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PRINTED: 03/22/2002

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: MORNING STAR PROPERTY

ALTERNATE NAMES:
FORTUNA
HAPPY THOT
GOLD BUG
GENERAL HANCOCK
CARELESS
EWING PROPERTY

PINAL COUNTY MILS NUMBER: 709B

LOCATION: TOWNSHIP 10 S RANGE 16 E SECTION 20 QUARTER NW
LATITUDE: N 32DEG 30MIN 55SEC LONGITUDE: W 110DEG 44MIN 15SEC
TOPO MAP NAME: CAMPO BONITO - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:
TUNGSTEN
COPPER SULFIDE
LEAD SULFIDE

BIBLIOGRAPHY:
ADMMR MORNING STAR MINE FILE
DALE, V.B., TUNGSTEN DEPOSITS OF YUMA, MARICOPA, PINAL AND GRAHAM COUNTIES ARIZ. USBM RI 5516, P. 52-61
USAEC PRELIM RECONN REPT. 172-488, 1953,P. 39
WILSON, E.D. TUNGSTEN DEPOSITS OF AZ. AZBM 148, 1941, P. 33
AZBM BULL. 180 P. 280
ADMMR U FILE PINAL W-2

07/22/88

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

PRIMARY NAME: MORNING STAR PROPERTY

ALTERNATE NAMES:
FORTUNA
HAPPY THOT
GOLD BUG
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AZBM BULL. 180 P. 280
ADMMR U FILE PINAL W-2
ADMMR FILE

REFERENCES:

SEE: USBM RI 5516 1959 pp-53 (map) (Careless Claim)
Also pp-53(map) (General Hancock Claim)
Also pp-53 (map) (Gold Bug)

Also pp-53 (map) (Happy Thot)

SEE: USBM RI 5516 1959 pp-49, 53-54, 56, 61-65

ABM Bull. 180, p. ~~314~~ 28

ABM Bull 148 p. 33

Cuox Mining, Inc. (file)

MAPS - Upstairs in the ABM rolled file boxes - 1 claim map
See Bonita Group of Mines See also Cross-Town Mill-site Claim

NAME OF MINE: MORNING STAR
(FORMERLY FORTUNA)

COUNTY: PINAL
DISTRICT: OLD HAT
METALS: W

OPERATOR AND ADDRESS:		MINE STATUS	
DATE:		DATE:	
5/1/44	H. G. Henderson, Oracle L. M. Forcey, Box 23, Oracle Manpower survey 8 men	5/1/44 2/45	Shipping Contract Settlement Claim

MORNING STAR GROUP

Au, Wo

Pinal 11 - 4 T 10 S, R 16 E

Mrs. Eliz. Lambert Wood, Oracle, '44

FORCEY, L. M.
~~P. O. Box 23~~
~~Oracle, Arizona~~

114 W. Fifth St.
Santa Ana, Calif.

See MORNING STAR - re claim against Govt. 12-5-44

MORNING STAR

Wo, Cu, Pb

Pinal 11 - 4 T 10 S, R 16 E

Elizabeth Lambert
Mrs. Wood, Oracle '42

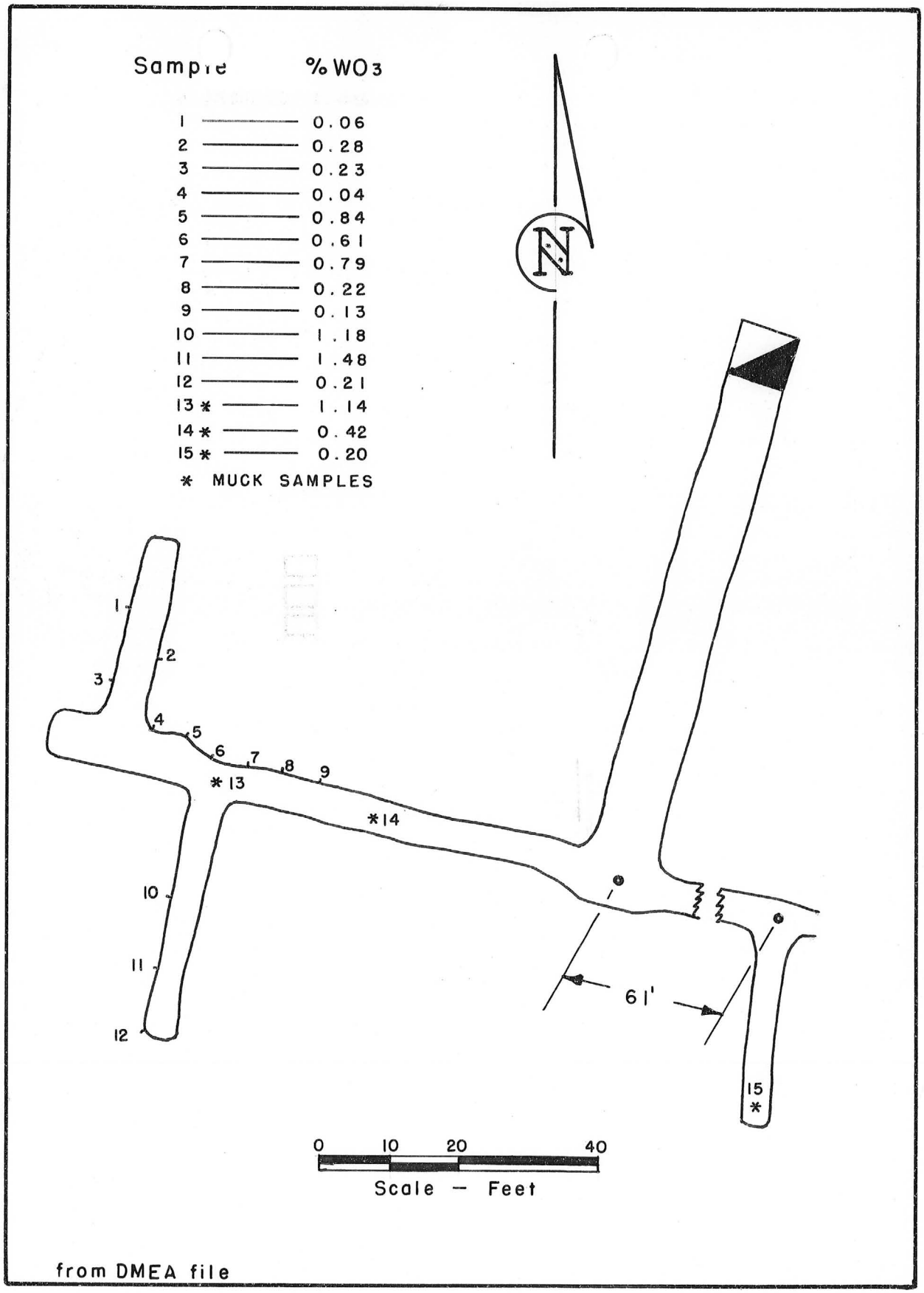


Figure 26 Assay map, 100 level - Morning Star tungsten mine

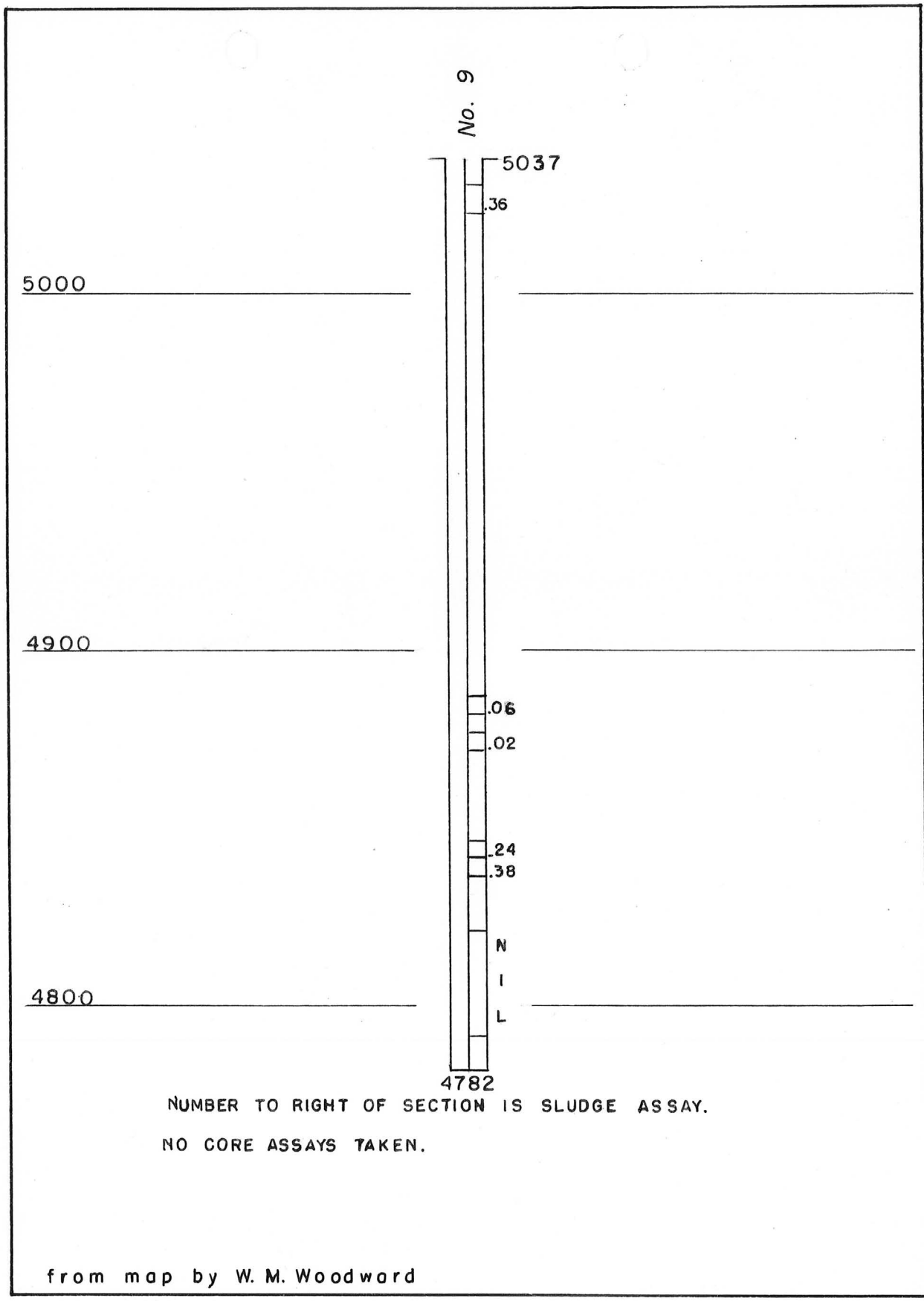


Figure 27 Drill hole cross-section, Morning Star claim, Pinal County, Arizona

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine: Morning Star - Maufina group

Date: October 12, 1973

District: Yavapai County

Engineer: Glen Walker

Subject:

Recent owner not mentioned in file. RI 5516 gives good description. The contact metamorphic scheelite ore is 50' wide by at least 200' long. Granite is on FW and siliceous limestone on HW. Some higrade streaks up to 2-3' wide have produced some tonnage of 1.75% WO_3; most ore has assayed 0.7% WO_3.

DE[illegible]TMENT OF MINERAL RES[illegible]
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Morningstar Mine Date Sept. 13, 1956

District Old Hat District ---Pinal Co. Engineer

Subject: Mine Report, Present Status ----- Information from Don K. Lieberman.

For Location and Owners, see my report of Sept. 2, 1954.

For Lessees, see my report of Nov. 30 & Dec. 30, 1955.

Sublessees & Operators Don Lieberman Enterprises, 1500 W. Ajo Way, Tucson, Ariz. This company operated the mine during the latter part of ~~a~~ 1955 and first part of 1956. Operations were suspended last spring. Uncertainty of the market for tungsten was given as the reason for ~~xxxx~~ closing the mine.

I contacted Mr. Lieberman on Sept. 13, 1956, and inquired regarding possible future resumption of mining operations at the Morningstar. Mr. Lieberman reported difficulties with the Nikas Mining Co., and stated that he will not operate the Morningstar as a sublessee of the Nikas Mining Co., but is willing to negotiate a direct lease with Mrs. Elizabeth Lambert Wood and the Tucson Y. M. C. A., the owners of the property, if some way can be found to satisfy the Nikas Mining Co. interests.

Principal Minerals Tungsten ore in the form of scheelite.

Production Rate None, Mine is closed down.

Other Informations See previous reports on this property.

See 2 maps in brown cabinet - Section #5

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Morningstar Mine Date Nov. 30, 1955 & Dec. 30, 1955

District Old Hat District ---- Pinal Co. Engineer Axel L. Johnson

Subject: Mine Report --- Personal Visit and information from Arthur Zappia, Mine Foreman.

For Location and Owners, see my report of Sept. 2, 1954.

Lessees Nikas Mining Co., composed of the following parties ----- Tom D. Calles, A. Nikas, John Gekas, Mike Cotageorge, and John Paulos. Lease provides for a 10 % royalty. It is a 5 year lease with a provision for renewing an additional 5 years.

Sub-Lessees and Operators Don Lieberman Enterprises, 1500 W. Ajo Way, Tucson, Ariz.

Officers Don K. Lieberman, Pres. and Manager, 1500 W. Ajo Way, Tucson, Arizona.
Arthur Zappia, Mine Foreman, 650 S. 4th Ave., Tucson, Arizona.

Principal Minerals Tungsten ore in the form of scheelite.

Number of Men Employed 5 men

Production Rate About 30 tons per day, when stoping ore. However, stoping operations have been intermittent due to necessary repair work and also development work. Average production will, probably, not be more than about 15 tons per day.

Ore Values Mr. Zappia, mine foreman, estimates that the ore is averaging about 1.0 %.

Geology, Ore in Sight and Probable Ore See my report of Sept. 2, 1954.

Milling and Marketing Facilities Ore produced is trucked to the Lieberman Mill at 1500 W. Ajo Way, Tucson, Ariz., owned by the Don Lieberman Enterprises, and milled there. See report of the Lieberman Mill under date of June 17, 1955 for milling operations on the Morningstar ore.

Present Operations Stoping ore from the sides and top of a tunnel, running through the ore vein. Also some repair work and development work.

