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ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: UNION

ALTERNATE NAMES:

OLD 94

LIBERTY UNION

PATENTED CLAIMS MS 1612

YAVAPAI COUNTY MILS NUMBER: 813A

LOCATION: TOWNSHIP 10 N RANGE 1 W SECTION 15 QUARTER N2
LATITUDE: N 34DEG 12MIN 54SEC LONGITUDE: W 112DEG 20MIN 52SEC
TOPO MAP NAME: CROWN KING - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:

GOLD

SILVER

COPPER

LEAD

ZINC

IRON

ARSENIC

BISMUTH

BIBLIOGRAPHY:

USGS CROWN KING QUAD

BLM MINING DISTRICT SHEET 210

ADMMR UNION MINE FILE

10/01/92

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May 1, 1957

M. Gemmill reported:

Union Mine

Inactive

Owned by Glen Van Tilborg X
Crown King, Ariz.

Union Mine Crown Crng

Sample of 2 tons down 50 ft
in wing gory south

^{7.60} Au 0.23 ^(21.11) Ag 31.37

^(119.22) Chalcopyrite Ag 28.6 ^(2.06) Au 0.28

Ruby (Glenca) 2.9507 Ag Au Trace

Dark Quartz in wing Au 0.08 Ag 75.207

Sample from drift 50 ft down wing

^{7.70} Au 0.24 ^{8.25} Ag 12.36 ^{4.70%} Au 3.01% = 20.68

Lead quartz Au 0.08 Ag 9.12

Iron sulphide ^(16.24) Au 0.32 ^(11.70) Ag 17.48

Union mine, or Old 94

CARLSON, Vic
Crown King, Arizona

10-30-42

See ORO BELLE MINE
Re - field engineer's report

UNION MINE

Cu, Zn, Pb, Au, Ag

Yavapai

13 - 7

T 10 N, R 1 W

Louis Schrade, Crown King

'42

6/42

JOURNAL

R E P O R T

on

SARATOGA GROUP OF MINING CLAIMS

and

CROWN KING DUMP

by

ALBERT S. KONSELMAN

MINING ENGINEER

1931

I N D E X

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INTRODUCTION

This report is written May 1, 1931, for the Arizona Engineering and Reduction Company, Ltd., after an examination by the writer. His work consisted of examining the surface of the Saratoga Group and the Crown King and Union Mines; making a survey and computing the tonnage of the Crown King Dump, investigating methods by which its value was estimated; estimating cost of and determining type of plant to profitably treat this dump and studying all available data pertaining thereto. As a result of this work the following conclusions are reached:

CONCLUSIONS

1. The Saratoga Group of claims warrant development and should provide a source of future ore supply.
2. The Crown King Dump contains approximately 150,000 tons of ore having an average value in excess of \$4.25 per ton in gold and silver with additional small values in copper, lead, and zinc.
3. Twenty thousand dollars spent in re-arranging and making additions to the plant now on the property should treat this ore at a profit of \$1.54 per ton and earn \$5,400 per month.
4. Considering the comparatively small investment required, the margin of profit in treatment of the dump, and the possibilities of sustained operation from mine development, there appears to be no reason why the proposition should not be highly profitable and your entering into it is therefore recommended.

Description of conditions and facts on which these conclusions are based, and outline of work to be done for successful operation follows:

PROPERTY: (Exhibit A)

The Saratoga Group consists of four patented and three full and one fractional unpatented mining claims. These are:

King Solomon	{ Unpatented }	Recorded in Book	128 of Mines
King Richard	{ " }	" " "	128 " "
Fraction	{ " }	" " "	155 " "
Eagle	{ U. S. Patent No. }	Recorded in Book	L11 & 15 of Mines
Annexed	{ U. S. " " }	" " "	50 " "
Buskeys	{ U. S. " " }	" " "	03 & 15 " "
Union	{ U. S. " " }	" " "	L11 & 15 " "

All of record in the Court House at Prescott, Yavapai County, Arizona.

