feet - make for a low cost mining. In certain areas it has been possible to start a hole with an ordinary $\frac{1}{2}$ " pipe for cleaning blast holes, and advance the pipe with 100 pounds air, at a rate of 3 to 4 feet per minute. In spite of this fact, the ore stands without timbering in stopes with spans of 30 to 40 feet, where the ground water level has been lowered.

The mining methods will be some combination of top slicing and carving, but the actual procedure will depend upon the structural condition of the hanging wall.

MILL TESTS:

Concentration test on the sulphide ore have been made by simple flotation. With a 60 mesh grind, a recovery of 95% of the copper and gold was made, and a concentration ratio of 30 to 1. Under the present high costs of transportation by truck or rail, this makes the erection of a flotation mill at the mine a "must" in order to handle the large body of low grade ore.

The flow sheet of the mill will be as follows:

Controlled feeder to ball mill;
Classifier;
Conditioner tank;
Flotation cells;
Concentrate to thickness^{ner};
Filters;
Shipping bin.

It is estimated that the cost of equipment and mill erection will be about \$150,000 and will take from 5 to 6 months, during which time stope preparation can be done and the mine placed in shape for low-cost mining and hoisting.

ASSAY MAP:

On a large-scale office map the location of each carload shipment is plotted, and attached to it, copies of lists of smelter settlements and assays. This map is not included with this report but is available, and is of far reater value than an assay map of channel smaples and assay results.

COSTS:

Mining and Milling costs are estimated at \$3.90 per ton on a 200 ton daily production, as follows:

Mining	\$1.10 per ton	
Development	.50	"
Milling	1.25	"
Insurance, Taxes, Etc.	.40	"
Royalty	.65	"
		\$3.90

Value of ore	\$6.50
Cost	3.90
Profit per ton	<u>\$2.60</u>

EARNINGS:

200 tons@ \$2.60 per ton	\$	530.00 per day
300 days per year		156,000.00

RECOMMENDATIONS:

The erection of a 200 ton per day mill
The equipment of the mine for low-cost
production.

Sink the inclined shaft another 200 feet with stations each 100 feet. Connect adit level with vertical shaft and incline shaft, with 400 ton underground ore pocket and direct hoist through incline shaft. 50-ton underground ore pockets on the 350' and 415' levels and on the new levels.

Exploration of the iron gossan on the Arizona Claims.

Power line from the truck high-power line to railroad.

The cost of the work recommended is estimated at about \$200,000.00 and provision should be made of \$40,000 to \$50,000 for working capital and contingencies.

CONCLUSIONS:

The ore in sight and practically assured, fully justifies work outlined. Enough ore is assured to not only repay the capital investment required, but to show a substantial profit in addition. The prospect of opening up a larger tonnage of higher grade ore in depth is most favorable and indicates a long-continued profitable operation.

Respectfully submitted:

J.S. COUPAL
Registered Mining Engineer
Phoenix, Arizona

May 1950 *(initials)*

*Note by C.R. King - platat of original report in
Yuma Co file 3/27/56*

1/20/70

Phase #3 - At the conclusion of the evaluation period, and upon a favorable determination, Alaskamet would proceed to spend a minimum of \$50,000 on the property prior to December 31, 1970, and in so committing, earn a 50% undivided interest in the mine.

a - Alaskamet become the operators of the property and participate in 50% of the net profits of the operation.

b - A comprehensive understanding between the partners regarding operating procedures, cost, profits, policy, etc., would be entered into with provisions for arbitration in the event that mutual concurrence requires same.

c - Some performance criteria timetables would be necessary and a formula for jointly providing funds for the purposes of exploration, development, mining, milling or expansions thereof, could be prepared whereby in the event, for any reason, the non-operating partner was unable to provide its prorata share of required funds, then and in that event, its profit participation percentage would be reduced prorata to its ability to contribute to the partnership, but in no event to be reduced to less than 15%.

In the event that Alaskamet fail to prudently place the property into production within an agreed period of time, then the non-operating partner would have the right to assume the operating partner's position and all rights and liabilities to the respective parties would reverse.

Alaskamet is holding a stockholder's meeting January 25th, 1970 in Tucson, and I would very much like to submit this for their conditional approval at that time due to the reasons I discussed with you. Please advise.

Very truly yours,
HEINRICHS GEOEXPLORATION CO.
E. Grover Heinrichs, V. Pres.

EGH/k

Partial Description of the YUMA COPPER PROPERTY, by George Spry, Manager.

The Yuma Copper Property is located in Vicksburg, Northern Yuma County, Arizona, and is connected by practically level, well-graded road with McVay, the loading point, on the Parker cut-off of the Santa Fe Railroad, about six miles to the southwest.

The ore is copper, carrying small payable amounts of gold and silver, and extensive tests have shown the ore to average 1.648 in copper, 0.04 oz. in gold, and 0.40 oz. silver, or a gross value of \$9.37 per ton. Mine and mill costs have been carefully figured at \$2.85 per ton, and a mill test showed a recovery of 94% of the copper, gold and silver.

The ore occurs in a garnetized limestone which dips about 30 degrees from the horizontal, and is developed by several thousand feet of adit tunnel, incline shaft, winzes, drifts, and crosscuts.

Development work has proven the ore body for a length of approximately 500 feet on the strike, 250 feet on the dip, and a thickness of 80 feet normal to the dip. Ore still shows in length and in depth on the various openings, and the hanging wall has not yet been reached, so that additional ore can be reasonably expected.

The above 250 feet developed on the dip is in reference to the sulphide ore alone, and has nothing to do with several hundred feet of over-lying carbonate ores. The carbonate ores have not been mentioned as they are leached to a point where they are not commercially shippable, and would be of no importance in a mill operation. The tonnages and values quoted in this description cover only the sulphide ores, which lend themselves very readily to a simple flotation process.

The present assured ore shows a block 500' x 250' x 80', or 10,000,000 cubic feet, approximately 900,000 tons of ore. The gangue is highly ferruginous and consequently has a high density. This block of ore by no means covers the known extent of the ore zone. This statement can be safely made, as the ore has very definite characteristics that hold true from the surface outcrops down to the present level. The whole structure, including the mineralization, has an east-west strike, and a dip north of 30 degrees, and rakes east 65 degrees. In doing the development work on the lower levels, and figuring back on what is known to exist on the upper levels, the continuity of structure and rake is very definitely established.

One of the upper levels in the carbonate ore has shown ore at least 125 feet easterly on the structure beyond the ore developed in the lower or sulphide levels. This carbonate drift shows ore all the way, which strongly indicates that the extent of ore in the lower levels has not anywhere nearly been reached. It was the structure in this drift that was responsible for our doing the development work below that blocked out the ore mentioned. As far as we have been able to go with the development work to date, the ore body has been continuous. The outcrop shows ore for several thousand feet east of anything that is developed in the mine to date.

Conditions at the mine are all favorable for economical mining and milling operations. Water is available at the mine, and the ore is soft and in many cases actually sandy. In spite of this, large areas have been opened up, and no timbering has been necessary except in development drifts where stoping has been done. Transportation offers no difficulty.

(Signed) GEORGE SPRY.

(Manager during the operating period.)

CC: Mr. J.G.Tinkle, President, Alaska Metal Mines, Inc. (Alaskamet)

January 20, 1970

Mr. Larry Drake, Agent
North Goldstream Mines Ltd.

Tucson, Arizona

Dear Larry:

As per our negotiations of January 20, 1970, I have discussed our meeting with my principal (hereinafter referred to as Alaskamet), and the following constitutes the type of situation which they would be interested entering into with your Company regarding the Yuma Mine located in Yuma County, Arizona.

Phase #1 - Acquiring a 90-day option for the purposes of:

- a - Examining titles to the property
- b - Evaluation of engineering data reports and reserves.
- c - Prepare preliminary feasibility report regarding mining.

Phase #2 -(Indicating favorable phase #1 evaluation)
An extension of the option for an additional 90 days to prepare a preliminary mill feasibility study.

You suggested \$300 per month, token consideration, during the evaluation option period, which would be satisfactory. However, it would be my recommendation that you be available to perform certain work on behalf of both our Company and yours during that period at the mine site.

415' Level

Drill Sludge Info.

By C. H. King

Send agreement N.C.S. Mines
agreement with King

YUMA COPPER MINE

A preliminary examination of the Yuma Copper Mine was made by the writer during March, 1957.

The deposit is a pyrometamorphic type, Copper metallization occurring as a replacement in a limestone bed contained in a series of schists and gneisses. The metamorphic beds dip about 30° towards a granitic mass that forms the backbone of the Granite Wash Hills to the north. Metallization occurs at various horizons in the limestone bed, and pitches to the east at about 20 degrees.

The property is opened up by three principal levels, the lowest of which ("415") is just above the water table, and is 220 feet below the collar of the Tres Arigos shaft. A fourth level ("450") is about 65 feet below the 415; one shipment of 36.5 tons of drift muck was rade from this level, and ran 2.06% cu. Some Chalcopryite and bornite was found on the 415 level, but most of the ore from this level, and all of the ore from the upper levels is oxidized material, although King has classed as sulfide ore all that extending from 40 feet above the 165 level to the lowest present workings because metallurgical tests indicate that this material can be concentrated with a good recovery by flotation methods. (See p. 9, King and King Report).

The future of the mine abviously lies in the development of richer ore at depth, either due to secondary enrichment, or to the discovery of good grade primary sulfides. The most feasible point of attack to accomplish this would be to diamond drill down the pitch of the ore shoot from near the east face of the 415 level. It is entirely possible that such a drill hole might pass between two mineralized horizons within the ore-bearing limestone, but such mineralization should be detected by a halo of lower-grade mineralization that commonly surrounds the high grade ore bodies, and would serve to orient a second or third hole from the same set-up.

It is not considered desirable to try to drill from the surface in an attempt to cross-cut the limestone bed because of the excessive depths that would have to be drilled. On the other hand, to get in a position underground to cross-cut the bed would entail driving drifts or cross-cuts, possibly several hundred feet in length. If richer ore could be picked up with one or two holes from the present workings, then such drifting and/or cross-cutting might be warranted and would probably be necessary to block out an ore body.

C
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Surface reconnaissance has disclosed that presence of a magnetite outcrop some quarter of a mile to the east of the present workings, which encourages the belief that mineralization continues down dip with an eastward pitch. This area should be prospected by electro-magnetic methods in an attempt to pick up indications of sulfides at depth below the outcrop of magnetite.

The magnetite outcrop along the road to the property should likewise be prospected electro-magnetically to determine if the minor copper mineralization seen in the outcrop is overlying a larger ore body of sulfides.

The area immediately west of the Yuma Mine along the strike of the limestone bed that is mineralized. The limestone bed ends against granite, and shows almost no hydrothermal alteration. The ore shoot developed in the mine is probably controlled by a flexure in the bed, or by a zone of recrystallization, or a zone of fracturing. The westward extension of this control and the limestone bed have been removed by erosion, and if an ore body exists west of the low granitic hills to the west of the mine, it would be an entirely separate deposit. Minor scheelite mineralization in small quartz veins occurs in the granite, and has been mined during recent years.

The ground immediately west of the west magnetite outcrop is held by the scheelite miners, and the ground should be obtained before exploration there is started.