Mine Workings See my report of Sept. 2, 1954.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Morningstar Mine — Date July 7, 1955

District Old Hat District ---- ~~Pima~~ PINAL County — Engineer Axel L. Johnson

Subject: Mine Report ---- Personal Visit and information from Tom D. Calles, mine foreman.

For Location and Owners see my report of Sept. 2, 1954.

Lessees and Operators Nikas Mining Co. ----composed of the following parties ---- Tom D. Calles, A. Nikas, John Gekas, Mike Cotageorge, and John Paulos.
Lease provides for a 10 % straight royalty. It is a 5 year lease with provision to renew for an additional 5 years.
The White Mountain Mining and Milling Co., who purchased the lease from the Nikas Mining Co. last year and built a dry electrostatic mill to treat the ore, defaulted on their contract ~~to the Nikas Mining Co.~~ and the lease went back to the Nikas Mining Co.

Officers Tom D. Calles, Mine Foreman.

Principal Minerals Tungsten ore in the form of scheelite.

Number of Men Employed 2 to 3 men. Men working only about 1/2 of the time on account of the fact that the Lieberman Mill in Tucson is not able to mill their ore as fast as it is being produced.

Production Rate About 15 to 20 tons per day, when the mine is operated (about 1/2 of the time.) Production has been about 50 tons per week, or a little over 200 tons per month. 600 to 700 tons have been produced in the past 3 months.

Ore Values Ore produced the past 3 months has averaged about 0.88 % WO_3.

Geology, Ore in Sight and Probable Ore See my report of Sept. 2, 1954.

Milling and Marketing Facilities Ore produced is trucked to the Lieberman mill in Tucson. Don lieberman Enterprises have been their scheduled prices for this ore, viz.: 1.5 % --- to 2.0 % ------ $34 per unit; 1.0 % --- to 1.5 % ------ $30 per unit; 0.6 % --- to 1.0 % ------ $26.50 per unit; No pay for ore assaying below 0.6 %. Mr. Calles reports that now Don Lieberman Enterprises wants to pay for same on a recovery basis. He estimates that the recovery has been about 75 %. As a result of this, Mr. Calles took 20 tons of ore to the Fernstrom mill in Tucson for a test to see what his mill could do. This ore assayed 1.75 %, and only 290 lbs. of concentrates was obtained assaying 44.3 %, and after 40 lbs. of iron was removed from same, the product assayed 51.4 %. This would mean a recovery of less than 20 %, according to the figures given by Mr. Calles. As a result, Mr. Calles says that he will continue to sell the ore to Don Lieberman Enterprises.

Present Operations Stoping ore from tunnel, running along the ore vein. Mr. Calles reports that they are paying royalties to the government for the D. M. E. A. exploration work done there in 1952 and 1953, although the ore produced now is not in the area that was developed by the D. M. E. A. exploration work.

History of the White Mountain Mining and Milling Co. operations This company attempted to mill the ore in their dry electrostatic mill, which they constructed about 1 1/2 miles from the mine, and to sell the concentrates to Bishop. Mr. Calles reports that most of the concentrates from the mill ran only from 4 1/2 to 19 %, with a small amount running 34 %, and that this company lost money on their operations. The mill still stands intact, with the Nikas Mining Co. having a lien on same for labor and unpaid royalties.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT
Page 1.

Mine Morning Star Mine Date Sept. 2, 1954

District Old Hat District ---- Pinal Co. Engineer Axel L. Johnson

Subject: Field Engineers Report --- Information from Dave McCconnell and Personal Visit.

Location 7 miles south of Oracle. Take Mt. Lemmon Road south from Oracle for a distance of 5 miles. Turn right at Y. M. C. A. camp and go west 3/4 mile to mill and an additional 1 1/2 miles to the mine.

Owners The Tucson Y. M. C. A. holds the deed to the property. The former owner, Mrs. Elizabeth Lambert Wood, Long Beach, Wash., deeded the property to the Tucson Y. M. C. A., retaining for herself, however, a life time right to all the royalties and proceeds from the property. After the death of Mrs. Wood, the Tucson Y. M. C. A. will be in full possession of the property. Mr. Clermont D. Loper is Secretary of the Tucson Y. M. C. A.

Lessees and Operators White Mountain Mining and Milling Co., (David P. McConnell,1/3 interest; Dan V. O'Flaherty,1/3 interest; heirs of 3rd party, 1/3 interest). Box 25, Oracle, Ariz. This company purchased previous lease of Nikas Mining Co. on royalty payments, agreeing to pay to the Nikas Mining Co. 15 % royalty on gross shipments of tungsten ore until agreed purchase price is paid off; Nikas Mining Co.,in the meanwhile, paying their 10 % royalty to Mrs. Wood and also royalties to the DMEA as payments on the exploration loan.

Officers David P McConnell --- Mill Superintendent.
Dan V O'Flaherty --- Business Manager and General Superintendent.
Tom Calles --- Mine Foreman.

Metals and Minerals Tungsten ore in the form of scheelite.

Men Employed 7 men --- 3 men at the mine drifting --- 4 men at the mill on mill construction.

Production Rate Very little ore production to date. A drift is being driven, and the ore from this drift is being stockpiled at the mill for future milling.

Geology Contact metamorphic deposit in limestone rock, adjacent to a granite intrusion. Footwall is granite on the granite-limestone contact. Hanging wall is silicified limestone. Ore shoot dips about 45 degrees south-west and strikes N 75 W. Length and width of ore deposition is variable. Length from 125 to 200 ft. Width about 50 ft.

Ore Values Previous mining operations have produced ore of an average value of 1.1 % WO_3. Ore developed by the DMEA loan exploration was of much lower grade averaging about 0.5 %. Ore in the drift on the shaft level runs about 0.7 %. Ore in a new drift being driven on the 50 ft. level is estimated to run 1.0 %. Operators estimate that their average mill run will be about 0.7 %

Ore in Sight Operators estimate 17,000 tons of ore blocked out. 14,000 of this is on the 110 ft. level developed by the DMEA loan, which runs about 0.5 %, and 3,000 tons is on the zero and the 50 ft. levels, and below the old open cut.

Probable Ore About 50,000 tons.

Mine Morning Star Mine Date Sept. 2, 1954.

District Old Hat District ---- Pinal Co. Engineer Axel L. Johnson

Subject: Field Engineers Report --- Information from Dave McConnell and Personal Visit.

Milling Facilities The operators are now constructing a dry mill about 1 1/2 miles east of the mine and about 3/4 mile west of the Y.M.C.A. camp. The mill construction was started about Aug. 1st, and the mill is scheduled to be completed about Oct. 15th. The mill will be of 50 tons per day capacity, its outstanding features being a roaster, dry grinding by impact mills, and two elecro-static (dry) tables, called McConnell Separators. The mine run ore will be dumped into a 25 ton primary ore bin, then crushed by a jaw crusher to minus 1 inch, then carried by means of a belt conveyor to a 30 ton secondary ore bin, and from there going to a hood roaster where it is roasted at a temperature of 1400 deg. F. The roasting is said to be necessary to remove the $CaCO_3$ coating from the scheelite crystals, the scheelite being tightly locked within a coating of lime. Roasting changes the $CaCO_3$ to Ca O, which is liberated, releasing the scheelite. From the roaster, the ore will be carried by means of an oscillating pan conveyor to a 50 ton ore bin. From this ore bin, the ore will pass to three impact mills, followed by a cyclone dust collector and a screen classifier, reducing the ore by these processes to a minus 50 mesh. The ore will then go to a 20 ton fine ore bin, and from there fed to 2 electro-static tables (McConnell Separators), which will take out the gangue material and all the impurities, producing a plus 60 % concentrate.

General Features of the electro-static tables (McConnell Separators) --(Smaller Table Described)

The ore is fed into 15 mahogany troughs, 1 3/4 inches wide, running lengthwise with the table, with spaces in between these troughs for the deposition of the waste materials. The shaking motion of the table carries the ore in the troughs and the resulting waste between the troughs from one end of the table to the other.

Above these ore troughs, supported by iron frames, are 4 plastic plates (plexoglass), each plate being 42 in. x 72 in. x 1/4 in. in thickness, and placed so that there is approximately 1 inch distance between the top of the mahogany ore troughs and the bottom of the plexoglass, this distance being adjustable according to results desired.

8 foam rubber electro-static brushes, each about 3 in. x 3 in. x 42 in. in length are moved over each of the 4 plexoglass plates, the brushes being held in their proper places and moved over the plexoglass by means of being attached to an endless chain drive, driven by a 1/2 H. P. variable speed electric motor. The movement is from one side of the table to the opposite side. The brushes are spaced from 10 to 12 inches apart, and are alternately negative and positive brushes. The negative brushes are made entirely of foam rubber and create a static charge of electricity in the plexiglass when moved over same. The positive brushes are made out of foam rubber impregnated with zinc, having also a wire screen inside, and releases the static charge of electricity in the plexiglass when moved over it. When a portion of the plexoglass has been charged with electrostatic electricity, this charge lifts a portion of the waste particles from the ore trough and deposits them on the bottom of the plexoglass. Later on, when this electrostatic charge has been released by a positive brush, these waste particles are released from the plexoglass and fall into the space between the ore troughs and is carried away as tailings. Owing tothe gradual release of the electrostatic charge, these waste particles drop down to the table at an angle into the waste space below. (See sketch of same on page 4 below flow sheet).

Mine Morning Star Mine Date Sept. 2, 1954.

District Old Hat District --- Pinal Co. Engineer Axel L. Johnson

Subject: Field Engineers Report --- Information from Dave McConnell and Personal Visit.

The amount of electro-static charge or potential in the plexoglass is regulated and controlled by (a) speed of the movement of the brushes over the glass, (b) the amount of pressure of the brushes on the glass, and (c) the distance between the negative and positive brushes. The affinity of the waste particles for the electro-static charge can also be regulated by an adjustment of the distance between the glass and the ore troughs below.

The table is divided into 4 equal sections, each section having one sheet of plexoglass 42 in. x 72 in. x 1/4 in., with one set of 8 brushes moving over same. As a general rule, the first section of the table, using a light electro-static charge, picks up most of the lime; the second section, using a greater charge or potential, removes the lime silicates; the third section, using a still greater charge, picks up hematite, magnetite, epidote and garnet; and the fourth section, removes the silica. The scheelite, not being attracted by the amount of electro-static charge produced, remains in the ore troughs, and is removed from same as concentrates; while the waste materials, picked up by the charge and dropped in the spaces between the ore troughs, is removed as tailings. The amount of electro-static charge required to lift a particle is not dependent on the gravity of the particle.

The second table being installed is larger than the first table. The first table, described above is 5 ft. x 18 ft. with 4 sheets of plexoglass each 42 in. x 72 in., while the second table will be 7 1/2 ft. x 20 ft. with 4 sheets of glass each 48 in. x 102 in. Except for size, the tables will have similar construction. The capacity of the small table is about 1 1/4 ton per hour, and that of the large table about 2 tons per hour.

Tables are manufactured by the Electronic Appliance Mfg. Manufacturing Co., of Los Angeles, Calif,, and are sold by the McConnell Separator Co., Star Route Laws, Bishop, Cal. This company also manufactures roasters and impact mills. The cost of the tables are $8,000 apiece.

This table was operated at Bishop, Calif. for cleaning tungsten concentrates. Mr. McConnell operated same and cleaned concentrates for the Molybdenum Corp. of America, C. W. Jones, and Milton Gee. He also milled some ore. A mill test was made at Bishop, on the Morning Star ore, using the McConnell Separator. A 10 ton sample was milled, and a 63 % concentrate was produced with a 76 % recovery.

According to Mr. McConnell, this table is superior to the standard table on (a) ores containing lead and copper sulphides, garnet and epidote and heavy penalty minerals, which can not be separated readily with the standard table, and (b) ores that have to be ground very fine, and will slime on the standard table.. (He admits that some ores can be milled better on the standard tables) Another advantage of this table is, of course, that it does not require water to operate, and can be used where there is no water available.

Mining Operations Drifting, making 5 ft. per day. Ore stockpiled at the mill. Mining operations were started about July 1st. Drift in 55 ft. with last 20 ft. in good ore.

Mine Workings (1) 1 shaft incl 45 deg.--- 110 ft. deep put down by DMEA.loan.

(2) 330 ft. of drifts and crosscuts from shaft on the 110 ft. level, 200 ft. of this being in ore, averaging about 0,5 %. (DMEA work)

(3) Big open cut with a 200 ft. drift. No ore in the drift. Some ore in the bottom of the open cut.

(4) One drift on zero level (shaft level) started 55 ft. from shaft. This drift is 30 ft. long, with stope, stoped out 2 yrs. ago. Has ore in drift aver. about 0.7 %.

(5) One drift, being driven now, on the 50 ft. level is now in 55 ft., with last 20 ft. in good ore, estimated to run about 1 %.

