CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
1520 West Adams St.
Phoenix, AZ 85007
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

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Arizona Department of Mines and Mineral Resources Mining Collection

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PRINTED: 04/29/2002

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: OLD RELIABLE

ALTERNATE NAMES:
- PATENTED CLAIMS MS 4059
- COPPER CREEK MINING CO. PROP.
- CALUMET
- AZ. MINING CO. OF BISBEE
- CLARK-SCANLON GROUP
- RELIABLE
- AMT INTERNATIONAL MINING

PINAL COUNTY MILS NUMBER: 547B

LOCATION: TOWNSHIP 8 S RANGE 18 E SECTION 10 QUARTER N2
LATITUDE: N 32DEG 45MIN 07SEC LONGITUDE: W 110DEG 29MIN 22SEC
TOPO MAP NAME: OAK GROVE CANYON - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:
- COPPER
- COPPER SULFIDE
- COPPER OXIDE
- LEAD SULFIDE
- MOLYBDENUM SULFIDE
- BARIUM BARITE
- GOLD
- SILVER

BIBLIOGRAPHY:

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- ADMMR OLD RELIABLE COPPER MINE FILE
- ADMMR MAGMA CHIEF MINE FILE
- ADMMR U FILES PINAL CU32 (USBM NO 464.2/1453)
- WAR MINERALS REPORT USBM #275
- USAEC PRELIM RECONN RPT 172-488, P 35; 1953
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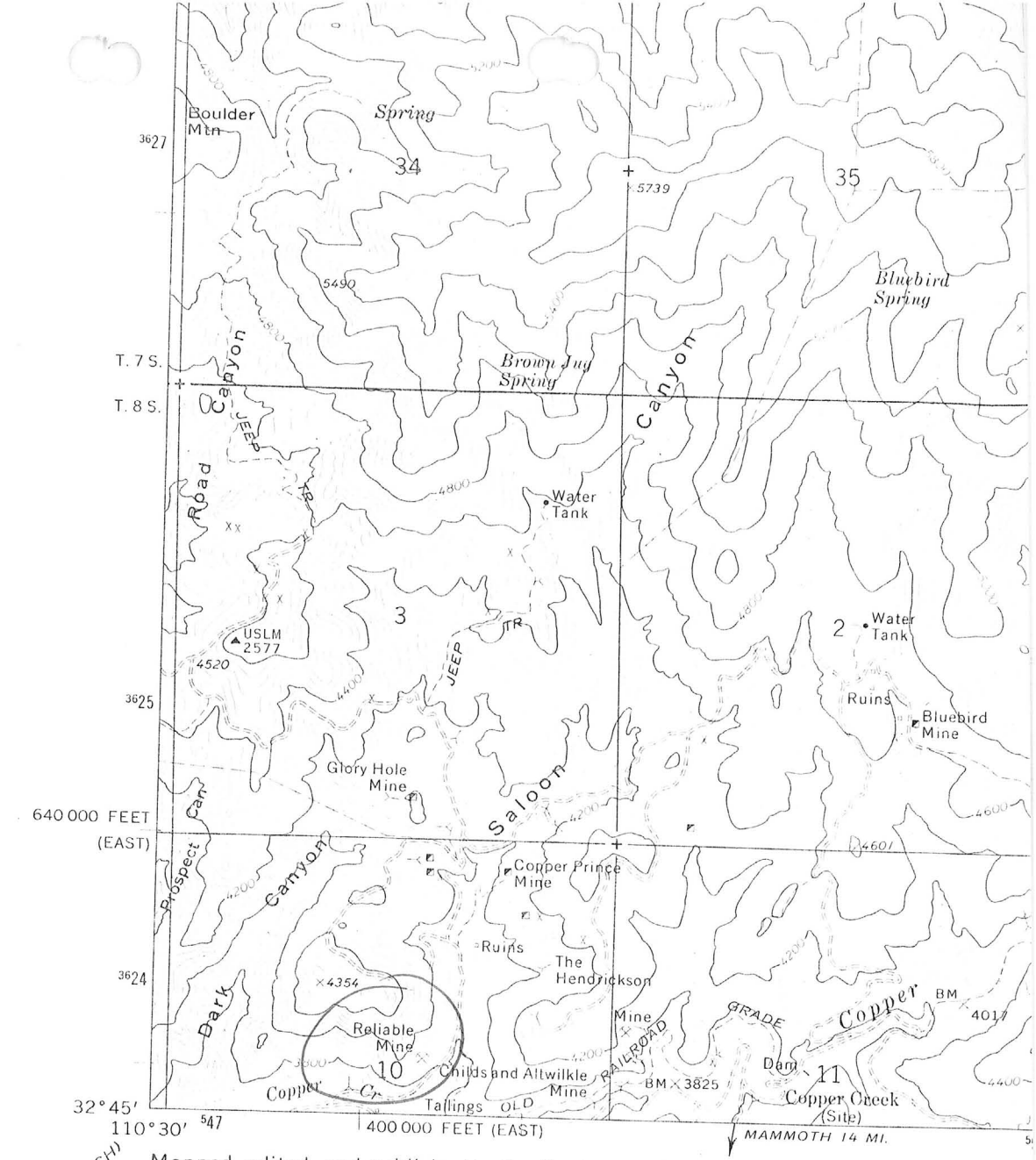
- KUHN, T., "ECON GEOL" VOL. 36, P 512-538;1941
- SIMONS, F.S. "GEOL OF KLONDYKE QUAD" USGS PP 461, P 162; 1964
- ADMMR AZ INDUSTRIAL MINERALS RPT P 53
- ADMMR RANCHERS EXPL ACTIVE FILE



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1971. Field checked 1972

Projection: Arizona coordinate system, east zone (transverse Mercator)
10,000-foot grid ticks, based on Arizona coordinate system, east and central zones
1000-metre Universal Transverse Mercator grid ticks, zone 12, shown in blue. 1927 North American datum

Fine red dashed lines indicate selected fence lines

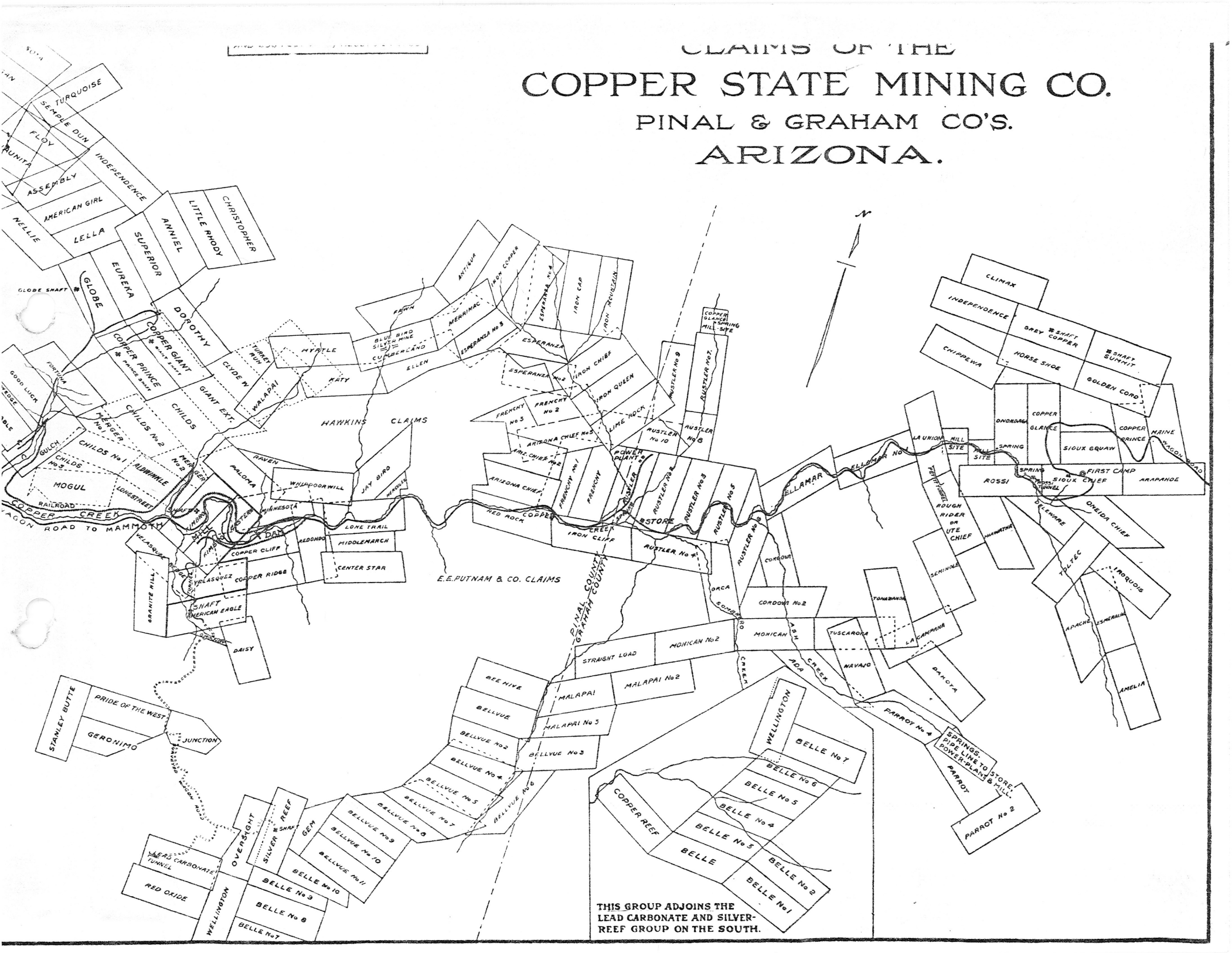
GN MN
0°18'
5 MILS
13°
231 M

UTM GRID AND 1972 MAGNETIC DECLINATION AT CENTER OF

Reliable Mine
T8S R18S R10

Oak Grove Canyon 7.5'

CLAIMS OF THE
COPPER STATE MINING CO.
PINAL & GRAHAM CO'S.
ARIZONA.



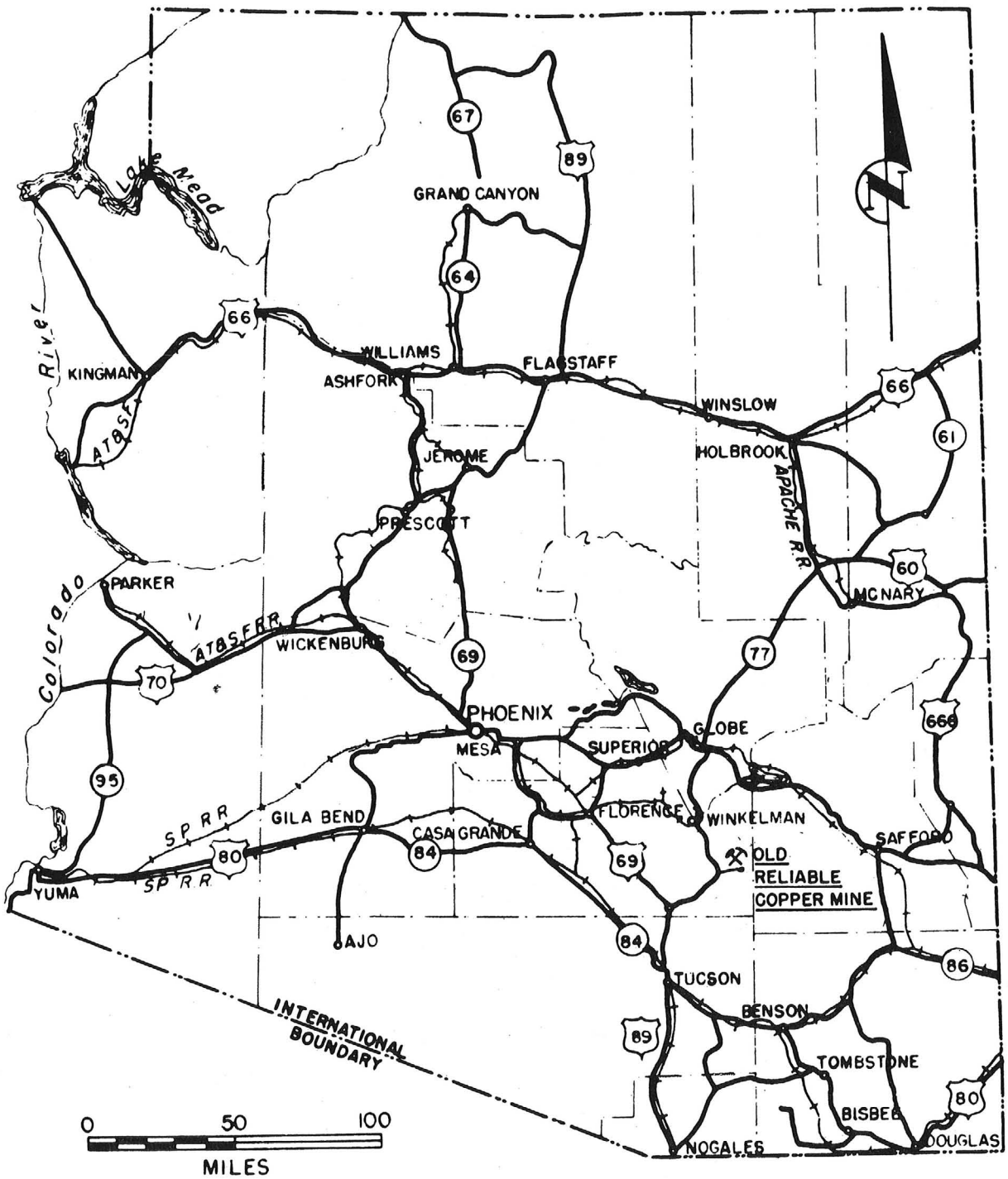


Figure 1.- Location map, Old Reliable copper mine, Pinal County, Arizona.

OLD RELIABLE COPPER MINE PINAL

MAPS - Upstairs in the flat storage area in the second drawer.