TITLE

Has been investigated by the Guarantee Title and Trust Company of Prescott, Arizona (Exhibit "J").

LOCATION

The Saratoga Group is located in the Pine Grove Mining District, one mile north of Crown King, in Yavapai County, Arizona.

FACILITIES

Crown King, one mile from the property, is the nearest settlement and offers a store, telephone, hotel, and post office. Middleton, twelve miles distant, is the terminus of the railroad and Prescott, the county seat, 65 miles distant, by the Black Canyon Road and 40 miles by the mountain road, is the nearest large town. The Santa Fe Railroad and its branches serve the district. Electric power is at the property; roads are good. Timber and water are on the ground.

THE PINE GROVE DISTRICT: (Exhibit B)

One of the old mining districts of the State. Located in the heart of the Bradshaw Mountains at an elevation of from 6,000 to 7,000 feet, it is a well timbered, well watered area. The summers are cool and winters are not severe enough to seriously hinder operations.

Its geology is described in U. S. Geological Survey Bulletin 782, as a mass of grano-diorite three to four miles in diameter intruded into the Bradshaw granite and earlier Yavapai Schist. These formations are cut by a series of light colored rhyolite dykes with which the veins are thought to have a genetic relation. The general trend of the veins and dykes is northerly and the dip is about sixty degrees to the west. The veins are about five feet in width. The ore shoots contain pyrite, chalcopyrite, galena, sphalerite with some tetrahedrite with a quartz gangue. They pitch to the north. The district was most intensively worked when gold and silver were the sought-after metals and recovery by amalgamation followed by rather inefficient methods of concentration were in use. Mines flourished as long as the rich surface and partly-oxidized deeper deposits held out, but when the lower-grade sulphides were encountered at greater depths, costs overtook gross

recoveries, the mines shut down and activity practically ceased. With modern methods of recovery, better roads, smelting facilities, and electric power, it is altogether reasonable to predict that these old producers will sometime be re-opened and yield more than they did in their bonanza ore days.

Estimated productions of the district has been placed at \$3,000,000.00.

Of this amount, approximately \$1,500,00.00 was produced by the Crown King Mine.

The Crown King Vein System enters Saratoga ground. The Crown King's low-grade ore was piled on Saratoga ground. Therefore a history of this mine is necessary in a report on the Saratoga.

THE CROWN KING MINE!!! (Exhibit C)

This group consists of eight patented claims adjoining the Saratoga on the north. It was originally owned by Messars Harrington, Place, and Moody, who operated the mine from 1888 to 1899 when disagreement among the partners brought on litigation and resulted in the mine's shutting down. In 1905 it was purchased by F. M. Murphy and in 1930 his estate optioned the property to the Ord Copper Co., Ltd. The mine has not been unwatered since 1899.

Production came from a vein closely following a rhyolite dyke in schist striking northerly and dipping west. Three ore shoots were found, all pitching north at about thirty degrees. The most southerly enters from the Saratoga ground. The middle shoot was best developed. Little work was done on the north shoot below the tunnel level. The stopping length of the middle shoot was nearly one thousand feet. It was about one foot wide. Ore above the 500 level averaged \$30.00 gold and \$10.00 silver with copper, zinc, and lead sulphides. Below the three hundred values were irregular. It is claimed that they were in free gold which would account for erratic values. On the five hundred level a rich pocket was found and it is notable that the best dividends were paid in 1898, the year before the mine shut down.

In a report written by J. N. McLeod, M. E. in 1918, the following production figures are given as having been taken from the books of the company:

Year:	Tons Ore:	Bullion:	Concentrates:	Recovery Per Ton:	Dividends:
1895	6,530.05	\$ 77,900.50	\$ 89,668.08	\$22.60	\$19,809.00
1896	7,085.77	85,518.52	104,805.70	28.80	49,500.00
1897	6,445.55	83,280.72	85,046.53	25.80	54,530.00

1898	8,978.55	\$139,915.12	\$147,554.89	\$32.00	\$119,800.00
1899	2,263.58	54,804.28	20,570.06	33.25	11,980.00
Total:	31,305.48	\$441,218.94	\$425,425.14	\$27.65	\$255,619.00

In 1916 the Randolph - Gemil Development Company leased the tailings of the Crown King Mill and successfully treated them by the floatation process.

