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PRELIMINARY PROPERTY EXAMINATION NO. 145

Lead-Silver Mine
Date of Examination 3-18-58
Date of Report 3-21-58
GERALD WEATHERS

I. NAME OF PROPERTY: The Glove Mine, operated by the Sunrise Mining Co., consisting of 60 unpatented lode claims.

II. OWNERS: A Mr. Simmons of California is reported to own 55% of the stock of the company and Mr. Edward Mack of Amado, Arizona (the prospector-developer) owns the remaining 45% of the stock. The property was presented by Mr. Richard Chilson of Tucson, Arizona.

III. LOCATION AND PHYSICAL FEATURES: The mine is located in the Tyndall Mining District, T 20 S, R 14 E, Santa Cruz County, Arizona. It can be reached by travelling east of U. S. 89 at Amado on a secondary road to the mine site. The Southern Pacific Railway line is located 12 miles westward at Amado. No developed water was noted. The terrain is hilly, of moderate relief and with sparse foliage.

IV. DEVELOPMENT: Two block buildings, approximately 12' x 20', and a small tool shop-change house were noted. There are about 5,000 feet of underground workings accessible from a 240 foot shaft and a 60 foot winze. Work is now in progress on the lowest level or 300 feet below the surface.

V. HISTORY AND PRODUCTION: As shown on the enclosed production tabulation, the first record of production from this property was during the period 1911-1917 when the Copper Queen Mining Co. shipped 612 dry tons and received $7,168.65 net return. Small, sporadic shipments were made from the property from that time through 1949, totalling 638 dry tons and $10,000 net return.

Mr. Mack of the Sunrise Mining Company acquired the property in 1950 and has constantly developed and mined from the property since that time, increasing production from 884 dry tons in 1951-2 to 5,230 dry tons in 1957. The total production by the Sunrise Mining Company through 1957 has been 13,424 dry tons for which they received $540,174 after smelting, freight, haulage and assaying charges were paid or $40.23 per ton. The mine is currently producing 400 tons of ore per month, averaging 14% oz. silver and 35-40% lead using two shifts of 7 Mexican miners and one mine captain.

Ore is selectively mined, dropped into chutes orhand mucked into one ton ore cars; trammed about 300 feet to a winze and hoisted from the 300 to the 240 level; then trammed about 600 feet to the shaft, hoisted to about the 50 level and then hand trammed about 1,000 feet to a 50 ton ore bin at the portal.

VI. GEOLOGY: The ore occurs as a limestone replacement near intrusive porphyritic dacite dikes. The area is underlain by (Naco?) limestone to the north and granitic rock to the south. Narrow porphritic dacite dikes cut the limestone. The mine was developed along one of these dikes striking N 60° W and dipping 55° NE. This dike can be traced on the surface for about 2,000 feet. Mineralization occurs on both sides of the dike in limestone. The ore bodies follow nearly vertical solution channels in the limestone adjacent to the dikes. The channel containing the present reserves gradually widens downward to the 300 level where the open cavity is about 50 feet in diameter. Cerrussite occurs in red mud along the walls of the chimney like channel and galena occurs in the limestone forming its walls. Large Wulfenite (Pb Mo 04) crystals are also found in the channels. (Note that molybdenum is not reclaimed).

VII. ORE RESERVES: Developed reserves are located adjacent to and in a chimney between the 300 and 240 level or 60 feet vertically. The ore body is estimated to average 60 feet along strike x 30 feet wide or 180 tons per vertical foot (based on 10 cubic foot/ton). This would result in 10,800 tons of ore in place at 85% recovery equals 9,180 tons of recoverable developed ore. There is probably an equal amount of undeveloped ore in this chimney below the 300' level. It is possible to develop additional ore in the mine, but no additional ore was noted in this preliminary examination.

VIII. TERMS: The terms are open for negotiation; however, Mr. Chilson states he believes the mine can be purchased for $225,000. $200,000 payable to Mr. Simmons and $25,000 payable to Mr. Mack. In addition, Mr. Mack desires 10% of the net smelter returns.

IX. ASSETS: The mine is equipped with fairly new equipment valued by the owners at $80,000. They report $50,000 banked. Buildings are appraised at $4,000.

X. EVALUATION: Estimated ore reserves are 18,000 tons averaging 35% Pb and 14% Ag, valued at $103.32 per ton, based on 13¢ lead and 88¢ silver or a gross value of $1,859,760.00. Assuming the remaining ore will return about the same per ton as in 1957 after smelting, freight, haulage and assaying charges; its value per ton is $34.45. Other estimated costs are:

Mining Costs	$10.00 per ton
Royalty (10%)	3.45
Overhead	1.00
Exploration and Development	2.50
Taxes	.50
	$ 17.45

Estimated Profit $17.00 per ton or	$306,000
Probable Cost of Mine	225,000
Net Profit	$ 81,000, not including equipment, etc.

Assuming that the mine will produce 500 tons of ore per month or 6,000 tons per year and will return a profit of $17 per ton or $102,000 per year, then a formulae commonly used to evaluate such a property giving an interest return of 12% and capital investment return of 5% is:

$$\text{Value or Property } Vp = \frac{A}{\frac{r}{r^n - 1} \text{ plus } r'}$$

Wherein A = $102,000
r = .05
r' = .12
n = 3

$$Vp = \frac{102,000}{\frac{.05}{1.05^3 - 1} \text{ plus } .12} = \frac{\$102,000}{.1517} = \$672,000$$, estimated value not including equipment, bldgs., etc.

XI. ALTERNATE TERMS: Mr. Chilson reported he has received an alternate proposal in which a Los Angeles businessman will offer his apartment houses, valued at $609,000 as security for a loan of $225,000 for the purchase of the property. This gentleman desires in return that the money be repaid, plus a reasonable interest, from the profits of the mine. After payment of the loan he desires to be assigned a continued interest in the mine (exact percent open for negotiation).

XII. CONCLUSIONS: The Glove Mine (the only known operating lead mine in Arizona at the present time) is available for purchase due to a dispute between the owners. A preliminary examination indicates the included tabulation of ore production represents the tonnage, grade and returns from production by selective mining on a small scale. Ore reserves are estimated as 18,000 tons averaging 35% Pb and 14% Ag. (A more complete sampling and ore reserve calculation should be undertaken if this company is interested in this mine). The net profit to be realized, not including the present assets is estimated as$81,000 in three years.

This is a high grade small mine that has a possibility of being developed into a larger mine with the cost of development to be paid from the sale of present ore reserves.

XIII. RECOMMENDATIONS: It is recommended this property be given serious consideration if this is the type mine the company is interested in and that it be examined thoroughly. While the mine examination is in progress, negotiations with the owners for the most favorable terms can be completed. If the mine is obtained, it is recommended that development consist of drifting along the strike in search of additional channels and that the existing channel be followed downward to increase the ore reserves. Another shaft can be sunk after sufficient reserves are developed to warrant it. Mining operations can be continued during this initial development stage.

Copies to:
G. Heikes
C. H. Reynolds
S. Gunther
File

Enclosures: 1. Tabulation of Production 1911-1957
2. Patagonia Quad Sheet
3. Tubac Quad Sheet

GLOVE GROUP
Tyndall Mining District
Santa Cruz County, Ariz.

