



CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

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With the continuation of the 100 level drift to the east to a point over Station 2-26 on the second level, a good tonnage should be developed.

On the 200 west drift, a new ore shoot appears at a point 650 feet from the main shaft, and is continuous for over 125 feet in length, but only one crosscut has been driven into same, and final sampling is not completed. Indicated samples show values from \$5.75 to \$19.36 per ton.

At a point 374 feet west from the main shaft on the 300 level, there is indication of the same shoot as mentioned above, and I recommend that work be performed to determine this ore body.

With the contemplated extension of a winze to the 700 level, in all probability the value of the estimated ore will be doubled.

CONCLUSION

In conclusion, I wish to state I have given figures on tonnages after careful measurements, mapping, and sampling, and they are intended to represent my best judgment.

Respectfully submitted,

(Signed) R. L. DIMMICK,
 Superintendent

I have also included in this report a longitudinal section drawn exactly to the confines of the ore limits and will set forth its figures in comparison to block measurements.*

Surface

to 100 level	19,845	Sq. Ft.
100 to 200 "	38,450	" "
200 to 300 "	38,100	" "
300 to 400 "	32,250	" "
400 to 450 "	5,100	" "

Total area of cross section	133,745	" "
Multiplied by	15.70	Area cross sec.
Equals	2,099,796.50	Cu. Ft.
Divided by 13	161,522.76	Gross tons
Multiplied by	\$13.64	Av. val. per ton
Equals	\$2,203,170.44	Gross val.

This method compares very closely with block estimates, and I believe the latter to be the gross value of mine in the proven ore body.

RECOMMENDATION

There exists what is termed Possible Ore in several sections of the mine, the first block occurring on the 300 level east, between Station 3-02 and 3-10, also the continuation of the proven ore shoot to the east of Station 4-18, on the 400 level, exposed by two cross-cuts, but unsampled. We have every reason to believe this shoot will be as long as on the levels above, which will add considerable ge to this ore body.

REPORT

on

KATHERINE MINE

August 5, 1921.

Mr. Charles Sutro, President,
Katherine Gold Mining Co.,
410 Montgomery Street,
San Francisco, California.

Dear Sir:—

The following report is made to cover the entire period of operations, development and tonnage estimate, with values, on the above named mine. Therefore, I will set forth in divisions my estimates after giving a brief description of the location of the property, equipment, geology, and my connection with the property.

LOCATION

The Katherine Mine is situated in the San Francisco Mining District, Mohave County, Arizona, in what is known as the Union Pass Section, which is thirty-nine miles west of Kingman, the County Seat, and about one and a half miles east of the Colorado River, at an elevation of 937 feet above sea level.

The property is reached over a fine auto road from Kingman, on the main line of the Santa Fe railroad, the nearest shipping point

being Union Station on the Chloride branch of the Santa Fe, 26 miles distant.

The nearness of the Colorado River will facilitate the furnishing of an ample water supply for both domestic and milling purposes.

PROPERTY

The Katherine Group embraces practically eight full claims and a fraction, which lie along the strike of the Katherine vein for a distance of 4700 feet. The claims are as follows:

1. Dorothy
2. Dorothy No. 1
3. Katherine
4. Katherine Extension (fraction)
5. Princess Katherine
6. Katherine Extension No. 2
7. Woodrow
8. Wilson
9. Howard

the position of which will appear from map * of claims hereto attached.

DEVELOPMENT

The exploration work has been carried on in the property in an active way for the last two years. Prior to that, it has lain idle since 1907. During the early periods, a shaft was sunk to the 400 level, with very little other work. But, in the last operations, levels were carried off at 100, 200, 300 and 400-foot points.

100 LEVEL DEVELOPMENT

On the 100 level a short cross cut was run from the shaft, exposing the vein, together

*Maps not included, as difficulty of reproducing and lack of space will not permit.

	Sq.Ft.	Ht. in Feet	Gross Tons	Value
Block A & B	1960	135	20,353	\$326,869.18
Block C	684	135	7,103	87,579.99
Block D	1144	135	11,110	183,870.50
100 LEVEL				
Block A	965	on 50 feet below and above level.	7,423	107,209.17
Block A-1	1386	100	10,661	351,813.00
Block A-2	3450	100	26,539	234,870.15
Block B	957	100	7,361	79,646.02
Block B-1	423	100	3,253	23,724.49
Block B-2	279	100	2,146	18,710.42
Block C & D	1176	100	9,046	194,036.70
200 LEVEL				
Block A	1358	on 50 feet below and above level.	100	93,387.24
Block B	650	100	5,000	41,500.00
Block C	750	100	6,000	68,400.00
Block D	1295	100	9,961	114,750.72
Block E	938	100	7,215	112,399.70
300 LEVEL				
Block A	1400	on 50 feet below and above level.	100	124,705.02
Total tonnage by blocks				
			10,769	154,386
				\$2,163,472.30
400 LEVEL				

recognized it at this time as belonging to the main ore shoot.

