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ASARCO

Exploration Department
Southwestern United States Division
James D. Sell
Manager

April 16, 1984

Mr. Mike Guzman, Jr.
President, Guzman Construction Co.
Box 3100
Globe, AZ 85501

Dear Mike:

Your letter to Mr. William Kurtz has been passed on to me concerning the Silver King Mine north of Superior, AZ.

ASARCO Exploration would be pleased to secure further information on the last status and terms.

Until I see you again,

Sincerely,

James D. Sell

JDS/cg

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703
1150 North 7th Avenue (602) 792-3010

GUZMAN CONSTRUCTION CO.

READY MIX CONCRETE
ASPHALT PAVING
EXCAVATING & EQUIPMENT RENTAL
"SINCE 1941"

PLANTS:
GLOBE: 425-5775
SUPERIOR: 689-5632
WINKELMAN: 356-666

MAIN OFFICE
BOX 3100
GLOBE, ARIZONA 85501

April 13, 1984

ASARCO Inc.
P.O Box 5747
Tucson, AZ 85703

Attn: ~~William Kurtz~~ J D Sell

Dear Sir,

The board of directors of Guzman Construction Company has decided to offer the famous Silver King Mine in Superior, Arizona for exploration and development. This old mine was shut down in the late 1800's after it produced 6 million ounces of silver. It was re-opened from 1918 to 1920 and produced another 300,000 ounces. The area has never had any deep drilling.

Presently there is a 300 ton per day Merrill-Crow zinc recovery system with leach pad, holding ponds for pregnant, barren and overflow solutions. A complete laboratory and refining process is also available.

If more information is desired we will be happy to forward same.

Best regards,

Mike Guzman Jr.

Mike Guzman, Jr.
President, Guzman Const. Co.

MG/mg

RECEIVED
APR 16 1984
EXPLORATION DEPARTMENT

DXK – JDS

I haven't looked at this yet. feel it is of low priority
Any thoughts?
JDS
Not really

FROM GUZMAN CONSTRUCTION CO. TO JDS
P.O. Box 3100
Globe, Arizona 85502

Silver King Mine

Silver King Mining District

Pinal County, Arizona

By

Rene G. von Boeck

June, 1983

RECEIVED
APR 27 1984
S. W. U. S. EXPL. DIV.

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INTRODUCTION

This report was written at the request of Mike Guzman Jr., Vice President of Guzman Construction Company of Globe, Arizona. It is a summary from data provided by Mr. Guzman and from published literature. No field work was done for purposes of this report. The writer is familiar with the property and has visited it on sevaral occasions while working for a mining company. No information obtained for that company is included in this report unless the same has been released to the property owner and it is in Guzman Construction files. Some geological interpretations and inferences for exploration potentials are the sole responsability of the writer. They are based upon available data and personal knowledge of the property.

Copies of portions of literature dealing with the mine are attached in the appendix.

LOCATION

The Silver King Mine is located 2.5 miles north of Superior, Pinal County, Arizona, in section 24, Township 1 South, Range 12 East, Gila and Salt River Meridian. The mining claims under control of Guzman Construction Co., which contain the mine and adjacent areas cover portions of sections 10, 11, 13, 14, 23, 24 and 26 (see Index Map and Fig. 1).

The mine is reached by driving west from Superior on U.S. highway 60 for approximately one mile, thence turning right on a graded road (Silver King Road) and travelling north-northwest for 4.5 miles to the mine

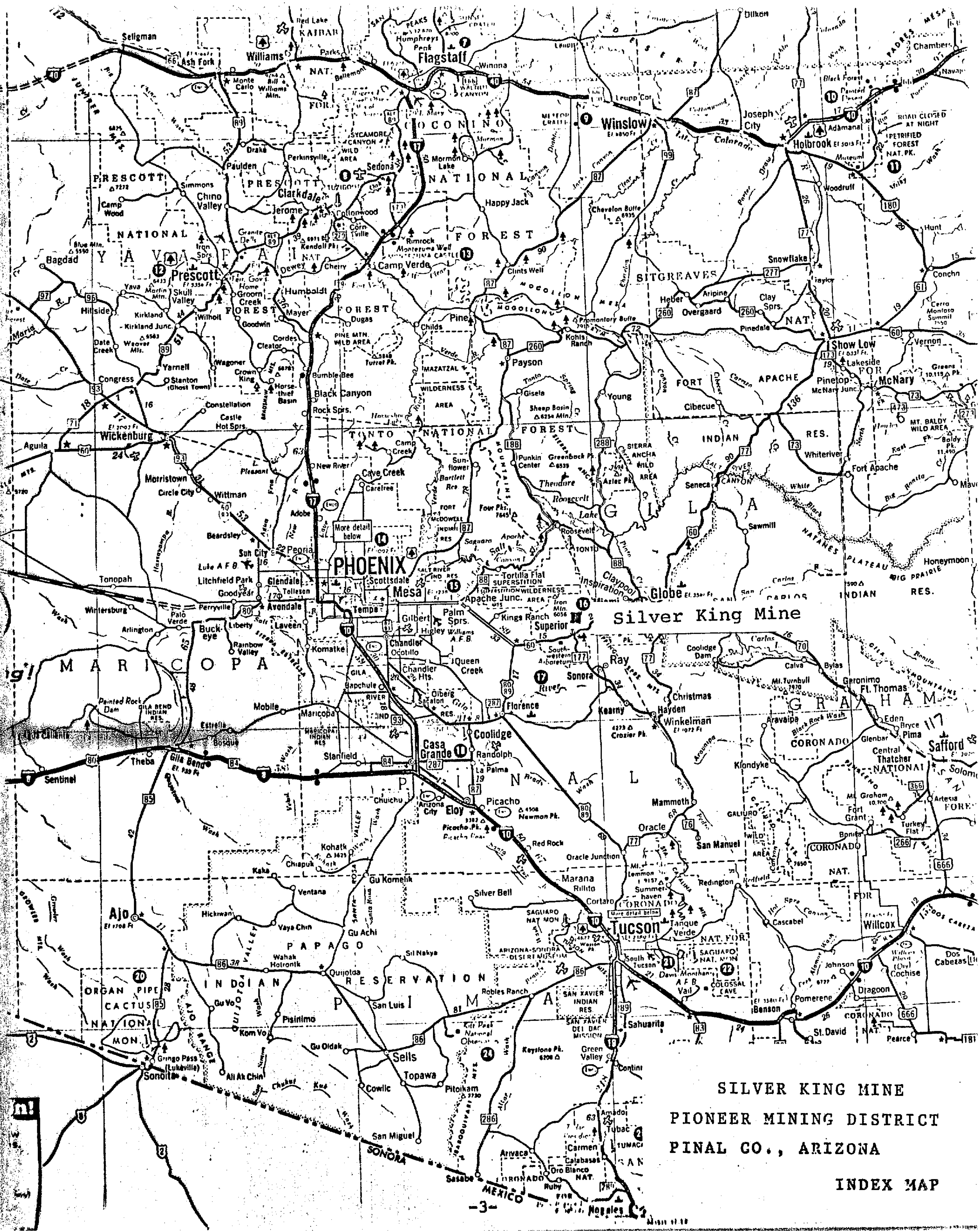
site. The surrounding claims are accessible by jeep trails and on foot from these trails. The graded road is open all year. The jeep trails are often washed-out by heavy rains.

LAND STATUS

Guzman Construction Company controls 60 unpatented lode mining claims over the Silver King Mine and adjacent areas (Fig. 1). The corners of all the claims have been re-established and new monuments have been placed at all the corners. Some of the claims were reportedly acquired through leases, while others have been located by members of the Guzman family. All the claims have been properly recorded and, on the date of this writing, are being maintained in compliance with State and Federal Laws.

Most of the area surrounding the Guzman Construction claims is adversely owned. To the south are claims owned by Magma Copper. To the east is a group of claims controlled by Fisher Watt Mining Company. The rest of the area contains claims or groups of claims under various ownerships. They are all presumed to be valid claims, but no title search has been done at this time.

Some patented claims are scattered through the area but none are owned by Guzman construction. These patented claims include three that are adjacent to the Silver King Mine workings. Two of them, Bilk and Mowry, belong to Magma Copper. The other, 1st. Extension of The Silver King Mine, belongs to Jeff Smith.

