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PRINTED: 01/02/2004

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: MONTE CRISTO MINE AND MILL

ALTERNATE NAMES:
JULIAN MERGER MINING
AMETHYST VEIN

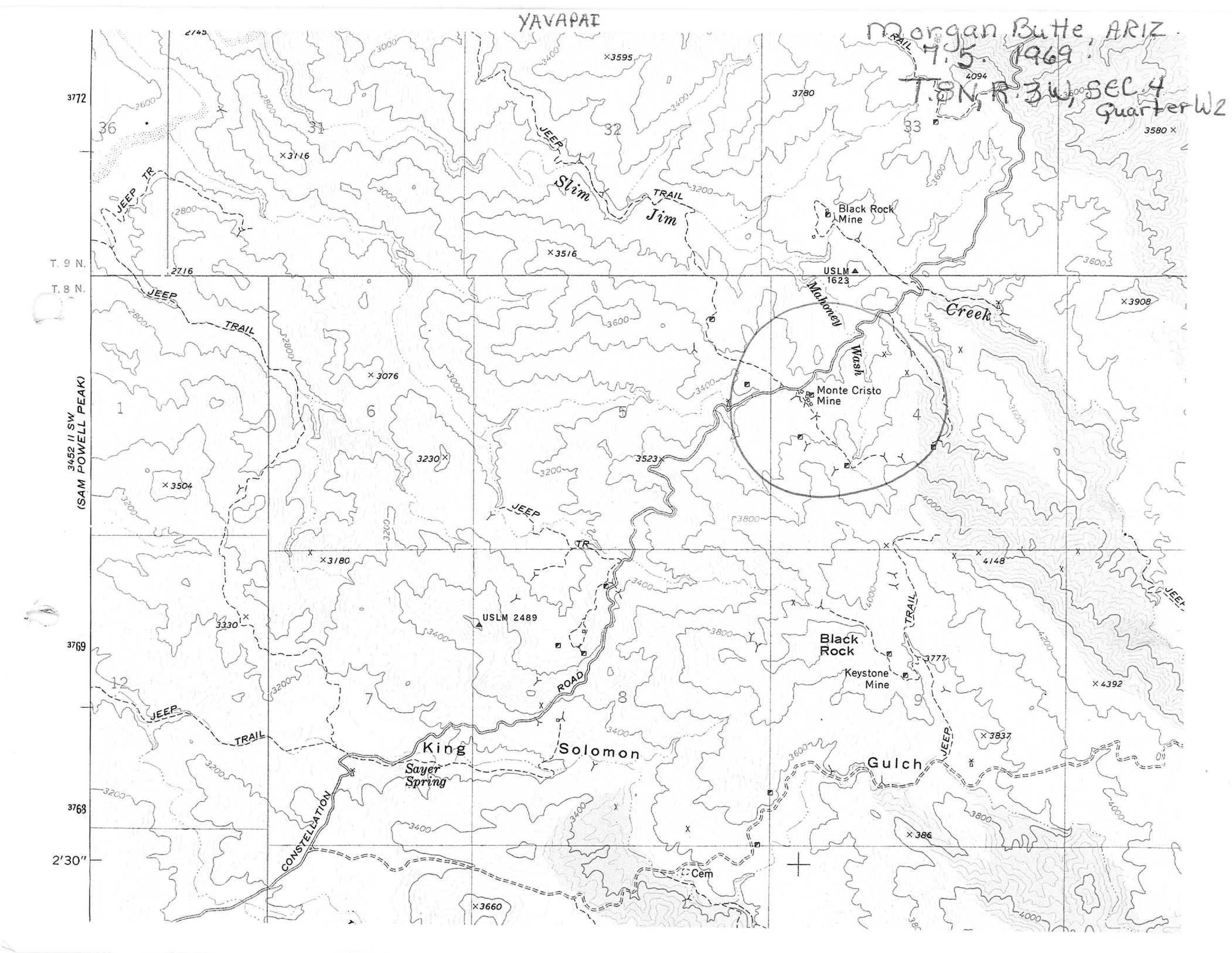
YAVAPAI COUNTY MILS NUMBER: 365A

LOCATION: TOWNSHIP 8 N RANGE 3 W SECTION 4 QUARTER W2
LATITUDE: N 34DEG 03MIN 51SEC LONGITUDE: W 112DEG 34MIN 28SEC
TOPO MAP NAME: MORGAN BUTTE - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:
SILVER
COPPER OXIDE
NICKEL
IRON
GOLD

BIBLIOGRAPHY:
USGS MORGAN BUTTE QUAD
USGS MINERAL RES OF U.S. PRT 1, P 182; 1907
ADMMR MONTE CRISTO (BLACK ROCK) COLVO FILE
BILBREY, J.H. JR. USBM IC 8103 1962, P 28
ADMMR MONTE CRISTO MINE AND MILL FILE
USGS BULL 735 CONT. TO ECON. GEOL. 1922 P 131
WEED, W.H. MINES HANDBOOK VOL XIV 1920 P 360
CLAIMS EXTEND INTO SEC. 4


YAVAPAI
Morgan Butte, ARIZ.
7.5. 1969
T.8N, R.3W, SEC.4
Quarter W2
Slim
Jim
TRAIL
JEEP TR
JEEP TRAIL
Black Rock Mine
USLM 1623
Mahoney Wash
Creek
Monte Cristo Mine
USLM 2489
Black Rock
Keystone Mine
ROAD
King
Solomon
Sayer Spring
Gulch
CONSTELLATION
Cem
T. 9 N.
T. 8 N.
3452 II SW
(SAM POWELL PEAK)
2'30"

ARU_AGE	PROT SAME AS N30|PALEO-MIO UNDATED, PROBABLY MID-TERTIARY
ARU_NAME	UNNAMED GRANODIORITE, GRANITE|UNNAMED RHYOLITE, ANDESITE(?) DIKES
CONT_CODE	NA
GEOL_COM	DEPOSIT IS HIGH-ANGLE QUARTZ VEIN WHICH IS ASSOCIATEED WITH RHYOLITE OR ANDESITE DIKES OF PROBABLE MID-TERTIARY AGE THAT CUT PRECAMBRIAN IGNEOUS AND METAMORPHI C ROCKS
GEN_COM	A PRIMARY NATIVE-SILVER DEPOSIT ; INFO.SRC : 1 PUB LIT
REF	BASTIN, E.S., 1922 , PRIMARY NATIVE-SILVER ORES NEAR WICKENBURG, ARIZONA; U.S.G.S. BULLETIN 735 - E.
CONT_NAME	NORTH AMERICA
STATE_NAME	ARIZONA
WORK_TYPE	U
CP_ITEM	AG
CP_ACC	EST
CP_AMT	15.000
CP_U	DOLLARS
CP_YEAR	1926 - 1927
AP_SOURCE	A.B.M. BULLETIN 140 , P. 103 .
UPD_DATE	81 10
UPDATER	JOHNSON, K. H.; CREASEY, S. C.; LARABA, PETER (DEWITT, ED)
COMMOD_TYP	M
DATE_ISSUE	95/5/18
PROF_ID	100
PROF_LOC	100
PF_COMMOD	100
PROF_EXPL	50
PFDESC_DEP	50
PFDESC_WRK	100
PROF_GEOL	92
PROF_REF	100
PPROD_RESV	13
PROF_ALL	78
HR_AGE_MV	PROT,TERT UNDATED, BUT PROBABLY 1750 MILLION YEARS AND OLDER ; UNDATED, PROBABLY PALEOCENE - MIOCENE
HR_TYPE_MV	GRANODIORITE, GRANITIC GNEISS, SCHIST; RHYOLITE, ANDESITE
AR_AGE_MV	PROT,TERT SAME AS K1
AR_TYPE_MV	GRANODIORITE, GRANITE; RHYOLITE, ANDESITE (?)
DEP_CODE	11200
HUC	15070103

From USGS DDS 20 MRDS database

RECNO	M003309
REC_TYPE	S
REP_DATE	79 04
REP	HALL, R. K.; CREASEY, S. C.
REP_AFF	USGS
DIST	BLACK ROCK DISTRICT
COUNTY	YAVAPAI
STATE_CODE	AZ
CTRY_CODE	US
PHYS	11
DRAIN	15070103
QUAD1	MORGAN BUTTE
Q1_SCALE	24000
ELEV	3440 FT
UTM_N	3770300
UTM_E	353960
UTM_Z	+12
TOWNSHIP	008N
RANGE	003W
SECTION	04
SECT_FRACT	NW
MERIDIAN	G&SR
POSITION	12 1/2 MI BY ROAD NE OF WICKENBURG
LOCATION	UTM TO MAIN SHAFT ON MAP
SITE	MONTE CRISTO MINE
LAT	34.0650
LONG	-112.5825
CTRY_NAME	UNITED STATES
COMMOD	AG CU AU NI CO AS
ORE_MAT	NATIVE SILVER, ARGENTITE; CHALCOPYRITE, PYRITE, ARSENOPYRITE, TENNANTITE, CHLOANTHITE, NICCOLITE
GAD	TWO SAMPLES: 17.75 & 18 % CU, 29 & 44 OZ. AG/TON, $3.60 & $3.68 AU/TON
MAJOR	AG
MINOR	CU AU
CLH_USE	95/02/22
TRACE	NI CO AS
PROD	S
LOC_STRUCT	VEINS (AND GENETICALLY-RELATED(?)) DIKES TREND N10W TO N40W AND CROSSCUT PRECAMBRIAN FABRIC
STATUS	8
DEP_TYPE	VEIN/SHEAR ZONE
DEP_FORM	BANDS/LENSES
MAX_WID	15
M_W_U	FT
DEP_SIZE	S
STRIKE	NW
DIP	50 SW
DDESC_COM	TWO VEINS
QUAD250	PRESCOTT
DEPTH_WK	1100
D_W_U	FT
MIN_AGE	PALEO-MIO UNDATED PROBABLY MID-TERT
NORE_MINS	QUARTZ
ORE_CNTL	FAULTING, SHEARING IGNEOUS ACTIVITY - DIKES
REG_STRUCT	FOLIATION IN PRECAMBRIAN SCHIST AND GNEISS TRENDS N25E TO N65E
ALTER	MINOR TO NONE
CONC	OXIDATION AT NEAR SURFACE
HRU_AGE	PROT UNDATED, PROBABLY 1750 MILLION YEARS OR OLDER
HRU_NAME	UNNAMED GNEISS, SCHIST

MONTE CRISTO MINE & MILL

T8N R3W
Sec. 5?
4

YAVAPAI COUNTY

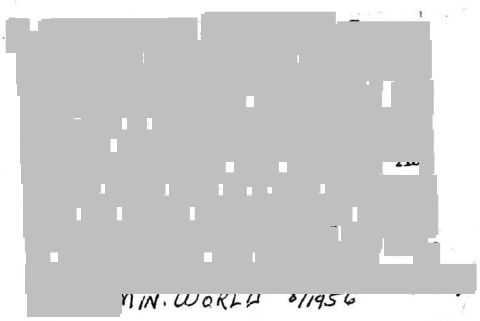
USGS Bull. 735 p. 131

IC 8103 p. 28

1937 Mines Register p. 605

A.L. Flagg vanadium reports - Book VI

Ariz. Mining Journal, Dec., 1918, p. 7



MIN. WORLD 8/1956

PAY DIRT 7/1970

NAME OF MINE: MONTE CRISTO
OWNER:

COUNTY: Yavapai
DISTRICT:
METALS: ~~Rare metals~~ Cu, Au, Ag

Date:	OPERATOR AND ADDRESS	Date:	MINE STATUS
4/45	Franklin E. Wallace, Wickenburg	4/45 10/46	Mill testing Developing

[redacted]

Mining Journal 6/30/28

7- 8-52

R. M. WRIGHT of

HUNTER SECURITIES CORPORATION
52 Broadway, N. Y. 4, N. Y.

States they have acquired this property [redacted]

M. WORLD 3/55

NEWS ITEM
Received in office Oct. 14, 1954

International Ore Corp., D. W. Simpson, Pres. and Genl Mgr., 2nd and Jackson Str. Wickenburg is unwatering the Monte Cristo Mine 16 miles east of Wickenburg, for the purpose of sampling and exploration. 4 men are presently employed.

MARK GEMMILL

Property is inactive. MARK GEMMILL, May 27, 1957

DEPARTMENT OF MINERAL RESOURCES.

News Items ✓

Date Aug. 12, 39

Mine Monte Cristo

Location 15 miles east

Owner Wickenburg

Address

Operating Co. No activity

Address

Pres. Awaiting engineers for examination

Genl. Mgr.

Mine Supt.

Mill Supt.

Principal Metals Silver - Gold

Men Employed

Production Rate

Mill, Type & Capacity

Power, Amt. & Type

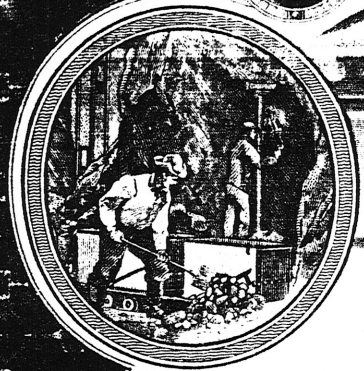
Signed Barth

(Over)

No.

INCORPORATED UNDER THE LAWS OF THE STATE OF UTAH

SHARES



Monte Christo Gold Silver Co.

5,000,000 SHARES $500,000.00

THIS CERTIFIES that CURTIS VARNAM is the owner of - - - - - - - TWO HUNDRED FIFTY- - - - - - - Shares of the Capital Stock of MONTE CHRISTO GOLD SILVER CO.

Transferable only on the Books of the Corporation in person or by Attorney on surrender of this Certificate properly endorsed.

In Witness Whereof, the duly authorized officers of this Corporation have hereunto subscribed their names and caused the corporate Seal to be hereto affixed.

This 17TH day of JUNE A.D. 19 35

NOTICE. THE SIGNATURE OF THIS ASSIGNMENT MUST CORRESPOND WITH THE NAME AS WRITTEN UPON THE FACE OF THE CERTIFICATE, IN EVERY PARTICULAR WITHOUT ALTERATION OR ENLARGEMENT OR ANY CHANGE WHATEVER.

For Value Received, ________ hereby sell, assign and transfer unto ________ Shares of the Capital Stock represented by the within Certificate, and do hereby irrevocably constitute and appoint ________ to transfer the said Stock on the books of the within named Corporation with full power of substitution in the premises.

Dated ________ 19__

In presence of

CERTIFICATE

FOR

SHARES

OF THE

Capital Stock

OF

Monte Christo Gold Silver Co.

ISSUED TO

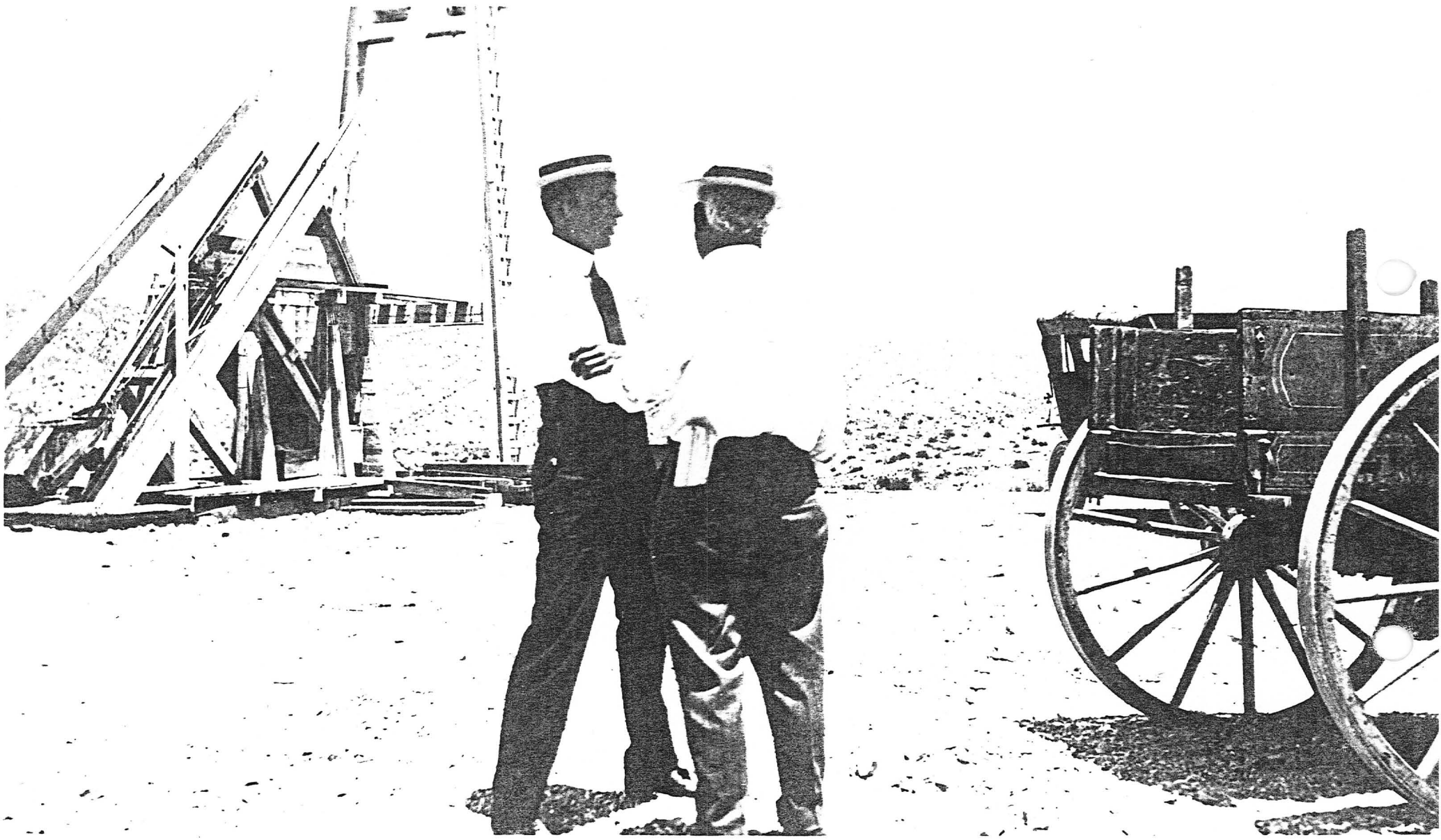
DATE

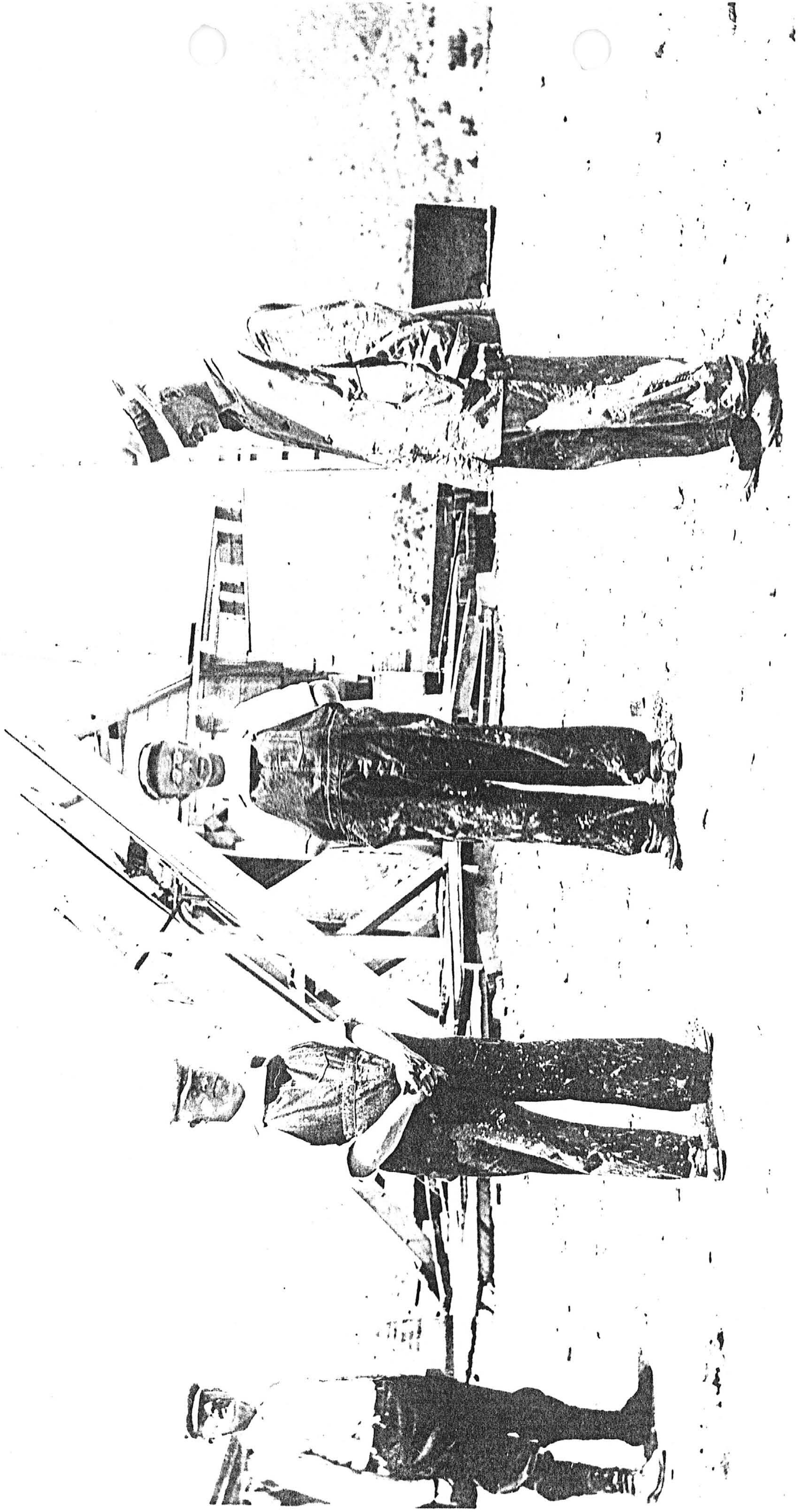
PAID
ASSESSMENT No. 4
[illegible]
Cert. No. 3577
Monte Christo Gold Silver Co.
By [illegible] Secretary