Receipts El Paso Smelting Works 1911 to Dec. 1957 (Lot 4485 B/L 12-14-57)
Compiled from Settlement Sheets on file Southwestern Ore Purchasing Dept.
American Smelting and Refining Co.

Year	Shipper	Dry Tons	Value after Smelting	Freight	Hauling	Assaying	Royalty	Net Return to Shipper
1911-1917	Copper Queen Min Co.	612.0		Record Incomplete				$ 7,168.65
1925	E. T. Sheehy	32.0						,064
1949	E.J.Sikes. Lessee	39.0	$ 2,028.16	$ 246.82			$ 28.51	,752.83
Total prior to Sunrise Mining Co. Operation		638.0						$ 9,985.53
1951-1952	Sunrise Mining Co.	884.7	$ 47,191.61	$ 4,854.67	$1,954.59	$168.50	$ 7,830.47	$32.383.38
1953	Ditto	996.7	42,294.22	5,611.79	2,189.37	172.50	6,619.31	27.701.25
1954	"	921.5	38,894.27	5,117.41	2,014.99	191.50	5,940.01	25,630.36
1955	"	2086.0	131,609.87	12,420.28	1,540.88	493.50	29,959.19	87,196.02
1956	"	3304.9	156,433.08	18,830.48	-	902.50	23,219.45	113,480.65
1957(thru Lot 4485 B/L 12-14-57)		5230.3	223,463.63	32,281.80	9,551.88	1416.00	27,244.42	152,969
Total Sunrise Mining Co.		13,424.1	639,886.68	79,116.43	17,251.71	3344.50	100,812.85	439,361.19

Tucson, Arizona
January 7, 1958

REED F. WELCH

THE GEOLOGY OF THE GLOVE MINE, SANTA CRUZ COUNTY, ARIZONA

by

Harry J. Olson

ABSTRACT

The Glove Mine is located on the southern extremity of an isolated synclinal sedimentary block of Paleozoic and Cretaceous sediments on the southwest flank of the Santa Rita Mountains.

Solutions probably associated with a quartz monzonite intrusive, emplaced to the south of the Glove fault, have deposited argentiferous galena, sphalerite, and lesser amounts of quartz, pyrite, and chalcopyrite along permeable zones caused by bedding-plane fault intersections within a favorable limestone horizon of the Naco group. A pre-ore latite porphyry sill has prevented the spread of the mineralizing fluids into the limestones and siltstones to the north on the upper levels of the mine by acting as a deflecting barrier which has channeled the ascending mineral solutions along its footwall side.

As the result of extensive oxidation, only relics of the primary sulfides exist in the mined portion of the deposit. Cerussite, lesser

amounts of anglesite, wulfenite, smithsonite, and other products of the oxidation of the primary sulfides, have been concentrated in caverns leached along the mineralized zone by acids formed by atmospheric CO_2 and the oxidation of pyrite.

A zone of increased silver values occurs at the interface between the oxide and sulfide zones.

Mining at the Glove terminated at the top of the sulfide zone after producing over 21,000 tons of ore worth slightly over one million dollars.

2. MINING HISTORY AND PRODUCTION

(2.1) Claiming

The original Glove group of 15 claims was located by Dan J. Sheehy, Edward T. Sheehy, Jerry Sheehy, Pat J. Sheehy, and A. O'Donnell between March of 1907 and January of 1911. The final claim of this group was added in April of 1923 when a fraction was discovered and located. This brought the total number of claims in the Glove group to 16.

No further additions were incorporated into this group, until Edward A. Mack, then general manager of the Glove Mine for the Sunrise Mining Company, located the Zombie and Zeco claims to the south of the Glove group in 1954 in conjunction with Joseph G. O'Brien and Otho Kinsley, Jr. Further claims surrounding the original group were located by the Sunrise Mining Company from 1954 to 1957, bringing the total number of claims in the group to 55.

(2.2) History and Production

Although the original staking of the Glove group of claims was undertaken in 1907, production did not start until 1911. This group,

originally of 15 and later of 16 unpatented claims, belonged to E. T. Sheehy with various associates until 1951, when it was purchased by the Sunrise Mining Company. Final payments for this property were made in 1959, when Sunrise assumed complete ownership. Of the Glove group, only two claims—the Rover and the Glove—have proved to be of economic importance (see Fig. 2.1). Over 21 thousand tons of predominantly lead-silver ore, worth over one million dollars after smelter costs, has been produced from these two claims.

The production from the Glove group can be divided into three periods. During the period from 1911 to 1917 the first active work was undertaken, and although production was small, it was more or less continuous through this period. The second period extends from 1918 to 1950 and marks a time of inactivity. Only two shipments to the smelter at El Paso are recorded during this time. The third period, from 1951 to 1959, was a time of continuous production in which the main ore body was discovered and the carbonate ores were exploited down to the sulfide zone.

Ore from the original workings, known as the Sheehy-O'Donnell Mine, consisted of a mixture of galena and a variety of cerussite known as "sand carbonate." The ore was hand sorted and hauled by mule team about 5 miles west to Chaves, Arizona, a station on the Tucson-Nogales line of the Southern Pacific Railroad. From there the ore was shipped to the American Smelting and Refining Company at El Paso, Texas.

TABLE II
HISTORY OF PRODUCTION

Year	Dry Tons	Oz. Ag Per Ton	% Pb	% Zn	% Cu	Net Value Per Ton After Smelting	Value After Smelting	Net Return To Shipper
1911-49	682.3							$ 9,985.53
1951-52	884.7	(3.9-8.4)	(14.7-34.5)	(10.3-18.1)	-	53.34	47,191.61	32,383.38
1953	996.7	(3.1-6.9)	(17.1-27.9)	(6.0-18.7)	-	42.43	42,294.22	27,701.25
1954	921.5	(4.1-5.9)	(17.9-28.5)	(6.8-10.5)	-	42.21	38,894.27	25,630.36
1955	2,086.0	(3.5-10.2)	(27.1-38.3)	(4.0-12.0)	-	63.09	131,609.87	87,196.02
1956	3,072.9	4.2	22.0	2.6	0.1	47.31	145,387.37	105,400.54
1957	4,828.5	4.9	22.8	1.9	0.1	44.36	214,180.12	147,292.62
1958	4,171.0	9.2	31.5	3.8	0.1	53.76	224,215.00	154,977.64
1959	3,244.7	13.3	26.3	8.1	0.2	46.95	152,310.11	109,214.68
1960	202.7	8.2	20.0	20.5	0.2	31.15	6,315.56	4,645.35
Total	21,091.0					$49.12*	$1,002,398.13*	$704,427.37
Average Grade (1956-60)		7.7	25.7	4.1	0.1			

* For years 1951 through 1960; ( ) Data are incomplete, only the grade range is known.

Shippers: 1911-17, Copper Queen Mining Company; 1925, E. T. Sheehy; 1949, E. J. Sikes; 1951-60, Sunrise Mining Company.