The ground west of the scheelite holdings is covered by alluvium, and is probably open for location. This area could be prospected by airborne magnetometer, and if an anomaly is found, then staked.

A program to explore this property could be set up in different ways, depending upon the objective. Some drilling down the pitch of the ore shoot from the underground workings to determine if secondary enrichment exists should probably be the first step. Because of the flat pitch of the present ore zone, if secondary enrichment is found, it could be of considerable horizontal extent, and might constitute a major discovery. If this fails to disclose ore rich enough to be mined by underground methods, this portion of the program should be dropped forthwith.

Exploration by electro-magnetic means, followed by drilling of any anomalies found, of the two magnetic outcrops would be a separate phase. The east outcrop would involve an underground operation; the west outcrop might be amenable to open-pit mining, or might likewise be an underground property. The desirability of checking the downward nature of these ore-bodies is that this work would show what to expect in any magnetic anomalies that might be found under alluvium to the west, without the necessity of having to fly the property first.

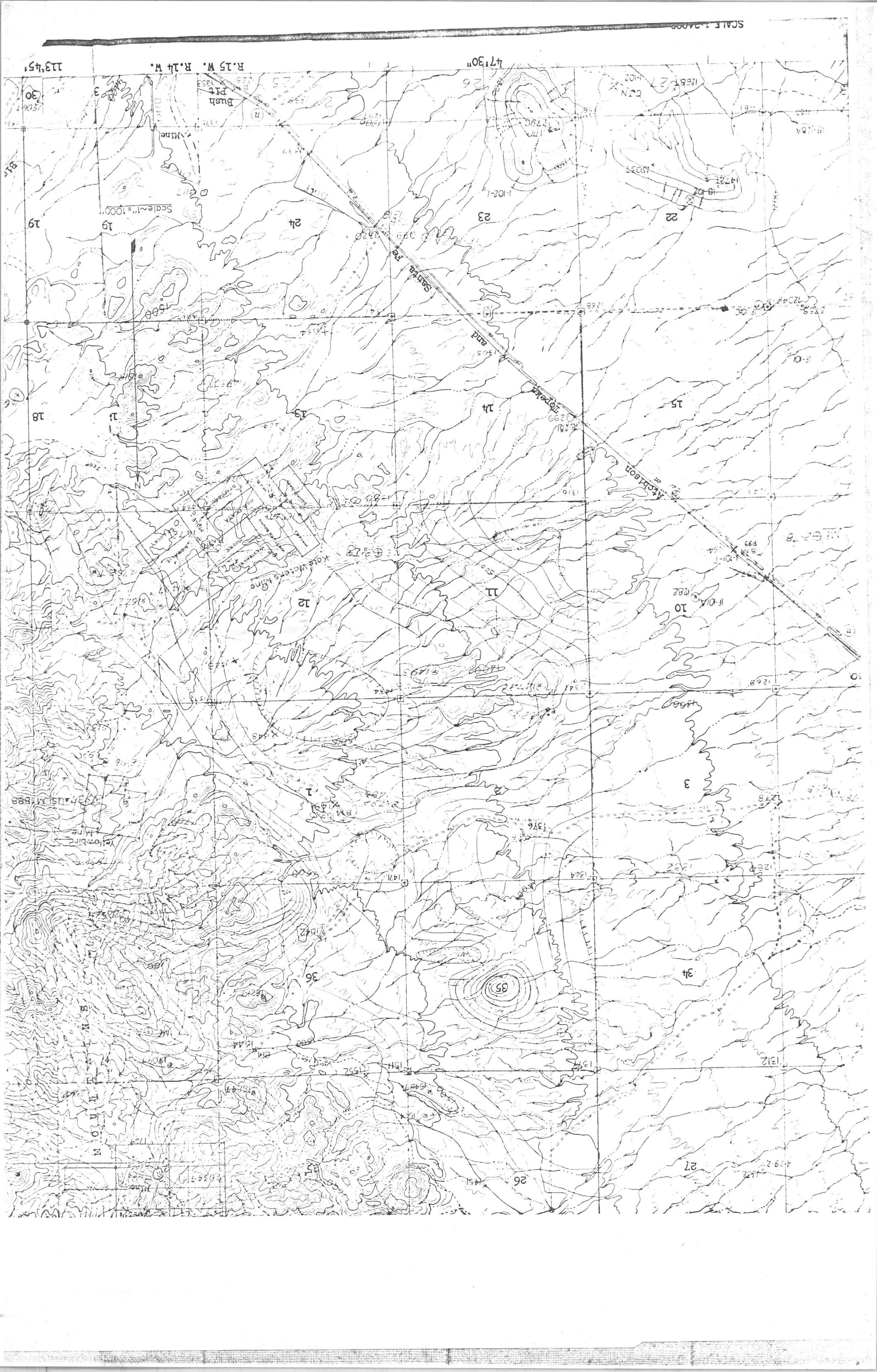
C
O
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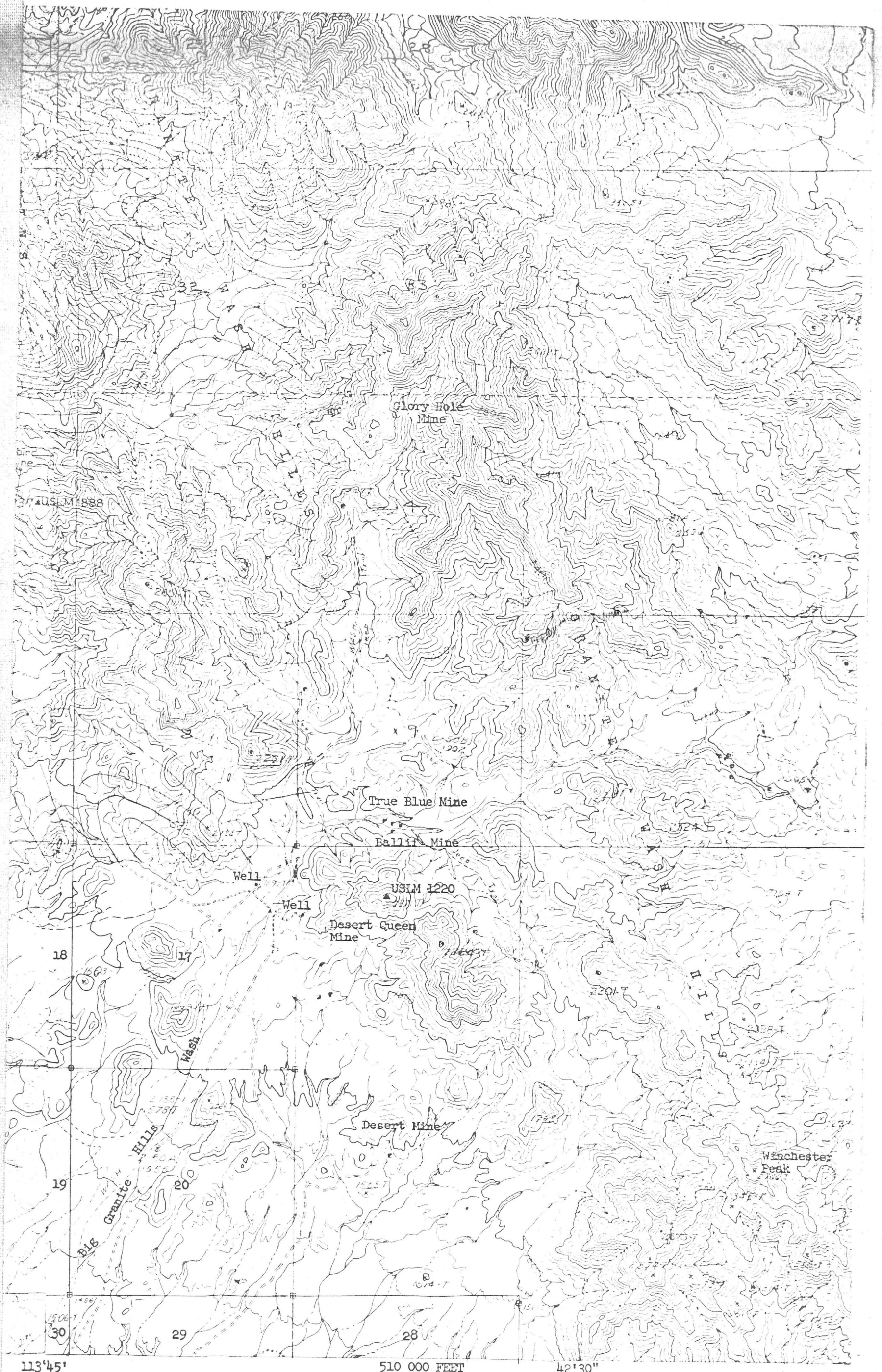
If our only interests is in an open-pit mine, then it might be well to start with a magnetometer survey of this area to the west of the scheelite zone. This should be followed by electro-magnetic work to check any anomalies found to determine if drilling is warranted.

Because of intermittent mineralization along the limestone bed to the east magnetite outcrop, and the eastward pitch of the ore shoot developed in the present mine workings, it is quite likely that mineralization extends down dip and for a considerable distance east of the present workings. It is therefore recommended that this area be explored sufficiently to determine if an ore body exists there that will warrant the erection of a mill. If this property can be brought into production, exploration can be extended to the west to determine if further ore bodies might be found there.

