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Cu 50¢/lb
Au $35.00/oz
Ag 2.00/oz

Ore 2% Cu
.03 oz Au
.3 oz Ag

Concentrate (500# Cu)
25% Cu .29 oz Au 2.9 oz Ag

14 to 1 Conc Ratio

Assume 8% Moisture

Therefore: 1.08 tons Conc = 1 dry ton

Payments

Gold 92.57 @ 35.00
.29 × 32.32 = $9.70

Silver 95% of [2.9 − .5 = 2.4] × 2.00 − 3¢
= 95% × 2.4 × 1.97 = $4.50

Copper 500# − 8# × 95% @ 50¢ − 5¢/lb Acct for

= 492# × 95% × 45¢
= $210

9.70
4.50
210.00
$224.20
25
$199.20

Treatment 25.00
plus 15¢/unit > 25% − No charge
Vicksburg − Hayden Freight 5.71
Net Smelter/dry ton $193.49

Freight Cu @ 14¢

500# - 8# x 95¢ @ (14 - 9¢) =

492 x 95% x 9¢ = $42

	9.70
Gold	4.50
Ag	$56.20
Treat: less $25	25
	31.20

$30 - 40 Value as $5.71 per Ton

$193.49 / dry ton

~~1.08 Ton wet / 1T dry x $193.49 = 193.49~~

.92 dry T = 1 Ton Conc.

193.49 x 92% = $178 / ton Conc.

178 / 14 = $12.80 / ton Cruda at Vicksburg

Gross Cu 40# Cu @ 50¢ =	2000	@ 90%	=	1800
Au .03 x 35	= 105	70%		75
Ag .3 x 200	= 60	70%		40
				19.15

Mine
Yuma Project

Phone Call - R. Webb
6/5/70

Swansea

Shaft in meta gneiss rock
schist gneiss - strong meteor.
much specul. in gneiss
much alt in ore body — Required
very heavy square set — Killed profit.

Attempted pits - used CF&I drilling
suggested small pit possible.
Stripping ratio high - CF&I.

Old production around 2 to 2½ % Cpy ore.

Spec rules and direct shipping

Ariz Cu Corp Don King — Chemical plant in Aguila

Mineral Hill - Parker -
Dr. Nelson (formerly Duval)
Riverbend Metals Co.
Superintendent - Ted Lang — old Friend of R. Webb

J E K

J. E. K.
JUN 05 1970

P 13 King & King Yuma Mine

$3,400 000 profit after taxes over 15 years

$\frac{3.4 M.}{15} = \$227,000$ per year

present Value @ 5% for 15 years.

227000 x 10.38 = 2.45 Mill

@ 7%:

227000 x 9.11 = 2.05 Mill = approx Cap. Val invest.

Therefore, rate of Return on hypothetical ore body at 2% Cu etc is 7%

P. 14 - oxide acid consumption

Vat - 80% Recovery - 150 - 200 # Acid per Ton ore

@ 1.5% Cu = 30#/ton

Say: 175# acid / 30# Cu = 5.8 #/# Cu

EXAMINATION • EVALUATION • PLANT DESIGN • MANAGEMENT

KING & KING

MINING ENGINEERS

P.O. BOX 2127, LOS NIETOS, CALIFORNIA OXbo 9-0036

CLARENCE R. KING
7648 BOLSA RD.
MIDWAY CITY, CALIF.
TWinoaks 9-5711

DAN M. KING
11762 MINER BLVD.
WHITTIER, CALIF.
OXbo 9-0220

REPORT UPON THE YUMA COPPER MINE.

Yuma County, Arizona.

Sept. 1, 1960 Clarence R. King.

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.

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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°to35°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 chalcopyrite, bornite, pyrite, pyrrhotite, tactite 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 similiar 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

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) same claim	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

Yellow Bird group, (patented): out

Mendota Lode)
Coronet Lode) -- ---------- U. S. Mineral Survey No. 1888.
Security Placer)

out

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 sporatic 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.

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.

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^{o} to 60^{o}.

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 north-east 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 quaftz-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 min-erals, 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.

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 sparcely 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.

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, $CuCO_3.Cu(OH)_2$	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, $CaSO_4.2H_2O$	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, $3RO.3SiO_2.R_2O_3$	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.

TABLE II.

YUMA OREBODY: SUMMARY OF ORE ANALYSES BY LEVELS.

Level	Elevation, Ft.	Tons shipped.	Troy oz./ton		Percent-							Remarks.
			Gold	Silver	Cu	Zn	Fe	S	Al_2O_3	SiO_2	CaO	
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	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	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	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	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	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 resistent 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 turqooise. The ore shipped from the L8B&D stopes, is, however, representative of the oxide ore in the main orebody.

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 similiar. The Swansea orebody outcrops as an inconspicuous gossan, below which was a leached semi-sulfide zone similiar 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.

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. Diel'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 highernear 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

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: 600x1.5 / 1000x1.6/1600, 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).

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
Weighted averages:	----	1.572	0.0287	-0.24

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.

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.

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 SO_2 gas and high-copper calcine. The SO_2 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: (See maps No. 2 & 5).	$190,000.

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.

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 rnge.:	$ 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. deisel-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 jackhamers, 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.

KING & KING
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 R. 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 CaO	Z-5	MIT	Remarks
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	- -	0.1	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 %Cu	Assays Oz. Au	Content Oz. Ag	Content, % 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% revoery 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.