USGS Bul. 1490, p. 32
Metals Week, March 27, 1972, p. 7

Mining Journal, June 16, 1972, p. 505,506
" " July 19, 1974, p. 64 (production)
" " October 18, 1974, p. 346
" "

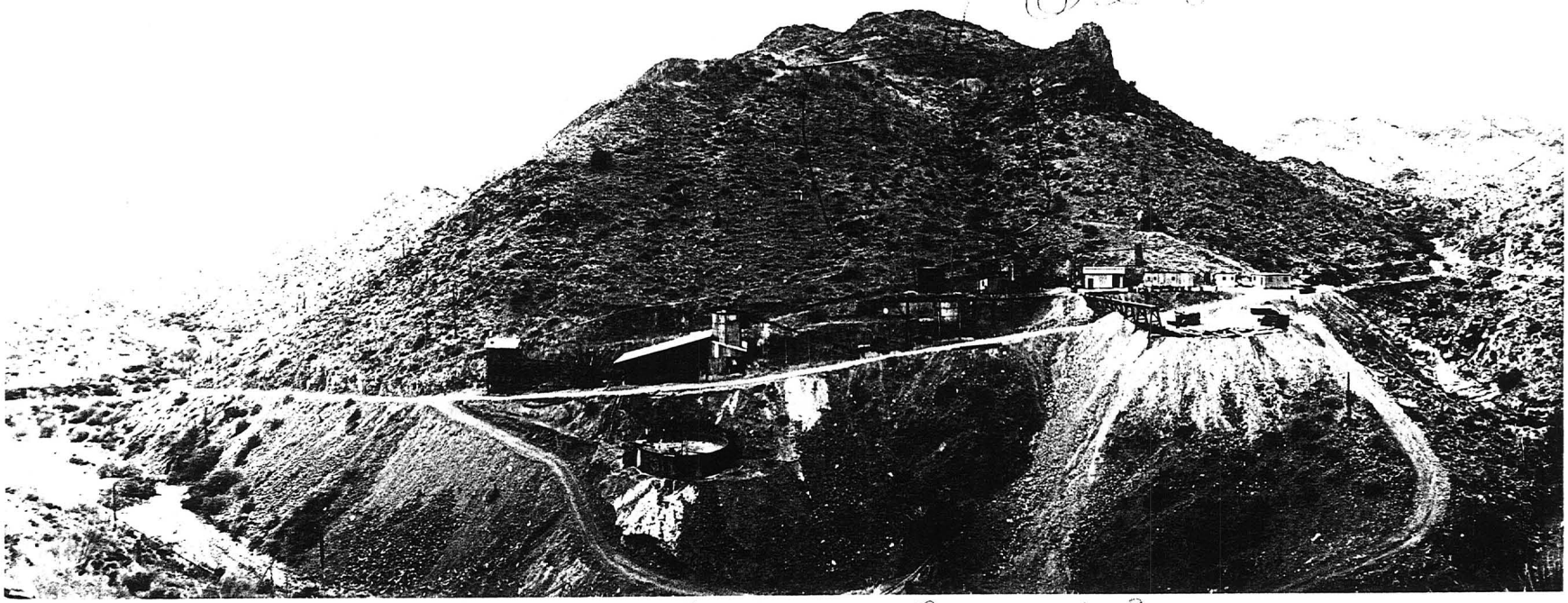
Mining Engineering, April, 1973, p. 47
" " August, 1973, p. 10

Skillings Mining Review, April 21, 1973, p. 8
" " " May, 26, 1973, p. 22
" " " January 12, 1974, p. 38
" " " March 23, 1974, p. 1, 12-15
" " " April 27, 1974, p. 1, 9, 10
" " " Nov. 23, 1974, p. 10 (gen. info.)

E/MJ, August, 1973, p. 133

Contractor & Engineer, November, 1973, p. 16

Mining Magazine, May, 1974, p. 353, 355, 357, 359 (in-situ cu leaching)



Geliable mine (f)
Pinal

AMT INTERNATIONAL MINING CORPORATION

TSE:AAI NEWS RELEASE

AMT ANNOUNCES RESULTS OF ITS 1999 DRILLING PROGRAM

(Monday, August 9, 1999 - Toronto, Canada) AMT International Mining Corporation reports that its LM-1 and LM-2 diamond drill holes are completed and that, in addition to the upper Mammoth breccia interval reported in its June 21, 1999, press release, LM-1 has intercepted a 630 foot interval (1,730 feet to 2,360 feet) of 1% copper. The Mammoth-Keel Zone, which is located within this intercept, grades 1.77% copper in a 110 foot interval (1,730 feet to 1,840 feet). LM-2 has intercepted 810 feet (1,790 feet to 2,600 feet) of 0.95% copper, including 150 feet (2,250 feet to 2,400 feet) of 2.02% copper in the Mammoth-Keel Zone. Substantial molybdenum credits, along with gold and silver credits, have been found within the mineralized copper zones for both LM-1 and LM-2, although assays for these minerals have not yet been completed. Copper mineralization in both LM-1 and LM-2 holes substantiates a larger breccia porphyry zone at depth in the Mammoth area. Drilling will be ongoing in this area, and it is anticipated that diamond drill hole LM-3 will be completed during the week of August 9. At least two or three additional holes are planned for the Mammoth area. AMT will add a second drilling rig and intends to initiate drilling in the American Eagle breccia on August 9 to better define a previously drilled high grade intercept of 1.16% copper and 0.316% molybdenum over an interval of 170 feet.

APPOINTMENT OF TWO NEW DIRECTORS

AMT is pleased to announce the appointment of George Hanna and Michel Gaucher to its Board of Directors. They replace Gordon Slade and Steve Vaughan who resigned as directors. Mr. Hanna and Mr. Gaucher are nominees of Norshield Investments and their election as directors fulfills one of the terms of the financing agreement reached by AMT and Norshield.

Mr. George Hanna is currently president of Intrafina Ltd. and Managing Director of Sopamy Inc. He is also a director of a number of companies, including Canficorp Inc and Palos Capital Corporation. In addition, Mr. Hanna is a member of the Board of Directors of several organizations, including Concordia University and the Sacred Heart School Foundation.

Mr. Michel Gaucher has extensive senior level experience with major Canadian and international corporations, and is Chairman and Chief Executive Officer of Dynamis Group, Inc. and Chairman of the Board of Sofati Ltd. Mr. Gaucher is also a member of the Quebec Bar Association, the Canadian Bar Association, and is President of Stanislas College.

Both Mr. Hanna and Mr. Gaucher will contribute a wealth of business and management experience to AMT and will assist the corporation in the advancement of its future financing and strategic growth programs.

For further information, contact:

W. Glen Zinn
Chief Operating Officer
Telephone: (520) 544-8815, Ext. 23
Fax: (520) 544-8507

Old Reliable (file)
Penal Co.

AMT INTERNATIONAL MINING CORPORATION

TSE:AAI

NEWS RELEASE

AMT INITIATES 1999 DRILLING PROGRAM

Monday, June 21, 1999 - Toronto, Canada AMT International Mining Corporation has initiated a drilling program of 25,000 feet at its Copper Creek Project for the purpose of advancing resources to the reserve status. This program commenced on June 1, 1999, and is expected to be completed by the end of 1999.

The first breccia complex to be drilled is the Mammoth, with targets both in the Upper Mammoth Breccia and the Lower Keel Zone. To date the first hole, M-1, has intersected 160 feet, from 130 ft. to 290 ft., of 2.23% copper within the Mammoth breccia. This drill hole will continue to a depth of 2,300 feet to intersect the high grade Mammoth-Keel Zone and to gather additional information from the porphyry system surrounding the Keel Zone.

W. Glen Zinn, Chief Operating Officer of AMT, said: "I am extremely pleased that the intersection has confirmed and enhanced the Mammoth Breccia, and we are looking forward to the continuing development of our reserves from this drilling program".

AMT is engaged in advanced stage mineral exploration and is focussing its activity on acquiring and exploring developed or semi-developed reserves of copper and precious metals located on the Copper Creek Property.

For more information, contact:

Glen Zinn, Chief Operating Officer
Phone: (520)544-8815, Ext. 23
Fax: (520)544-8507

E-mail: amt1@primenet.com
Website: www.primenet.com/~amt1/

pr99-4

Old Reliable

For Immediate Release: Monday April 26, 1999

AMT INTERNATIONAL MINING CORPORATION

TSE: AAI

NEWS RELEASE

(April 26, 1999 - Toronto, Ontario) AMT International Mining Corporation is pleased to announce that, subject to all applicable regulatory approvals and certain other conditions, it has entered into an agreement with Norshield Capital Management Corporation of Montreal ("Norshield") pursuant to which Norshield has agreed to purchase 6,666,666 special warrants to acquire senior convertible voting preferred shares (the "Preferred Share Special Warrants") at a price of Cdn. $0.30 per Preferred Share Special Warrant and 8,571,430 special warrants to acquire common shares (the "Common Share Special Warrants") at a price of Cdn. $0.175 per Common Share Special Warrant, for total aggregate proceeds of Cdn. $3.5 million.

Each Preferred Share Special Warrant will entitle the holder to receive, for no additional consideration, one senior convertible voting preferred share of the Corporation. Each preferred share carries a 10% dividend and is payable quarterly in common shares of the Corporation based on a 20-day weighted average daily closing price of the common shares on The Toronto Stock Exchange or, at the option of Norshield and once the Corporation's Copper Creek property is in production, an annual dividend equal to 5% of certain defined income, payable in cash. The preferred shares are also convertible at Norshield's option into common shares at any time, at an attributed value of $0.30 per preferred share, at a price equal to the lesser of Cdn. $0.30 per common share and the 20-day weighted average closing price of the common shares on The Toronto Stock Exchange. Norshield is required to convert all preferred shares, if any, at the end of five years on the foregoing basis. On the first anniversary of the issuance of the preferred shares, the conversion price may be reset to a lower price if the 20-day weighted average closing price of the common shares is below $0.30. Norshield also has the option to require redemption of the preferred shares at the higher of market value and a value equal to Cdn. $0.30 plus an aggregate 25% annual return (inclusive of interest which has been paid) for each year that the preferred shares have been outstanding under certain circumstances, such as change of control of the Corporation or a change of two-thirds of the members of the Board of Directors of the Corporation without Norshield's consent.

Each Common Share Special Warrant will entitle the holder to receive, for no additional consideration, one common share of the Corporation. The Corporation is required to file a prospectus qualifying the issuance of the securities underlying the special warrants within 90 days following the closing of the transaction. The offering of the special warrants is scheduled to close on or about June 23, 1999 and may be subject to shareholder approval.

Net proceeds from this issue will be used to complete exploration necessary for completion of exploration and the feasibility study in respect of the Corporation's Copper Creek Project located in Pinal County Arizona.

The Corporation also announced today that it has recently learned that 39 unpatented claims, covering 511 acres on its Copper Creek Project, located in the Copper Creek district in Pinal County, Arizona, may have been deficiently staked by a predecessor in title to the Corporation. These particular claims do not materially affect the Corporation's present resource base, have no affect on its present reserve base and have no impact on its planned 1999 drilling plans. With assistance from Arizona counsel, the Corporation is in the process of investigating this matter and evaluating possible remedies available to it. The Corporation does not anticipate any significant disruption of its long term plans to develop the Copper Creek Project into an economically viable copper project, nor does the Corporation anticipate that the ultimate resolution of this matter will have a materially adverse effect on the Corporation's financial position.

The Board of Directors of AMT International Mining Corporation also announced today that it has terminated the position of Dr. Kushal Singh as the President and Chief Executive Officer of the Corporation and his employment as Chairman and Chief Executive Officer of AMT (USA) Inc., the Corporation's wholly owned operating subsidiary, effective immediately. Peter Crossgrove has been appointed the new President and Chief Executive Officer of the Corporation.

In the course of seeking alternative financing arrangements for the Corporation, Dr. Singh entered into a series of transactions and, without the knowledge of the Board, expended a total of approximately (Can.) $1.4 million of the Corporation's funds. While there is no evidence that he was a personal beneficiary or instigator of the fraud on the Corporation, having regard to his actions and the amount of funds expended, together with the results of the forensic audit report prepared on behalf of the Board, the Board has decided to terminate his employment and position, as mentioned above. Dr. Singh has also filed a lawsuit in connection with his termination. The Board is of the view that these funds are unlikely to be recovered. As a result, these funds have been written off in their entirety as a loss. As at April 26, 1999, the Corporation's cash position was approximately (Can.) $770,000.

The Corporation is engaged in advance stage mineral exploration and is focussing its activity on acquiring and exploring developed or semi-developed reserves of copper and precious metals located on the Copper Creek Property.

- 30 -

For further information, contact:

W. Glen Zinn
Chief Operating Officer

Telephone: (520) 544-8815, Ext. 23
Fax: (520) 544-8507

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Attention: Mason Cog[illegible]
Arizona [illegible]f Mines and Mineral Resources

Coppan Prince
old Reliable
Copper Creek

Final
AMC
file.
Copper Creek
Old Reliable
Childsaldwinite
Magma Chief

AMT INTERNATIONAL
MINING CORPORATION

TSE:AAI

NEWS RELEASE

AMT ANNOUNCES EXPANSION/UPGRADE OF COPPER RESOURCES AT COPPER CREEK

(September 8, 1998 - Toronto, Canada) AMT International Mining Corporation is pleased to announce that the extensive program of geological fieldwork and drilling carried out during the last twelve months at its Copper Creek (Arizona) project has enabled the Company to increase its estimate of the shallow sulfide (breccia) copper resources. The potential for expansion of the porphyry resource has also increased significantly. This drilling has also upgraded some of the breccia pipes from the inferred resource category to measured and drill indicated resources. The expanded resources have enabled AMT to increase its estimates of annual copper production and mine life from the breccia deposits by about 50%.

