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

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PRINTED: 05/31/2002

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: PAYMASTER

ALTERNATE NAMES:

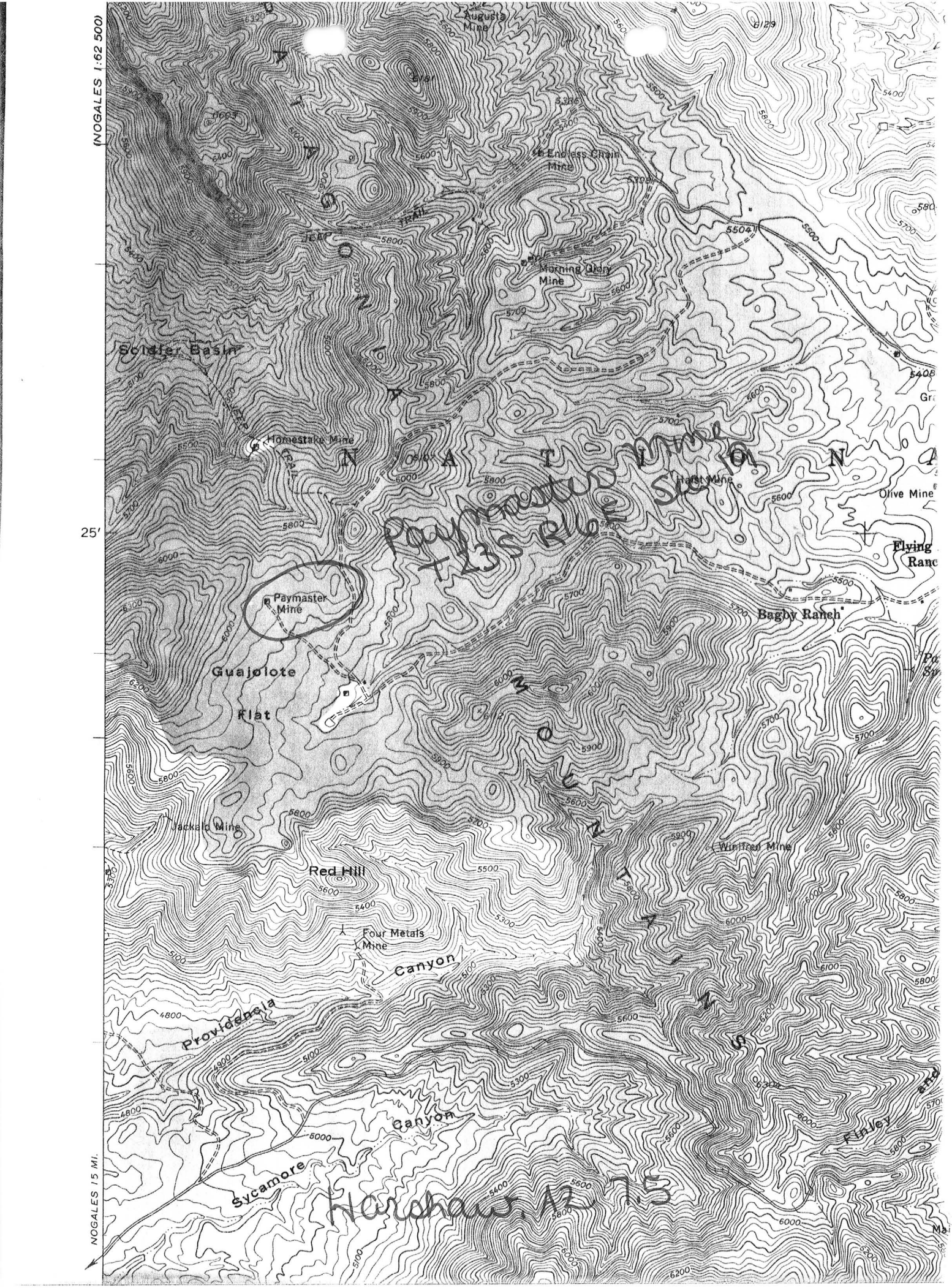
SANTA CRUZ COUNTY MILS NUMBER: 136B

LOCATION: TOWNSHIP 23 S RANGE 16 E SECTION 19 QUARTER E2
LATITUDE: N 31DEG 24MIN 49SEC LONGITUDE: W 110DEG 44MIN 29SEC
TOPO MAP NAME: HARSHAW - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:
- COPPER SULFIDE
- SILVER
- GOLD
- LEAD SULFIDE
- ZINC SULFIDE
- ARSENIC