PAID
ASSESSMENT NO. 1
AUG 30 1935
CERT. No. 3577
MONTE CHRISTO GOLD SILVER CO.
BY [illegible] SECRETARY

PAID
ASSESSMENT No. 2
2/18/36
Cert. No. 3577
Monte Christo Gold Silver Co.
By [illegible] Secretary

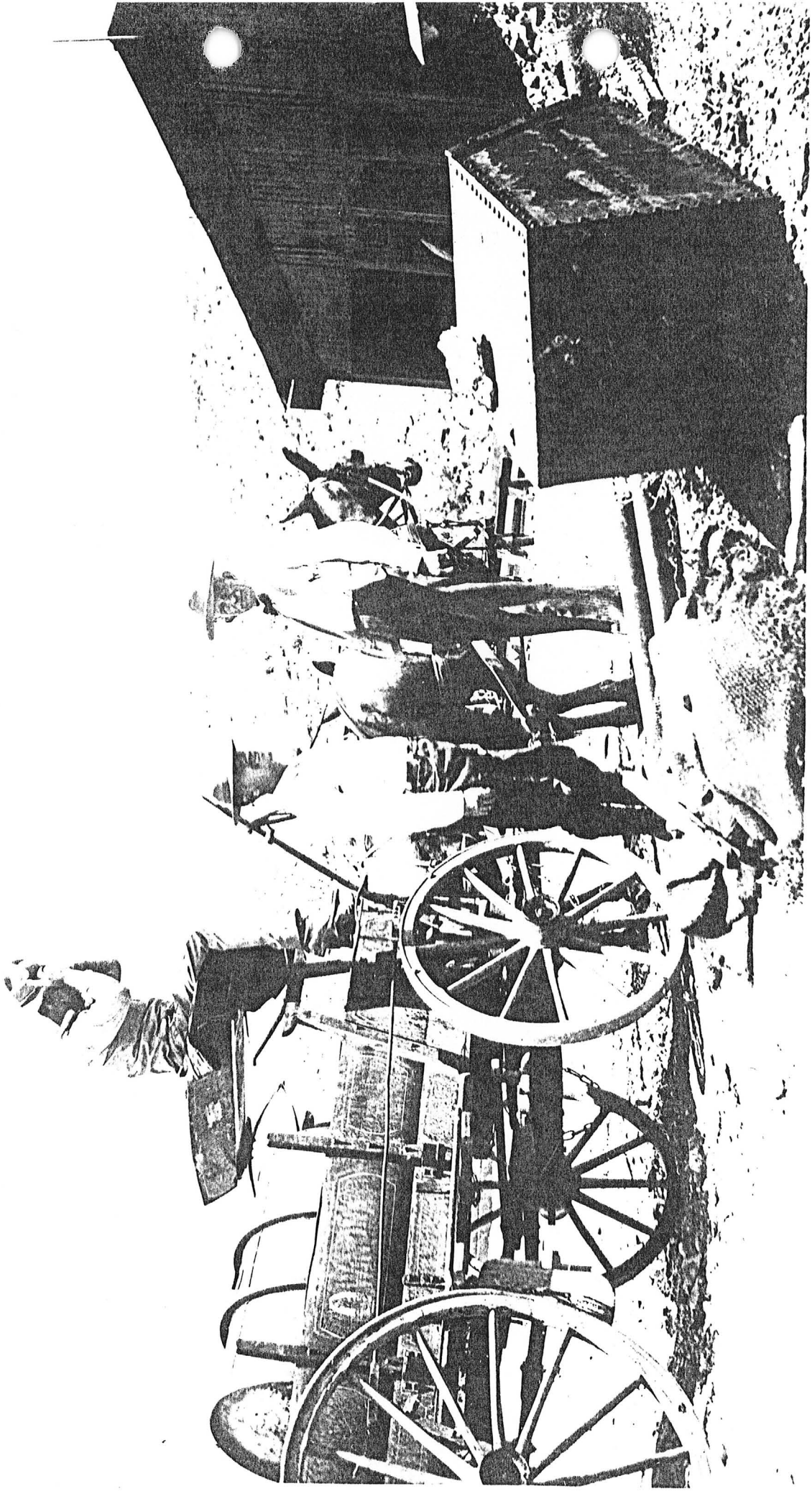
PAID
ASSESSMENT No. 3
6/ /36
Cert. No. 3577
Monte Christo Gold Silver Co.
By [illegible] Secretary





A-124-2

1912



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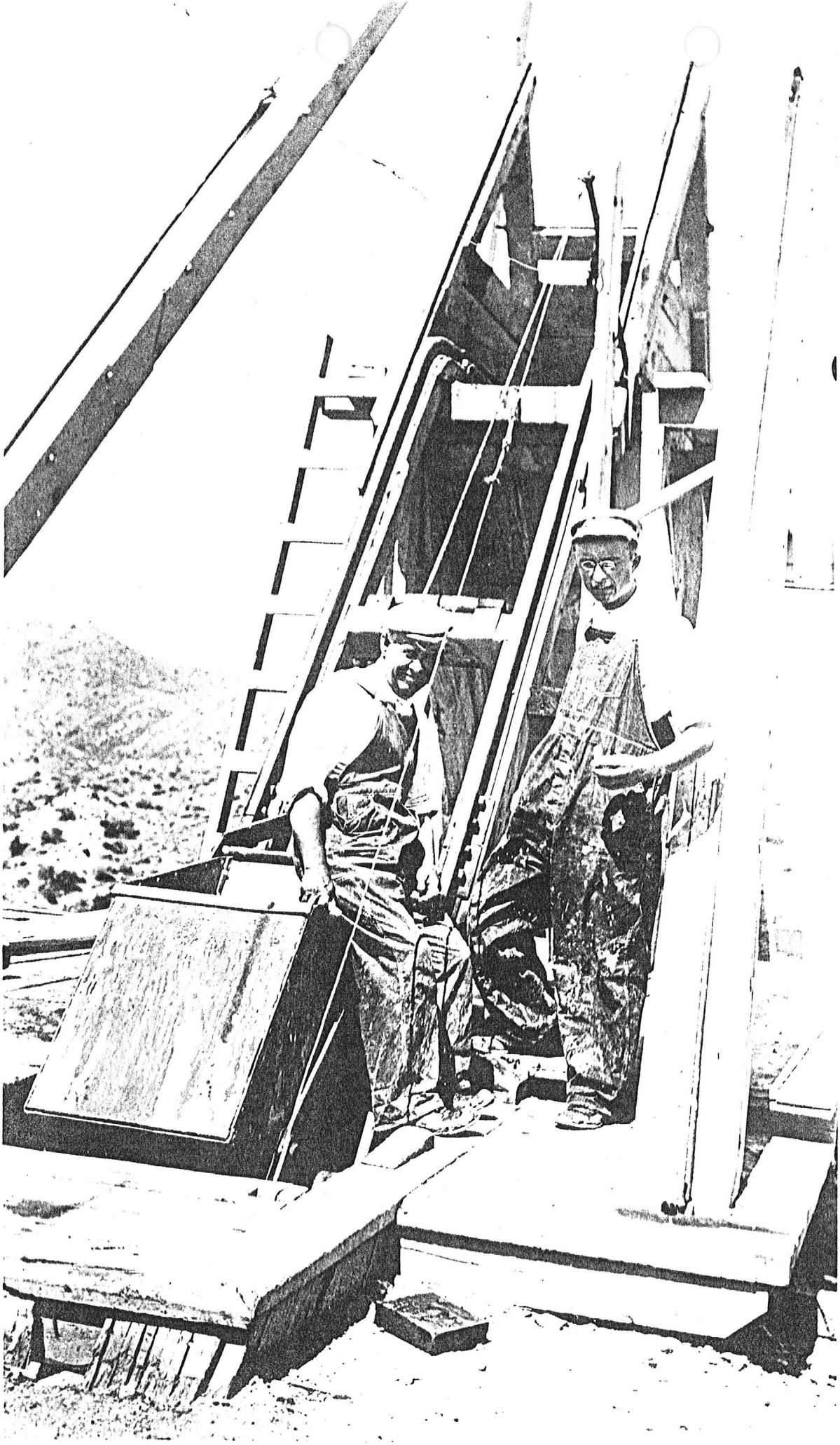

A-124-5

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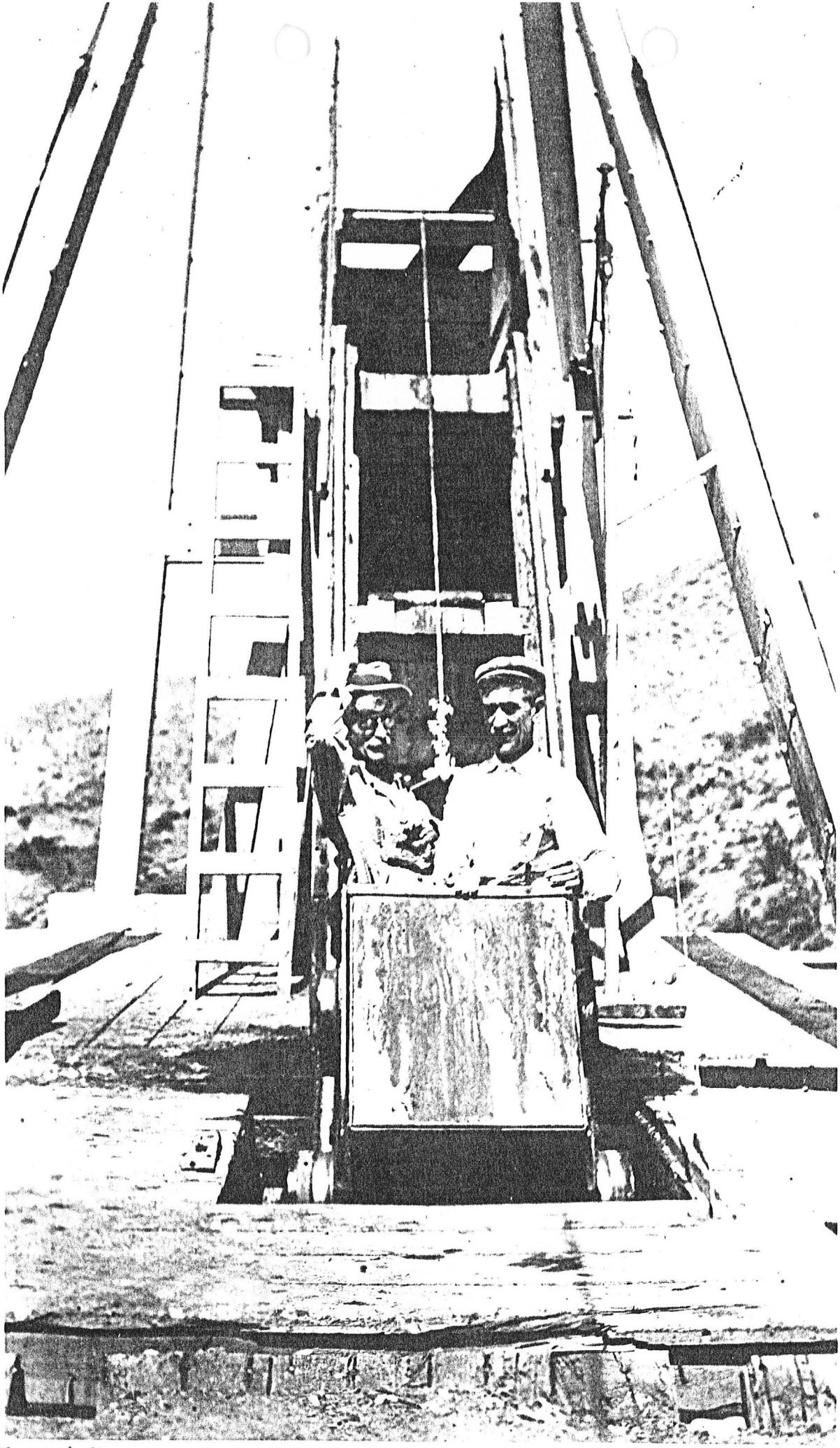

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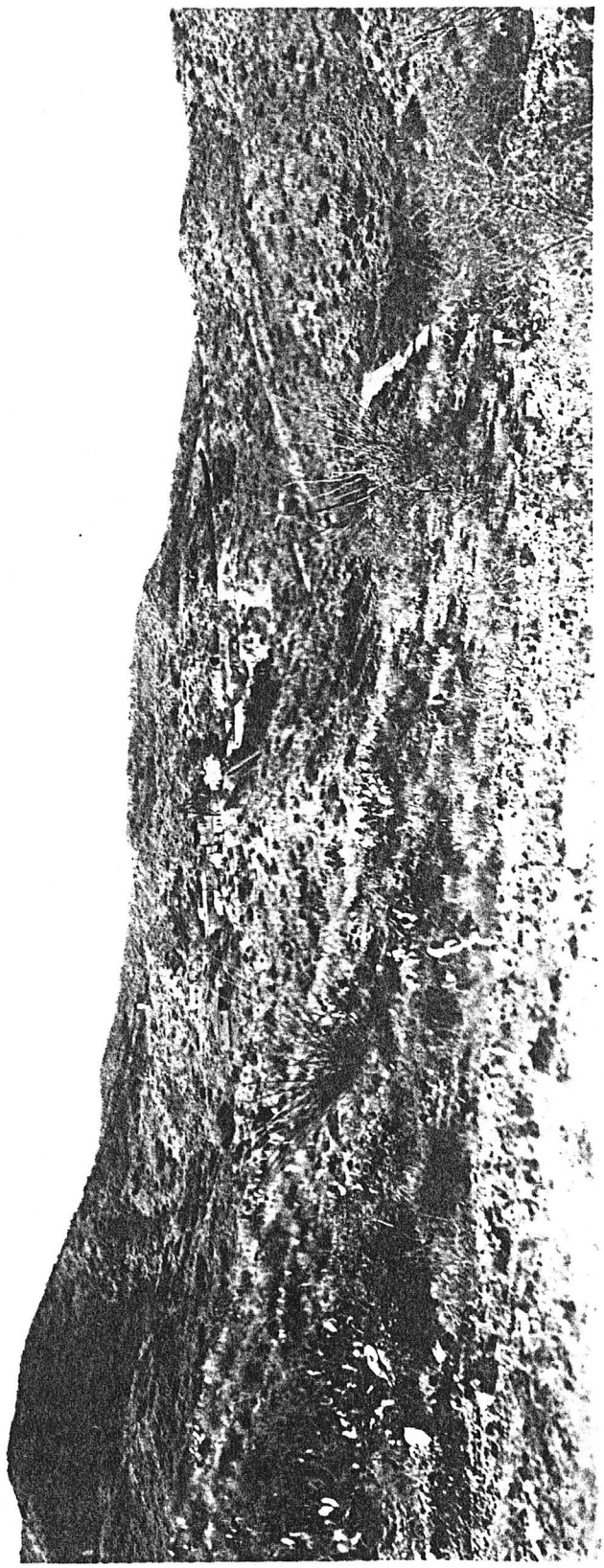
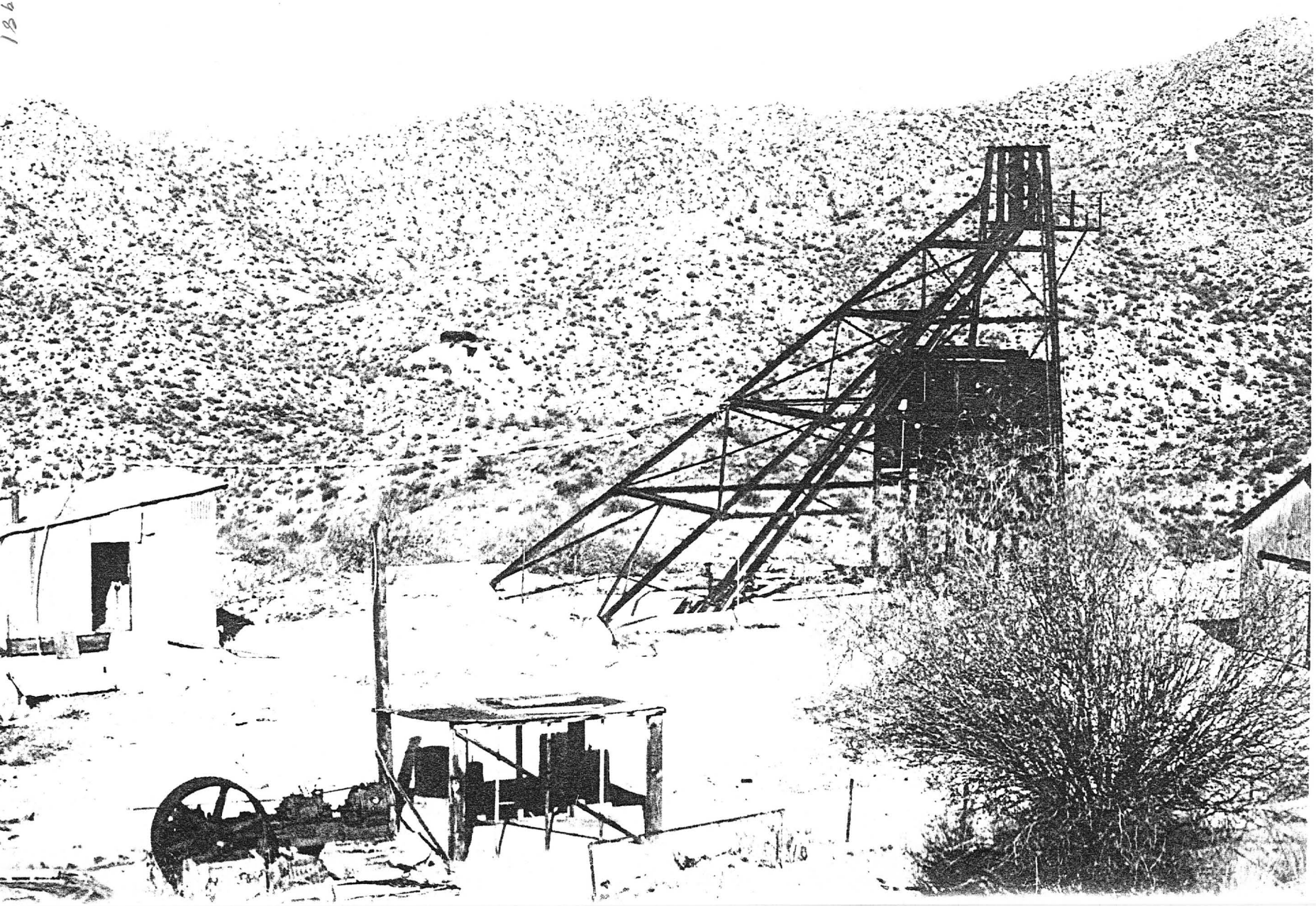


MONTE CRISTO MINE



MONTE CRISTO MINES

OWNED BY

MONTE CHRISTO GOLD SILVER COMPANY

CONSTELLATION

YAVAPAI COUNTY

ARIZONA

1932

CLIMATE

The climate is characteristic of this desert region; hot and dry during the summer months and clear and bracing throughout the rest of the year and work can be carried on throughout the entire year.