Total resources and reserves in the shallow breccia systems have now been increased from 40 to 43 million tons, of which:

- 10 million tons grading 1.73 % copper equivalent are now classified as proven and probable reserves;
- 5 million tons grading 2.00% copper equivalent are now classified as measured and indicated resources; and
- 28 million tons grading +2.00% copper equivalent are now classified as inferred resources.

In addition, five porphyry targets have now been identified by magnetic and geochemical data as well as by diamond drilling. One of these porphyry systems, the American Eagle-Lower Creek zone, hosts a total of 300 million tons of measured and inferred resources grading 0.80% copper equivalent grade.

The fieldwork that resulted in this increase/upgrade included ground magnetic, radiometric, geochemistry, orthophotos and detailed geological mapping, with particular emphasis on geochemical factor analyses. The first phase evaluation has produced over one dozen additional breccia pipes for expansion of the resource and reserve base. The most significant conclusions drawn from this program are:

1. To date, approximately 500 breccia pipes have been identified on land controlled by AMT within the Copper Creek district.

NOTE: Copper equivalent grades are expressed on the basis of a copper price of US$0.75 per pound and a molybdenum price of US$4 per pound. No credit has yet been given for contained gold or silver.

2. Drilling has so far identified twelve of the 500 breccia pipes as significant mineral resource targets.

3. Additional mineralized breccia pipes have been identified near the infrastructure planned for the initial stage production scheme.

4. The 1998 drilling program just completed has confirmed the effectiveness of AMT's geological analytical techniques using geochemical, radiometric and magnetic, together with detailed geological mapping.

AMT has to date developed six high priority targets (shown on the attached map) that have ore grade mineralization, confirmed by drilling. The Company will begin an expanded drilling program this fall with the objective of converting an additional 10 million tons of resources at these targets to the proven and probable reserve category within the next six to nine months.

Listed below are the results of the recent drilling program at the six highest priority targets:

KEEL

The Keel Zone is about 600 feet below the Mammoth (formerly Creek) breccia and has been intersected by seven diamond drill holes. The significant mineralized intercepts are 2.28 % copper equivalent over 160 feet in Hole NE-6 and 1.79 % copper equivalent over a 190 foot interval in Hole VIX28-2. A drill indicated resource estimate of 5 million tons grading 2.00% copper has been established for this deposit.

AMERICAN EAGLE BRECCIA COMPLEX

Copper mineralization has been intercepted in two holes; the significant intercept is Hole CU-2, which has an interval of 180 feet grading 2.58% copper equivalent. An inferred mineral resource estimate of approximately 3 million tons of 1.60 % copper equivalent has been established for this deposit.

MARSHA

This is an open pit resource tested by 4 drill holes completed in 1998. The significant intercepts were: 180 feet of 1.18 % copper equivalent in Hole MB-2, 170 feet of 1.10% copper equivalent in Hole MB-2a and 190 feet grading 0.83 % copper equivalent in Hole MB-1. A resource of 1.5 to 2 million tons grading +1.00% copper equivalent has been estimated for this deposit.

COPPER PRINCE, GIANT AND GLOBE

These breccias have been drilled by AMT during 1997 and 1998. The significant mineral intercepts are 320 feet of 2.60 % copper equivalent in Hole CP-3 (Copper Prince), 130 feet of 2.50 % copper equivalent in CP-1 (Copper Prince), 122 feet of 0.96% copper in Hole DH-11 (Giant) and 130 feet of 1.80 % copper equivalent in Hole G4 (Globe). An inferred mineralized resource of 2 to 4 million tons grading +1.50% copper equivalent has been estimated for these breccia pipes. The top of these three breccia pipes will be amenable to open pit mining.

OTHER TARGETS

Other important targets identified by factor analyses (geochemical, radiometric, magnetic and detailed mapping) and tested by drill holes are: North Childs (Drill hole CA-2R) intersected 60 feet grading 1.53% copper only, Rum (Drill hole Rum-1) intersected 90 feet grading 1.65% copper equivalent and West Mammoth target tested by two drill holes and a geophysical survey. Of importance, the Un Named breccia (Drill hole UB-4R) intersected 210 feet grading 1.01% copper equivalent, including 80 feet containing high gold values of 1.5 grams per ton (0.044 oz/ton). Other breccia pipes identified to date are Buzzard, HN-2 (one drill hole intercepted 60 feet grading 2.22 % copper equivalent), Fred, Charles, and Michael.

MERCER RANCH PURCHASE

AMT also announces the purchase of the approximately 37,000 acre Mercer Ranch property in August 1998. The property is strategically located adjacent to land already owned or controlled by AMT for its Copper Creek Project in Pinal County, Arizona, 45 miles north east of Tucson. This acquisition will expedite the development of AMT's Copper Creek Project by providing alternative road and power line accessibility, additional water rights, new mineralized areas, and the potential future opportunity to trade certain portions of the ranch property for other mineralized areas owned by federal agencies.

COPPER CREEK PRODUCTION PLANS

AMT is focussed on becoming one of the lowest cost copper producers in North America. From the expanded resource and reserve of the shallow breccia pipes, the production plans and mine life are now being revised upward to between 75 and 80 million pounds of copper annually at (all-in) cash costs below 50 cents per pound over ten years of mine life.

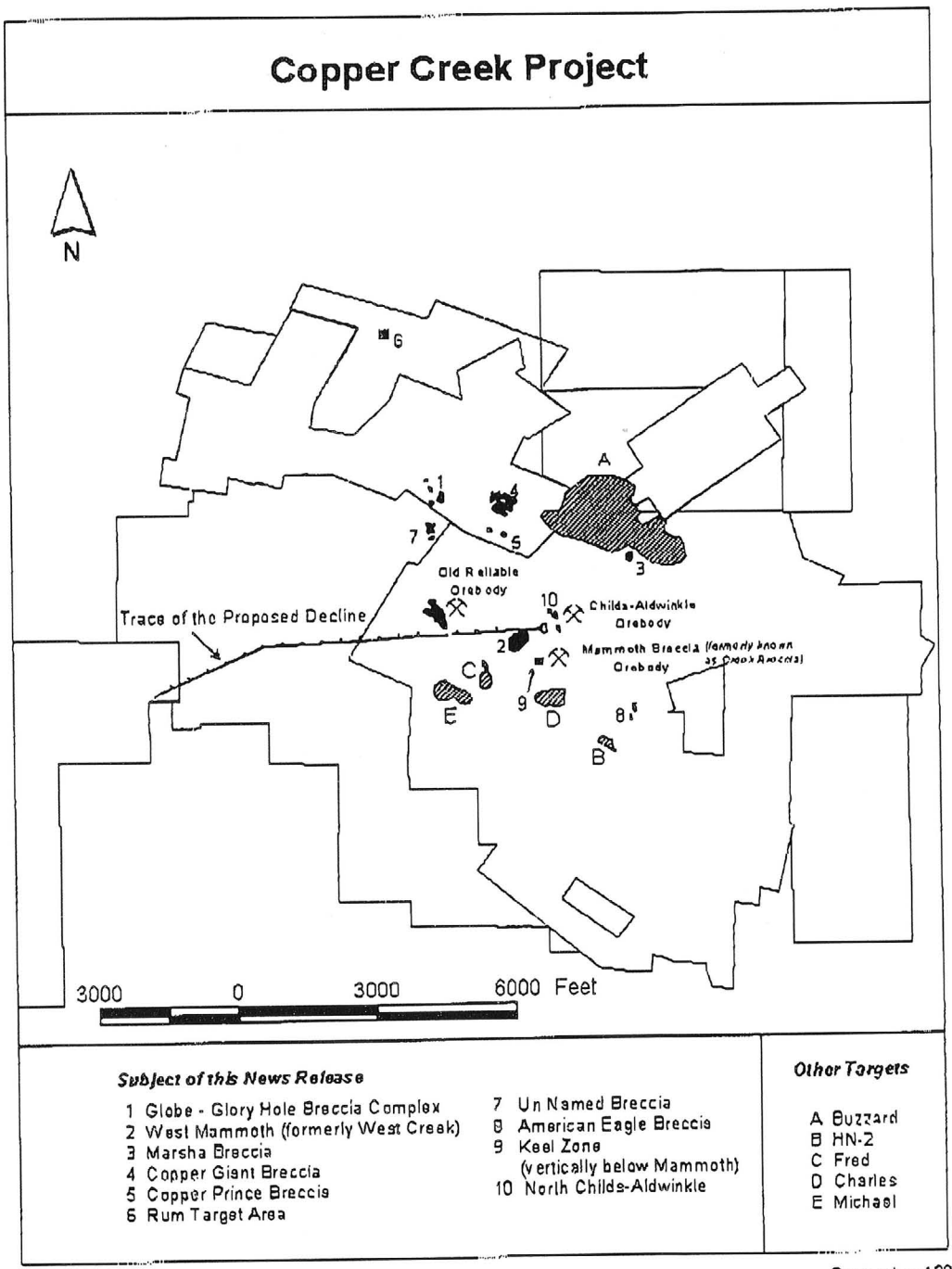
For further information, contact:

Dr. Kushal Singh, President (ext. 1)
or W. Glen Zinn, Chief Operating Officer (ext. 2)

Telephone: (520) 544-8815
Fax: (520) 544-8507
e-mail: amt1@primenet.com

Forbes West, Investor Relations
Telephone: (416) 413-4608

AMT website: www.primenet.com/~amt1/ *pr98-5*



September 1998

Attention: Mason Coggin
Arizona Dep' of Mines and Mineral Resources

NEWS RELEASE

AMT International Mining Corporation - TSE: AAI

AMT Reports Discovery of New High Grade Gold-Copper-Moly System at Copper Creek

(Toronto, January 11, 1998) AMT International Mining Corporation has reported the discovery of the Holly Zone, a new area within the Copper Creek Project boundaries containing high-grade gold, copper and molybdenum. Assays from one surface rock-vein sample have produced gold values up to 16.1 g/t (one-half an ounce per ton), copper values up to 5.52%, and molybdenum values up to 0.012%.

The Holly Zone was discovered during the re-evaluation of drilling data within the structural zones. Re-assaying indicated that Hole UB-4R had an ore grade interval of 160 feet at a depth of between 300 and 460 feet, of 0.59% copper, and 240 feet (300' – 540') of 0.9 g/t gold: at today's prices, this is the equivalent of approximately 1.3% copper. Following the re-evaluation, surface samples containing highly anomalous values of gold copper and moly were collected in an area of approximately 900 feet by 1000 feet. While all 80 surface samples contain unusually high levels of gold for an Arizona porphyry copper system, 28% of the samples assayed to date contain greater than 0.1g/t gold - an extremely high result. The 80 samples averaged 0.06g/t gold, 0.17% copper and 0.01% moly. Based on previous drill results, it is anticipated that mineralized values will increase at depth.

Geological mapping, together with geochemical detailing of the new zone, located in an area between the Old Reliable deposit and the Globe Breccia, have been completed. The zone comprises a complex of seven breccia pipes, multiple porphyry intrusives, the intersection of intense east-west trending structural systems with a minor N20°W trending structural system, and strong sericitic-quartz alteration with local argillic alteration. This zone is also coincident with several magnetic lows.

The extensive work completed to date indicates that the new zone is potentially a porphyry related mineralizing system at shallow depth. Specifically, the Holly Zone is interpreted to represent a shallowly buried (± 800 feet), multiple-phased intrusive copper-gold-moly system emplaced into a structurally prepared trap. The associated high gold content could be on the system's perimeter and/or in the core of this system. This high-grade gold-copper-molybdenum system is the first discovered in the district. Given a surface area of 900' x 1000' and assuming a thickness of 1000 feet, consistent with other known systems in the district, such a system could contain 40 million tons of ore.

Glen Zinn, AMT Chief Operating Officer said: "The discovery of this most interesting porphyry related high-grade gold-copper-moly zone is further confirmation of the potential to significantly expand the reserves and resources at Copper Creek. Our intention is to follow up with 6,000 foot drilling program to further test the zone. "

For more information contact:
Dr. Kushal Singh, Chief Executive Officer
(Ext. 1) or Glen Zinn, Chief Operating
Officer (Ext. 2);
Telephone:(520) 544-8815
Fax: (520) 544-8507

E-Mail: amt1@primenet.com
Website: www.primenet.com/~amt1/

Forbes West, Investor
Relations
Telephone: (416) 413-4608
E-Mail:
fwest@hillandknowlton.ca

Attention: Mason Loggi
Arizona De . Mines and Mineral Resources

COPPER CREEK (A)
OLD RELIABLE (A)

AMT INTERNATIONAL MINING CORPORATION

TSE:AAI NEWS RELEASE

AMT HAS EARNED ITS 50 PERCENT OWNERSHIP INTEREST IN THE BHP COPPER CREEK PROPERTY

(December 8, 1997 – Toronto, Ontario) AMT today announces that AMT's positive feasibility study on the development of Phase I of the Copper Creek deposits has been approved by BHP Copper Inc. In a letter dated December 2, 1997, BHP Copper confirmed that AMT has earned an undivided 50% interest in the Copper Creek Project by making exploration, administrative and other qualifying expenditures totaling three million dollars ($3,000,000) and delivering a feasibility study in such form as required by the Letter Agreement dated October 17, 1995. BHP Copper stated that it is prepared to move forward and negotiate a joint venture agreement with AMT, or any other mutually beneficial business arrangement.

AMT President and CEO, Dr. Kushal Singh, said, "We are very pleased to have reached this important milestone in acquiring ownership in one of the most significant undeveloped North American copper deposits. We are moving ahead quickly with the permitting process. We will also resume exploration drilling on both the breccia and porphyry deposits to increase our proven and probable reserves".

AMT's Copper Creek Project is located 45 miles northeast of Tucson, Arizona, and approximately 12 miles from BHP Copper's San Manuel Copper Mine and Smelter. The Copper Creek Project now covers approximately 6,500 acres. In addition to the joint venture property with BHP Copper, the project includes a joint venture property with Phelps Dodge Corporation and properties 100% controlled by AMT. AMT also has an inclusive option to purchase an additional 25% undivided working interest in the 1,680 acre BHP Copper portion of the property, bringing that interest to 75%.