Their sample of the tailings ran:

Oz., Gold:	Oz., Silver:	Zinc:	Copper:	Iron:	Insoluble:
.50	4.52	10%	.80%	5%	53%

Disregarding the base metal values because they probably entered but little into the returns to the old operators, and taking into consideration the fluctuating price of silver, it may be safely assumed that the average grade of the ore delivered to the mill was \$35.00 per ton during these years.

An analysis of the above figures shows that costs (gross return less dividends) were over \$20.00 per ton; and nothing less than \$28.00 ore was profitable.

The mine was developed over a distance of 2,500 feet laterally and to a depth of 650 feet below the shaft collar. There is approximately 15,000 feet of work done on the vein and 950 feet of cross-cutting shown on the section.

The above facts have certain bearing on the Saratoga Group and the dump which will be developed as they are described.

THE SARATOGA GROUP::: (Exhibits A and C)

The Buckeye, Eagle, and Union Claims comprise an area 5,886 feet long and 600 feet wide. Adjoining on the north is the Crown King Mine and adjoining on the south is the Union Mine. The Crown King has produced one and a half million dollars from its vein which unquestionably extends into the Buckeye Claim. No records are available as to the production of the Union Mine, but mining was done close to the south end line of the Saratoga property and stopes coming to the surface for several hundred feet south show that much ore had been extracted. The vein of the Union Mine can also be definitely traced into Saratoga ground. The vein is softer than the walls. Therefore, bold outcrops are lacking and one cannot follow a continuous vein from the Union Mine through the Saratoga to the Crown King on the surface. But a survey shows that the workings on the Saratoga line up so perfectly with where the extension of the Crown King and Union veins should be that there is no doubt but what the three properties are on the same vein system, if not the same vein.

G E O L O G Y

The country rock on the Union Mine, the Union Claim, the Eagle Claim, and Buckeye Claim, up to a point between the No. 2 and the Line Shaft, is granite. At this point the granite contacts the schist which extends north into Crown King ground. Both schist and granite are cut by a narrow rhyolite dyke which is clearly seen at the portals of both the Union Mine Tunnel, which was driven south, and the Crown King Tunnel, which was driven north, and can be seen at intervals throughout the length of the Saratoga property. This is one of several parallel dykes crossing the property.

D E V E L O P M E N T

This consists entirely of shafts along the strike of the vein. All were inaccessible due to water or caved conditions and for information as to what was and is in them, certain exhibits are presented.

Shaft No. 1 (The Line Shaft), so-called because it was sunk on the line between the Crown King and Saratoga properties. It is stated that this shaft was started at the point in 1890 - 91 to be used for both properties. Disagreement stopped the work and in 1904 O. F. Place, who controlled the Saratoga, through the Moody & Place Mining & Milling Company, moved the shaft into his ground by cutting out the south side and filling in the north side. O. A. Tyler, of Crown King, Arizona, states that rich ore was found in this shaft (Exhibit D). The Crown King Mine section shows an ore shoot at that point. R. S. Patterson, now postmaster at Crown King, states he sunk this shaft to the 60 level and found 4 feet of \$14.00 gold ore (Exhibit E). The collar of the shaft is in good condition and water stands close to the surface. It would be the logical place for a joint shaft, but inasmuch as all ore shoots pitch north it would not be good business to do any work at that point unless additional ground were secured from the Crown King Group.

The No. 2 Shaft is 600 feet south of No. 1. This shaft dips slightly to the west. It appeared to be in good condition, though full of water. It is equipped with pump-jack and 5 h. p. motor. It is about 180 feet deep with a 20-foot drift running north on the 50-foot level; 15-foot drifts running north and south on the 100-foot level, and on the 165-foot level, a drift runs 50 feet south

and 400 feet north.