LABOR

There is an abundant supply of intelligent labor available at the prevailing low wage scale. There are no labor troubles, and the State Compensation Law protects the employer from excessive damage claims in case of accidents.

WATER

There is an abundant flow of water in the main workings of the mine for milling and general use. This flow is, normally, about 25,000 gallons daily, and during the past five years since the mines were operated some 3,000,000 gallons of water have accumulated in the lower levels of the main workings. The water level in these workings has risen to a point between the 300 and 400 foot levels. This reserve of mine water can be utilized when milling operations are started and constitutes a considerable asset.

There is an ample supply of drinking water available in an adit some 2,000 feet to the southeast of the camp and at a higher level, from where it can be brought to the camp by a gravity pipeline. This water has been analyzed and found to contain no harmful elements. In case of a shortage of domestic water from this source, there is a more abundant supply available on the property about one mile to the northeast, from which point it can be brought to the camp by pumping.

IMPROVEMENTS

The property has been extensively improved by the installation of a high-tension electric power line 43 miles in length from Prescott at a cost of over $100,000.00. Under the repurchase of this line by the Power Company there should be no power bills to pay for a period of five years, at the normal rate of power consumption.

Aside from this, there is a modern camp with 11 buildings in good repair. There is a boarding house equipped to care for 100 men and sleeping accommodations for any crew of workmen that might be employed. There are several cottages with water and sewers, wired for electric lights, offices, machine and blacksmith shop, headframe, hoist and building, garages, storehouses, tools, etc. representing an investment of some $150,000.00 in addition to the power line.

REPORT

ON THE

MONTE CRISTO MINES

CONSTELLATION, YAVAPAI COUNTY, ARIZONA

By

FRANCIS E. AGNEW, *Mining Engineer*

Gentlemen:

I submit herewith the following report on the Monte Cristo Group of Mines showing their condition as of this date, together with plan of operation of the property.

LOCATION

This group of mines is located 12½ miles east of Wickenburg, Yavapai County, Arizona, a junction point on the Santa Fe Railway, [illegible] Phoenix, the State Capital.

DESCRIPTION OF PROPERTY

This property consists of 43 lo[illegible] in a contiguous group, with a su[illegible] 800 acres, held by location and assessment. [illegible] is good and the assessment work for the year 1931-32 has been performed and proof of labor has been duly recorded at Prescott, the County Seat of Yavapai County. Assessment work for the ensuing year 1932-33 has been waived by Congressional action as an emergency measure, hence there is no assessment work required to hold this group of mines for the current year.

As you already have complete maps of the surface extent and underground workings of the property, I am not including these in this report.

FACILITIES

The property is connected with Wickenburg by an excellent truck road that, with a small expenditure for repairs, will provide excellent transportation facilities. From Wickenburg a splendid system of paved highways extends to all parts of the country. The Santa Fe Railway maintains adequate service and connects with the adjacent smelters at Hayden and Superior, and also with the El Paso smelters. Under competitive rates of these smelters there is an assurance of reasonable treatment rates for the products of these mines.

March 7, 1933

Monte Christo Gold Silver Company,
Constellation, Arizona.

Gentlemen:

I was extremely pleased when I learned that you had acquired control of the famous old Monte Cristo mine in Yavapai County, Arizona, and intend immediately to commence operations. Twelve years of my life were spent as superintendent of this rich mine when it was controlled by Ezra W. Thayer, and I am writing this letter in the hope that the information contained herein will prove of value to you. Facts concerning this famous old property read like a romance, but I have spent the greater portion of my life in the mining business and I assure you that my statements are conservative. Should you desire any further detailed information, please communicate with me.

When I started work in 1909, the shaft was down 160 feet. Under my direction the shaft was driven to the 1100 foot level and over ten thousand feet of work accomplished in the form of drifts, intermediates and upraises. All of this footage from the top to the bottom opened up thousands and thousands of tons of high grade and good mill ore. With the exception of a small amount for display purposes, none of the ore has been extracted. The former owner, Mr. Thayer, was determined to open up a big mine and often stated that he considered that his money was safer in the ground than it would be in the banks.

In my opinion the Monte Cristo is a veritable treasurer vault and is over-ripe for production. In 1911, I encountered some high grade ore which ran from 15,000 to 20,000 oz. of silver to the ton. This strike became world-famous, and hundreds of people from this continent, Europe, Africa and even the Orient, visited the property. A regular register of visitors was kept and many well known names were subscribed therein. I feel certain, from my knowledge of the property, that other bodies of similar high grade ore can be opened.

Although the Monte Cristo has always been considered a silver mine, large bodies of gold ore have been discovered, running from $2.00 to $10.00 a ton. On the 600 foot level I discovered a body of gold ore six feet in width. Some of the ore ran 25 oz. to the ton in gold. In my opinion, other large bodies of gold ore can be opened up which will average better than $10.00 a ton. Taking into consideration the gold and silver ore already available, I am satisfied that the property can be operated at a good profit right now.

Your activities are most encouraging, and I feel certain from my knowledge of the property that, properly handled, the Monte Cristo will be one of the greatest mines in the Southwest.

Sincerely,

CHAS. B. BROAN.

GEOLOGY

The predominating formation is a granitic gneiss, with large crystals of feldspar, which is highly kaolinized in the principal veins. This granitic gneiss has been cut in many places by intrusions and dykes of later eruptions, principally diorite and diabase.

Development work on the property has reached a total of some 22,000 linear feet in adits, shafts, drifts, upraises and cross-cuts and serves admirably to expose developed ore in seven large veins that traverse the property.

The coarse texture of the country rock indicates the veins to be of deep-seated origin and the mineralization should extend to a great depth.

The principal development work on the property consists of an incline shaft sunk on the foot-wall vein of the Monte Cristo to a depth of 1100 feet. Levels have been run at each 100 feet of depth. Drifts have been run on this vein for long distances in both directions and connected by upraises to thoroughly block out the ore bodies. These workings are well timbered and ready for stoping, and, since no mill has ever been installed on the property, the mine is practically virgin and extensively developed. The Monte Cristo veins have a course slightly west of north and dip to the west at an angle of 45 degrees from the horizontal. The hanging wall vein lies at a slightly flatter angle than the footwall vein and dips away from it in its downward course. High grade silver ores predominate in the footwall vein and lower grade ores in the hanging wall vein.

The high grade silver ores are principally of native silver embedded in chloanthite, similar to the silver ores of cobalt. Several years ago C. C. Julian, then owner of the mine, had extracted from a point on the fourth level over 33,000 ounces of this high grade silver ore which was cleaned in a jig on the property, whence it was shipped to Los Angeles, melted and cast into a bar. After machining, this bar weighed more than one ton and was on exhibit in Julian's office for a considerable time.

According to various reports from those who have worked in the mine, there is a considerable tonnage of this character of ore available for extraction, but I could not verify this, as these points were under water.

ORE RESERVES

A report, which I read, by Henry M. Crowther, engineer in charge for C. C. Julian, estimates the gross value of the ore blocked out in the main workings of the Monte Cristo at $5,500,000.00, the values being principally in silver and copper, with a small gold content.

An adit known as the "Boarding House Tunnel" follows the course of the Monte Cristo vein some 1400 feet to the intersection of this vein with the Amethyst Vein, and reports show a body of ore of good value at this point. This adit is caved part way in and must be repaired before production can start from this working. A United States Government Bulletin which I examined reports that a long crosscut was run to the Amethyst vein on the 700 foot level where samples were taken that ran from 2½ to 25 ounces gold to the ton.

The Mountain View adit lies about 1 mile southeast of the main shaft and has been run some 600 feet on the vein which averages 4 feet in width. A shaft connects with this adit and there is a cross vein exposed in these workings 10 feet in width. Due to lack of time, I did not sample all these workings, but two samples ran $11.60 and $23.00, respectively, in gold and I estimated some 50,000 tons of ore available in these workings.

In the writer's opinion, the Amethyst Vein is by far the most important, as it has a width of from ten to thirty feet. It appears to carry higher values in gold than the other veins exposed, and should yield a considerable revenue without depleting the ore reserves in the Monte Cristo veins during the present low price of silver and copper.

Aside from the blocked ore in sight, there is an ore dump just north of the main shaft which contains 12,000 tons of ore with a gross value of $14.00 a ton. This can be tapped near the main shaft, hoisted and milled for $2.00 a ton and should yield a quick and substantial profit.

METALLURGY

The ores are essentially sulphides of copper with arsenides of nickel and silver and are ideally adapted to treatment by the flotation process. A mixed sample of ore from the 2nd level of the Monte Cristo shaft was submitted to the Groch Engineering Company of Los Angeles. This sample assayed 130 ounces in silver and small gold values and the report of their flotation tests showed a recovery of 98% of the contained values with a gross recovery of $32.00 a ton and a small consumption of reagents.

In the writer's opinion, however, this is somewhat higher than the average value of the blocked-out ores in the mine at the present price of metals, but he believes that, by selective mining, the grade of the mill ores can be maintained at from $15.00 to $20.00 which, with a normal cost for mining and milling in a plant of 100 tons daily capacity should return a net daily profit of from $1,000.00 to $1,500.00 a day, exclusive of high grade ores which might be shipped directly to the smelters.

RECOMMENDATIONS

I would recommend the installation of a pilot flotation plant of a minimum daily capacity of 100 tons of ore, as per the appended estimate of cost. This can be completed, if sufficient funds are available, within 90 days from starting of work.

Also, I would recommend the installation of a 75 horsepower motor to drive the Norwalk Air Compressor and the installation of a 4'-0"x16'-0" air receiver with necessary pipe and valves and 3 jackhammers for stoping.

Also, I would recommend the installation of an adequate electrically driven sinking pump, to lower the water level in the mine to the 700 foot level. That new air and water lines be installed in the shaft to replace the rusted lines which are in bad condition. That the successive levels be drained and any defective timbering replaced. That the ladderway be completed in the vertical shaft from its connection with the main workings on the third level, to provide exit for men in case the incline shaft should be blocked.

I would also recommend the retimbering of the caved section in the Boarding House Tunnel and tapping the ore dump on the 25 foot level.

The mine workings should be thoroughly sampled and an assay map made to determine the most profitable areas for extraction of ores. So far as possible, the ores containing the highest gold values should be mined and treated first, keeping in reserve the lower grade silver and copper bearing ores until the price of these metals advances.

The mine should be placed in production as soon as possible and additional slimers and flotation cells added to the milling plant to increase its capacity as conditions permit.

CONCLUSION

Under previous ownership no attempt was made at systematic production, so there is no basis on which this can be accurately forecast.

However, in consideration of the size and extent of the vein system, favorable geology, character of ores, simple metallurgy, extensive development, ample modern improvements and excellent facilities for transportation and smelting and good climatic and labor conditions, with competent and economical management, the Monte Cristo Mines should return a large and consistent profit for many years on a very modest additional investment.

Respectfully submitted,

FRANCIS E. AGNEW,
Mining Engineer.

Los Angeles, California,
Nov. 7, 1932.

as at present determined. A list of a GEOL
with included, taken from grabs from
of this class of ore being mined for shipment. The average of these grabs indicates shipping ores of from 1500 to 2000 ounces of silver per ton, may be prepared.

Associated with these rich ores there is talc and vein filling that will assay 50 to 100 ounces of silver. The milling copper values, of which a number of samples are shown herewith, taken from various levels with width of from 3 to 32 feet and without including any of the silver ores, indicate an average of 5% copper, 4 ounces of silver and $4.00 in gold, to which it is anticipated to add a portion of the lower grade silver ores to bring the average of the mill feed to contain fully 10 ounces of silver per ton, in addition to the copper and gold, making the proposed average mill feed to be reasonably assured of value of $18.00 to $25.00 per ton.

MILLING TESTS

Recent tests made by the General Engineering Company at Salt Lake City, on crude ore of the assay value follow:

Gold	0.18 oz.
Silver	8. oz.
Copper	6.47%
Insoluble	64.40%
Iron	10.3 %

Produced by simple flotation the following concentrates:

Concentrates by weight 20.8%

Assaying:

Gold	0.68 o
Silver	12.5 o
Copper	28.69%
Iron	27.95%
Insoluble	8.6 %

Which indicates a saving of fully 95% of the per and silver and 85% to 90% of the gold. The figures indicate a remarkable recovery possible and produce a production highly desirable to smelt and which product should obtain a very low smelting rate.

Equally favorable tests have been made by the Minerals Separation Corporation of San Francisco, and elsewhere, all confirming that these ores are exceptionally favorable for simple milling operations.

From a small experimental stope on the 400 level, we have recently produced a ton of silver bullion by melting up a few tons of the high grade metallic silver bearing ores and incidently have placed on the mill ore dump, additional ore having about one

GEOLOGY

The prevailing formation of the property is a granite gneiss of banded structure and of steep dip. There are numerous dikes of fine grained diabase associated with the vein system, but not necessarily connected with the ore bodies.

VEIN SYSTEM

The Monte Cristo vein system proper, consists of two parallel veins or fissures with a dip of 50 to 55 degrees West and with a general strike of North to South. There are two Monte Cristo veins parallel as to strike, but varying somewhat in dip and are, accordingly, distant from each other 6 to 60 feet as depth is gained. These veins are called the East Vein and the West Vein. While the East Vein contains high grade native silver ores, it is the West vein that is of most importance and contains the greater part of the developed ore bodies. In addition to the Monte Cristo veins, there are six other important veins on the property which are known as the Amethyst Vein, the Copper Nellie Vein, the Mahoney Vein, the Colorado Vein, the Mountain View Vein and the Rowland Vein. Except the Amethyst Vein and the Rowland Vein which are roughly parrallel to the Monte Cristo Veins, the other veins are considered cross veins which in cases, cut through the Monte Cristo vein system.

MINERALIZATON

The mineralization may be roughly classified under three divisions:

1. Primary native silver ores associated with calcite and some barium and containing native silver in amounts from 50 to 100 ounces per ton, having widths of two to three feet, and ores of 1000 to 3000 ounces per ton as broken and cobbed and affording massive native silver ores containing 10% to 80% metallic silver.

2. Copper sulphide ores containing as mined for mill feed, 3% to 6% copper; 4 to 12 ounces of silver; $2.00 to $5.00 in gold and 5% to 12% iron.

3. There is also another class of copper sulphide ore such as the Amethyst and Mountain View ore, which, in addition to commercial values in copper sulphides and silver, contains as high as 2 ounces of gold to the ton.

ORES

The native silver bearing ores will range in width from a few inches to 3 feet and occur in shoots, 50 to 100 feet in length. These ores occur from the surface mainly to the 500 foot level of the Monte Cristo shaft, but also exist as deep as the 800 level

PRELIMINARY REPORT ON MONTE CRISTO MINES

CONSTELLATION, ARIZONA

HISTORY

These famous mines have been under active development for over 15 years, under the supervision of Mr. Ezra W. Thayer, hardware merchant of Phoenix, Arizona.

Over $590,000.00 had been expended in development operations to September, 1926, when Mr. C. C. Julian succeeded in purchasing the property for the New Monte Christo Mining Company.

The Monte Cristo Mines, though well known to all the large mining concerns of the country and having the reputation of millions of dollars in ore reserves, included in which are considerable tonnages of the most sensationally rich metallic silver ores known and unmined today, has never been placed in production because Mr. Thayer insisted on completing the campaign of development he set out to accomplish and steadfastly held to original plans.

Several offers to purchase the mines were made by various big operating concerns, but were always met with the statement that "The Monte Cristo Mines are not for sale."

The following extracts from U. S. Geological Survey Special Bulletin 735 E 1922, by E. S. Bastin on the Monte Cristo Mines, will be of interest:

"The Monte Cristo ores that form the subject of this report show conclusively that native silver may occur as a primary associate of nickel and cobalt arsenides and therefore support the view that the silver at Cobalt is primary."

"Distribution of rich silver ores, the rich silver ores of the mine, many of which carry niccolite, are largely restricted to a somewhat ill-defined shoot that intersects the shaft at the first level and appears to pitch about 45 degrees S. South drifts on the fourth, fifth and sixth levels have tapped this ore body, but in 1913 the seventh, eighth, and ninth levels had not been extended far enough to reach it."

"Gold ores: The richest gold ores are reported to have been found south of the shaft on the sixth level, for a length of about 150 feet along the drift. The richest ore ran 25 ounces in gold to the ton, and the average gold content is said to have been about 2½ ounces."

on of contained silver bullion that was of lower grade and not available for direct melting. This experimental production of a ton of practically pure silver bullion was done in Los Angeles at a local brass foundry, using the crude methods available, but not at all adapted to the melting of ores; however, the demonstration of the sensational value in metallic silver of Monte Cristo ores was generally satisfactory considering that the regular smelting companies are not equipped to smelt any ores individually and return the same bullion to the shipper, so to obtain Monte Cristo Silver in a ton bar, we were forced to work out a special method, as described.

The Monte Cristo Mines are developed with an included shaft of 1100 foot depth with levels every hundred feet, aggregating 22,000 feet minimum underground development at this portion of the property.

In addition to these main workings, there are several thousand feet of development work on other veins of the group, most of which is not deeper than 200 feet under the outcrops. The Monte Cristo Mine makes normally about 25,000 gallons of water per day of twenty-four hours. A new three-compartment, vertical shaft, located about 1000 feet from the old incline single hoistway shaft on the Monte Cristo vein zone, is now under construction and being equipped with a new heavy duty high-speed electric hoist. This installation is needed to facilitate tonnage operations as old shaft is not large enough nor economical to enlarge.

ORE RESERVES

Considering the ore reserves in the Monte Cristo workings on a basis of preliminary estimates of the various ore shoots over a lineal length of 300 to 500 feet and mainly existing from the 200 level to the 1100 level and below same, the following estimated tonnage of ore available, is considered within what should be produced:

Estimated Tonnage	Estimated Value per ton	Estimated Total
75,000 tons	$ 25.00	$1,875,000.00
Metallic Silver Ores		
10,000 tons	250.00	2,500,000.00
20,000 tons	50.00	1,100,000.00
Dump Ores		
10,000 tons	10.00	100,000.00

Such sensationally rich silver ores as Monte Cristo is productive of cannot be measured and only actual mining of the productive areas will finally determine the total value, but results thus far obtained, are gratifying, indeed.

INDICATED AND PROBABLE ORES

As the above estimates allow nothing for several other veins which can be traced on the surface for

thousands of feet and wherever prospected show commercial ore possibilities and taking into consideration that all of the ore above estimated, occupies but about 2% of the surface area of the Monte Cristo property and is all within a small section of the Monte Cristo claim, proper, the total production life of the property should be large. The property has 40 claims, about half of which show commercial ore possibilities and many have extensive commercial ore exposures. The deepest ore development in the property has only reached the comparatively shallow depth of about 800 feet vertically, with good ore bodies going down to greater, but unexplored, depth.

ECONOMIC CONDITIONS

An electric power line from Prescott, a distance of 43 miles, completed at a cost of about $100,000.00 is now delivering power to the electric driven compressors, hoists and other machinery. A structural steel shaft house has been erected for the new three-compartment, vertical shaft. A two or three hundred-ton-a-day mill is being planned and when erected, will be of the latest, best advised, construction. Ten new buildings have been erected for camp quarters and for housing the new operating units. Monte Cristo Mines is considered one of the best equipped properties in the Southwest.

There is ample water at the Hassayampa River, three miles distant, and an electrically driven pump will supply the property. The truck haul of 12 miles from the property to Wickenburg, Arizona, on the Santa Fe Railroad, is of easy grade and is accomplished at extra low cost.

The property is within 60 to 150 miles from three commercial smelters now competing for our product which condition is exceptionally favorable. The product to be produced by the mill is exceptionally desirable for smelting.