For further information, contact:

Dr. Kushal Singh, President (ext. 1)
or W. Glen Zinn, Chief Operating Officer (ext. 2)
Telephone: (520) 544-8815
Fax: (520) 544-8507
e-mail: amt1@primenet.com

Forbes West, Investor Relations - Telephone: (416) 868-6666
AMT website: www.primenet.com/~amt1/

pr97-12

AMT INTERNATIONAL MINING CORPORATION

TSE:AAI NEWS RELEASE

AMT ANNOUNCES COMPLETION OF FEASIBILITY STUDY

(October 16, 1997 – Toronto, Ontario) AMT International Mining Corporation (AMT) has completed a positive feasibility study with respect to the development of Phase I of the Copper Creek copper deposits located approximately 45 miles northeast of Tucson, Arizona. A copy of this feasibility study has been delivered to BHP Copper (BHP) for review, which, when approved by BHP, together with BHP's acceptance of expenditures of more than the required US$3.0 million on the BHP portion of the property, fulfills AMT's commitment to earn a 50% joint venture ownership interest in BHP's Copper Creek properties.

The Copper Creek Project is comprised of five contiguous properties covering approximately 6,000 acres. These properties include the joint venture property with BHP, a joint venture property with Phelps-Dodge Corporation, a 100% AMT-owned staked federal claims property, a purchase option on a 780 acre homestead ranch property and a prospecting permit on state lands.

Phase I of the Copper Creek project involves the open-pit mining of the Old Reliable surface leachable deposit and the underground mining of the shallow sulfide ores of the Childs-Aldwinkle and the Creek breccia deposits. The surface leachable ore will be heap leached and processed at an SX-EW plant to be constructed by AMT on its ranch property. The shallow sulfides will be mined using blast hole stoping methods and the ore pre-concentrated by means of heavy media separation and thereafter treated by a flotation plant to be constructed at AMT's ranch property.

The Phase I feasibility study, which is based on total mineable reserves of 11.4 million tons averaging 1.3% total copper (2.9 million tons of leachable reserves at 0.93% total copper and 8.5 million tons of sulfide reserves at 1.42% total copper) and is derived from information obtained from over 100 drill holes, confirmed positive economics at a production rate of 2,000 tons per day of leachable material and 5,000 tons per day of underground sulfides for an average annual production rate of 55 million pounds of copper at cash costs of approximately US$0.54 per pound (all costs except financing). The total estimated pre-production capital cost of placing the Phase I shallow sulfide reserves into production is US$40 million. The capital cost of placing the leachable reserves into production is estimated at US$12 million, which amount is expected to be funded from future cash flow.

Phase II of the project involves the delineation of further leachable reserves on the total 6,000 acre property as well as increasing sulfide production to approximately 10,000 tons per day, resulting in 100 million pounds of annual copper production.

Phase III involves the continued exploration and development of known and indicated large hybrid porphyry copper systems, commencing at a depth of approximately 2,000 feet below the surface. Exploration, including 44 diamond drill holes completed to date, suggests the presence of multiple large tonnage hybrid porphyry copper systems on the Copper Creek property having the potential for copper grades averaging in excess of 0.9%, not including credits for contained molybdenum, gold and silver. The mineral resource delineated by AMT to date is 301 million tons at 0.75% copper grade. This includes 80 million tons in the indicated category, and 221 million tons in the inferred resource category, as defined in the Australasian Code. Pre-feasibility engineering has been carried out using 60% of these geological resources at 0.9% copper grade to produce over 200 millions lbs. of copper per year.

The Phase I feasibility study has been completed to industry standards for reserves, plant, infrastructure and mine design as well as economic evaluation with the assistance and review of independent consulting firms including: The Winters Company (permitting,

flotation plant design, environmental issues and economic evaluation); Western States Engineering (engineering design and cost estimation for the heavy media separation plant and the leaching project); Mountain States R&D International (metallurgical testing and flow sheets); Cella Barr Associates (roads, water and power); BLM Engineering (mine planning) and Golder Associates (rock mechanics). The feasibility results were then reviewed and audited by The Winters Company as to mineral resources and ore reserves and Behre Dolbear & Company Inc. as to mining, infrastructure and processing.

The Phase I feasibility study is currently being reviewed with BIP and financing alternatives for its implementation are under consideration.

For further information, contact:

Dr. Kushal Singh, President (ext. 1)
or W. Glen Zinn, Chief Operating Officer (ext. 2)
Telephone: (520) 544-8815
Fax: (520) 544-8507
e-mail: amt1@primenet.com

Forbes West, Investor Relations
Telephone: (416) 868-6666

AMT website: www.primenet.com/~amt1/

pr97-11

Attention: Mason Coc
Arizona Dep't. of Mines and Mineral Resources

Old Reliable (f)
Pinal

AMT INTERNATIONAL MINING CORPORATION

TSE:AAI NEWS RELEASE

AMT Announces Results of Recent Drill Program

(Toronto, Ontario, November 24, 1999) AMT International Mining Corporation is pleased to announce the results of its recently completed drilling program at its Copper Creek property located in Pinal County in southern Arizona, USA. The program commenced on June 1, 1999 and was completed on October 29, 1999. A total of 26,886 feet of core drilling was completed in 12 holes that explored two of the Company's primary targets. The two targets are known as the Mammoth-Keel Zone and the American Eagle Breccia.

Mammoth-Keel Zone

The Mammoth-Keel Zone target lies sub-vertically below the Mammoth Breccia deposit, which is part of AMT's current ore reserves. The Mammoth-Keel Zone is interpreted to be a high grade copper-molybdenum feeder zone within a larger shell of lower grade, porphyry-related copper (± molybdenum) mineralization. The high grade mineralization is localized within brecciated hangingwall contacts between granodiorite and southeasterly-plunging, tongue-shaped porphyry dikes.

The results from the eight drill holes for 19,539 feet (LM-1 through LM-8) at the Mammoth-Keel Zone are as follows:

Mammoth/Keel Zone Drilling Program

Drill Intercepts				
Drill Hole	Interval (footage)	Length (feet)	Avg. Cu%	Avg. Mo%
LM-1	1,730 to 2,360	630'	1.00%	0.031%
includes	1,760 to 1,890	130'	1.81%	0.021%
Also includes	2,160 to 2,250	90'	1.12%	0.133%
LM-2	1,800 to 2,600	800'	0.95%	0.029%
includes	1,800 to 1,940	140'	1.01%	0.011%
also includes	2,250 to 2,400	150'	2.02%	0.111%
LM-3	1,860 to 1,920	60'	1.02%	0.008%
	2,240 to 2,340	100'	1.20%	0.036%
includes	2,240 to 2,200	40'	1.93%	0.080%
LM-4	1,990 to 2,060	70'	1.30%	0.021%
LM-5	No significant interval		No assays	No assays
LM-6	2,070 to 2,140	70'	1.02%	0.014%
LM-7	No significant interval		No assays	No assays
LM-8	1,790 to 2,980	1,190'	0.77%	0.018%
includes	2,390 to 2,550	160'	1.67%	0.053%
also includes	2,410 to 2,510	100'	2.25%	0.069%

Also, as anticipated, the recent drilling intersected high grade copper mineralization within the Mammoth Breccia in all eight holes. The results from these intercepts will be used to update the grade model when all assays have been received.

An additional hole (UM-1) was drilled to test the possible upward continuity of the mineralization. This hole was terminated at 743.5 feet. The hole did not encounter breccia and was barren of mineralization.

American Eagle Breccia

The American Eagle Breccia area is located approximately 2,500 feet south-east of the Mammoth Breccia deposit. The current target is situated above the American Eagle porphyry copper deposit which is carried in AMT's resource inventory.

The results from the three drill holes aggregating 5,603.5 feet (AE-1 through AE-3) at the American Eagle Breccia are as follows:

American Eagle Breccia Drilling Program

Drill Intercepts				
Drill Hole	Interval (footage)	Length (feet)	Avg. Cu%	Avg. Mo%
AE-1	670 to 720	50'	0.94%	0.022%
	880 to 970	90'	0.84%	0.015%
AE-2	900 to 980	80'	0.63%	0.199%
AE-3	No significant interval		No assays	No assays

Drill holes AE-1 and AE-2 intersected mineralized breccia containing copper and molybdenum. This program demonstrated that breccia mineralization in the American Eagle Breccia target has depth continuity of at least one thousand feet.

Major Environmental Permit Granted

AMT has been advised by the Arizona Department of Environmental Quality (ADEQ) that it has ended the statutory 30 day public comment period for the Aquifer Protection Permit (APP) which is necessary prior to the construction of AMT's Ryland decline. The ADEQ received no public comments and advised AMT that they intend to sign and issue the APP during the next few weeks.

This permit is the essential permit required prior to starting construction and AMT is pleased that ADEQ is in agreement that AMT's proposed plan is protective of the environment.

New Appointments

AMT International's Board of Directors is pleased to announce the following new appointments:

Peter A. Crossgrove - Chairman and CEO
John W. W. Hick - President
Richard Neal - Director

For further information, contact:

Mani Verma
Executive Vice President
Telephone: (520)544-8815, Ext. 28
Fax: (520)544-8507

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA 85007
602/271-3791

OLD RELIABLE of Ranchers Project

October 4, 1976 - At a conference with Russian delegation. Mr. Bhappu of Mountain States Engineer provided following information.

Old Reliable had 4,000,000 tons of ore at 0.8. In 22 months of operation 15% of the copper was recovered. The project was shut down reportedly due to low price of copper. It will require 80 cent copper to operate.

However, four problems were becoming serious:

1. Poor internal solution distribution.
2. Channeling and large unbroken masses of ore.
3. Leach solution carry insufficient ferric iron.
4. Iron solids precipitating in certain areas inhibiting circulatory (Jarosite?)

BY: John H. Jett

Dear Roger,—

Here is a Flow Sheet of the "Old Reliable" mill — which can also be added to my last report of the "Old Reliable" under date of 8/31/54

Excel

SISKON CORPORATION
RENO, NEVADA
P. O. BOX 889 - GAZETTE BUILDING - TEL. FAIRVIEW 3-5260

July 8, 1961
File 1-2552

VIA AIR MAIL

Mr. Ellis E. Nichols
312 East Garfield Street
Phoenix 4, Arizona

Dear Mr. Nichols:

Thank you for your letter of July 6, 1961. The copy of letter from Jackbean Pumicite Mines, Gardner, Colorado, written by Merle I. Zweifel, dated July 2, 1961, is returned herewith.

It is our opinion that in order to accomplish Mr. Zweifel's objective it will be necessary to find a porous sandstone in an unbroken and original state without faults or slips.

We tried to leach in place the Old Reliable copper ore zone at Copper Creek, Bunker Hill Mining District, Pinal County, Arizona, and the attempt was a failure. The property has since been sold to a large copper company, which is now drilling the area.

Yours sincerely,

H. B. Chessher

sc
HBC/dm
Enc. per ltr.

VIA AIR MAIL

(Please return)
E. E. Nichols

September 11, 1954

Inspection Division
General Services Administration
49 Fourth Street
San Francisco, California

ATTENTION: Robert J. Burgess

Dear Mr. Burgess:

In accordance with your request of September 10, 1954 a narrative report of the reasons for the temporary suspension of mining and milling operations and the present intent of the management concerning future operations of the Copper Creek Consolidated mining Company is herewith submitted.

Mr. Morris J. Elsing, President and General Manager, suffered a serious coronary attack about 3 months ago, and many of the burdens of management were shifted to Mr. Lewis W. Douglas, a stockholder in the company. It is not likely that Mr. Elsing will be very active for several months.

During the month of July the recovery of copper in the total tonnage milled amounted to 60%. Attempts were made to solve the metallurgical difficulty of oxide copper flotation and George Roseveare, Metallurgist, Arizona Bureau of Mines was retained to assist in this work. No immediate solution was found and the very poor recovery resulted in a substantial operation loss. Therefore, operations were suspended pending further metallurgical work and a reorganization of the management setup so as to eliminate high overhead costs. Mr. John G. Ford, Acting Chief, Contracts Administration Branch, Minerals Division, Emergency procurement Service, General Services Administration, was notified of these developments by a letter dated August 16, 1954.

Metallurgical tests by the Metallurgical Division of the Southwest Experiment Station of the U. S. Bureau of Mines, Tucson, Arizona, indicated that the sulfide recovery in the mill was very high, over 90 percent, but that the recovery of the copper oxides was negligible. Further, they determined that the predominant oxide mineral was brochantite ($Cu_4(OH)_6SO_4$). So far as is known no previous attempt has ever been made to float brochantite. Current work by this organization indicates that at least an 80 percent recovery can be made

on ore from the Old Reliable Mine by flotation of the sulfide copper with subsequent leaching of copper oxide in the tailing. A private metallurgical consultant, Mr. Harmon E. Keyes of Phoenix, Arizona, has submitted a report that corroborates, generally, the tentative results submitted by the U. S. Bureau of Mines.

Metallurgical difficulties can be solved and there remains a considerable potential of copper to be won from the Old Reliable orebody. Unfortunately, however, Mr. Lewis Douglas has been ill for the past few weeks. He is recovering at present, but in any event he is so occupied that it is impossible for him or Mr. Joralemon or any other proprietor to assume the duties of managing the property. Therefore, a sale or lease of the mine and mill is contemplated.

We will keep you fully advised.

Very truly yours,

Leland C. Vought
Executive Vice - President

cc: Government 5
Axel Johnson
Mr. Ford
Martin Fenton
Ira Joralemon
Wm. Elsing
Mr. Stollenwerck
L.W. Douglas, Jr.
New York, office

OLD RELIABLE COPPER MILL RECORD AND ASSAYS FROM JUNE 30, 1954, thru AUGUST 7, 1954.
COMPILED FROM DATA FOUND IN COPPER CREEK CONSOLIDATED MINING CO. BOOKS AND RECORDS.