S.A. Robinson

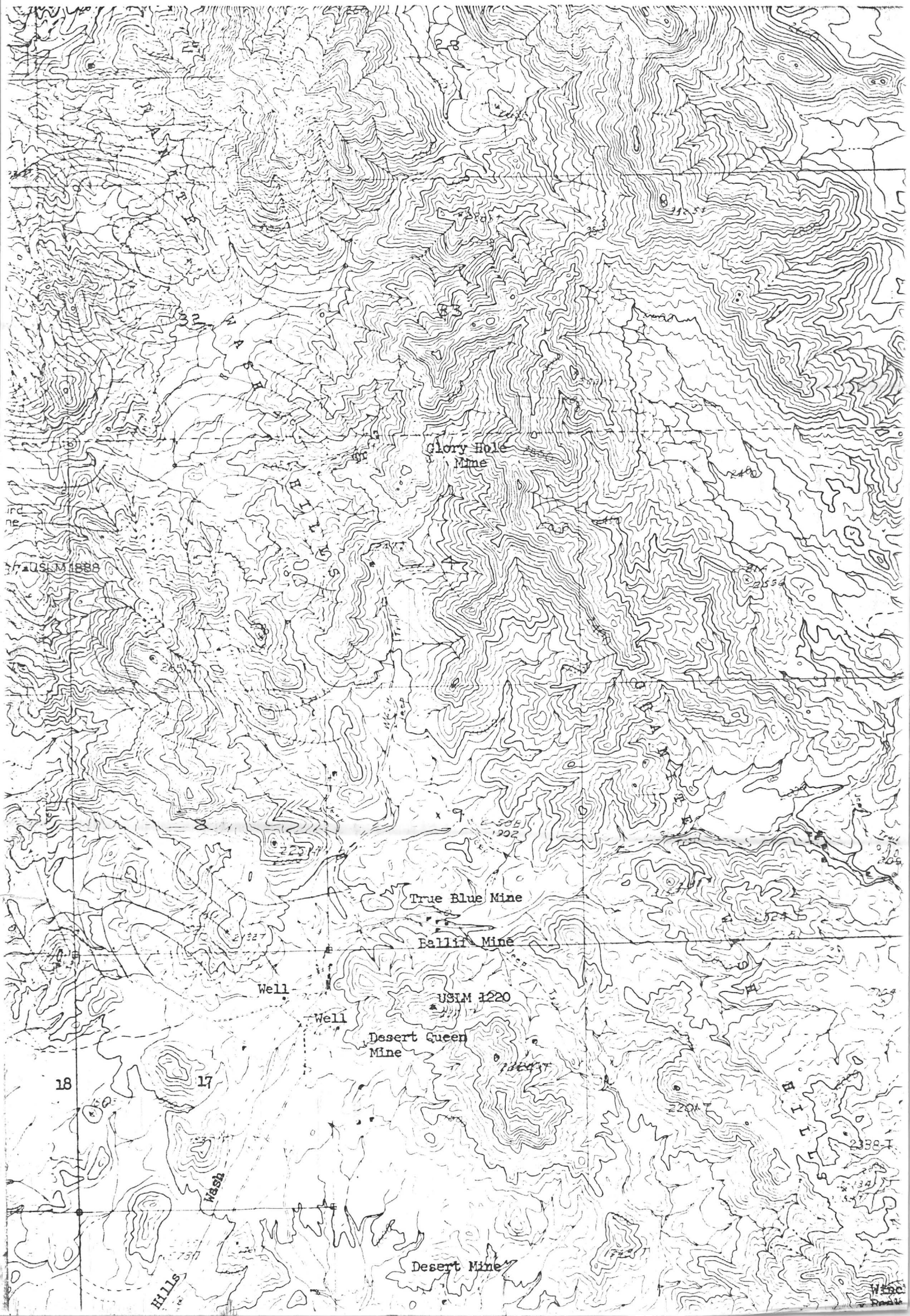
April 2, 1957





Kob. center

around 1000000?



SW

NE

SECTION A-A YUMA MINE

THRU TRES AMIGOS SHAFT

WORK SHEET - MAR 15 1963

T.C. KING.

N 37° E - IN DIRECTION OF
INTERSECTION OF YELLOW BIRD SHEAR ZONE N 6° E - DIP 50° E
WITH ANCIENT METAMORPHOSED LIME BED N 70° W - DIP 23° N
PROBABLE RATE OF ORE REPLACEMENT ALONG FLANK OF
MAGNETIC ANOMALY ~

MAGNETIC PROFILE

~ GAMMAS
ARBITRARY
DATUM.

RELATIVE TOTAL MAGNETIC INTENSITY

CROSS SECTION THROUGH
YUMA COPPER OUTCROP

SCALE 300' = 1"

20 γ = 1"

SURFACE PROFILE

SURFACE PROFILE

SURFACE PROFILE

TRES AMIGOS SHAFT
WEAK OUTCROP

HOIST

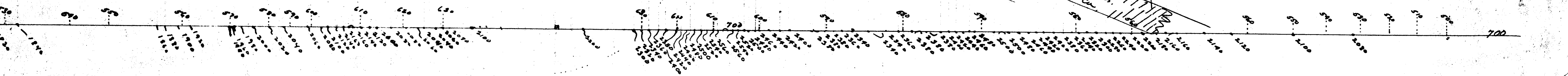
SLUMP
FROM
OXIDATION
THICKNESS
OCT. FROM D.O. 2000
HOLES FROM
SULFIDE
MASSIVE
SULFIDE

SEA LEVEL
ELEVATION

MASSIVE SULFIDE
PHYLLITE - CHALCOPHYLLITE
MARBLE & TACTITE
GNEISS

3000' x 1120' wide x 150' thick @ 10 cwt/ton.
50' 400,000 tons @ 1.6% Cu

FAULT



JOINT DEVELOPMENT AND PRODUCTION AGREEMENT

This JOINT DEVELOPMENT AND PRODUCTION AGREEMENT, herein designated Agreement, is entered into at Tucson, Arizona on February _____, 1970, between Alaska Metal Mines, Inc., a Delaware Corporation, hereinafter designated "Alaska," and North Coldstream Mines, Ltd., a Canadian corporation, hereinafter designated "Coldstream."

WHEREAS, Coldstream is the Lessee with an option to purchase a Mining Property commonly known as the Yuma Mine in Yuma County, Arizona, under a Lease-Option Agreement, a copy of which is attached hereto as Exhibit A; and

WHEREAS, Alaska and Coldstream wish to enter into an agreement pursuant to which Alaska shall have the right to examine and explore the Mining Property and to conduct drilling and other exploration operations thereon and, if Alaska so elects, to join with Coldstream in joint development and production operations from the Mining Property;

NOW THEREFORE, in consideration of the mutual covenants and agreements herein contained, the parties agree as follows:

1. EXPLORATION PERIOD

Coldstream hereby grants to Alaska the exclusive right to enter upon the Mining Property to conduct such exploration operations, including but not limited to, the right to conduct such geological, geophysical and geochemical examinations, excavations, sampling, testing, drilling and evaluation, as Alaska in its sole discretion deems advisable. Such rights shall continue for a period of six months from the effective date hereof, unless sooner terminated or unless the exploration period is extended, as hereinafter provided, or unless Alaska sooner elects to commence joint operations which period together with any extensions, is hereinafter designated as the "Exploration Period."

Alaska shall pay Coldstream the sum of three hundred dollars (\$300.00) upon the execution of this Agreement and \$300.00 on or before the expiration of each month thereafter if it is desired to continue the Exploration Period for another month.

At the conclusion of six months, if Alaska does not desire to conduct a joint operation but desires to continue this Agreement, provided Alaska is current in all payments required to be made to Coldstream, Alaska may remain in exclusive possession without further payments to Coldstream and the Exploration Period shall be extended to December 31, 1970, provided Alaska shall continue such work as it deems necessary or desirable to determine and evaluate the mineral potential of the Mining Property. If Alaska shall have spent not less than fifty thousand dollars (\$50,000.00) as of December 31, 1970, the Exploration Period shall be automatically extended beyond December 31, 1970 for a period of two weeks for each ten thousand dollars (\$10,000.00) that Alaska shall have expended, not including the monthly payments to Coldstream.

2. EXPLORATION EXPENDITURES

All expenditures paid or incurred by Alaska during the Exploration Period may include specifically, but not exclusively--(i) on-site expenditures; (ii) the cost of supplies and equipment expended on the Mining Property and the transportation thereof; (iii) the cost of drilling; geological, geochemical and geophysical work; sampling; assays; and mining claim surveys; (iv) the cost of acquiring, constructing and maintaining means of access to the Mining Property; (v) metallurgical testing; (vi) curative title work; and (vii) head office and overhead expense directly related to exploration of the Mining Property. It is the intent of the parties that the expenditures shall be intended to determine the mineral potential of the Mining Property and that such expenditures shall be within the discretion of Alaska.

If this Agreement is terminated or if Alaska elects to enter joint operations with Coldstream, Alaska shall have no obligation to make any additional expenditures thereafter during the Exploration Period or any extensions thereof.

3. JOINT OPERATIONS

If during the Exploration Period, Alaska's exploration operations indicate a mineral deposit which, in the opinion of Alaska, is capable of producing minerals in commercial quantities, Alaska may, at any time prior to expiration of the Exploration Period or any extension thereof, and prior to termination of this Agreement, elect to enter into joint operations with Coldstream on the Mining Property, and to acquire a one-half undivided interest in and to the Mining Property. To qualify for the acquisition of a one-half undivided interest, Alaska (a) must have spent not less than fifty thousand dollars (\$50,000.00) on or before December 31, 1970, in the manner set forth in Clause 2 or (b) if it has not spent the sum of fifty thousand dollars (\$50,000.00) it shall pay to Coldstream the difference between fifty thousand dollars and the sums actually spent in accordance with Clause 2. In the event Alaska elects to enter into joint operations, Alaska shall notify Coldstream of its election and Coldstream shall execute and deliver to Alaska, in form suitable for recording, an assignment from Coldstream to Alaska of a one-half undivided interest in the said Lease-Option Agreement.

Upon such election Alaska and Coldstream shall enter into a formal joint operating agreement incorporating provisions for joint operations as are customary and desirable in such an agreement and containing in substance the following terms and conditions:

- (a) Alaska shall be the manager and operator of all joint operations.
- (b) Alaska shall have an undivided fifty per cent (50%) interest and Coldstream shall have an undivided

fifty percent (50%) interest in and to the joint operations. All costs, expenses, liabilities and profits of the parties in the proportion that each party's undivided interest bears to the entire undivided interest in and to the joint operations.

- (c) Coldstream shall appoint a representative who will be responsible for consulting with Alaska in the formulation of further plans for exploration and development of the Mining Property. However, Alaska shall have the final responsibility for making any and all decisions relating to the organization, exploration, development and production under the joint operations. Alaska, as manager, may require Coldstream to advance its proportionate share of development, mining, operation, exploration and equipment costs as to any operations and shall account for and distribute monthly to Coldstream its proportionate share of any profits received from the joint operations. An accounting procedure containing provisions customary or desirable in such joint operations shall be attached to, and become a part of, the joint operating agreement.
- (d) If, after the time that both parties are required to participate in the financing of the joint operations, either party chooses to withdraw, the withdrawing party shall assign all of its right, title and interest in the Lease-Option Agreement and in the Mining Property to the continuing party and shall thereupon cease to be a joint operator. As consideration for such withdrawal, the withdrawing party shall be paid the sum of fifty thousand dollars (\$50,000.00) from operating profits, if any, in the amount of one-half (1/2) of any profits that may be available for distribution from operations conducted thereafter by the continuing party.
- (e) If either of the parties desires to assign its interest in and to the joint operations to any third party ~~other than~~ to such party's parent corporation, subsidiary of such parent corporation, or successor by way of merger, consolidation or reorganization--the other party shall have the right of first refusal to receive such assignment on the terms proposed by the third party.
- (f) Alaska may cause an operating entity to be formed. The operating entity shall be designated by Alaska, and may take the form of (i) a corporation or other organization, in the form and attributes of which as set forth in its charter documents shall be determined by Alaska, or (ii) any alternative method of ownership and operation which shall protect the respective interests of Alaska and Coldstream. Any such entity shall be managed by Alaska and the interest therein shall be 50% and 50%.

If the operating entity shall be a corporation, Alaska shall so vote its shares that Coldstream will have at least one representative among the membership of the Board of Directors so long as Coldstream (or a controlled corporation to which their joint venture operations or shares or interest in the operating entity may have been transferred) retains at least a 50% interest in such operating entity.

Promptly following the organization or creation of the operating entity all of the properties of the joint operations shall be transferred to the operating entity by appropriate instruments of transfer. If the operating entity is one which is authorized to issue shares of its capital stock for assets transferred to it, all shares shall be nonassessable and the shares issued to Alaska shall be 50% and those issued to Coldstream shall be 50% of the aggregate of shares issued as consideration for the assets of the joint operations; and in such event no further shares shall be issued except by mutual agreement between Alaska and Coldstream or their respective successors in interest.

If Alaska fails to give notice to Coldstream of Alaska's election to enter joint operations prior to expiration of the Exploration Period, or any extensions thereof, this Agreement shall automatically expire unless it has been sooner terminated under the provisions hereof.