EARNINGS

The total cost of mining, milling the crude ore and transporting and smelting the product, should not exceed $8.00 per ton under the conditions prevailing and can be done for less, on a large tonnage basis, leaving a generous profit on the milling grade of ores. The profit on the high grade ores naturally will be very high per ton, of production.

CONCLUSION

The Monte Cristo Mines operations, amply financed and placed in production as planned, will make one of the outstanding profit earning operatings.

Respectfully submitted,

(Signed) HENRY M. CROWTHER,
Consulting Engineer.

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA 85007

May 22, 1969

COPY

George Bott
P. O. Box 1670
Tucson, Arizona 85702

Dear Mr. Bott:

This will acknowledge your inquiry regarding the Lane mine and the Monte Cristo Mine.

This office has Mark Bradshaw's report on the Lane mine. It is rather lengthly and our copying facilities are limited. At present, R.C.Hanford, Crown King, Arizona has a lease and option on the Lane mine. With the aid of an OME loan he is doing some of the work recommended by Mr. Bradshaw and should be finished in a few months.

Attached is a copy of a report on the Monte Cristo Mine. Another good reference is U.S.G.S. Bulletin # 735, pages 135 to 155. This bulletin is available at the University of Arizona library for your inspection.

If we can assist you further let us know.

Sincerely yours,

FRANK P. KNIGHT, Director

by:

F.T.Johnson,
Field Engineer.

FTJ:p
Encs.

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

June 5, 1958

To the Owner or Operator of the Arizona Mining Property named below:

Monte Cristo Mine & Mill (Yavapai County) Copper, gold, silver
(Property) (ore)

We have an old listing of the above property which we would like to have brought up to date.

Please fill out the enclosed Mine Owner's Report form with as complete detail as possible and attach copies of reports, maps, assay returns, shipment returns or other data which you have not sent us before and which might interest a prospective buyer in looking at the property.

Frank P. Knight

FRANK P. KNIGHT,
Director.

Enc: Mine Owner's Report

Decieced

Mr. D.W. Simpson
2nd & Jackson Street
Wickenburg, Arizona

Owner of Monte Cristo
Cyrus W. Thayer
Thayer Hdwe Co Photo copy
Mine in Slim Jim Gulch

Frt rate Wickenburg To Mine
$3.75/ton 18 miles
Concentrates shipped to Kingdon
Frt to Wickenburg on concentrate $3.75
Frt to Kingdon from Mine $4.00
Miners $4/day $1.25 for Board
Muckers $3.25
Head Mill man $5
Blacksmith $4.50 cook $50 + board
Foreman $4 Timber $45 per M
Ass Mill man $4 rough at mine

40-50 tons/day 12 men + 1 cook
1 machine for 2 shifts or else more
Must must run while men are
working underground

old prospect shaft N 25 W 65 N vein 3' wide

Monte Cristo

Shaft — 900' level at least 100,000 gal/day

40' deep

vein dips 75° N   50" wide

shattered qtz some massive sulfides

good walls in granite

N 60 W strike to N 45 W

14' deep well   430' of 2½

Spring 125' above collar of shaft 3/1000' away

present pipe line 1¼"–2¼"

50 hrs 10 gals/min minimum

in Dec. No rains before. Max 25 gal/min

another undeveloped spring on same belt

between shaft + prospect. Springs along fault zone?

8 hrs test 25 gal/min

Shaft

40 hrs 18 gals/min at 200' level

draw down 68' → 20 gals aver. from shaft

held level with water back again 10 days — Test made in Dec. 1934

40 gals/min worst water conditions

in surrounding mines

No copper in water

Spring

16' of water in well

11' deep to water

pipe out 16' from surface

A. DIETZ CO. SAN FRANCISCO No. 800 A

Do not Reproduce

January 1, 1972 - Monte Cristo Mine - Yavapai County (per Mr. Jett's notes)

Kent Glasgow and Philip Selleman live in Morristown. Were in the office going over file. Going to sample the mine for copper.

Work for Mr. Perry Underdown, who owns the Monte Cristo. Owner of Wickenburg Lumber Company in Wickenburg.

Also owns the pile of concentrates from the Vulture Mine that is stored in Wickenburg.

The Monte Cristo has been leased by the Goldex Co., Spokane, Ed Armstrong, geologist. They intend to dewater, sample and core drill it similar to their work at the Gold Bar. Here they cored in the neighborhood of 2500 ft. and in value from 3 oz. Au/T to 0.1 oz/T. They have made a deal with an English company to mine it. GW WR 8/25/75

Mr. Armstrong of Goldex Mining Co. came in with his drawings of the headframe they expect to erect at the Monte Cristo Ag mine about 12 miles east of Wickenberg. The mechanics of the structure were discussed and several books on the subject were loaned to him. GW WR 9/25/75

Ed Armstrong of Goldex, Inc., called regarding some assistance with a hoisting problem at the Monte Cristo mine northeast of Wickenburg. Suggested he stop in and go over the problem with Mr. Jett. They have intermittently worked the Gold Bar property. They have set up a headframe and hoist on the Monte Cristo property and plan to clean up the old mine in preparation for a detailed sampling program. Mr. Armstrong currently has a home in Wickenburg and receives mail at P.O. Box 2024 and has a phone number of 684-7115. KAP WR 9/25/75

Went to the Monte Cristo mine 12 miles east of Wickenburg where the collar of the inclined shaft has been concreted and a used steel headframe and single drum hoist have been installed. Although Mr. Armstrong wasn't around, three men were building a hoist room. GW WR 10/17/75

Ed Armstrong, geologist for Goldex, says finances have been insufficient for the past 4 months for work to continue at the Monte Cristo mine 12 miles east of Wickenburg. GW WR 2/19/76

Ed Armstrong, Goldex geologist, called for suggestions on laying the skip track in the Monte Cristo incline. He said they had raised money for dewatering. GW WR 3/9/76

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

September 1, 1960

Mr. Charles W. Childs
3169 Island View Drive
Ventura, California

COPY

Dear Mr. Childs:

With reference to your inquiry of August 30th regarding the Monte Cristo mine:

We do have considerable information regarding the Monte Cristo mine 12 miles northeast of Wickenburg. Most of it is by owners or owners' engineers, such as the enclosed copy of an unsigned report on a Mine Owners Report form furnished by this department.

You perhaps have a copy of a booklet put out by the Minte Christo Gold Silver Company about 1933. It contains reports of two mining engineers, Francis E. Agnew and Henry M. Crowther, of whom we have no other record.

We ulso have an undated copy of a report by Ralph Speaker, Research Engineer.

It would be preferable for you or your representative to examine our file. We do not feel free to release copy of the Speaker report, but you may arrange with Ace Photo Copy Service, Inc., 343 North First Avenue, Phoenix, Arizona, for them to pick up from us the printed booklet, make copy for you and return the booklet to us.

You will note the reference in the owner report to U.S.G.S. Bulletin No. 735 and Lindgren's report. We are unable to find published record of the latter in U.S.G.S. bibliographies or elsewhere. You may find the out-of-print bulletin No. 735 at a library.

In the above, it has been assumed that you are familiar with the history of the Monte Christo, which to the best of our knowledge has been inactive since 1954 when it was being sampled by International Ore Corporation. Prior to that, in 1945-6, there was some development and mill testing, but we have no record of production since that of 1927 mentioned in the enclosed report.

Please do not hesitate to write us if we can be of further service.

Yours very truly,

FRANK P. KNIGHT
Director

FPK/H

MONTE CRISTO MINE & MILL YAVAPAI COUNTY

RRB WR 6/1/84: W. K. Ramsey, independent landman, 3415 Winged Foot Court, Dallas, Texas (214) 357-3202 was in looking for a Mining Engineer to supervise the dewatering and reopening of the Monte Cristo Mine, Black Rock District, Yavapai County. He reports that his people have a lease-purchase agreement on the property and he needs an engineer with a "good resume" to satisfy the investors.

MONTE CRISTO MINE

YAVAPAI COUNTY
(Black Rock District)

11-23-77 - A map of Black Rock District, and a map of Wickenburg showing points of interest, are filed in the Wickenburg general file. 11-23-77 bh

9-2-66 lp

Walter K. Ephraim, P. O. Box 847, Wickenburg, Arizona says he has been doing some work , particularly exploring for juncture of Monte Cristo and Amythest veins on claim to north.

Mr. Ephraim also has 1130 Hearst Building, Market & Third Streets, San Francisco, California as an address.

Mr. Walter Ephriam visited the office and talked with Mr. Knight 12/12/66 - says he is working at the Monte Cristo.

MONTE CRISTO MINE YAVAPAI

Went to the Monte Cristo mine 12 miles east of Wickenburg where Ted Wolosiak, the foreman, said they were pumping about 65 gpm and the water was between the 700 and 800 levels. When asked about the sample results he said most of the levels were caved a short distance from the shaft and that they were getting a mucking machine soon to clean up the muck in the drifts.
GW WR 8/6/76

Called Ed Armstrong, geologist for Goldex Mining Company, who said Canada south had temporarily quit the Monte Cristo project; they got the water down to the 800 level in the shaft but didn't get any of the levels cleaned out. GW WR 9/29/76

WR KAP 9-9-77 - Ron Hanna, Triangular Mining Co., reported the following: Resources International, represented by George Livo has staked considerable U_3O_8 ground near the Monte Cristo silver mine (Yavapai County?) and around the Kingman area, both on hardrock formations. 9-12-77 bh

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GM/WR 5/1/79 - Visited the Monte Cristo Mine, found empty "BX" core boxes with the following information: Goldex Inc., P.O. Box 2024, Wickenburg, Arizona. 7/5/79 a.p.

CH/WR 9/12/79 - Duane Grey is working toward a lease on the Monte Cristo, Constellation District, Yavapai Co.

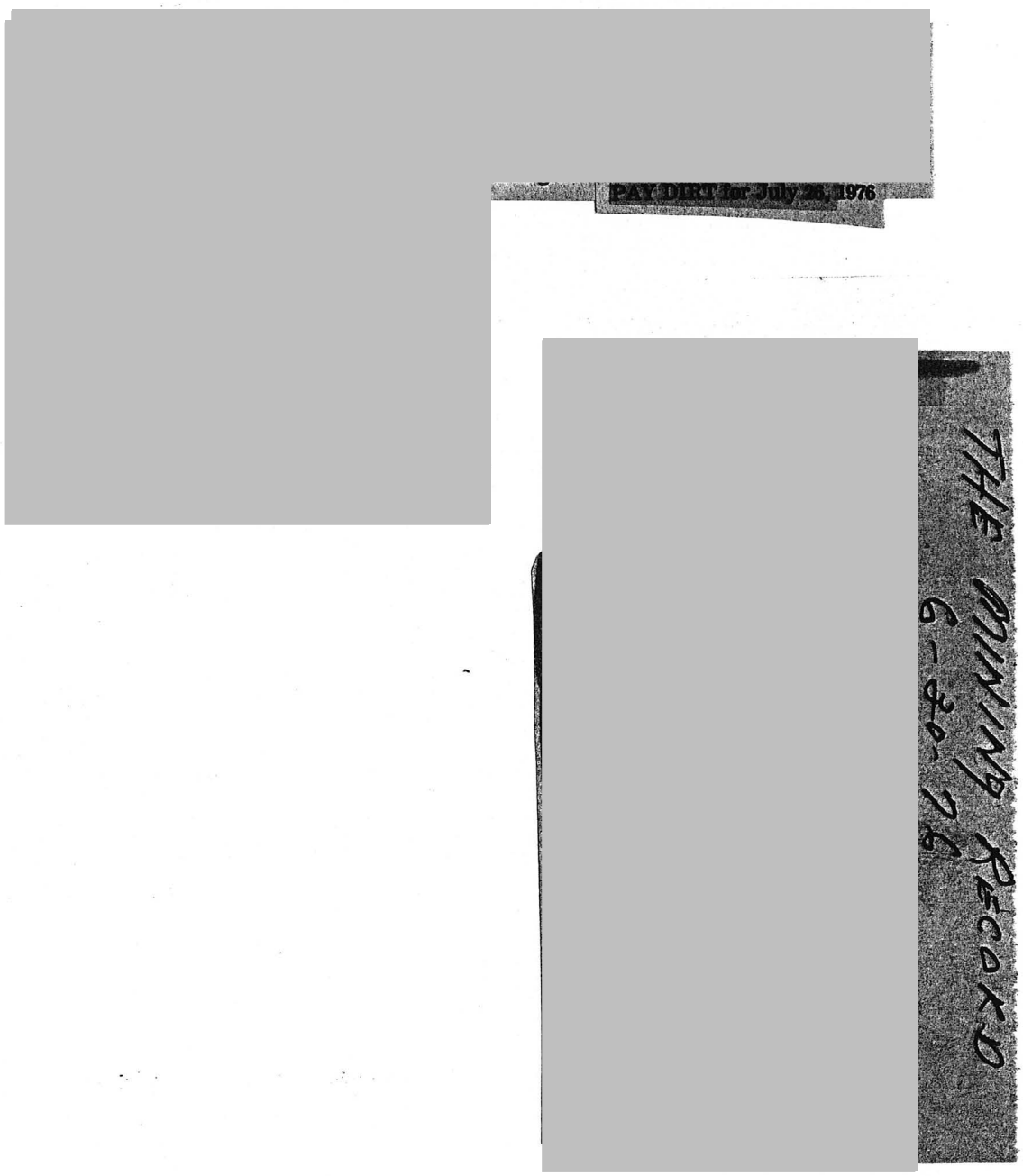
RRB WR 5/16/80: Visited Monte Cristo Mine in Sec. 4, T8N, R3W, Yavapai County. No activity.

JHJ WR 12/30/83: Office interview with Roy Rogers. Owns 10 claims. Has a work lease agreement on Emma and Ezra owned by Mr. Underdown, also owner of the Monte Cristo. Mr. Rogers is personally drilling on the Monte Cristo.

MONTE CRISTO MINE YAVAPAI

Andy Watzek came in for information on the Monte Cristo mine near Constellation saying the Canadian Mounties had written him regarding investments by a South Canadian Mining Co. of Canada on the Monte Cristo. GW WR 4/26/76

Mrs. W. J. Presmyk of 7523 N. 35 Avenue, Phoenix, came in to the office and stated that she and her husband had purchased the Monte Cristo, a patented property, and intended to live on the property the year round. 7-12-76. Elizabeth Smith



DEPARTMENT OF THE INTERIOR
HUBERT WORK, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Bulletin 735

CONTRIBUTIONS TO ECONOMIC GEOLOGY

(SHORT PAPERS AND PRELIMINARY REPORTS)

1922

PART I.—METALS AND NONMETALS EXCEPT FUELS

F. L. RANSOME, G. R. MANSFIELD, AND E. F. BURCHARD
GEOLOGISTS IN CHARGE

WASHINGTON
GOVERNMENT PRINTING OFFICE
1923

silver in this specimen has replaced niccolite. The regular crystalline outlines shown by the silver are not valid evidence against replacement, for it is well known that pyrite, for example, may assume its characteristic cubical form while replacing the minerals of rocks, and in this particular specimen if silver has not replaced niccolite

FIGURE 33.—Characteristic relations of niccolite, chloanthite, and calcite, Monte Cristo mine, near Wickenburg, Ariz. The chloanthite envelops the niccolite. Quartz and barite in turn envelop both; here and there veinlets of quartz and barite cut niccolite and chloanthite, as at A, or these minerals may embed fragments of niccolite and chloanthite, as shown at B. Camera lucida drawing from polished surface.

it has certainly replaced rock minerals. Yet where native silver has clearly replaced niccolite and similar minerals, as in the ores of Cobalt, Ontario, its form and distribution are plainly controlled by fractures and by the contacts between different minerals. Furthermore, where the replacement has been nearly complete rounded remnants of the replaced mineral are common within the silver. No such relations exist in the Monte Cristo ores. Areas of pure silver

enveloped in chloanthite and of pure niccolite enveloped in chloanthite may occur side by side, or the nucleus in the chloanthite envelope may be part silver and part niccolite separated by a single even, sharp contact. Such relations would be extraordinary if the silver had replaced the niccolite. The textural relations between silver and niccolite illustrated in figure 34 can be adequately ex-

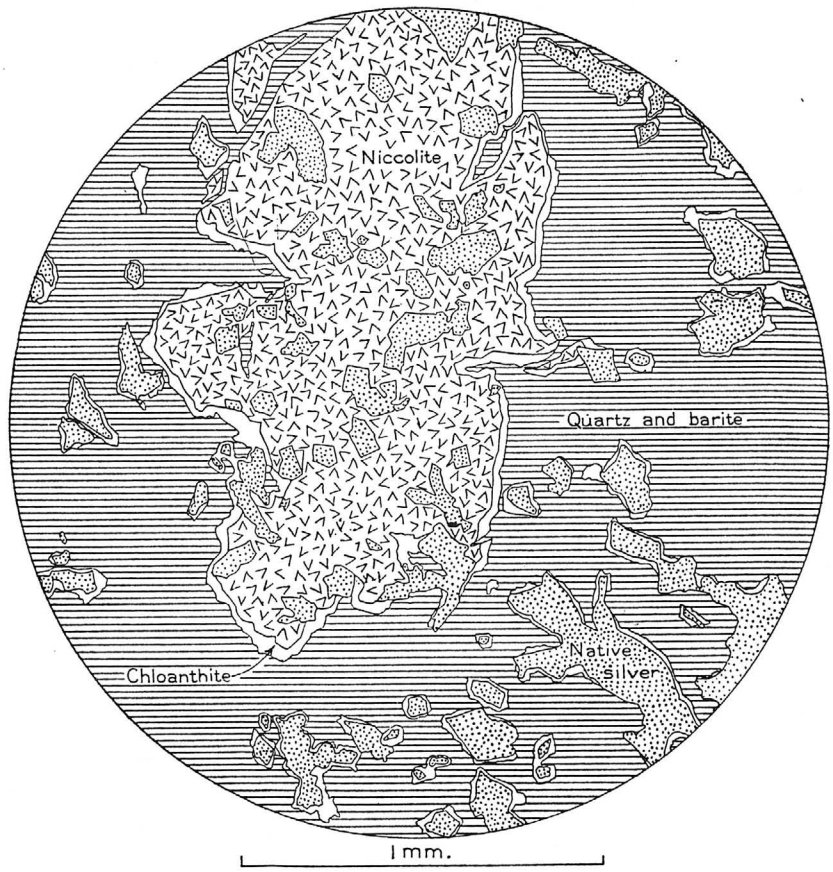


FIGURE 34.—Primary intergrowth of niccolite, native silver, and chloanthite, Monte Cristo mine, near Wickenburg, Ariz. Note the crystal forms assumed by much of the silver and the absence of any evidences that the silver has replaced other ore minerals. Camera lucida drawing from polished specimen.

plained on the hypothesis that both minerals are primary but that the silver began to crystallize about numerous centers slightly earlier than the niccolite. This interpretation is supported by other textural features to be described below. The contrasts between the mineral relations at Cobalt and at the Monte Cristo mine are discussed further on pages 147–150. Chalcopyrite, tennantite, and the rare enargite in general lie outside the chloanthite envelopes and appear

commonly to be slightly younger, but in places they are irregularly intercrystallized with chloanthite. Most of the silver is slightly older than the chloanthite, but minor amounts of it are in places intercrystallized with the chloanthite in very fine intergrowths. The order of crystallization appears to be roughly that in which the

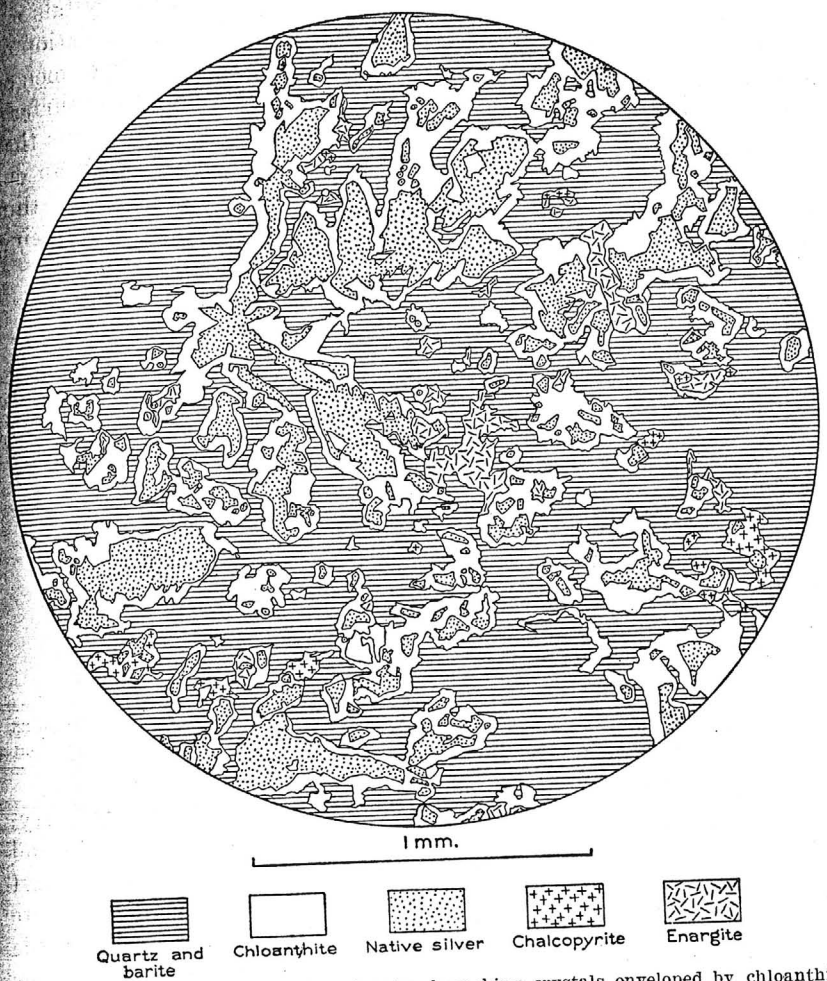


FIGURE 35.—Primary native silver forming branching crystals enveloped by chloanthite, Monte Cristo mine, near Wickenburg, Ariz. Camera lucida drawing from polished specimen.

minerals are listed on page 154, but the periods of deposition of some of the minerals overlap. All, with the possible exception of calcite and argentite, belong to a single period of primary mineralization.