1954 Date	Mill Shift	Heads % Cu	Tails % Cu	Conc. % Cu	Recov'y % Cu	Tons of Conc.	Tons Milled	Hours Operat.	Ratio Conc.	Remarks & Notes by Mill Operators
June 30	8-4	N.D.	N.D.	N.D.	N.D.	N.D.	36	8	N.D.	None
	4-12	N.D.	N.D.	N.D.	N.D.	N.D.	36	8	N.D.	None
	12-8	N.D.	N.D.	N.D.	N.D.	N.D.	36	8	N.D.	None
TOTAL							108	24		
July 1	8-4	2.10	0.44	23.90	80.05	2.54	36	8	14.12	None
	4-12	1.26	0.95	24.15	25.80	0.48	36	8	N.D.	None
	12-8	1.26	0.95	24.15	N.D.	N.D.	36	8	N.D.	None
TOTAL							108	24		
July 2	8-4	2.29	0.71	N.D.	N.D.	N.D.	32.40	8	N.D.	None
	4-12	1.47	0.84	23.83	44.5	1.47	46.08	8	31.4	Assays Salted?
	12-8	1.47	0.84	23.83	N.D.	N.D.	43.20	7	N.D.	Overloaded Mill
TOTAL							121.68	23		
July 3	8-4	N.D.	N.D.	N.D.	N.D.	1.50	36.00	8	N.D.	Same as 4-12
	4-12	1.650	0.528	27.50	69.7	1.95	46.80	8	24.0	None
	12-8	1.815	0.440	30.25	76.6	1.66	36.00	8	21.7	None
TOTAL							118.80	24		
July 4	Holiday - Mill closed.									
July 5	Holiday - Mill closed.									
July 6	8-4	1.37	0.44	24.53	77.3	2.14	36.00	8	16.8	None
	4-12	1.54	0.22	21.89	86.5	2.40	39.60	8	16.4	None
	12-8	1.375	0.48	25.20	67.2	1.44	39.60	8	27.8	None
TOTAL							115.20	24		
July 7	8-4	1.90	0.73	29.98	63.2	1.49	36.00	8	24.2	None
	4-12	2.15	0.78	34.62	65.5	1.33	44.26	8	24.5	None
	12-8	1.70	0.60	30.94	66.0	1.70	46.30	8	27.6	None
TOTAL							127.76	24		
July 8	8-4	1.97	0.73	26.57	64.6	1.90	33.30	8	20.8	None
	4-12	2.56	0.84	27.54	69.2	2.19	44.26	8	20.5	None
	12-8	1.34	0.69	35.28	84.4	1.45	43.20	8	29.8	None
							137.76	24		
July 9	8-4	2.30	0.79	28.20	70.5	2.38	43.20	8	18.2	None
	4-12	2.20	0.77	31.38	67.7	2.09	43.20	8	20.7	None
	12-8	1.96	0.64	30.47	67.0	1.77	46.20	8	24.4	None
							132.60	24		

	4-12	2.59	0.87	35.12	68.2	2.26	45.00	8	19.9	None
	12-8	2.13	0.64	31.92	71.4	2.14	45.00	8	21.0	None
TOTAL							126.00	24		
July 11	Sunday - Mill closed.									
July 12	8-4	2.12	0.74	29.01	64.5	1.32	27.00	5	20.5	None
	4-12	1.73	0.74	31.06	53.8	1.41	43.20	8	30.3	None
	12-8	1.80	0.67	29.78	64.0	1.60	41.40	8	25.8	None
TOTAL							111.60	21		

M.F.

1954 Date	Mill Shift	Heads % Cu	Tails % Cu	Conc. % Cu	Recov'y % Cu	Tons of Conc.	Tons Milled	Hours Operat.	Ratio Conc.	Remarks & Notes by Mill Operators
July 13	8-4	2.25	0.58	24.52	75.7	1.32	18.9	4	14.3	None
	4-12	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0	N.D.	Lack of Ore
	12-8	2.50	0.95	26.70	64.5	2.09	36.0	8	17.2	None
TOTAL							54.9	12		
July 14	8-4	2.50	0.95	31.06	72.0	1.89	36.0	8	19.6	None
	4-12	2.57	1.10	24.52	59.6	2.26	36.0	8	15.2	None
	12-8	2.57	0.87	26.57	63.4	2.38	36.0	8	15.1	None
TOTAL							108.0	24		
July 15	8-4						37.3	8		None
	4-12	2.00	0.82	26.31	61.0	5.26	39.6	8	61.0	None
	12-8						36.0	8		None
TOTAL							113.4	24		
July 16	8-4	2.29	0.66	27.48	72.5	2.25	37.80	8	16.8	None
	4-12	1.97	0.76	29.26	63.0	1.78	42.00	8	23.6	None
	12-8	N.D.	N.D.	N.D.	N.D.	N.D.	39.60	8	N.D.	None
TOTAL							119.40	24		
July 17	8-4	2.16	0.84	28.23	63.2	2.00	41.40	8	20.7	None
	4-12	2.29	0.84	28.50	65.0	1.93	41.40	8	21.0	None
	12-8	1.65	0.91	29.14	46.2	1.35	39.60	8	38.2	None
TOTAL							122.40	24		
July 18	Sunday - Mill closed.									
July 19	8-4	2.73	1.04	27.35	64.3	2.12	33.64	6.5	15.9	None
	4-12	2.35	0.96	29.00	61.0	1.96	39.60	8	20.2	None
	12-8	2.22	0.89	30.02	62.0	1.82	39.60	8	21.8	None
TOTAL							112.84	22.5		
July 20	8-4	2.42	0.79	28.62	66.3	2.39	46.80	8	19.6	None
	4-12	N.D.	N.D.	N.D.	N.D.	N.D.	9.90	2	N.D.	Power Failure

1954 Date	Mill Shift	Heads % Cu	Tails % Cu	Conc. % Cu	Recov'y % Cu	Tons of Conc.	Tons Milled	Hours Operat.	Ratio Conc.	Remarks & Notes by Mill Operators
July 10	8-4	2.39	0.95	30.02	62.4	1.79	36.00	8	20.2	None
	4-12	2.59	0.87	35.12	68.2	2.26	45.00	8	19.9	None
	12-8	2.13	0.64	31.92	71.4	2.14	45.00	8	21.0	None
TOTAL							126.00	24		
July 11	Sunday - Mill closed.									
July 12	8-4	2.12	0.74	29.01	64.5	1.32	27.00	5	20.5	None
	4-12	1.73	0.74	31.00	53.8	1.41	43.20	8	30.6	None
	12-8	1.80	0.87	29.78	64.0	1.60	41.40	8	25.8	None
TOTAL							111.60	21		
July 13	8-4	2.25	0.59	24.52	75.7	1.32	18.9	4	14.3	None
	4-12	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0	N.D.	Lack of Ore
	12-8	2.50	0.95	26.70	64.5	2.09	36.0	8	17.2	None
TOTAL							54.9	12		
July 14	8-4	2.50	0.95	31.06	72.0	1.89	36.0	8	19.6	None
	4-12	2.57	1.10	24.52	59.6	2.26	36.0	8	15.2	None
	12-8	2.57	0.87	26.57	63.4	2.38	36.0	8	15.1	None
TOTAL							108.0	24		
July 15	8-4	2.00	0.82	26.31	61.0	5.26	37.3	8		None
	4-12						39.6	8	61.0	None
	12-8						36.0	8		None
TOTAL							113.4	24		
July 16	8-4	2.29	0.66	27.48	72.5	2.25	37.80	8	16.8	None
	4-12	1.97	0.76	29.26	63.0	1.73	42.00	8	23.6	None
	12-8	N.D.	N.D.	N.D.	N.D.	N.D.	39.60	8	N.D.	None
TOTAL							119.40	24		
July 17	8-4	2.16	0.84	28.23	63.2	2.00	41.40	8	20.7	None
	4-12	2.29	0.84	28.50	65.0	1.93	41.40	8	21.0	None
	12-8	1.65	0.91	29.14	46.2	1.35	39.60	8	38.2	None
TOTAL							122.40	24		
July 18	Sunday - Mill closed.									
July 19	8-4	2.73	1.04	27.35	64.3	2.12	33.64	6.5	15.9	None
	4-12	2.35	0.96	29.00	61.0	1.96	39.60	8	20.2	None
	12-8	2.22	0.89	30.02	62.0	1.82	39.60	8	21.8	None
TOTAL							112.84	22.5		
						2.39	46.30	8	19.6	None
										Power Failure

July 20	8-4	[illegible]	[illegible]	[illegible]	[illegible]	N.D.	9.90	2	N.D.	Power Failure
	4-12	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0	N.D.	Power Failure
	12-8	N.D.	N.D.	N.D.	N.D.		56.70	10		57 Minutes
TOTAL										Power Failure
July 21	8-4	2.21	0.76	25.82	67.5	1.65	28.46	5.5	17.3	None
	4-12	2.80	0.91	31.04	69.7	2.72	43.20	8	15.9	None
	12-8	2.67	0.91	29.76	68.3	2.42	39.60	8	16.4	
TOTAL							111.26	21.5		
July 22	8-4	2.22	0.71	23.40	70.2	2.90	39.60	8	15.0	None
	4-12	1.65	0.81	24.55	50.5	1.35	39.60	8	29.3	None
	12-8	1.78	0.76	21.50	59.4	1.95	39.60	8	20.3	None
TOTAL							118.80	24		
July 23	8-4	1.91	0.94	21.88	53.1	1.96	43.20	8	21.5	None
	4-12	2.16	0.99	24.04	56.5	2.19	43.20	8	19.7	None
	12-8	1.91	1.04	24.04	47.6	1.56	39.60	8	25.4	None
TOTAL							126.00	24		
July 24	8-4	2.03	1.07	17.55	N.D.	2.00	43.20	8	N.D.	None
	4-12	2.04	1.09	18.32	49.4	2.16	39.60	8	18.3	None
	12-8	1.91	0.99	26.20	50.0	1.44	39.60	8	27.4	None
TOTAL							122.00	24		
July 25	Sunday - Mill closed.									

1954 Date	Mill Shift	Heads % Cu	Tails % Cu	Conc. % Cu	Recov'y % Cu	Tons of Conc.	Tons Milled	Hours Operat.	Ratio Conc.	Remarks & Notes by Mill Operator
July 26	8-4	2.03	0.94	13.44	56.6	2.58	41.40	7.5	16.0	None
	4-12	1.91	0.94	16.02	54.0	2.47	39.60	8	15.5	None
	12-8	1.42	0.80	15.39	41.3	1.59	41.40	8	26.0	None
TOTAL							122.40	23.5		
July 27	8-4	2.04	1.11	18.05	48.6	2.27	41.40	8	18.2	None
	4-12	2.29	1.16	21.51	52.3	2.20	39.60	8	18.0	None
	12-8	1.97	0.81	21.27	61.3	2.25	39.60	8	17.6	None
TOTAL							120.60	24		
July 28	8-4	1.92	0.78	N.D.	N.D.	2.00	27.00	6	N.D.	4 hrs. power failure
	4-12	1.85	0.74	20.13	62.3	2.00	35.10	8	17.5	Changed to Z-5.
	12-8	2.47	0.69	19.56	74.6	4.74	50.40	8	10.6	None
TOTAL							112.50	22		None

July 29	8-4	1.73	0.66	13.11	65.0	3.42	39.60	8	11.6	None
	4-12	1.68	0.91	25.47	44.0	1.27	44.10	7	34.6	Shut down 1 hour
	12-8	2.04	0.83	25.59	61.2	2.62	54.00	8	20.6	None
TOTAL							137.70	23		
July 30	8-4	2.16	1.01	24.23	55.5	2.46	50.00	8	20.2	None
	4-12	2.53	0.91	31.40	66.2	2.66	50.00	8	18.8	None
	12-8	2.66	0.79	31.30	72.3	3.07	50.00	7.5	16.3	None
TOTAL							150.00	23.5		
July 31	Sunday - Mill closed.									
Aug. 1	No ore. Mill closed to allow mine development to catch up.									
Aug. 2	8-4	1.85	0.73	22.13	N.D.	2.5*	50.40	7	N.D.	None
	4-12	1.92	0.66	22.67	67.7	2.5*	50.40	8	17.4	None
	12-8	1.98	0.62	24.11	70.4	2.5*	36.00	9	17.3	None
TOTAL							136.80	23		
Aug. 3	8-4	1.69	0.64	17.55	47.3	1.75*	28.80	8	16.1	None
	4-12	1.91	0.74	17.92	64.0	1.60*	28.80	8	14.7	None
	12-8	1.85	0.71	26.56	63.3	1.50*	32.40	8	22.7	None
TOTAL							90.00	24		
Aug. 4	8-4	2.04	0.99	18.96	54.40	1.33	28.80	8	17.0	None
	4-12	1.98	0.89	19.92	58.00	1.66	28.80	8	17.4	None
	12-8	2.96	0.50	24.00	88.50	3.02	28.80	8	9.5	None
TOTAL							86.40	24		
Aug. 5	8-4	1.80	0.69	32.64	63.2	1.00	28.80	8	28.7	None
	4-12	2.04	0.98	32.64	53.7	0.95	28.80	8	30.0	None
	12-8	2.22	0.88	24.24	63.0	1.66	28.80	8	17.4	None
TOTAL							86.40	24		
Aug. 6	8-4	1.93	0.96	26.28	53.5	1.13	28.80	7.5	25.4	Repaired Ball Mill bolts
	4-12	1.93	1.05	26.16	47.0	1.07	28.80	8	27.0	None
	12-8	2.16	1.17	33.84	47.5	0.86	28.80	8	33.0	None
TOTAL							86.40	23.5		
Aug. 7	8-4	2.16	1.15	28.80	50.3	1.10	28.80	8	26.2	None
	4-12	2.52	1.41	31.32	46.2	1.07	28.80	8	27.0	None
	12-8	2.28	1.44	44.16	36.3	0.56	28.80	8	51.0	None
TOTAL							86.40	24		

1934 Date	Mill Shift	Heads % Au	Tails % Au	Conc. % Au	Recov'y % Au	Tons of Conc.	Tons Milled	Hours Operat.	Ratio Conc.	Remarks & Notes by Mill Operators
Aug. 8	Sunday - Mill closed.									
Aug. 9	Record indicates that mill was started at 9 a.m. but no data is available in files at Old Reliable mine office for this day or for any day hereafter. It is assumed that this is the day that Mr. Douglas ordered the mill closed.									

