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PRINTED: 12/17/2002

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: CENTURION MINE

ALTERNATE NAMES:
LADY ROSE & ALASKITE GPS.

COCHISE COUNTY MILS NUMBER: 38

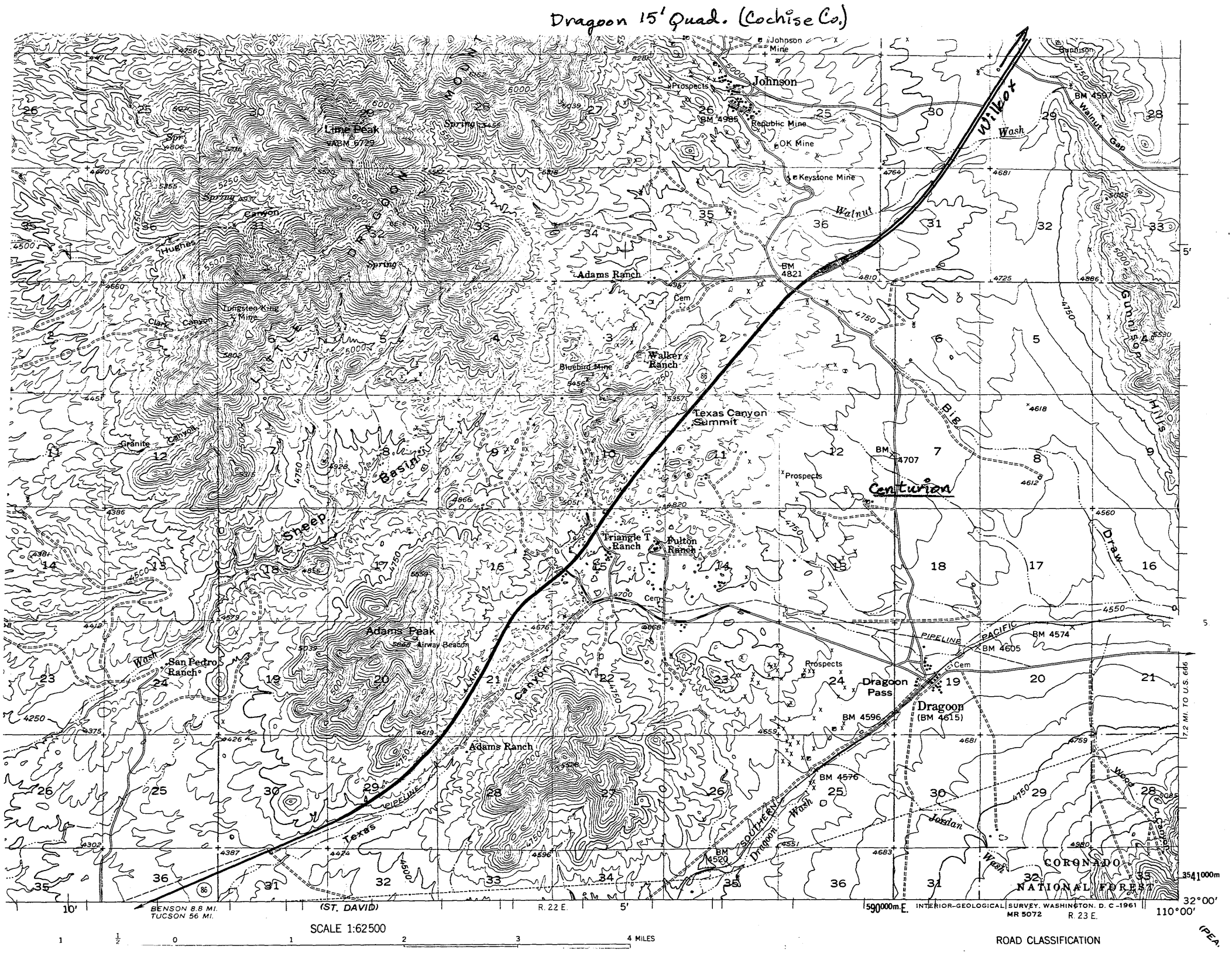
LOCATION: TOWNSHIP 16 S RANGE 22 E SECTION 12 QUARTER SE
LATITUDE: N 32DEG 03MIN 04SEC LONGITUDE: W 110DEG 02MIN 55SEC
TOPO MAP NAME: DRAGOON - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:
COPPER OXIDE
GOLD LODE
SILVER
LITHIUM

BIBLIOGRAPHY:
KEITH, S.B., 1973, AZBM BULL. 187, P. 56
MINES HANDBOOK 1924, 1926
USGS PP 416, P. 176-177
ADMMR CENTURION MINE FILE
ADMMR MAPS-UPSTAIRS IN FLAT STORAGE-DRAWER 2

Dragoon 15' Quad. (Cochise Co.)



CENTURION MINE COCHISE COUNTY

Visited the Centurion mine - not operating - trying to obtain financing. GWI WR 6-6-70

Mine visit - Centurion mine - a little repair and other work. GWI WR 12-5-70

Mine visit - Centurion mine - owner doing a little repair work. GWI WR 2-8-71

Mine visit - Centurion mine. GWI WR 6-7-71

Mr. R. N. Bales has been doing a little clean up and repair work at the Centurion mine, Dragoon. GWI QR 6-30-71

Mr. R. N. Bales is still doing a little repair work, etc at the Centurion Mine. QWI QR 9/71

Mr. R. N. Bales has been doing a little repair work at the Centurion mine. GWI QR Oct-Dec '71

Mr. R. N. Bales is still at the Centurion mine. GWI QR Jan.-March'72

Mr. R. N. Bales is still at the Centurion Mine. GWI 4 ¼ 1972

MG WR 4/5/85: A Mr. Tony Rimza (c) is attempting to buy the Centurian mine (Cochise Co). The Centurian property is comprised of one patented claims, the Captain No. 2. The property was patented, and is owned, by Mr. Osman Webb Mercer, (c). Two acres of the full-sized lode claim are owned by Mr. W.T. Elsing (deceased). Engineering reports, maps, assays, etc. have been loaned by Mr. Mercer to Mr. Jim Sullivan (c). Mr. Mercer reports there has been no activity in or around the Centurian for several years.

Mrs. Landfair died at St. Joseph's hospital Feb. 17, 1962.
Son and heir is Webb Mercer, 4230 E. Clarendon, Phoenix - Phone 265-1517 LP

Mr. Kaske stated that the owners of the Centurion mine at Dragoon had applied for a patent, and that this had been advertised in the Willcox paper. ALJ Conf. report 2-13-63

Patent was issued to the estate of S. Jane Landfair for a 20 acre claim located about 12 miles northeast of Benson in Cochise County. Examination revealed copper deposits. BLM (file) 9-19-63

Visited the Centurion mine - idle, no one around. GWI WR 2-10-67

It has been reported that the Centurion mine has been leased by R. N. Bales, Box 521, Dragoon, 85609. A small transformer has been installed on the power line near the shaft collar. GWI QR 3-1969

A 'A DEPARTMENT OF MINER SOURCES
Mineral Building, Fairgrounds
Phoenix, Arizona

1. Information from: R. M. Bales

   Address: P.O. Box 521 Dragoon

2. Mine: Centurion 3. No. of Claims - Patented 1

   Unpatented

4. Location:

5. Sec 12 Tp 16S Range 22E 6. Mining District Cochise

7. Owner: Webb Mercer (Jane Landfair's son)

8. Address:

9. Operating Co.:

10. Address:

11. President: 12. Gen. Mgr.:

13. Principal Metals: 14. No. Employed:

15. Mill, Type & Capacity:

16. Present Operations: (a) Down ☐ (b) Assessment work ☒ (c) Exploration ☐
    (d) Production ☐ (e) Rate tpd.

17. New Work Planned: Plans to install hoist and mine some copper ore.

18. Miscl. Notes: Option and lease and purchase arrangement.

Date: Oct. 7, 1969 G. W. Irvin (Signature) G. W. Irvin (Field Engineer)

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Centurion Mine Date Oct. 11, 1962

District Dragoon District - Cochise County Engineer Axel L. Johnson

Subject: Present Status. Information from Dr. H. R. Small

References: Report of Feb. 17, 1956

Location: Sec. 12, T16S, R22E. About 1½ miles north of Dragoon.