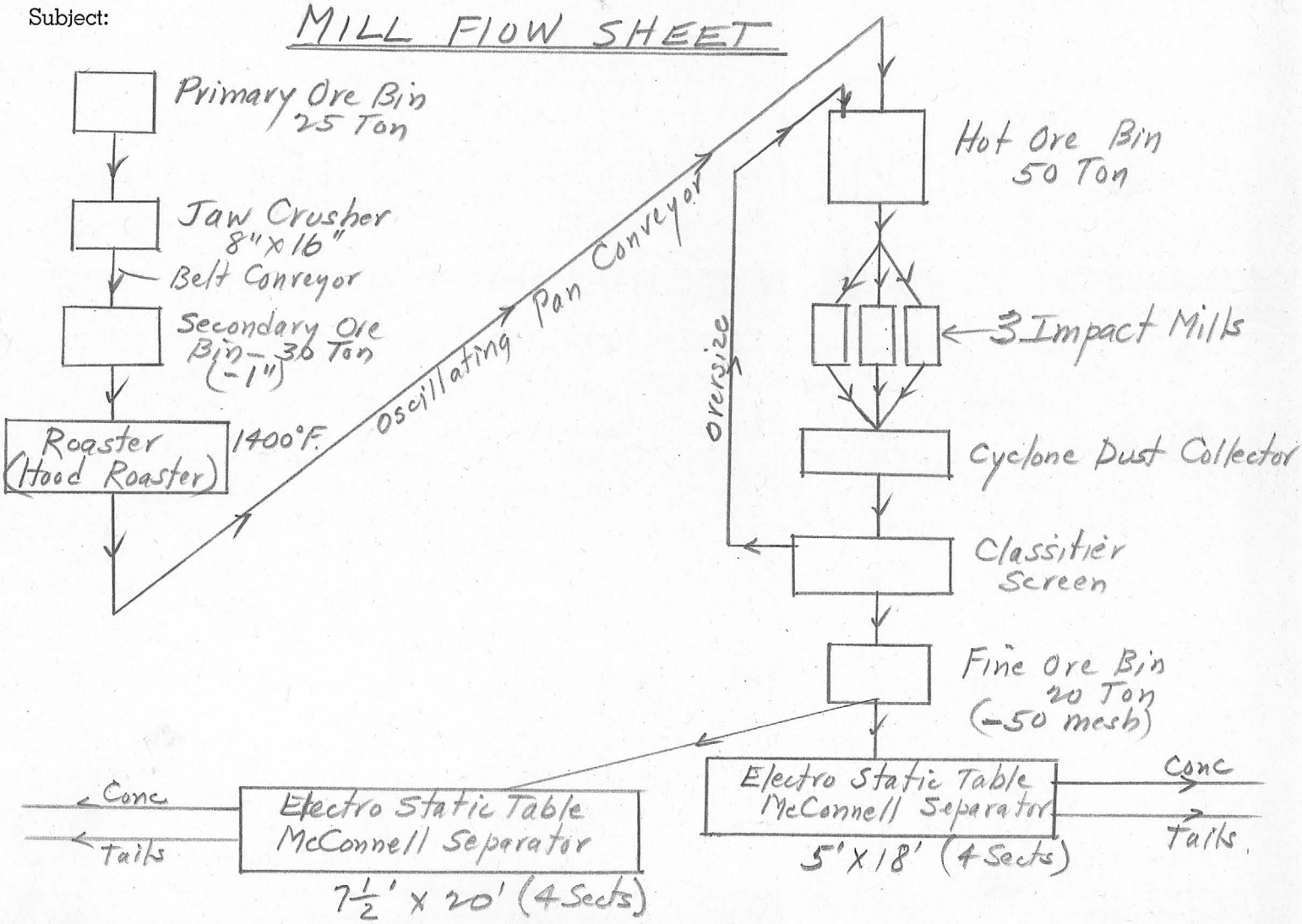
DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT
Page 4

Mine | Date

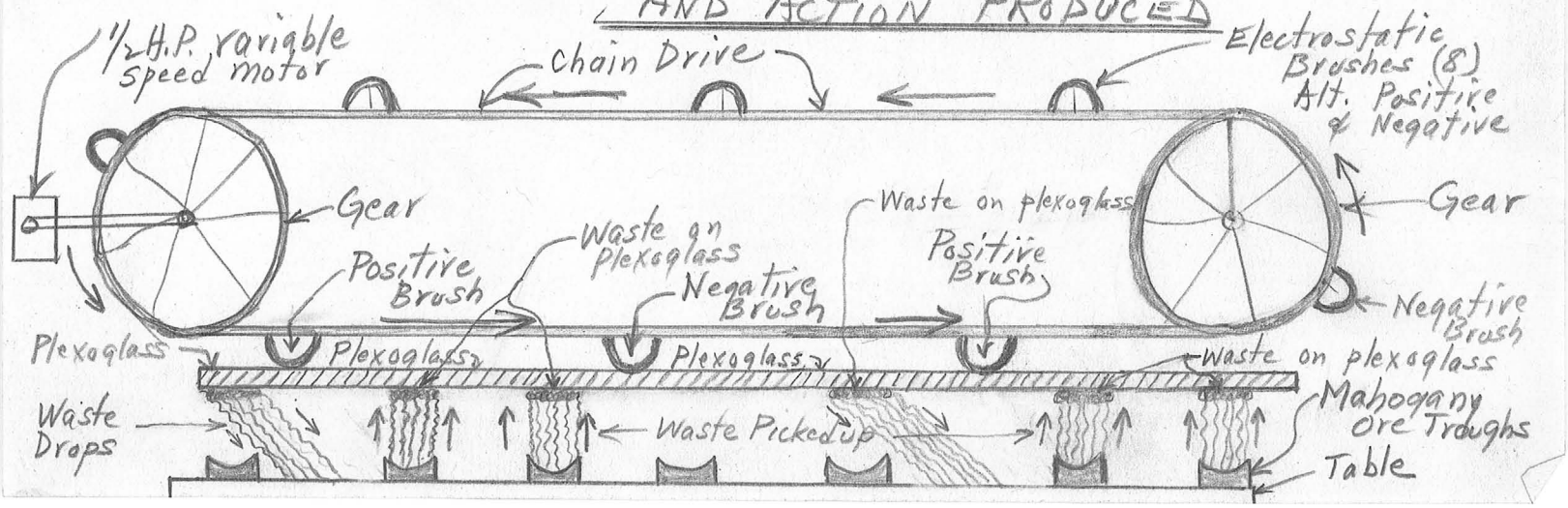
District | Engineer

Subject:

MILL FLOW SHEET



SKETCH OF ELECTROSTATIC BRUSHES AND ACTION PRODUCED



DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Page 1.

Mine Morning Star Mine Date May 13, 1953

District Old Hat Dist., Pinal County Engineer Axel L. Johnson

Subject: Mine Report ----- Information from Harry Krumlauf, John Gekas, C. D. Loper

Location 11 miles south of Oracle. Take Mt. Lemmon Road south from Oracle for a distance of 8 miles. Turn right at Y. M. C. A. camp and go 3 miles.

Owners The Tucson Y. M. C. A. holds the deed to the property. The former owner, Mrs. Elizabeth Lambert Wood, Long Beach, Wash., deeded the property to the Tucson Y. M. C. A., retaining for herself, however, a life time right to all the royalties and proceeds from the property. After the death of Mrs. Wood, the Tucson Y. M. C. A. will be in full possession of the property. Mr. Clermont D. Loper is Secretary of the Tucson Y.M.C.A.

Lessees Nikas Mining Co.----composed of the following parties-------Tom Calles, A. Nikas, John Gekas, Mike Cotageorge, John Paulos.

Lease provides for a 10 % straight royalty. It is a 5 year lease with provisiom to renew for an additional 5 years.

Metals Tungsten in the form of scheelite.

Men Employed 3 to 4 men on D. M. E. A. Exploration contract.

Production Rate No production. Operations are limited to exploration work.

D. M. E. A. Loan A D.M.E.A. Exploration Loan was granted on Aug. 28, 1952, and work was started on this project at once. The amount of the loan was $59,200, with the government contribution at $44,400. This loan was set up for 2 stages, viz:

(1) Build a surface plant, head frame, hoist, 2 buildings, waste and ore bins.
Sink 110 ft. of shaft---45 deg. incl. (5' x 8') 2 compartment shaft to the 100' lev.
~~(2)~~ 240 ft. of drifting and cross cutting.

(2) If the first stage was declared to be successful by the government field team, and the operators also were willing to go ahead, then the 2nd stage of the loan would be put into operation. This calls for
Sinking the shaft an additional 100 ft. to the 200 ft. level.
240 ft. additional drifting and cross cutting.

The first stage of the loan has now been completed, according to specifications, and the operators has asked for an extension of work on the 100 ft. level, before starting the second stage of the program. An application was made for an additional 90 ft. of drifting and cross cutting on the 100 ft. level, and this request was granted by the D. M. E. A.

Substantial amounts of low grade tungsten ore has been developed by the D. M. E. A. exploration program to date. This, however, is considered of too low a grade for economic mining operations. Not enough good grade ore has been developed yet to warrant the construction of a mill, or the resumption of stoping operations. It is hoped that future exploration work called for on the D. M. E. A. program will develop better ore, in substantial amounts.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Morning Star Mine Date May 13, 1953

District Old Hat District, Pinal Couhty. Engineer Axel L. Johnson

Subject: Mine Report--- Information from Harry Krumlauf, John Gekas, C. D. Loper.

Geology Contact metamorphic deposit in limestone rock, adjacent to a granite intrusinn. Footwall is granite. Dip of the ore formation is 45 degrees to SW. Strike is N 75 W. Width of ore deposition is variable, but reported to be a maximum of up to 200 ft.

Ore Values Previous mining operations produced ore of an average value of 1.1 %. The ore developed so far by the D. M. E. A.loan exploration is of a much lower grade, according to Harry Krumlauf, Manager, and is considered of too low grade for profitable mining operations. Exploration will be continued in order to develop better grade ore.

Ore in Sight There is 75 to 100 tons of good grade tungsten ore (aver. about 1.1%) broken in the old stope near the old open cut. This is available for milling. Some additional ore could also be mined in this area.

Past Production See report of May 31, 1952.

Milling Facilities The company has no milling facilities at present. The company plans to build a mill to treat their ore, if sufficient ore is developed by the D. M. E. A. exploration program to warrant the construction of a mill. The site being considered for the mill is at Big Wash, about 5 miles south of Oracle Jct. The plans for the mill at present call for a 30 ton mill with tables and flotation (subject to change depending on amount and grade of ore developed).

Mill Tests The mill tests, according to Harry Krumlauf, Manager, shows following
(1) Recovery of about 70 % at 100 mesh.
(a) 25 % recovery on tables, with a concentrate of 68 % to 70 % WO_3.
(b) 45 % recovery with flotation, with a concentrate of about 15 % WO_3.
(2) The table concentrate runs about 5 % lead, mixed carbonates and sulphides. The lead carbonates have to be sulphidized first, and then the concentrates have to be treated by a batch flotation process to remove most of the lead/in the concentrates. A concentrate product, of 1 % lead or less, can be obtained by this process.
(3) The 15 % flotation product would be shipped to the U. S. Vanadium Corp. of Bishop, Calif. for treatment in their hydro-metallurgical plant at Bishop.

Officers Manager ---- Harry Krumlauf, University of Arizona, Tucson, Arizona.
Mine Foreman ----- Tom Calles, Oracle, Ariz.

Mine Reports Mr. T. P. Lane, Consulting Engineer, Phoenix, Arizona has been engaged to make a report on the property, prior to starting the second stage of the D. M. E. A. exploration program.

Axel L. Johnson

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Morningstar Mine Date Ma y 31, 1952.

District Old Hat Dist., Pinal Co. Engineer Axel L. Johnson

Subject: Mine Report ---- Information by Johns Gekas, ~~part owner~~. Co-operator

Location 11 miles south of Oracle. Take Mt. Lemmon Road south from Oracle for a distance of 8 miles. Turn right at Y. M. C. A. Camp, and go 3 miles. Road good.

Owner Mrs. Elizabeth Lambert Wood, Long Beach, Wash.
Y. M. C. A. of Tucson, Ariz. is her agent.

Lesee Nikas Mining Co., Tucson, Ariz., composed of following Limited Partnership:-
Tom Calles ---- 15 % John Geka s -------12 % John Paulos ----- 12 %
A. Nikas ------ 27 % Monte Seymour -----17 % open & owned equal 17 %
Lea se provides for 10 % straight royalty. It is a 5 year lease with provision to renew for an additional 5 years.

Meta ls Tungsten ore in the form of Scheelite.

Men Employed None. Mine is idle. Closed down in March or April.

Production Rate None.

Milling Facilities None at present.

Ore Values Average is 1.25 % WO_3 without handpicking.

Mine Workings 2 open cuts.

Past Production Company shipped approximately 600 tons of ore to the mill at Apache Jct. last winter and fall for concentra tion, and afterwards hauled the concentrates to Bishop, Calif. The mine was closed down in March or April, as the operators could not make a profit on the operation, although the ore averaged 1.25 %. The reasons given for this were: (a) Too far to haul the ore to the mill (150 Miles), (b) Too low recovery from the milling operations, as the mill was not designed to mill this particular type of ore (operators claim thst they got less than 50 % recovery on some shipments), and (c) Too high impurities in the concentrates obtained from the milling operations.

Government Exploration Loan Application Application was made in March for a government exploration loan for $93,000 to explore the mine.

Construction of Mill If the government loan is granted, and if the exploration work proves up sufficient ore for milling operations, the operators plan on building their own mill at Canon del Oro, 10 miles south of Oracle Jct. Mill tests have been made (3 separate tests), indicating recoveries of 82 to 86 % with elimination of most of the impurities by the use of proper milling equipment, specifically designed to treat their particular type of ore. A 50 ton mill is planned.

Officers Manager-- Harry Krumlauf, University of Arizona, Tucson, Ariz.
Mine Foreman ---- Tom Calles, Oracle, Ariz.

STATE OF ARIZONA

DEPARTMENT OF MINERAL RESOURCES

MINERAL BUILDING, FAIRGROUNDS

PHOENIX, ARIZONA

NEWS ITEM

Sept. 25, 1951
By Axel L. Johnson

SOURCE OF INFORMATION ----Tom D. Collas, Box 123, Oracle, Ariz.
MINE ----Morningstar Mine
DISTRICT ----Old Hat Mining District

Location. 7 miles south of Oracle--at north edge of Catalina Mts.

Owners. [redacted].

Operators. [redacted]

Officers. Tom Collas, Mine Supt., Box 123, Oracle, Ariz.

Metals Mined. Tungsten ore in form of Scheelite.

Men Employed. 3

Production Rate. 15 to 25 tons per day.

Milling Facilites. Hauling ore to the Goldfield mill near Apache Jct. Mill is well equipped with ball mills, classifiers, tables, and flotation. Ore sent to the mill runs 1 to 1.5 % of tungsten trioxide, but contains lead carbonates, and is, therefore, hard to treat. Recovery is only about 70%, and penalties in the concentrates run about $21.00 per unit. Milling charge is $10.00 per ton, and hauling charge from the mine to the mill is $8.50 per ton. According to Mr. Collas, three concentrates were obtained from the ore milled, and one shipment was as follows: (1) 900 lbs. running 68% (from tables), (2) 1250 lbs. running 54% (from tables), and (3) 2200 lbs. running 14% (from flotation). The average of these three products is 36.44 %. The contentrates are sold to the U. S. Vanadium Co. of Bishop, Calif., being hauled there by the operators' own trucks.

Ore Values. Ore averages 1 to 1.5 % in tungsten trioxide.
Concentrates averages 36.44 % to date, as mentioned above.
Recovery is approximately 70%.
Penalties for impurities run about $21.00 per unit.