The small amounts of argentite noted in the niccolite ores are mentioned in the section on argentite ores (p. 141).

Chloanthite-bearing silver ores.—The niccolite-bearing ores described above grade into other ores that differ mainly in the absence of niccolite and the greater abundance of chloanthite. The general order of crystallization is the same as for the niccolite-bearing ores. Specimens from depths ranging from 80 to 400 feet were studied.

In some of these ores native silver forms groups of crystals enveloped in chloanthite, which in turn is inclosed by an association of quartz and barite. Figure 35 shows the appearance of a specimen of such ore, which came from a depth of only 80 feet below the surface, near the first level. The silver shows branching crystal forms that are characteristic of that metal and is generally inclosed in an envelope of chloanthite, although such envelopes may be very thin and are in a few places entirely absent, the crystals of silver being

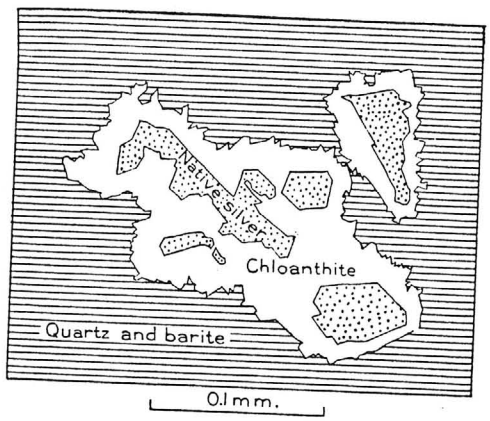


FIGURE 36.—Drawing on a larger scale of a portion of the specimen shown in figure 35. Note the straight crystal outlines of the silver. Chloanthite also shows crystal outlines against quartz and barite, though on a smaller scale.

directly inclosed by barite and quartz. The silver is nearly everywhere bounded by straight crystal faces, as shown in figure 35 and still more clearly in figure 36, a larger-scale drawing from a part of the same specimen. In other parts of the same specimen minute inclusions of silver are dusted abundantly through considerable masses of chloanthite. Under high power some of these inclusions are seen to be branching crystalline masses, miniatures of those shown in figure 35, but most of them are highly and fantastically irregular. In places they form a veritable sponge of silver within the chloanthite. They bear no relation in distribution to the borders or the crystallographic directions of the chloanthite crystals, and there are no indications that they have been formed by replacement. In other parts of the specimen shown in figures 35 and 36 silver, chloanthite, and quartz are intergrown in the intimate and irregular

fashion shown in figure 37; the silver of these intergrowths appears to be of approximately the same age as the other minerals. In a few places silver, chalcopyrite, and tennantite are irregularly intergrown without any chloanthite.

Ores carrying ruby silver.—At several places on the fourth to sixth levels in the main ore shoot ores rich in ruby silver (proustite) occur. In these ores the minerals are distinctly of two generations, both of which appear, however, to be primary. The minerals of the

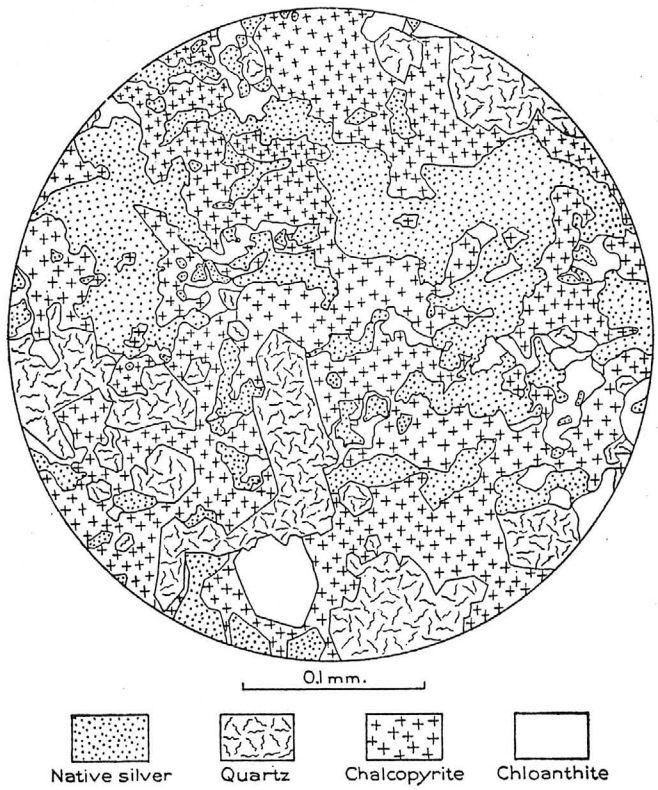


FIGURE 37.—Irregular primary intergrowths of native silver, chalcopyrite, chloanthite, and quartz, Monte Cristo mine, near Wickenburg, Ariz. Note that there are no indications that the silver has replaced other ore minerals. Camera lucida drawing from polished specimen.

first generation include arsenopyrite, pyrite, chalcopyrite, and quartz, with a little sphalerite and siderite. Those of the second generation are proustite, tennantite, and calcite, with minor amounts of chalcopyrite, gersdorfite (NiAsS), argentite, pearceite, and quartz.

In a specimen from the 600-foot level minute sharp-walled veinlets of pearceite and calcite traverse the minerals of the first generation. In parts of this specimen coarser portions of the ore composed of an irregular intergrowth of calcite, chalcopyrite, and proustite

appear to grade into the finer portions characterized by the minerals of the first generation. Elsewhere, however, small veinlets composed of intergrown calcite, chalcopyrite, argentite, and proustite traverse the older minerals.

A specimen obtained between the fourth and fifth levels shows ore composed of the minerals of the first generation in places fractured

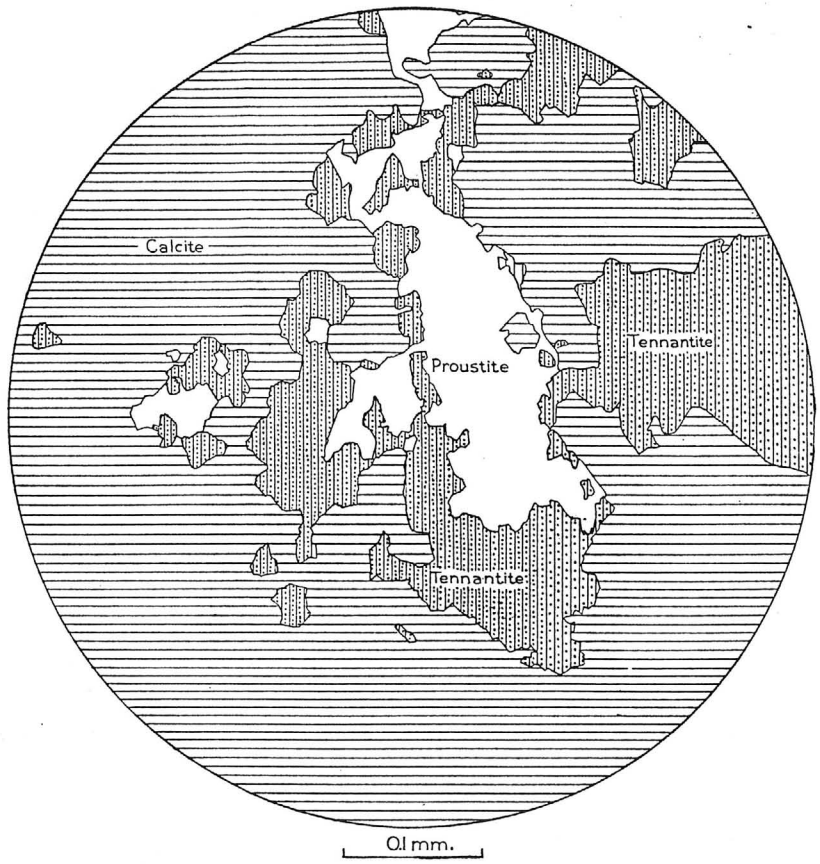


FIGURE 38.—Irregular primary intergrowth of proustite, tennantite, and calcite, between 400 and 500 foot levels, Monte Cristo mine, near Wickenburg, Ariz. Camera lucida drawing from polished specimen.

and traversed by veinlets of proustite, chalcopyrite, gersdorfite, tennantite, quartz, and calcite. The gersdorfite commonly occurs in radiating form along the walls of these veinlets. Tennantite and proustite are irregularly intergrown, as shown in figures 38, 39, and 40, all drawn from parts of the same specimen. As shown by these figures there is no evidence that the proustite has replaced tennantite. Either mineral may inclose the other; the boundary between them is usually characterized by crystal faces. The two

stages in the primary mineralization may be perceived in the hand specimens as well as microscopically.

Argentite-bearing ores.—Argentite was noted in the niccolite, chloanthite, and proustite bearing types of ore that have already been described. In these ores it is usually a very minor com-

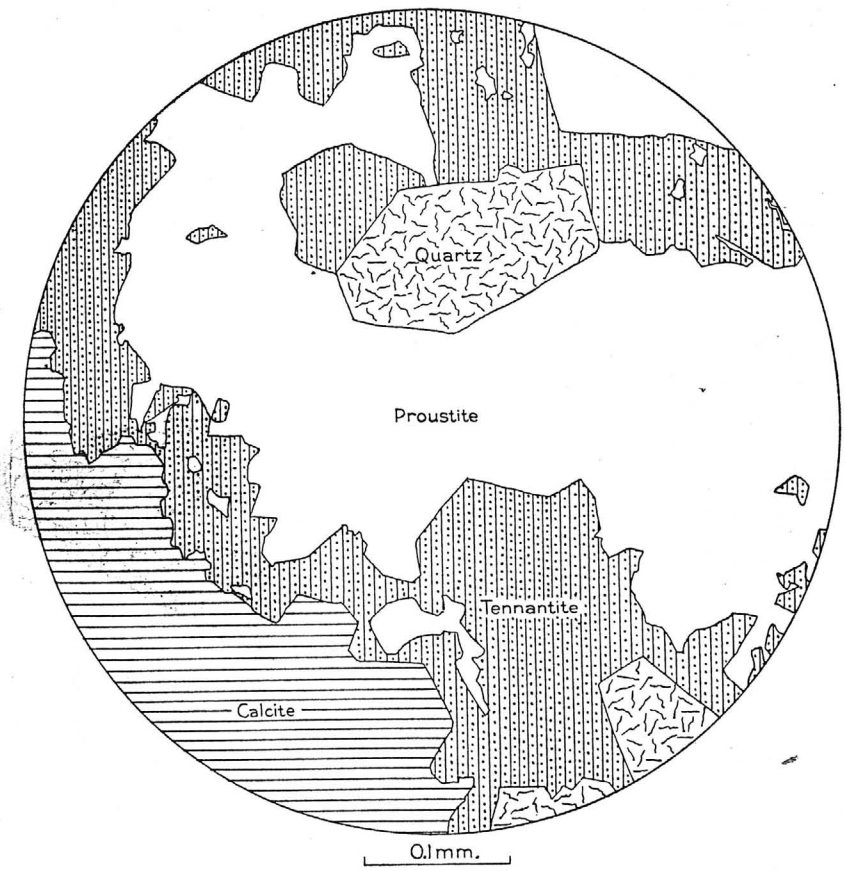


FIGURE 39.—Primary association of proustite, tennantite, calcite, and quartz, between 400 and 500 foot levels, Monte Cristo mine, near Wickenburg, Ariz. Note the nearly straight crystal faces common between proustite and tennantite; these indicate that neither mineral has replaced the other. Camera lucida drawing from polished specimen.

ponent and was among the last minerals to be deposited. Figure 41 illustrates its textural relations in ore containing niccolite and native silver. Argentite, calcite, and quartz form veinlets traversing both niccolite and chloanthite, and these veinlets are continuous with the calcite and quartz matrix that envelops the nickel arsenides. Evidently in such ores ores the argentite is one of the latest of the primary minerals.

In the proustite-bearing ores small amounts of argentite are intimately intergrown with proustite and tennantite and, like them, represent a late primary crystallization.

In some places argentite occurs in considerable abundance. On the 400-foot level, for example, it is associated with barite and calcite in parts of a 6-inch streak of rich ore. It forms well-defined crystals intercrystallized with calcite in vugs in this ore and also forms nar-

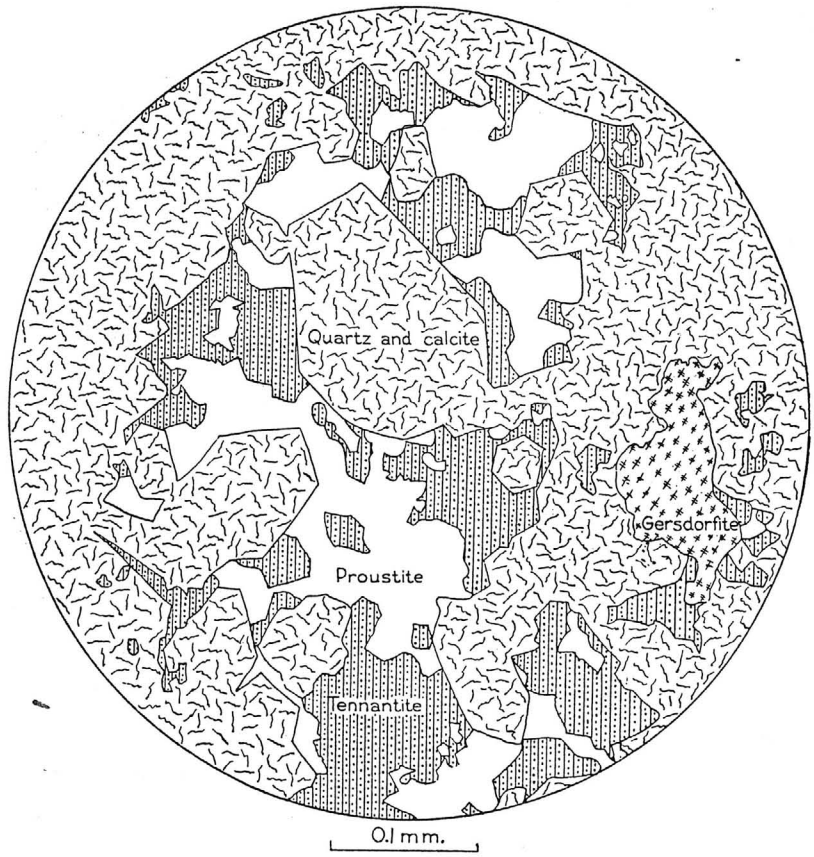


FIGURE 40.—Primary intergrowth of proustite, tennantite, quartz, and gersdorfite, Monte Cristo mine, near Wickenburg, Ariz. Camera lucida drawing from polished specimen.

row veinlets, 0.5 millimeter or less in width, cutting barite and calcite. These relations, though indicating that the argentite was deposited late in the epoch of mineralization, do not show whether it is primary (hypogene) or secondary (supergene). However, the rich argentite ore is associated in the same 6-inch band with ore showing native silver and chloanthite in branching intergrowths resembling those illustrated in figure 35, and in this ore some of the native

silver cores within chloanthite have clearly been replaced peripherally by argentite or by an intimate intergrowth of argentite and calcite. This is the only instance of replacement of one metallic mineral by another noted in the mine. The boundaries between silver and argentite or the argentite-calcite intergrowth are of the utmost irregularity, even when viewed under high power. The specimen

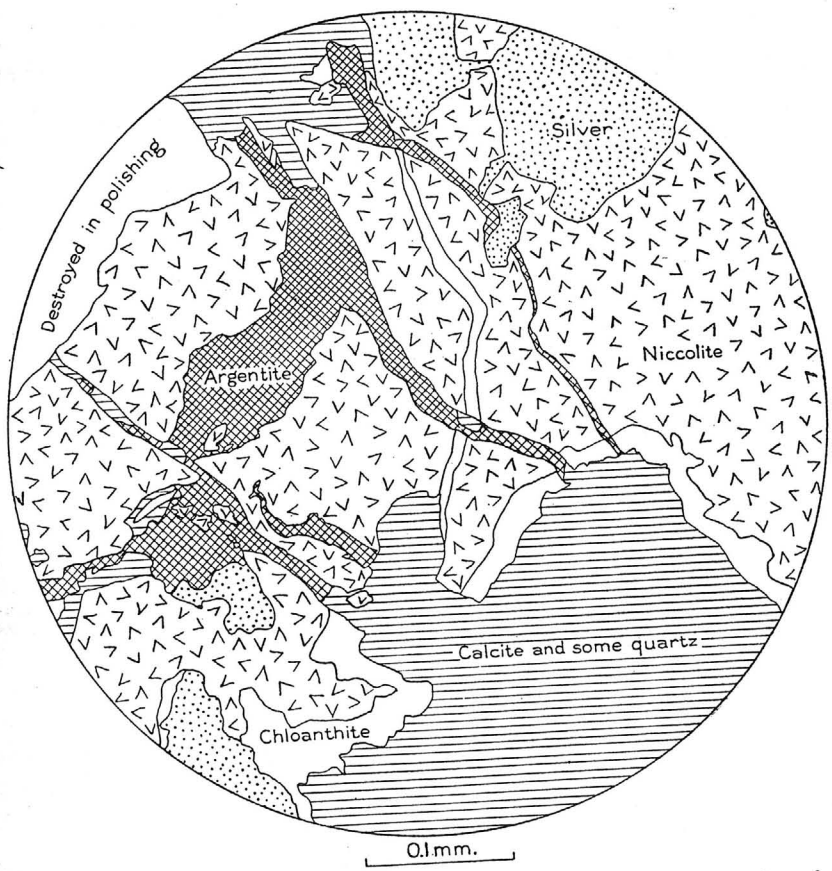


FIGURE 41.—Association of niccolite, chloanthite, and native silver which has been fractured and argentite and calcite have been deposited in the fractures, probably as late primary minerals, 400-foot level, Monte Cristo mine, near Wickenburg, Ariz. Camera lucida drawing from polished specimen.

was not suitable for the preparation of a large sketch, but the irregular nature of the silver-argentite boundaries at two places is shown by figure 42. The replacement of silver by argentite is the reverse of the characteristic replacement of argentite by silver so commonly noted in the downward enrichment of silver ores. The latter is usually attributed either to direct oxidation of the combined

sulphur by atmospheric oxygen or to its less direct oxidation through the united agency of sulphuric acid and iron sulphates in accordance with some such equations as

$$Ag_2S+H_2SO_4 \rightarrow Ag_2SO_4+H_2S.^2$$
$$H_2S+Fe_2(SO_4)_3 \rightarrow 2FeSO_4+H_2SO_4+S.$$
$$Ag_2SO_4+2FeSO_4 \rightarrow 2Ag+Fe_2(SO)_4)_3.^3$$

Such explanations, though not in all respects satisfactory, have the merit of invoking only reagents that are abundant and characteristic in the oxidized zones of sulphide ore bodies.