Number of Claims: 1 patented claim, and 10 unpatented claims.

Owner: Webb Mercer, 4230 E. Clarendon, Phoenix, Arizona.
(Inherited property from his mother, Mrs. S. J. Landfair)
Legal Representative: W. T. Elsing, Suite 712 Arizona Bank Bldg., 34 W. Monroe, Phoenix, Arizona

Principal Minerals: Copper and limestone

Present Activity: Idle

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Centurion Mine Date Feb. 17, 1956

District Johnson Dist., Cochise County Engineer Axel L. Johnson

Subject: Present Status. Personal Visit & Information from Mrs. S. J. Landfair, Owner.

Location Sec. 12, T 16 S, R 22 E. About 1 1/2 miles N. of Dragoon.

Number of Claims 11 claims. One of these is patented, and one is in the process of being patented.

Owner Mrs. S. J. Landfair, 2014 1/2 N. 7th St., Phoenix, Arizona.
also Box 61, Dragoon, Arizona.

Operator Not in operation.

Principal Minerals Copper and Limestone

Number of Men Employed None. Mine is idle.

Geology Narrow veins in and along limestone contact.

Ore Values Mrs. Landfair reports an average of 3.6 % copper.

Ore in Sight and Probable

Mrs. Landfair reports a total of 70,000 tons of 3.6 % copper ore, partially blocked out, between the 125 and the 500 ft. levels.

She believes that there is also considerable ore below the 500 ft. level, which has not been determined by exploration and development.

Milling and marketing Facilities There is no mill on the property.. Ore, during past operations, was shipped to the smelters.

Present Mine Workings

(1) one inclined shaft----- 665 ft. deep on the incline (56 deg. incl.), with 7 different levels from same, the bottom level being the 640 ft. level. There is now about 35 ft. of water at the bottom of the shaft. Mrs. Landfair reports that the water supply from the shaft would be equivalent to 32 gal. per min.

(2) many shallow shafts and open cuts from various parts of the claims.

Past History The mine is reported to have worked last in 1945. It closed down at that time, after having operated at a loss for some time.

Present Operations Mrs. Landfair is getting ready to dewater the shaft, and make a few minor repairs on same in order to be able to show prospective lessees. Mrs. Landfair is also doing some exploration work in other parts of the property, in order to find some high silica copper ore that can be mined by open pit operations and shipped to the smelter.

Proposed Plans (1) To lease the mine to some operator. Terms not stated.

(2) To mine some of the high silica copper ore on the surface, by contract with some mine contractor.

(3) To interest some company to install a cement plant, and mine the limestone on her property for the purpose of the manufacture of cement.

General Remarks Will make a more thorough inspection later, when time is available.

CENTURION MINE

Owner: S. J. Landfair

Encumbrances: None

Description:

Mining District - Johnson County, Cochise, Arizona, Range 22 East, Township 16 South, Sections 12 and 13.

Claims:

Captain Nos. 1, 2, 3 and 4; also Lizzie, Adin, Trosper, all contingent.

Workings consist of a shaft 665 - 56° -- 8,000 to 9,000 feet of underground workings, 7 levels, ladders and rail to bottom. Sump has 35 feet of water. All other parts are accessible except for some stoping areas which have recently caved in. Mine is dry throughout. Have 2.7% copper carbonates show an average throughout the mine. Eighteen carloads of this ore have been shipped in 1943 and 1944. Smelter sheets are available.

This shaft was opened on a lime-schist contact, but the contact was not explored. Rather they sunk and drifted to the enriched carbonate areas. Many other shafts have been sunk over the property up to 50 feet deep. There is a 4-foot quartz vein containing lead and silver running across the western half of the property. There has been some recent exploration work done here.

The railroad, gas and power lines are within 1½ miles. The main telephone line runs across the lower edge of the property. It is on the county road which is always kept up. The Coronado Copper and Zinc mines are less than four miles to the north. Numerous other advantages are connected with this property.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine El Capitan Claims Date June 27, 1961

District Dragoon (Johnson) District, Cochise Co. Engineer Lewis A. Smith

Subject: Interview with W.E. Reed, 714 4th St., Phoenix (AL 4-4558)

Mr. Reed reports that wollastonite lies next to the quartz in certain veins. The wollastonite appears to be white and is affiliated with a greenish and brownish cubic mineral (possible diopside). The veins dip 56-60° SW and strike NW-SE in general. According to Reed the wollastonite is up to 6-8 feet wide and the specimens are clean except for the cubic mineral. The depth of the wollastonite is unknown, and it usually forms where limestone is attack by silicic acid. It is commonly present in contact metamorphic zones in limestone and diopside is a common associate. The cross-sections of diopside (?) crystals may be a rectangular. The material is composed of a compact mass of radiating and interlocking crystal aggregates.

NAME OF MINE: Centurion (Captain Copper)

COUNTY: Cochise S
DISTRICT:
METALS: Cu

OPERATOR AND ADDRESS: DATE:		MINE STATUS DATE:	
6/2/44	C. L. Orem, Phx. Nat'l Bank Bldg. S. J. Landfair, Dragoon	6/2/44 6/2/44 12/44	Developing Shipping (per GNB) Idle

CENTURION MINE

Cu

Cochise 2 - 4 T 17 S, R 23 E

S. J. Landfair, Box ~~426, Phoenix~~ 52, Dragoon '43

Min Jour 6/41

(C) If you could not do this yourself, would a quick drilling program by some government agency (at government expense) be sufficient?

If drilling could be avaiable could open up ~~s~~alphides below water level as well as the lead. Would much prefer a drilling program. Reports show large deposits should be below.

(D) Or would you prefer a loan plan similar to the arrangements during World War II?

No

How about a combination plan in two stages such as follows?

Stage 1: Government engineers review project and, if a little drilling appears to be justified and a preliminary key to the situation, such drilling program to be agreed upon by owner and government engineer, paid for by the government, but let by contract.

Stage 2: If results of drilling (or without drilling) justify underground development and/or production equipment, same to be obtainable via a mortgage loan on property.

Please discuss the above: Stage 1. Appears to be satisfactory These properties should be thouroughly checked by Government Engineers As well as other Engineers or experienced mining men . Brief examinations do not reveal the true value of a property.

SUGGESTIONS:

Loans should be made according to the size and need of a property and not a specified amount.

DATE September 26, 1950 SIGNATURE L J Landfair

STATUS OF DORMANT MINES

MINE NAME: Centurion Mine

LOCATION: One and onehalf Miles northerly of Dragoon, Arizona

OWNER AND/~~OR LEASEE~~: S.J.Landfair

ADDRESS: P.O.Box 52 Dragoon, Arizona

APPROXIMATE PRODUCTION (Year of 1945):

COPPER _____ Lbs. LEAD _____ Lbs.

ZINC _____ Lbs. (OTHER) _____

CHECK THE CHIEF CAUSE OF YOUR DISCONTINUED PRODUCTION:

(A) Easily available ore worked out.
(B) Increased costs, but have quantity similar to past grade of ore.
(C) Too close a margin to develop more ore.
(D) Lack of finances to equip mine so it could produce at least one carload per day.

If you have ore ready to mine please give your estimate of the amount of metal (name each metal) that you could produce in one year (after allowing 60 days to get started) if there were premiums above present market prices. Name amount with a low premium, and amount at a high premium; such as:

Copper at 22½¢ plus 5¢ premium..... 1,000,000 Lbs.
Copper at 22½¢ plus 10¢ premium..... 1,500,000 Lbs.