A report by S. W. Osgood, made prior to June, 1902, states: "No. 2 shaft was 140 feet deep at the time of my examination, and has a drift at a depth of fifty feet that was run north about 20 feet, showing in the face about thirty inches of ore that had the same characteristics as the same class of ore in the Crowned King Mines, some 800 feet north . . . After my examination they sunk the shaft to a depth of 165 feet . . ."

(EXHIBIT F)

Mr. E. M. Foltz corroborated this statement.

There was a small amount of ore on the dump but the entire dump was granite. I saw nothing that looked like a vein on the surface, thought there is a rhyolite dyke to the north where ore might be found.

Having the pumping equipment there, it will be an easy matter to dewater this shaft and check these statements, and if substantiated, it is a good place to develop from.

No. 5 Shaft is 300 feet south of No. 2. This shaft is 80 feet deep and connects with a crosscut tunnel out of which a 5-gallon-per-minute stream flows. The tunnel is caved and the shaft without timber. Sulphide ore lay on the dump and a good looking vein from one to two feet wide shows down the ends of the shaft.

On the Eagle Claim are several shallow holes. A sample taken from cropping a foot wide, ran .27 oz., Gold and .70 oz., Silver.

The ore shoot found in the Union Mine following the characteristics of other shoots, would pitch north into Saratoga ground at this point.

SUMMARY

The Saratoga Group, lying between the Crown King Mine and Union Mine, and covering the same vein system, should yield valuable ore deposits. It is along the dykes which cut both granite and schist that the ore-bearing solutions circulated. Gemmill observes, in his report on the district, that the veins cross the dykes following either the hanging or foot-walls. Therefore, these veins are later than the dykes and the nature of the walls has no bearing on ore deposition. For this reason there is as good a chance of finding ore in the Saratoga granite

as in the Crown King schist. This is confirmed by the ore shoot found on the Union Mine.

It therefore follows that the chance of finding ore in the Saratoga ground is favorable. The Saratoga Shaft is the best place to develop because of the work already done, its nearness to the Crown King line and the fact that an ore find is already reported.

THE CROWN KING DUMP: (Exhibit G)

The Crown King Mine was originally developed through a tunnel. The portal of this tunnel is in a narrow gulch. The north endline of the Buckeye Claim of the Saratoga Group crosses this gulch about 100 feet south of the portal of the tunnel. At the time the Crown King was opened up, Mr. O. F. Place was one-third owner and superintendent, and also interested in the Saratoga. Friendly relations existed between the owners of the properties and material not rich enough to go to the Crown King Mill was dumped on Saratoga ground. Just what the deadline between ore and waste was, over the whole operation of the Crown King Mine, cannot be accurately determined, but it has been established that losses were \$8.00 per ton and during the last third of its life, costs were in excess of \$20.00 per ton.

It was also noted that at least 15,000 feet of development work was done on the vein. This would account for only 38% of the volume of the dump.

It is generally known that the ore shoot was narrow. Therefore, the large tonnage on the dump must have come not only from development, but also from the stopes, since miners need more room to work in than a one-foot ore shoot provides.

Because of high costs, a very selective system of mining had to be used. Low grade ore and residue after sorting out high grade had to be got rid of. What the stopes could not accommodate as fill had to go over the dump. In this manner a large tonnage accumulated.

That this dump contained valuable ore has long been known. Attempts have been made to hand sort and in 1915, Mr. Frank Alters worked a five-stamp mill for a short time. In 1916, Mr. J. L. Deming made an effort to mill the ore. These operations paid in a small way, but the tonnage handled was so small and the mills so inefficient that no real profit could possibly have been effected.