At a point 50 feet above this level in the main shaft there appears a strong fault with a dip to the east of 6° , and from Station 4-06 to 4-16, the ore shoot is above this fault, but it appears in the level at Station 4-17. The raise from the 400 to the 300 level remains in ore from 20 feet above the 400 level to the 300 level. There was a throw of 55 feet south under this fault and the ore shoot appears in the level between Station 4-16 and 4-18. Although I have taken only a small block into consideration here, owing to the sampling not being finished, the ore body shows in two crosscuts beyond Station 4-18, not appearing on this map. *

Block A 7 Samples 1400 Sq. ft. 20x70 Av. Val. \$11.58. I have extended this block 50 feet below the level on the longitudinal section accompanying this report. See assay plan, 30 scale, of 400 level. *

TONNAGE

Thus the averaged and sampled block of ground I have grouped in two divisions, called North and South ore bodies, and I have made up and enclose with this report five cross section maps, marked 0 plus 00 to 4 plus 75, respectively, which explain conditions better than I can do in words. *

In figuring the tonnage on the separate blocks, I will first give the tonnage by the divisions of levels, using the square foot areas by their heights, assuming 85 feet above the 00 level and 50 below.

with 488 feet of drifting and 331 feet of cross cutting at 50 foot intervals, exposing the vein and its width, making the total lateral development on this level, to the east, 819 feet.

200 LEVEL DEVELOPMENT

On the 200 level a short cross cut from the shaft exposes the vein. To the east, 999 feet of drifting, together with 1017 feet of cross cutting, has been driven. To the west, on this level, 790 feet of drifting and 483 feet of cross cutting has been done. Total development on this level, 3289 feet.

300 LEVEL DEVELOPMENT

At the 300 foot level the cross cut from shaft to vein is somewhat further, and the drifting east totals 621 feet, with 483 feet of cross cuts. To the west, on this level, drifting 374 feet, cross cuts 47 feet. Total development on this level, 1525 feet.

400 LEVEL DEVELOPMENT

On the 400 level, from shaft to vein, 140 feet, drifting east a footage of 931 feet, and cross cutting 701 feet. Total, on this level, 1632 feet.

One air raise has been driven between each level to the surface, within the vein, with a total footage of 420 feet.

This gives an approximate total footage developed in the mine of 7839 feet.

See map showing plan of levels, marked "EXHIBIT 2." *

EQUIPMENT

The property is furnished with everything necessary for operations at the present depth, but additional machinery will be necessary

for greater depth. Hoist, compressor, and pumping unit, which total 100 H.P., operated by gas engines.

GEOLOGY

On this subject so much has been written in the last few years by Oscar H. Hershey and other engineers, covering in detail the structure on this property, that nothing can be added by me.

Briefly stated, the geology in general is simple. The surrounding country is composed of porphyritic granite, and the vein occurs in its midst. Near the mine the granite is entirely covered by debris except for a small outcropping near the shaft.

The porphyritic granite is a fairly uniform body, extending under the debris in every direction. It is found to extend deep, and, as far as mining goes, the mine has no problems based on change of wall rock.

The vein strikes nearneast and southwest, and consists of a zone 20 to 60 feet wide, in which the granite porphyry has been extensively fractured and altered and partly replaced by quartz and calcite.

The lode was formed in three stages. The first stage was formed of seams and layers of quartz of a white and glassy variety. The intervening rock was silicified. In this stage there appear very little values.

In the second stage, seams and large lenses of crystallized calcite were deposited in the vein.

In the third stage, most of the calcite was replaced by quartz having a pale greenish tint, and in part retains the internal structure of the calcite. The greenish quartz is at

Block B is exposed by crosscuts 3-10 and 3-12; Block C is exposed by crosscuts 3-12 and 3-14; Block D is exposed by crosscuts 3-14 and 3-15; Block E is exposed by crosscuts 3-15 and 3-17.

Block A	9 Samples	1358
Sq. ft.	5.41x251	Av. Val. \$ 8.94
Block B	5 Samples	650
Sq. ft.	13. x 50	Av. Val. 8.30
Block C	6 Samples	750
Sq. ft.	15. x 50	Av. Val. 11.40
Block D	11 Samples	1295
Sq. ft.	23.9x50	Av. Val. 11.52
Block E	5 Samples	938
Sq. ft.	21.8 x 43	Av. Val. 15.58

Block E contains one very high sample, and in striking the average, I dropped this figure and accepted the normal average indicated by the next section, which is \$26.70. Although this block has been sampled many times and shows high value, in milling operations the moderate value of the block is more consistently taken. This method is maintained on all levels where values like this appear.

Taking the general average of this level, we have \$11.14 over a length of 444 feet, with an average width of 15.82 feet, containing an area of 4991 square feet.

400 FOOT LEVEL

On this level, owing to a decided rake of ore shoot caused by faulting, a greater footage of drifting was required to reach the main ore shoot. Although all of the vein showing between crosscuts 4-06 and 4-16 contains some commercial ore, I have not

Block B-1	5 Samples	423	
Sq. ft.	5.1x83	Avg. Val.	7.33
Block B-2	2 Samples	279	
Sq. ft.	4.3x65	Avg. Val.	8.77
Block C & D	8 Samples	1176	
Sq. ft.	4.9x240	Avg. Val.	21.45

On this level, the two portions of the vein mineable are the same as on the 100 level, to-wit, a foot wall, or north vein, composed of Blocks A-1 and B-1; and a south or hanging wall streak, composed of Blocks A, A-2, B, C, and D; and the intermediate Block B-2.