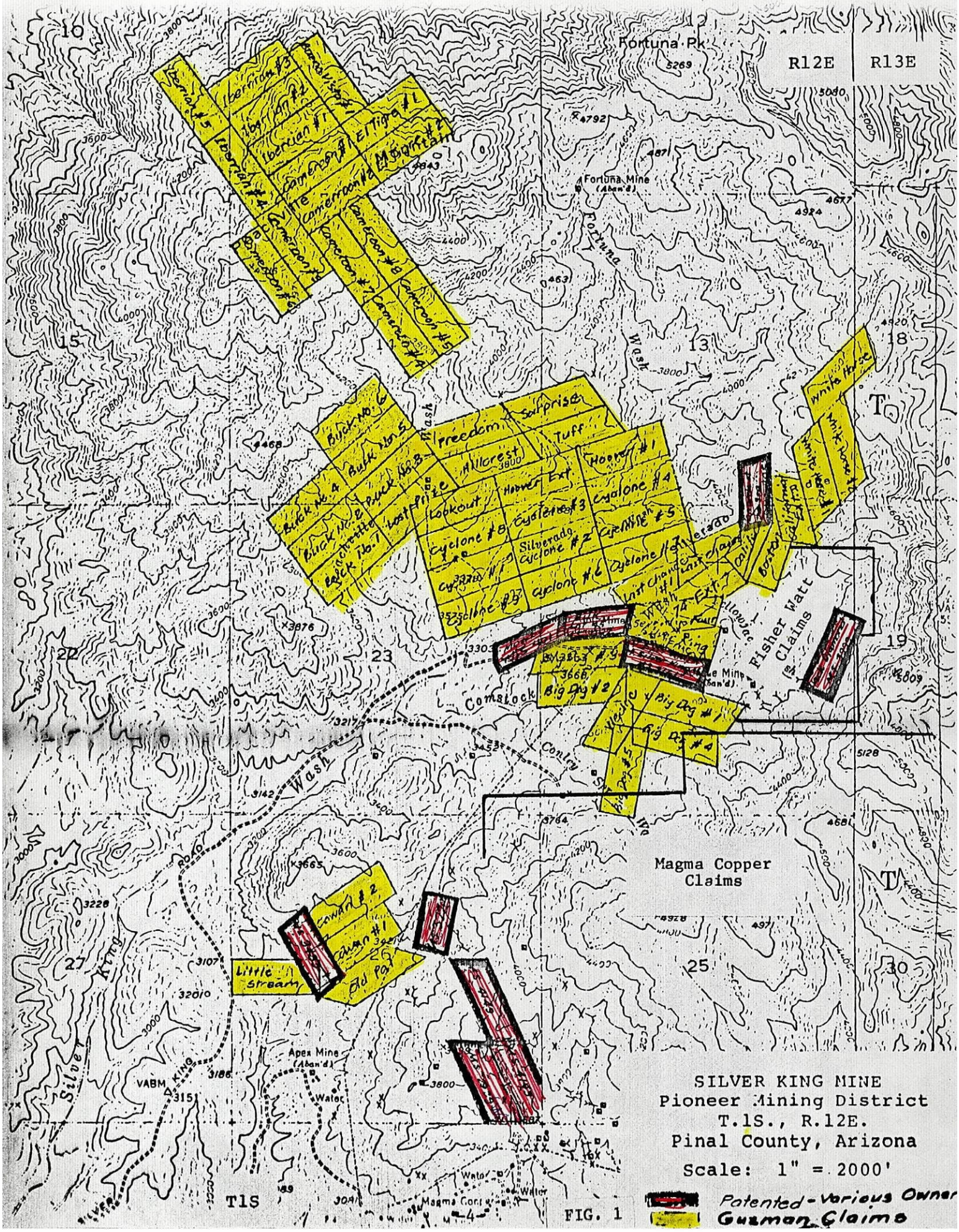


SILVER KING MINE

PIONEER MINING DISTRICT

PINAL CO., ARIZONA

INDEX MAP



SILVER KING MINE
Pioneer Mining District
T.1S., R.12E.
Pinal County, Arizona
Scale: 1" = 2000'

Patented - Various Owner
Guzman Claims

FIG. 1

HISTORY AND PRODUCTION

The Silver King Mine is one of the early bonanza deposits mined in Arizona. It was discovered in 1875 by a group of prospectors.[1] Since that time it had a continuous production through 1889. During that period it produced 5,943,157 ounces of silver with a gross value of $6,526,094. From 1918 to 1920 there was another period of production which yielded 229,764 ounces of silver with a gross value of $250,919. In addition to silver, the mine produced undisclosed amounts of copper, lead and zinc. Some of these metals may not have been recovered in the early years of production.

The mine has been idle since 1920. Sporadic attemts to mine have been made since in the most accessible portions of the mine The only recorded production of these later attempts are 3,000 ounces in 1928. Most recently, in 1981, Guzman Construction Co. set up a small leaching operation treating crushed dump material. The operation was short lived. It was set up when the price of silver was high, but the sudden drop in price forced the operation to a halt. The small recovery plant is still in place and it is apparently functional.

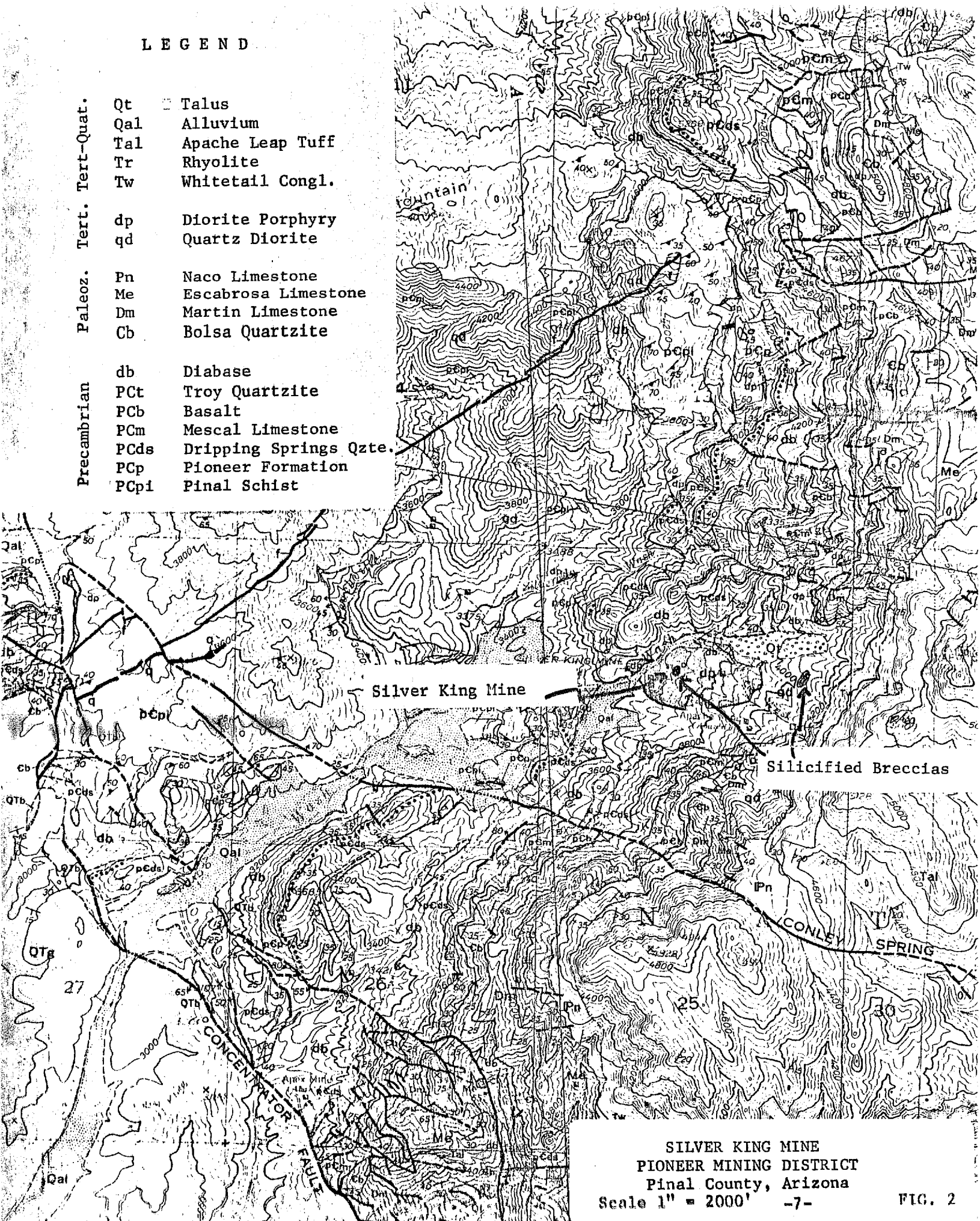
AREAL GEOLOGY

Rock formations in the area range from Precambrian to Tertiary and include: Precambrian schist and sediments, Paleozoic sediments, Cretaceous and Tertiary intrusive igneous rocks, and Tertiary and Quaternary volcanic rocks and clastic sediments [2] (Fig. 2). Significant rock units present are as follows:

	(Qt)	Talus	
Quaternary	(Qal)	Alluvium	
			Unconformity
	(Tal)	Apache Leap Tuff	
	(Tr)	Rhyolite	
Tertiary	(Tw)	Whitetail Conglomerate	
			Unconformity
Cretaceous or	(dp)	Diorite Porphyry	
Tertiary	(qd)	Quartz Diorite	
			Unconformity
	(Pn)	Naco Limestone	
	(Me)	Escabrosa Limestone	
	(Dm)	Martin Limestone	
			Disconformity
Paleozoic	(Cb)	Bolsa Quartzite	
			Unconformity
	(db)	Diabase	
	(PCt)	Troy Quartzite	
	(PCb)	Basalt	
	(PCm)	Mescal Limestone	
Upper	(PCds)	Dripping Springs Quartzite	
Precambrian	(PCp)	Pioneer Formation	
			Unconformity
Lower Precambrian	(PCpi)	Pinal Schist	

The reader is referred to published literature e.g. U.S.G.S. GQ-818 (ref. 2) for detailed description of the various rock units listed.