BIBLIOGRAPHY:
- INDEX OF MINING PROP. IN SANTA CURZ CO. AZBM BULL. 191 P. 81
- AZBM CARD FILE SANTA CRUZ CO.
- USGS HARSHAW QUAD
- ADMMR PAYMASTER MINE FILE


(NOGALES 1:62 500)
Augusta Mine
Endless Chain Mine
Morning Glory Mine
Soldier Basin
Homestake Mine
Paymaster Mine
Guajolote Flat
Jackal Mine
Red Hill
Four Metals Mine
Providencia Canyon
Sycamore Canyon
Hardy Mine
Olive Mine
Flying Ranc
Bagby Ranch
Winifred Mine
Finley Can
Paymaster Mine
T23S R16E Sec 10
Harshaw, AZ 7.5
NOGALES 15 MI.
25'

PAYMASTER MINE

8/84

SANTA CRUZ COUNTY
PATAGONIA DISTRICT
T23S R16E Sec. 19

MILS Santa Cruz Index #136B

ABM Bull. 191, p. 81

Arizona Mining Journal Feb. 15, 1922 p. 15

Harshaw, AZ 7.5 (included in file)

* GENERAL REFERENCES

REFERENCE 1 F1 <USBM-ABGMT PRODUCTION FILE DATA>

REFERENCE 2 F2 <USBM FILE DATA - CLUSTER # 27, PAYMASTER MINE>

REFERENCE 3 F3 <KEITH, S.B., 1975, ABM BULL 191, p. 81>

REFERENCE 4 F4 <ABGMT CLIPPINGS FILE DATA, PAYMASTER MINE>

F5< ABGMT FILES, STANTON B. KEITH>
F6< SIMONS, FRANK S, 1974, GEOLOGIC MAP AND SECTIONS OF THE NOGALES AND LOCHIEL QUADRANGLES, SANTA CRUZ COUNTY, ARIZONA; USGS MAP I-762 (1:48000)>

K5< GRANODIORITE>
N5< MINERALIZED ROCK IN FAULT FISSURES CUTTING DIORITE AND QUARTZ MONZONITE>

N70< FISSURE VEIN JUST EAST OF PAYMASTER PROPERTY>

N75< ALTERATION>

N85 <SUBORDINATE VEINS, LENSES, STRINGERS, AND SEAMS IN FRACTURES, FISSURES, JOINTS, AND SHEETING PLANES IN ROCK>

MDD
#1360

U.S. CRIB-SITE FORM

RECORD IDENTIFICATION

RECORD NUMBER B10 <> *RECORD TYPE B20 <X,1 M> DEPOSIT NUMBER B40 <>

REPORT DATE G1 <82 YR. 04 MO.> *INFORMATION SOURCE B30 <1 2> *FILE LINK IDENT. B50 <USBM-00402303I4>

REPORTER(SUPERVISOR) G2 <LARABA, PETER H. (last, first, middle initial) (CALDER SUSAN (last, first, middle initial)>

REPORTER AFFILIATION G5 <ABGMT> *SITE NAME A10 <PAYMASTER MINE>

SYNONYMS A11 <>

LOCATION

MINING DISTRICT/AREA A30 <PATAGONIA DISTRICT>

COUNTY A60 <SANTA CRUZ> *STATE A50 <AZ> *COUNTRY A40 <U.S.>

PHYSIOGRAPHIC PROV A63 <12.>

DRAINAGE AREA A62 <15050303.01, LOWER COLORADO> *LAND STATUS A64 <41, , , (1979)>

QUADRANGLE NAME A90 <HARSHAW, AZ (1948)> *QUADRANGLE SCALE: A100 <24000>

SECOND QUAD NAME A92 <LOCHIEL (1958)> SECOND QUAD SCALE. A91 <62500>

ELEVATION A107 <5900 FT>

UTM
NORTHING A120 <3474800>
EASTING A130 <525000>
ZONE NUMBER A110 <12>

*ACCURACY
*ACCURATE (ACC) (circle)
ESTIMATED EST <>

GEODETIC
*LATITUDE . A70 <31-24-49 N>
*LONGITUDE A80 <110-44-29 W>

CADASTRAL
TOWNSHIP(S) A77 <023S> *RANGE(S) A78 <016E>
SECTION(S) A79 <19>
SECTION FRACTION(S) A76 <SE OF SE>
MERIDIAN(S) A81 <GILA AND SALT RIVER>