NOTE: The foregoing data was copied from information found in the files of Copper Creek Consolidated Mining Co. All of the foregoing ore was processed by flotation. No acid leaching or other method used.

AVERAGE OF HEADS	2.056% Au
AVERAGE OF TAILS	0.824% Au
AVERAGE RECOVERY	60%
TOTAL TONS MILLED	3575.7

*Estimated

N.D. No data available.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine COPPER STATE METALS CO. Date September 22, 1942

District Bunker Hill Mining District Engineer

Subject:

In compliance with your request for information on the Copper State Metals Company property:

The property consists of 20 patented and 23 unpatented claims, situate in the Bunker Hill Mining District, Pinal County, Arizona. It is reached from State Highway at Mammoth over 10 miles of road built by the Company. The Hayden smelter is 31 miles distant and Tucson, the trading point, is 60 miles distant.

Above $700,000.00 has been expended on the property for exploration, development, construction of 100 ton pilot mill, roads, railroad, buildings, water development, etc. During a short period of pilot mill operation about 2,000,000 pounds of copper was produced in concentrates, which were trucked to Hayden. The property has been inactive since economic collapse of 1920.

Under the existing strategic metals emergency, the Old Reliable, one of a group of 6 patented claims, is of particular interest. In this claim there is well developed 450,000 tons of ore, the actual mill recovery on many thousands of tons having been 40 pounds plus per ton.

The ore is developed by two addit tunnels, one directly above the other, and 101 feet apart, and 16 crosscut tunnel, at right angles to drift tunnels. There are stopes from each crosscut, full of broken ore, and about 25 draw chutes installed. These stopes would be of no particular value in any future extensive mine operation.

From the ore extracted in the development work there was produced approximately 1,000,000 pounds of copper in concentrates, which were smelted at Hayden.

The gossan area above the ore is about 147,000 square feet. The pay area at present developed is about 24,200 square feet and shows about 3,000 tons of ore per foot of depth. The ore, as proved, has been taken for a height of 200 feet. This gives a total of 600,000 tons of proved ore, of which about 25% is barren granodiorite. In operation, it probably would be economical to sort as much waste as was practical.

Developed ore would permit several years operation at the rate of 500 tons per day. However, abailable water is sufficient for not much over 200 tons per day. There is unlimited water in the San Pedron River Valley, 8 miles distant.

The old pilot mill was sold and the railroad from the Old Reliable mine to the mill, with locomotive, gondolas, etc., were junked several years ago. The only usable equipment on the property is several buildings, water system, including pipe line and storage tanks, and a 285 H.P. Diesel electric power plane in excellent condition.

W

COPPER STATE METALS CO.

It is estimated that the property could be operated at present at a profit of 2¢ per pound of copper produced, bases on a gross smelter return of 14½¢ per pound, including 5¢ premium.

Because of uncertain priorities, the certainty of costly delays in procurement of machinery, equipment, supplies and labor and the uncertainty of future labor procurement and costs, no estimate of costs of any future operation can be made.

The Old Reliable claim has developed easily treated ore that will yield at least 20,000,000 pounds of metallic copper, and has a potential production of many times that amount. If it becomes necessary to produce this copper the operation would have to be something of the nature of a defense project, under which the urgency of the demand and the amount of money available would limit the size of the operation.

I trust this summary will be sufficient for your purpose.

Signed: J. W. MacDonald

COPPER STATE METALS CO., Pinal County, Arizona. J. W. McDonald, Lessee, Phoenix, Arizona.

In this property there are 450,000 tons of ore developed with a recoverable value of 2% copper, according to records and reports.

Sufficient water is available with which to operate a 200 ton treatment plant. The lessee does not have funds to inqugerate a program of the magnitude required for operation, and due to the marginal profit possibilities it is doubtful that private capital would interest itself in such an enterprise.

If the program was properly sponsored it is believed that 240,000 pounds of copper could be produced per month. This on the basis of a 200 ton reduction plant.

Report by Earl F. Hastings, October 9, 1942, to Copper Branch, War Production Board.

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HARMON E. KEYES
Chemical and Metallurgical Engineer

506 East Culver Street,
Telephone Alpine 3-5909
Phoenix, Arizona

REPORT ON OLD RELIABLE MINE LEACHING PROJECT

July 16, 1953

To-
Mr. M. J. Elsing
95 Camine Espanol
Tucson, Arizona

OBJECT

The objective was to formulate an opinion of the feasibility of the proposed leaching program at the Old Reliable Mine, situated in Pinal County, Arizona.

FIELD INVESTIGATION

On July 14, 1953, a one-day field inspection of the above property was made in company with Mr. M. J. Elsing, who conducted the undersigned over the ground and into the 100 ft. level tunnel, including various drifts and the "Big Stope" where samples were taken for inspection. Particular note was made of the pyrite and copper sulphide association, with attendant oxidation effects.

Me. Elsing explained the proposed leaching program. In brief, this provides for underground leaching of broken ore, precipitation with scrap iron such as cans, mixing scrap iron discard ferrous sulphate solution with make-up commercial sulphuric acid and water, pumping this leaching solution onto broken ore in stopes with a maximum static lift of about 150 ft., and collecting the copper-bearing solution in the 100 ft. level tunnel, from where it is to be piped to the copper precipitation tanks near the tunnel portal.

Surface observations were made of the nearby terrain, particularly the bed-rock and talus in the canyon adjacent the main tunnel portals, as well as the proposed sites for the mill and tailings pond.

On returning from the mine, the mill equipment at Tiger, which is available, was looked over.

REFERENCE LITERATURE

The following references served as background on character of Old Reliable Mine ore and metallurgical tests to date. These were supplied by Mr. Elsing.

1. U. S. Bureau of Mines RI 4006, Feb., 1947.

2. Ore testing reported by U. S. Bureau of Mines, Tucson; Ariz. Bureau of Mines; and E. V. Given, formerly of At. Anthony Mine & Development Co.

3. Calculations by Mr. Elsing on proposed milling and leaching programs.

In addition to the above, reference is made to U. S. Bureau of Mines Bull. 321, "Innovations in Hydrometallurgy of Copper, Employing Ferric Sulphate-Sulphuric Acid", pages 48-55. This deals with open-drainage leaching of chalcocite ore at Castle Dome, Arizona, with special reference to effect of crushing size on leaching rate, and degree of regeneration of ferric sulphate in the ore column. This is referred to as Item No. 4.

DISCUSSION OF OBSERVATIONS

Discussion is based on the above information and is limited to the leaching aspects.

A. Observations at the property agreed with information given in the reports.

B. Calculations in Item No. 3 were checked, and basis for these calculations noted. Although the scope of this report precludes independent checking of some details on these basic costs, yet figures appear reasonable. The minor variations from Mr. Elsing's estimates which the undersigned might suggest are of a compensating nature. It is believed that the overall estimate is conservative and suitable for present needs.

C. Water soluble copper was found in the sample from the broken ore in the top of the "Big Stope". This indicates natural conversion to copper sulphate, which proves the ore to be acidic in character. Actual acid consumption might, therefore, be less than theoretical 1.54 lbs. H_2SO_4 per lb. Cu.

D. Pyrite was noted, both in the normal ore, and in the fringes at the edge of the pipe. This will supplement both acid and ferric sulphate, by decomposition when water solutions are added to the broken ore.

E. Ferric sulphate is needed to leach copper sulphide. It can be regenerated in the broken ore by returning scrap iron discard solution with sulphuric acid. Or by minimizing acid addition, the ferrous sulphate may oxidize and hydrolyze in the broken ore zone, resulting in regenerated acid and deposition of hydrated iron oxide. Thus, by proper control of leaching solutions added to broken ore, either ferric sulphate or sulphuric acid may be regenerated in the leaching cycle. This is an asset to increasing speed and lowering cost of leaching.

F. Reference to Item No. 4, above, shows that Cable Dome ore, crushed to 2" maximum size, gave leaching extraction of 56.8 percent in 13 days, simulating heap or stope leaching conditions, but using acidified ferric sulphate. Similar ore, crushed to 1/8" maximum size, gave copper extraction of 68.9 percent in the same time.

A large portion of the ore in the "Big Stope" was noted to be less than 4" size. By introducing ferric sulphate and acid in proper amounts, it is believed that ore in the "Big Stope" may be leached at a much faster rate than given in Mr. Elsing's calculations. In fact, a copper extraction of 50 percent in the first year, and an additional 25 percent in the second year, seem reasonable to expect on basis of what has been demonstrated on rather similar ore.

G. The undersigned believes that above the 100 ft. level the oxidized copper in this ore may be of a magnitude to warrant a leaching step in the milling ore treatment, if the regular mill recovery drops appreciably below 80 percent due to oxidized copper loss.

H. The undersigned also believes that the canyon, on both sides, adjacent to the main tunnel, offers possibilities for successful leaching of dumps as supplement to the mill. Mill slimes could be used to seal the ground on which these dumps would be built.

I. A sample calculation is given below, as basis for size of initial plant equipment for underground leaching.

Tonnage in stope	50,000
Lbs. copper per ton	52
Lbs. copper in stope	2,600,000

	No. 1 Est. 15 per cent	No. 2 Est. 50 percent
Extraction, 1953 and 1954, 15 months	390,000 lbs.	1,300,000 lbs.
" per day 1/456	856 lbs.	2,850 lbs.
Solution, at 1 percent copper	85,600 lbs.	285,000 lbs.
" gal. per minute	7.13	23.7
Size plastic pipe, est.	1"	2"

If the ferric sulphate, produced as above indicated, is not acequate to furnish the required extraction rate shown in No. 2 estimate, this can be supplemented by controlled addition of air and sulphur dioxide to the ferrous sulphate solution rejected from the

precipitators. Details on this may be supplied if interest warrants. Necessary acid also could be supplied by this process, probably at cost of $20 - $25 per ton equivalent 100 percent H_2SO_4.

The above is offered as an indication of flow relationships in a 50,000 ton stope. However, this report does not deal with leaching plant design.

CONCLUSION

From considerations presented above, the undersigned believes that the stope leaching project, as outlined by Mr. M. J. Elsing, is technically and economically sound.

Respectfully submitted;

HAMMON E. KEYES

COPY from Copy/hjl-1/6/57(3) for Shattuck Denn Mining Corp.

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REPORT ON THE OLD RELIABLE MINE
COPPER CREEK CONSOLIDATED MINING CO.
BUNKER HILL MINING DISTRICT
PINAL COUNTY, ARIZONA

November 1951

M. J. Elsing, E. M.

Property

The Old Reliable group consists of 5 patented mining claims. The company also owns some 30 unpatented mining claims and also the American Eagle group of 15 patented claims. All of the above claims are in one contiguous group.

Location

The property is situated in the Copper Creek section of the Bunker Hill mining district. The Old Reliable mine is 12 miles east of the town of Mammoth by road and approximately 14 miles from the San Manuel mine of the Magma Copper Co. From the Old Reliable mine to the A. S. & R. smelter at Hayden it is approximately 33 miles of which 21 miles is over a paved highway. After the construction of the proposed railroad to the San Manuel mine the distance to the railroad will be approximately 12 miles. The El Paso Natural Gas Co. has a gas main at the San Manuel mine and electric power is available at Mammoth. A power line some 10 miles in length would provide power for operations.

Development

The Old Reliable has been developed by two tunnel levels 100 feet vertically distant. There are approximately 2600 feet of drifts and crosscuts on the Upper Tunnel level and 1040 feet on the Lower Tunnel level. A raise from the Upper Tunnel to the surface is 260 feet in height and there are two raises 100 feet each between the Upper and Lower Tunnels, making a total of some 4100 feet of development work. This footage does not include many stope raises.

History and Production

There was considerable activity in the district from 1908 to 1918. During this period ore was milled from the Old Reliable and American Eagle mines. From 1933 to 1938, the Childs-Aldwinkle claims adjoining the Old Reliable were operated by the Arizona Molybdenum Corp. Some 329,000 tons of ore were milled with the recovery of 7,000,000 pounds of MoS_2 and 6,000,000 pounds of copper. Maximum production was reached in 1936 when 87,021 tons were milled. It is estimated that production during

this period was approximately 300 tons per working day.

The production of the Old Reliable mine is unknown but it probably was some 700,000 pounds of copper.

Ore Reserves

By reference to Figure 3, it will be seen that the boundaries of the orebody on the Upper Tunnel level have been defined on the north, east and west sides. Additional development to the south may add considerable ore. The calculation of the ore actually blocked out is given as follows:

CALCULATION OLD RELIABLE ORE RESERVES

Area 100 tunnel level	36,488 sq. ft.
Average grade 273 samples, copper	2.73%
Average grade balanced	2.60%
Height above level	43 ft.
Volume above 100	1,568,984 cu. ft.
Tons above level at 12.5 cu. ft. per ton	125,500
Tons extracted in drifts and stopes	20,000
Net tons above 100 level @ 2.6%	105,500
Area 200 tunnel level	19,536 sq. ft.
Average grade on 200 level, copper	2.19%
Average grade balanced on 200 level	2.00%
Height 100 to 200	100 ft.
Average area 100 and 200	28,012 sq. ft.
Volume 100 to 200	2,801,200 cu. ft.
Tons 100 to 200 at 12.5 cu. ft. per ton	224,000 tons
Tons extracted in drifts and stopes	5,000
Net tons 100 to 200 level	219,000
Grade ore 100 to 200 level	2.4 %

Total 100 & 200 levels
325,000 tons at 2.46% copper

It is believed safe to assume that above the Lower Tunnel level including the probable extension to the south, there are 400,000 tons of reasonably assured ore which will average 2.4 percent copper and small but unknown amounts of silver and molybdenum.