The Tertiary Whitetail conglomerate and volcanics have been deposited over east dipping Paleozoic sediments. The volcanics cover



SILVER KING MINE
PIONEER MINING DISTRICT
Pinal County, Arizona
Scale 1" = 2000'

FIG. 2

an extensive area to the east and form a west slopping scarp above the contact with the sedimentary rocks.

All Pre-Tertiary rocks are intruded by a Laramide complex consisting of a quartz diorite pluton, which in turn is intruded by a smaller quartz diorite porphyry stock. These two stocks have economic significance for they contain the Silver King ore body and at least one other mineralized breccia.

Structurally the area is cut by east-west normal faults which are, in most cases, cut by more extensive north-south and northeast trending faults. The density of faulting increases towards the south. Almost all the east-west trending faults in the district are at least weakly mineralized. Calcareous sediments adjacent to the vein systems along these faults are hosts to replacement mineral deposits. In the case of the Magma vein, several copper ore bodies have formed in the Martin, Escabrosa and Naco Limestones.

GEOLOGY OF THE SILVER KING MINE

The Silver King Mine deposit is contained within a breccia pipe intruded into a stock-like mass of siliceous quartz diorite porphyry. The stock at the outcrop meassures about 2,000 ft. from east to west and 1200 ft. from north to south(dp in geologic map). This body is intruded into a much larger quartz diorite stock (qd). The contacts between these rocks, where exposed, are well defined. The quartz diorite contains less silica and tends to weather more easily than the quartz

diorite porphyry, thus producing weathering and color contrasts. The breccia pipe at the outcrop, shows a reddish tan color anomaly due to alteration and oxidation of sulfides.

The breccia pipe itself is composed of light colored diorite porphyry fragments cut by small and irregular dikes of dark porphyritic rock. It has not been established whether this dark rock is a later intrusive injection or an alteration product. Mineralization is present in both dark and light colored rocks. The shape and nature of the mineralized body is no obvious at the outcrop, which has been greatly disturbed by mining. The following is a description of the deposit by Ransome:[3]

> The ore body formely cropped out at the top a little hill about 75 feet high, composed of much-altered yellowish-brown to greenish-gray porphyry.... Here and there in the porphyry walls of the pit may be found small veinlets of rich, partly oxidized ore, but, so far as can be seen from the surface, the ore was not part of a vein, and there is nothing to suggest that it was determined by the intersection of two or more persistent fissures. It apparently was a compact plexus of veinlets inclosed in comparatively unfissured porphyry.
>
> ...maps from underground workings show that the ore body was a stockwork about 130 feet in maximum diameter, with a general dip of 70° W. The stockwork was disposed about an irregular core or axis of milk-white quartz, containing some bunches of rich ore but as a whole comparatively barren....The ore consisted of altered porphyry traversed in all directions by innumerable veinlets carrying stromeyerite, tetrahedrite, galena, sphalerite, chalcopyrite, and pyrite in a gangue of quartz with some barite....Blake makes the interesting observation that the stromeyerite and high argentiferous tetrahedrite with more or les argentite were the most important constitutents of the ore on the upper levels, whereas argentiferous sphalerite had become the principal ore mineral on the seventh level. Native silver associated with stromeyerite and sphalerite, was abundant at that level, according to the same observer....

> Various explanations are given locally for the failure of this interesting deposit below the 800-foot level, some stating that the ore body was faulted, some that the ore changed in character and grade. The latter is probably true....

No much more has been learned since Ransome wrote about the deposit in his 1914 report although some work was done at the mine after that date. The old shaft which has a depth of 987 feet was dewatered and a new shaft to a depth of 615 ft. was sunk. The production from 1918 to 1920 mentioned earlier in this report came as a result of this later work. The new shaft was not sunk any deeper presumably because the Company went into bankruptcy in 1920. Ore produced probably came from upper levels.

ECONOMIC POTENTIAL

The Silver King Mine has been shut down for a long period of time. Except for what can be recovered from dumps and shallow mineralization, no ore is accesible from the old mine workings. As an exploration target the property has good potential for additional silver ores in the breccia pipe and for porphyry copper mineralization within the igneous stocks. Of most immediate interest is the silver mineralization potential. Porphyry copper mineralization is of low priority at this time of low prices and low demand.

Silver Potential: Galbraith has used data from old mine maps and constructed a stereogram of the Silver King ore body (see Appendix).

If the tonnage of rock in this body is calculated using the dimensions given by Galbraith it gives a total of approximately 550,000 tons. Production to 1928 is given in ounces per ton. Assay values for the ore that produced the silver are not available in the literature or available data exept as follows: Some mention is made for production in 1883 with ore going to the mill with heads of 61.08 opt Ag; in 1884 mention is made of ore having a metal content of 43 to 46.40 opt Ag; in 1887 ore to the mill was running from 21.08 to 32.47 opt Ag; for the period 1918 to 1920 the heads are given at 18.7 opt Ag.

For calculation of tonnage mined to yield the silver produced the following silver values will be assumed: 1875 to 1883 - 55 opt, 1884 to 1886 - 40 opt, 1887 to 1889 - 25 opt, and 1918 to 1920 - 18 opt. These values are realistic but should not be taken as the true values. They are being used here to estimate the potential ore that was not mined or is left in dumps or underground. The tonnage of ore mined using the above values is 159,500 tons. What remains in place or broken underground or in dumps is the difference between the original ore in place and the ore mined. This difference is 390,500 tons. The silver content of the remaining mineralized material is not known but should be assumed to be less than 18 opt Ag, with values in copper, lead and zinc in addition to the silver.

Whether or not the Silver King ore body continues at depth or has lateral extensions can be determined only by exploration. A silicified brecciated zone containing pyrite is present in quartz diorite about 2.000 ft. east of the Silver King ore body. This breccia is out-

side of the Guzman Construction claims but points out that other potential targets may exist in the area.

Porphyry Copper Potential: Both the quartz diorite and the quartz diorite porphyry show widespread quartz and sulfide veining, and alteration is locally intense. This alteration is mostly propylitic to weak phyllic, with local potassic alteration in the vicinity of the breccia pipe at the Silver King Mine. The alteration pattern and widespread sulfide mineralization (pyrite and rare chalcopyrite) are evidence of a potentially larger sulfide body that may contain economic concentrations of disseminated copper mineralization.

R G von Boeck

Rene G. von Boeck
Exploration Geologist

REFERENCES

1. Galbraith, Frederic W.,1935, Geology of the Silver King Area, Superior, Arizona, University of Arizona Thesis, pp 118-129.

2. Peterson, Donald W.,1969, Geology of the Superior Quadrangle, Pinal County, Arizona; U.S.G.S. G Q -818 .

3. Ransome, F. L., 1914,"Copper Deposits Near Superior, Arizona"; Contributions to Economic Geology; U.S.G.S. Bull. 540 pp 156-158.

A P P E N D I X

Silver King Mine

From

Geology of the Silver King Area

Thesis

by

Frederic W. Galbraith

Economic Geology

Discovery of the Silver King Mine

There are three published accounts[1,2,3] of the discovery

---

1. Raymond, R.W. - Eighth An. Rept. of the Mineral Resources West of the Rocky Mtns. 1876.
2. Blake, W.P. - The Silver King Mine of Arizona. Tuttle, Morehouse, and Taylor. Printer, New Haven, 1883.
3. Clark, Chas.M.- The Discovery of the Silver King Mine.

---

of the Silver King mine all of which are in essential agreement. As territorial geologist Blake examined the property at various times, and as he is known to have been an accurate and keen observer, the following story is based upon his published material.

In the middle of the 19th Century, while the settlements along the Gila River were slowly growing and spreading, the mountainous areas, now included largely in Pinal and Gila counties, were still in the possession of the Apaches. These marauding savages dominated the whole region, and made it almost inaccessible to the prospectors who began to press outward from the frontier settlements on the Gila River toward its source in the mountains. The country is rugged, the flanks of the Pinal mountains having been cut into innumerable small ridges and spurs by the intermittent streams flowing south and west into the low lying Sonoran Desert. One of the trails most frequented by the Apaches led up over the steep limestone cliffs about two miles north of the present town of Superior.

In 1873, when General George Stoneman, later to become Governor of California, was commander of the military department of Arizona Territory, it became necessary to expend every possible effort in an attemp to stop Apache raids. To this end, he established a camp at the base of the mountains close to the Apache trail and began the construction of a road known as the Stoneman Grade up the face of the cliffs, which became the main route of travel between the Globe mining districts and the valleys of the Salt and Gila Rivers.