POSITION FROM NEAREST PROMINENT LOCALITY A82 <1 MILE NNW OF RED HILL; 4.0 MILES SW OF HARSHAW>
LOCATION COMMENTS A83 <ON THE NORTH END OF GUAJOLOTE FLAT; 1/2 MILE SOUTH OF HOMESTAKE MINE>

ESSENTIAL INFORMATION
ESSENTIAL SOMETIMES OR HIGHLY RECOMMENDED

COMMODITY INFORMATION

COMMODITIES PRESENT C10: CU, AG, AU, PB, ZN, AS
ORE MINERALS C30: PYRITE, C[illegible]PYRITE, BORNITE, ARSENOPYRIT[illegible]ENA, SPHALERITE
COMMODITY SUBTYPES C41:
GEN. ANALYTICAL DATA C43: 1930's ORE VALUES AVERAGED ABOUT 7% CU, 3 OZ./TON Ag, MINOR Au
COM. INFO. COMMENTS C50: ARSENIC AS A BYPRODUCT

* SIGNIFICANCE

	PRODUCER	NON-PRODUCER
MAJOR PRODUCTS	MAJOR: CU, AG	MAIN COMMODITIES PRESENT C11:
MINOR PRODUCTS	MINOR: AU, PB, ZN	MINOR COMMODITIES PRESENT C12:
POTENTIAL PRODUCTS	POTEN:	
OCCURRENCES	OCCUR: AS	OCCURRENCES OCCUR:

*PRODUCTION

PRODUCER	NON-PRODUCER
PRODUCTION (YES) (circle) PRODUCTION SIZE (SML) MED LGE (circle one)	PRODUCTION UND NO (circle one)

*STATUS

EXPLORATION OR DEVELOPMENT

PRODUCER	NON-PRODUCER
STATUS AND ACTIVITY A20: 4	STATUS AND ACTIVITY A20:

DISCOVERER L20:
YEAR OF DISCOVERY L10: *NATURE OF DISCOVERY L30: B *YEAR OF FIRST PRODUCTION L40: 1937 *YEAR OF LAST PRODUCTION L45: 1941
PRESENT/LAST OWNER A12: RICHARDSON CORPORATION (1939)
PRESENT/LAST OPERATOR A13: HUTCHINS AND BOND AND MATLOCK (1939)
EXPL./DEV. COMMENTS L110: OWNERS AND OPERATORS INCLUDED JACK BOSTWICK, LYNCH, JOE BACON, PAYMASTER SILVER-LEAD CO. (1919)

DESCRIPTION OF DEPOSIT

DEPOSIT TYPE(S) C40: VEIN / SHEAR ZONE
DEPOSIT FORM/SHAPE M10: TABULAR
DEPTH TO TOP M20: *UNITS M21: *MAXIMUM LENGTH M40: *UNITS M41:
DEPTH TO BOTTOM M30: *UNITS M31: *MAXIMUM WIDTH M50: *UNITS M51:
DEPOSIT SIZE M15 (SMALL) M15 (MEDIUM) M15 (LARGE) (circle one) *MAXIMUM THICKNESS M60: *UNITS M61:
STRIKE M70: NE *DIP M80:
DIRECTION OF PLUNGE M100: *PLUNGE M90:
DEP. DESC. COMMENTS M110:

DESCRIPTION OF WORKINGS

Workings are: SURFACE M120 UNDERGROUND (M130) BOTH M140 (circle one)
DEPTH BELOW SURFACE M160: *UNITS M161: *OVERALL LENGTH M190: *UNITS M191:
LENGTH OF WORKINGS M170: *UNITS M171: *OVERALL WIDTH M200: *UNITS M201:
DESC. OF WORK. COM. M220: MOSTLY SHAFT WORKINGS *OVERALL AREA M210: *UNITS M211:

GEOLOGY

AGE OF HOST ROCK(S) K1: TERT., 58±5 m.y. (SIMONS, F.S., 1974)
HOST ROCK TYPE(S) K1A: BIOTITE-HORNBLENDE GRANODIORITE
AGE OF IGNEOUS ROCK(S) K2: TERT., 58±5 m.y. (SIMONS, F.S., 1974)
IGNEOUS ROCK TYPE(S) K2A: PORPHYRITIC GRANODIORITE, DIORITE, APLITE DIKES
AGE OF MINERALIZATION K3: TERT.
PERT. MINERALS (NOT ORE) K4: QUARTZ GANGUE; IRON STAINING
ORE CONTROL/LOCUS K5: NE-TRENDING, JACKALO-PAYMASTER VEIN IN STRONG FAULT SHEAR ZONE CUTTING
MAJ. REG. TRENDS/STRUCT. N5: E-W AND NE-TRENDING QUARTZ VEINS AND ASSOCIATED BANDS OF CRUSHED
TECTONIC SETTING N15: GUAJOLOTE FAULT BLOCK; DOWNTHROW TO E
SIGNIFICANT LOCAL STRUCT. N70: NW-TRENDING, INFERRED GUAJOLOTE FAULT TERMINATED BY JACKALO-PAYMASTER
SIGNIFICANT ALTERATION N75: GRANODIORITE IS STRONGLY ALTERED, SHATTERED, SHEETED, AND CRUSHED; STRONG POTASSIC
PROCESS OF CONC./ENRICH. N80: OXIDATION AND ENRICHMENT NEAR SURFACE; MINERALIZATION ALONG SHEAR ZONE
FORMATION AGE N30:
FORMATION NAME N30A:
SECOND FM AGE N35:
SECOND FM NAME N35A:
IGNEOUS UNIT AGE N50:
IGNEOUS UNIT NAME N50A:
SECOND IG. UNIT AGE N55:
SECOND IG. UNIT NAME N55A:
GEOLOGY COMMENTS N85: SOURCE OF MINERALIZATION BELIEVED TO BE FROM CENTRAL PORTION OF PORPHYRITIC GRANODIORITE INTRUDING GUAJOLOTE FAULT; DEPOSITS IN REGION OCCUR IN FORM OF

GENERAL COMMENTS

GENERAL COMMENTS GEN:

MILLING PROJECT.

GLOVE AND PAYMASTER MINES

PAYMASTER 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 $58,660-$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' shaft	$ 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 sections, the Glove mine proper and the Blacksmith edit, 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.

GEOLOGY OF THE GLOVE MINE

Harry J. Olson
Geologist

9 November 1959

GENERAL GEOLOGY OF THE AREA:

The Glove mine is located on the south flank of an east-west-trending synclinal sedimentary block on the southwest flank of the Santa Rita Mountains. This synclinal block of Pennsylvanian, Permian, and Cretaceous sediments probably represents an erosional remnant of a portion of the southwestern limb of an anticline which has been breached by the monzonite intrusives of the main mass of the Santa Rita Mountains.

The southern flank of the synclinal block in the vicinity of the Glove mine is composed of the Horquilla and Earp formations of Pennsylvanian and Pennsylvanian-Permian age. These formations dip to the north about 55° and are separated from the monzonite to the south by the nearly vertical Glove Fault. This contact, with its limestone stringers and partitions which extend out into the monzonite, appears to represent an intrusive contact.

A sill which varies in composition from an andesite porphyry to a quartz latite porphyry occurs approximately 200 feet to the north of the limestone-monzonite contact. This sill, which is but one of several in the area, strikes more or less parallel to the contact and to the bedding of the limestone.

GEOLOGY OF THE MINE AREA:

The formations in the mine area include the monzonite to the south, a chloritic limestone, a marbleized limestone, the andesite porphyry sill, and a gray limestone to the north of the porphyry. These formations, which strike approximately N 60° W and dip roughly 50° to 60° to the north, are cut by a series of faults with approximately the same attitude. Cross faults are not common on the upper levels, but become more abundant in the lower levels. The northwest-trending faults are for the most part closed, and show no evidence of extensive movement. Solution by groundwater and acid solutions from the oxidation of the sulfides, especially in the zones of brecciation caused by fault intersections, has produced cavernous pipes which trend approximately N 60°W and plunge roughly 30° to the southeast. These pipes may be empty water courses or may be filled with the products of oxidation of the primary sulfides.