4. TERMINATION

Alaska shall have the right to terminate this Agreement at any time during the Exploration Period by giving Coldstream notice of Alaska's election to so terminate. Upon giving of such notice in the manner set forth in Clause 7, this Agreement shall automatically terminate thirty (30) days thereafter without further action of the parties, and Alaska and Coldstream shall have no further rights or obligations hereunder except as to obligations, if any, the due dates for payment or performance of which occur prior to the date of such termination. In the event of such termination, Alaska shall deliver to Coldstream copies of all basic maps, drill logs and all other factual data not previously furnished to Coldstream. Upon any termination or expiration, Alaska shall have a period of ninety (90) days to remove all of its machinery, equipment and other property of every nature and description placed upon the Mining Property by Alaska, except any underground timbers or supports.

5. DEFAULT

If either Alaska or Coldstream shall be in default in making any payment or performing any other obligation herein set forth during the Exploration Period or the joint operations, neither party shall lose rights granted hereunder unless within thirty (30) days' notice in writing from one party is given the defaulting party specifying such default, and the defaulting party shall fail to undertake to cure such default by the appropriate payment or performance.

6. ACCESS; INFORMATION; CONFIDENTIALITY

Alaska shall keep Coldstream informed of the progress and results of exploratory work performed by Alaska hereunder, and shall at reasonable intervals and upon request, furnish Coldstream with copies of any data pertaining to the work which can be conveniently copied. Coldstream, at its sole risk, shall have access, at all reasonable times, to the Mining Property.

Alaska and Coldstream each agree to treat all data, reports, records and other information relating to the Mining Property as confidential. While this Agreement is in effect, no party hereto shall, without the express written consent of the other party, disclose any information it may obtain with respect to the results of the exploration operations hereunder nor issue any press releases concerning the exploration operations, except where counsel for such party deems such disclosure necessary. Due consideration shall be given to present and future governmental regulations with respect to data disclosure, and any disclosures shall be made in accordance with governmental regulations.

7. NOTICES

Any notice permitted or required to be given hereunder shall be effective when deposited in the United States mail,

postage prepaid and certified and addressed as follows:

If to Alaska:

Alaska Metal Mines, Inc.
Failing Building
Portland, Oregon

with copy to:

Alaska Metal Mines, Inc.
P. O. Box 12012
Tucson, Arizona 85711

If to Coldstream:

North Coldstream Mines, Ltd.
34 Adelaide Street West
Toronto 1, Ontario, Canada

*Provide for change of
address*

8. ARBITRATION

All disputes arising in connection with this Agreement which cannot be settled by agreement between the parties shall be finally settled by arbitration in the City of Tucson, Arizona, in accordance with the commercial arbitration rules of the American Arbitration Association then in effect and judgment on any award rendered pursuant thereto may be entered in any court of competent jurisdiction or application may be made to such court for a judicial acceptance of the award and an order of enforcement as the case may be.

9. LIABILITY SEVERAL

The liability of the parties shall be several, not joint or collective. Each party shall be responsible only for its obligations herein set forth. It is not the intention of the parties to create a partnership and this Agreement shall not be construed so as to render the parties liable as partners, associates, or joint venturers or as creating a mining or other partnership or association. Each of the parties hereto elects

to be excluded from the application of all of the provisions of sub-chapter K of Chapter 1 of Subtitle A of the Internal Revenue Code of 1954.

IN WITNESS WHEREOF this Agreement has been executed as of the date first above set forth.

ALASKA METAL MINES, INC.

By _____

ATTEST: _____

NORTH COLDSTREAM MINES, LTD.

By _____

ATTEST: _____

STATE OF ARIZONA)
) ss.
COUNTY OF _____)

On this the _____ day of _____, 1970, before me,
the undersigned Notary Public, personally appeared _____
_____, who acknowledged himself to be
the _____ of ALASKA METAL MINES, INC., a
corporation, and that he, as such officer, being authorized so
to do, executed the foregoing instrument for the purposes
therein contained, by signing the name of the corporation by
himself as such officer.

IN WITNESS WHEREOF, I have hereunto set my hand and
official seal.

Notary Public

My commission expires:

STATE OF ARIZONA)
) ss.
COUNTY OF _____)

On this the _____ day of _____, 1970, before me,
the undersigned Notary Public, personally appeared _____
_____, who acknowledged himself to be
the _____ of NORTH COLDSTREAM MINES, LTD.,
a corporation, and that he, as such officer, being authorized
so to do, executed the foregoing instrument for the purposes
therein contained, by signing the name of the corporation by
himself as such officer.

IN WITNESS WHEREOF, I have hereunto set my hand and
official seal.

Notary Public

My commission expires:

MEMORANDUM OF LEASE-OPTION AGREEMENT

Under the terms of that certain Lease-Option Agreement dated February _____, 1970, by and between DAN M. KING, a single man (hereinafter designated "King"); LARRY R. DRAKE and JEAN DRAKE, husband and wife (hereinafter designated "Drakes"), and NORTH COLDSTREAM MINES, LTD. (hereinafter designated "Coldstream"), which Lease-Option Agreement became effective May 23, 1969, King granted to Coldstream for a period of eight (8) years, unless sooner terminated in accordance with the provisions of the said Agreement, the exclusive right to search, prospect, explore for and to mine valuable minerals and ores on the lands referred to in the Agreement as the "Mining Property," commonly known as the Yuma Mine situated in Secs. 19, 20, 29 and 30, T. 6 N., R. 14 W., G&SRM, Yuma County, Arizona, as more fully described in Exhibit A attached hereto, together with the right to ingress and egress and the right to perform such physical operations necessary in the opinion of Coldstream, to evaluate the mineral potential of the above-described lands, and the right to remove and sell any valuable minerals or ores. Coldstream was further granted the option which it may exercise at any time within eight (8) years after May 23, 1969, in which to purchase the said Mining Property.

In the said Lease-Option Agreement the Drakes relinquished and disclaimed any and all rights, benefits or privileges in or to the property described in Exhibit A.

The said Lease-Option Agreement is on file at the office of Dan M. King, Aguila, Arizona, and whose mailing address is P. O. Box 98, Aguila, Arizona 85320, and also on file at the office _____

DATED this _____ day of February, 1970.

Dan M. King

STATE OF ARIZONA)
) ss.
COUNTY OF _____)

On this the _____ day of February, 1970, before me, the undersigned Notary Public, personally appeared DAN M. KING, a single man, known to me to be the person whose name he subscribed to the within instrument and acknowledged that he executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Notary Public

My commission expires:

STATE OF _____)
) ss.
COUNTY OF _____)

On this the _____ day of February, 1970, before me, the undersigned Notary Public, personally appeared _____, who acknowledged himself to be the _____ of NORTH COLDSTREAM MINES, LTD., a corporation, and that he, as such officer, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the corporation by himself as _____.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Notary Public

My commission expires:

STATE OF ARIZONA)
)
COUNTY OF _____)
) ss.

On this the _____ day of February, 1970, before me, the undersigned Notary Public, personally appeared LARRY R. DRAKE and JEAN DRAKE, husband and wife, known to me to be the persons whose names they subscribed to the within instrument and acknowledged that they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Notary Public

my commission expires:

EXHIBIT A

The following lode claims comprise the Yuma Copper properties:

Claim name & group	Mining Records of Yuma County	
	Book	Page
Yuma Copper group:		
Carbonate No. 1	27	2
Carbonate No. 2	27	3
Carbonate No. 3	27	4
Carbonate No. 6	27	5
Carbonate No. 7	27	6
Union	26	258
Arizona No. 1	27	7
Arizona No. 2	40	236
Arizona No. 3	40	237
Arizona No. 4	40	238
Arizona No. 5	27	8
Arizona No. 8	27	9 (page missing)
Arizona No. 8 Relocation) same claim	170	514
May	170	515
Ginka	170	516
Lita	170	520
Fran	170	519
Max	170	518
Elma	170	517
Joiner 2	224	501
Joiner 1	224	509
Strike 1	224	502
Strike 2	224	503
Strike 3	224	504
Strike 4	224	505
Strike 5	224	506
Strike 6	224	507
Strike Fraction	224	508
Kate Waters group:		
Noralie	17	165
Stafford	26	443
Moore	26	444
Western Bell	26	445
Western Bound	26	446
Ora Plata	26	447
Waters	26	448
Edwin B. Jones	26	449
W. J. B.	26	450
Mule	40	223
Go Lucky	40	224

LEASE-OPTION AGREEMENT

This Lease-Option Agreement, herein designated "Agreement," is entered into by and between Dan M. King, a single man, hereinafter designated "King"; Larry R. Drake and Jean Drake, husband and wife, hereinafter designated "Drakes"; and North Coldstream Mines, Ltd., hereinafter designated "Coldstream," to be effective May 23, 1969.

WHEREAS, the Drakes as agents or trustees for Coldstream entered into a "Mining Agreement" dated May 23, 1969, which purported to grant to the Drakes as representatives for Coldstream a lease and option to purchase that certain property known as the Yuma Mine (more particularly described in Exhibit A which is attached hereto); and

WHEREAS, Drakes and Coldstream subsequently entered into an agreement to be effective May 23, 1970, in which the Drakes relinquished and discharged any and all rights, benefits and privileges under the Mining Agreement with King, and the Drakes granted the President and Secretary of Coldstream power of attorney to do all acts necessary to give to Coldstream any and all rights, benefits and privileges under the agreement between King and Drakes, and in which the Drakes agreed to do all acts necessary to assure Coldstream obtained those rights, benefits and privileges; and

WHEREAS, King and Coldstream wish to enter into a lease-option agreement directly and not through the intervention of a representative, agent or trustee;

NOW THEREFORE, in consideration of their respective covenants and promises, the parties hereto agree as follows:

I.

Coldstream and King hereby release the Drakes from any and all obligations and liability under the terms of the

aforementioned Mining Agreement dated May 23, 1969.

II.

The Drakes hereby release King and Coldstream from any obligations and liability which may arise under their respective agreements with the Drakes, and the Drakes hereby relinquish and disclaim any and all rights, benefits or privileges in or to the property known as the Yuma Mine and more fully described in Exhibit A.

III.

King and Coldstream restate and confirm the terms of the May 23, 1969 "Mining Agreement" effective as of that date, in which Mining Agreement it is stated that for the sum of One Hundred Dollars (\$100.00) advance royalty and other good and valuable considerations, the receipt of which is hereby acknowledged, King grants to Coldstream the exclusive right to search, prospect, explore for and to mine valuable minerals and ores on the following-described lands hereinafter referred to as the Mining Property, to wit: YUMA MINE - see attached "Exhibit A," containing 514 acres more or less, situated in Sections 19, 20, 29 and 30, T. 6 N., R. 14 W., G&SRM, Yuma County, Arizona, together with the right to ingress and egress and the right to perform such physical operations necessary in the opinion of Coldstream to evaluate the mineral potential of the above-described lands, and the right to remove and sell any valuable minerals or ores found subject to the following terms and conditions:

1.

The within agreement shall extend for a period of eight years from and after the date hereof and so long thereafter as valuable ores or minerals are produced from the described lands, providing this lease is in good standing and the terms and conditions are kept in good faith, and royalties are paid as provided.

2.

Coldstream shall conduct prospecting and/or mining activities with reasonable diligence, skill and care, for the purpose of achieving and maintaining production of ores and minerals, consistent with good business and mining practices, the size of the deposit, market price and production quotas and the laws of the State and Nation.