Have at least 158,697 tonsof 2.7 per cent copper ore reserves,reports disclose.Through out levels in main shaft.

If you do not have ore ready to mine please discuss the following:

(A) Do you think a reasonable development program would produce a justified tonnage of commercial ore at above mine?

Yes.Have the above tonnages as well as a 35 foot shaft which discloses a four foot vein of 82 % silica with a 5.25% copper and a 2.10 oz.silver. This vein has been opened with eight and ten foot shafts. At least 200 feet. Also have a very high grade galena and silver prospect being opened up on surface west of silica vein. This lead ore is being opened up by hand steel with very encouraging results.

(B) With a premium price (guaranteed for one year) could you carry out such a development program yourself? What premium?

Yes.If prices are stabelized.

LANDON F STROBEL,EXE. E SECY QUOTA COMMITTEE
PREMIUM PRICE PLAN FOR COPPER LEAD AND ZINC WPB ROOM 2047
TEMPORARY H BLDG. WASHINGTON, D.C.

Bradford Venture in Mine

CAN PRODUCE 50,000 TONS 3.6% COPPER.CAN START IMMEADEATELY RATE 50 TONS PER WEEK AND REACH RATE OF 50 TONS PER DAY WITHIN 6MONTHS OR SOONER. WITH RIGHT EQUIPMENT THIS RATE MAY BE FURTHER ADVANCED.

MINE HAS PRODUCED VERY HIGH GRADE ORE,22% COPPER.GUTTED OF HIGH GRADE ORE BY LEASERS IN FORMER YEARS.MOVING OF THIS LOW GRADE ORE MAY RESULT IN OPENING ADDITIONAL TONNAGES OF HIGH GRADE ORE THAT COULD BE PRODUCED AT A LOWER PRICE FOR COPPER.

MINE HAS EXCELLENT DEVELOPMENT POSSIBILITIES FOR LARGER TONNAGES.

ORE OXIDIZED MUST BE SHIPPED DIRECT TO CUSTOM SMELTERS.

DATA AS FOLLOWS :-HAVE :-

1. TONS OF ORE RESERVES AND GRADES.50,000 TONS,ESTIMATED 3.6% COPPER.
2. CAN START 1 CARLOAD OF 50 TONS,PER WEEK AND WORK RATE UP TO 1 CARLOAD PER DAY.
3. SMELTER,CHOICE OR 4 SOUTHERN ARIZONA SMELTERS.
4. TEN POUNDS PER TON DEDUCTED BY THE SMELTER.
5. PRICE DEDUCTED BY THE SMELTER PER POUND OF COPPER 2.725 CENTS PER POUND.
6. COST OF EXPLORATION,DEVELOPMENT AND MINING $6.50 PER TON.
7. COST OF LOADING AT MINE.TRUCKING TO RAILROAD.LOADING AT RAILROAD $1.00 PER TON.
8. COST OF RAILROAD TRANSPORTATION PER TON $1.80
9. COST OF SMELTING PER TON $3.50
10. NO ROYALTY-OWNED OUTRIGHT
11. START AT ONCE.CONTINUALLY INCREASE PRODUCTION RATE.
12. PRICE REQUIRED TO PRODUCE EQUALS 27CCENTS PER POUND OF COPPER

3.6% COPPER EQUALS 72 POUNDS PER TON.SMELTER DEDUCTIONS;SLAG LOSS MIMUMUM TEN POUNDS PER TON.PAY FOR 62 POUNDS PER TON.
COSTS PER TON; SMELTING $3.50; RAILROAD TRANSPORTATION $1.80; TRUCKING AND LOADING $1.00;EXPLORATION,DEVELOPMENT AND MINING $6.50; TAXES $ 0.50.TOTAL $13.30

27 CENTS PER POUND FOR COPPER LESS 2.725 CENTS FOR SHIPPING EAST AND REFINING OF THE BULLION EQUALS 24.275 CENTS PER POUND.
62 POUNDS COPPER PER TON AT 24.275 CENTS PER POUND EQUALS $15.065 PER TON GROSS VALUE.LESS TOTAL COSTS $13.30 EQUALS $1.70 PROFIT FOR RE- PAYMENT OF LOAN.

OPERATING SMALL CREW MAKING OLD WORKINGS ACCESSIBLE UNDER $5.000.00 GOVERNMENT LOAN WITH ABOVE RESULTS TO DATE.

660 FOOT SHAFT.8,000 FEET DEVELOPMENT OPENINGS.

S.J.LANDFAIR'S CAPTAIN COPPER CO'S OLD CENTURION MINE, DRAGOON,COCHISE COUBTY, ARIZONA.

S.J.LANDFAIR, POST OFFICE BOX 426,PHOENIX,ARIZONA PHONE 5-1316.

June 12, 1946

Mrs. S. J. Landfair
Box 52
Dragoon, Arizona

Dear Mrs. Landfair:

Some of those who know the lime business in Arizona seem to be very dissatisfied with the service rendered by the Paul Company.

It is rumored that the Phelps Dodge Company is so dissatisfied that they are considering the installation of a quarry of their own. You might write to their office at Douglas and tell them about your deposit.

You could also write to the Paul Lime Co. at Paul's Spur near Douglas. I understand Mr. Paul lives there.

A good deal of the lime coming into Arizona is produced by the Permanente Company at King City, California. Perhaps they would be interested in an Arizona deposit.

Also, the California Portland Cement Co. of Colton, California, is planning to build a cement plant near Tucson and might be interested in a side line of high grade lime.

It would seem as if someone should enter into the business but I guess it is quite an undertaking and I have no further suggestions at present, but will keep it in mind.

Yours very truly,

Chas. H. Dunning
Director

CHD:LP

May 8, 1944

File MRDD

War Price and Rationing Board
No. 81.7.1
137 No. Second Avenue
Phoenix, Arizona

Gentlemen:

Mrs. Jane Landfair, 306 West Osborn Road, Phoenix, Arizona, has made application for supplemental gasoline. Mrs. Landfair owns the Centurian Mine located in the Dragoon district about 25 miles from Benson. The mine is working under an R.F.C. loan and has reached the production stage and they are now shipping copper ore.

There are many problems connected with this property. First, they are unable to get to build housing for the mine workers, hence it is necessary to bring the men from Benson to the mine and back each day, which amounts to about 1500 miles a month. It is necessary to probably make two trips a month on ore settlements, calling for 320 miles. In addition, as this operation is under R.F.C. mine loan arrangements, it calls for making four trips a month between Phoenix and the mine, a distance of 1600 miles. It is furthermore necessary to make Willcox and Tucson at least once a week for supplies, which would add another 800. The application is for 5,000 miles which I believe can be somewhat shaded.

The operation is on one of the critical metals and it is a very worthwhile property so that I can certify as to the need of gasoline for this work.

Yours very truly,

J. S. Coupal, Director

JSC:LP

returned for your files

M E M O R A N D U M

TO: C F WILLIS

FROM: J S COUPAL

SUBJECT: Advance copper premium on Centurion Mine

Mr. C. L. Orem has submitted the application for advance premium on cooper from the Centurion Mine. I attach copies of application to Landon F. Strobel together with copy of covering letter attached to the application.