A soldier by the name of Sullivan, engaged in the construction of the Grade, was attracted by some heavy, black lumps of metallic material, which flattened instead of breaking up when pounded on the rocks. He gathered a few specimens, but said nothing of his find. When his term of service expired soon afterward, he made his way to the ranch of Charles G. Mason near the present city of Phoenix, where he frequently showed the black ore, since known as nugget silver, but without revealing where he had found it. Sullivan suddenly disappeared, and it was supposed that he had been killed by Apaches while trying to return to the place where he had discovered the rich silver ore.

In 1874, Mason and some of his fellow ranchers began to organize preospecting trips to locate Sullivan's find. The first discovery of importance was the Silver Queen, now known as the Magma mine, and soon afterwards the Globe mine was located to the east which gave its name to the Globe

Mining District.

In 1875, a party consisting of Mason, Benjamin W. Reagan, William H. Long, and Issac Copeland, returning from the Globe district with a pack train of samples for assay camped just off the road at the base of the Stoneman Grade where more of the black nuggets were found. This float was followed up the slope of a small conical hill nearby to the outcrop of the ore at the top. On March 22, 1875 the initial location was made, duly recorded, and the Pioneer Mining District laid out. Assays by Tom Price of San Francisco established the value of the ore, and active mining began.

Development and Production

The development and production of the Silver King mine has been admirably treated by Tenney.[1] The following account is a condensation of his material.

1. Tenney, J.B. - Unpublished manuscript.

In his report on the mineral resources of the Rocky mountains, Raymond states that by the end of 1875 the shaft was down 42 feet and a 12 foot drift had been driven from the bottom. The shaft started in ore and was sunk along a network of stringers ranging from 3 to 18 inches wide in "granite." The gangue material in the stringers was quartz and the ore minerals were cerargyrite(the chloride of silver), argentite, and native silver. This ore when sorted ran $20000.00 a ton. A small furnace of the cupel type was

erected at Florence by Cury and Hughes to treat the ore. Pig lead for collecting the silver was obtained from the Mowry mine in the Patagonia mountains, which lie 150 miles to the south near the International Boundary between Arizona and Mexico. Five hundred pounds of selected ore obtained from the first 14 feet of the shaft yielded over 5 dollars a pound. The total production from the shaft and drift was estimated at $50,000.00 1 10,000 oz/Ton

When the news of the discovery reached San Francisco, mining experts representing the Comstock interests were sent to negotiate the purchase of the property, and in 1876 the mine was sold to a corporation known as the Silver King Mining Co. Further development was begun and a small stamp mill and amalgamation plant was erected five miles from the mine at Pinal, on Queen Creek. Most of the ore was shipped without milling, only the lower grade ore being treated.

In 1879, Arthur Macy, E.M., was appointed superintendent. Due to the exhaustion of the free milling ore it became necessary to change the method of treatment, which was done in 1882. The ore was crushed at the mine in a Blake crusher and sent to the concentrator at Pinal. There it was further crushed by a battery of 20 stamps and concentrated over 12 Frue Vanners. The concentrates were sent to the Dome Mining and Smelting Company, Melrose, Calif., the Selby Works at San Francisco, and the Omaha Smelting Works. In 1883 the mill treated from 50 to 57 tons a day with a concentration ratio of about 20 to 1. The average grade of the heads was

$61.08 in silver, and the reported extraction was 92.31 per cent. In addition to silver the concentrates assayed 21½ per cent lead and 18 per cent zinc.

Active prospecting of adjoining ground closely followed the success of the Silver King mine. In 1883 fourteen groups were being actively worked and three mills had been erected, the largest being the amalgamation plant of the Windsor Consolidated Company. In 1884 this mill was leased by the Silver King Company to treat a part of the ore not amenable to concentration. The mine was developed to a depth of over 800 feet and most of the ore was being obtained from the 700 and 800 foot levels. The grade had fallen to $43.00 for concentrating ore and $46.40 for that treated by amalgamation.

The last year of profitable operation was 1887. The grade of the ore had fallen to 21.08 ounces per ton for the concentrated ore and 32.47 ounces for the ore amalgamated. Lixivation was tried on some ore high in copper from the 800 foot level, and some old tailings were reconcentrated. The costs reported by the superintendent for 1887 were as follows:

Mining	$10.97 per ton
Milling and Roasting	9.69 " "
Total	$20.66 per ton

During the first half of 1888 the company operated at a loss and the president, Mr. H.H. Noble, reported a debt of $75,000. An assessment was levied, and a drastic reduction was made in operating costs which were lowered from $40,000 to $5,000 a month. By December the indebtedness had been

paid and the company had a balance of $74,000 in the treasury and sufficient ore in sight to run to January 1,1889.

Prospecting in 1889 and 1890 failed to find commercial ore, and the mine was closed in January 1891. It was reopened in September of the same year after 44,000 delinquent shares had been called in. In October a strike was made in a new shaft to the east of the old workings. This ore was developed in 1892 but the company was again in debt. Ten stamps were moved from Pinal to the mine and a small production of concentrates was made during the remainder of the year. With the decline of the price of silver in the early part of 1893 the mine was again closed.

The property was reopened by the superintendent, Mr. W.S. Champion, in the fall of 1895, work being confined to the new shaft. He reported finding a pocket of ore worth $40,000 at a depth of 75 feet. The mine was again closed in 1896.

From 1876 to 1896 the company declared dividends of $1,950,000., the last dividend being paid in 1887. A total of $300,000 in assessments was levied from 1888 to 1895, making the net operation profit $1,650,000. The dividends were paid on 100,000 issued shares and the assessments were collected on 56,000 shares.

In 1916, after the successful exploitation of the neighboring Silver Queen mine by the Magma Copper Company, the property was acquired by the Silver King of Arizona Mining Company, a Delaware corporation, with A.W.Hildebrand of

New York as president, and John Fowler as manager. In 1917 the old main shaft, 987 feet deep, was unwatered and repaired. Small high grade ore bodies overlooked by the former operators were mined on the 120 foot level. A small flotation mill was completed in 1918 to treat this ore and low grade dump material. About 35 tons a day were treated with a reported extraction of 90 per cent. A small vein on the 400 foot level yielded some rich ore that was shipped to the smelter, and shipments of concentrates continued intermittently to July, 1919. At that time the management claimed to have 10,000 tons of ore developed averaging over $20.00 per ton.

In July 1919 a new shaft, financed by a $500,000 bond issue, was started 150 feet northwest of the ore chimney. The old shaft was kept unwatered and ore from the 120 and 400 foot levels was treated at the mill. In October a cross-cut from the old shaft on the 400 foot level connected with the 415 foot levels of the new shaft.

In January of 1920 a reorganization was effected whereby the capitalization was reduced to allow for further financing. Shaft sinking continued until June, 1920, when a depth of 635 feet was reached. A cross-cut on the 615 foot level extended to the old workings. The company went into bankruptcy shortly afterwards and a reorganization as the Silver King Mine Incorporated was effected but no further work was done. The total ore treated from 1916 to 1920 amounted to 12,546 tons averaging approximately $20.00 a

18 g/ton

ton in silver. The concentrates contained from 1000 to 1980 ounces of silver, 20 per cent lead and from 7 to 8 per cent copper.

The Bilk shaft apparently sunk in the early days of the camp, is located 450 feet to the northwest of the new Silver King shaft, and is reported to be over 1000 feet deep. The writer has heard numerous stories about this shaft from old timers in the district but as no authentic account of the operation has been located, it seems inadvisable to include the unverified material here.

At the present time the Silver King property is owned by Mr. Pat Gays, of Superior, Arizona, who has carried on a little prospecting to the east of the old workings.

Production of the Silver King

(Figures compiled by J.B.Tenney)

Year	Price	Ounces of Silver	Gross Value
1875	1.24	40,323	$ 50,000
1877-79	1.16	706,157	819,142
1880	1.15	439,689	505,642
1881	1.13	574,049	648,675
1882	1.14	714,912	815,000
1883	1.11	533,787	592,503
1884	1.11	429,559	476,811
1885	1.07	764,832	818,570
1886	.99	656,566	650,000
1887	.98	709,184	694,951
1888	.94	319,149	300,000
1889	1.00	55,000	55,000
Total 1875-1889		5,943,157	$ 6,526,094
1918	1.00	37,000	37,000
1919	1.12	126,892	142,119
1920	1.09	65,872	71,800
1928	.58	3,000	1,755
TOtal 1918-1928		232,764	$ 252,674
Grand Total		6,175,921	$ 6,778,768

The Silver King Ore Body

The mine is filled with water and therefore could not be examined. Blake's article already referred to contains the only original description of the ore body, although Ransome[1], who visited the mine in 1912, has given a con-

1. Ransome, F.L. - Copper Deposits Near Superior, Arizona U.S.Geol. Survey Bull. 540 pp. 139-158, 1914.

cise summary of this description in addition to some material collected by himself during his visit. The following is from Ransome's article:

The ore body formerly cropped out at the top of a little hill about 75 feet high, composed of much-altered yellowish-brown to greenish-gray porphyry. Stoping was carried to the surface and a crater-like pit from 100 to 125 feet in diameter marks the site of the former outcrop. Here and there in the porphyry walls of the pit may be found small veinlets of rock, partly oxidized silver ore, but, so far as can be seen from the surface, the ore body was determined by the inter-section of two or more persistent fissures. It apparently was a compact plexus of veinlets in-closed in comparatively unfissured porphyry. Blake's description and the maps of underground workings show that the ore body was a stockwork about 120 feet in maximum diameter, with a general dip of 70°W. The stockwork was disposed about an irregular core or axis of milk-white quartz, containing some bunches of rich ore but as a whole comparatively barren. This material is abundant and conspicuous in the mine dump and evidently constituted at times the bulk of the waste.