3.

Coldstream shall pay King as production royalty on all sums received by Coldstream for minerals, metals or ores sold from the Mining Property, less all transportation and treatment charges incurred after the ore is removed from the leased premises (i.e. Net Smelter Returns less transportation to smelter) a royalty of five percent (5%), on or before the 20th day of the month next following receipt of payment by Coldstream of such sales, and shall pay King a minimum advance royalty in lieu of production requirements the sum of, three hundred dollars (\$300.00) per month, in advance, starting on the first day of October, 1969 for twelve months; six hundred dollars (\$600.00) per month for the second twelve months; twelve hundred dollars (\$1,200.00) per month for the third twelve months; two thousand dollars (\$2,000.00) per month for the balance of the option period.

However, if production is attained, the total royalties and payments at the end of the fourth year and thereafter will be increased to divide the total net balance due, five hundred thousand dollars (\$500,000.00) less prepayments, into four equal payments and payments will be increased at the end of each year, if necessary, to complete the payment of five hundred thousand dollars at the end of the eighth year.

All payments will be made in U. S. dollars or mutually acceptable securities. All payments may be made to King at P. O. Box 98, Aguila, Arizona, or, at the option of Coldstream,

they may be made to the account of King at the First National Bank of Arizona, Main Office, Phoenix, Arizona.

4.

King may examine Coldstream's records and accounts at a reasonable time monthly and may inspect the property and mine workings at all reasonable times at his own risk. Should this agreement be terminated before the purchase of the Mining Property, then Coldstream will furnish King with a copy of drilling, assay, and engineering data pertaining thereto. In the event that mining operations are commenced, Coldstream will carry adequate insurance to indemnify, defend, and save King harmless from incidents or accidents which may result from such work. King shall post and record his own notices of non-liability. Coldstream will conduct its operations in full compliance with the laws of the State and Nation, and shall pay when due all valid claims for work done and services rendered and/or material furnished in its operations hereunder, and shall pay all State and County tax assessments upon its structures, machinery and/or personal property placed upon the Mining Property. In the event this agreement is terminated prior to purchase, Coldstream shall have 90 days in which to remove its mining or milling machinery, equipment, fixtures and structures from the Mining Property irrespective of its manner of attachment, provided no ground supports shall be removed.

5.

King may cancel this agreement if Coldstream fails to remove or cure default or breach of contract within (30) days after written notice served by registered mail on Coldstream particularly describing the default. Coldstream may terminate its rights and responsibilities hereunder by giving thirty days' written notice served by registered mail and paying all sums then due which shall be retained by King as liquidated damages.

6.

King warrants and represents clear title and ownership to the Mining Property and/or mining claims described herein subject to the paramount title of the State and Nation. In the event Coldstream incurs reasonable legal costs and fees in the perfection of title to same, such costs and fees incurred may be deducted from amounts due King hereunder. If King is found to own less than the whole and undivided fee of the Mining Property described herein, then the royalties and other considerations may be paid into escrow to be divided among the owners in proportion to their respective interests.

7.

Coldstream agrees to perform at least three thousand dollars (\$3,000.00) in work on the property prior to September 1, 1969 and to record proper proof of labor on behalf of King. Thereafter, annual assessment work shall be done on unpatented mining claims which are part of the Mining Property and proof of labor filed of record on or before September 1st by Coldstream during any calendar year in which this agreement is in effect after January 1st of that year.

8.

All property within a five (5) mile radius of the mine-shaft acquired by either party, or their agents, will be included in this agreement and if Coldstream cancels, per the terms and conditions herein, Coldstream agrees to transfer to King title to any ground held by Coldstream or its agents.

9.

OPTION TO PURCHASE: In consideration of the premises and the sums paid as royalties and advance royalties, King hereby gives Coldstream an exclusive option to purchase the Mining Property herein described for the total sum of five hundred thousand dollars (\$500,000.00) if paid within eight

years of the date hereof. All payments made hereunder including minimum, advance and production royalties made prior to the close of the option period or term shall apply on, and decrease the option price accordingly, and when such payments, advance and production royalties, shall total twenty percent (20%) of the option price then King, upon written request by Coldstream, will place a quitclaim deed or deeds in escrow which, upon close of escrow, will convey all of King's right, title and interest in and to said Mining Property unto Coldstream.

10.

Any written notices provided for herein shall be deemed so given if sent by registered or certified mail and addressed as follows:

TO KING:

Mr. Dan M. King
P. O. Box 98
Aguila, Arizona 85320

TO COLDSTREAM:

North Coldstream Mines, Ltd.
34 Adelaide Street West
Toronto 1, Ontario, Canada

with copy thereof to the escrow agent. Any notices given by the parties hereunder shall be deemed to have been given on the date of such deposit of such notice in the United States mail as evidenced by the date and time imprinted on the envelope or on the registry receipt by or in accordance with the regulations of the United States Post Office or may be delivered personally to the person to whom such notice is given.

This agreement, effective May 23, 1969, shall inure to the benefit of the heirs, successors and assigns of the parties hereto and it is expressly agreed that Coldstream may assign its right and obligations hereunder in whole or in part.

Aguila, Arizona
February _____, 1970

Dan M. King

Larry R. Drake

North Coldstream Mines, Ltd.

Jean Drake

By _____

STATE OF ARIZONA

COUNTY OF _____

) ss.

On this the _____ day of February, 1970, before me, the undersigned Notary Public, personally appeared DAN M. KING, a single man, known to me to be the person whose name he subscribed to the within instrument and acknowledged that he executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Notary Public

My commission expires:

STATE OF _____

COUNTY OF _____

) ss.

On this the _____ day of February, 1970, before me, the undersigned Notary Public, personally appeared _____, who acknowledged himself to be the _____ of NORTH COLDSTREAM MINES, LTD., a corporation, and that he, as such officer, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the corporation by himself as _____.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Notary Public

My commission expires:

STATE OF ARIZONA)
) ss.
COUNTY OF _____)

On this the _____ day of February, 1970, before me, the undersigned Notary Public, personally appeared LARRY R. DRAKE and JEAN DRAKE, husband and wife, known to me to be the persons whose names they subscribed to the within instrument and acknowledged that they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Notary Public

my commission expires:

EXHIBIT A

The following lode claims comprise the Yuma Copper properties:

Claim name & group	Mining Records of Yuma County	
	Book	Page
Yuma Copper group:		
Carbonate No. 1	27	2
Carbonate No. 2	27	3
Carbonate No. 3	27	4
Carbonate No. 6	27	5
Carbonate No. 7	27	6
Union	26	258
Arizona No. 1	27	7
Arizona No. 2	40	236
Arizona No. 3	40	237
Arizona No. 4	40	238
Arizona No. 5	27	8
Arizona No. 8	27	9(page missing)
Arizona No. 8 Relocation)	170	514
May	170	515
Ginka	170	516
Lita	170	520
Fran	170	519
Max	170	518
Elma	170	517
Joiner 2	224	501
Joiner 1	224	509
Strike 1	224	502
Strike 2	224	503
Strike 3	224	504
Strike 4	224	505
Strike 5	224	506
Strike 6	224	507
Strike Fraction	224	508
Kate Waters group:		
Noralie	17	165
Stafford	26	443
Moore	26	444
Western Bell	26	445
Western Bound	26	446
Ora Plata	26	447
Waters	26	448
Edwin B. Jones	26	449
W. J. B.	26	450
Mule	40	223
Go Lucky	40	224

1/12/70

Yuma Mine
Larry Drake

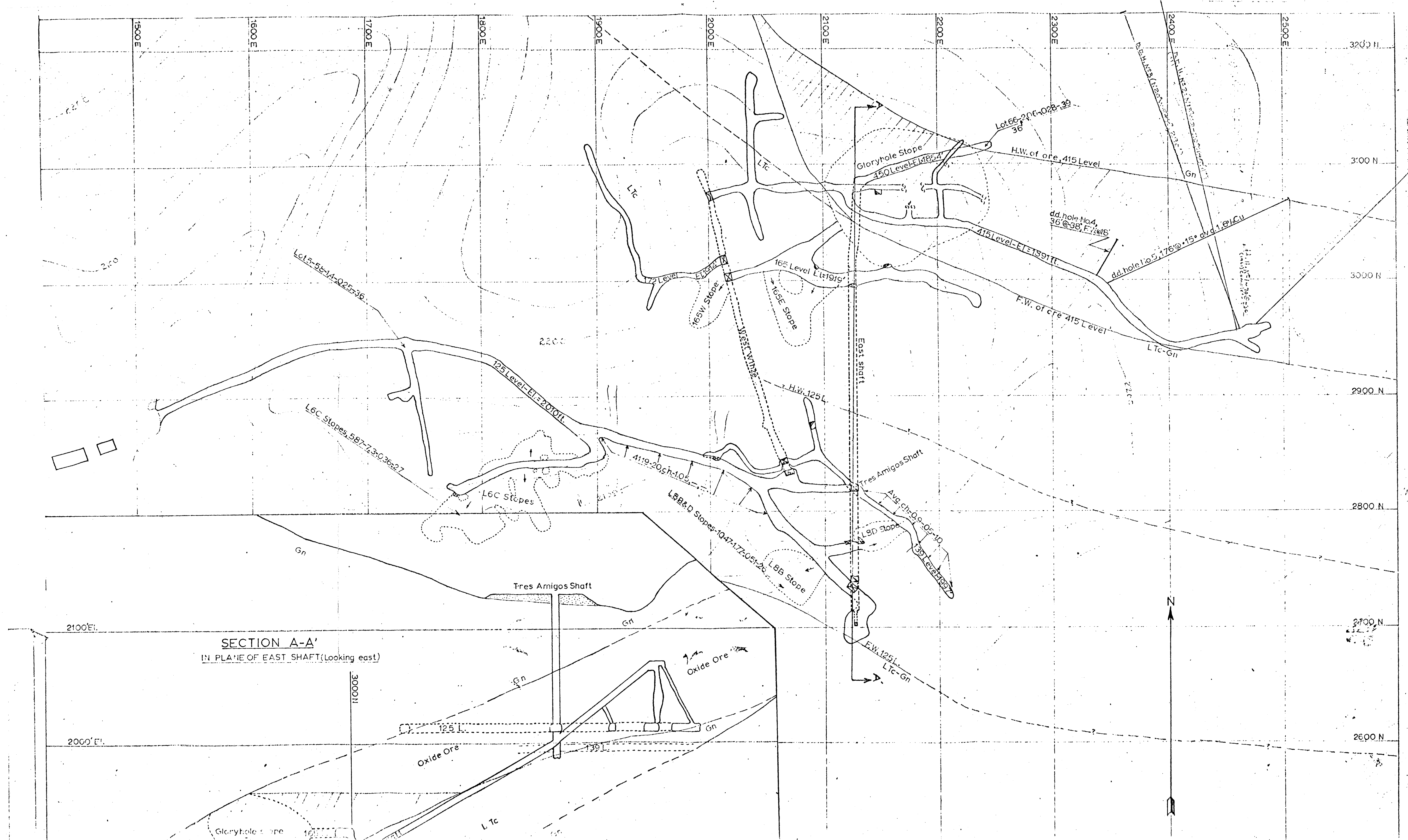
EGH called C. Miller of
Amax who has visited the
property @ 7954731