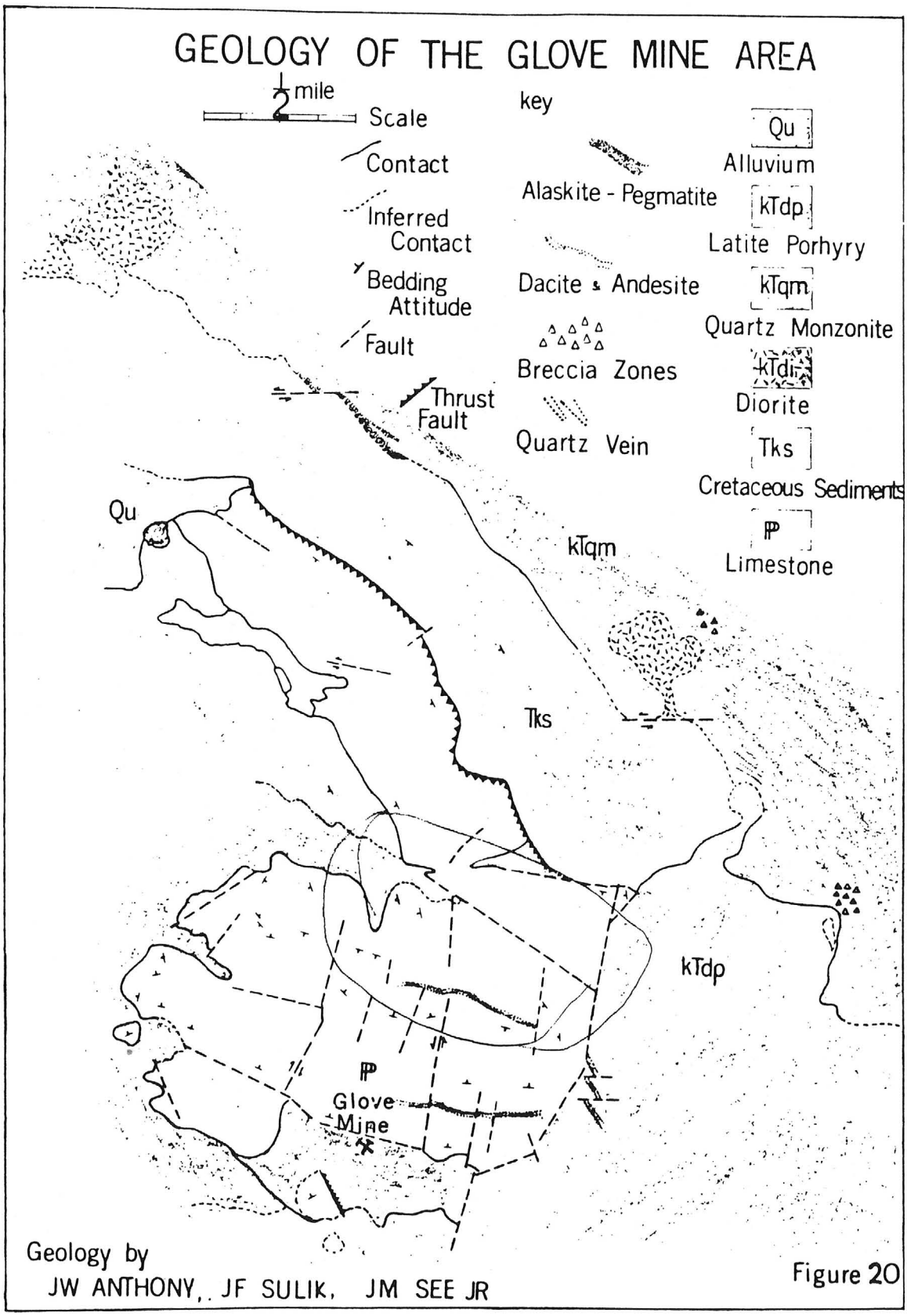

GEOLOGY OF THE GLOVE MINE AREA
½ mile
Scale
key
Contact
Inferred Contact
Bedding Attitude
Fault
Thrust Fault
Qu
Alluvium
Alaskite - Pegmatite
kTdp
Latite Porhyry
Dacite & Andesite
kTqm
Quartz Monzonite
Breccia Zones
kTdi
Diorite
Quartz Vein
Tks
Cretaceous Sediments
Limestone
Qu
kTqm
Tks
kTdp
Glove Mine
Geology by
JW ANTHONY, JF SULIK, JM SEE JR

Figure 20

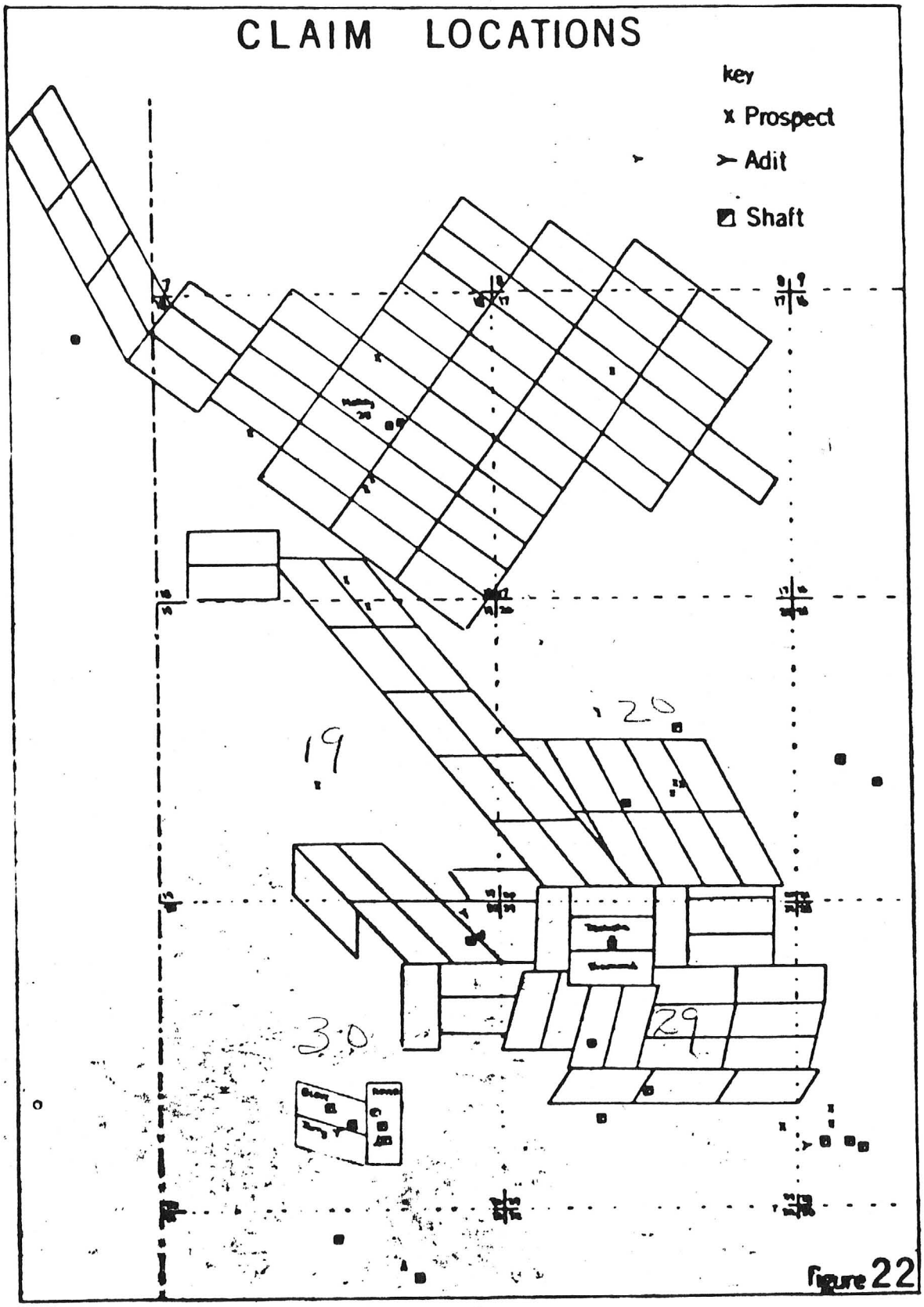


Figure 22

MILLING PROJECT.