Present Operations. Mining from tunnels and open cuts.
Ore vein from 5 to 18 ft. wide.

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA

Sept. 25, 1951
By Axel L. Johnson

Proposed operation. Continue mining from tunnels and open cuts.

Proposed new plans. Operators are planning the construction of a new tungsten mill near Tucson. The location picked is at Steam Pump, near Russell Ranch, about 15 miles north of Tucson. This mill would treat any custom ore, as well as their own ore from the Morningstar Mine. Operators would like to obtain a Government Loan of $150,000 to finance the construction of the mill.

Geology and Past Production. See University Of Arizona Bulletin "Tungsten Deposits of Arizona" by Eldred D. Wilson---page 33.

Special Difficulties Encountered. The difficulties encountered in the mining and treating of this ore (principally milling and transportation)

(1) Milling Difficulties. The ore being high in lead carbonates, and possibly other carbonates, which are hard to separate even with the use of flotation, yields a concentrate which runs up to $21.00 per unit in penalties for impurities, with a recovery of only about 70%, and a low value concentrate from the flotation unit. The operators have engaged Mr. George Roseveare of the University of Arizona to make mill tests of the ore to see if a more efficient method of mill treatment can be worked out.

(2) Transportation Problem. The cost of trucking the ore to the mill near Apache Jct. is $8.50 per ton. The cost of hauling the concentrates from the mill to Bishop, Calif. had not been calculated by Mr. Collas, as it is being hauled by their own trucks. I should estimate about $1.50 per ton of ore mined.

(3) The writer was not able to determine definitely how much the producers were getting paid for the ore by the U. S. Vanadium Co. However, on account of the high cost of milling and transportation, it is difficult to see how they can make a profit from the operation. Following are the estimated costs per ton of ore mined, assuming an average of 1.25 % ore with a 70% recovery.

Ore mined ------1.25 units per ton of ore.
WO_3 recovered---0.875 units per ton of ore mined.
Approx. Costs---

Hauling to Goldfield Mill-----	$ 8.50	per ton
Hauling conc. to Bishop, Cal.--	$ 1.50	" "
Mill treatment Charge --------	$10.00	" "
Assay Charges ----------	$ 1.15	" "
Ded. for impurities (0.875 units) at $21 per-	$18.38	" "
Mining Costs ----------	$10.00	" "
Total Cost	$49.53	per ton of ore mined.

WO_3 recovered -- 0.875 units per ton of ore mined.

Axel L. Johnson

DMEA GRANTS ADDITIONAL LOANS TO ARIZONA MINES

Several new exploration assistance contracts have been signed by Defense Minerals Exploration Administration with Arizona mining companies. Projects for copper, fluorspar, asbestos lead and zinc are covered in the nex contracts and call for a total

expenditure of $181,020. Of this amount $109,698 is the government's share in the projects, and $71,322 is private funds.

The companies to which the recent contracts were granted were William W. Sorensen and William C. Williams, Arizona Copper Mines, Inc., Arizona Metals Company, Fluorspar Producers Corporation, Bear Canyon Mining Company, and Magma King Manganese Mining Company.

On December 4, 1952, the following approved exploration project contracts were in force in Arizona:

Mine	Government Participation	Value of Contract
Banner Mining Company's Mineral Hill Mine (Copper)	$ 63,393	$126,789
Banner Mining Company's Twin Buttes Mine (Copper)	67,894.50	135,789
Sherwood B Owens, Abril Mine (Zinc-Copper)	31,963	63,926
Yucca Mining and Milling Company, Antler Mine (Copper)	29,735	59,470
American Asbestos Cement Corporation, 74 claims (Asbestos)	111,482.10	123,869
Reed and Reed Mining Company, Fountain Head and Silver Legion claims (Lead-Zinc-Copper)	10,000	20,000
Nash Mines, Bonanza Lead-Zinc-Copper Mine (Lead-Zinc-Copper)	19,300	38,600
Nikas Mining Company, Maudina and Morning Star Mines (Tungsten)	44,400	59,200
Arizona Metals Company, Summit and Silver Monster Claims (Lead-Zinc)	23,050	46,100
Fluorspar Producers Corporation, Polly Anne and Elizabeth Claims (Fluorspar)	6,925	13,850
William W. Sorensen & William C. Williams (Asbestos)	19,575	21,750
Magma King Manganese Mining Company's Ajax and Ajax No. 1 (Lead-Zinc)	11,550	23,100
Arizona Copper Mines, Inc., Santa Catalina Mine (Copper)	25,000	50,000
Bear Canyon Mining Company's Bear Canyon Mine (Asbestos)	23,598	26,220
	$487,865.60	$808,663.00

, C. A. TUCSON
on, Arizona

: MORNINGTON STAR, Pinal County - 7 mi. S of Oracle.
R: Tucson YMCA holds deed to property
Mrs. Elizabeth Lambert Wood, Long Beach, Wash, holds lifetime right to all the royalties & proceeds from property.
EES & OPERATORS: Nikas Mining Co., Tucson, Ariz. 7-7-55

NIKAS MINING CO., Lessee
Tucson, Ariz.

MINE - MORNINGSTAR MINE - Old Hat Dist., Pinal Co.

OWNER - Mrs. Elizabeth Lambert Wood, Long Beach, Wash.
(Y.M.C.A of Tucson, Ariz, her agent.)

LESSEES & OPERATORS: Morningstar Mine, Pinal Co. 7-2-54

Eylw cop

April 4th, 1945

Mr. William A. Evans
c/o Ellinwood & Ross, Attorneys
Title & Trust Building
Phoenix, Arizona

Re: Morning Star (Forcey vs. Molson).

Dear Mr. Evans:

I have carefully studied your letter of March 27th, addressed to Judge Darnell. I have also reconsidered all technical phases of this case in the light of information obtained at our March 23rd conference in Tucson on which occasion the defendants explained their theory and permitted us to examine their exhibits, including certain survey maps of which I obtained prints on March 31st.

The defendants will aim to convince the Court that:--

(1) They had the apex of a vein of scheelite ore with quartz which outcropped in part on the Pure Gold Claim as shown by photo, survey maps and model.

(2) That this proved to be a well defined vein (hereinafter referred to as the "trespass vein") whose outcrop crossed the common side line about 280' from its east corner with a strike of about north 30° west and a dip of some 45° to the southwest. This vein was followed down along its dip at the point of trespass for a distance of 93' from the surface and developed for a total length of 420' along the outcrop which was traced for 270' on the Pure Gold and 150' on the Morning Star.

(3) That this vein with a width varying from 5 to 40' had a well defined hanging wall of "dark lime-stone" as shown on their maps and photos and this hanging wall near the point of trespass was for a short distance close to and parallel with but did not cross the common side line. This hanging wall was barren of values as proved by their assays while all of the alleged vein carried a substantial percentage of scheelite, even though the commercial ore was limited to shoots and pockets.

(4) That this vein had a well defined foot wall of gray limestone also barren of values, below which lay the breccia and crushed material constituting the gouge of the Mogul fault that can be traced for several miles. In the gouge of this fault zone was found the crushed granite and breccia with solid granite on the foot wall.

Proof of all of these contentions has been carefully prepared and should be very convincing especially when illustrated by the model, which will be explained and verified by Pennybaker, Molson and Ewing. As matters now stand and regardless of whether or not their claims conform to the facts, I fear that the defendants would simply overwhelm us by the preponderance of their testimony and exhibits.

It is not clear to me why the defendants in their Answer to the Complaint state that there are located on the Pure Gold Claim "numbers of veins, lodes or ledges containing valuable minerals traversing the

same easterly and westerly and thru and beyond its east end line." They have apparently prepared no data or maps pertaining to any other than the above described trespass vein and if any other parallel or nearly parallel veins actually exist it is hardly possible that they could be so located (in view of the location of the Mogul Fault) as to cross the east end line of the Pure Gold claim.

However, this quoted statement would seem to be of little importance if they can substantiate their claims regarding the trespass vein and show that, where outcropping on the Pure Gold claim it was entitled to extra-lateral rights by virtue of which they have legally mined what they term the "extra-lateral ore" amounting altogether as per their figures to 1072 tons with an average grade of 0.927% WO_3.

In reference to your #1 (pages 1 thru 6 of your letter) it is evident that the fact that the alleged vein does not cross either end line of the Pure Gold Claims has no bearing on its extra-lateral rights and in this respect my own study of the law had led me to reach a similar conclusion, mainly based on the decision of the U. S. Circuit Court of Appeals in the case of Work Mining & Milling Co., vs. Doctor Jack Pot, 194 Federal 620-629.

Commenting on your opinion regarding the possibility that we might show that the alleged trespass vein crossed both the north and south side lines of the Pure Gold Claim, I might say that after carefully reviewing my notes I do not believe that we could possibly

make such proof, except at prohibitive expense. The strike of the Mogul fault and of the alleged vein swings sharply toward the north near the west end of the outcrop and if the vein extended far enough in that direction it should cross the north side line rather than the west end line of the Pure Gold claim. However, a deep gulch runs north thru this claim about 600' from its west end and the sides of this gulch are covered with loose overburden and talus which completely masks the outcrops of rock. While I never carefully examined the surface on the west of this gulch it did not appear that any vein outcropped in this area and even if such a vein were found it probably could not be identified as a continuation of the trespass vein unless the entire length should be trenched and the outcrop more or less continuously exposed.

I have obtained a copy of the patent survey of the Pure Gold claim and note that the original discovery pit was located along the center line of the claim at a point 350' west of the east end line. The vein (if any) on which this discovery was made has obviously no connection with the alleged trespass vein and therefore from your study of the law, the legal effect of proving that the trespass vein crossed both side lines of the claim would appear to be nil.

Complainant's Argument and Proof:--

Now it has been and still is my opinion that the scheelite in all of this area occurs as replacement deposits in the wide band of crushed and shattered limestone that is found along the hanging wall

of the Mogul fault and that nearly all of this limestone which I shall term the mineralized zone is more or less homogeneous in character and carries a small percentage of scheelite, but that within this area there are certain sections which have been highly silicified so that quartz and quartzite are more predominant and here the scheelite has been concentrated to a point where in some places it constitutes commercial ore, which ore was actually found and mined in pockets or kidneys associated with vugs and fissures in the rock. These areas may be termed the ore zones and several of them will be shown on the map of the surface of the two claims which I am now preparing.

Actually, I believe that we can show that the trespass vein differs from its foot and hanging wall only to the extent that in that particular area the rock is more highly silicified and dotted with vugs and fissures. one of which last was particularly featured in defendant's maps and model. The trespass shoot of pay ore was much shorter than mapped by defendants and the ore pinched out about 35 to 40' below the surface. If any pay ore was found in the lower drifts and crosscut, it seems to have been only in small, detached pockets which were not connected with the main ore-shoot.

It is significant to note that all of the defendant's exhibits represented only the conditions in the immediate vicinity of the trespass, for if they had mapped a larger area they would have been obliged to show other deposits of ore which occur under similar geological and physical conditions, notably at the Rivera

workings and inclined shaft in the Morning Star claim.

I believe that we can show that nothing gives the trespass vein "an individuality which, apart from other differences, clearly distinguishes it from the neighboring rock". This quotation from the case of U. S. Mining Co. vs. Lawson 134 Federal 769, and the balance of the decision quoted on page 10 of your letter may be made, along with other similar citations, the basis for a claim that the entire area of silicified limestone on the hanging wall of the Mogul fault has been so shattered and mineralized "as to convert it into a single broad vein or lode", in which case it obviously extends over a large portion of the surface of the Morning Star.

However, in the particular case of the trespass ore body we shall have to admit that the ore zone in which the shoots or pockets of pay ore occur does take the form of an elongated lense which,-while it is not nearly so well defined as claimed by the defendants, may be held by the Court to constitute a vein, ledge or lode within the legal meaning of the term.

To meet that situation, it seems most important to produce conclusive evidence that the outcrop or apex of that particular ore body itself extended for a considerable distance across the common side line where its higher portion was found on the Morning Star, which is the senior location.

It is very significant and I consider very suspicious that the defendant has shown in maps and model that on the surface the hanging wall of the alleged vein almost exactly coincided for a considerable distance with the common side line of the claims although strange to say it never actually crossed that line by even so much as an inch.

Now, it is my distinct recollection that in May, 1944,--when the rim of the trespass pit was only 3 or 4' over the line- material which was to all appearances pay ore, and was so designated by the operators was plainly visible on the south rim and wall of this pit in the Morning Star ground and even today, when the trespass pit has invaded the Morning Star to the extent of 10' on the surface and 16' somewhat lower down, there are patches of what appear to be similar pay ore showings at points along the wall of the pit and along the surface farther up the hill to the south, all of which the defendants designate as the barren hanging wall of the vein.

Unfortunately I never had the opportunity to test by lamp or sample any of these showings, and their importance was not apparent until the theory of the defendant was explained to us in Tucson, but it would now appear that a thorough examination of this hanging wall would be our best procedure, and that the testimony of witnesses who were on the ground before the defendant broke across the line and destroyed the original outcrop may have even greater importance. No doubt the defendants failed to find ore at one or more particular points along the side line but they did not pretend to have sampled this continuously along the area where it is now caved and where the

the outcrop was directly above the stopes from which the extra-lateral ore was mined, and their photographs in contrast with mine show the hanging wall of one pocket of ore and not along the length of the alleged vein.

This situation is discussed under (4) on page 17 of your letter of March 27th and it is my understanding that the Pure Gold operators would not be entitled to any extra-lateral rights along the downward extension or dip of the vein throughout the entire length where its original apex or outcrop was split by the common side line. Actually this would mean that Molson had no legal right to most of the extra-lateral ore which he has mined to date and that he could only continue mining at the west end of his present workings where I understand that very little pay ore was left aside from what may have recently been developed by the drill holes.

If you and Judge Darnell should agree with the legal effectiveness of the proof which is outlined in this letter I strongly recommend that our case should be much more thoroughly prepared before we go to trial, mainly thru a careful and complete testing of the hanging wall area of the trespass ore shoot conducted by lamp and, in the more important places, by cutting and assaying samples.