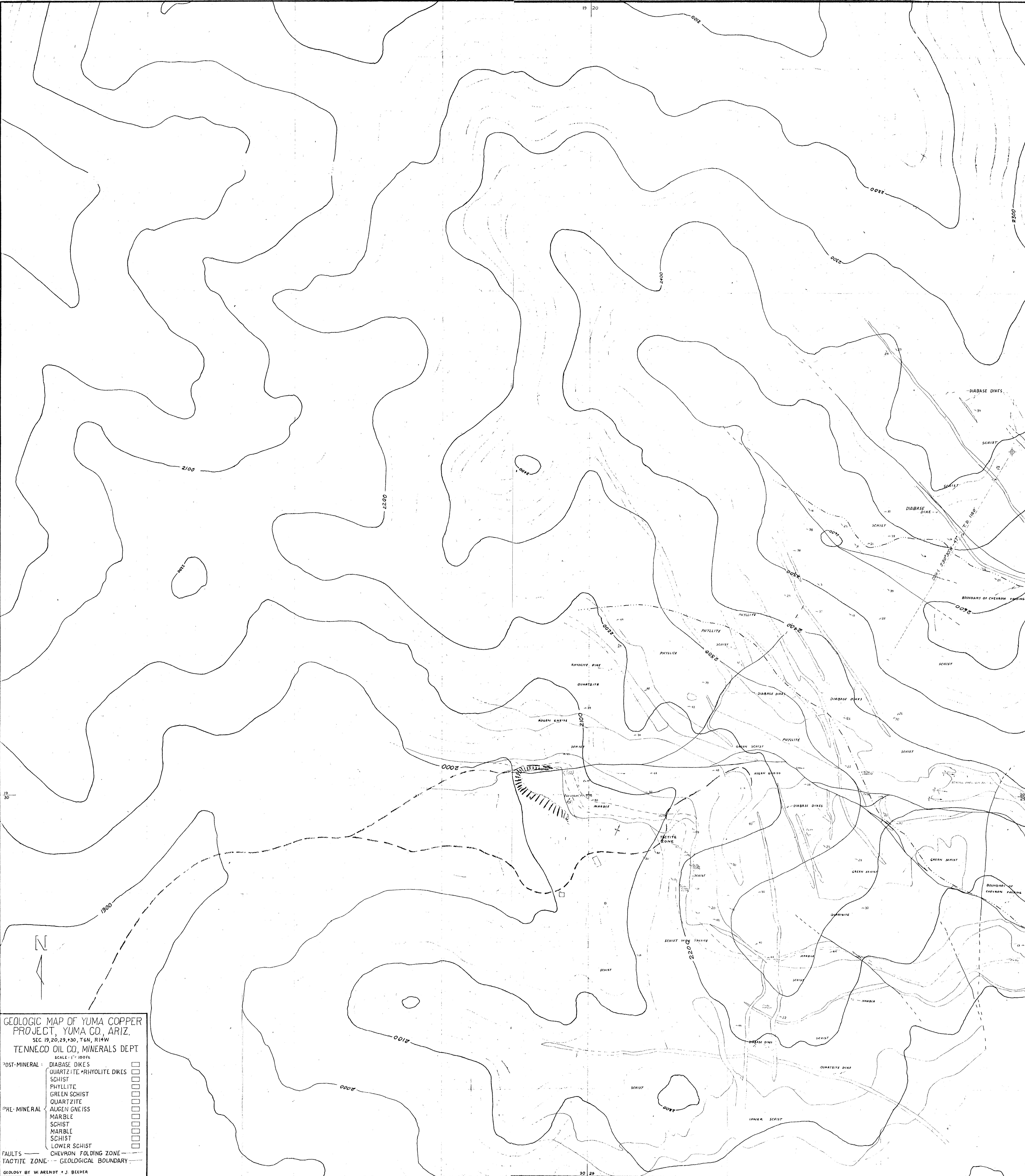
C. Miller says

1. Not a log
2. Small mine potential
at depth low strike.

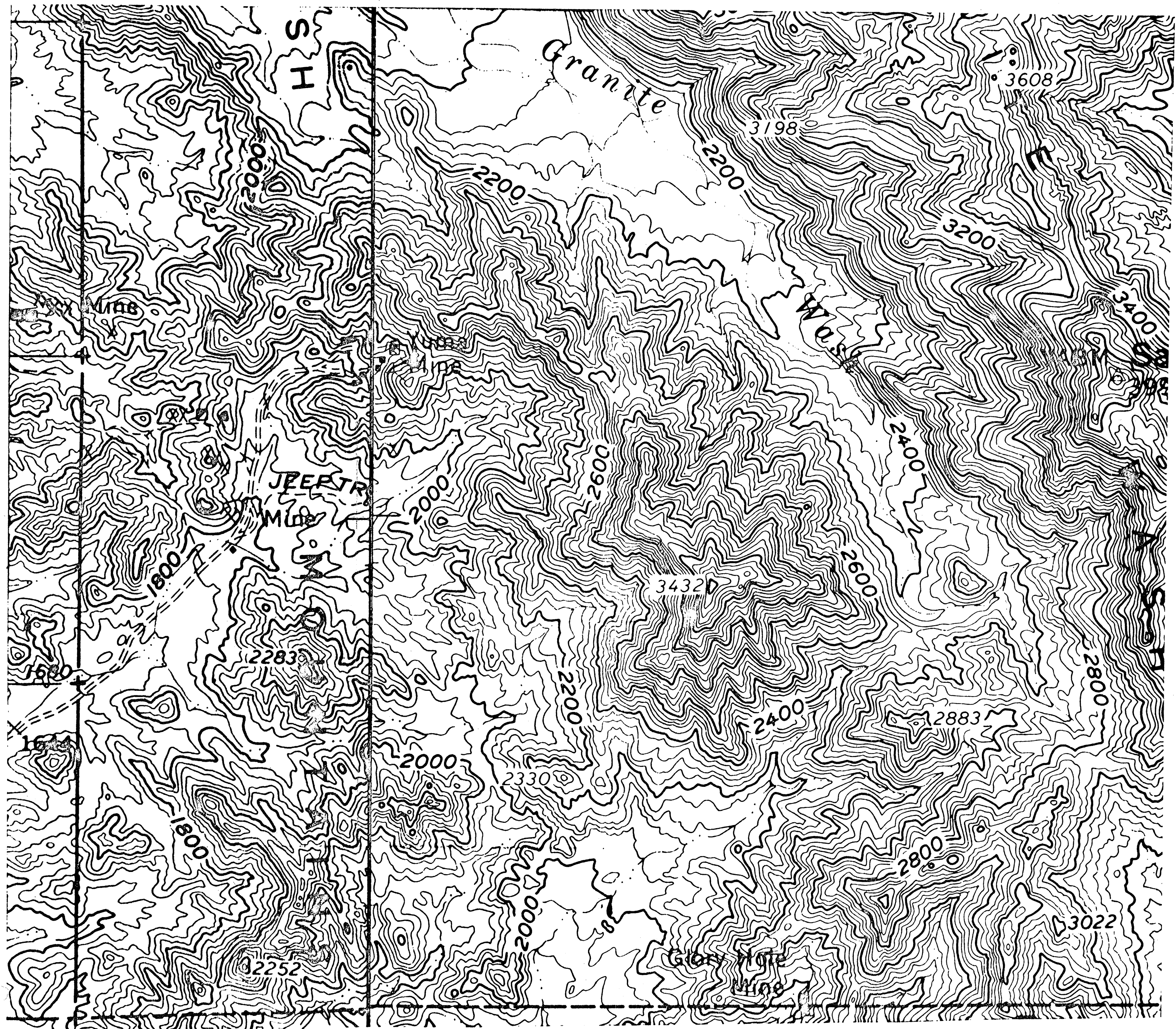
~~Subsidiary~~
3. Leached oxide possibilities