The foot wall area contains 1388 sq. ft., is five feet wide, and has an average value of \$11.56. The hanging side or south streak contains 7048 sq. ft., has an average width of 10.53 feet, and an average value of \$16.59.

300 FOOT LEVEL

On this level the vein is exposed by a drift 931 feet long, and a number of crosscuts. The commercial ore is divided into a number of Blocks marked, A, B, C, D and E, bounded by the Sections 0 plus 00 to 4 plus 75.

In the Block A, it is my belief considerably more ore than shown will be mined when another raise is put through near Station 3-04. This is caused by a fault that is just above the back of drift and above this we find the same body of ore exposed on the level above. See plan 30 scale assay map. * 300 level.

Block A is exposed at Station 3-02 to 3-10 by crosscuts as well as drift at station 3-03 and 3-08.

times traversed by narrow wavy bands of ribbon quartz, of layers of greenish yellow waxy and white quartz. This character of quartz, together with waxy ribbon seams, and remnants of the coarse, crystallized calcite, stained dark by black manganese oxide, makes the ore. The gold is very fine and distributed through the quartz. The vein is free from other minerals, only a sprinkling of pyrite being seen in some of the fracture planes of the country rock. Sulphides are entirely absent from the ore.

I have been in direct charge of operations at the mine for the past two years, therefore am very familiar with conditions underground, and have made a study of the faulting as well as vein structure and ore reserves and will now set forth my estimates.

SAMPLING

The mine has been thoroughly sampled during the progress of development. Large cuts were made by a chipping hammer, the trenches being eight inches wide by four inches deep, making a sample of about 250 pounds for each five-foot section. Crosscuts were sampled in this manner on opposite sides and each section kept separate. All assays were run by Abbot Hanks of San Francisco, California.

Mr. Frank Littlefield, of Alameda, California, performed the sampling, and I must say that a more complete job would be impossible, therefore he must be commended.

ORE TONNAGE AND VALUES

In making this estimate, I have taken into consideration several problems the mine sets

forth which are characteristic of the other mines of this district, particularly, the erratic distribution of values. I have tried to eliminate the risk of milling loss by placing a minimum value covering the cost of such operations.

100 FOOT LEVEL

On the 100 level, the vein is disclosed in a drift for a distance of 487 feet. There have been six crosscuts exposing its width. A 30 scale assay plan of this level is attached. *

I have divided the area sampled into a number of vertical sections, which I have marked upon the assay plan of this level as 0 plus 00, 1 plus 00, 2 plus 00, 3 plus 00, together with the plan assay map showing in colors the ore bands of \$5.00 assays and higher, and divided in areas marked A-B, C, and D.

A-B: A and B are exposed by the drift and extend beyond both crosscuts 1-07 and 1-10, or from vertical section 1 plus 00 to 3 plus 00, a distance of 200 feet, and contain 27 samples, whose average value is \$16.06 for a width of 9.8 feet.

C: C is exposed by Section 0 plus 00 at crosscut 1-03, and in crosscut 1-05 and Section 1 plus 00, having a length of 120 feet, and contains five samples, whose average value is \$12.33 for a width of 5.7 feet.

D: D is exposed 25 feet east of Section 0 plus 00, and is cut by crosscuts 1-04 and 1-05, 1-07 and 1-09; extends 25 feet east of Section 2 plus 00; has a length of 220 feet; and contains four samples, whose ave-

rage value is \$16.55 for a width of 5.2 feet.

Block A & B	27 Samples	1960
Sq. ft.	9.8x200	Av. Val. \$16.06
Block C	5 Samples	684
Sq. ft.	5.7x120	Av. Val. 12.33
Block D	4 Samples	1144
Sq. ft.	5.2x220	Av. Val. 16.55

The hanging wall ore body thus sampled and averaged totalled 2644 sq. ft., is 320 ft. long, 8.6 feet wide, of an average value of \$14.19. The foot wall ore body gives a length of 220 feet, width 5.2 feet; contains 1144 sq. ft., and an average value of \$16.55.

200 FOOT LEVEL

This level has been divided into similar blocks as listed below. The ore zones shown are only those covered by the Littlefield sampling at this time, but there exists considerable tonnage on this level not represented, owing to lack of crosscuts and sampling, which will be treated as "possible ore." See map of 200 level, "EXHIBIT 4." *

Block A is exposed by the crosscuts 2-19 and 2-22, and covers the area from Section 1 plus 00 to 50 feet, east of Section 2 plus 00.

Block A	12 Samples	965
Sq. ft.	5x193	Av. Val. \$1579
Block A-1	6 Samples	1386
Sq. ft.	9x154	Av. Val. 33.06
Block A-2	2 Samples	3450
Sq. ft.	23x150	Av. Val. 8.85
Block B	8 Samples	957
Sq. ft.	15 E. End 7 W.	10.82
end 87	Av. Val.	