J/Coupal

J. S. Coupal / Director

JSC:JES

CENTURION MINE REFERENCES COCHISE COUNTY

USGS P.P. 416 p. 176

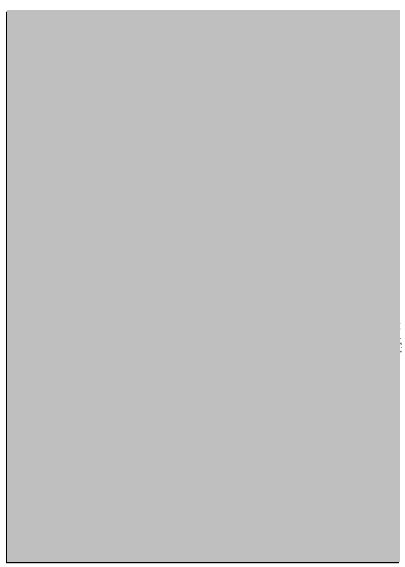
ABM Bull. 187, p. 18

Mines Handbook 1924

MAPS - Upstairs in for flat storage - Drawer 2

MILS Sheet sequence number 0040030111

Gazette 2-21-62



DEPARTMENT OF MINERAL RESOURCES
State of Arizona
MINE OWNER'S REPORT

Date Aug 12, 1946

1. Mine: Centurion
2. Location: Sec. 12 Twp. 16 S Range 22 E Nearest Town Dragoon
   Distance 1½ Direction South Road Condition Good
3. Mining District & County: Jo Cochise
4. Former Name of Mine: None
5. Owner: Mrs S. J. Landtair
   Address: Dragoon
6. Operator: same
   Address:
7. Principal Minerals: Lime
8. Number of Claims: 4 Lode — Placer
   Patented Unpatented —
9. Type of Surrounding Terrain: Low Hills
1½ Miles to Railroad
1½ " to natural gas line from El Paso to coast.
10. Geology & Mineralization:

11. Dimension & Value of Ore Body:
1500' X 2000' X 600'

BB

12. Ore "Blocked Out" or "In Sight":

Ore Probable:

13. Mine Workings—Amount and Condition:

No.	Feet	Condition
Shafts		
Raises		
Tunnels		
Crosscuts		
Stopes		

14. Water Supply: Good water potential supply in mine.

15. Brief History:

16. Signature:

17. If Property for Sale, List Approximate Price and Terms:

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Centurion Date May 13, 1944

District Johnson Engineer

Subject:

Mr. and Mrs. Landfair and Clarence Orum were here on my visit. Joe Lee is in charge of work. Screening dump, segregating high lime ore from high siliceous and sweetening with ore from mine. Shipping about two cars per week.

The Landfairs are moving down to Dragoon. Anxious to obtain RFC loan. Advised them to obtain blanks and made appointment for June trip to district when they will be ready to make application.

This property has been shipping a low-grade siliceous fluxing ore to Douglas. Advised them to anticipate probable reduction by opening up known values in mine rather than trying to bring dump up to acceptable grade, especially when some mining is being done for this purpose on 200 level. Mine is said to be 600' deep on about 65° incline.

Mrs Landstair sole owner.

P.O.Box 426
Phoenix, Ariz.
October 18,1943

Landon F.Strobel.Executive Secy Quota Committee
Premium Price Plan for Copper Lead and Zinc
W.P.B.Room 2047
Temporary H Bldg.
Washington D.C.

Dear Mr. Strobel:

Am forwarding data(see enclosed form W P B-2465) for an increased premium on copper ore.

The property is known as the Centurion Mine of the Captain Copper Co. and I own and manage the property which is located one and a half miles from the railroad siding at Dragoon,in the Johnson Mining District, Cochise County,Arizona.

These claims cover a large contact area between limestone and granite-schist.The ore bodies occur in replaced beds and water coursessin the limestone and vary in thickness from small stringers to very wide mineralized masses formed where the pre-mineral cross fractures are numerous and closely spaced.

The ores are oxidized deeply due to the porosity of the formations and this well shattered condition.In places large lower grade masses of garnet-copper ore bodies appear.

The development consists of a 660 foot 60 degree incline shaft in limestone and several thousand feet of lateral openings on seven levels.There are also several hundred feet of shallower shafts and development workings in these mineralized formations on the surface.

The lower three levels,i.e.,the 425, 525, 625, foot levels show increasing amounts of films of copper glance and black and red oxides in all the fracture planes.

The old workings have produced considerable tonnages of very high copper ores and it is considered that additional and better grades of copper ores will be produced below the water level which stands just below the 625 foot level at present but at times rising up into the 625 foot level.We plan to develop the richer ores at depth and the upper ores laterally during the next two year period.

Leasers under various names mined out much of the higher grade ores for many years in the upper levels and left many of them in an inaccessible condition.

With the aid of a $5000.00 accessibility loan from the R.F.C. many hundreds of feet of these old workings were opened and sampled.

A very complete report by Mr.Hubbard,Mining Engineer,in 1911 is enclosed to give a complete idea of the ore bodies encountered and their geological and structural setting.

By reducing Mr. Hubbards sampled widths considerably and, allowing for ores already mined,-C.L.Orem,our Mining Engineer, estimates we can produce a much smaller tonnage of this material. that will closely approximate 3.6% copper.

The results of this work todate indicate that in an area approximately 500 feet deep and 200 feet long,averaging seven feet wide(although composed of widely divergent thicknesses),-approximately 50,000 tons of copper ore could be mined or reclaimed averaging nearly 3.6% copper.

Former copies of old smelter returns are enclosed to show the desirability of the ores as nearly self fluxing or desirable fluxing mixtures,-especially from the content of high silica in some and of high lime content in others of the lower grades of ores.

We are working six men and with sufficient bonus to avoid loss,could start producing without delay,one or more fifty ton carlots per week and increase this rate gradually to one carlot per day or better by improving the hoisting and the handling equipment and facilities.

Additional man power could be secured locally. Most of our present force are men toooldtto be of use in the larger mining camps or are to inexperienced to be of use to such companies.We can secure enough additional help of this nature to carry out this work.

The ore is all oxidized and must at present be shipped to c to custom smeltersdirect to be realized on in the immediate future.

Costs on this ore will be as follows:

Smelter treatment charges	$3.50	per ton.
Freight charges(mine to smelter)	1.80	" "
Loading at mine,Trucking to R.R., Loading at R.R.	1.00	" "
Mining costs	4.50	" "
Exploration and Development	2.00	" "
Taxes	0.50	" "
Total	$13.30	" "

Ten pounds copper per ton will deducted by the smelter for slag losses. 3.6% copper equals 72 pounds per ton.Less ten pounds per ton equals 62 pounds copper per ton paid for by the smelter.

The smelter also deducts 2.725 cents per pound copper for shipping east and refining costs.At 27 cents per pound for copper,this would leave 24.275 cents per pound for 62 pounds per ton which would be $15.05 per ton ore.Less the above costs of $13.30 perton leaves $1.75 per ton for amortization of equipment, repayment of loans, and a profit.

It is estimated in reaching a production of one car per day or more from this property that $25,000.00 additional equipment and improved facilities will ultimately be used over a period of eighteen months in realizing the above costs.This will not be added all at one time but progressively as production is stepped up.The amortization over a period of two years will on, 72 pound copper ore per ton,slightly exceed one cent per pound of copper leaving less than 1.5 cents per pound or lessthan $1.00 per ton for loan repayments and profits,at 27 cents per pound for copper.

Increased equipment will be for larger hoists and skip,cars and track on each level,ore pockets on part of the levels,and larger headframe and ore bin facilities.

I have an initial quota No. 343 for this property which is a zero quota,effective date 2-1-42,

Will appreciate hearing from you at as early a date as possible in regard to this application for a 27-cent copper

price to enable us to immedeately start production of this material.

Very truly yours,

S.J.Landfair

S.J.Landfair,Owner and Manager
P.O.Box 426
Phoenix, Arizona

FORM WPB-2465
(5-31-43)

UNITED STATES OF AMERICA
WAR PRODUCTION BOARD

BUREAU OF THE BUDGET NO. 08-R332.1
APPROVAL EXPIRES APRIL 30, 1944

INFORMATION TO BE USED IN THE REVISION OF QUOTAS FOR NEW MINING OPERATIONS

TO: War Production Board, Washington, D. C.
ATTN: *The Executive Secretary of the Quota Committee*
Premium Price Plan for Copper, Lead and Zinc

INSTRUCTIONS - *One (1) original and three (3) copies* of this form are to be filled out and sent to the above address. The term "tons" means dry tons of 2,000 lbs. The term "mine" means any mine, group of mines, dump, or other source of primary metal-bearing material for which a quota is to be revised. (All new mining operations receive zero A quotas upon application. "Revision" as used herein refers to the establishment of B or C quotas for such mines.) Only those questions or parts of questions applicable to the operation to be described should be answered.