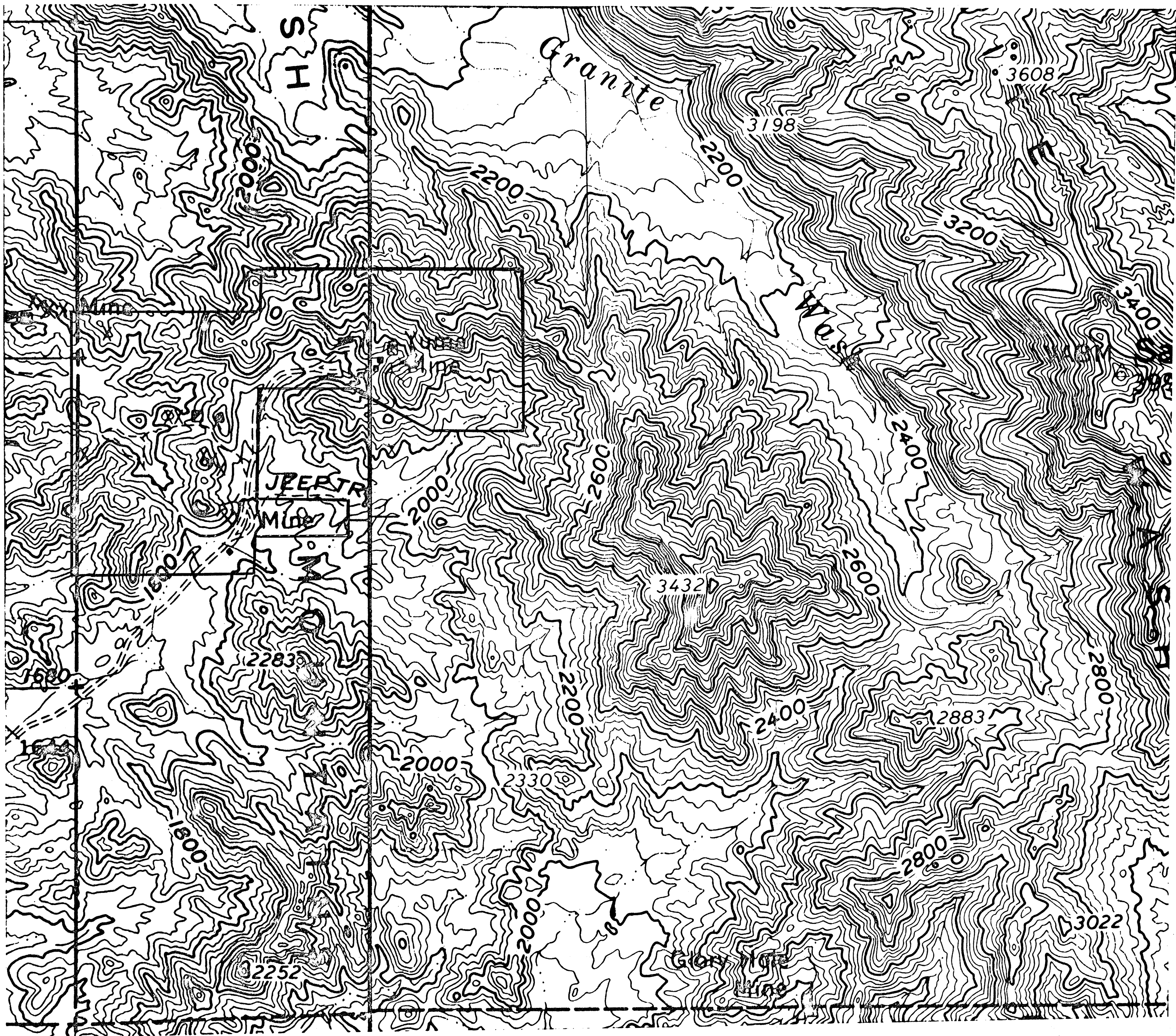
North Coldstream Mines Ltd.
has option

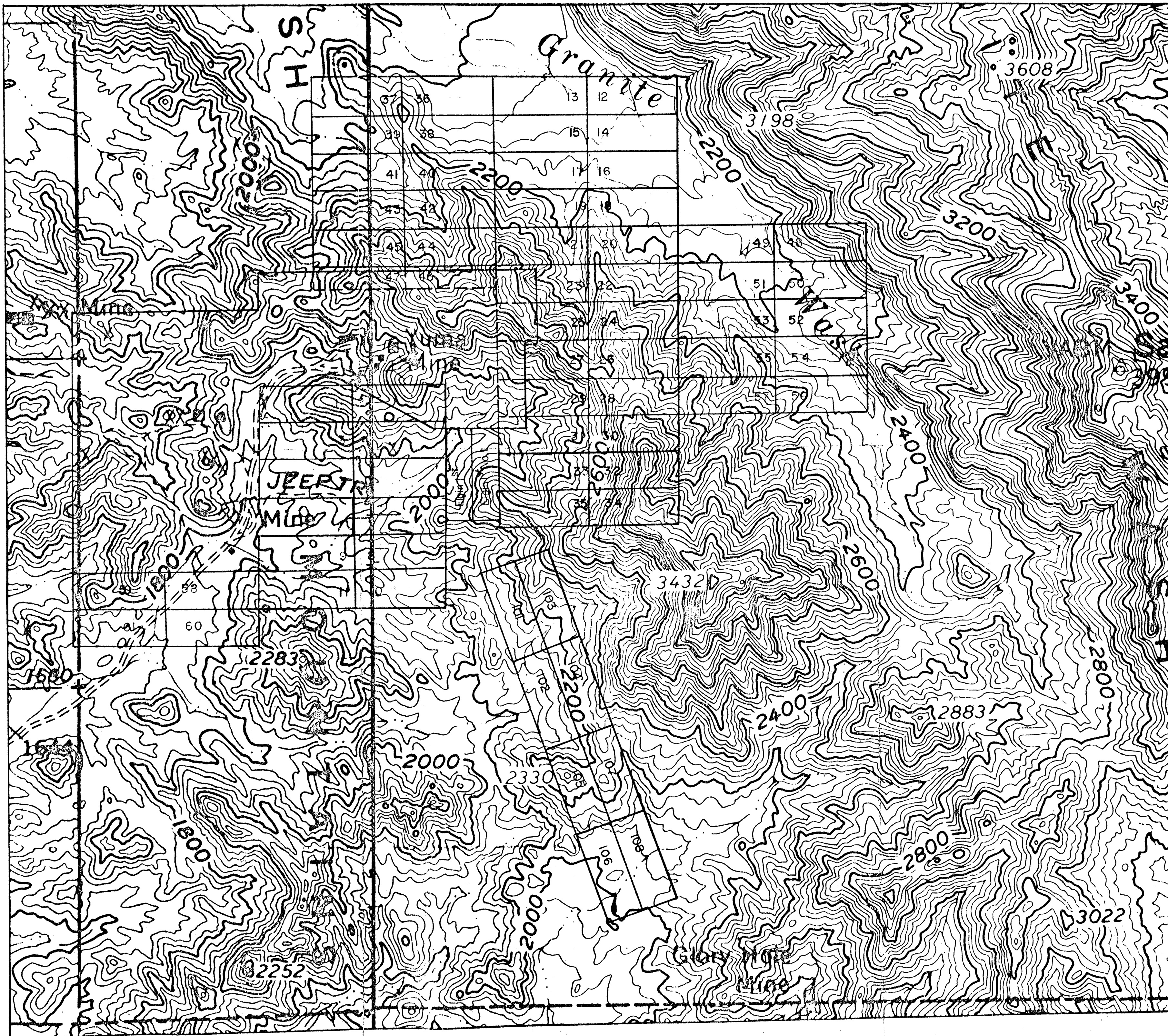




GEOLOGIC MAP OF YUMA COPPER
PROJECT, YUMA CO., ARIZ.
SEC. 19, 20, 29, 30, T6N, R14W
TENNECO OIL CO., MINERALS DEPT.
SCALE: 1" = 1000'
POST-MINERAL: DIABASE DIKES
QUARTZITE + RHYOLITE DIKES
SCHIST
PHYLLITE
GREEN SCHIST
QUARTZITE
AUGEN GNEISS
MARBLE
SCHIST
MARBLE
SCHIST
LOWER SCHIST
FAULTS: CHEVRON FOLDING ZONE
TACTITE ZONE: GEOLOGICAL BOUNDARY
GEOLOGY BY W. ARENDT + J. BEEDER





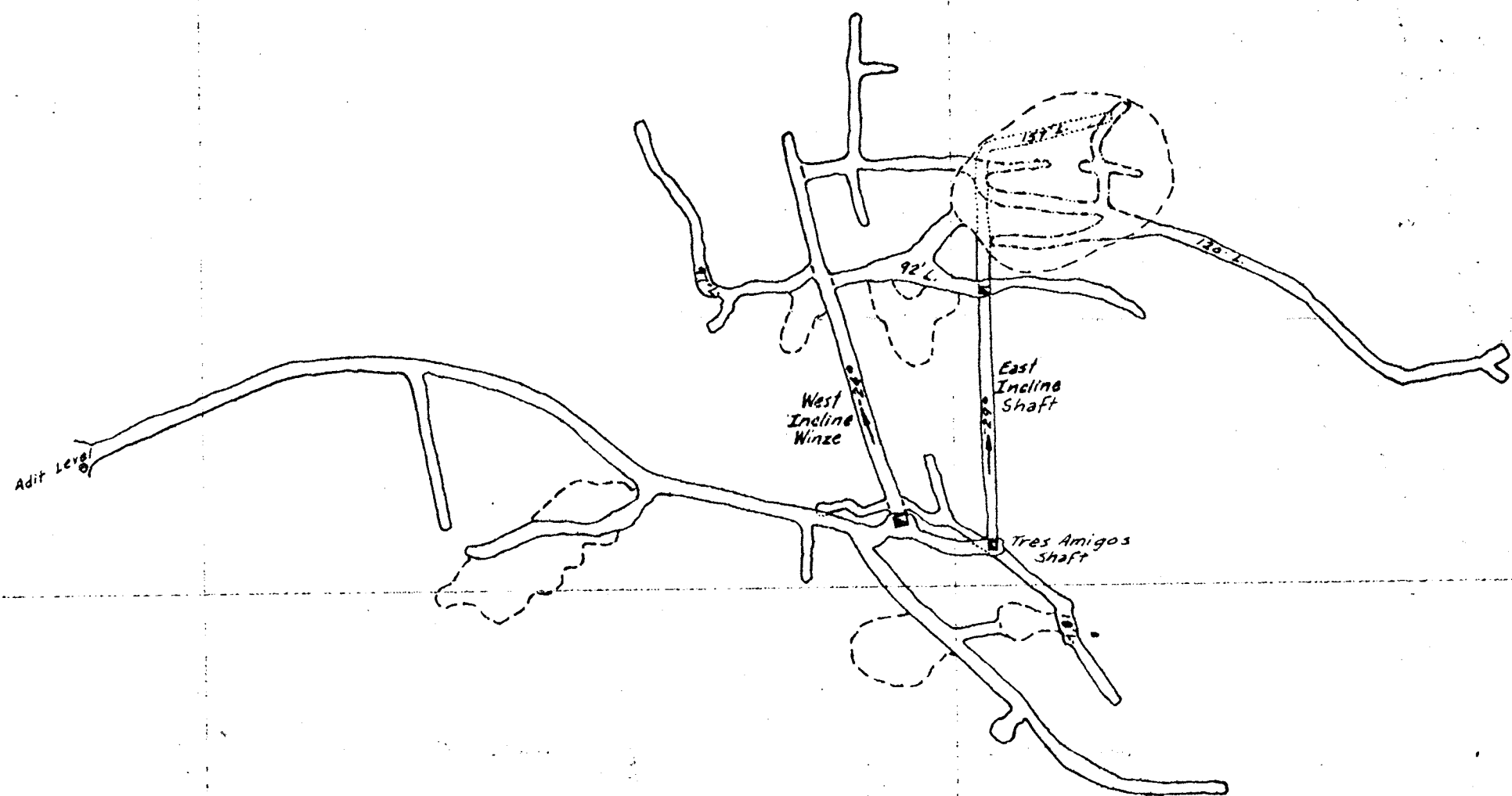


LEGEND
Yuma Copper Group
Tenneco Claims

24

CLAIM MAP OF
YUMA COPPER
PROJECT
Tenneco Oil Co.
Scale 1"=1000'

By 9 June 1972



2800 N.

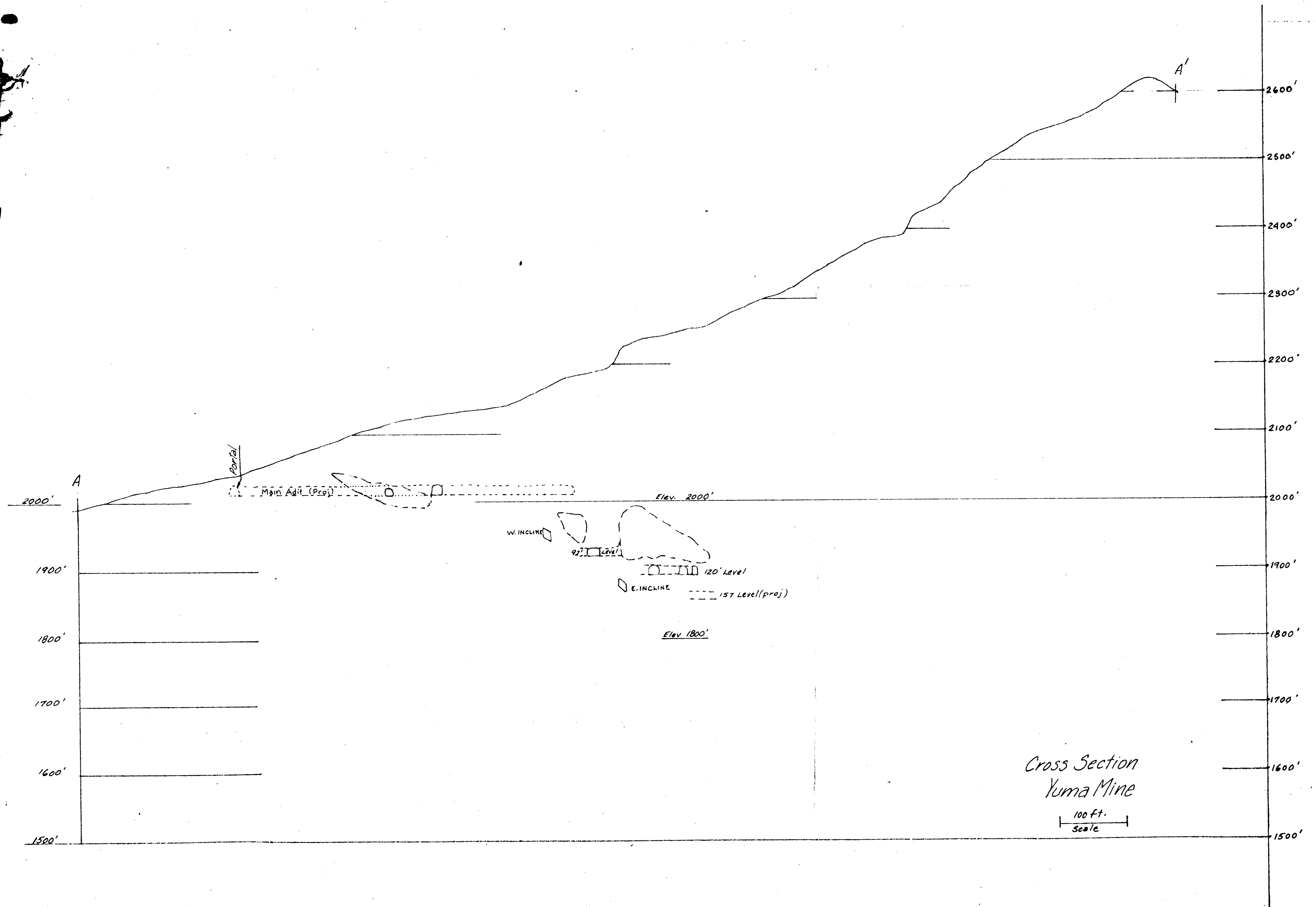
1600 E.