The following description is from Blake's original article:

The portion removed from the open pit consisted largely of rock, the porphyry, so-called, penetrated and seamed with interlacing veinlets of quartz, reticulating and crossing in every direction. These veinlets varied from the thickness of a sheet of paper to one quarter of an inch or an inch in

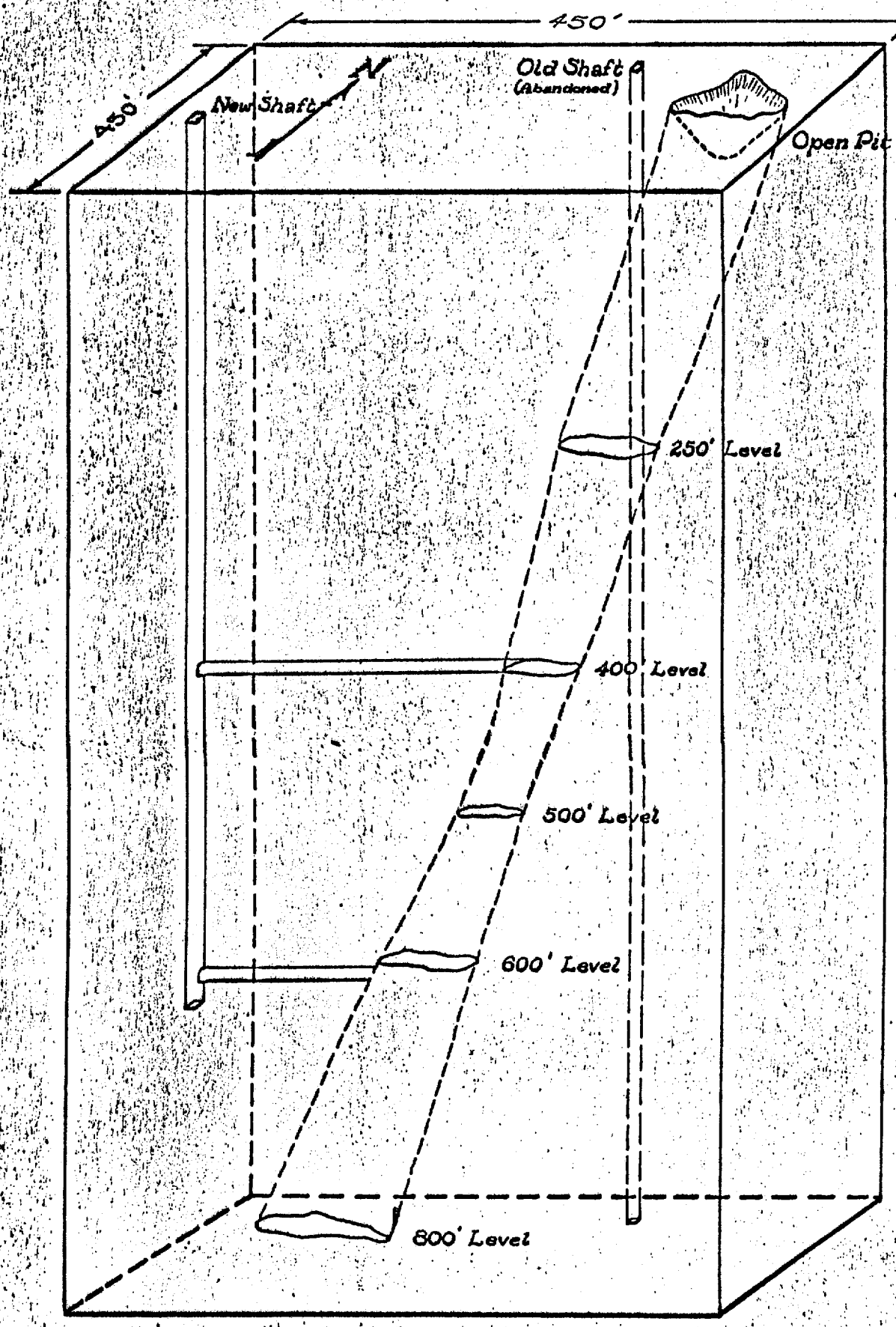
thickness, and were generally accompanied with ore in a medial position, having quartz on each side of it next to the rock. The same conditions may be seen in the lower levels at the present time. In addition to these veinlets, there are masses and bunches of ore, and apparently (at least in the upper levels) a central mass of quartz, a large and compact body, toward which the system of veinlets converged, or from which they may be said to radiate. This mass of quartz, of irregular dimensions, still exists in the region opened by the lowest levels of the mine, but it has not yet been thoroughly explored. This quartz appears to hold some direct relation to the deposition of the ore: the heavier bodies of ore, so far, having been cut below, or on the foot-wall side of the quartz body. It may be regarded as holding the relation of the chief veinstone to the ore, and as presenting within itself, and together with the branching veinlets, the characters of a true fissure-fikling, although it has not the usual sheet-like or tabular form. It is, instead, a columnar or chimney-like mass, some eighty feet in diameter in places, but irregular and without longitudal extension. In other words, this quartz-vein, instead of having a width much greater than its breadth, is approximately cylindrical or columnar in its form, filling a nearly vertical, spirally-formed cavity.

If we examine the structure of the veinlets in detail, we find them presenting the characteristics of fissure-veins. They extend for long distances through the rocks, and with parallel walls. They have regular veinstone and vein structure. The quartz forms on the opposite walls of the fissures in regular sheets, with "combs" or quartz crystals pointing inward and holding the ore in bunches and sheets. Such inclusions of ore are still to be seen in the small veins at the summit of the croppings and in the levels below.

The ore occurs also in bunches in the rock with but little veinstone. A tendency to triangular forms is observable, and in several places I have noted veins joining together nearly at right angles.

It will be inferred from the preceding descriptions that the richest and most import nt accumulations of ore are not found in the main body of the quartz veinstone. Although the massive quartz does hold bunches of rich ore, it is not, as a rule, so rich and profitable to work as the rock adjoining it. The ore is more abundant in connection with the small branching veins in the outside rock than in the mass of the quartz itself. It must, however, be stated that the quartz body has not yet been fully explored, being merely cross-cut in the upper levels. It is my opinion, however, based upon what has already been shown, that, contrary to the usual conditions in mines, the chief body of quartz veinstone does not carry the best part of the ore. It appears rather to have been the main channel of the mineralization: the main artery or feeder to the thousands of veinlets branching from it into the wall-rock following

Stereogram of the Silver King Ore Body



the clefts and penetrating the substanced of the rock, depositing and diffusing native silver and the sulphides throughout the whole mass of rock for an indeterminate distance on each side.

The level map and vertical section which accompanied Blake's paper are reproduced on Plates XXII and XXIII. Through the courtesy of Mr. Bat Gays, the present owner of the Silver King mine, level maps made by Mr. Starbird, resident engineer for the Silver King of Arizona Mining Company, were examined by the writer. These show the stoped area of the ore body to have been as follows. Dimmensions are in feet, the first representing the north-south coordinate, the second the east-west.

250' level	----------	100 x 100
400' "	----------	80 x 50
500' "	----------	60 x 50
600' "	----------	80 x 70
800' "	----------	180 x 100

Silver King Mine

From

U.S.G.S. Bulletin 540

Copper Deposits Near Superior, Arizona

by

F. L. Ransome

ORE BODY OF THE SILVER KING MINE.

The Silver King mine was well described by W. P. Blake[1] 30 years ago, but his original publication is not readily accessible. Accordingly, although the present paper is concerned mainly with the copper deposits, and although the old mine, being full of water, could not be reexamined, a brief descriptive summary of the conditions under which the ore occurred will perhaps be of sufficient interest to warrant its inclusion here.

The eruptive mass which incloses the ore is a quartz diorite porphyry or closely related rock. It presents some rather noticeable variations, which Blake distinguished as "porphyry," "sienite," and "granite," although they appear to be merely facies of one intrusive body which is probably of Mesozoic age.