The maps which I am now preparing would be a great deal more convincing if they could show the actual records of tests or assays of

of samples and the verbal testimony of our witnesses should also be supported by such returns if we expect to defeat the contention of our opponents. I regret that substantially more expense will have to be incurred than I had assumed before our conference in Tucson, particularly since I feel that it will now be essential to engage at least one other engineer as an expert witness who should take part in the lamping and sampling of the surface and underground workings.

Finally, I wish to refer to the damage done to the surface of the Morning Star claim for which there was absolutely no wrrrant in law. This was not mentioned in our complaint which was drawn up at a time when the south rim of the trespass pit extended to a maximum of 4' over the line and only for a length of some 30', involving perhaps 100 sq. ft. of surface.

Since that date, the defendants, thru failure to support their workings, have caused the surface of the Morning Star to cave for a length of 82' and to a maximum distance of over 10' beyond the side line so that some 700 sq. ft. of surface rock has now fallen into the pit and it is practically certain that there will be more caving in the future. This can properly be stated to detract from the value of the Morning Star as it will make further mining in that area more difficult and expensive.

Mr. William A. Evans
Re: Morning Star (Forcey vs. Molson)
April 4th, 1945

I am attaching to this letter a Memo regarding the general geology and other technical matters, and another Memo regarding the witnesses whom we may wish to call for the trial.

The preliminary maps will follow later.

Yours very truly,

G. M. Cobrowsky

GMC/b
Enclosures

TECHNICAL NOTES RE MORNING STAR APEX TRESPASS SUIT

(Forcey vs. Molson)

General Geology:--

The principal country rocks in this district are pre Cambrian granite exposed on the north or footwall side of the prominent Mogul fault; and sediments of the Apache Series (late Cambrian or Silurian) lying on the south or hanging wall side of the fault and consisting mainly of limestone (including marble, dolomite and silicified lime) quartzite and sandstone. Along and near the fault contact there is much fragmented and brecciated material often occupying a crushed and broken zone of substantial width.

The outcrop of the fault and fault gouge is not always traceable on the surface, but apparently it crosses the east end line of the Pure Gold Claim at a point about 100' north of the southeast corner and striking in a northwesterly direction it does not touch the common side line of the Pure Gold and Morning Star Claims.

The Mogul is a normal fault dipping steeply to the south (30° - 60°) and the throw has probably not been accurately determined but is locally reported to be 2500'. The thickness of the formations above described have also not been determined.

Origin and Character of Scheelite Deposits:--

The ore deposits are of the replacement type. The original source of the heated solutions in which the tungsten was dissolved was doubtless the granite and the Mogul fault together with the subsidiary faults served as channels thru which these solutions came up from the magma to leach out portions of the more soluble

rocks along the hanging wall,--particularly the limestone, and to then deposit the tungsten minerals in and around the vugs and fissures from which the original rock had been dissolved. Often the minerals also impregnated the partially dissolved portions of that rock in such a manner that its original form and texture were still preserved.

Thus it appears that the existing ore bodies or ore shoots generally conform to the shape and size of the dissolved and replaced area of the limestone and that the ore itself (containing scheelite which has the chemical formula $Ca\ WO_4$) is distinguished from the mineralized rock only by reason of a higher content of tungsten, for otherwise there is little or no change in its physical or chemical character. There are no well defined or even poorly defined walls to these deposts. There is no regular pattern in which they occur and while some of the ore shoots are elongated it should be noted that the axes lie in different directions, that so far none of them been found to have any great length or depth and that the majority of the shoots are irregular or roughly spherical in shape so that in mining parlance they are termed <u>pockets</u> or <u>kidneys</u>. The location of these ore shoots is erratic and they vary greatly in size and shape.

It is interesting and significant to note that the four U. S. Geologists who examined the showings in April 1943 and February 1944 (Krauskopf, Stopper, Bateman and Erickson) never refer to any <u>veins</u> and describe the deposit of scheelite on the Morning Star (Rivera workings) as being "erratically distributed in an irregular, elongate body of silicified limestone which trends <u>northeast</u>" and they also mention ore lying along two faults which strike at right angles to one another. Likewise they describe the trespass ore body as being "localized in the silicified breccia of the Mogul fault zone".

Because of the manner in which the tungsten minerals were introduced and deposited in this district it is natural that the deposits should be more or less confined to the area consisting of the series of rocks which form the hanging wall of the Mogul fault including quartz, quartzite, breccia, dolomite and silicified limestone. This is true of all of the scheelite deposits which have been found on the Morning Star and Pure Gold claims and also on the Maudina claim over half a mile southeast of them. But this area or zone which is merely the host to the ore deposits, is very irregular in trend and width and except for the fact that the Mogul fault, and the gouge or selvage which accompanies it, forms a foot-wall it has absolutely none of the essential characteristics of a vein, ledge or lode.

At the particular point where the U.S.G.S. Engineers drew their Section A-A thru the trespass ore shoot they showed the formation of quartz and silicified limestone to have a width of about 40' at the surface (somewhat less at depth) and a strike to the northwest and dip of 30° to the southwest, but in Section G-G at the Rivera workings, only 250' farther south the same formation is shown as vertical with a width of 75' and a strike to the northeast while here the narrow streak of enriched material although striking also to the northeast dips 70° to the southeast. The plan maps of other workings show similar irregularity.

The entire areas of the rocks in which commercial ore occurs can hardly be classed as a vein, but merely as a host to the ore bodies or ore shoots such as those which are differentiated in the U.S.G.S. drawings. None the less this mineralized zone seems to carry some small quantities of scheelite and at one place in Section A-A, there is a point marked as containing an average of 0.1% WO_3. Actually no

material containing less than 0.5% WO_3 could have been mined with profit even when the Government was paying the highest premium price of $30.00 per unit of WO_3 while today there is no pay ore which does not contain a minimum of 0.7 to 0.8% WO_3, and such material has always been found in small irregular pockets. To the best of my knowledge no one has ever attempted to compute the average tenor of the quartz, breccia, quartzite and silicified limestone in which the ore shoots occur, but these formations have been quite thoroughly prospected on the surface and in various underground workings with the ultra violet light (which will detect minute quantites of scheelite) and outside of the erratic occurrences of intensive mineralization I believe it safe to assume that its average content in WO_3 could only be described as a "trace".

Eldred D. Wilson, Geologist for the Arizona Bureau of Mines examined the showings in 1941, before the trespass ore shoot had been discovered. He does apply the term "vein" to the silicified zone in the limestone at the location of the Rivera workings and elsewhere but goes on to say that it contains small "irregular disseminations of scheelite" which constitute the ore shoots.

I am told that a Mr. Huey, also connected with the Arizona Bureau of Mines has also described the ore deposits as scattered pockets occurring in a broad zone of general but feeble mineralization.

It is my opinion that not a single one of these shoots of commercial ore has been proved to have any of the legal or technical characteristics of a vein, ledge or lode and therefore there would

seem to be no basis for claiming that their outcrops represented such an apex as would give its owner extra-lateral rights beyond a common side line with an adjacent claim. No showing which meets or even approaches there requirements can now be seen at or near the point of trespass, but the defendant has built up a strong case from photographs, maps and an elaborate model to support, which they will probably offer the testimony of those who were on the ground at the time that the trespass ore was discovered and mined.

Re Defendant's Exhibits and Anticipated Testimony:--

Concerning the first three exhibits comment will have to be made by Mr. Forcey or others. Apparently the defendants concede that they have mined 1072 tons of extra-lateral ore and Forcey calims that some of this was of much higher grade than shown by the defendant's assays, but I fear that he may lack convincing proof of this contention.

As to Exhibits #4,5,6,7,8 and 9 we have stipulated that in so far as these reflect the surveys by Stevens they will be accepted as accurate, but the geology, structure and location of the vein and walls, as shown in these exhibits and in their model are all open to criticism and correction or contradiction by our witnesses.

No. 10 is presumably the report and map of Bateman and Erickson, dated February 14th, 1944 and it should be noted that whereas the defendant twice mentions that this shows the "vein" yet actually that term is nowhere used by the authors nor do they refer to the Mogul fault in the vertical Section A-A, but merely to a "crushed zone."

In the plan map the common side-line is not shown, but I have drawn it in on my copy as located from Stevens' surveys. In the vertical Section A-A the scheelite mineralization was drawn down less than 20' below the surface, and was not connected with the point of feeble mineralization (0.1% WO_3) shown at the southwest face of the adit, nor do they state that the ore in the trespass shoot was connected with ore in the Morning Star open cut lying to the east. Forcey claims that the rock between these showings was mineralized with less than 0.1% WO_3.

Subsequent work did prove that some ore extended to a maximum depth of about 35' below the surface in the trespass pit, but at this depth it apparently pinched out and we shall try to prove that it did not continue to the adit, nor to the sub-level as claimed by the defendant. I have good hopes that we can convince the Court that the U.S.G.S. Report and maps do not confirm or in any way supportthe claims of the defendant.

As to their witnesses I understand that Ewing was pretty constantly in charge on the ground for Molson while all of this work was in progress, and therefore his statements of fact will no doubt carry weight unless they can be satisfactorily refuted. However, I believe that Ewing has no standing as an Engineer and any technical or expert testimony that he might offer should be subject to challenge. The same comment will apply to any testimony that may be given by Molson.

Pennybaker will apparently be the principal and perhaps the only expert technical witness. We know he will assume responsibility for the geology shown in the exhibits and that he will claim that the trespass ore pocket is a true vein and has been followed down at this

point from an apex, which he saw when he first examined the property.

Great weight will doubtless attach to Pennybaker's opinion as to the nature of the ore deposit, etc., since this has been based on personal observation, lamp tests and sampling and we must if possible, present similar evidence in contradiction to his testimony.

Pennybaker contends that the trespass vein outcrop continues to the northwest on the Pure Gold claim, but apparently the ore pinched out in the two open cuts before it reached the side line and since these workings have been largely allowed to cave, it does not seem that the Pure Gold people intend to reopen or extend them.

The reported logs of the two drill holes which are now being sunk still farther to the west seem to confirm the claims of the defendant respecting the extension of a vein in that direction but they may have struck another ore pocket and in this area the ore would have to be followed a long distance downward before it would cross the common side line.

Since the Mogul fault strikes to the northwest it is obvious that any shoots or veins located near to or directly along its hanging wall will be farther and farther away from the common side line as one proceeds in that direction and even granting that they might dip across the side line, the depth of such intersection would be progressively greater. No pay ore has been found on either of these claims at a depth of more than 100' below the surface, and very little ore at more than half that depth, so that I cannot anticipate that the question of extra-lateral rights will have any

importance except in respect to the trespass ore body and if we can prove that at that point the apex of the ore body,-whether it be a vein or pocket,-actually split the common side line it seems to me that the Morning Star owners will be entitled to collect for all or almost all of the extra-lateral ore which has been mined to date, or which might be mined at greater depth along that section of the side line. In addition I think that we shall have a valid claim for substantial damage to the surface of the property where no trespass is authorized under any circumstances by the provisions of the Apex Law.

S.M.C.

SUGGESTED WITNESSES FOR MORNING STAR

TO BE CALLED AT THE TRIAL ON MAY 7TH, 1945.

(1) L. M. Forcey, Oracle, Arizona

Can testify as to conditions on surface of claim before and subsequent to date of trespass and to some assays of ore, drill cores and other material and tests by lamp. Will also identify records of production, shipments, etc.

(2) L. T. Derwin, Registered Mining Engineer

Oracle, Arizona

Has visited mine on same occasions that I did and would testify that in his opinion the ore occurred in pockets and not in any regular vein. (May not be available for trial).

(3) H. G. Henderson, experienced mining and oil operator.

P. O. Box 112, Fullerton, California

Was associated with Forcey et al in development of property and very familiar with all conditions until a few months ago. Will testify that all ore was found in scattered pockets, that trespass ore shoot was not a continuous vein as shown by defendants and that pay ore did not occur at several of the points where they claim to have found it but that there was some ore at the surface extending across the common side line, presumably at points where Molson and Pennybaker did not sample. Henderson should make a very good witness and seems to have a very complete and accurate recollection of facts.

(4) G. M. Colvocoresses.

Will testify that in his opinion ore occurs in pockets and that there is no true vein at point of trespass, but elongated lense similar to other lenses worked by Pure Gold farther to the northwest and by the Morning Star in open cut to the southwest and in the Rivera pit and trench and perhaps also in shaft at top of ridge. Will develop theory that wide area of crushed and shattered limestone in hanging wall of Mogul Fault is mineralized with scheelite to a very small extent (to be confirmed by Forcey, Henderson and others and by reference to U.S.G.S. bulletin.) In this large zone of limestone are found areas of more intensive silicification with quartz and quartzite and often higher values in scheelite up to 2 or 2.5%. The occurrence of these ore shoots is erratic and their shape irregular but that in the case of the trespass ore-body the mineralized zone did occur as an elongated lense with long axis northwest,-southwest and crossing the common side line between the Pure Gold and Morning Star claim and dipping with the general trend of the formation toward the southwest.

The width of this ore zone was erratic but at a point about 300 ft. from the east corner it attained a maximum width of some 40 ft. This outcrop of ore originally straddled the common side line as will be shown on the map and for a certain length, which represented the section from which the greater portion of the trespass or extra-lateral ore was mined below the apex, which, where found on the Morning Star, was at all times higher in elevation than the corresponding portion of the outcrop on the Pure Gold.

Therefore and because the Morning Star is the senior location it follows that in the event that the Court should decide that this trespass deposit is a true vein and entitled to extra-lateral rights, those rights can only attach to that portion of the alleged vein which lies west of the point where its hanging wall outcrop crosses the common side line (marked (X) on the map.).

The above testimony will be partly substantiated by maps and photos, but I consider it essential that we should have at least one other qualified expert witness whose testimony would in general corroborate my own and who could spend one or two days with me on the property using the lamp and taking samples and measurements to check and amplify the information already obtained.

As such a witness I would tentatively suggest Arthur Flagg, Mining Engineer of Phoenix, who has had much experience with tungsten deposits during the past 25 years, and recently did a lot of work for the United States Government.

<u>Other witnesses for consideration</u>:--

Mohney, once foreman at Morning Star and now with Eagle-Picher Company in Tucson, who would testify,-according to Forcey and Henderson,- that trespass deposit and all other deposits on these two claims were pockets and not veins.

R. H. Murray of Tiger, Arizona, once night foreman for Pure Gold Company who will give similar testimony to Mohney, according to Forcey.