NAME OF MINE
The old Centurion Mine of Captain Copper Co.

LOCATION OF PROPERTY
Dragoon, Arizona

NAME OF COMPANY
Captain Copper Co.

LOCATION OF COMPANY
S.J.Landfair
Dragoon, Arizona

DATE
October 1 1943

1. DESCRIPTION OF PROPOSED OPERATION (DESCRIBE HERE IN GENERAL TERMS THE PROPOSED OPERATION, USING ONLY THE SPACE BELOW)

To mine copper ore from seven levels in a 660 foot shaft, aggregating approximately 8000 feet of underground development workings. To ship this copper ore to a custom copper furnace.

Present operation cleaning out old debris, fills, etc. from leasers operations which gutted out high grade ore. Also putting in new skip-way, ladderways, timbers etc. Old production shipped limited tonnages of 20 to 25% copper ore, Present operation may open ore bodies of high grade upon which cheaper productio may be obtained.

2. ORE RESERVE DATA AS OF THE MOST RECENT DATE AT WHICH ESTIMATED — DATE OF ESTIMATE

CLASSIFICATION	SHORT TONS	AVERAGE GRADE				
		OUNCES PER TON		PERCENT		
		GOLD	SILVER	ZINC	LEAD	COPPER
PROVEN		- - -	- - -	- -	- -	3.6
PROBABLE	50,000	- - -	- - -	- -	- -	

DESCRIBE IN THE BLANK SPACE ON THE LAST PAGE OF THIS FORM THE BASIS UPON WHICH THE ABOVE ORE RESERVE ESTIMATES WERE MADE, SUCH AS CHURN DRILL RESULTS, ASSAYS OF SAMPLES, OR SHIPMENTS OF ORE.

3. PRODUCTION ESTIMATES

ITEM	DATE	ITEM	SHORT TONS
A. STATE ESTIMATED DATE WHEN PRODUCTION WILL BEGIN As soon as bonus granted will start moving ore with present force.	11/1/43	C. STATE THE ESTIMATED MAXIMUM RATE OF PRODUCTION IN SHORT TONS PER 24-HOUR DAY, OF (1) DIRECT SMELTING ORE	50
DATE WHEN MAXIMUM PLANNED RATE OF PRODUCTION WILL BE OBTAINED May reach 1500 tons per month when larger equipment installed.	3/1/44	(2) MILLING ORE	none
ITEM	**NUMBER**	**ITEM**	**NUMBER**
B. HOW MANY MEN (MAXIMUM) WILL BE REQUIRED TO PREPARE MINE AND MILL FOR PRODUCTION? (1) UNDERGROUND Now working	4	D. HOW MANY MEN WILL BE REQUIRED? (1) UNDERGROUND	25
(2) SURFACE " " "	2	(2) SURFACE	5

3. PRODUCTION ESTIMATES - Continued

C. IF THE ORE IS TO BE SHIPPED DIRECT TO A SMELTER OR A CUSTOM MILL, STATE THE GRADE OF THE ORE TO BE SHIPPED IN THE TABLE BELOW: ATTACH A COPY OF A SETTLEMENT SHEET OR PURCHASE SCHEDULE OF THE SMELTER OR CUSTOM MILL.

ITEM	GRADE OF ORE
OUNCES GOLD PER TON	none
OUNCES SILVER PER TON	none
PERCENT ZINC	none
PERCENT LEAD	none
PERCENT COPPER	3.6%

D. IF THE ORE IS TO BE MILLED AT THE PROPERTY AND CONCENTRATES ARE TO BE SHIPPED, STATE IN THE TABLE BELOW THE ESTIMATED GRADES, RECOVERIES, AND SO FORTH, AND ENCLOSE A COPY OF A SETTLEMENT SHEET OR PURCHASE SCHEDULE OF THE SMELTER OR SMELTERS TO WHICH THE CONCENTRATES ARE TO BE SHIPPED.

ITEM	OUNCES PER TON		PERCENT		
	GOLD	SILVER	ZINC	LEAD	COPPER
CRUDE ORE GRADE	- - -	- - -	---	- -	3.6%
CONCENTRATE CONTENT ZINC CONCENTRATE					
LEAD CONCENTRATE					
COPPER CONCENTRATE					
MILL RECOVERY ZINC RECOVERY					
LEAD CONCENTRATE					
COPPER CONCENTRATE					

E. STATE IN THE TABLE BELOW THE TONS OF CONCENTRATES EXPECTED TO BE OBTAINED PER 100 TONS OF MILLING ORE MILLED.

ITEM	TONS
ZINC CONCENTRATE	none
LEAD CONCENTRATE	none
COPPER CONCENTRATE	none

F. STATE IN THE TABLE BELOW THE ESTIMATED CHARGES AND NET SMELTER OR MILL RETURNS PER TON OF DIRECT SMELTING ORE, OR ORE TO BE SHIPPED TO CUSTOM MILLS, OR PER TON OF CONCENTRATES. NET SMELTER OR CUSTOM MILL RETURNS MEANS THE NET MONEY PER TON TO BE REALIZED FOR THE ORE AFTER FREIGHT AND SMELTER OR MILL CHARGES, ROYALTIES AND OTHER DEDUCTIONS, *and does not include any premium payments either in the "A" range under zero quotas or in the other ranges.* THEREFORE, IF THE SUM OF THE FREIGHT AND SMELTER OR MILL CHARGES WILL BE GREATER THAN SMELTER OR MILL PAYMENTS, WITHOUT PREMIUM PAYMENTS, SHOW HOW MUCH GREATER THE CHARGES WILL BE. LABEL THIS AMOUNT "DEFICIT".

ITEM	FREIGHT CHARGES PER TON	SMELTER CHARGES PER TON	ROYALTY PER TON	NET SMELTER OR MILL RETURNS PER TON
DIRECT SMELTING ORE OR ORE TO BE SHIPPED TO CUSTOM MILLS	$ 1.80	$ 3.50	$ none	$ @.12 .90
COPPER CONCENTRATES				
LEAD CONCENTRATES				
ZINC CONCENTRATES				

4. COST ESTIMATE

A. INDICATE BELOW THE ESTIMATED OPERATING COSTS PER TON OF CRUDE ORE. THESE COSTS SHOULD NOT INCLUDE FREIGHT ON OUTGOING ORE OR CONCENTRATES, SMELTER CHARGES OR DEDUCTIONS, OR ROYALTIES.

ITEM	MILLING ORE	DIRECT SMELTING ORE OR ORE TO BE SHIPPED TO CUSTOM MILLS
EXPLORATION	$ none	$ 1.00
DEVELOPMENT	none	1.00
MINING	none	4.50
MILLING	none	none
OTHER (*Specify*)		
Trucking & Loading		1.00
TOTAL		7.50

B. ARE THE ORE BODIES IN A VEIN? ☐ YES ☒ NO

IF SO: Fissures & fractures in limestone off granits-schist contact.