In 1928, Mr. Frederick F. Kip, E. M., of San Diego, California, organized the Crown Milling and Reduction Company. This being financed by Mr. A. S. Bridges, of San Diego, who owned 75% of the stock, and a plant to handle 150 tons per day was erected. This plant depended on Wilfley Tables for concentration -- a method which was even then obsolete. It operated two months during which time Mr. Bridges passed on and his estate refused to finance the necessary additions needed to make the plant efficient.

Since that time nothing has been done. A watchman was placed in charge and the machinery and motors kept in good condition. The Crown King Milling and Reduction Company ceased functioning and the property reverted to the present owner. He has optioned the property to Mr. Thomas T. Priestley, who in turn, has assigned his contract to the Arizona Engineering and Extraction Co., Ltd., an Arizona Corporation.

L O C A T I O N

The dump is located along the north endline of the Buckeye and Annexed Claims. A branch road, one mile in length, connects it with the main highway, putting it 13 miles by road from the railroad at Middleton.

T O N N A G E : : (Exhibit H)

There is approximately 150,000 tons of material on this dump. This figure was arrived at by making a contour map of the dump (Exhibit H), computing the volume and allowing 18 cubic feet per ton. Screen tests indicate:

45%	of the material will pass through	$\frac{1}{2}$ inch screen
7%	" " " " " "	" $\frac{5}{4}$ " "
58%	" " " " " "	is between $\frac{3}{4}$ and 3 inches
10%	" " " " " "	" greater than 3 inch

Having lain over thirty years, the dump is well consolidated and the weight factor used is considered liberal.

G R A D E

The average grade should prove in excess of \$4.25 in gold and silver only. There is much evidence to substantiate this estimate:

1. In 1918 the Arizona Mines and Reduction Works, which operated a mill and sampling plant at Wickenburg, Arizona, sampled the dump and sent 64,000 pounds of samples to be run through their plant. According to a report by Mr. J. N. McLeod, E. M., the following results were obtained:

422 Coarse (run lump)	.12	1.10	.10	.10	1.87
422 Fines " " "	.18	.60	.10	.00	1.14
423 Old Dump "	.28	.80	.20	.25	1.40
423 Fines "	.28	1.50	.15	.20	1.52
424 Coarse (oxides) "	.16	.60	.15	.00	1.04
424 Fines " "	.20	.60	.18	.00	.92
425 Coarse top of dump	.12	.70	.10	.00	.94
425 Fines " " "	.20	.60	.10	.00	1.56
Large rocks on dump (ore)	1.52	8.90	1.50	.10	18.10
Composite Assay	.18	.90			

2. A check sample taken by the writer assayed:

Oz., Gold:	Oz., Silver:	% Copper:	% Lead:	% Zinc:
.16	.75	.12	.10	.95

This sample was taken from a gash cut in the dump through its center. It was made up of small shovelfuls and aggregated 600 pounds. It was not meant to be representative of the entire dump but the small difference between it and other samples signifies that the values are well distributed.

3. In 1928 Mr. Kip, with a crew of men, spent four weeks on the dump, digging pits and trenches. The distribution of his values are shown on map (exhibit H). He states that by giving proper weight to the various results he obtained as an average of the entire dump:

Oz., Gold:	Oz., Silver:	% Zinc: (1927 prices -- 8¢ per lb.)
.22	.90	\$5.80

The arithmetical average of his 29 values is \$5.70 and if we discard the seven abnormally high values (namely from \$7.10 to \$13.50) the average is \$4.78.