William Ward of Tiger, Arizona, once general foreman for Pure Gold who will agree with Mohney and Murray, according to Forcey.

Rivera, formerly lessee on Morning Star Claim and then foreman for Company operations,--a practical miner with wide experience in mining tungsten in this district. Henderson and Forcey believe that he would corroborate Colvocoresses, Henderson, Forcey, Mohney, Ward and Murray and could testify in detail to the extension of the apex of the trespass ore shoot southward across the common side line.

S.h.c.

C
O
P
Y

Geological Survey
506 Federal Building
Salt Lake City 1, Utah
March 7, 1944

MEMORANDUM to Mr. S. R. Zimmerley
U. S. Bureau of Mines
Salt Lake City, Utah

The following reports are transmitted herewith for your official use:

Quartzite Tungsten Project, Gold Hill Dredging Company, Yuma County, Arizona, by P. C. Bateman & M. P. Erickson, dated February 14, 1944.

Maudina and Morning Star Tungsten Mines, Pinal County, Arizona, by P. C. Bateman and M. P. Erickson, dated February 16, 1944.

One copy of each report has been forwarded to Mr. J. H. Hedges, district engineer for Arizona.

A. R. Kinkel, Jr.
Acting Regional Geologist

Enclosures
Quartzsite report and 2 illustrations
Maudina and Morning Star report
with 2 illustrations

cc: J. H. Hedges
S. E. Clabaugh

Carded

February 16, 1944

MAUDINA AND MORNING STAR TUNGSTEN MINES
Pinal County, Arizona

by
P. C. Bateman & W. P. Erickson

Abstract

The Maudina and Morning Star mines are in the northern part of the Santa Catalina Mountains, seven miles by a fair gravel road from Oracle. The workings of the Morning Star mine and the Pure Gold workings, the only currently active development on the Maudina property, are only 240 feet apart.

The deposits are in silicified limestone breccia which is localized along the Mogul fault and related structures. Not enough development work has been done at either property to indicate large reserves, but substantial quantities of good-grade ore has been produced from both properties. Both operating companies are digging adits to develop the downward extensions of their ore bodies.

During the latter part of December and January more than 840 tons of ore containing at least 2.0% of WO_3 were shipped from the Maudina mine to the Metals Reserve stockpile at Phoenix. The ore was all from an open cut. The present rate of production is 24 tons daily.

Total production from the Morning Star mine since 1940 amounts to an estimated 1450 units of WO_3. The ore was milled in a plant owned by the mine operators about 1½ miles from the mine.

Introduction

The Maudina and Morning Star mines are in the northern part of the Santa Catalina Mountains, Arizona, seven miles by a fair gravel road from Oracle. The workings of the Morning Star mine and the Pure Gold workings, the only currently active development on the Maudina property, are only 240 feet apart. Both mines are in the S. W. ¼ of section 17, ~~T. 16 E., R. 10 W.~~ T. 10 S, R. 16 E., Gila and Salt River Base and Meridian.

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The Morning Star mine was briefly examined by Krauskopf and Stopper in April 1943. At that time the ore body at the Pure Gold workings was not yet known. We spent 3 days, January

29, 30, and 31, mapping and studying the deposits. Poor exposures and the structural complexity of the area make detailed mapping difficult.

Geology

The principal geologic feature of the area is the Mogul fault. The Geologic Map of Arizona shows this fault trends north of west across the range and brings Paleozoic and pre-Cambrian sedimentary and metamorphic rocks on the south against the pre-Cambrian Oracle granite on the north. The fault dips 30 to 60 degrees south. It involves a wide zone with many planes of movement. The main zone, which is about 50 feet thick, contains much breccia and mylonite.

In the area of scheelite mineralization dark blue limestone lies on the south side of the fault, but this is a local feature. On all sides, except the northeast where the Mogul fault cuts it off, the limestone is bordered by quartzite. Bedding in the limestone is generally absent or unrecognizable, but on the ridge above the Pure Gold workings the bedding appears to strike N. 20° W. and dip 75° E. Some faulting, particularly at the south end of the limestone, seems necessary to explain the relations of the limestone and quartzite, but the contact is nowhere exposed. The presence of numerous poorly preserved corals suggests the limestone is the Devonian Martin limestone.

The scheelite mineralization is limited to silicified zones in the limestone. These zones are controlled by structures related to the Mogul fault. The scheelite occurs in the silicified zones in well-defined shoots.

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Maudina Mine

The Maudina property, owned by the Campo Bonito Tungsten Mines Company, Inc., consists of 29 unpatented claims. During World War I, a substantial amount of scheelite was produced from old workings about 1,000 feet north of the Pure Gold development. The deposit on the Pure Gold claim was not found until the summer of 1943. The present operator is Edward H. Molson of Tucson, who has a lease and option on the property from the Campo Bonito Tungsten Mines Company, Inc. Associated with Molson are E. J. Ewing of Tucson and I. M. McKinley, the mine foreman. Thirteen men are employed, but only half of them are engaged in mining. The rest are building bunkhouses and making other camp improvements.

Workings at the Pure Gold development consist of an open cut from which all the ore is being produced, a 120-foot adit, and several trenches. The initial expense of operation has been paid from a $15,000 R. F. C. loan.

Most of the ore mined has been shipped to the Metals Reserve stockpile at Phoenix. Because there are no facilities in Phoenix for milling tungsten ores, the Reconstruction Finance Corporation has loaned Arthur Jacobs and E. P. Hilton $20,000 to remodel their custom mill in Tucson. When the mill is operating, ore from the Maudina mine will be shipped there for milling. Jacobs states that the mill should be operating by the end of March.

During the latter part of December and January, 14 cars containing an average of more than 60 tons of ore each were shipped. The present rate of production is about 24 tons

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daily. Following are data available on the third of February from the Metals Reserve Company's records:

Lot No.	Dry Tons	% WO_3
P-9	66.444	1.94
P-10	62.270	2.05
P-11	61.9077	2.71
P-12	66.3474	2.53
P-13	59.995	2.32
P-14	62.086	2.19
P-15	63.293	1.87
P-16	60.540	2.04

The ore body is localized in the silicified upper portion of the breccia in the main Mogul fault. On the surface the ore zone varies from 5 to 40 feet wide and is exposed for about 200 feet along its length. At the south end it may continue under alluvium and connect with a mineralized breccia near the portal of the lower adit on the Morning Star property. The mineralized zone appears to dip with the fault 45 to 50 degrees to the south.

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The 120-foot adit barely reaches the downward extension of the mineralized zone 50 feet below the level of the open cut. The ore in the face of the adit appears under ultra-violet light to contain only a trace of scheelite. Two samples taken by B. R. Prisbie of R. F. C. contained only 0.14 and 0.05% WO_3. The adit, however, does not penetrate the ore zone far enough for a good test, and ore of better grade may lie beyond its face. The operators of the Maudina mine plan to explore the mineralized zone at this level by extending a branch adit due west from the main adit about 30 feet from the adit face. This procedure is necessary because the line between the Maudina and Morning Star properties passes through the adit near

this point, and the adit face is on Morning Star property.

We estimate that per foot of depth there are 300 tons of ore. There is no real basis for assuming any given depth for the continuation of commercial mineralization. It seems reasonably safe, however, to infer the commercial grade ore extends 15 feet beneath the bottom of the open cut. This block of 4,500 tons of inferred ore will contain 9,000 units of WO_3 if the grade continues at 2.0%.

Morning Star Mine

The Morning Star mine, owned by Mrs. Elizabeth Wood of Oracle, is leased by the Morning Star Mining Company. This company acquired the lease from the Fortuna Mining Company August 30, 1943. Persons interested in the Morning Star Mining Company are Walter Tubuch, W. S. Forsey, Frank Burchard, and Guy G. Richards, all of Los Angeles. Richards is acting as mine superintendent.

According to Krauskopf and Stopper (Report of April 26, 1943), the total production to April 1, 1943, amounted to 1075 units of WO_3. Mr. Phillip Rivera, formerly part owner and manager of the Fortuna Mining Company, states that 6¼ tons of 70% concentrates were produced in 1943 until the 30th of August, and that 1200 pounds have been produced since. The 6¼ tons include 66 units Krauskopf and Stopper reported. The figures indicate a total production of 1455 units of WO_3. The concentrate was made in a small gravity mill about 1½ miles from the property.

All of the production has come from a glory hole and some small stopes west of the glory hole. Other workings are a

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haulage level for the glory hole and stopes, a 23-foot shaft, a 120-foot adit, and several small pits. The 120-foot adit is being extended to cut the ore zones in the glory hole 60 feet below the bottom of the glory hole.

In the glory hole and stopes the scheelite is contained in an irregular body of silicified limestone that is elongated in a northwest direction. The scheelite is concentrated in large crystals along two faults at right angles to each other that cut through the silicified limestone. The northwest-trending fault, which has some post-mineral movement, offsets the southwest-trending fault about 10 feet. The ore along the faults, across widths of 6 inches to 2 feet, appears under ultra-violet light to contain several percent of WO_3. Scheelite is sparsely disseminated through the rest of the silicified zone.

The 5-foot-wide silicified limestone breccia near the portal of the lower adit, which is probably a continuation of the Pure Gold ore zone, contains substantial amounts of scheelite. The scheelite is fine grained, and the grade is difficult to estimate under ultra-violet light. No assays were available. The first 60 feet of the adit are also dug in silicified limestone, but it contains little scheelite.

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The downward extension of the silicified zone in the glory hole should be intersected by the adit in the next 50 feet. If ore persists to this level, 60 feet beneath the bottom of the glory hole, the reserves may be 2,000 to 3,000 tons of ore that contain at least 1.0% WO_3. The extension of the Pure Gold ore zone may also contain reserves of commercial ore, but we do not

have sufficient information to make an estimate of the amount.

Conclusions and Recommendations

The zone along the Mogul fault offers exceptional opportunities for finding additional ore bodies. The most favorable setting for ore bodies is probably where the Mogul fault or related structures are in contact with limestone.

We believe mapping of the zone by the Geological Survey is a project which might have considerable value in directing prospecting or even in directly locating additional ore bodies. Airplane photographs would provide the most suitable base for this mapping. The fault as shown on the Geologic Map of Arizona is about 10 miles long. Probably only parts of the zone would require mapping.

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WP

June 28, 1942

SURVEY OF OPERATING MINES MORNINGSTAR MINE

To: Director, Dept. Mineral Resources
From: George A. Ballam

This property is located in the Old Hatv District, one mile south of Campo Bonito, and 6 miles south of Oracle. It is owned by Mrs. E. L. Wood, and leased by the Rivera Bros. of Oracle.

The scheelite is found in a limestone granits contact, which haw been glory-holed, beneath which is a haulage adit. Five men are working at present. A mill is being operated about two miles north of the property. Small veinlets and shoots are being worked. Work is intermittent.

The Rivera Bros. are active members of the Oracle Council, ASMOA.

George A Ballam

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA

OWNERS MINE REPORT

Date

Mine Morning Star Group

District Old Hat

Location Head of So. Belle Canyon

Former name

Owner Mrs.Elizabeth Lambert Wood

Address Oracle

Operator

Address

President

Gen. Mgr.

Mine Supt.

Mill Supt.

Principal Metals Gold

Men Employed

Production Rate

Mill: Type & Cap.

Power: Amt. & Type

Operations: Present None

Operations Planned

Number Claims, Title, etc. Morning Star, Happy Thot, Gold Bug, General Hancock, Careless Crosstown, mostly patented

Description: Topog. & Geog.
Same as So. Belle Group

Mine Workings: Amt. & Condition

None

(over)

Geology & Mineralization

Ore: Positive & Probable, Ore Dumps, Tailings

Mine, Mill Equipment & Flow Sheet

Road Conditions, Route Oracle to So. Belle Canyon

Water Supply Peppersauce Canyon

Brief History

Special Problems, Reports Filed

Remarks

If property for sale: Price, terms and address to negotiate.

Not for sale or lease

Signed Elizabeth Lambert Wood
By P. K. D.

Use additional sheets if necessary.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
OWNERS MINE REPORT

Date

Mine Morning Star Group

District Old Hat

Location Head of So. Belle Canyon

Former name

Owner Mrs Elizabeth Lambert Wood

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Use additional sheets if necessary.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA

MM - 79

OWNERS MINE REPORT

REPORT BY:
A. BRODIE CAMPBELL

Date May 9, 1942

1. Mine Morning Star Mine

2. Mining District & County Old Hat District, Pinal Co.

3. Former name

4. Location Old Hat District. 10 miles S. of Oracle on Mt. Lemon Rd.

5. Owner Mrs. Woodd

6. Address (Owner) Oracle, Arizona

7. Operator Rivera Bros.

8. Address (Operator) Oracle, Arizona

9. President

10. Gen. Mgr.

11. Mine Supt.

12. Mill Supt.

13. Principal Metals Scheelite. Some copper and lead as sulphides.

14. Men Employed 6

15. Production Rate 25 toons/week. 1,000 lbs concen @ 65% WO_3

16. Mill: Type & Cap. Gravity 1 ton/hr

17. Power: Amt. & Type Both electric & gas A pprox. 50 HP connected on power line from Oracle. Gas. Compressor at mine

18. Operations: Present

Mining & milling

19. Operations Planned Mine, mill & develop. There is a possibility that U. S. B. M. will drill this area to develop this property.

20. Number Claims, Title, etc. 1 patented claim

21. Description: Topography & Geography Rugged mountainous country 5000' elevation. Quite a good annual precipitation rate. Timbered country.

22. Mine Workings: Amt. & Condition Several thousand feet of workings in this Campo Bobito dist. Surface glory holes about 40 feet in depth at Rivira Calim. 75' drift about 50' below the glory hole. Not in too good condition.

(over)

23. Geology & Mineralization Quartz veins in contact zone of granite with sediments. (Shale quartzite, limestone and sandstone.) Veins contain scheelite, copper minerals in varying degrees of alteration and galena. Considerable faulting is present, but one vein is traceable for quite a distance - 400'. A faulted section of present commercial vein or another vein of same type is exposed 50' below. General structure is quite extensive.

24. Ore: Positive & Probable, Ore Dumps, Tailings

Might be considered as having 500 tons of questionable grade ore including tailings dump of about 200#. This does not include the whole area. It is highly probable that this section ~~that this section~~ is capable of considerable production if demanded.