The main fault, which lies just to the south of the porphyry, strikes roughly N 60° W and dips 55° to the north. Most of the mineralization has taken place along this fault. This fault is intersected at the 180 level by a fault striking N 60°E and dipping 60° to the south. The zone of brecciation caused by the intersection of these two faults has provided the loci of ore deposition and concentration in the main stope area from the 180 to the 360 levels. However, in the lower levels, the south-dipping fault seems to take a more controlling aspect of the ore deposition.

"Horsetailing" of the faults from the main structures have produced splits in the ore body. Most important of these are the "Square Set" stope between the 210 and 240 levels, the "Horseball Cave-240 Breakthrough" zone between the 210 and 240 levels, and the "San Xavier" stope complex between the 240 and the 360 levels. This splitting of ore channels or ore pipes seems to increase with depth and the outlook in proposed levels below the 360 is for more, but smaller, ore pipes.

The fault zone along the north limestone-porphyry contact has produced a small ore pipe above the adit level, but exploration consisting of three longholes on the 210 level has failed to pick up the possible downward projection of this pipe.

The limestone to the north of the porphyry appears for the most part to be unaltered and without mineralization. This is probably due to the presence of the porphyry, which acted as a deflecting layer to the ore solutions, although the rock could be chemically unfavorable to ore deposition.

ORE CONTROLS:

The lead-zinc-silver mineralization at the Glove Mine is of a limestone replacement type which has produced pipe-like structures of galena and sphalerite. These structures have been largely oxidized above the 360 level, and the carbonate products of this oxidation have migrated downward filling the caverns in the limestone leached by the acids from the oxidation of the primary sulfides. The oxide pipes may therefore, not necessarily represent ore solution conduits.

The primary mineralization control consists of brecciated areas of increased permeability along fault zones within the favorable limestone horizon to the north of the chloritic limestone. No ore mineralization has been encountered in the chloritic limestone, and it can be considered to be chemically unfavorable to ore deposition. The details of chemical favorability or unfavorability have not yet been determined.

The brecciated zones in the larger stopes are caused by fault intersections of the "Horsetail" type which become more important with depth as small local ore conduits which have channeled the ore solutions into the main zone.

In the lower levels the porphyry sill seems to have no effect on ore deposition, but at the 210 level where the main fault zone first intersects the porphyry, it seems to have formed an impermeable layer which has channeled the solutions along its footwall side. The ore on the north side of the porphyry on the adit level probably represents deposition caused by leakage of ore solutions through the porphyry along cross fractures at about this level.

The sequence of events in the deposition of ore are:

1. Folding of the sediments and intrusion of the monzonite.
2. Faulting in the N60°W direction and formation of the other "Horsetailing" structures.
3. Emplacement of the porphyry sill.
4. Introduction and deposition of the lead-zinc-silver ore solutions.
5. Oxidation and supergene enrichment of the levels above the 360.

ORE OCCURRENCE:

The lead-zinc-silver ores of the Glove mine have a variety of forms in the zone of supergene enrichment above the 360 level. In the main stope area, which represents to a large part cavern fill by the products of oxidation, the ore mineralization has largely been cerussite, with minor amounts of anglesite and unaltered galena. Cerussite occurs as massive bodies which represent oxidation in place of the primary galena. Cerussite also exists as a "Sand carbonate" caused by the leaching away of the gangue minerals and the downward migration and concentration of the cerussite by groundwater. In this form the cerussite occurs as a more or less pure, uncemented sand or as crystalline cerussite disseminated throughout limonite, wad, and secondary calcite and gypsum.

In areas of less intense leaching, the oxidation of the primary galena has not gone to completion and veins, cobbles, and boulders of anglesite, often with galena nuclei, occur in close association with the cerussite. In areas of tight ground, galena occurs in an unaltered form.

Silver appears to be associated with the lead, but at the present its exact mode of occurrence has not been determined.

In the upper portions of the oxide zone zinc in the order of 5% or less occurs disseminated throughout the oxide products. The low concentration is due to removal by leaching. In the lower portions of the oxide zone zinc increases to the order of 15% to 20% as veins and incrustations of "Dry-bone" smithsonite. Some zinc occurs as sphalerite associated with galena in the lower portion of the oxide zone, but the amount is minor.

The 360 level roughly marks the beginning of the sulfide zone. Here, galena and sphalerite occur in approximately equal amounts in stringers and blebs scattered throughout the calcite of the ore zone. Chalcopyrite and pyrite are associated in minor amounts as inclusions in the ore minerals. The concentration of silver remains approximately the same in the sulfide zone as it does in the oxide zone.