GLOVE AND PAYMASTER MINES

GLOVE MINE FILE COPY SC

Original maps with report
in Tucson office of ADMMR.

SUMMARY

The ore at the Paymaster and Glove mines is a complex of lead, zinc, copper and silver sulfides, and is not amenable to direct shipping since smelters do not pay for the total metal content in complex ores.

The installation of a mill to separate and concentrate the different sulfides is recommended. Milling the ore and shipping the concentrate to the smelter will afford maximum payment for the value of the ore, and thus maximum profit.

An estimated investment of $58,650-$79,650 will be required prior to commencement of operations. Of this amount $15,000 is for standby expenses in case of unforeseen difficulties and delays, and the remainder is for capital expenditures. An itemized cost estimate is submitted on the following page.

Current estimated reserves from the two properties are 11,004 tons, conservatively valued at $20-$24/ton on a net smelter basis. These reserves are sufficient to operate a 100-ton-per-day mill for 3 1/2 to 4 months. As mining proceeds additional ore will be developed, and high-grade ore bodies ranging in value from $50 to $200/ton can be expected.

Mining and milling expenses are estimated at $12-14/ton. Given a net profit of $8.00 per ton the program may be amortized in one to two years. With continued operation and development of high-grade ore bodies profits may be increased substantially.

Geologic and geophysical evidence indicates the presence of unexplored ore-bearing structures at both mines, in addition to those structures presently being worked. A program of exploration and development of these unexplored structures in conjunction with normal mining operations will extend the life of the Paymaster-Glove operation for many years. The possibility of an eventual 300-ton-per-day operation may be visualized.

Thomas S. Nye

April 4, 1960

Thomas S. Nye
Resident Geologist
Sunrise Mining Company

COST ESTIMATE

Glove Mine:		
100' sheft	$ 12,000	
Headframe and hoist installation	2,000	
Pump	500	
Skip	500	
Misc. supplies	1,500	
Rehabilitation of Blacksmith tunnel	1,500	
Drift under drifts A and B of upper level, from adit level	3,150	
	$ 21,150	$ 21,150
Paymaster Mine:		
Electric compressor	$ 10,000	
Electrical installations	2,000	
Pump	500	
Misc. supplies	1,500	
	$ 14,000	$ 14,000
Concentrator:		
Used mill	$ 7,500	
Moving and setup of mill	7,500	
Misc. supplies	1,500	
Modifications and repairs	3,000	
	$ 19,500	$ 19,500
Water wells (2, each 500' @ $10./ft.)	$ 10,000	$ 10,000
Standby expenses	$ 15,000	$ 15,000
Total		$ 79,650

INTRODUCTION

The Glove and Paymaster mines are approximately 45 and 30 miles, respectively, southeast and southwest of Tucson, Arizona. Both mines are readily accessible by good roads. All but 8 miles of road to the Glove and 3 miles of road to the Paymaster mine are paved.

The first record of mining at the Glove property is in 1911. Over 95% of the total production of approximately 22,000 tons, having a net value of $1 million (records from American Smelting and Refining Company), took place after purchase of the property by the Sunrise Mining Company in 1951. The ore consisted of sulfates and carbonates of lead, zinc, copper and molybdenum. Silver contained in the ore ranged from 3 to 22 ounces per ton. In the upper portions of the mine the ore was principally lead-silver, the zinc content increasing proportionately in depth. Payments from the smelter were based on silver and lead values only.

Mining was halted in the summer of 1959 when operations extended below the oxide zone of high lead-silver into the sulfide zone, where the lead-zinc ratio is approximately 1:1. It was considered uneconomic to ship the complex ore, as full credit for the value of the various metal components is not given unless the metals are separated and concentrated.

"The Paymaster mine is estimated to have produced about $220,000 in silver and lead from 1887 to 1908." (1., p. 209). Since then the property has been worked intermittently by various-small operators, and records are not available for production. The Paymaster property is presently controlled by the Sunrise Mining Company under a lease, covering 14 claims, from Mr. Russell A. Todd of Tucson, with option to purchase. 4 additional claims were staked adjoining the Paymaster group by the writer, for the Company.

Rehabilitation of the old workings and exploration was begun in the summer of 1959. According to unconfirmed reports from various sources the Paymaster was purported to contain ore bodies of high lead-silver content. Exploration and development have exposed complex sulfide ore bodies of lead, silver, zinc and copper, with minor values in gold. It is not feasible to ship the ore without prior concentration into its various metal components.

A program for the installation of a mill, and geologic reports of the two properties are included.

Mapping at the Glove mine was done by Harry Olson with Brunton and tape, with surface control by plane table. Mr. Edward McCullough established surface control at the Paymaster with a transit, and mapping was done by the author. The general geology of the area, as shown in plate I, was done on aerial photographs. Brunton and tape were used for the remainder of the mapping. Figure 44, showing the geology of the East Sierrita area, was compiled by Dr. W.C. Lacy (1., p. 206), of the University of Arizona.

The author wishes to express his thanks for the aid and criticisms of Dr. Lacy and Mr. G.W. Irvin, General Manager for the Company.

MILL PROGRAM

The installation of a flotation mill with a capacity of 50 to 150 tons per day is recommended, to be located at the Paymaster mine. A mill of the desired capacity has been found, and preliminary negotiations have been made.

Electric power is available at the Paymaster mine, and water can be provided. Neither of these commodities is readily available at the Glove mine.

Water for the mill can be provided initially from the flooded workings in the southern area and from shaft 4, below the 95 level. Minimum reserves, on the basis of a 100-ton-per-day operation, are sufficient for 23 days without recharge.

Recharge from shaft 4 has amounted to 1 ton per day during periods in which water was pumped for mining operations. Milling operations would require 2 tons of water per ton of ore, and it is evident that extraction of water from all of the flooded shafts would not suffice indefinitely.

One, and possibly two wells, as added insurance, are required to furnish water for the milling operation. Drilling a well down to the San Xavier thrust sheet, preferably at or near the intersection of more steeply-dipping faults with the thrust sheet, may be expected to provide the necessary water supply.

Cost data are included in the Summary and cover the following: Purchase and installation of the mill, rehabilitation and preparation for mining in the Blacksmith adit and main workings of the Glove mine, mining machinery for the Paymaster mine (equipment currently in use has been borrowed from the Glove and would have to be returned), drilling of 2 water wells, and working capital. Drifting at the Blacksmith adit is to make accessible for minin g the ore projected from drifts A and B on the upper level.