24-A Vein Width, Length, Value, etc. UNKNOWN. The vein outcrops for several hundred feet to the west. No Tungsten has been found to the west. The same vein, or a similar one has been cut by a drift 75' lower and probably 175' NW that shows tungsten under the lamp.

25. Mine, Mill Equipment & Flow Sheet 240 cu ft portable compressor gas driven at mine. Flow sheet: Mine run to 5" x 11" jaw crusher. Undersize to 3' x 4' Herman mill. Mill discharges to two Plato tables. Makes three products. Tails pumped to storage. Concentrates dried, Midds. to re-grind. Mill is driven from 30 HP motor to line shaft. Tails and water are handled with individual motor drives.

26. Road Conditions, Route Good to within one and one-half miles of mill. Fair from there on. Go S. 5 miles on Oracle-Mt. Lemon road. At cross-roads where sign says Reddington turn west 1½ miles to mill.

27. Water Supply Fair at present. Sufficient water could be developed for almost any sized operation.

28. Brief History Mined as gold mine as early as 1908. Some scheelite came from this section in 1917-18. District may have produced as much as 1000 units WO_3.

29. Special Problems, Reports Filed Tungsten Deposits of Arizona, Wilson, 1941

30. Remarks This section has splendid possibilities for both low grade and hi-grade production. District would lend itself readily to diamond drilling for structure. It is probable that there is some tungsten in all contact quartz veins in this district. ~~Approximately~~ Proximity of limestone may have definite influence on grade of ore.

31. If property for sale: Price, terms and address to negotiate. Do not know.

32. Signed.....

33. Use additional sheets if necessary.

Morning Star Group

REPORT UPON THE

SOUTHERN BELLE GOLD PROPERTY

OLD HAT DISTRICT
PINAL COUNTY
ARIZONA

By

WILLIAM P. BLAKE

Geologist and Mining Engineer

April, 1906

SOUTHERN BELL GOLD PROPERTY.

The Southern Belle Gold Mines are situated at the head of the Southern Belle Canyon, gulch or arroyo, descending from the high ridges of the Santa Catalina Mountains on the North-eastern end of the range, in Pinal County, Arizona. They are in the Mining District known as the "Old Hat" and are accessible by wagon road or automobile from Tucson by way of Oracle, a distance of about forty-eight miles. This may be much lessened by the construction of a few miles of road through a low gap in the mountains.

The altitude is from 5,000 to 6,000 feet above sea, and the climate is extremely favorable to all mining operations.

EXTENT OF PROPERTY

The property consists of ten or more mining locations, some of which are secured by patent from the United States, and a ten stamp gold mill, and office and other buildings, besides a pumping plant and pipe line for the supply of water and the mill site.

One of the claims has been considerably worked in a desultory way, without adequate equipment or capital, and has been lying idle for some years past owing to the death of their owner and delays in the settlement of the estate.

There are two groups of locations or claims, the Southern Belle Group and the Morning Star Group, on the opposite or Northern side of the Southern Belle Ridge.

SOUTHERN BELLE GROUP OF CLAIMS:

Apache Girl	14.83 acres
Dolphin	19.37 "
Humming Bird	2.18 "
Southern Belle	19.77 "
Lewis	26.61 "

THE MORNING STAR GROUP:

Morning Star	20.35 acres
Happy Thot	20.35 "
Gold Bug	15.11 "
General Hancock	15.11 "
Total	153.68 "

The position of these several claims is shown upon the accompanying map, carefully made by Mr. Edward Dietrich from the surveys and notes upon the ground. It is upon the scale of .... feet to the inch, and shows the form and extent of the lode mined out, the position of the company's mill and other buildings.

NATURE OF THE VEIN:

The claims of the Southern Belle Group cover the larger part of the gold-bearing quartz vein of the same name, from which a large amount of gold has been taken out from one claim alone. It is a flat or "blanket" vein, cutting through the hills in a nearly horizontal plane, and cropping out in the hill sides in such a way as to be readily reached and opened by tunnels and drifts from the surface, without the need of shafts, pumps and other hoisting appliances. The slight dip of inclination of the vein, about 20 to 30 degrees in a northeasterly direction towards the mill, facilitates the extraction of ore and invites the mining by a succession of tunnels.

Three tunnels have been run in from the Southern Belle Canyon and upwards of 18,666 tons of quartz have been extracted from this claim and worked at the company's mill in the canyon below, averaging, so far as can be ascertained, about ten dollars a ton. It is simple, free milling quartz without injurious element, and the gold ie easily amalgamated on plates.

THE UPPER VEIN.

In the main stope of the Southern Belle Mine, extending into the Careless Claim ground, the mining has revealed the existence of an upper layer, or vein of quartz, separated from the lower vein by a few inches, or fact, in thickness of slate or shale. It is particularly evident in the highest stope, but has not been much mined. It is again well shown at the surface in a shallow cutting or pit above the entrance to tunnel No. 1, where it is five feet or more in thickness. Sample No. 10 was taken there, over two feet of the thickness, and showed a value of $15.00 per ton.

In many places the quartz of the lode is moer or less singled with the slatey wall rocks, and as the included layers of slate thick down the layers of quartz are united and the upper and lower veins become blended or merged in one.

The general thickness is over six feet, about four feet of quartz below and two feet above a parting layer of red shale.

In the estimate of the total thickness of the vein the general existence of an upper and lower layer is considered in averaging the thickness at five feet.

AMOUNT OF ORE MINED:

The extent of the extraction of ore is ascertained approximately by the measurement of the space left by the removed ore. The space or stope extends northerly and easterly through the Southern Belle Claim and into an adjoining claim known as the "Careless". The total length of the stope across the two claims is about 500 feet, and its width 160 feet in its widest part. Computing the area by squares of forty feet each and taking the average thickness of the quartz taken out at five feet and its weight at twelve cubic feet to the ton, we reach the total tonnage of 18,666 tons.

AMOUNT OF VEIN STANDING:

By a similar method of measurement the horizontal area and the tonnage upon all the claims is ascertained. It amounts to 637,500 tons. Subtracting the 18,666 tons mined, leaves 618,800 tons in round numbers as the amount standing in the vein within the present ascertained limits. There is reason to believe that the vein has greater extension and area in the Delphin Claim, not yet de-

veloped. It may extend southward through the main ridge under the great thickness of quartzite, which there forms the summit between the head of the Southern Belle Canyon and the upper tributaries of the Pepper Sauce Gulch.

VALUE AND EXTENT OF ORE.

The value of the ore has already been indicated in a general way as shown by the working of the mill. It is regretable that no record has been kept of the full number of tons worked and of the yield in gold per ton, or, if kept in any form, such records have been lost or destroyed. From W. Brzjevitch I learn that 713 tons of the quartz of this lode, packed over to a five stamp mill in Pepper Sauce Gulch in 1844, averaged $15.75 per ton. This was no doubt selected quartz and above the average in value. The gold was valued at $14.75 per ounce.

I am also informed that a trial run of 1,200 tons of quartz from the lode was made in the Southern Belle Mill by Wm. Brzjevitch. Of this lot 1,000 tons was first class selected ore, and 200 tons were from the low grade portions; the 1,000 tons averaged $9.33 per ton of gold saved.

Sampling upon such a vein is eminently unsatisfactory, inasmuch as large quantities of the quartz are required to gain an average. Mill tests of fifty or one hundred tons are far more reliable as regards an average.

Numerous tests by panning portions of the loose, broken ore were made, especially along the outcroppings upon the Apache Girl and the Crosstown at the higher croppings. Such tests were very satisfactory in showing the general presence of the metal in paying quantities at each of the openings. The gold is generally fine and free, any pyrites which formerly existed having been fully exided.

The heavy white powder which is formed with the gold by panning is the carbonate of lead resulting from the oxidization of the galena. It has been observed from the traces of lead ore are most abundant, the quartz is richer in gold than where there is no lead.

It is evident that in this mine and vein, as in all other gold bearing veins, the gold is most uniformly spread. It is not found in equal quantities everywhere in all portions of the lode. There are portions of the vein in streaks and patches consisting of high grade quartz, together with low grade portions which will not pay to extract. Consequently in mining and milling attention is given to the selection of the ore, such portions only as will pay being stoped and sent to the mill, while the barren quartz and any rock is used as filling.

As a rule, in the Southern Belle Mine, with but few exceptions the hard parts of the lode left standing in the tunnels and in some places in the stopes are low grade, and for this reason were not mined out.

The higher values are found in the upper stopes and upon the upper vein and at the croppings of the unworked vein on the Crosstown and Apache Girl Claims.

In the upper stope on the Careless, the samples showed a value of $11.40 per ton for thirty inches of quartz; another point five feet of quartz was found to be worth $4.40 per ton.

The coppings of the upper vein on the hill above Tunnel No. 1 were sampled for thickness of two feet and yielded at the rate of $15.00 per ton. This quartz also showed good value, indicating from $15.00 to $20.00 by the panning test. It is well to note that the average of four assays above given is $9.70.

Samples from the croppings of the eastern and of the Crosstown claim gave high results. At the north opening a thickness of two and a half feet of quartz, where free gold was seen, yielded at the rate of $30.40 per ton. A sample from the central opening (a photograph of which was taken) yielded at the rate of $164.20 per ton. This is exceptional and above the working average. Another sample of the southern opening, where the quartz is very hard and not much mineralized, gave only a trace. The average of the twenty-three samples from the ore ground is $10.80 per ton. I prefer, however, not to estimate the value at a higher figure than $8.00 per ton for the milling ore, a figure which I believe to be moderate and conservative and likely to be more than realized with proper working.

ORE OUT:

A large amount of the ore is available for immediate working, not along the stopes above the old mine, but in the upper vein near Tunnel No. 1 and at the open cuts at the lower end of the Crosstown claim, and around other workings.

It is believed to be possible to open into the lower portions of the vein on the Careless claim by a short tunnel run in from the ravine north of the mill, at a distance of only ninety-five feet, and part of this through the rotten diorite rock, easily excavated. The position of this suggested tunnel and tramway or chute to the Crusher floor of the mill is indicated by the red lines upon the map. It will not only provide a shorter and more economical and convenient outlet for the mine, but will also have the greatest advantage of being put below the mouths of tunnels upon the claim known as the Humming Bird, where good quartz is exposed.

It is not possible to exactly compute the value of the large area of unworked vein in the two claims extending up the hill to the croppings to the westward (the Crosstown Claim and the Apache Girl). The vein at the croppings at both ends and where exposed along the hillside prospects assays well, and it is fair to assume that the pay is continuous from one end to the other of this exposure. Not,however, limiting the estimate to these two claims, but including the whole of the unworked area of 618,000 tons and allowing one half of it for barren ground, we have approximately 309,400 tons worth, gross, at $8.00 per ton, $2,475,200.

COST OF MINING AND MILLING:

In the future working of the property I strongly advise beginning the mining at the lowest point and the extension of the mining upwards and backwards from the main outlet, much in the manner of coal mining or drift mining, piling the waste quartz and rock behind, thus largely avoiding the use of timbers, while the roof is well supported by the filling.

Transportation to the mill may be by tramway, or by an aerial tramway, or by wire transmission. With these and other labor saving adjuncts and the complete equipment of the mill, the cost of mining and milling should not exceed $4.00 per ton.

THE MILL:

The company's mill of ten stamps of modern construction is conveniently located below the chief part of the mines on the main arroyo or gulch of the Southern Belle. It is so placed that ore from the lowest tunnels can be delivered by a chute to the top of the mill, high enough for a rock breaker or crusher and the required grizzlys and a bin above the self feeders, of which there are two.

There is no rock breaker but one is essential to successful, economical work. The needed pulleys are there and a counter shaft and breaker can be readily installed.

The mortars appear to be in good order. The amalgamated aprons are in good condition. There are two at each end of the bettery, each twelve feet long.

The power is supplied by a 40 h.p. steam engine. The boiler is tubular, of locomotive type, and is set in adobe. Wood, which can be had in abundance at from $4.00 to $5.00 per cord, is used for fuel. The boiler should be inspected and tested before using.

There are many tools and adjuncts of the mill, among them a differential pulley, dies for cutting threads on pipes, blacksmiths tools, some carpenter's tools and many striking hammers, drills, bars, picks and gads for mining.

Additional belting will be required for the mill when the rock breaker is added, and when a breaker is added the capacity per stamp per day of twenty-four hours should at least be three tons.

The general arrangement of the interior of the mill and its appearance is well shown by the annexed photograph taken by Mr. Frank Dietrich, by the aid of the magnesium flash light.

It will be necessary to renew the battery blocks, which are badly decayed. It would be well to make a substantial concrete grouting block to take the place of the wood without the necessity of moving the mortars from the place; all the decayed wood being removed while the mortars are blocked up or otherwise supported by the frame during the making of the cement block.

WATER SUPPLY:

The water for the mill is obtained at the Southern Belle Millsite from a well and underground flow in the gulch known as Pepper Sauce, about a mile northeast, where there is a good flow throughout the year. The location is picturesquely chosen in a dense grove of sycamore, ash, walnut, mulberry, cottonwood, and other trees, which, by their size and luxuriant growth, bear witness to an abundant and continuous water supply.

Pepper Sauce Creek drains the extensive water shed between Mt. Rice and Apache Peak, opposite to the sources of the Canada del Oro. The amount of water flowing at the time of my visit, visibly, was two feet wide and a depth of one inch. This, of course, did not show the amount of the underground flow. The well, sunk at one side of the channel, is cribbed and planked, but requires repairs and cleaning. I believe that there is water sufficient for the ten stamp mill.

The pump, a Worthington Duplex, No. 18,760 is 7 1/2 inches by 3 by 10 inches. It is in fair condition but needs to be taken apart and cleaned and oiled. It rests upon a timber foundation a few feet higher than the top of the well and is operated by steam from a wood burning locomotive boiler. There are from twenty to twenty-five cords of seasoned wood on hand.

The barometer at the well and pump indicates a difference of 600 feet below the mill. The summit pump on the pipe is said to be 750 feet above the pump. From that point the water descends to the mill by gravity.

The three inch wrought iron pipe is, in part, in poor condition and requires

renewing. There are some twenty-five lengths of unused pipe on hand.

GEOLOGY OF THE SOUTHERN BELLE:

The geological structure of the ridge out by the Southern Belle gold ledge is extremely interesting, and taken in connection with the adjoining areas, forms a very instructive chapter in the hisory of the earth.