PROJECTIONS TO THE 420 LEVEL:

The 360 level has three areas of proven mineralization:

1. Two splits of the "San Xavier" stope which are tapped by the cross-cuts at 10470E and 10505 E,
2. A split off the main stope at 10585E-10155N and,
3. The main stope area itself.

Possibilities for additional mineralization exist along the E-W fault zone from 10510E-10190 N to 10588E-10185N, and in the area to the north of the main drift.

Mineralization below the 360 level will probably be completely sulfide, consisting of equal amounts of galena and sphalerite. By taking the entire zone of mineralization for milling the ore should run between 10% and 20% combined metal with approximately 8 ounces of silver per ton.

Calculations for tonnage above the 420 level are based on these estimates:

1. Tonnage factor = 11.
2. Pb/Zn = 1:1.

MAIN STOPE:

1,800 tons ore (10% to 20% combined metal with 8 ox. silver)
30 tons per vertical foot

SPLITS:
1,500 tons ore (10% to 20% combined metal with 8 oz. silver)
25 tons per vertical foot

TOTAL:

3,300 tons ore (10% to 20% combined metal with 8 oz. silver)
55 tons per vertical foot.

(Note: the above is probable ore; assuming an equivalent amount of possible ore, total tonnage is 6600 tons, possible ore being derived from an extension of the ore shoots below the 420 level.---T. Nye)

Blacksmith Adit

Significant mineralization, all sulfide, is exposed in 3 places in the Blacksmith adit on the upper level. Earlier mining in oxide ore was done in stopes (unmapped) above the level, off the main shaft which connects the two levels with the surface.

Galena and sphalerite are disseminated through the monzonite adjacent to its southern contact with the limestone, as small blebs and veinlets.

In drift A galena and sphalerite, in equal proportions, are exposed in lenticular bodies 6 inches to 1 foot wide and as disseminated blebs and veinlets through the limestone, along the strike of the fracture zone. Olson has expressed the opinion (Oral Communication, 1960) that the massive sulfide bodies are parts of two ore pipes raking toward the northwest at a low angle.

Small amounts of lead and zinc sulfides are exposed in the fracture zone in drift B as disseminated blebs and lenticular bodies.

Ore-grade material was observed only in drift A. Using a length of 40 feet for the mineralized zone in drift A, a mining width of 5 feet, and a density factor of 11 cubic feet per ton, 18 tons per vertical foot are calculated. Extending the ore from 15 feet above drift A to the adit level 24 feet below, 702 tons of ore are calculated, carrying an estimated grade of 10% combined lead and zinc (1:1 ratio) and 4 ounces of silver per ton. On a geologic basis development of additional ore along the strike of the fracture zone in the drift can be anticipated, thus doubling reserves to 1404 tons of possible ore.

Potential Ore Bodies

A self-potential survey over the surface of the mine area was made by Mr. A. Rugg of Tucson, geophysical consultant, with the assistance of the author. Negative anomalies indicative of oxidizing sulfide ore bodies were delineated west and south of the present mine workings.

Areas of altered and iron-stained limestone, also indicative of ore bodies in depth, extend across the mine area on the surface from east to west, and warrant further investigation.

In the Blacksmith adit ore exposed in drift A may be extended laterally, and may become more extensive and massive in depth, as the ore bodies may tend to coalesce. Similarly, mineralization in Drift B may become ore-grade at lower levels and/or laterally. The fracture zone in drift A dips at a lower angle than that in drift B and it is possible that the intersection of the two structures may provide the locus of an orebody comparable to that mined in the main stope area of the Glove mine.

Disseminated mineralization at the southern contact of the monzonite with the limestone suggests the possibility of ore-grade material nearby.

The locus for a possible ore body can be suspected along the "Keel," or bottom contact, of the limestone exposed between drifts A and B, and the monzonite.

In the Glove mine the main ore body can be expected to continue downward to the southeast. The value of the ore in the sulfide zone has ranged from 10% to 40% mixed sulfides with a lead - zinc ratio of 1:1. Olson, in his report, considered the grade to range from 10% to 20%. Dr. Lacy has expressed the opinion that the grade in the sulfide zone is higher, in the 20%-30% range.

Additional ore may be found on subsidiary structures to the main ore shoot.