4. Mr. Kip also states that a report was shown him in the office of Seely Mudd, E. M., of Los Angeles, in which another engineer had reported:

Oz., Gold:	Oz., Silver:	Value: (Ag. @ 50¢)
.22	1.0	\$4.70

5. The small mill operating in 1916 recovered:

Oz., Gold:	Oz., Silver:	Value: (Ag. @ 50¢)
.21	.56	\$4.52

This was over an operation of between 700 and 1,000 tons, according to Mr. Kip's report.

ing and Reduction Company. This was from October, 19th, to October 27, 1928. Mr. Ed. Tomlinson, of Venezia, Arizona, was assayer during this period and below are results copied from his daily mill sheets which the writer has in his possession, and which he discussed with Mr. Tomlinson:

<u>Date:</u>	<u>Tons:</u>	<u>Oz. Gold:</u>	<u>Oz. Silver: (50¢)</u>
October, 1928			
19	27	.16	.54
	27	.20	.50
20	50	.12	.48
21	50	.22	.46
	40	.24	.68
22	40	.18	.42
	40	.12	.62
23	40	.20	.52
	12	.12	1.28
24	61	.12	.58
25	40	.16	1.04
	40	.32	.70
26	40	.24	.60
	30	.24	.52
27	46	.40	1.20
Total:	585	.205	.645 \$4.42

All this ore came from the center of the dump and it is interesting to note that the arithmetical average of the samples closest to this out check this figure exactly -- \$4.45.

To sum up these data:

<u>Sampler:</u>	<u>Oz. Gold:</u>	<u>Oz. Silver:</u>
Arizona Mines and Reduction Company	.16	.90
A. S. Konselman (600-lb. Check Sample)	.16	.75
Mr. F. F. Kip	.22	.90
"Other Engineer"	.22	1.00
1916 operation	.16	.86
C. K. Milling and Reduction Company	.20	.64
Arithmetical average: - - - - -	.19	.76
Value: (Gold \$20.00 -- Silver \$.50 per ounce) - - - - -		\$4.05

In the above figures, only the gold and silver values are considered and when proper weight is given the various results and the base metal values are added, the writer feels entirely justified in placing the value in excess of \$4.25 per ton.

METHOD OF TREATMENT

The present equipment consists of dragline scraper to deliver the ore to the dump bin, from which it is conveyed by belt to the mill bin. This is efficient. The ore may then be crushed and ground, and treated by the floatation process which concentrates the values, making a product readily saleable to custom smelters. An alternative to selling the ore is to extract the gold and silver from the concentrates by the cyanide process. It is recommended that this be considered as it will effect a saving of comparatively heavy selling costs. Tests on floatation have been run by the Southwest Engineering Company and the Denver Engineering Company and its successful, practical application demonstrated by the Randolph - Gemmill Development Company in its treatment of the Crown King Tailings.

WATER

Water may be obtained from gulches and shafts on the property, but the main and sure supply may be purchased from the Philadelphia Mining Company. The Crown King Milling and Reduction Company installed a pump and tanks at the portal of the Philadelphia Tunnel. The equipment consists of:

- 1 -- 6 x 6 Aldrich Triplex Pump
- 1 -- 15 h. p. motor

FLOW SHEET::: (Exhibit I)

Exhibit I give flow sheet of mill which will treat the dump by the floatation process. It will make one product -- a sulphide concentrate containing gold and silver. Should an excess of zinc appear, it may be modified to remove the zinc mineral as a separate product.

PLANT COSTS

In order to bring the existing plant up to this plan, the following equipment is needed:

<u>EQUIPMENT:</u>	<u>COST:</u>	<u>WEIGHT:</u>
Dump bin feeder	\$ 500.00	1,400
Magnetic pulley	455.00	800
Mill bin feeder	500.00	1,400
Conditioner tank	585.00	3,600
Reduction crusher	3,500.00	10,500
Fines bin feeder	500.00	1,400
Floatation cells	2,100.00	13,800
Filter	2,441.00	5,595
Thickener	<u>1,970.00</u>	<u>14,000</u>
	\$12,550.00	52,495
Handling charges @ \$1.00 per ton mile	\$ 325.00	
Freight charges @ \$3.00 /c	1,500.00	
Installation @ 5¢ /#	2,625.00	
Tools, hardware, etc.,	<u>3,000.00</u>	
	\$20,000.00	

C O S T O F O P E R A T I O N

These costs are based on a mill of 150 tons capacity, operating 90% of the time, making a 90% extraction with a concentration ratio of thirty-to-one:

Power

Estimates are based on a preliminary contract submitted by the Arizona Power Company based upon requirements.