The Copper Prince and the Globe mines adjoin the Old Reliable mine. These properties are owned by the Phelps Dodge Corporation. Assay maps and other data indicate that the ore reserves of these mines are approximately 400,000 tons with an average grade of 2.6 per cent copper. The Copper Creek Consolidated Mining Co. has been assured that at such time as they are prepared to start operations at the Old Reliable with

a view to the production of copper that the Phelps Dodge Corp. will give the company a lease on the Copper Prince and Globe mines on favorable terms.

These properties can be most efficiently worked by driving a tunnel from the Old Reliable property. Such a tunnel will connect with the bottom of these shafts below the ore blocked out. There will be no hoisting and pumping and ventilation will be no problem.

The ore reserves of the combined properties amount to 800,000 tons with an average content of 2.5 per cent copper.

The ore occurs in breccia pipes in andesite. There are more than 100 such pipes in the district, the majority of which are located on the property of the Copper Creek Consolidated Mining Co. It is not anticipated that all of these pipes will produce ore. A dozen of these pipes have been explored or partially explored. Out of the dozen 7 pipes have been found to contain commercial ore. There are 3 ore pipes on the Copper Prince claim, 2 on the Globe, 1 on the Old Reliable, 1 on the Childs-Aldwinkle and 1 on the American Eagle group.

After the property is in production a campaign of exploration of other pipes is warranted. Such exploration might be best by diamond drilling from surface. The chance that other ore pipes will be found are considered good.

Proposed Plan of Operation

It is proposed that a flotation mill of approximately 250 tons daily capacity be erected on the Old Reliable property and that 250,000 to 300,000 tons of ore be mined by caving and treated by flotation. It is believed that the extraction of such a tonnage can be done at a profit. The main purpose of mining this orebody is to create a large opening into which the low grade upper oxidized portion of the orebody will cave. It is believed that approximately a million tons of low grade ore running from 0.6 to 0.8 per cent copper will be broken to fill the opening. It then is proposed to leach this broken ore in place. On the basis of leaching operations at Ohio Copper, Tyrone, N. M., Cananea, Mexico and other localities, it is believed that in 5 years from 50 to 80 per cent of the copper content should be recovered. Taking the average of these figures the recovery should be some 10,000,000 pounds of which 7,000,000 pounds should be obtained during the first 2 years of leaching.

An alternative method would be to mine and heap leach on surface some 200,000 tons of ore so as to permit the caving of the upper part of the orebody to prepare it for leaching in place. This method would have the advantage of reducing the capital outlay for a flotation mill but this advantage would be offset by the capital invested in the ore being heap leached. Immediate pro-

duction of copper would be impossible. With the completion of a mill, amortization of the mill would begin immediately.

Mining Methods and Costs

An exact detailed method of mining cannot be designed until some additional crosscutting has been done. It is proposed that crosscut No. 1-320 Fig. 3 be extended to the westerly limits of the orebody. IF this crosscut proves to be in ore, crosscut No. 1-280 should be driven.

Simultaneously with the driving of No. 1-320, a crosscut No. 2-310 Fig 4, should be driven on the Lower Tunnel level. It is expected that the driving of these crosscuts will materially increase the proven ore reserves.

It is anticipated that exploration on the Lower Tunnel level will indicate that the orebody will be large enough so that undercutting it will start caving of the ore from the Lower Tunnel to the surface. Should caving not occur readily diamond drill holes from present raises and from the Upper Tunnel level when blasted will start caving once the opening below becomes sufficiently large.

The most common practice in caving is to use a haulage level, a draw-off level and an undercutting level. The use of these 3 levels will tie up too much ore and therefore, it is proposed to eliminate the draw-off level. This method, known as the chute caving method was successfully used at Cananea and other places. It is proposed that instead of drawing ore out of chutes into cars that the ore be dropped to the floor of the drift, bulldozed where necessary and scraped to small inclined pockets in the main tunnel where it will be transported to the mill by a diesel driven truck.

The cost of mining by chute caving is higher than the standard undercut caving method. Since a large part of the development work already done can be used, the difference in cost will not be materially higher by the proposed method. In view of the fact that approximately 10 per cent of the total tonnage to be mined is already broken, it is estimated that some 250,000 tons of ore can be mined and delivered to the portal of the tunnel at $2.00 per ton.

Milling Method and Costs

Many different types of tests have been made on Old Reliable ore. The complete results of these tests are available. The following is a summary of the type of test and the results of the more important tests:

1. Straight Flotation
   This test was made by E. V. Given, Metallurgical

Superintendent of the St. Anthony Min. & Devel. Co., Ltd. One-third of the copper in the sample occured as non-sulphide copper. Test 16 showed a total recovery of 83 per cent of the copper in a 25 per cent copper concentrate. Date-March 1951.

This method has the advantage of being simple, cheap and requires the minimum capital for a mill.

2. Leach-float Method

Tests by the Inspiration Copper Co., the University of Arizona and the U. S. Bureau of Mines gave an average of approximately 90 per cent recovery with a concentrate containing from 34 to 44 per cent copper. Date - 1942 - 44.

3. Sink-float Method

The American Cyanamid Co. conducted a number of sink-float tests on Old Reliable ore. Results were not conclusive.

4. U. S. Bureau of Mines Tests

The following is a summary of data and information given the writer by J.B. Clemmer, Chief of the Bureau of Mines at Tucson, July 14, 1950:

Grade of ore 2.12% total copper
0.77% acid soluble
Ore in all tests was ground to 1 inch

Test No. 1 Plain water leach for 24, 48, 72 and 96 hours; water returned each time. Recovery trace of copper. Conclusion: Little or no copper can be recovered by direct water leach. It would require a 6 months test to determine recoveries by water leaching with alternating wetting and drying with return of leach water. The Bureau because of rush of work is unable at this time to make such a test.

Mr. Clemmer does not think plain water leaching of the broken ore underground would be advisable as he thinks the orebody is too valuable to run the risk of further complicating the ultimate recovery by other methods.

Test No. 2 Acid leach with 2½% H_2SO_4

24-hour leach; recovery 33.5% of total Copper
48-hour leach; recovery 36.5% of total Copper
72-hour leach; recovery 40.1% of total Copper
96-hour leach; recovery 42.6% of total Copper

Very favorable acid consumption.
2 lbs acid per lb. copper recovered
Acid worth $30 per ton F.O.B. Tucson

Test No. 3 Leach with acid $Fe_2(SO_4)_3$

2½% acid, 2% Fe as ferric sulphate
24-hours; recovery 42.0% of total Copper
48-hours; recovery 52.8% of total Copper
72-hours; recovery 58.7% of total Copper
96-hours; recovery 63.0% of total Copper

Test No. 4 New Method

The Bureau is working on a new method of leaching. Work has not gone far enough to make any claims for it as to possible recoveries or cost and practibility of a plant.
Ore was ground to 65 mesh and treated with strong acid at a temperature of 250 degrees in a kiln or furnace. After 15 minutes in the kiln and a 15 minute leach with water, gave a 68% recovery of total copper contained in Old Reliable ore. A very favorable acid consumption resulted. 1.6 lbs acid per lb. copper recovered.

General Conclusion:

Mr. Clemmer stated that he thought the ore was ideal leach-float ore. Mr. Clemmer stated that heap leaching on surface would be much better than to try underground leaching without additional caving and breaking the ore. He also suggested that a test could be made by getting a wooden barrel. Place ore and water in it and periodically agitate it for a period of 6 months. On the whole he thought the leach-float method would give the best results.

It is believe that the floation mill should be designed to include a picking belt over which the run-of-mine ore will pass before crushing. Like most breccia ores the Old Reliable ore contains many unmineralized blocks of waste which are practically barren and are easily recognized. A considerable amount of barren material can be picked from a picking belt. The chances are that the wate picked from the belt will contain less copper than the mill tailing. The Alaska Juneau mine is the outstanding example of picking before milling. The grade of the ore was doubled and the material picked contained lower values than the mill tailing. One picker removed from 50 to mae than 100 tons of waste from the ore per shift. While no such ratio as this is possible at Old Reliable it is believed that the grade of the mill feed can be materially increased. If a man removed as little as 6 tons of waste per shift, he would pay his wages. Any additional rejected waste would show a profit. An additional advantage would result in reducing the size of the mill which would reduce the capital investment and the amortization charges.

In calculating milling cost and recoveries consideration has not been given the possibilities of sorting. It is assumed that the grade of the ore will be 2.4 per cent copper and that the recovery will be 83 per cent and the grade of the concentrates 25 per cent copper.

On this basis the mill recovery will be 40 pounds of copper per ton of ore. The ratio of concentration will be 12.5

It is estimated that the cost of milling by straight flotation will be $2.50 per ton.

Water

Water for the operation of a mill at Old Reliable can be obtained from several sources. The company has a water permit from the Forest Service covering a spring some three miles up Copper Creek. When the Airzona Molybdenum Corporation's mill was in operation a 3-inch pipeline brought water from the spring to the mill. Some 2100 feet of this pipeline is out and 3400 feet is in need of repair. The rest of the line is usable. The spring is reported to have a minimum flow of 40 gallons per minute.

The run-off flow of Copper Creek was caught behind a concrete dam. This dam is now full of silt to within 2 or 3 feet of the top. It would probably be worthwhile cleaning out the dam so as to provide a storage reservoir. This could be done with a bulldozer.

During the former mill operations in the district the Phelps Dodge Corp. allowed the operators to pump water from the Copper Prince mine. This water is now available.

Because of the fact that the Arizona Molybdenum Corp. treated approximately 300 tons per working day during 1936, it is believed that there is sufficient water available to operate a 300-ton flotation mill.

Smelting Methods and Costs

Flotation concentrates will be trucked to the Hayden smelter of the A. S. & R. It is estimated that the cost of trucking will be $3.00 per wet ton or $3.25 per dry ton. This will amount to $0.26 per ton of ore. The cost of smelting is estimated at $6.50 per ton of concentrates or $0.52 per ton of ore. On the basis of a concentrate containing 25 per cent copper or 500 pounds, the smelter pays for 480 pounds. The freight, refining and marketing will cost 3¢ per pound of copper.

* Parenthetical items in pencil on report - HJL

Summary of Costs

		Per Ton Ore
Mining	(5.00) *	$2.00
Milling	(1.00)	2.50
Trucking Concentrates		.26
Smelting Concentrates		.52
Overhead		1.00
State Sales Tax		.07
Total before Income Tax & Amortization		$6.35 (20%)*
Mill recovery 83 per cent		40 lbs. Copper
Smelter recovery		38 lbs. Copper
Value of 38 lbs. Cu 38 x 21½¢	(@ 384 x 38)*	$8.17 (12.54)*
Operating cost		6.35
Operating profit		1.82
Amortization $425,000		.53
		$1.29
State & Federal Income Tax		.25
Profit per ton of ore		1.04
Profit per lb. copper		2.74¢

The main purpose in erecting a flotation mill and mining and milling 250,000 tons of ore is to break 1,000,000 tons of water leachable ore. After leaching starts it is anticipated that some 7,000,000 pounds of copper will be recovered in two years and a total of 10,000,000 pounds in 5 years.

It is believed that the copper recovered from leaching will cost approximately 10¢ per pound leaving*a profit of approximately $1,000,000 after leaching for 2 years. * (Underline)

*--Penciled parentheses)

(While the mill is in operation, it is proposed to drive a tunnel to connect with the Copper Prince and Globe mines and to have these mines ready for production before exhaustion of the Old Reliable mill ore. These mines are mostly inaccessible) and it is impossible to accurately estimate the amount of leachable ore that they contain. Assay maps of the various levels are available and the tonnage of mill ore can be checked.)

(43 2/86x)* (38)* (9.84)* (9.84)* (23 8)* (46 83/138 368/38.18 32/76 36 1145 4/12.10)*

Capital Requirements

It is believed that a 250-ton straight flotation mill built with good second hand equipment will cost approximately $1,000 per ton or $250,000. The other main items of expense are listed below:

		* Parenthesis penciled
Mill	$250,000)	
Power Line	25,000)	
Mine equipment	75,000)	
Mine development	25,000)	(This is now
Water development	25,000)	all done)*
Buildings including houses	25,000)	
	$425,000)	
Prepaid expenses, supplies, etc.	75,000	
Working capital	100,000	
Total	$600,000	

It is believed that a very efficient mine and mill plant with ample working capital can be provided for $600,000. On the basis of the above, $425,000 can be spread over a mill production of 400,000 tons of 2.4 per cent ore from the Old Reliable and 400,000 tons of 2.6 per cent ore from the Copper Prince and Globe mines. This will result in an amortization charge of $0.53 per ton of mill ore.

(The following was typed by different typewriter: HJL)

Time and Production Schedule

It is believed that it will be possible to erect and put into operation a 250-ton mill in approximately nine months. From then on production should be at the rate of 3,000,000 pounds of copper annually. In approximately three years sufficient tonnage will have been mined to start leaching. During this period the Copper Prince and Globe mines will be made ready for production at a rate of 3,000,000 pounds annually. By the end of the fourth year the combined production from milling and leaching will be some 6,000,000 pounds annually, of which 3,000,000 pounds will come from leaching at the Old Reliable and 3,000,000 pounds from milling the Copper Prince and Globe ores.

Conclusions

The development work already done at the Old Reliable mine if dne today would cost at least $150,000. The greater part of this work is necessary and of use in the proposed operation of the mine.

In the past 25 years the writer has examined a great many mining properties in the Southwest. No property has been seen that has an equivalent tonnage that is developed and so suitable to cheap mining and milling operations. Breccia pipe deposits offer greater possibilities than many other type of ore deposits. The neighboring Childs-Aldwinkle pipe attained a depth of some 800 feet from surface. At this depth 2 per cent copper ore was still available. The Lower Tunnel of the Old Reliable only partially explored the pipe. There are definitely possibilities of additional ore below this level. There are possibilities that other of the numerous breccia pipes will be found to contain workable ore shoots.