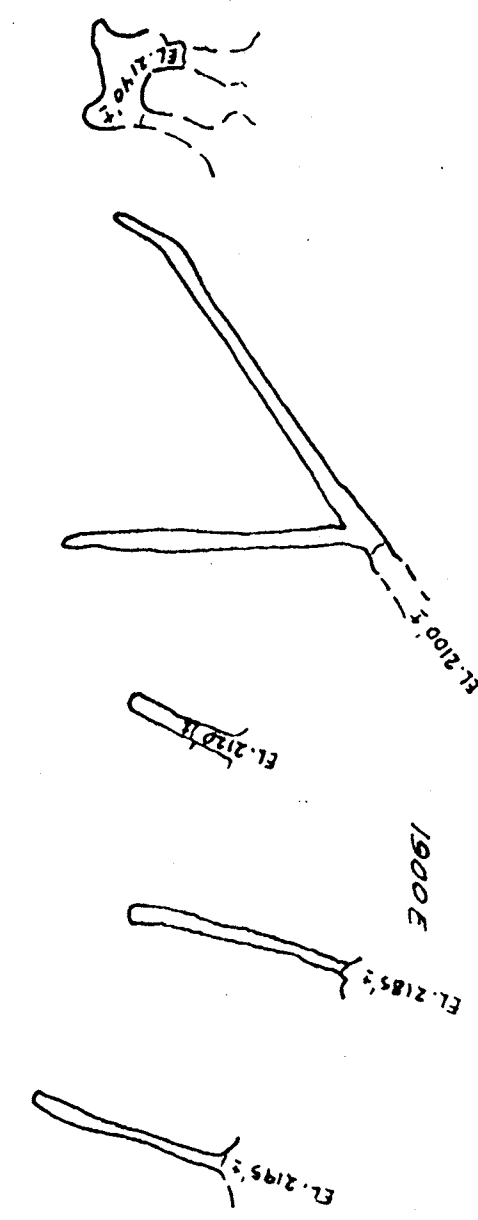
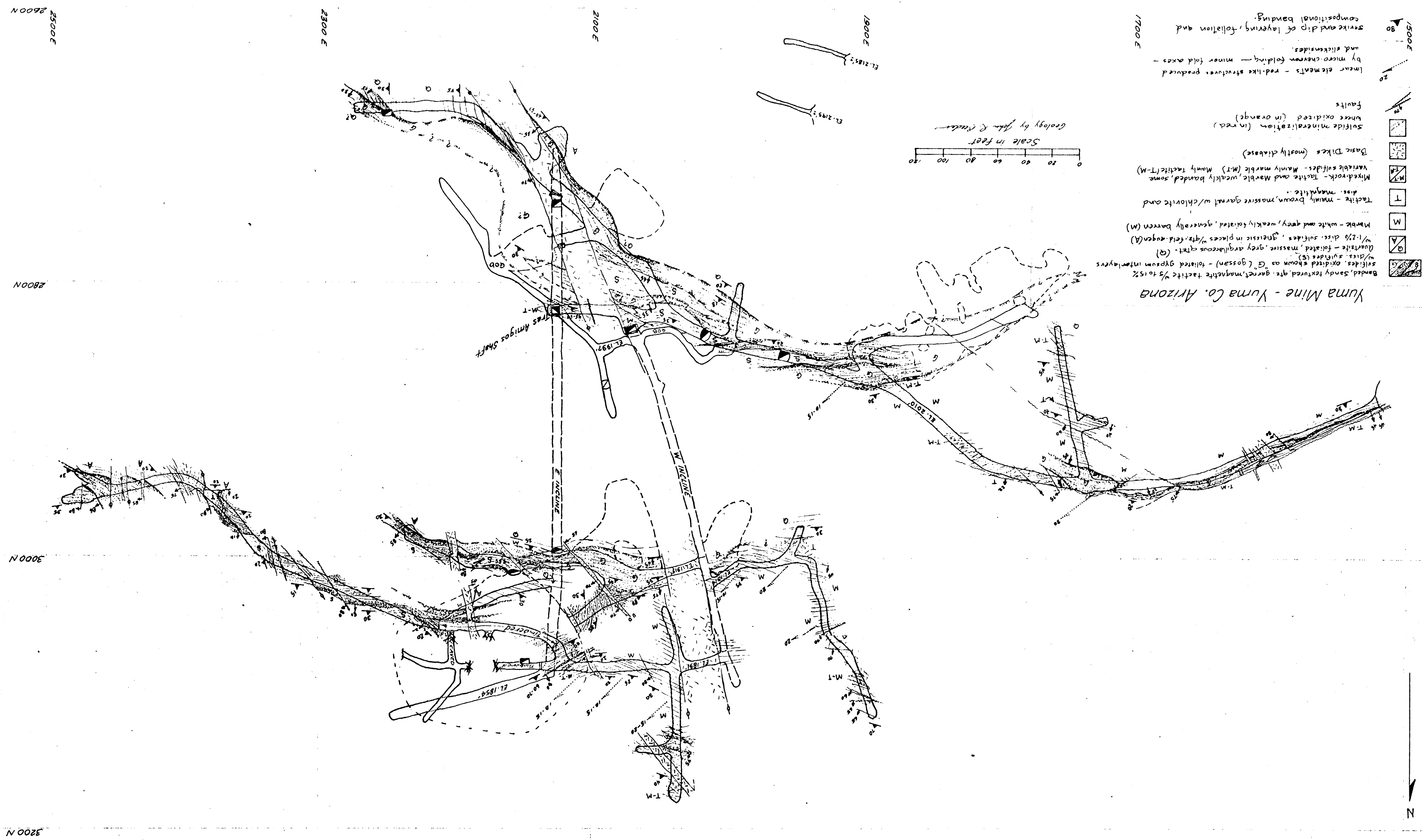
2100 E.

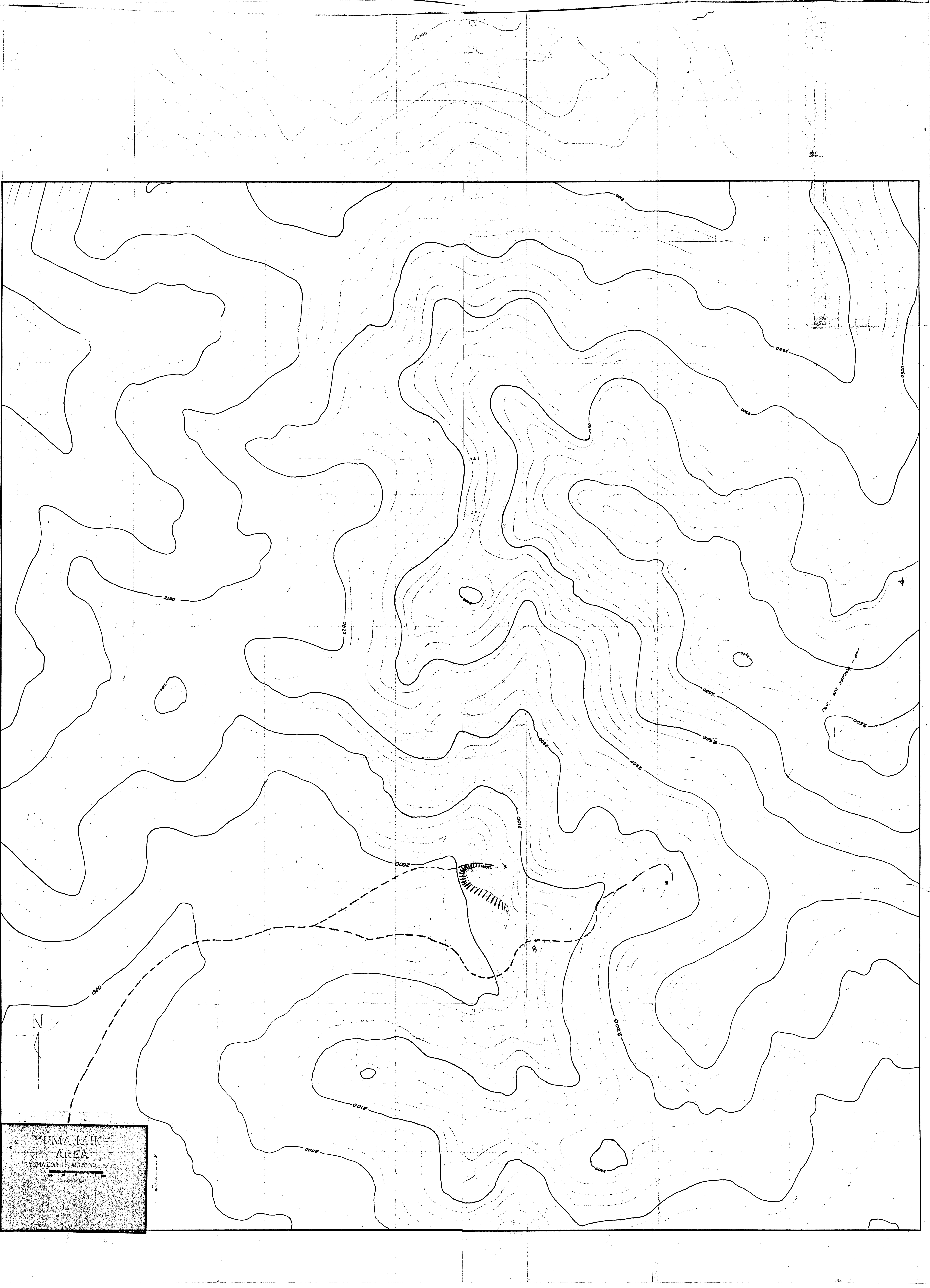


Yuma Mine - Underground Workings

Scale
100 feet







YUMA MHE
AREA
YUMA COUNTY, ARIZONA
Scale 1:50,000