If only one water well is drilled, and operations commenced at the Blacksmith adit exclusive of the main workings of the Glove, the initial expenditure may be reduced by $21,000. Working capital, listed as standby expenses in the cost sheet, has been included to cover unforeseen delays in the commencement of operations. Operations can be started at the Glove without sinking of the shaft as planned, so that $12,000 may be deducted from the estimate if necessary.

As described, the program is estimated to cost between $58,650 and $79,650, exclusive of the costs of operation of mines and mill prior to receipt of income from the sale of concentrates.

Conservative estimates of current reserves of ore are:

Glove mine (main workings)	6600 tons @ $30/ton
Blacksmith adit	1404 tons @ $15/ton
Paymaster (128 level)	3000 tons @ $15/ton
Total, average value	11,004 tons @ $24/ton

Mining and milling expenses are estimated at $12-14/ton, on a 50-150 tpd operation. The expense of transporting Glove ore to the mill at the Paymaster is estimated at $3-4/ton, thus reducing the value of current reserves to $22/ton. The value of the ore is computed on a net smelter basis, and not on quoted metal prices.

As mining progresses, development of additional ore will progress. At both properties the ore can be expected to increase in grade with further development.

Given a net profit of $8/ton, or a monthly profit of $24,000, on ore valued at $22/ton and production of 100 tons per day, the Glove-Paymaster project may be amortized in one to two years. The grade of the ore presently calculated is low compared to what may be expected in future mining and the profit described above is near the minimum which can be anticipated.

With continued exploration and development at the Paymaster, the number of targets containing potential ore bodies permits the visualization of a 300-ton-per-day operation within a few years, exclusive of ore developed at the Glove mine.

GLOVE MINE

The geology of the Glove mine is covered in 2 section, the Glove mine proper and the Blacksmith adit, which is a separate group of workings west of the main mine. All maps, and a brief report on the main mine were made by Mr. Harry Olson of the University of Arizona.

PAYMASTER MINE

Previous work

Operations by the company were commenced on the property in the summer of 1959. Since shafts 8 through 11 were flooded by water, it was considered more feasible to begin exploration from the workings to the north, hence referred to as the "North area." Workings south of shaft 7 constitute the "South area."

Exploration and development have been conducted from shafts 6 and 7. Many of the old workings have been backfilled with waste, and the full extent of these workings is not known. Shaft 7 was deepened from the 45 to the 79 level and a crosscut driven east to intersect a projected ore-bearing structure. Upon intersection of the structure it was discovered that previous operators had come in under the ore from shaft 6 and mined it out. Shaft 6, which was caved from the 64 to the 116 level, was deepened to the 128 level and exploration commenced from there, as shown on Plate X.

A self-potential survey conducted by the author in the area south of shaft 11 revealed two major negative anomalies. Shaft 12 was sunk to a depth of 53 feet on the western, or A, anomaly. Of this depth, 33 feet was in alluvium, the remainder in andesite. The andesite is badly sheared and fractured at the bottom of the shaft, but unmineralized. Longholes extended 80 feet east and west of the shaft failed to inter sect mineralized structures. It is believed that the southward extension of the vein at shaft 11 has been complexly "Faulted out" by a combination of thrust and tear faults, so that the downward extension of the vein lies below the bottom of shaft 12.

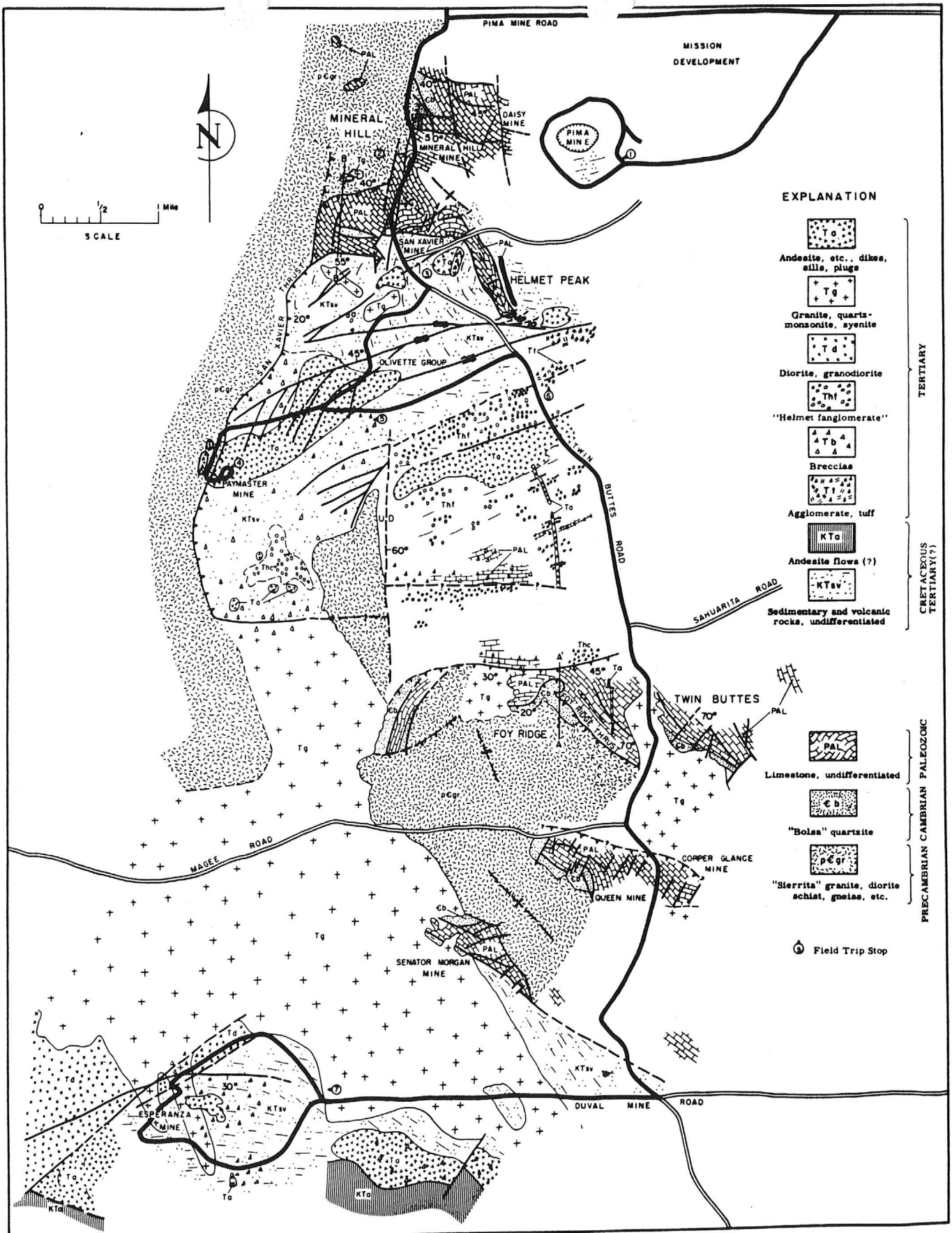


FIGURE 44. Generalized geologic map of the East Sierrita area, Pima County, Arizona, showing part of route of Field Trip I and location of cross sections (figs. 41A, B; 42B).