The ore body formerly cropped out at the top of a little hill about 75 feet high, composed of much-altered yellowish-brown to greenish-gray porphyry. Stoping was carried to the surface and a crater-like pit from 100 to 125 feet in diameter marks the site of the former outcrop. Here and there in the porphyry walls of the pit may be found small veinlets of rich, partly oxidized silver ore, but, so far as can be seen from the surface, the ore body was not part of a vein, and there is nothing to suggest that it was determined by the intersection of two or more persistent fissures. It apparently was a compact plexus of veinlets inclosed in comparatively unfissured porphyry.

Blake's description and the maps of underground workings show that the ore body was a stockwork about 130 feet in maximum diameter, with a general dip of 70° W. The stockwork was disposed about an irregular core or axis of milk-white quartz, containing some bunches of rich ore but as a whole comparatively barren. This material is abundant and conspicuous in the mine dump and evidently constituted at times the bulk of the waste. The ore consisted of altered porphyry traversed in all directions by innumerable veinlets carrying stromeyerite, tetrahedrite, galena, sphalerite, chalcopyrite, and pyrite in a gangue of quartz with some barite. The minerals named were noted in 1912 on the dump, but Blake lists and describes also native silver, argentite, bornite, calcite, and siderite. Bornite, chalcopyrite, and pyrite are said to have been comparatively rare. Blake makes the interesting observation that stromeyerite and highly argentiferous tetrahedrite with more or less argentite were the most important constituents of the ore on the upper levels, whereas argentiferous sphalerite had become the principal ore mineral on the seventh level. Native silver, associated with stromeyerite and sphalerite, was abundant on that level, according to the same

[1] Description of the Silver King mine of Arizona, New Haven, 1883, 48 pp., with illustrations.

observer. He also describes the metallic minerals as occurring generally along the medial plane of the veinlets, a characteristic that is verifiable in specimens collected on the dumps in 1912. Apparently the deposit was not deeply oxidized and veinlets seen in the open pit in 1912 showed sulphides present with cerargyrite, malachite, and azurite. Blake notes also native copper, cuprite, "oxides and carbonates of lead and possibly embolite, the chlorobromide of silver; also the argentite, in pure black lumps."

From the fact that water is now flowing from the collar of the No. 2 shaft the original water level was probably close to the surface. The quantity of water pumped to keep the mine clear near its maximum development in 1887 was 10,941 gallons a day.[1] Blake states that at the time of his visit (1882 or 1883), when the mine was 714 feet deep, only 2,000 gallons a day was pumped, all of which entered the mine at the first or 114-foot level.

In the early stages of development, before there was a railroad in Arizona, some rich ore was shipped under great disadvantages. Blake states that some of this carefully sorted ore averaged $1,000 a ton, and as late as 1887 the superintendent, Mr. Arthur Macy, reported assays up to 447 ounces of silver to the ton in ore consisting chiefly of tetrahedrite. Subsequently two 20-stamp mills were built at Pinal, 5 miles from the mine. Some idea of the character of the ore during a rather late stage in the activity of the mine is obtainable from the company's report for 1887, wherein it is stated that mill No. 1, employing wet crushing and concentration, treated 2,698.75 tons of ore with an average content of 21.08 ounces of silver to the ton. The product was 577,813 tons of first-class concentrates averaging 834,135 ounces of silver to the ton and 31 per cent of lead. Of the total silver contents, 53.95 per cent was native silver. In addition the mill turned out 1,261.55 tons of second-class concentrates carrying 31.77 ounces of silver to the ton, chiefly combined in zinc blende and galena. Mill No. 2, in which chloridizing, roasting, and pan amalgamation were employed, treated 4,840.08 tons of first-class ore, averaging 32.47 ounces of silver to the ton of roasted pulp, 1,913.51 tons of second-class concentrates, and 3,875.34 tons of old tailings with an average content of 12 ounces of silver to the ton. The superintendent states that whereas previously the ore treated in this mill had carried 50 per cent of its silver in native condition, the proportion for the year covered by the report had fallen so notably and the bullion, not withstanding an extraction of over 96 per cent of the total silver, had become so base that he had stopped this method of treatment and was experimenting with an old lixiviation plant previously used.

[1] Report of the Silver King Mining Co. for 1887, San Francisco, 1888.

Various explanations are given locally for the failure of this interesting deposit below the 800-foot level, some stating that the ore body was faulted, some that the ore changed in character and grade. The latter is probably true. The worked-out part of the deposit appears to have been a striking example of deep downward enrichment. If so, the time may come when the old mine will be reopened and its low-grade hypogene ore utilized.

Silver King Mine

From

Arizona Bureau of Mines Bull. 156

on this level is weaker than on those above. The wall rocks are highly silicified, and the vein contains minor amounts of pyrite, chalcopyrite, and sphalerite. Mineralization is strongest where both walls are diabase. Westward the vein feathers out and becomes indefinite; at a point 900 feet west of the shaft it could not be located.

Silver King Mine

Operations and production: The Silver King mine, about 2 miles north of Superior, was worked almost exclusively for silver, but its ores contained also important quantities of base metals which were not recovered. Under present-day metallurgy, those ores might have yielded substantial amounts of zinc, lead, and copper.

Production of the Silver King mine has been reported[16] as follows:

Years	Ounces silver	Value
1875-89	5,943,157	$6,526,094
1918-28	232,764	252,674
Total	6,175,921	$6,778,768

During 1876-96 the mine was operated by Silver King Mining Company which paid $1,950,000 in dividends to the end of 1887. Most of the ore was milled at Pinal, on Queen Creek at the base of Picket Post Mountain. In 1883 this mill treated about 50 tons per day, with a concentration ratio of nearly 2 to 1. The average grade of the heads was $61.08 in silver, and the reported extraction was 92.31 per cent. In addition to silver, the concentrates assayed 21.5 per cent lead and 18 per cent zinc.[17]

As stated by Ransome,[18]

> Some idea of the character of the ore during a rather late stage in the activity of the mine is obtainable from the company's report for 1887, wherein it is stated that Mill No. 1, employing wet crushing and concentration, treated 2,699 tons of ore with an average content of 21.08 ounces of silver to the ton. The product was 577.813 tons of first-class concentrates averaging 83.4135 ounces of silver to the ton and 31 per cent of lead. Of the total silver contents, 53.95 per cent was native silver. In addition the mill turned out 1,261 tons of second-class concentrates carrying 31.77 ounces of silver to the ton, chiefly combined in zinc blende and galena. Mill No. 2, in which chloridizing, roasting, and pan amalgamation were employed, treated 8,840 tons of first-class ore, 1,914 tons of second-class concentrates, and 3,875 tons of old tailings.

In 1916 the property was acquired by Silver King of Arizona Mining Company. The old shaft, 987 feet deep, was unwatered, and a new shaft was sunk to a depth of 615 feet. A small flotation mill treated 12,546 tons of ore and dump material during 1916-20. Its concentrates contained 1,000 to 1,980 ounces of silver per ton, 20 per cent lead, and 7 to 8 per cent copper. Subsequently

[16]Ariz. Bur. Mines Bull. 151, p. 144.
[17]Ariz. Bur. Mines Bull. 151, p. 142.
[18]F. L. Ransome, Copper deposits near Superior, Arizona: U.S. Geol. Survey Bull. 540, pp. 139-58 (1914).

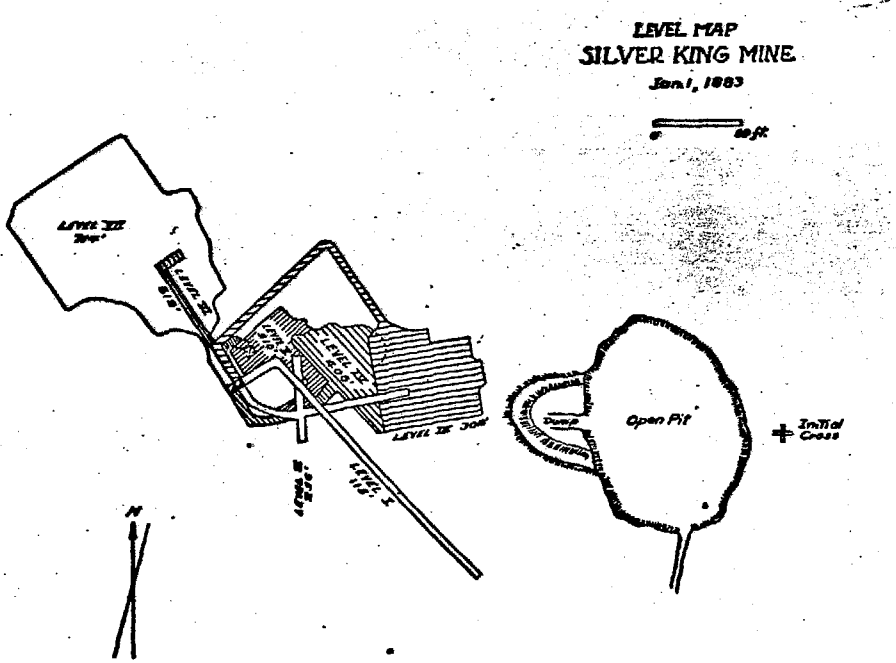


Figure 30.—Map of Silver King mine levels (after Blake).

the property was acquired by Bat Gays who has carried on small-scale operations. Several shipments have been made from the dumps. During 1945-46 some of the area was prospected by diamond drilling.