The replacement of native silver by argentite noted in the Monte Cristo ores can not be so readily explained as the work of reagents characteristic of the zones of oxidation or sulphide enrichment. It is

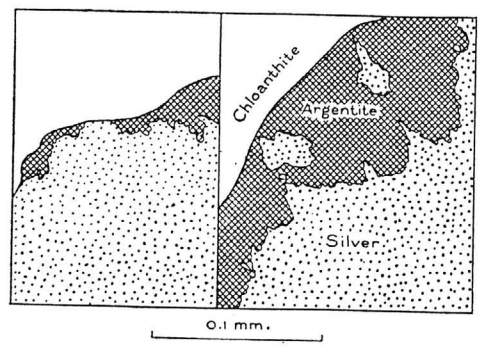


FIGURE 42.—Replacement of native silver by argentite, Monte Cristo mine, near Wickenburg, Ariz. Note ragged replacement boundaries between silver and argentite and the silver replacement remnants in argentite. Camera lucida drawing from polished specimen.

possible to regard the replacement of silver by argentite in these specimens as involving no chemical interchange and as therefore analogous to the well-known replacement of limestone by pyrite or of silicified wood by chalcocite. This interpretation is of improbable validity, however, because the argentite in the Monte Cristo ores replaces only native silver, a fact which strongly suggests that the silver content of the argentite was derived mainly if not wholly from the native silver. If this is true what was the agent that accomplished the oxidation? Hydrogen sulphide or alkaline sulphides, as is well known, may effect such transformations. It would appear also from experiments by H. C. Cook[4] that finely divided sulphur may also combine with silver even at ordinary temperatures and pressures to form silver sulphide. Hydrogen sulphide may be de-

[2] Cook, H. C., The secondary enrichment of silver ores: Jour. Geology, vol. 21, p. 25, 1913.

[3] Stokes, H. N., Experiments in the solution, transportation, and deposition of copper, silver, and gold: Econ. Geology, vol. 1, p. 649, 1905–6.

[4] Op. cit., p. 25.

veloped during downward enrichment by the action of sulphuric acid on certain sulphides, but such sulphides are absent from the Monte Cristo mine, and the prevalence of calcite shows that descending acid waters were not abundant. On the other hand, the presence of either hydrogen sulphide, alkaline sulphides, or sulphur would accord with our knowledge of the character of ascending waters of deep-seated origin.

In ore between the fifth and sixth levels argentite is found in fine-grained intergrowth with barite, bands half an inch across being about half argentite. Under the microscope it is found that the barite nearly everywhere shows its characteristic crystal faces next to the argentite. The argentite has clearly not replaced barite; if it had, the crystalline outlines of the barite would, in places at least, have been destroyed. What to the unaided eye appears to be veinlets of argentite traversing barite are shown by the microscope to be simply narrow masses of argentite lying between the flat faces of large parallel crystals of barite. In a few places small inclusions of chalcopyrite are inclosed by the argentite, but there is no evidence that argentite has replaced chalcopyrite. The argentite of this specimen is interpreted as probably of the same age as the barite. Barite, as is well known, may be deposited from descending solutions, but in this mine it is one of the principal primary gangue minerals.

Because argentite is in places intergrown contemporaneously with quartz, barite, and calcite, the common primary gangue minerals, and because in replacing silver it reverses the relation usual in downward enrichment, it is considered probable that much of the argentite is a late primary mineral.

Gold ores.—No gold minerals were noted in any of the ores collected, but assays show high gold content in a few places. The richest gold ores are reported to have been found south of the shaft on the sixth level, for a length of about 150 feet along the drift. The richest ore ran 25 ounces in gold to the ton, and the average gold content is said to have been about 2½ ounces.

OXIDATION.

The original ground-water level is reported to have stood about 300 feet below the surface. The first level was not accessible in 1913, but on the second and all deeper levels oxidation was notably slight. Limonite stains were noted along fractures in the vein as far down as the seventh level, but some of these stains may have been deposited since mining began. Ore said to have come from a depth of only 60 feet showed no evidence either of oxidation or of enrichment. Figures 35 to 37, sketched from this ore, show entirely unaltered primary ore.

Sparse and interrupted coatings of the hydrous arsenates cobalt bloom (erythrite) and nickel bloom (annabergite) were noted on a slickensided surface in ore from the second level that in other respects showed no alteration. These arsenates are in general of rare and meager occurrence, even in the shallow ores.

A little staining with malachite was noted along fractures in chalcopyrite ore on the third level. No halogen salts of silver were seen.

In general, therefore, with the possible exception of a few feet of vein material close to the surface in parts of the mine that were not accessible, there is no thoroughly oxidized zone. Oxidation products are found only in small amounts along a few fractures. Ores that are perfectly fresh were found at depths of only 60 feet and probably extend much nearer to the surface.

MINE WATERS.

The mine workings are comparatively dry. No water was noted above the fourth level. Numerous tests with litmus paper and methyl-red solution of waters dripping through the vein on the fifth and lower levels showed that they were all neutral.

DOWNWARD SULPHIDE ENRICHMENT.

Sulphide enrichment in copper was essentially negligible, being restricted to the development of peacock tarnishes on chalcopyrite, noted even on the deepest or ninth level. No recognizable chalcocite was seen.

Argentite that is probably of late primary origin has been described above, but in a few other occurrences the argentite may possibly be secondary (supergene). A specimen from the third level, for example, shows primary ore traversed by veinlets as much as 0.5 millimeter in width that consist mainly of argentite, although crystals of calcite and barite project into the argentite from the walls.

On the sixth level the granite gneiss of the hanging wall, carrying disseminated grains of pyrite, is traversed by numerous fractures, along some of which sheetlike masses of argentite less than 0.3 millimeter in thickness have been deposited. Minute crystals of calcite occur in close association with the argentite, and in one place sphalerite was apparently intimately intergrown with the argentite. Sphalerite where observed elsewhere in the mine is clearly primary.

Criteria seem to be lacking to determine the primary (hypogene) or secondary (supergene) origin of this argentite. If it is secondary it was not deposited from acid solutions, as is shown by its association with calcite. Even if this argentite is secondary, enrichment phenomena have at best played but a very minor part in the geologic history of the Monte Cristo mine.

THE MONTE CRISTO ORES COMPARED WITH THOSE OF COBALT, ONTARIO.

Native silver has long been recognized as a characteristic associate of cobalt and nickel arsenides and antimonides, and the type examples of this association in the Erzgebirge, Germany, and at Cobalt, Ontario, form the subject of a considerable literature. The minerals present in these deposits have been carefully identified, but the age of the native silver with respect to the other ore minerals has not been demonstrated for the Erzgebirge deposits and has been only partly demonstrated for the Cobalt deposits.

Because native silver in most sulphide ore deposits is clearly a product of downward enrichment many economic geologists have been inclined to regard the silver of the cobalt-nickel veins as also a product of enrichment. The apparent playing out of the silver in depth in certain of the veins at Cobalt lent support to this hypothesis, as did also the demonstration that cobalt and nickel arsenides and antimonides were effective precipitants of metallic silver from sulphate solutions.[5] On the other hand, those geologists who have had the most intimate first-hand knowledge of the geology of the Cobalt district have consistently held that the native silver was primary and that downward enrichment operated on only a minor scale, if at all.[6] Their belief is based mainly upon the presence of "blind" (not outcropping) veins rich in native silver, the extension of ores carrying native silver in places to depths of 1,600 feet below the surface, and the presence of rich silver ores in veins that lie beneath the Nipissing diabase sill and so should have been protected by it from downward enrichment. On the whole, the field evidence at Cobalt, which is obviously entitled to first consideration in any attempt to determine the origin of the ores, appears to offer insuperable obstacles to the hypothesis of downward enrichment.

The Monte Cristo ores that form the subject of this report show conclusively that native silver may occur as a primary associate of nickel and cobalt arsenides and therefore support the view that the silver at Cobalt is primary. The mineral relations observed in the Monte Cristo ores made it desirable to review the Survey's small collection of typical ores from Cobalt in order to determine whether any evidences of a primary origin of the silver had been overlooked in previous studies.[7]

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[5] Palmer, Chase, and Bastin, E. S., Metallic minerals as precipitants of silver and gold: Econ. Geology, vol. 8, pp. 140–155, 1913.

[6] Miller, W. G., The cobalt-nickel arsenides and silver deposits of Temiskaming: Ontario Bur. Mines Rept., vol. 19, pt. 2, 1913. Whitehead, W. L., The veins of Cobalt, Ontario: Econ. Geology, vol. 15, pp. 103–135, 1920.

[7] Bastin, E. S., Significant mineralogical relations in silver ores of Cobalt, Ontario: Econ. Geology, vol. 12, pp. 219–236, 1917.

The results of this review confirm in most particulars the relations previously reported, which may be summarized as follows:

1. Native silver in the Cobalt ores studied is nowhere of the same age as nickel and cobalt arsenides and antimonides. It has replaced niccolite, breithauptite, smaltite, and locally ferruginous calcite. A study of many specimens from all parts of the district might of

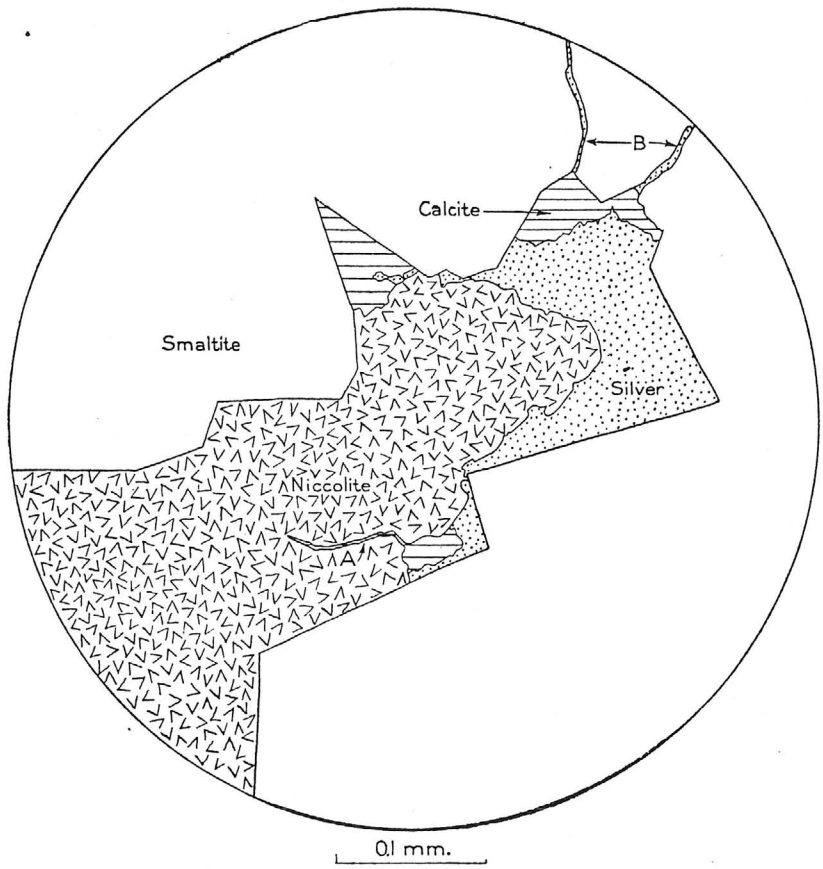


FIGURE 43.—Part of a "nest" of niccolite within smaltite, Kerr Lake mine, Cobalt, Ontario. At vulnerable angles the niccolite has been replaced by native silver and calcite. A is a veinlet of calcite traversing niccolite, and at B are veinlets of silver traversing smaltite. Depth 250 feet. Camera lucida drawing from polished specimen.

course reveal other relations. Evidence of replacement is found in such relations as are shown in figures 43, 44, and 45. All transitions are observable from cores of niccolite alone (or of breithauptite, or both) within smaltite to others in which corners and edges evidently once niccolite are now silver (see fig. 43), to others that are mainly silver inclosing large semirounded niccolite remnants (see fig. 44), and finally to cores that consist wholly of silver except

for very minute and well-rounded niccolite remnants (see fig. 45). These relations are in marked contrast to those at the Monte Cristo mine, where native silver nowhere replaces other minerals, and therefore demand special explanation.

2. The replacements at Cobalt apparently involved chemical interchange between the nickel and cobalt sulphides and arsenides and the

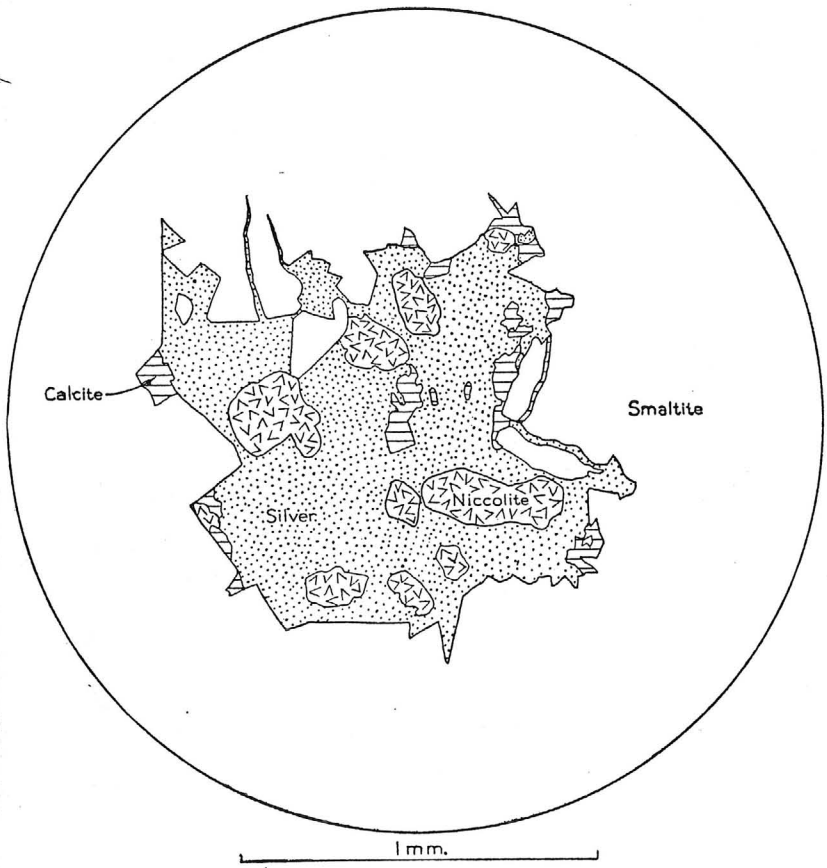


FIGURE 44.—"Nest" of niccolite and silver within smaltite, Kerr Lake mine, Cobalt, Ontario. The niccolite has been partly replaced by silver and a little calcite, leaving several semirounded unreplaced remnants. Camera lucida drawing from polished specimen.

solutions concerned in the replacement and therefore differ from such well-known phenomena as the replacement of calcite by pyrite or of silicified wood by chalcocite. This inference is drawn from the fact that simple arsenides and antimonides of nickel and cobalt have been replaced by silver, whereas sulpharsenides and sulphantimonides have not. In the laboratory the same arsenides and antimonides are rapidly attacked by silver sulphate solution, with the precipitation of

metallic silver, whereas the sulpharsenides and sulphantimonides are not attacked. Furthermore, the replacement of the nickel and cobalt arsenides and antimonides by silver has been selective or preferential. Cores of niccolite are commonly in large part replaced by silver before the replacement of the surrounding smaltite begins. In the laboratory niccolite is attacked much more rapidly by silver sulphate solution than smaltite.

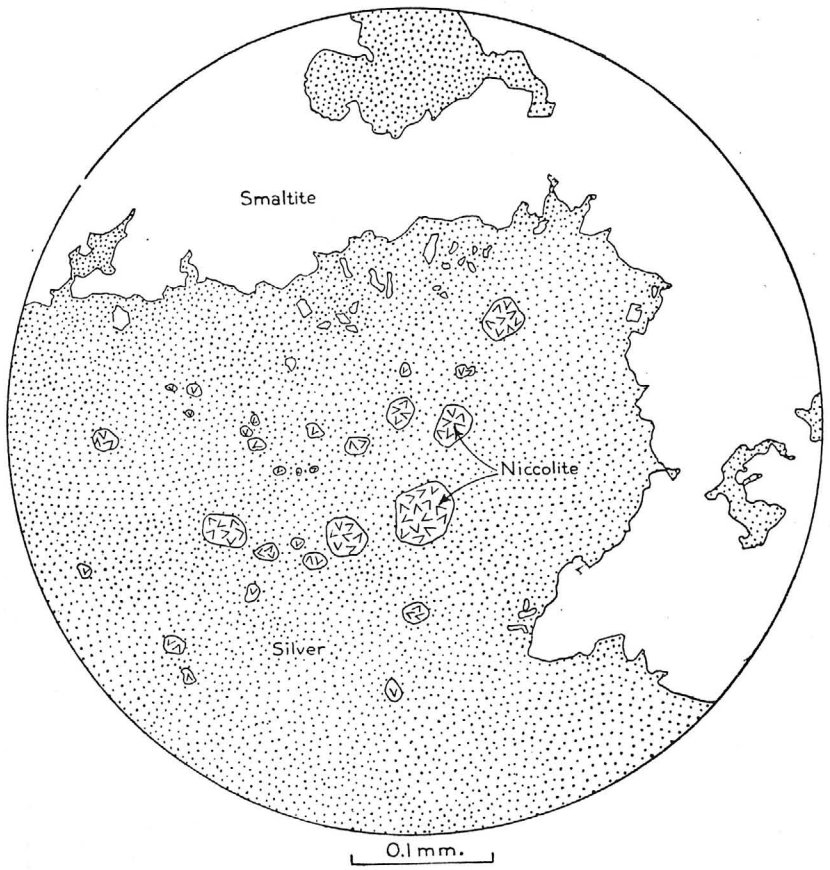


FIGURE 45.—View on larger scale of a part of a "nest" of silver in smaltite similar to that shown in figure 44, except that replacement of niccolite has proceeded farther, leaving only minute rounded niccolite remnants; replacement of smaltite has also begun. From Kerr Lake mine, Cobalt, Ontario. Depth 250 feet. Camera lucida drawing from polished specimen.

NATURE OF SILVER-DEPOSITING SOLUTIONS AT COBALT, ONTARIO.

On the basis of the facts just outlined the writer in his earlier paper [8] concluded that much if not all of the native silver at Cobalt had probably been deposited from sulphate solutions through reac-

[8] Op. cit., p. 236.

tions analogous to those which took place in the laboratory. Certain features of the ores, however, have always been somewhat inharmonious with this view. First among these inharmonious features is the abundance of carbonates in the ores. Palmer has shown that the precipitation of silver by nickel and cobalt arsenides and antimonides may proceed under neutral conditions, but metallic sulphides and free sulphuric acid are products of the reactions. If such reactions have brought about the abundant deposition of native silver at Cobalt it would be logical to expect a considerable destruction of carbonate gangue minerals. Some ferruginous calcite has been replaced by silver in these ores, but there is also evidence, cited below, that calcite and silver have jointly replaced niccolite—that is, that they have been deposited simultaneously from the same solution. In the second place the field studies have failed to disclose any sulphates in the ores.[9] If silver was present in the mineralizing solutions in balance with the sulphate radicle we might reasonably expect to find some gypsum, anhydrite, barite, or other sulphate as a gangue mineral. With these facts in mind the writer at the conclusion of his earlier paper on the Cobalt ores stated that "The study of reactions that would take place if the same suite of primary minerals [the nickel and cobalt arsenides and antimonides] were brought in contact with silver-bearing solutions having properties analogous to those of hypogene ore-bearing solutions offers an attractive field for geochemical research."