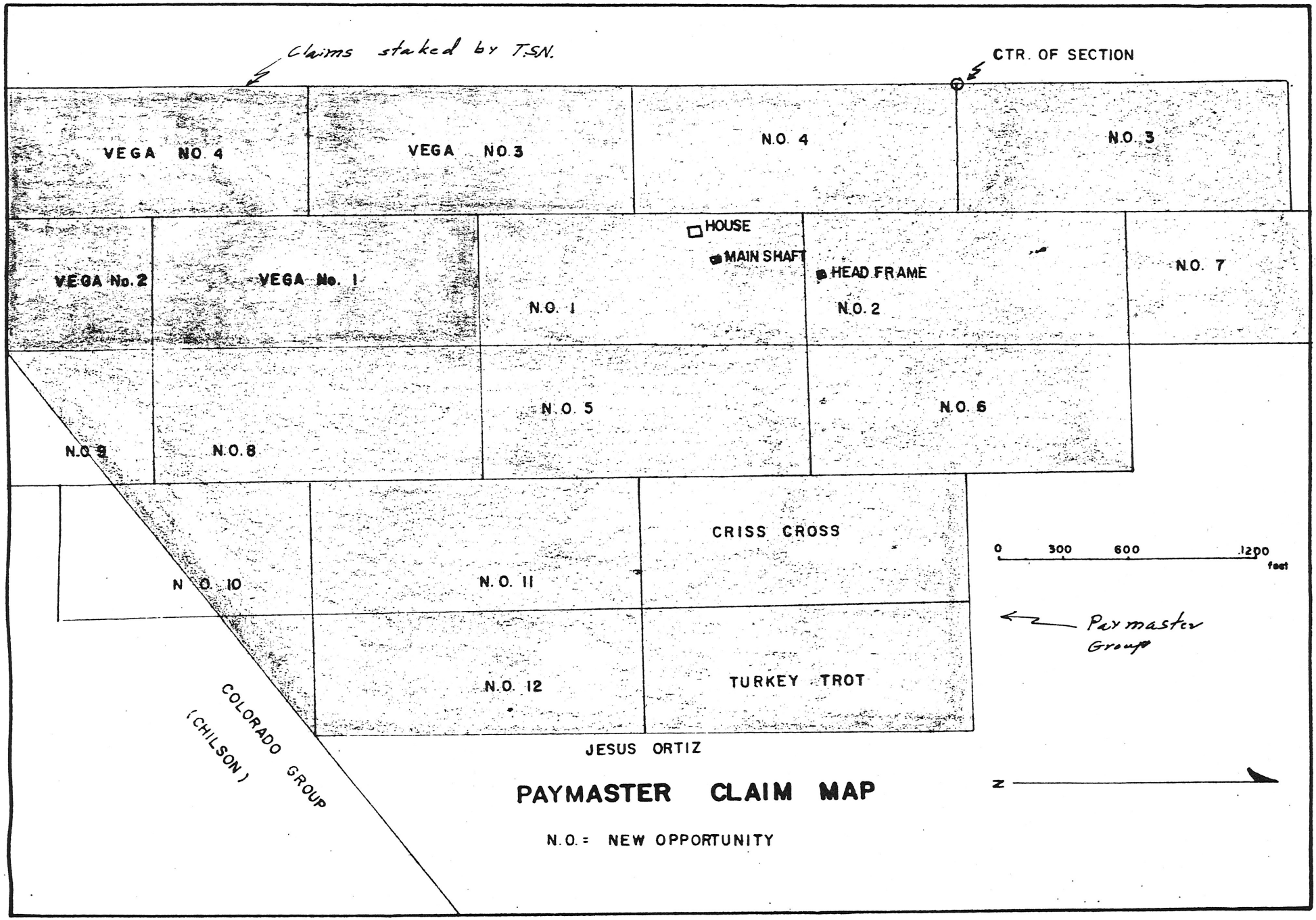
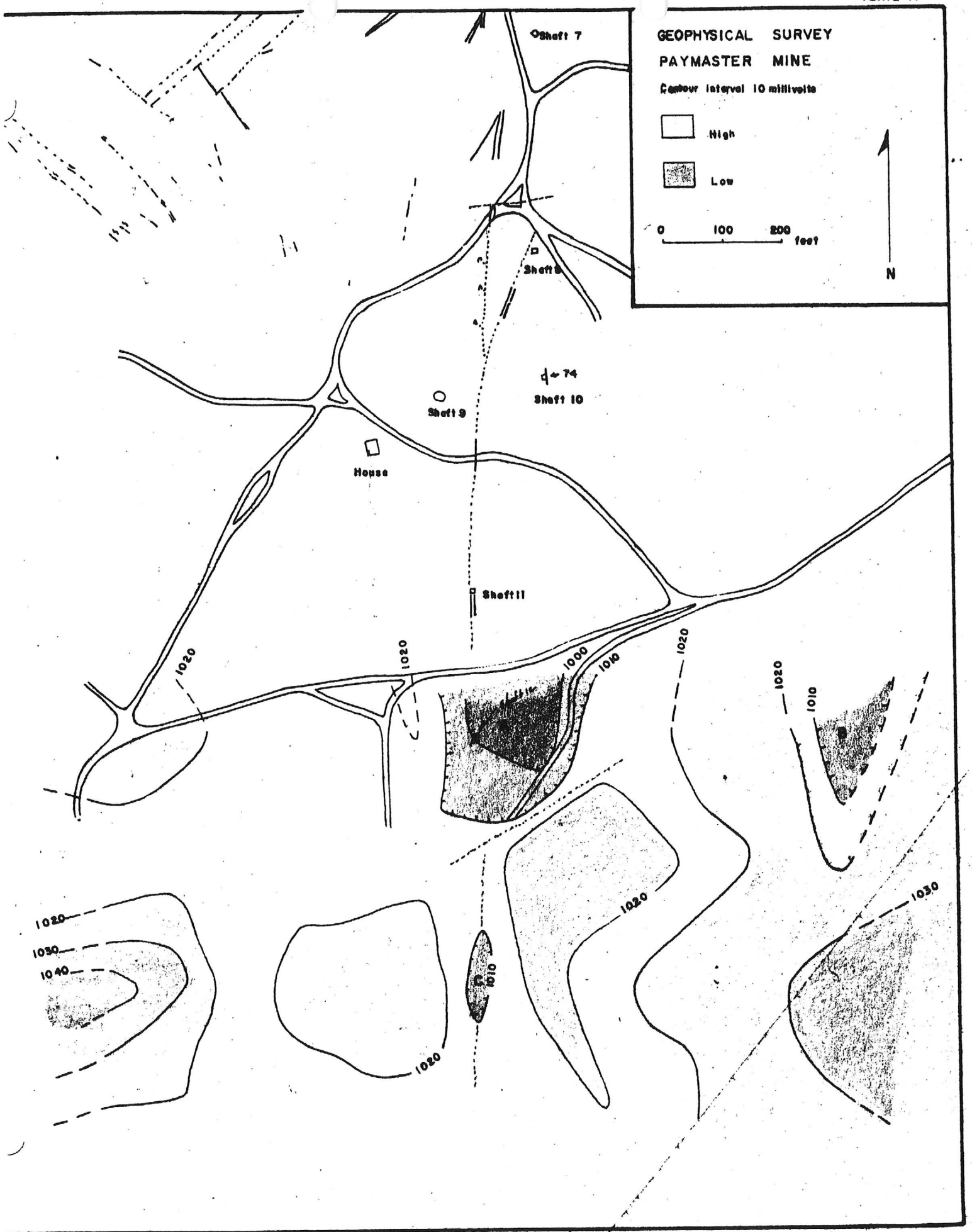