Geology: The Silver King porphyry, in which was developed the Silver King ore body, crops out as an irregular mass approximately 2,500 feet long from east to west by 1,200 feet wide. It was intruded into the southeastern part of a much larger stock of quartz diorite.

The pit marking the former outcrop of the ore body shows brecciated quartz and porphyry. Extending N. 60°-70° E. from the breccia mass is a steeply northwestward-dipping fissure which was mineralized for a few hundred feet along its strike. Evidence for other structural control of the breccia mass is not readily apparent; alluvium and mine dumps conceal most of the area north, south, and west of the pit, and the mine workings are not accessible.

Ore body: Blake published an original description of the Silver King ore body and a map (Fig. 30) of the workings as of 1883.[19] Ransome gave a summary of Blake's report together with data collected by himself.[20] Quoting from Ransome,

> The ore body formerly cropped out at the top of a little hill about 75 feet high, composed of much-altered yellowish-brown to greenish-

[19]W. P. Blake, The Silver King mine of Arizona. New Haven (1883).
[20]F. L. Ransome, work cited, pp. 156-8.

gray porphyry. Stoping was carried to the surface, and a craterlike pit from 100 to 125 feet in diameter marks the site of the former outcrop. Here and there in the porphyry walls of the pit may be found small veinlets of rich, partly oxidized silver ore, but so far as can be seen from the surface, the ore body was not part of a vein, and there is nothing to suggest that it was determined by the intersection of two or more persistent fissures. It apparently was a compact plexus of veinlets inclosed in comparatively unfissured porphyry.

Blake's description and the maps of underground workings show that the ore body was a stockwork about 130 feet in maximum diameter, with a general dip of 70° west. The stockwork was disposed about an irregular core or axis of milk-white quartz, containing some bunches of rich ore but as a whole comparatively barren. The ore consisted of altered porphyry traversed in all directions by innumerable veinlets carrying stromeyerite, tetrahedrite, galena, sphalerite, chalcopyrite, and pyrite in a gangue of quartz with some barite. Blake makes the interesting observation that stromeyerite and highly argentiferous tetrahedrite with more or less argentite were the most important constituents of the ore on the upper levels, whereas argentiferous sphalerite had become the principal ore mineral on the seventh level.

Other minerals listed by Blake were native silver, native copper, cuprite, oxidized lead minerals, bornite, calcite, and siderite.

The paragenesis of the minerals has been described in detail by Galbraith,[21] who noted that sphalerite was the most abundant sulfide mineral, and galena the next most abundant.

Ransome's[22] conclusion was:

Various explanations are given locally for the failure of this interesting deposit below the 800-foot level, some stating that the ore body was faulted, some that the ore changed in character and grade. The latter is probably true. The worked-out part of the deposit appears to have been a striking example of deep downward enrichment. If so, the time may come when the old mine will be reopened and its low-grade ore utilized.

[21]Ariz. Bur. Mines Bull. 151, pp. 146-154, 2 pls.
[22]F. L. Ransome, work cited, p. 158.

CHAPTER VIII.—LEAD AND ZINC DEPOSITS IN THE GLOBE-MIAMI DISTRICT, ARIZONA[1]

By Nels P. Peterson[2]

INTRODUCTION

The Globe-Miami district is in the northern foothills of the Pinal Mountains about 90 miles by road east of Phoenix, Arizona. It is almost entirely within the Inspiration and Globe quadrangles as mapped by the U. S. Geological Survey in 1945. The topography of the district is fairly rugged, the altitude ranging from 3,400 feet at Miami to 5,060 feet on Needle Mountain near the southern edge of the Inspiration quadrangle.

[1]Published by permission of the Director, U. S. Geological Survey.
[2]Geologist, U. S. Geological Survey.

The columnar section of sedimentary and volcanic rocks in the district is illustrated in Figure 31. The oldest rock of the region is the Pinal schist, a complex of metamorphosed sedimentary rocks of early pre-Cambrian age. Also of pre-Cambrian age, but much younger than the Pinal schist and separated from it by a major unconformity, are rocks of the Apache group. All formations of the group are represented in the district, but in most places the Mescal limestone and much of the Dripping Spring quartzite were removed during the period of erosion preceding the deposition of the Troy quartzite of Cambrian age. Another period of intense erosion following the Cambrian period removed the Troy quartzite in most parts of the district and cut still deeper into the rocks of the underlying Apache group.

The Martin limestone of Devonian age rests either on Dripping Spring quartzite or on small remnants of Troy quartzite. The Mississippian Escabrosa limestone and Pennsylvanian Naco limestone overlie the Martin limestone with no apparent disconformity, although beds of upper Mississippian age are absent throughout the district.

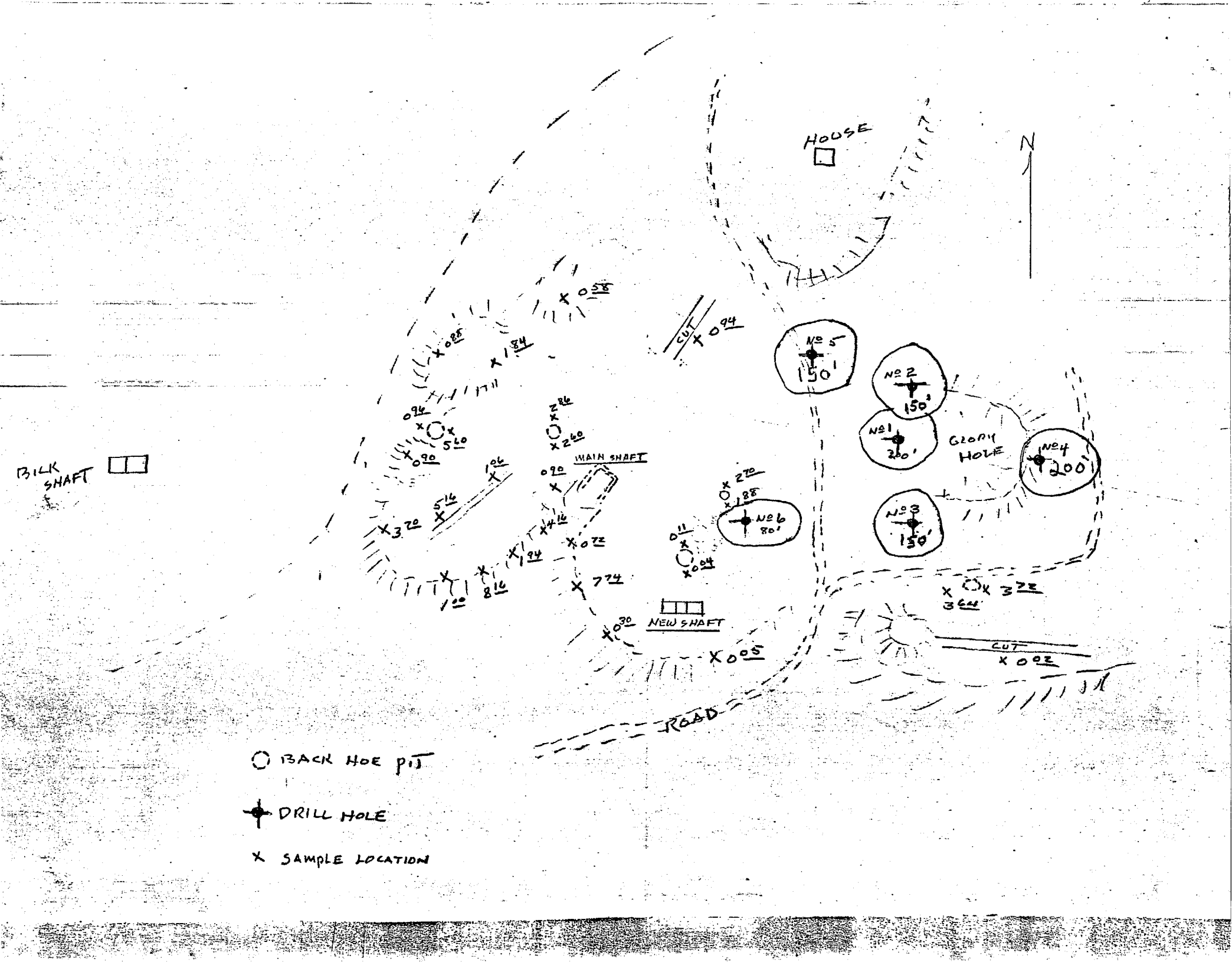
There is no record of sedimentation between the Pennsylvanian epoch and the deposition of the Tertiary (?) Whitetail conglomerate, but widespread igneous intrusions occurred during this interval. A thick flow of dacite younger than the Whitetail conglomerate covered the entire region. In later Tertiary and Quaternary time the Gila conglomerate was deposited as great coalescing alluvial fans and stream deposits filling valleys and spreading more thinly over much of the higher parts of the region.