From the testimony of fossils found by me near the Southern Belle (chiefly corals of marine growth) it appears that the stratified rocks in which the vein occurs are Devonian or Silurian, two of the older formations of the globe. These rocks in the Southern Belle Canyon consist of a series of shales, red sand stones, grey sandstone, quartzite and limestone, underlaid and apparently uplifted by an intrusion of diorite. This rock rising from the depths of the earth has hardened and altered the softer formation with which it came in contact, and appears to have caused the quartz vein and its impregnations with gold.

The existing conditions warrant the conclusion that the Southern Belle lode formerly had a much wider extension than we now find, that it extended over a large part of the region drained by the present canyon following generally the plains of contact of the lower shales with the diorite, and that it has been cut through, eroded and denuded by the drainage of the main canyon and its branches, leaving the edges of the blanket ledge exposed as we find them, while the portions of the ledge cut away have been carried to lower levels, broken up and the gold dislodged to form the placer deposits which line the canyon from the summit of the vein to the mesa, two miles away.

This cutting out by the canyon forms a fine section of the rock formation from one end of it to the other, showing the edges of the uplifted strata, below and above the vein, all dipping regularly eastward, at from 15 to 25 degress. This is the best illustrated by a section from the summit of the mountain to the mesa, a reduced copy of which is herewith presented.

SECTION OF THE FORMATION
AS SHOWN IN THE SOUTHERN BELLE CANYON

I also append a geological map of the Old Hat Mining District from my own exploration and observation, made during my recent and former visits. This shows the topographical distribution of the formations and their relations to the Southern Belle and other groups of mines.

The lowest substratum or foundation for the strata is the coarse, grey, porphyritic granite of Oracle, the "oracle granite", which covers a wide area in the northern and central parts of the Old Hat District. This is traversed by heavy intrusive masses or dykes of diorite, by which the stratified formations have been uplifted, and to a varying degree altered by hardening and by the flow of silicious water forming the quartz veins.

THE MORNING STAR GROUP:

This group of several claims is north and west of the Southern Belle lode, and the claims cover a different system of lodes. I find there a series of massive croppings of quartz resembling reefs of quartzite at and near the contact of the older limestone and granite.

These claims have little development and are in the conditions of prospects.

(Signed) Wm. P. Blake

MAUDINA TUNGSTEN MINE
AND
MORNING STAR MINE

PINAL COUNTY, ARIZONA

SCALE

0 40 80 120 feet

CONTOUR INTERVAL 10'

P C Bateman and M P Erickson
2-18-44

al Alluvium

WO3 Mineralization

q Quartz and silicified marble

g Granite

m Marble

qtzt Quartzite

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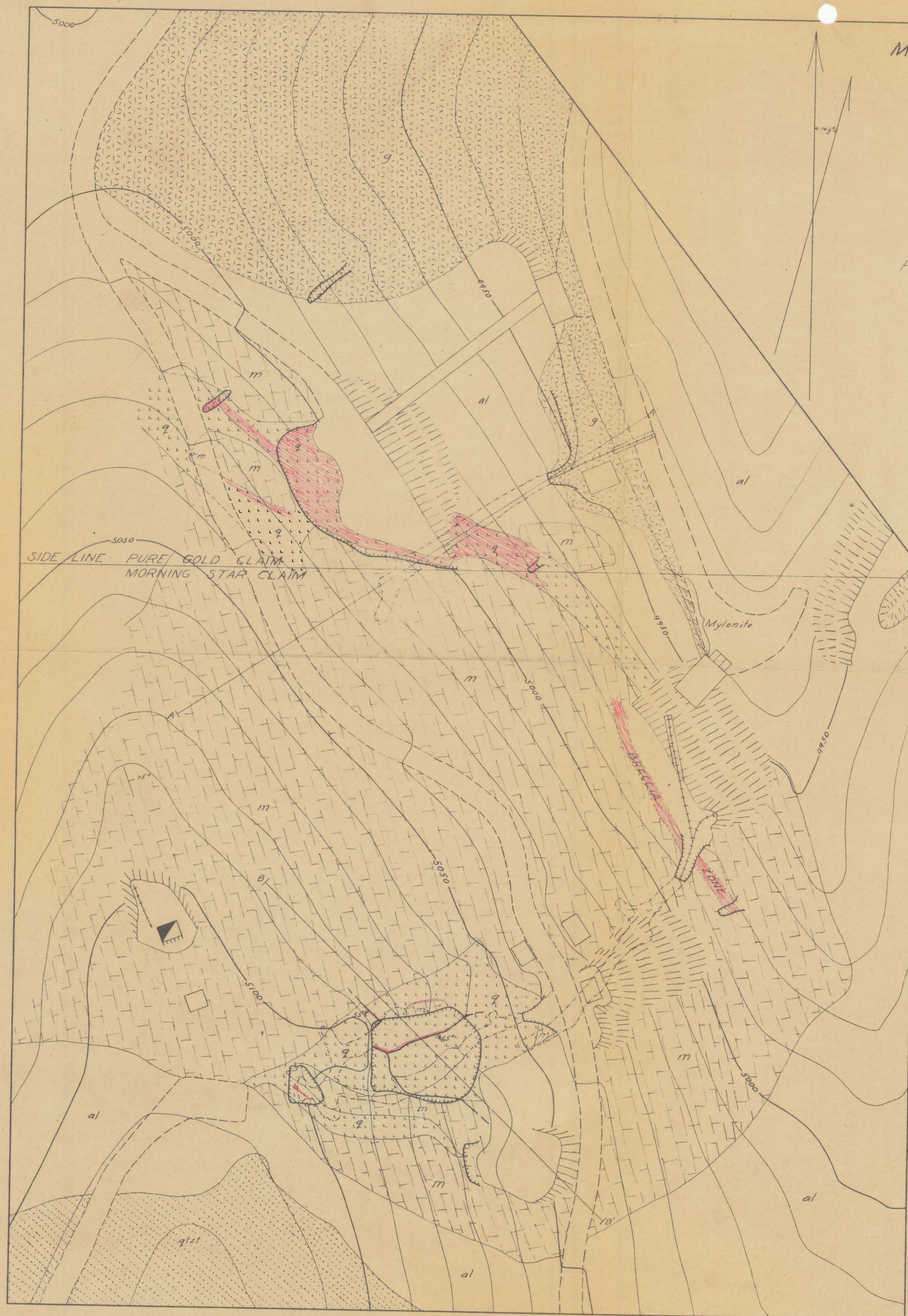
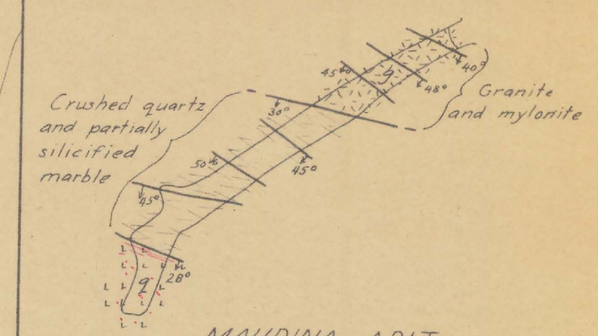
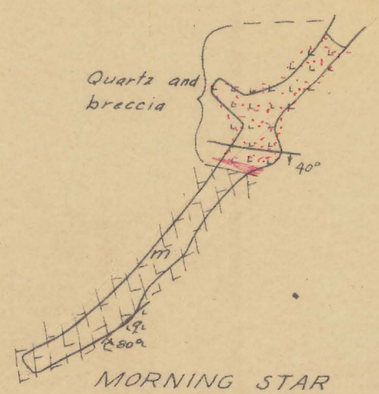
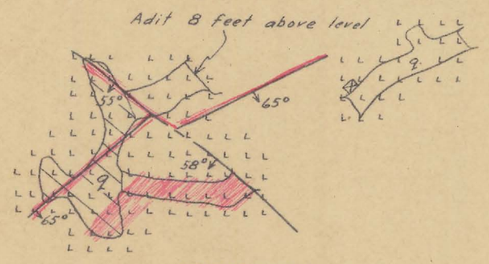




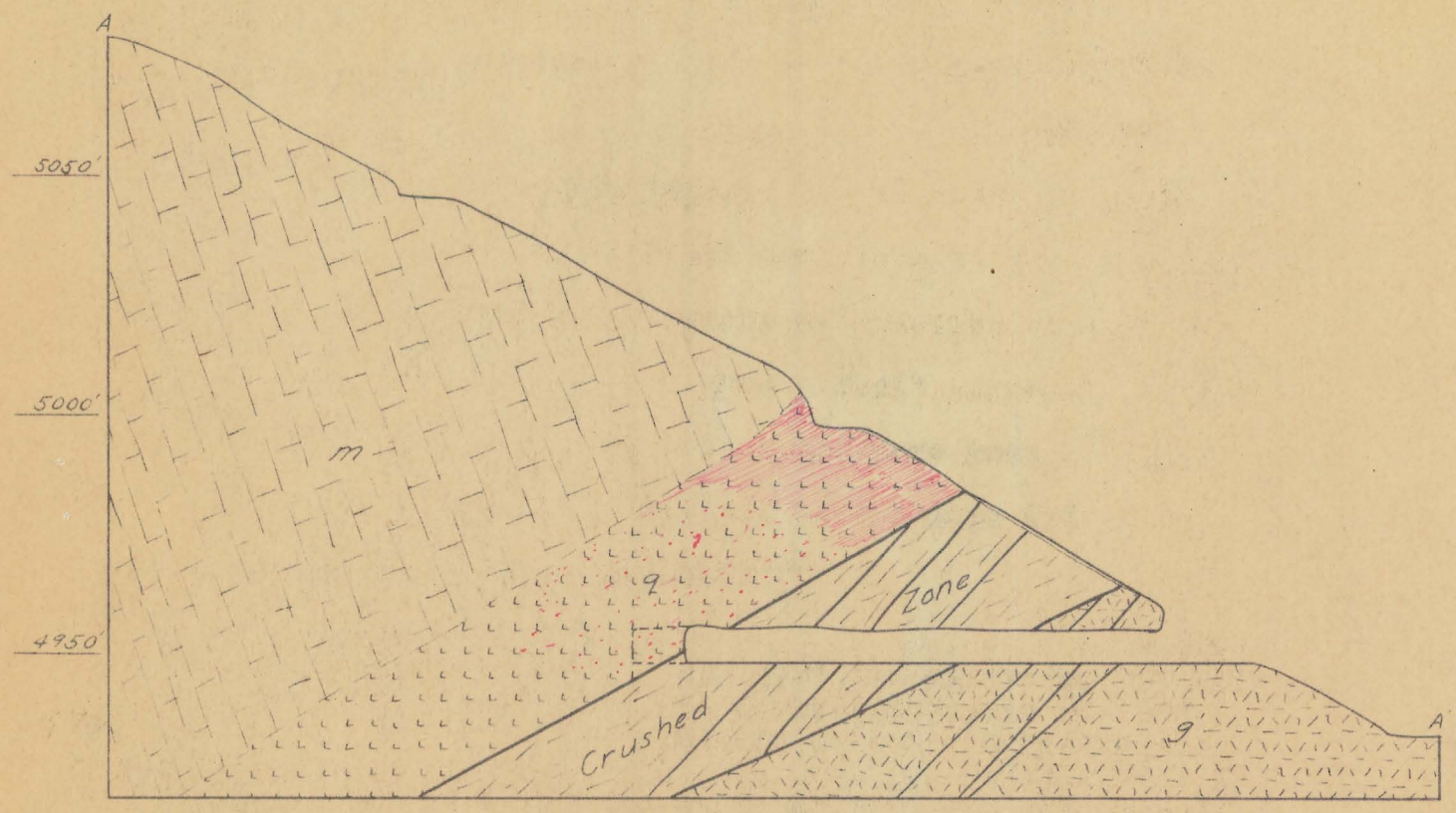
MAUDINA ADIT



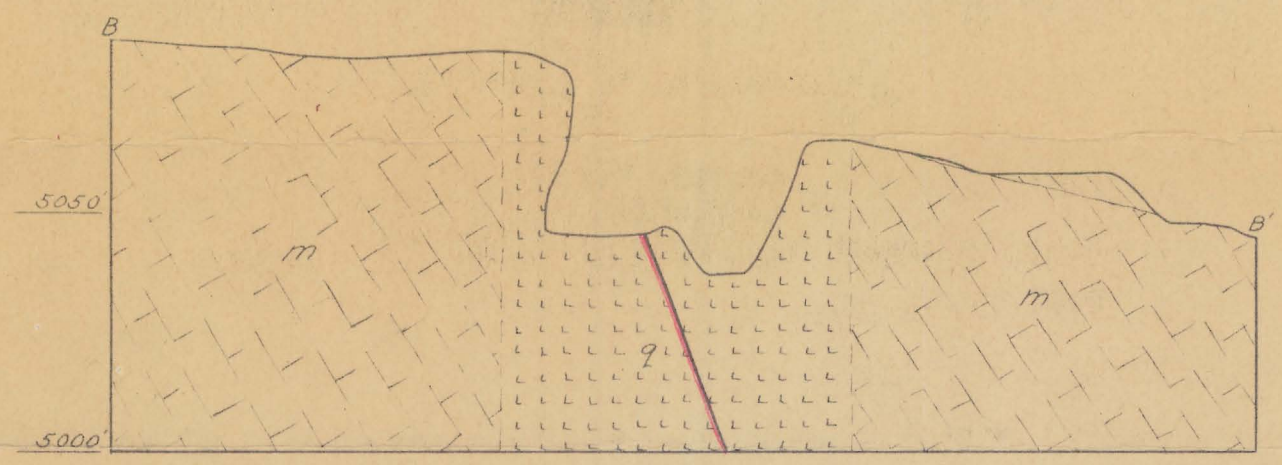
MORNING STAR
LOWER ADIT



MORNING STAR
GLORY HOLE LEVEL



SECTION A - A'



SECTION B - B'

MAUDINA TUNGSTEN MINE
AND
MORNING STAR MINE

PINAL COUNTY, ARIZONA

al — Alluvium

WO_3 Mineralization

q — Quartz

g — Granite

m — Marble

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ONLY

SCALE

0 40 80 120 feet

P C Bateman and M P Erickson
2-16-44