The reexamination of the Cobalt collections brings out one fact whose significance was previously overlooked. Some calcite appears to have been deposited contemporaneously with native silver in replacement of niccolite and subordinately of smaltite. In figure 46 is shown, for example, niccolite traversed by veinlets that are part calcite and part silver. Figure 43 shows what appears to be the contemporaneous replacement of niccolite by calcite and silver at vulnerable corners and angles of a niccolite "nest" inclosed by smaltite. The alternative explanation that the silver has replaced both calcite and niccolite is rendered improbable by the fact, apparent under high power, that the calcite-silver contacts are numerous straight crystal faces and have not the irregularities characteristic of replacement. In the specimen shown in figure 44 calcite and silver are also intergrown, apparently contemporaneously, with crystal faces between them.

Miller[10] illustrates branching crystals of silver in calcite. This relation suggests that the two minerals were deposited contempo-

[9] Barite has not been found in the veins of cobalt proper, although it occurs with silver-cobalt ores in one or two veins near Elk Lake, in the Porcupine district, Ontario (Miller, op. cit., p. 9, footnote).

[10] Op. cit., fig. 9, p. 14.

raneously, for silver that has replaced ferruginous calcite in these ores is characteristically devoid of crystal outlines.

All these relations suggest that in the mineralizing solutions at Cobalt the silver was carried in balance with the carbonate or more probably the bicarbonate radicle, and not in balance with the sulphate

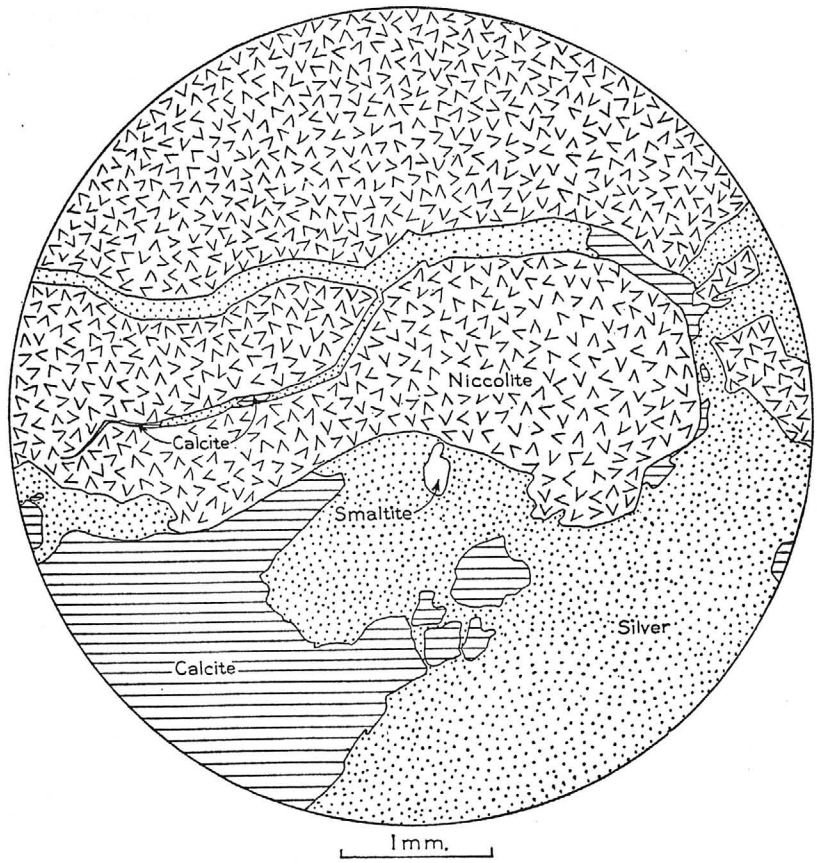


FIGURE 46.—Veinlets of calcite and native silver traversing niccolite, Kerr Lake mine, Cobalt, Ontario. An example of calcite apparently contemporaneous with silver, and both later than niccolite. Camera lucida drawing from polished specimen.

radicle, and the writer therefore proceeded to test this possibility chemically.

Freshly precipitated silver carbonate[11] in a beaker of distilled water was redissolved as bicarbonate by stirring the precipitate and at the same time passing purified carbon dioxide gas through the

[11] Silver carbonate was precipitated from silver sulphate solution by potassium carbonate in excess. The precipitate was washed repeatedly with distilled water until the wash water failed to give any precipitate of barium sulphate with barium nitrate. The washing was continued somewhat longer, to make sure of complete elimination of the sulphate radicle.

The residue imparted the characteristic cobalt-blue color to a borax bead, showing that cobalt had gone into solution concomitant with the deposition of silver.

These experiments, though purely qualitative, are perfectly definite and show conclusively that when cobalt and nickel arsenides and antimonides are in contact with a solution of silver bicarbonate a series of reactions ensues which results in the precipitation of metallic silver. These reactions are analogous to the reactions worked out quantitatively for the action of the same minerals on silver sulphate, but they do not develop acidity in the solutions. It is hoped that through cooperative study the reactions with silver bicarbonate may soon be worked out quantitatively and all the products definitely determined.

These experiments develop, therefore, a rational chemical explanation of the selective replacement of nickel and cobalt arsenides and antimonides by native silver in the ores of Cobalt, Ontario, based upon the transportation of the silver in solution as the bicarbonate rather than the sulphate. This explanation appears to be in harmony with the observed abundance of carbonates in the ores and the absence of sulphate and conforms also to the microscopic evidences that in places silver and calcite have simultaneously replaced niccolite and similar minerals. It is likewise harmonious with the field evidence, which points strongly to a primary (hypogene) origin for the rich silver ores.

SUMMARY AND CONCLUSIONS.

1. The ores of the Monte Cristo mine, near Wickenburg, Ariz., occur as replacement veins in rocks of probable pre-Cambrian age. There is no direct evidence of the age of the mineralization. If, as seems likely, these veins were formed contemporaneously with most other ore deposits of this region, their age is probably late Tertiary.

2. The minerals listed below were noted in the Monte Cristo ores; the commoner ones are shown in italics.

Primary (hypogene): *Chalcopyrite*, *pyrite*, *arsenopyrite*, sphalerite, galena, *tennantite*, enargite, specular hematite, *quartz*, *barite*, magnetite, *niccolite*, *chloanthite*, gersdorfite, *native silver*, proustite, pearceite, argentite, *calcite*, and *siderite*.

Secondary (supergene): Argentite (?), erythrite (cobalt bloom), annabergite (nickel bloom), and limonite.

3. Although several ore types are recognizable there is no clear evidence of more than one general period of primary mineralization.

4. The microscopic relations in the Monte Cristo ores show clearly that the silver-bearing minerals—native silver, proustite, and pearceite—are primary (hypogene), having crystallized contemporaneously with several of the commoner and unquestionably primary ore minerals. These three silver minerals never replace other minerals in these ores.

water. After filtering, the clear solution of silver bicarbonate, which was neutral toward litmus paper and free from the sulphate radicle, was used in the following experiments.

1. Experiment with niccolite fragments: Fragments of niccolite in an evaporating dish were covered with the clear solution of silver bicarbonate and set aside in the dark for one hour. At the end of that time branching fan-shaped masses of lustrous metallic silver mixed with a dark-gray substance of unknown composition had grown out from the niccolite. Some of these "fans" of skeleton crystals of silver were a quarter of an inch long. Nickel had at the same time gone into solution, as shown by the crimson solution and precipitate obtained when dimethylglyoxime was added to the filtrate. A yellow precipitate of silver carbonte also formed, which redissolved when carbon dioxide was passed into the solution. The solution at the end of the reaction was neutral toward litmus paper.

2. Experiment with powdered niccolite: Reactions like that reported above proceed much more rapidly if the mineral used is pulverized, for a much larger surface is thereby exposed to the attack of the solution. About a gram of powdered niccolite was shaken in a test tube with about 10 cubic centimeters of silver bicarbonate solution. Before the reaction the solution gave a pronounced precipitate of silver chloride when treated with hydrochloric acid. After the mixture had been shaken a few times and filtered the clear filtrate gave no precipitate of silver chloride when treated with hydrochloric acid, showing that silver bicarbonate had been completely removed from solution. With dimethylglyoxime the filtrate gave a marked crimson color and precipitate, showing that nickel had gone into solution.

3. Experiments with powdered breithauptite and maucherite: The procedure just described was repeated with the substitution of breithauptite (NiSb) and of maucherite (Ni_4As_3) for niccolite (NiAs) and similar results were obtained. In both experiments silver was rapidly and completely removed from solution and nickel was taken into solution. The solutions at the end of the reactions were neutral toward litmus paper. Breithauptite and maucherite are both present in the ores of the Cobalt district and have locally been replaced by native silver. The complete removal of silver from the solutions in experiments 2 and 3 shows that the results obtained were not due to unrecognized traces of silver sulphate remaining as impurities in the solution but involved reaction with silver bicarbonate.

4. Experiment with fragments of smaltite: The experiment described in paragraph 1 was repeated with the substitution of smaltite ($CoAs_2$) for niccolite (NiAs). At the end of 20 minutes the specimen was examined, and lustrous silver was found to have formed in abundance on the smaltite. The solution was neutral toward litmus paper. After filtering the clear solution was evaporated to dryness.

5. In some of the Monte Cristo ores argentite has replaced native silver. This argentite is clearly contemporaneous with calcite and is believed to be late primary (hypogene) rather than secondary (supergene).

6. Downward enrichment in silver is negligible unless some argentite is to be interpreted as secondary (supergene). Downward enrichment in copper is limited to the formation of peacock tarnishes on chalcopyrite.

7. Waters dripping through the vein are neutral.

8. Oxidation has been slight.

9. The undoubted primary association of native silver with nickel arsenides in the Monte Cristo mine lends credence to the view that the native silver associated with cobalt and nickel arsenides and antimonides at Cobalt, Ontario, and elsewhere may also be mainly primary.

10. The native silver at Cobalt differs from that at the Monte Cristo mine in that it is not contemporaneously intergrown with the cobalt and nickel arsenides and antimonides but has replaced them. For this reason it has been thought by some to be a product of downward enrichment through the agency of solutions carrying silver in balance with the sulphate radicle. The field relations at Cobalt indicate, however, that the rich silver ores are primary and offer apparently insuperable obstacles to the hypothesis of downward enrichment.

11. The abundance of carbonates and the absence of sulphates in the Cobalt ores suggest that in the mineralizing solutions silver was carried in balance with the bicarbonate rather than the sulphate radicle.

12. A restudy of typical Cobalt ores showing that silver and calcite have simultaneously replaced niccolite also suggests that silver deposition was accomplished by carbonate rather than sulphate solutions.

13. Qualitative experiments prove conclusively that cobalt and nickel arsenides and antimonides are effective precipitants of metallic silver from silver bicarbonate solutions, nickel and cobalt being simultaneously taken into solution. The reactions are analogous to those previously worked out quantitatively for silver sulphate solutions, except that the solutions remain neutral after the reactions.

14. The field relations of the Cobalt deposits, the microscopic relations of the silver to the other ore minerals, experimental work with silver bicarbonate solutions, and partial analogy with the Monte Cristo ores all appear to favor the hypothesis that the rich native silver ores of the Cobalt district are late primary (hypogene) deposits from bicarbonate solutions.

Clyde H. Spencer, Jr.
2571 Patricia Dr.
Santa Clara
California 95050
23 April 1968

Arizona Dept. of Mineral Resources
Phoenix, Arizona

Dear Mrs. Pare,

Last January I was in your office talking to you about the past activities of my father's uncle, Dr. Norman Morrison. I was unable to locate the silver nugget of which we spoke. However, I am sending to you copies of material which I have I the hopes that they may be of interest or value in completing your files.

Sincerely,

Clyde H. Spencer, Jr.

Clyde H. Spencer, Jr.

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA 85007

December 13, 1965

Mr. Thorp D. Sawyer
% Bear Creek Mining Co
3075 Mill Street
Reno, Nevada

COPY

Dear Mr. Sawyer:

Mr. Irvin has forwarded your December 15th letter to this office for reply.

We believe the Monte Cristo mine about which you inquire is 12 miles northeast of Wickenburg. The property is described in U. S. G. S. Bulletin # 735-E, entitled Primary Native-Silver Ores near Wickenburg, Arizona; also in Mines Register, 1937, pp 605 and 606.

We have considerable information in our file which we will be glad to show you or your agent sometime when you are in Phoenix.

To the best of our knowledge it has been inactive since 1954 at which time it was being sampled by International Ore Corporation. We have no further information as to current ownership.

If we can be of any further service, please feel free to call on us.

Yours very truly,

FRANK P. KNIGHT, Director

by:
Adm. Assistant.

P

cc: William C. Grover
23rd Floor Russ Building
San Francisco, California 94104

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA 85007

November 18, 1965

Aubrey M. Davis
311 Granger Building
San Diego, 1, California

COPY

Dear Mr. Davis:

With reference to your letter of November 17th about the Monte Cristo Mine in the Wickenburg area:

We have no map of the property, and so far as we know, it consists of unpatented mining claims. The County Assessor, Yavapai County, Prescott, Arizona, could tell you whether the claims are assessed as patented property.

Enclosed are photocopies of a published 1933 prospectus and an article from Mines Register, 1937; and you may find the following out-of-print paper at a library: Primary native-silver ores near Wickenburg, Arizona, in U. S. Geological Survey Bulletin No. 735(E), by E. S. Bastin (1922).

We have file material on the property which we would be glad to show you on your next trip to Phoenix.

Yours very truly,

FRANK P. KNIGHT,
Director.

FK:p
Encs.

From Wickenburg Mines File

July 27, 1946

Mr. Frank England
10741 Ventura Blvd.
North Hollywood, California

Dear Mr. England:

The Monte Christo Mine went into receivership about 1938 or 1939 and was subsequently sold to Dr. N. H. Morrison, 137 South Central Avenue, Phoenix.

We doubt if the old stockholders retained any rights.

We are sure Dr. Morrison would be glad to give you any further details if you care to inquire of him.

Yours very truly,

Chas. H. Dunning
Director

CHD:LP

July 24, 1946.

Bureau of Mines,
Phoenix, Ariz.

Gentlemen:

It will be greatly appreciated if you can give me any information about the Monte Christo Gold Silver Co. of Constellation, Ariz.

I had 480 shares of the New Monte Cristo Mining Co. which was transferred to the above Co. When they were calling for the five different assessments they had offices in Los Angeles, Phoenix and Salt Lake.

There was ore on the dump and ready to ship, according to their story, but I havnt heard a word from them since I sent the last six dollar assesment, in July, 1937. Thanking you in advance, I am

Dr. Harrison

Yours respectfully,

Frank England.

10741 Ventura Blvd.
North Hollywood
Calif.

all liquidated
Renewals 1939-40

December 31, 1945

Mr. George Hunt
Monte Cristo Mine

Dear Mr. Hunt:

This will introduce Mr. Earl Hastings and Mr. O. F. Marvin. They have a special and very important problem on the separation of oxidized copper and perhaps you can help them.

They would also be greatly interested in your general layout, and it would be appreciated if you would talk it over with them.

I will be up myself as soon as I can get on my feet again.

Yours very truly,

Chas. H. Dunning
Director

CHD:LP

Monte Cristo

February 19, 1945

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

Gentlemen:

Mr. E. H. Lundquist of Phoenix made an application through us for supplemental gas on February 7. This was for only 40 gallons a month and was for the purpose of carrying on very strategic work in connection with titanium and zirconium production at the Monte Cristo mine east of Wickenburg, Arizona.

Mr. Lundquist advises us that he still has had no action on this application and that this critical work is being very seriously curtailed because he does not have the necessary gasoline.

It would be greatly appreciated by this department if this application could be expedited without further delay.

Yours very truly,

Chas. H. Dunning
Director

CHD:LP

J. MAX ANDERSON, Agent
BEALE HOTEL
KINGMAN, ARIZONA

July 28th. 1940.

MM-
MM-60

Mr. J. S. Coupal.
Dept of Mineral Resources.
Capitol Building.
Phoenix, Arizona.

Dear Mr? Coupal.

I have just returned from Los Angeles, and, have your letter of 25th inst,with enclosure of Mine Owners Report. I will have my son Brooks, fill this out from the mine and send it in to you. The property is owned by the Monte Cristo Mines,Inc, of which I am President.

Am leaving for the mine early Wednesday morning with the parties of whom I spoke and,if we can arrange it,will come in to Phoenix and call on you. We expect to be at the property two or three days on this trip.

Thanking you for your courtesies and attention.
And,with best wishes to Mr. Willis and yourself.

Sincerely yours.

M. B. Dudley.

DEPARTMENT OF MINERAL RESOURCES

REPORT TO OPA ON ACTIVE MINING PROJECT

Date 2/7/45

Name of Mine Monte Cristo

Owner or Operator E H Lindquist

Address 1514 West Lewis Phoenix

Mine Location East of Wickenburg

Filing Information

File System

File No.

This chart to be used for gallons of gasoline required per month.

PRESENT OPERATIONS: (check X)

Production ; Development ; **Financing** ; Sale of mine ;

Experimental (sampling) X ; Owner's occasional trip X ;

Other (specify) Erecting a mineral separating plant

PRODUCTION: **Past and Future.** **Tons**

Approx. tons last 3 months

Approx. present rate per 3 months

Anticipated rate next 3 months

If in distant future check (X) here

EQUIPMENT OPERATED:

Type	Quantity or Horse Power	Miles or Hours Per Month	Gallons Required Per Month
Personal Cars	1	528	40
Light or Service Trucks			
Ore Hauling Trucks			
Compressors			
Other Mine or Mill Eqpt.			

PRODUCT PRODUCED OR CONTEMPLATED: Name metals or minerals.

Titanium Zirconium and other rare metals

REMARKS:

Application important and approved

ARIZONA DEPARTMENT OF MINERAL RESOURCES

By Chas H Dunning

DEPARTMENT OF MINERAL RESOURCES

REPORT TO OPA ON ACTIVE MINING PROJECT

DEPT. MINERAL RESOURCES
RECEIVED
JAN 22 1945
Filing Information
PHOENIX, ARIZONA

Date Jan. 19, 1945

Name of Mine Monte Christo Mine

Owner or Operator Franklin E. Wallace

Address Wickenburg, Arizona

Mine Location Constellation, Canyon

File System

File No.

This chart to be used for gallons of gasoline required per month.

PRESENT OPERATIONS: (check X)

Production ✓; Development ; Financing ; Sale of mine ;

Experimental (sampling) ; Owner's occasional trip ;

Other (specify) Research for rare metals

PRODUCTION: Past and Future.

	Tons
Approx. tons last 3 months	None
Approx. present rate per 3 months	None
Anticipated rate next 3 months	
If in distant future check (X) here	

EQUIPMENT OPERATED:

Type	Quantity or Horse Power	Miles or Hours Per Month	Gallons Required Per Month
Personal Cars			
Light or Service Trucks			
Ore Hauling Trucks			
Compressors	376 cu. in.	240 hrs.	230
Other Mine or Mill Eqpt.			

PRODUCT PRODUCED OR CONTEMPLATED: Name metals or minerals.

All rare metals

REMARKS:

Affirmed

ARIZONA DEPARTMENT OF MINERAL RESOURCES

By

DEPARTMENT OF MINERAL RESOURCES

REPORT TO OPA ON ACTIVE MINING PROJECT

Date: Oct 23 - 44

Name of Mine: Monte Cristo

Owner or Operator: Franklin E Wallace

Address: Wickenburg, Arizona

Mine Location: Constellation

Filing Information

File System:

File No.:

This chart to be used for gallons of gasoline required per month.

PRESENT OPERATIONS: (check X)

Production ......; Development ......; Financing ......; Sale of mine ......;

Experimental (sampling) X; Owner's occasional trip ......;

Other (specify) ......

PRODUCTION: Past and Future.

	Tons
Approx. tons last 3 months	none
Approx. present rate per 3 months	
Anticipated rate next 3 months	
If in distant future check (X) here	

EQUIPMENT OPERATED:

Type	Quantity or Horse Power	~~Miles or~~ Hours Per Month	Gallons Required Per Month
Personal Cars			
Light or Service Trucks			
Ore Hauling Trucks			
Compressors	60	240	960 (Wallace's statement)
Other Mine or Mill Eqpt.			

PRODUCT PRODUCED OR CONTEMPLATED: Name metals or minerals.

Operator won't state

REMARKS:

It is my opinion that the compressor will operate an average of about 6 hrs per day and in that case 720 gals per month should be plenty. I can approve that amount. I suggest that he be [illegible] write us a letter giving details of his operations

ARIZONA DEPARTMENT OF MINERAL RESOURCES

By A. C. Hebeker

Field Engineer

DEPARTMENT OF MINERAL RESOURCES

REPORT TO OPA ON ACTIVE MINING PROJECT

Date 5/14/45

Name of Mine [illegible]

Owner or Operator [illegible]

Address [illegible]

Mine Location [illegible]

Filing Information

File System

File No.