Claims staked by T.SN.
CTR. OF SECTION
VEGA NO. 4
VEGA NO. 3
N.O. 4
N.O. 3
HOUSE
MAIN SHAFT
HEAD FRAME
VEGA No. 2
VEGA No. 1
N.O. 1
N.O. 2
N.O. 7
N.O. 9
N.O. 8
N.O. 5
N.O. 6
N.O. 10
N.O. 11
CRISS CROSS
N.O. 12
TURKEY TROT
COLORADO GROUP
(CHILSON)
0 300 600 1200
feet
Paymaster Group
JESUS ORTIZ
N
PAYMASTER CLAIM MAP
N.O. = NEW OPPORTUNITY

PLATE VI


GEOPHYSICAL SURVEY
PAYMASTER MINE
Contour interval 10 millivolts
High
Low
0 100 200 feet
N
Shaft 7
Shaft 8
74
Shaft 10
Shaft 9
House
Shaft 11
1020
1000
1010
1030
1040

General Geology

The Paymaster mine is located near the flanks of the eastern foothills of the Sierrita mountains, in what Lacy terms the East Sierrita area of the Pima Mining District (1., p. 185).

Andesite of Tertiary age and arkosic quartzite of Cretaceous (?) age have been thrust over the Pre-Cambrian Sierrita granite, along the San Xavier thrust fault (Fig. 44). The andesite and quartzite have been brecciated, silicified and altered to sericite and clay minerals by ascending hydrothermal solutions over broad areas. Steeply-dipping northwest- and northeast-trending faults transect the area, and are intersected by faults of more easterly trend.

In the mine area (Plate I) andesite is the only rock exposed. The andesite has been altered, fractured, and faulted, forming a zone 300 to 500 feet wide and 1800 feet long, from north to south.

The northern end of this zone is intersected by a second zone of faulting and alteration trending N 50-70°E which extends to the southwest. The projection of these two trends to the north and northeast is obscured by alluvium. It is believed that the north-trending faults may be imbricate structures curving upward from the San Xavier thrust plane, and that the northeast-trending structures are tear faults. These "Tear" faults generally show left lateral offset, although some right lateral offsets have been observed.

The junction of these two trends of faulting may best be described as a "Splinter" area, in which numerous faults of different trends extend for short distances. Toward the south the structure is resolved into fewer, more continuous faults which are offset 5 to 100 feet laterally by individual tear faults, in places.

South of shaft 11 geologic relations are hidden by alluvium, but a second major "Tear," or tear zone, is thought to exist, from geophysical (Plate VI) evidence. Anomalies A and B appear to represent a single sulfide-bearing zone which has been offset by left lateral movement.

Within the zone of alteration the principal veins, as known to date, trend N. to N 30°E and dip 50° to 90° SE. Some veins trending N 10° to 40° W and dipping steeply southwest have been mined. Veins in the southeast-trending altered zone have not been explored.

South Area

Little is known of the geology of the south area except that which is shown on Plate I, due to the inaccessibility of the workings.

Mining near the turn of the century was done from shafts 8 through 11. "Two veins were developed: The Lead vein which contained principally galena; and the Iron vein which contained pyrite with a little chalcopyrite and tetrahedrite." (1., p. 210). According to unconfirmed reports the two veins joined in depth to form a zone 100 feet wide, containing disseminated sulfides and sulfide lenses 1 to 10 feet thick. Mining is not believed to have extended south of shaft 11, all of the known work having extended to the north.

Todd reports that northward development of the vein from shaft 8, at a depth of 60 feet, was halted by a northeast-trending cross-fault a few feet north of the shaft. A crosscut was driven along the south wall for a few feet, but apparently no exploration was done north of the cross-fault.

North Area

Alteration of the country rock along portions of the faults by hydrothermal solutions has produced veins of quartz, sericite and clay minerals, with disseminated pyrite. Within these veins are lenticular bodies of massive sulfides. Primary ore minerals are galena, sphalerite and chalcopyrite, with minor tetrahedrite. Traces of gold also occur locally. Sulfates and carbonates of lead, zinc and copper ~~ore~~ are found within 30 feet of the surface.

As described earlier, the principal veins trend north to north-northeast and dip east. These veins tend to split, or horsetail, toward the north. Faults trending N 10° to 30° W and dipping 50° to 90° W offset the veins. Other faults, trending N60° to 90° E or W dip north or south at angles of 20° to 70° and also offset the north-trending veins. Offsets tend to be right lateral on the northwest-trending faults and left lateral on the east-trending faults. Flat, rolling faults intersect the north-trending veins and may be planes of thrusting , subsidiary to the San Xavier thrust.

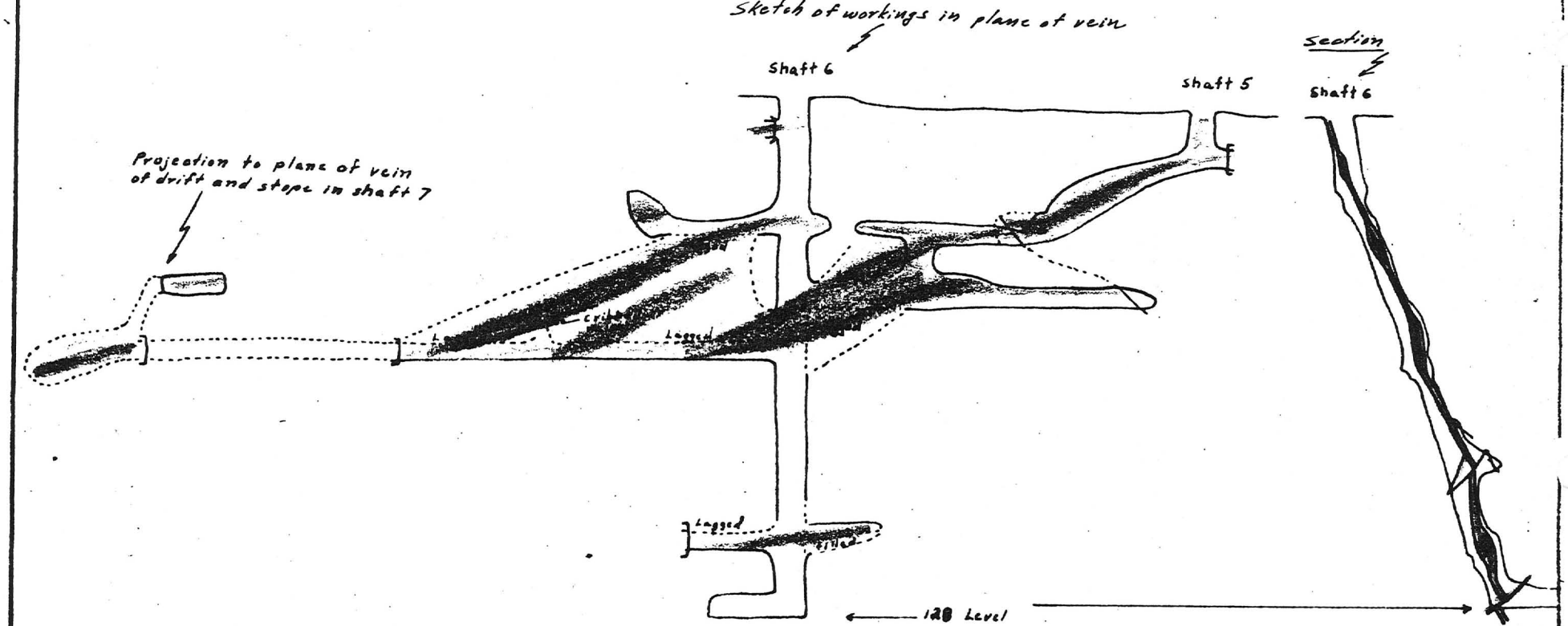
Reference is made to plates VIII-X, showing the distribution of ore on the Reliable, Water, Hidden and China veins. The bounding fault surfaces are irregular in plan and section, and pre-ore normal faulting created areas of tension along which ore was deposited. In section the ore "Makes" on the steeper portions of the faults and along concave rolls in the vein as seen in plan. The ore occurs in the form of cigar-shaped bodies which rake at angles of 10° to 30° south. The thickness of the or e in these bodies has ranged from 6 inches to 5 feet.