WHAT IS THE AVERAGE STOPPING WIDTH?	Av. undetermined as yet Varys 1ft to 50 ft — FEET
HOW LONG ARE THE AVERAGE ORE BODIES?	Est. 7 ft 100 ft
IS THE DIP ☐ FLAT OR ☒ STEEP?	
ARE THE ORE BODIES IN BEDS ☐ YES ☒ NO IF SO:	
HOW THICK IS THE ORE IN THE BEDS	Fissures down to 1 ft up to 50 ft. — FEET, AVERAGE Est. 1 ft in fractures zones
IS THE MINE OPENED BY A SHAFT ☐ YES ☐ NO. IF SO:	
HOW DEEP IS THE SHAFT?	660 — FEET
HOW MANY WORKING LEVELS?	7 — NUMBER
IS THE MINE OPENED BY A TUNNEL? ☐ YES ☒ NO. IF SO:	
HOW LONG IS THE TUNNEL?	— FEET

WHAT METHOD OF MINING IS USED? (FOR EXAMPLE - SQUARE-SET, SHRINKAGE, CUT AND FILL) Cut & fill, shrinkage, small amount square set, narrower stopes open, supported by stulls

8. ARE THE ORES TO BE MINED MOSTLY OXIDIZED ORE? IF SO, STATE WHAT RECOVERIES ARE EXPECTED.

Yes, the ores are direct smelting silicious copper ores containing carbonates, silicates, and oxides,-no sulphides.
The only other gangue minerals besides silica are comparatively small percentages of limes and iron, both considered favorable copper fluxing materials.
Copies of Smelter returns on this grade of material are as follows:-
Attach Copies.

2.
Ore reserves were based on channel samples across the ore checked by shovel samples of material over hundreds of feet of old stopes and drifts excavated.
An old report:-See attached copy, showed nearly 160,000 tons of all classes of ore, averaging 2,7% copper by channel samples cut every 5 feet and over thicknesses up to over 60 feet.
This has been only partially opened and by cutting the widths down in some instances it is estimated to maintain a grade of 3.6% copper.

CERTIFICATION - THE UNDERSIGNED COMPANY, AND THE OFFICIAL EXECUTING THIS CERTIFICATION ON ITS BEHALF, HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REPORT IS CORRECT AND COMPLETE TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

Doing business under the name of

Captain Copper Co. (NAME OF COMPANY)

BY S.J.Landfair, Owner and Manager (SIGNATURE OF AUTHORIZED OFFICIAL)

October 15, 1943 (DATE)

(TITLE)

SECTION 35(A) OF THE UNITED STATES CRIMINAL CODE, 18 U.S.C. SEC. 80, MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

5. INVESTMENT ESTIMATES - SPECIFY UNDER THE GENERAL HEADINGS INDICATED ON THE FOLLOWING TABLE THE EXPECTED CASH INVESTMENTS REQUIRED. INCLUDE ONLY CASH INVESTMENTS SINCE JANUARY 1, 1942. OMIT CENTS.

ITEM	MADE TO DATE SINCE JANUARY 1, 1942	FURTHER ANTICIPATED[1]	TOTAL
EXPLORATION	- - -		
ORE-TESTING			
DEVELOPMENT (PHYSICAL WORKINGS ONLY)	Cleaning out and making accessible 8,000 ft of old workings preparatory to production through		
SAMPLING	Government (R.F.C.) Loan.		$5,000.00
MINING PLANT (GROUP IN GENERAL CATEGORIES)	If able to maintain the grade estimated expect to	put in larger skip and	
	hoist, cars and track on each level, ore pockets on	some of the	levels and
	larger bin and head frame to cheapen process of production.		
		Estimated	$25,000.00
TOTAL MINING PLANT	none		
MILLING PLANT (GROUP IN GENERAL CATEGORIES)			
TOTAL MILLING PLANT			
OTHER	none		
TOTAL OTHER	none		
TOTAL Accessibility Loan			

[1] *Amount necessary to reach rate of production described under 3-C above.*

6. FINANCIAL CONDITION - ATTACH TO THESE PAPERS A RECENT STATEMENT OF CURRENT ASSETS AND LIABILITIES. IF YOU HAVE AN RFC LOAN OR OTHER TYPES OF LOANS, STATE: No liabilities

AMOUNT YOU OWE ON LOAN	DOLLARS	WHEN DUE	DATE
Accessibility Loan	5000.00	Due from profits on production	

IF YOU HAVE ANY ORE STOCKPILED FOR SHIPMENT OR MILLING, STATE:

ESTIMATED TONNAGE OF SUCH ORE	TONNAGE	ESTIMATED AMOUNT YOU CAN REALIZE ON IT	DOLLARS

7. DO YOU OWN THE PROPERTY? ☒ YES ☐ NO IF NOT:

WHO OWNS IT?	DOES THE ROYALTY APPLY ON THE PURCHASE PRICE? ☐ YES ☐ NO. IF SO, STATE:	
	PURCHASE PRICE	DOLLARS: none

WHAT ROYALTY WILL YOU PAY?	% OF NET SMELTER RETURNS	IF OTHER BASIS, DESCRIBE
	none	none

CENTURION MINE

Introduction In the examination of a mining property, several factors are of great importance. First of these is the Physiographical location of the property to be examined for certain regions are productive of great wealth in minerals while others are not; secondly, a comparative study of the different mines occurring in the same geological region and thereby obtaining similar points of resemblance and applying comparative tests of these points to the property examined. Such a study brings out the conclusion that large ore bodies are formed under certain conditions and where similar conditions obtain, other large ore bodies may reasonably be expected. And finally, a study of the character of the ores occurring in the property examined, from which it may be determined whether the ore bodies will extend to great depths in the earth or are merely surface enrichments.

The conclusions reached in this report have been arrived at from such an analysis.

Physiographic Divisions of Arizona Geologists have divided the Territory of Arizona into three Physiographic Regions. The first of these, named the Plateau Region, occupies the Northeastern part of the Territory and extends on the North into Colorado. This Region is characterized by volcanic peaks overlooking a plateau surface, which is covered with masses of volcanic rocks.

The second Physiographic division, named the Mountain Region, adjoins the Plateau Region on the Southwest and extends across the Territory from the Northwest to the Southeast, having a width of from 70 to 150 miles. In this Region are found the large mines of Jerome, Miami, Globe, Clifton, Tombstone, Bisbee, and many smaller mines such as those at Johnson, Pearce, Gleeson and Courtland. As the Centurion Mine lies in the heart of this Mountain Region, it will be necessary to go into a little more detail concerning the Geology.

The reader interested in this report should bear in mind that this Region differs materially from the Volcanic Plateau Region to the North and is characterized by a number of mountain ranges with Northwest and Southeast trend, consisting mainly of limestones and quartzites resting upon schists and granites.

The schists are the oldest rocks of this Region, having been intruded and crystalized by granitic masses, which have thrown the schists out of their original position and scattered them, appearing now in patches over the whole Region and always found associated to some extent with the ore bodies of every mining camp of the Mountain Region. These schists are in general called the Pinal Schist.

The intrusive granite, next in age to the Pinal Schist, is variously named in the different mining camps, but it all comes under the general name Alaskite. Later in the age are quartzites and limestones resting unconformably upon the schists and granites. These alternate, the limestones having by far the greater thickness and make up the greater part of the Mountain ranges.

Into this granite, schist, quartzite, lime formation have been intruded dikes of Diabase and Basalt varying from an inch to several hundred feet in thickness.

Occupying the Southwestern part of Arizona in the third Physiographic Division, characterized by its vast deserts and named the Desert Region.

Location of the Centurion Mine The Centurion Mine is located in the Little Dragoon Mountains, a Northwest continuation of the Dragoon Range and about two Miles Northwest of the Southern Pacific Railway Station of Dragoon.

The Johnson Mining Camp, once a scene of busy activity through the production of copper by the Peabody Mine, lies three miles to the North. Twenty-five and forty miles, respectively, to the South are the famous camps of Tombstone and Bisbee. To the East, about twenty-five miles, is the Pearce Mine, which has had a large production in gold and silver. Northerly, about sixty miles, are the Clifton-Morenci Copper Mines and Northwesterly, approximately ninety miles, are the great copper camps of Globe and Miami.