Freight Rates

Were submitted by the Atchison Topeka and Santa Fe Railroad.

Smelting Costs

Were based on schedule submitted by the Magma Copper Company which buys ores and concentrates for its smelter at Superior, Arizona. A schedule submitted by the American Smelting and Refining Company ^{is} slightly more favorable. Freight rates to either smelter are identical.

Milling

Superintendent	\$10.00 per day	
3 Oper	@ \$5.50	16.50
3 Helpers	@ \$4.75	14.25
Assayer	@ \$175.00 per month	5.84
Mechanic -- Electrician		7.00
Dump men	@ \$4.00	12.00
Engineer on drag		5.50
Water		1.00
Power		31.14
Cook House losses		7.00
Supplies		<u>30.00</u>
Total		\$140.25
Cost per ton -- 90% capacity		\$1.04

Selling Cost

Total values	\$ 4.25 per ton.	
90% Extraction	3.85 " "	
Concentrates @ 30 : 1	114.75 " "	
Less freight	\$8.80	
7% Less " on moisture	.62	
Less Smelting Charges	5.74	
Losses (3.8%)	<u>4.25</u>	(Smelting Deductions)
Net	\$ 95.34	
Royalty @ 12 1/2%	\$ 11.92	

Summary of Selling Costs

Hauling to railroad	\$ 2.50	
Hauling moisture	.18	
Freight to smelter	8.80	
Freight on moisture (7%)	.62	
Smelter charge	5.60	
Losses	4.25	
Royalty	<u>11.92</u>	
Total	\$33.87	
Cost per original ton	-----	\$1.15

Insurance and Taxes

Compensation Insurance	\$ 3.12	
Taxes per day	<u>.68</u>	
Total	\$ 4.00	
Cost per ton		\$.03

Amortization

\$20,000.00 over 150,000 Tons	<u>.14</u>	
Total costs per ton		\$2.54

Estimated Profit

Recovery ^{per ton} put on	\$ 3.83	
Less smelting losses (3.8%)	\$.15	
Costs	<u>2.54</u>	
Estimated profit		1.34 per ton
" "	5,427 .00	" month
" "	210,000.00	on operation

Discussion

In actual practice the above estimated profits should be exceeded because for reasons of safety, conservative figures were used. 10% of the time of operation was allowed for shut downs for repairs, a very liberal allowance for a modern plant. With a secondary crushing plant feeding a smaller product to the ball mill its rated capacity of 150 tons should be exceeded by at least 10%. Extraction rated at 90% should be bettered several percent and supply costs of almost 23¢ per ton are above the average. The grade of ore — \$4.25 — is based on experience from a portion of the dump where original sampling and mill run checked \$4.42 while the average of all samples ran \$5.70.

It will be noted that the heavy charge is the selling of concentrates. By extracting the gold and silver on the ground, the cost of hauling, freight, and smelter charges will be eliminated. When the character of the concentrates is better known as a result of actual operations, experiments with the cyanide process will very probably solve the problem of extraction.

The charge of \$1.04 for milling can be reduced by increased capacity, which the mill should handle as above stated.

Considering facts presented, the writer feels entirely justified in his conclusions expressed at the beginning of his report.

(EXHIBIT "D")

Crown King, Jan. 17, 1931

Mr. Thos. Priestley

Dear Sir:

Regarding your query as to the shaft on the north end line of the Saratoga holdings will say that the shaft was originally sunk as a union shaft and was half on Crown King ground. This original work was done about 1890 - 91 before I came to Crown King but I knew some of the men who did the work very well and all agreed some bunches of very rich ore was taken out in doing the work.

In 1904 O. F. Place shifted the shaft, cutting out the south end and filling the north to put the shaft all on the Saratoga ground. I was working in the main Saratoga shaft at this time and told the men doing the work about a body of rich ore found in doing the original work they evidently found it as one of them showed me a cigar box full of splendid gold specimens he got there. I estimated the actual gold in this cigar box at not less than \$50.00.