The Old Reliable property is definitely more valuable because of its location with respect to the Copper Prince and Globe mines. The three properties should be worked together as a unit preferably by a tunnel from the Old Reliable property.

It is believed that the Old Reliable mine contains at least 20,000,000 pounds of (copper recoverable)* from milling and leaching operations with a profit after amortization of approximately 7.5¢ per pound.

* Parenthesis indicates underline in pencil

The writer has an interest in the Old Reliable property. He has made every attempt not to allow such interest to bias his views as to the value of the property.

Respectfully submitted,

(Not signed--This may be a copy of orig.HJL)

Morris J. Elsing, E. M.
Registered Engineer
State of Arizona

COPY/hjl-1/5/57(3) for Shattuck Denn Mining Corp.

(Here Figure 4 - Assay map, 200 foot level,
Old Reliable mine

Figure 3 -Assay map, 100-foot level,
Old Reliable mine.)

C
O
P
Y

*Title in ink

COPPER CREEK CONSOLODATED

MINING COMPANY

LIST OF PROPERTIES*

PARCEL NO. 1: Those certain patented mining claims called Fortuna, Good Luck, Wedge, Old Reliable, and Gulch Lode designated as Survey No. 4059 embracing a portion of Section 10 in Township 8, South of Range 18 East of the G. & S. R. B. & M. in the Bunnker Hill Mining District, Pinal County, Arizona, the United States Patent of which is of record in the office of the County Recorder of said Pinal County, Arizona, in Book 5 of Mining Deeds, Page 342.

PARCEL NO. 2: Those certain patented mining claims called Iron Duke, Cuprite, Four Metals, Mineral Hill, Rainbow Ledge, Russet Dyke, Veta Rica, Grand View, Lucky Joe, Silver Saddle, Deep Lode, Golden Spur, Mineral Reef, Jewel, and Vulcan Lode designated as Survey No. 4179, embracing a portion of Sections 13 and 14 in Township 8, South of Range 18 East of the G. & S. R. B. & M. in the Bunker Hill Mining District, Pinal County, Arizona, the United States Patent of which is of record in the office of the County Recorder of said Pinal County, Arizona, in Book 6 of Mining Deeds, Page 249.

PARCEL NO. 3: Those unpatented mining claims located in the Bunker Hill Mining District, Pinal County, Arizona, the location notices of which are recorded in the office of the County Recorder of Pinal County, Arizona in the Books of Mines and oh pages as follows:

Name of Claim	Book of Mines	Page	Name of Claim	Book of Mines	Page
MORNING SIDE	56	199	MINNESOTA	49	532
MORNING SIDE	46	199	COPPER CLIFF	49	533
NORTH STAR	49	94	COPPER RIDGE	49	534
NORTH STAR	56	198	REDONDO	49	531
GRANITE HILL	24	582	JAY BIRD	49	528
AMERICAN EAGLE	49	526	HERCULES	52	451
FRACTION	56	197	LONE TRAIL	52	452
VELASQUEZ	24	409	MIDDLE MARCH	49	530
VELASQUEZ WEDGE	24	583	CENTER STAR	29	529
KIMBRO	22	562	JUPITER	49	97
KIMBRO EASTERN	24	408	MARS	49	96
PALOMA	49	527	VENUS	49	95
WHIPPORWILL	52	453	AURORA	49	92

PARCEL NO. 4: Those certain unpatented mining claims located in the Bunker Hill Mining District of Pinal County, Arizona, the location notices of which are recorded in the office of the County Recorder of Pinal County, Arizona in the Books and at the Pages as follows:

Name of Claim	Book of Mines	Page
NAVAHOE NO. 1	A	190
AMENDED LOCATION	25	46
NAVAJO NO. 2	A	300
NAVAHOE NO. 3	A	192
AMENDED LOCATION NAVAHOE NO. 3	25	48
NAVAJOE NO. 4	A	301
NAVAJO NO. 5	A	302
NAVAJO NO. 7	A	303
NAVAJO NO. 8	A	191
NAVAJO NO. 9	A	304
NAVAJO NO. 10	A	305

PARCEL NO. 5: Those certain unpatented mining claims located in the Bunker Hill Mining District of Pinal County, Arizona, the location notices of which are recorded in the office of the County Recorder of Pinal County of Arizona in the Books and at the Pages as follows:

Name of Claim	Docket No.	Page No.
CC NO. 9	18	8
CC NO. 10	18	9
CC NO. 11	18	339
CC NO. 12	18	10

COPY/hjl-1/5/57(3) for Shattuck Denn Mining Corp.

Copper State Mine

Phoenix, Arizona
September 22, 1942.

Mr. J. S. Coupal, Director
Arizona Department of Mineral Resources
Phoenix, Arizona.

Dear Mr. Coupal:

In compliance with your request for information on the Copper State Metals Company property:

The property consists of 20 patented and 23 unpatented claims, situate in the Bunker Hill Mining District, Pinal County, Arizona. It is reached from State Highway at Mammoth over 10 miles of road built by the Company. The Hayden smelter is 31 miles distant and Tucson, the trading point, is 60 miles distant.

About $700,000.00 has been expended on the property for exploration, development, construction of 100 ton pilot mill, roads, railroad, buildings, water development, etc. During a short period of pilot mill operation about 2,000,000 pounds of copper was produced in concentrates, which were trucked to Hayden. The property has been inactive since economic collapse of 1920.

Under the existing strategic metals emergency, the Old Reliable, one of a group of 6 patented claims, is of particular interest. In this claim there is well developed 450,000 tons of ore, the actual mill recovery on many thousands of tons having been 40 pounds plus per ton.

The ore is developed by two addit tunnels, one directly above the other, and 101 feet apart, and 16 crosscut tunnel, at right angles to drift tunnels. There are stopes from each crosscut, full of broken ore, and about 25 draw chutes installed. These stopes would be of no particular value in any future extensive mine operation.

From the ore extracted in the development work there was produced approximately 1,000,000 pounds of copper in concentrates, which were smelted at Hayden.

The gossan area above the ore is about 147,000 square feet. The pay area at present developed is about 24,200 square feet and shows about 3,000 tons of ore per foot of depth. The ore, as proved, has been taken for a height of 200 feet. This gives a total of 600,000 tons of proved ore, of which about 25% is barren granodiorite. In operation, it probably would be economical to sort as much waste as was practical.

Developed ore would permit several years operation at the rate of 500 tons per day. However, available water is sufficient for not much over

200 tons per day. There is unlimited water in the San Pedron River Valley, 8 miles distant.

The old pilot mill was sold and the railroad from the Old Reliable mine to the mill, with locomotive, gondolas, etc., were junked several years ago. The only usable equipment on the property is several buildings, water system, including pipe line and storage tanks, and a 285 H.P. Diesel electric power plane in excellent condition.

It is estimated that the property could be operated at present at a profit of 2¢ per pound of copper produced, bases on a gross smelter return of 14½¢ per pound, including 5¢ premium.

Because of undertain priorities, the certainty of costly delays in procurement of machinery, equipment, supplies and labor and the uncertainty of future labor procurement and costs, no estimate of costs of any future operation can be made.

The Old Reliable claim has developed easily treated ore that will yield at least 20,000,000 pounds of metallic copper, and has a potential production of many times that amount. If it becomes necessary to produce this copper the operation would have to be something of the nature of a defense project, under which the urgency of the demand and the amount of money available would limit the size of the operation.

I trust this summary will be sufficient for your purpose.

Yours very truly,

J. W. Mac Donald.

J. W. MacDonald.

Address:
P. O. Box 1643
Phoenix, Arizona.

JWM:n

September 25, 1942

Mr. J. W. McDonald
P. O. Box 1643
Phoenix, Arizona

Dear Mac:

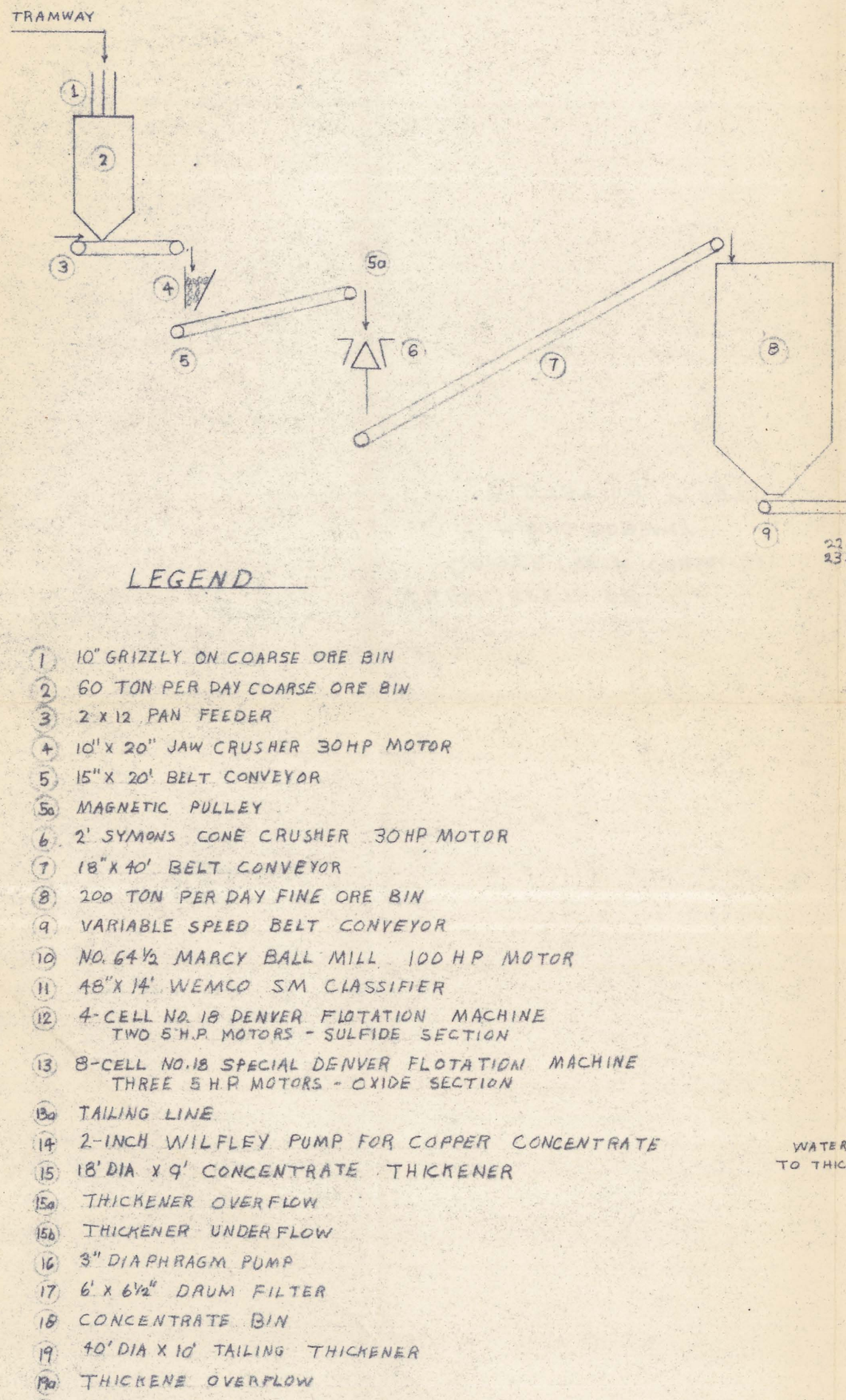
Many thanks for your summary of the Copper State Metals property and I will say that the information is quite complete and will be of value to us in giving a summary of the possible production from Arizona properties.

Yours very truly,

J. S. Coupal, Director

JSC:LP

COPPER CREEK CONSOLIDATED MINING COMPANY
FLOTATION PLANT FLOW SHEET



LEGEND

1. 10" GRIZZLY ON COARSE ORE BIN
2. 60 TON PER DAY COARSE ORE BIN
3. 2 x 12 PAN FEEDER
4. 10" x 20" JAW CRUSHER 30HP MOTOR
5. 15" X 20' BELT CONVEYOR
5a. MAGNETIC PULLEY
6. 2' SYMONS CONE CRUSHER 30HP MOTOR
7. 18" X 40' BELT CONVEYOR
8. 200 TON PER DAY FINE ORE BIN
9. VARIABLE SPEED BELT CONVEYOR
10. NO. 64½ MARCY BALL MILL 100 HP MOTOR
11. 48" X 14' WEMCO SM CLASSIFIER
12. 4-CELL NO. 18 DENVER FLOTATION MACHINE TWO 5 H.P. MOTORS - SULFIDE SECTION
13. 8-CELL NO. 18 SPECIAL DENVER FLOTATION MACHINE THREE 5 H.P. MOTORS - OXIDE SECTION
13a. TAILING LINE
14. 2-INCH WILFLEY PUMP FOR COPPER CONCENTRATE
15. 18' DIA. x 9' CONCENTRATE THICKENER
15a. THICKENER OVERFLOW
15b. THICKENER UNDERFLOW
16. 3" DIAPHRAGM PUMP
17. 6' x 6½" DRUM FILTER
18. CONCENTRATE BIN
19. 40' DIA x 10' TAILING THICKENER
19a. THICKENE OVERFLOW
19b. THICKENER UNDERFLOW
20. 2" CENTRIFUGAL PUMP
21. SYNTRON LIME FEEDER
22. SODIUM AEROFLOAT FEEDER
23. AEROFLOAT 31 FEEDER
24. AEROFLOAT 31 FEEDER
25. SODIUM SULFIDE FEEDER
26. DENVER DRY SODA ASH FEEDER
27. PAIRS OF SODIUM SULFIDE AND ZANTHATE FEEDERS

Mr. Axel Johnson
Arizona Dept. Mineral Resources