Ore-bearing gash veins, dipping steeply west, join the east-dipping veins and are offset normally by them.

In places the ore has been crushed and rolled by post-mineral movemen t of the faults enclosing the veins, and by some cross faults and flat faults; however, other cross-faults contain veins of uncrushed sulfides.

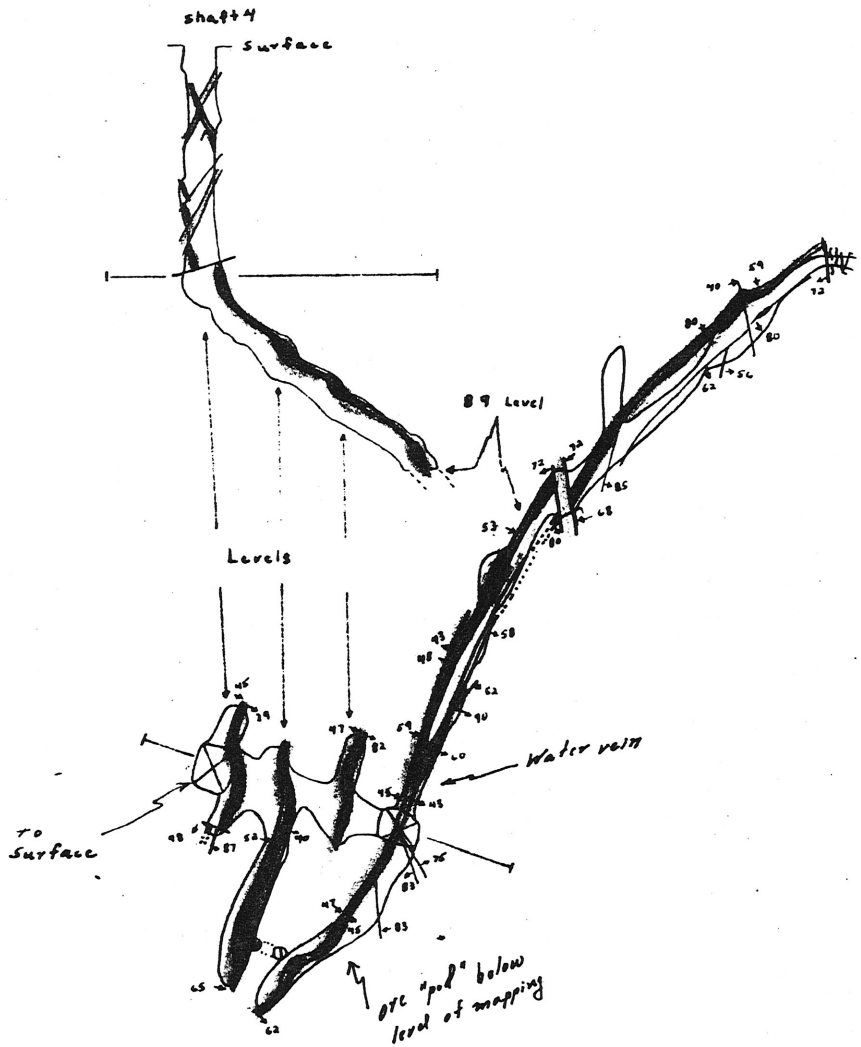
Approximately 500 tons of ore, with an estimated value of $10-20/ton have been mined from the Hidden and China veins on the 128 level, and have been stockpiled. Because the ore rolls in and out vertically and horizontally, assays taken on the Hidden and China veins vary. Where portions of the rolls are exposed in the drifts for assaying, values are high; where the rolls have pinched out, assays are low. The rolls will extend upward to the north and downward to the south, with lean portions in between. Probable reserves, extended 5 to 10 feet above and below the drift, amount to 1000 tons, giving a total of 1500 tons developed or mined thus far.

SHAFT 6


Sketch of workings in plane of vein
Shaft 6
shaft 5
Section
Shaft 6
Projection to plane of vein
of drift and stope in shaft 7
Caved
Logged
Logged
Caved
128 Level

SHAFT 4

PLAN AND SECTION



1 inch = 40 feet

- Fault
- Fault, inferred
- Ore Minerals
- Alteration
- Raise
- Shaft
- Drift

Additional reserves can be expected by drifting north and south, and in depth, so that total probable and possible reserves amount, conservatively, to 3000 tons of ore with an estimated grade of $15.00/ton, exclusive of high-grade ore bodies.

High-grade ore containing more than 40 ounces of silver and $100.00 in base metals per ton has been encountered where the rolls are sufficiently wide, and can be expected in future mining.

Potential Ore Bodies

It is evident from Plates I and II that many north-trending veins remain to be explored, as well as those of the northeast-trending group.

Further investigation of anomalies A and B, south of shaft 11, is warranted.

The periodic repetition of ore bodies in depth (sections, plates VIII and IX), and their tendency to increase in size with depth, may be expected to continue as mining is extended to lower levels. Also, since the veins become wider in the South area, the ore bodies can be expected to increase in size as well as grade toward the south.

Continued drifting along the Hidden and China veins, and drifting along the Reliable and Water veins should extend reserves of low-grade milling ore as well as intersect high-grade ore shoots.

The footwall veins west of the Reliable vein warrant further exploration, as do mineralized zones which have been intersected by longhole drilling west of the footwall veins.

The Hidden and China veins are not exposed on the surface, and were discovered by drilling. Long holes drilled from the 128 level east from the Hidden vein have intersected mineralized structures, which are likewise unexposed at the surface. It appears likely that continued underground exploration will develop new ore-bearing structures.

REFERENCES

1. Lacy, W.C., 1959, Structure and ore deposits of the East Sierrita area, pp. 185-192, 206-211. Southern Arizona Guidebook II, Arizona Geological Society.