In the immediate vicinity of the Centurion Mine, from two to three miles Northerly, are the Republic, Copper Chief, Empire, Black Prince and Peabody Mines. Easterly is the silver lead property (Ben X) of the Texas Arizona Mining Company. Immediately adjoining the Centurion on the South is the Higgins property, owned by the former owner of the Lowell Mine at Bisbee. A little further to the South is a large unprospected copper estate under bond to the Empire Copper Company.

Geology of the District Located in the heart of the Mountain Region, the geology of this district is the same as that of other parts of the Region.

A mass of granite, Alaskite, rising to the height of five hundred feet, occupies nearly the central part of the district, being the core of an anticline. Masses of Pinal Schist are found intimately associated with the granite, sometimes overlying it and at times entirely imbedded in it. The lines of separation between the schist and granite are very intricate due to the irregular invasion of the schists by the granite. The schists are found exposed only in patches on the surface. Resting upon the ragged edges of the schists, unconformably, is a belt of quartzite varying in thickness from a few inches to thirty feet. This quartzite is similar in appearance and occurrence to that at Bisbee and in this part of the Mountain Region is called the Bolsa Quartzite of Cambrian Geological Age. Resting upon the Bolsa Quartzite are beds of dark gray limestone. This is hard and compact and is fairly pure in calcarious material. In its upper part, it changes abruptly into a white granular limestone. This latter has an undetermined thickness, being for the most part covered with wash on the surface.

Because of the appearance of the gray lime and its relationship to the overlying white limestone, and, for the further reason that Devonian fossils have been found in it, I have assigned it to the Martin Limestone of Devonian Age, of the Bisbee District. If this classification is correct, the white limestone above is the Escabrosa Limestone of lower Carboniferous Age, also found in the Bisbee formation overlying Martin limestone.

This formation has been intruded by small dikes of Diabase and basalt. Limestone in contact with these dikes show great metamorphism. These dikes have accompanied or followed faults. Faults in the bedding plane of the stratified rocks are also in evidence. Such a faulting has caused planes of weakness in the rocks thus opening up channels for the ready flow of underground solutions.

In the schists and granites are countless small veins and seams of quartz, these carrying small values in gold, silver, copper, lead, tungsten and zinc. These,

occupying crevices previously caused by faulting and fissuring. Erosion has carried a great deal of this mineralized material to the gulches where it has been concentrated in placer deposits. The chief deposits of economic importance are tungsten, which have been worked for a number of years, and have produced several hundred thousand dollars in tungsten ore, principally Hubnerite and Wolframite.

The small veins have been worked to some extent and have produced marketable ores.

The granitic core is surrounded on every side by low granite hills. The outer rim is covered with stratified rocks. On this outer rim, to the East, is located the Centurion Mine. The West part of the hill in which this mine occurs is granite, while the East part of the hill is made up of schists, quartzites and limestones. The limestones have a strike of nearly East and West at the mine, dipping South at an angle of about 40 degrees under the surface wash. The surface of this wash has a gentle slope toward the town of Dragoon, affording an excellent road to the railroad station.

THE CENTURION MINE

History The honor and merit of the discovery and location of the Centurion Mine are due to J. P. Richardson, who had been previously employed by the Copper Queen Mining Company as Construction Foreman. While thus engaged, he made a study of the Geology of the Bisbee formation and the requisites necessary for the production of copper metal. While thus engaged, at a lucrative salary, he became imbued with a desire to own a mine of his own. Setting out as a prospector, after years of hardship, he was led to the Johnson Mining District. Not being fully satisfied there, he continued his exploration further South, near Dragoon, where he found a white lime formation overlying schist, similar to that at Bisbee. Here he located the claims which now give so much reality and promise to the Centurion Mining Company.

Development Development consisted of sinking a prospect hole in the copper stained limestone, near the contact, a depth of 45 feet, broke into a large ore body. Continued sinking, a depth of 125 ft. was reached. Cross cutting from this level to the lime schist contact, ore was again encountered and a drift was run along this contact for a distance of 125 feet in ore.

Continued sinking, reached a depth of 225 feet and from this point cross cuts were run to the ore near the contact, which was opened up by drifts and raises for a length of 160 feet. The ore opened up by three levels was of a good smelting grade. Some of the best of it was assorted and sent to smelters at Douglas. Reaching the 325 foot point, the ore was again opened up by cross cuts and drifts for a length of 150 feet, the ore being of practically the same grade as that above. The shaft was then continued to the depth of 425 feet. Cross cuts were run to the ore, which was proven for a length of 200 feet. This ore showed a great improvement in values over that in levels above. The width of the ore shoots had also increased from a maximum width of 20 feet on the levels above to a maximum width of 62 feet on the 425 foot level. Sinking was resumed to the present depth of 525 feet.

Cross cuts are now being run to the contact on the 525 foot level. One of these has cut a small stringer of copper ore, showing a much better grade of copper. This stringer is merely an offshoot of the main ore body, which has not yet been reached.

This development work has shown the large ore bodies to occur in the limestone formation close to its contact with quartzite and schist. They occur as the fillings of irregular chambers in the limestone. These chambers are, in general, lenticular in shape. Most of these are entirely filled with ore, some partially showing as caves, while one large cave has very little ore in it. All of these are connected with seams of ore varying in thickness from a few inches to several feet. Some of the partially filled caves can be followed for a considerable distance, passing from one cave to another through crevices in the limestone. Such a condition arises primarily from the formation having been greatly disturbed resulting in the excessive faulting. The most noticeable fault plane is one caused by the limestone slipping on the quartzite. This is a bedded fault plane and is parallel to the dip of the formation. Other faults have occurred, which are diagonal to the dip of the formation. This latter system of faults has been caused by the intrusion of dikes of diabase, none of which have been found up to this time in the Centurion Mine, but which further development will undoubtedly prove as they have been found on the surface in the near vicinity of the property.

These faults have fractured the earth's crust to great depths and are directly responsible for the existing ore deposits. In the first place, being lines of weakness in the earth, they have served as channels for the flow of underground solutions. These solutions attach the more easily decomposable rocks, such as the limestones, removing the material of the rock as it is broken down and leaving chambers for ore deposition. The solutions were hot and mineral bearing, having taken their mineral from the underlying granite and their action was slow. Eating into the limestone, a chemical action took place, which caused the solution to deposit its mineral content in place of the rock removed.

In the Bisbee Mines we find the ore bodies as lenticular masses in the Calcarious, Devonian and Carboniferous Limestones, occurring in close proximity and occasionally in fault planes. So also in the Globe mines, where the ore bodies occur in the fairly pure Devonian and Carboniferous limestone near fault planes. Many other mines of South Eastern Arizona could be cited, which bear out this important fact.

Such an action has taken place in the property of the Centurion Mining Company.

Character of the Ores Solutions following planes of weakness in the earth's crust may decompose and remove existing ore bodies. Transporting these they will redeposit them in places offering proper mechanical and chemical accommodation.

The original ore bodies are called primary while the latter are secondary.

It is of prime importance to determine whether an ore body is primary or secondary in its origin. This readily can be determined from the character of the ore and its occurrence or non-occurrence with other minerals.

The primary ore of copper is Chalcopyrite or Copper Sulphide. This is always accompanied with more or less Pyrite, a sulphide iron.

The principal secondary ores of copper are Azurite, and Malachite, carbonates of copper and Cuprite or copper oxide, while the secondary ores of iron are Hematite and Limonite.

A solution, in conjunction with oxygen from the atmosphere, attacking Chalcopyrite and Pyrite to primary ores of copper and iron would break them down or oxidize them. In this chemical change, the copper would readily go into solution as a copper sulphate, while the iron would not so readily go into solution. A part of the copper would be gradually transported from its original position to be redeposited in its secondary form, without the iron, in a new receptacle. Another part of the copper would never get out of its original receptacle, being redeposited there in its secondary form with the iron, which has been changed from Pyrite to Hematite.