All the rocks of the district are cut by a complex pattern of faults which Ransome[3] aptly described as "regional brecciation." The deformation of the rocks by faulting appears to have been continuous from pre-Cambrian time until after deposition of the Gila conglomerate when many of the largest displacements of the rocks occurred.

Diabase magma in great volumes was intruded into the earlier rocks probably during Mesozoic time. The diabase forced its way between beds of sedimentary rock as sills and occupied many of the faults. Great blocks of strata, particularly those of pre-Cambrian and Cambrian age, were pushed apart and in places completely enveloped in diabase.

Several other intrusions of igneous rocks, ranging from granodiorite to quartz monzonite, took place probably during late Mesozoic and early Tertiary time. The latest of these is the mass of Schultze granite, which underlies the southern part of the district, and numerous smaller bodies of granite porphyry which may be offshoots of the main Schultze granite mass. The mineralization of the district is most nearly contemporaneous with the Schultze granite and the granite porphyry and is probably genetically related to them.

[3]Ransome, F. L., Geology of the Globe copper district, Arizona: U. S. Geol. Survey Prof. Paper 12, p. 99, 1903.


HOUSE
N
BILK SHAFT
MAIN SHAFT
NEW SHAFT
CUT
CUT
ROAD
GLORY HOLE
No 5 150'
No 2 150'
No 1 200'
No 4 200'
No 3 150'
No 6 80'
BACK HOE PIT
DRILL HOLE
SAMPLE LOCATION

MAGMA COPPER COMPANY
Superior Division
ASSAY CERTIFICATE 'A'

SILVER KING - HOLE #1

DATE 3/22 1979

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
0951	0'-10'		0.00					
0952	10'-15'		0.00					
0953	15'-20'		0.00					
0954	20'-25'		2.57					
0955	25'-30'		0.09					
0956	30'-35'		0.22					
0957	35'-40'		7.89	193				
0958	40'-45'		0.43					
0959	45'-50'		0.00					
0960	50'-55'		2.36					
0961	55'-60'		0.09					
0962	60'-65'		0.03					
0963	65'-70'		0.03					
0964	70'-75'		0.00					
0965	75'-80'		0.00					
0966	80'-85'		0.00					
0967	85'-90'		0.00					
0968	90'-95'		TRACE					

S. M. Kalal
CHIEF CHEMIST

SC-1005

MAGMA COPPER COMPANY
Superior Division

ASSAY CERTIFICATE 'A'

- SILVER KING - HOLE #1

DATE 3/22 19 79

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
0969	95'-100'		TRACE					
0970	100'-105'		0.01					
0971	105'-110'		0.00					
0972	110'-115'		0.08					
0973	115'-120'		0.00					
0974	120'-125'		0.15					
0975	125'-130'		0.17					
0976	130'-135'		0.91					
0977	135'-140'		0.16					
0978	140'-145'		0.00					
0979	145'-150'		0.00					
0980	150'-155'		0.00					
0981	155'-160'		0.00					
0982	160'-165'		0.00					
0983	165'-170'		0.00					
0984	170'-175'		0.00					
0985	175'-180'		0.05					
0986	180'-185'		0.00					

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ASSAY CERTIFICATE 'A'

Silver King - Hole #1

DATE 3/22 19 79

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
0987	185'-190'		0.00					
0988	190'-195'		0.00					
0989	195'-200'		0.94					

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SILVER KING - HOLE #2

DATE 3/28 1979

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
	0'-10'		TRACE					
	10'-15'		0.09	↓				
	15'-20'		0.65		↓			
	20'-25'		1.62		15	2 28		
	25'-30'		0.48	5/2				
	30'-35'		4.73	1	1			
	35'-40'		0.50					
	40'-45'		1.44	1				
	45'-50'		0.53	1				
	50'-55'		TRACE					
	55'-60'		0.35					
	60'-65'		0.07					
	65'-70'		0.60					
	80'-85'		0.02					
	85'-90'		0.05					
	90'-95'		0.06					
	95'-100'		TRACE					
	100'-105'		TRACE					

125

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SILVER KING - HOLE # 2 DATE 3/28 1979

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
	105'-110'		0.02					
	110'-115'		0.02					
	115'-120'		0.02					
	120'-125'		0.01					
	125'-130'		TRACE					
	130'-135'		TRACE					
	135'-140'		0.01					
	140'-145'		TRACE					
	145'-150'		TRACE					

Sm. Kalaf
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- SILVER KING - HOLE #3

DATE 3/29 1979

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
	0'-10'		0.05					
	10'-15'		0.10					
	15'-20'		0.07					
	20'-25'		0.04					
	25'-30'		0.04					
	30'-35'		2.94					
	35'-40'		15.71					
	40'-45'		6.53	20				
	45'-50'		1.91					
	50'-55'		0.40					
	55'-60'		0.32					
	60'-65'		1.08					
	65'-70'		0.64					
	70'-75'		0.30					
	75'-80'		0.79					
	80'-85'		0.21					
	85'-90'		0.06					
	90'-95'		0.28					

S. M. Kalal

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Superior Division

ASSAY CERTIFICATE 'A'

Silver King - Hole #3

DATE 3/29 19 79

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
	95'-100'		0.23					
	100'-105'		0.20					
	105'-110'		0.44					
	110'-115'		0.33					
	115'-120'		0.86					
	120'-125'		0.30					
	125'-130'		0.11					
	130'-135'		0.23					
	135'-140'		0.64					
	140'-145'		0.32					
	145'-150'		0.05					

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SC-1005

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Superior Division

ASSAY CERTIFICATE 'A'

-SILVER KING - HOLE #4 DATE 4/4 19 79

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
	0'-10'		TRACE					
	10'-15'		0.02					
	15'-20'		0.00					
	20'-25'		0.00					
	25'-30'		0.02					
	30'-35'		0.00					
	35'-40'		0.00					
	40'-45'		TRACE					
	45'-50'		0.03					
	50'-55'		MISSING					
	55'-60'		0.05					
	60'-65'		0.02					
	65'-70'		0.00					
	70'-75'		0.00					
	75'-80'		TRACE					
	80'-85' ?		TRACE					
	80'-85' ?		0.00					
	85'-90'		0.00					

A. M. Kalal

ASSAY CERTIFICATE 'A'

SILVER KING - HOLE #4

DATE 4/5 19 79

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
	90'-95'		0.00					
	95'-100'		0.00					
	100'-105'		0.00					
	105'-110'		0.03					
	110'-115'		0.00					
	115'-120'		0.03					
	120'-125'		0.00					
	125'-130'		TRACE					
	130'-135'		0.00					
	135'-140'		0.00					
	140'-145'		TRACE					
	145'-150'		TRACE					
	150'-155'		0.00					
	155'-160'		0.00					
	160'-165'		0.00					
	165'-170'		TRACE					
	170'-175'		0.00					
	175'-180'		0.04					

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SILVER KING – HOLE #4 DATE 4/5 19 79

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
	180'–185'		TRACE					
	185'–190'		0.00					
	190'–195'		0.05					
	195'–200'		0.05					

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Superior Division

ASSAY CERTIFICATE 'A'

SILVER KING - HOLE #5

DATE 4/10 19 79

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
	0'-10'		0.79					
	10'-15'		1.33					
	15'-20'		0.30					
	20'-25'		0.24					
	25'-30'		0.10					
	30'-35'		0.10					
	35'-40'		0.08					
	40'-45'		0.10					
	45'-50'		0.05					
	50'-55'		0.14					
	55'-60'		0.09					
	60'-65'		0.10					
	65'-70'		0.06					
	70'-75'		0.08					
	75'-80'		0.11					
	80'-85'		0.09					
	85'-90'		0.07					
	90'-95'		0.07					

S. M. Kalaj

CHIEF CHEMIST

MAGMA COPPER COMPANY
Superior Division

ASSAY CERTIFICATE 'A'

-SILVER KING- HOLE #5-

DATE 4/10 1979

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
	95'-100'		0.05					
	100'-105'		0.05					
	105'-110'		0.05					
	110'-115'		0.02					
	115'-120'		0.03					
	120'-125'		0.02					
	125'-130'		0.06					
	130'-135'		0.04					
	135'-140'		0.04					
	140'-145'		0.05					
	145'-150'		0.06					

S. M. Kalal
CHIEF ASSAYER

Superior Division

ASSAY CERTIFICATE 'A'

SILVER KING - HOLE #6

DATE 4/9 19 79

NO.	LOCATION AND REMARKS	CU %	AG OZ.	AU OZ.				
	0'-15'-		0.19					
	15'-20'		0.16					
	20'-25'-		0.10					
	25'-30'		0.09					
	30'-35'-		0.03					
	35'-40'		0.05					
	40'-45'-		0.06					
	45'-50'		0.05					
	50'-55'-		0.02					
	55'-60'		0.05					
	60'-65'-		0.08					
	65'-70'		0.05					
	70'-75'-		0.04					
	75'-80'		0.05					