This chart to be used for gallons of gasoline required per month.

PRESENT OPERATIONS: (check X)

Production; Development; Financing; Sale of mine;

Experimental (sampling) X; Owner's occasional trip;

Other (specify)

PRODUCTION: **Past and Future.**

	Tons
Approx. tons last 3 months	
Approx. present rate per 3 months	
Anticipated rate next 3 months	
If in distant future check (X) here	

EQUIPMENT OPERATED:

Type	Quantity or Horse Power	Miles or Hours Per Month	Gallons Required Per Month
Personal Cars	One	500	40
Light or Service Trucks			
Ore Hauling Trucks			
Compressors			
Other Mine or Mill Eqpt.			

PRODUCT PRODUCED OR CONTEMPLATED: Name metals or minerals.

Rare metals

REMARKS:

This is an important new process for extraction of strategic rare metals and Dr Morrison is the chief investigator.

Application Recommended

ARIZONA DEPARTMENT OF MINERAL RESOURCES

By [illegible]

J. MAX ANDERSON, Agent
BEALE HOTEL
KINGMAN, ARIZONA

July 20th. 1940.

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

Dear Mr. Coupal.,

I am enclosing herewith a brief report and some data furnished me by Mr. Ralph H. Speaker, on the Monte Cristo Mine. Mr. Speaker at one time endeavored to secure the property for some of his clients, but, at that time the property was in litigation. I have had numerous conversations with Speaker regarding the property, with which he is quite familiar, and, he kindly consented to write the enclosed report as to his findings and recommendations. While, I appreciate that this is not a comprehensive report in any sense, it will give you an idea of the status there, and, will, I believe furnsih you with some valuable information as to the mine. I have a complete list of the equipment, and also a general report on the district, but, inasmuch as you are quite familiar with that district and, also have been on the property, I am not sending this.

We have every reason to believe from all the data available that there is upward of 400,000 tons of good commercial ore available at the present time and, with this in mind, I feel that the project is an exceptionally attractive one and well worth the serious consideration of anyone looking for a property of this character.

With best wishes.

Sincerely yours.

M. B. Dudley.

Beale Hotel.
Kingman, Arizona.

PS.
From the mill sheets we have, a conservative value of the present available ore would be around $12.75 per ton.

M. B. D.

J. MAX ANDERSON, Agent
BEALE HOTEL
KINGMAN, ARIZONA

July 21st. 1940.

Dear Sam.,

Cant tell you how much I enjoyed the meeting last evening and the chat later. I am thoroughly appreciative of the excellent work you boys are doing and,no one knows better than myself the many obstacles that you have had to overcome. The splendid showing made the first year,should be of great satisfaction to you,and demonstrates what even better results may be expected in the future. The matter of educatingthe people to what we really have in Arizona is no easy one and my hopeis that when the next session of the Legislature rolls around,there will be no quibbling as to appropriations sufficient to keep the good work going. You may rest assured that all of us who are really seriously interested in the betterment of conditions for the mining fraternity are with you one hundred percent.

Kind regards to Charlie and yourself.

Sincerely yours.

M. B. Dudley.

To. Mr. J. S. Coupal.
Director. Mineral Resources.
Phoenix, Arizona.

24 July 1940

Mr. M. B. Dudley,
Kingman,
Arizona.

Dear Mr. Dudley:

I thank you for your letter of July 21 and your kind remarks regarding the department.

I have noted the additional information submitted on the Monte Cristo Mine, which has been placed in our files where it will be available for any inquiries coming in on a silver property.

With best wishes, I am

Yours very truly,

J. S. Coupal
Director

JSC-jrf

Monte Cristo Mine

25 July 1940

Mr. M. B. Dudley,
Kingman,
Arizona.

Dear Mr. Dudley:

After dictating the attached letter, I find that we have no record of ever having received a Mine Owners Report on the Monte Cristo Mine.

I am, therefore, enclosing herewith a blank report, which I shall ask that you kindly fill out in detail and return so that this information may be available on your property.

Assuring you of my desire to be helpful, I am, with best wishes,

Yours very truly,

J. S. Coupal
Director

JSC-jrf
encl.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA

MINE OWNER'S REPORT

Date

1. Mine: Monte Cristo
2. Location: 12 miles NE of Wickenburg
3. Mining District & County: Black Rock--Yavapai
4. Former name:
5. Owner: Dr. N. H. Morrison
6. Address (Owner): E. Washington, Phoenix, Ariz
7. Operator:
8. Address (Operator):
9. President, Owning Co.:
9A. President, Operating Co.:
10. Gen. Mgr.:
11. Mine Supt.:
12. Mill Supt.:
13. Men Employed:
14. Principal Minerals: Silver, Gold
15. Production Rate:
16. Mill: Type & Cap.: Flotation (35-50 ton capacity)
17. Power: Amt. & Type: Electric
18. Operations: Present:
19. Operations: Planned:
20. Number Claims, Title, etc.: 61 unpatented mining claims in a compact group.
21. Description: Topography & Geography: The vicinity is characterized by rolling, brush covered, hills. In certain areas porphyry dikes just out prominently into the landscape.
22. Mine Workings: Amt. & Condition: Main shaft 1150' deep with 40' sump- Stations & drifts at 100' intervals in all approximately 22,000 feet of underground work.

23. Geology & Mineralization — Extensive oxidation seen on the surface shale with porphyry dikes.

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

400,000 tons of $12 ore developed.
800 tons of concentr tes shipped.
All of the rock and most of the ore that comes out of the development is still on the dump.

24A. Dimensions and Value of Ore body

Values in gold, silver, copper vary from $6 to $20. Gold ore on 6th level. 150' in length reported 2½ oz. average--also on this level some 10 oz. gold ore was found with sensationally high silver assays.

25. Mine, Mill Equipment & Flow-Sheet

Upward of $225.000 spent on surface equipment and power line. Mill of 35-50 ton (flotation) capacity complete on ground. Mill recovery for 12,000 tons ore handled was 92%. Ration of concentration 10-11 tol.

26. Road Conditions, Route

Excellent graveled mountain raod 12 miles in length connects the mine with main U.S. Highway.

27. Water Supply

An abundance of pure water for domestic purposes, together with ample water for milling 4,000 tons per month.

28. Brief History

Producted $15,000 in silver in 1926-27
Property sold for $1,000,000-$500,000 in cash and $500,000 in negotiable securities.

29. Special Problems, Reports Filed.

See. U.S.G.S. Bulletin #735 by E. S. Bastin
See. Lindgren's Report.

30. Remarks

The fact that the greater percentage of values occur in the ores associated with sulphides, render the ore ideal for flutution treatment.

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

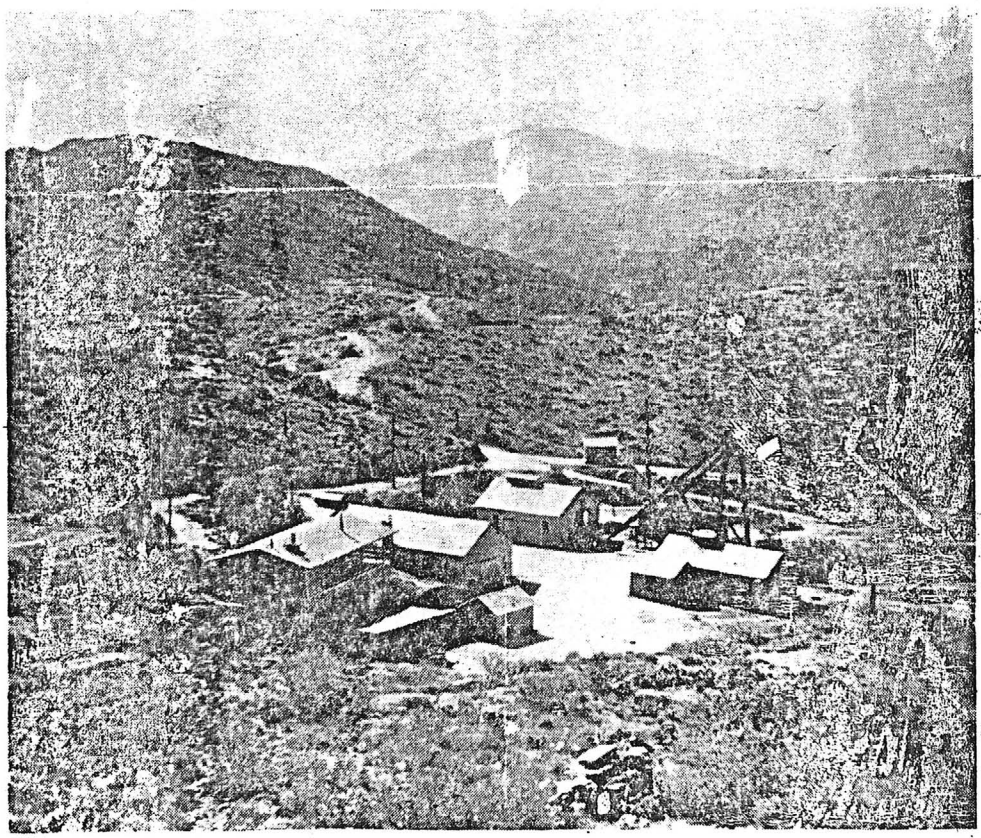
~~For sale apply for terms. See Dr.~~ Morrison.

32. Signature.....

33. Use additional sheets if necessary.

MAHONEY GOLD MINES, INC.

An Arizona Corporation
500,000 Shares Non-Assessable



NORMAN H. MORRISON

A. G. EAST
Sec. Treas.

A LETTER BY THE PRESIDENT OF THE MAHONEY GOLD MINES, INC.

To the many friends of Monte Cristo Mine, Inc., a word of explanation may clarify your minds as I know there is some confusion as to Mahoney Gold Mines, Inc.

When I bought the old Monte Cristo holdings from the Superior Court of Yavapai County, (It having gone through the receivership in Yavapai County) I took some of the claims and incorporated them in the New Monte Cristo Mine, the balance of the claims I held as an individual I have now dis-incorporated the Monte Cristo and have thrown my entire holdings into the Mahoney Gold Mines, Inc.

In offering this security to the public it is for the purpose of enlarging the present mill and developing the Mahoney vein, (The late Eryra Thayer bought the Mahoney group from a man by the name of Mahoney at a cost of many thousand dollars.)

The development on the Mahoney Group has produced some considerable ore in the Oxide Zone. Now it is my intention to develop the Mahoney Group at a depth that will produce sufficient Sulphide ore to maintain an enlarged mill to capacity. There are other vein systems on the property worthy of development, but their development will be undertaken at a later date.

The present Mahoney offering comprises the entire group, including the famous Monte Cristo. All the fabulous stories about the Monte Cristo Treasure House can soon be verified. As I have recently leased the mill to the Camp B. Mine for the reduction of Camp B. ores and as the water is lowered in the Monte Cristo shaft Mahoney Gold Mines has leased the Camp B. Mine any ores in the Old Monte Cristo workings on a straight 10% royalty. This together with the royalty of the Camp B. ores assures the Mahoney Gold Mine of a very substantial income.

Any prospective investor in Mahoney Gold Mines Participates in the entire holdings and I have faith in the ultimate outcome. So that I do not hesitate to offer this stock to the most conservative investor and if he will look into the proposition with an open mind he can only come to one conclusion and that Mahoney Gold Mines is a worthy proposition. If we get an open market for gold, the Mahoney Gold will come in for a very substantial price in its offerings.

Very Sincerely,

NORMAN H. MORRISON
President
Mahoney Gold Mines, Inc.

Mr. M. B. Dudley

Dr. N. H. Morrison

Los Angeles, Calif.

Dear Sirs:

Re our conversation re Monte Cristo Mining Property.

Briefly I am putting our conversation in writing as per your request.

As to my several observations , tests, and determinations since 1931 on the Monte Cristo Mine.

Also attached and made a part thereof is goverment and datta as to the district.

Past productions, and brief history of adjoining mines also an inventory of equipment and surface improvements.

The Monte Cristo property was visited by the writer first in 1931, 1934, 1936, 1938, some of 1938. Atthose times the writer was able to see some of the underground workings, etc. Therefore will outline below all of the above and my recommendations as to the development that ought to be carried on and the proper equipment necessary to make this property a large and very profitable venture for yourself and or associates.

Very respectfully,

Ralph H. Spears.

Copy of Original in file

BRIEF REPORT ON THE

MONTE CRISTO

Mining Properties.

The MONTE CRISTO mine, referred to below is situated approximately 12 miles North and East of Wickenburg, Arizona, and in the south west corner of Yavapai County, Arizona.

HISTORY

During the late eighties, after the exhaustion of the then known silver mines, many gold mines that had been productive in the past, were re-opened. New ones, notably the Vulture, Congress, Hillside, Octave, and others were discovered during the early nineties, and concentrators were erected to treat base gold ores. During this time a smelter was reected at Arizona City.

The perfection of the Cyanide process in the early 20th century was an added stimulus to gold ore mining.

The most important producers of this period were the Congress, Octave and McCate-Gladstone.

From 1913 to 1930 little gold mining was done in the County, altho there were numerous new developments started, and many of them are now active producers; Others, particularly the MONTE CRISTO, has carried on at various times extensive development. This property which was owned for many years by the late Ezra Thayer, of Phoenix was extensively developed over a period of some seventeen years and, at this time, it is the writers opinion that there is proven, and ready to stope in excess of Four Hundred Thousand (400,000) tons of good grade mill ore. The values of the mineral content of these ores are variable, as may be readily understood owing to the wide area of mineralization.

From preliminary sampling of a number of the veins by the writer, it has been determined that the values in gold, silver and copper varies from $6 to $20 per ton. This is a remarkable average in proportion to the width of the mineralization. The writers sampling has proven this to be approximately correct, although much higher grade samples taken at other places on the property, indicate an average value of $20.00 per ton mill ore.

AREA.- The Monte Cristo property conists of sixty one (61) unpatented mining claims,approximately 20 acres each,or a total of approximately Twelve Hundred (1200) acres. The property is in a compact group and the claims all contiguous. Full list of the claims appears later in this report.

ACCESSIBILITY and TRANSPORTATION FACILITIES.

An excellent gravel mountain road,twelve miles in length,connects the mine with the main U. S. Highway,coast to coast; also to the County Seat at Prescott, and the smelters at Jerome and Superior. The concentrates can be handled at either of these smelters which are easily accessible and available at a low freight or haulage rate.This factor insures a minimum of expense for trucking direct from the mine to the smeltersat either of the above points or to Hayden,Arizona. Wickenburg, the principal supply point is but 12 miles distant and located on the main highway and the Santa Fe railway.

CLIMATE

The climate is mild and equable, allowing continuous work the year around.

WATER.

There is an abundance of pure water for domestic purposes,together with ample water developed for milling purposes. It is the writers opinion that ample additional water for a large mill can be developed in the various shafts.. The present suuply,however,appears ample to take care of around 4,000 tons per month.

DEVELOPMENT.

The mail working shaft is approximately 1150 feet deep with a 40 ft sump. There are stations and drifts at each 100 foot level, and all in all approximately 22,000 feet of underground work.

The richest gold ore found in these drifts is reported to be on the 6th level and for a length of 150 feet it is reported an average of 2½ oz was obtained. Also on this level a number of assays showing as high as 10 oz in gold with some sensationally high silver values. The above is taken from U. S. G. S. Bulletin #735 E. by E. S. Bastin.

EQUIPMENT.

The property is equipped with the very finest machinery and buildings

that money could buy. The evidence would indicate that upward of Two Hundred and Twenty Five Thousand dollars ($225,000) has been expended on surface equipment and power line alone. List of equipment follows later in this report..

DEVELOPMENT B.

At this time there are eleven (11) levels opened up;serviced by a Double compartment shaft. The underground equipment is of the best and in excellent condition. There are extensive drifts on each level,all connected with raises. The engineeeas reports would indicate a minimum of 400,000 tons of developed ore with a value of $12 plus per ton. The stopes and chutes are all in,ready to go to work and,the property coudd be put into operation in thirty days time.

MILLING.

There is a mill of 35-50 tons capacity on the ground (flotation). This mill is on standard equipment and,is so arranged that the capacity can easily be doubled or trebled at a comparatively small expense.

ELECTRIC POWER.

The Power line to Prescott (58 miles distant) supplies the mine and mill with power. This line was erected at a cost of $110,000 by the original owners of the property. The line is in fine shape and power can be turned on at short notice.

The entire district in which the Monte Cristo is located has been mined for many years,but no attention has been paid to the Monte Cristo until lately,for copper. It is the writers firm belief that, after the large bodies of gold and silver ores that are now proven and developed are mined,that, the development to further depths below the main water table(approximately 1500 feet),will prove the existence of a tremendous body of high grade copper ore.(See Prof. Lindgren's report).

TOPOGRAPHY.

The vicinity is characterized by rolling ,brush covered hills. In the certain areas outstanding porphyry dikes with solidification of the country rock causes jagged and rough knobs or ledges to jut out prominently into the landscape. As a rule the topography is not sharply accentuated.

Timber.

The timber is scrubby; being suitable for firewood only. Large cordage of this class of wood is available.

SURFACE ORES.

The above area, and in particular the Monte Cristo is notable for the amount of oxidation seen on the surface,and in the various shallow openings that have been made on the claims. Similar surface showings on neighboring mines,where underground development has been done,has proved to overlie valuable ore bodies.

MILLING RECOVERY.

The present mill records show a recovery of 92% plus from approximately 12,000 tons of ore handled. This however, should be increased to at least 93% to 95% by following the installation of a larger plant and, the following flow sheet for this is recommended.:

1. Ore over grissly to crushed ore bin.
2. Oversize to preliminary jaw crusher.
3. To Storage Bin.
4. To Self Feeder.
5. To Rolls.
6. To Ball Mill.
7. To Classifier.
8. Overside return to Ball Mill (Closed circuit).
9. Overflow to Flotation cells (Rougher).
10. Then to flotation machines,(clean up)
11. Rejects to Wilfley clean up table, or slime table.
12. Concentrates to Oliver filter.

All of the above is in line with the present mill equipment, but refers to a plant of 100 tons ore more capacity; this plant to

be equipped with crushing and power capacity for increasing it to 200 to 500 tons per day. This can be done with comparatively small additional expenditure.

The ratio of concentration is from 10 to 11 to 1.

MINING AND MILLING COSTS.

On the basis of 100 tons daily capacity, daily production to start with the cost of production and marketing, should not exceed $1.50 per ton. This estimate being based on the output from stoping carried to a width of four feet; the work to be conducted under the shrinkage system, and, with the ores maintained (reserves) from two to three years ahead of production.

SUMMARY.

The reader must bear in mind that the Monte Cristo property is NOT A WORKED OUT MINE; That the property was sold for One Million Dollars ($1,000,000); Five hundred thousand of this amount being paid in cash and the remaining five hundred thousand in negotiable securities, and, this after an exhaustive examination of this and numerous other properties. The Monte Cristo mine is absolutely virgin property, and, practically all of the ore developed and blockedout during the long period of development, is still in the mine; that only about 800 tons of concentrates were shipped to the smelter, which probably represents a total of less than 12,000 tons of crude ore. All of the rock, and most of the ore that came out of the development is still on the dumps.

The fact that the greater percentage of the values occur in the ores associated with the sulphides, render the ore an ideal ore for flotation treatment.

RECOMMENDATIONS.

The writer strongly recommends the immediate increasing of the mill to handle at lest one hundred tons, or more, and, with the immense tonnage of developedore available, there is no question as to the

ultimate success of the undertaking. This, of course, providing the operations are conducted under economical and competent management, and, along the same business mthods as any successful manufacturing enterprise would be conducted.

In conclusion the writer again wishes to emphasize that in his many years of active mining, he has never had presented to him, a mining enterprise so attractive, and he has not the slighest doubt, as stated above, that the Monte Cristo can be developed in one of the outstanding producers of the country.

It must also be born in mind that this property is, not only thoroughly developed, but, is completely equipped and these facts, certainly make it a most unusual situations I have ever encountered.

Respectfully submitted,

(Signed) RALPH H. SPEAKER.
Research Engineer.

Attached find complete list of claims and equipment.

R.H.S.