In the upper workings of the Centurion Mine, we find large bodies of Hematite and Limonite, the iron oxides. These are loose, filling caves and fissures in the limestone. With this iron oxide, occurs copper in the form principally of Malachite and Chrysocolla. This occurs as both fine particles intimately mixed with the iron and as lenses large and small occupying considerable space with the iron oxide.

The 425 foot level, which are the deepest workings in ore at the present time, show a greater proportion of copper to iron than in the levels above and this is so clearly demonstrated as to prove that the ore body is becoming richer with depth. From the above association of iron oxide with secondary copper ores, I have derived the following conclusion.

The ore bodies of the Centurion Mine were originally laid down from circulating mineralized waters of deep seated origin by a process of metasomatic replacement in contemporaneously formed chambers in the limestone as copper sulphide and iron sulphide ores. In a later period of the earth's history, descending waters in connection with the oxygen of the atmosphere, oxidized these ores and removed the greater part of the copper content, but not all, leaving some copper in a secondary form with the iron oxides. A part of the copper must have been taken away laterally redepositing in seams and stringers, but by far, the greater part was taken directly downward along the original planes of weakness, where they have been redeposited.

The upper crust of the earth, in which such an action has taken place is called the zone of oxidation. In the arid regions of Southeastern Arizona, this zone of oxidation often extends to the depth of 1,000 feet. As may be inferred, this zone lies above the present level of the underground water. It may also be inferred that in the lower part of this zone, the oxidation is less complete as water level is approached.

In the mines at Bisbee the oxidized some extended over the depth of 1,000 feet though spots of sulphide ores were found close to the surface. In the Old Dominion Mine at Globe, complete oxidation of the ores prevailed to the depth of 700 feet. In this mine, as in the Centurion, were found large bodies of Hematite and Limonite in the upper workings. Complete oxidation will not go so deeply in the Centurion Mine as in the Old Dominion. This statement is based on the fact of the decided improvement in the ores found on the 425 foot level, where the ore, for the most part is Chrysocolla, which form of copper is usually found on approaching the lower part of the oxidized zone.

Some Cuprite, a form of copper usually occurring lower yet in the oxide zone, has been found in the stringer of the 525 foot level. From this, I conclude that the zone of richer ores is being rapidly approached.

Smelting Sufficient ore has been developed to run a 100 ton smelting plant for several years.

As stated before, the copper content is intimately mixed with masses of iron oxide. This iron oxide is of great value to the company in smelting for it furnishes a part of the base with which to smelt copper.

Having sufficient ore combined with a natural smelting base, it seems at first thought, that the Company should at once erect a smelting plant of at least 100 tons capacity.

On the other hand, the ore is becoming richer with depth. Exceedingly rich copper ore may be found at any time in the near future. These richer ores can be smelted on the same iron base as the lower grade ores. Better yet to mix the high grade ores with the very low grade, making a medium grade product and thereby in smelting get the full benefit of the existing iron. In other words, get the full benefit from this natural resource and not allow it to be wasted through hurry to make the mine yield immediate revenue. Patience must be used in developing a copper mine.

I should advise the continuation of the present excellent system, that of continued sinking just as soon as the ore body is developed on the lowest level. Such a policy should be carried out until the high grade ores are reached. This policy has multiplied the value of the money already spent by twenty times at least, in the present value of the mine in ore now blocked out. Hold to this good system for the present and leave the smelter problem to the not far distant future.

Value of the Ore Reserve In estimating the value of the ore reserves of the Centurion Mine, I have met with difficulty on account of the irregularity of the ore bodies. A survey shows two main systems of large ore bodies occurring 120 feet apart, but connected with smaller ore bodies occurring between.

A careful estimate of the contents of these ore bodies opened up on two sides, i.e., by levels above and below, from the surface to the shaft depth of 425 feet, gives me an ore content of 71,214 tons.

Samples taken from every five feet across these ore bodies give me an average assay value of 2.7 per cent copper; at 13 cents per pound this ore has a gross value of $499,922.28. One system of ore bodies, that in the most Westerly part of the mine, has been opened up to a shaft depth of only 225 feet. Allowing this to be continuous to the shaft depth of 425 feet, of which there is very little doubt, there will be an additional reserve of ore of 33,429 tons, which with a copper content of 2.7 percent, and copper at 13 cents per pound, will have a gross value of $234,671.58.

This gives a total gross value of the ore above the 425 foot shaft depth of $734,593.86.

Probable Ore Reserve At the 525 foot shaft depth a cross cut is being run to the contact to cut the ore body. This will undoubtedly open up the ore bodies occurring above, but at this time, their size cannot be determined. On the 425 foot level the ore bodies had greatly increased in size. In case they maintain this size to the 525 foot level, there is an additional reserve of ore between these two levels of 54,054 tons. This ought to have a better value than that above, but containing 2.7 percent copper at 13 cents per pound, it will have a gross value of $379,459.08.

The total of the value of the ore reserves and probable ore reserves is 158,697 tons of 2.7 per cent copper ore, which, with copper at 13 cents per pound, gives a gross value of $1,114,152.94.

Prospective Value On the surface seams of copper ore are found along the contact in places for a distance of over 1,000 feet. These are indicators of ore bodies below. The facts of drifts run, are in ore, indicating that the length of ore deposition has not yet been determined.

The ore bodies, having been persistent to the present depth, will go on to great depth. Present workings have opened up the leached oxidized zone only.

Deeper workings will open up the lower oxidized zone, one of secondary enrichment, which will furnish much high grade copper ore and a far better low grade product.

It is impossible to place a value on these prospective ores, but they will be of many times greater value than the ores so far developed.

Equipment The mine is, at present, provided with a 15 h.p. Fairbanks Morse Hoist operating skip. This hoist has done good work, having carried the mine to a depth of 525 feet. It is good for a further depth with a lighter load, but it would be good policy to install a hoist of greater power for deeper work.

The mine is further equipped with an engine room, blacksmith shop, storage house and surface ore bins. The Company also has a good dwelling house of four rooms, in which is located the office. Back of this are the stable and corral.

Employees of the mine for the most part live in their own homes on the Company's ground.

Water Abundance of good water for present needs is obtained from wells on a mill site owned by the Company. This millsite is located in the granite about a mile to the Southwest of the Mine. The yield of water from this can be greatly increased by a little further development.

Wood and Timber Firewood is obtained from the scrubby timber growing in the nearby mountains. Its cost varies from five to six dollars a cord. Sawed timbers can be laid down at Dragoon Station at a cost of from $35.00 to $40.00 per 1,000 feet.

Conclusion Copper mining is the surest and safest of all forms of mining for the reason that large primary ore bodies are persistent with depth. The ore bodies of the Centurion Mine are primary and will go deep, getting better with depth. No fear should be entertained because of the fact that the greater part of the ore now developed is leached and of low grade.

The conditions for the deposition of ore in this mine are identical with the conditions for mineral enrichment found in the mines of Bisbee, Globe, Clifton and other mines of Southeastern Arizona.

No new lines of development can be suggested. The method followed so far should guide the work of the immediate future. A suggestion, which will save some money for the Company is this: Only one cross cut should be run to the ore bodies on new levels and drifts from this.

A new vertical shaft should not be started at this time. Surveys show that the present incline shaft fortunately remains close to the ore for its entire length. Its sinking has been comparatively cheap. Passing for its greater length through the easily worked limestone, and requiring no timber and at the same time keeping close to the ore deposits yet entirely away from them, this shaft should be of service for a further depth of several hundred feet.

A hoist of greater power and a large skip, which will hold a load of at least one ton, will be required. The hoist should be a Fairbanks Morse of at least 25 h.p.

And finally, I would advise the early installation of a 10 x 12 Ingersoll Rand Air Compressor. This in no way should be run with the hoist, but entirely separate. It will require a 30 h.p. engine. This will be sufficient to operate five 2-1/4 Sullivan Machine Drills and with these the rapidity of mine development can be greatly increased.

/Sgd/ JAMES R. HUBBARD
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