With best wishes I remain

Yours truly,

(Signed) O. A. Tyler.

(EXHIBIT "E")

Crown King, Arizona.
Dec. 3, 1930

Mr. N. C. French,

San Diego, California

Dear Norman:

I have had in mind for some time to write you about the Saratoga mining claims here. I feel that I know something, perhaps not very much, but at least a little bit about them, since I have known these claims since 1916 and have done more or less work on them.

The last work I did was in what is known as the "Union" or line shaft which is on the boundary line between the Crown King and Saratoga properties. I did ten feet of work on this shaft after making the timbers safe and found it makes considerable water, which however can easily be handled. When I quit at the 60 ft. level the vein was practically across the shaft, that is from $3\frac{1}{2}$ ft. to 4 feet wide and I took an average sample across full 4 feet and it run \$14.00 in gold. (I am giving you round figures on that as the assay was either a few cents less or a few cents more than 14.00. It was very close to that figure). This sample was an average and I was very careful in taking it. Besides the vein which I sampled there is a ledge of quartz on the hanging wall approximately 12 inches wide. I did not sample it, intending to do so later. So I do not know what it runs if anything.

I also did some work on the south end of the claims next to the old Union Mine. I sampled the vein 18 inches on the surface in the creek which is the south end line and it run \$10.00 in gold. Then about 50 or 75 ft. from the end line I took a sample (on the surface) across 2 ft. and it run 11.00 gold. Prior to the time I took these samples three men sunk a shaft fifteen feet deep between where I took the two samples and shipped, I think 5 tons of ore which run, if I remember rightly, 45.00 a ton net to them. They quit then and say the bottom of the shaft runs \$25.00 a ton across the 4 or more feet.

I have heard it said that the Crown King vein does not run through the Saratoga property. I am sure it does for I have traced it from one end to the other. I have gone over it a number of times with practical miners, men who have spent a large portion of their lives mining and every one of them is of the opinion that it is the Crown King vein. And they seem to think that development will show a big ore shoot on top of the hill to the south of the Deming house. I have always thought that was the case.

Another place I sampled is the short tunnel on the hill above the Tom Pete place. The vein is very distinct and is probably only 8 or 10 inches wide, but it is good ore and run if I remember rightly around \$80.00. I believe that vein joins the main vein on top of the hill and if it does there is no question that a good ore shoot will be found there.

Mr. Charlie Kimble, who was foreman of the old Union Mine when it was in operation, says that they had a survey made which showed that the ore shoot in the Union, which they worked and from which quite a lot of ore was shipped pitches to the north towards the Saratoga property and goes into the Saratoga ground at 150 feet depth on the line between the two properties. That being the case there must be considerable truth in the assertion that the shaft on the Saratoga ground about 200 feet north of the south end line and which is about 90 ft. deep, contains around 18 inches of \$70.00 ore. I am satisfied it is true for when I first went over the Saratoga property, there was several tons of good ore piled up near the dump, ore that looked like it would be good shipping ore. This ore I think was afterwards shipped by some parties who had a lease on another property in this district.

In all the assays I had made I assayed for gold only.

I would like to see this property developed. I am satisfied it will prove it's worth proper development.

Very truly yours,

(Signed) R. S. Patterson.

(Mr. Patterson is Postmaster at Crown King at the present time.)

(EXHIBIT "F")

Crown King, Arizona
Jan. 14th, 1931

T. T. Priestley

Crown King, Arizona

My dear Tom:

In regard to what I told you some time ago about the ore in the old Saratoga shaft, you will find 3 ft. of sulphide ore on the 50 ft. level about 18 ft. N. of the shaft, but cannot say what values it contains, as I did not have it assayed.

Hoping this information may do you some good I remain.

Very truly yours,

(Signed) E. M. Folts.

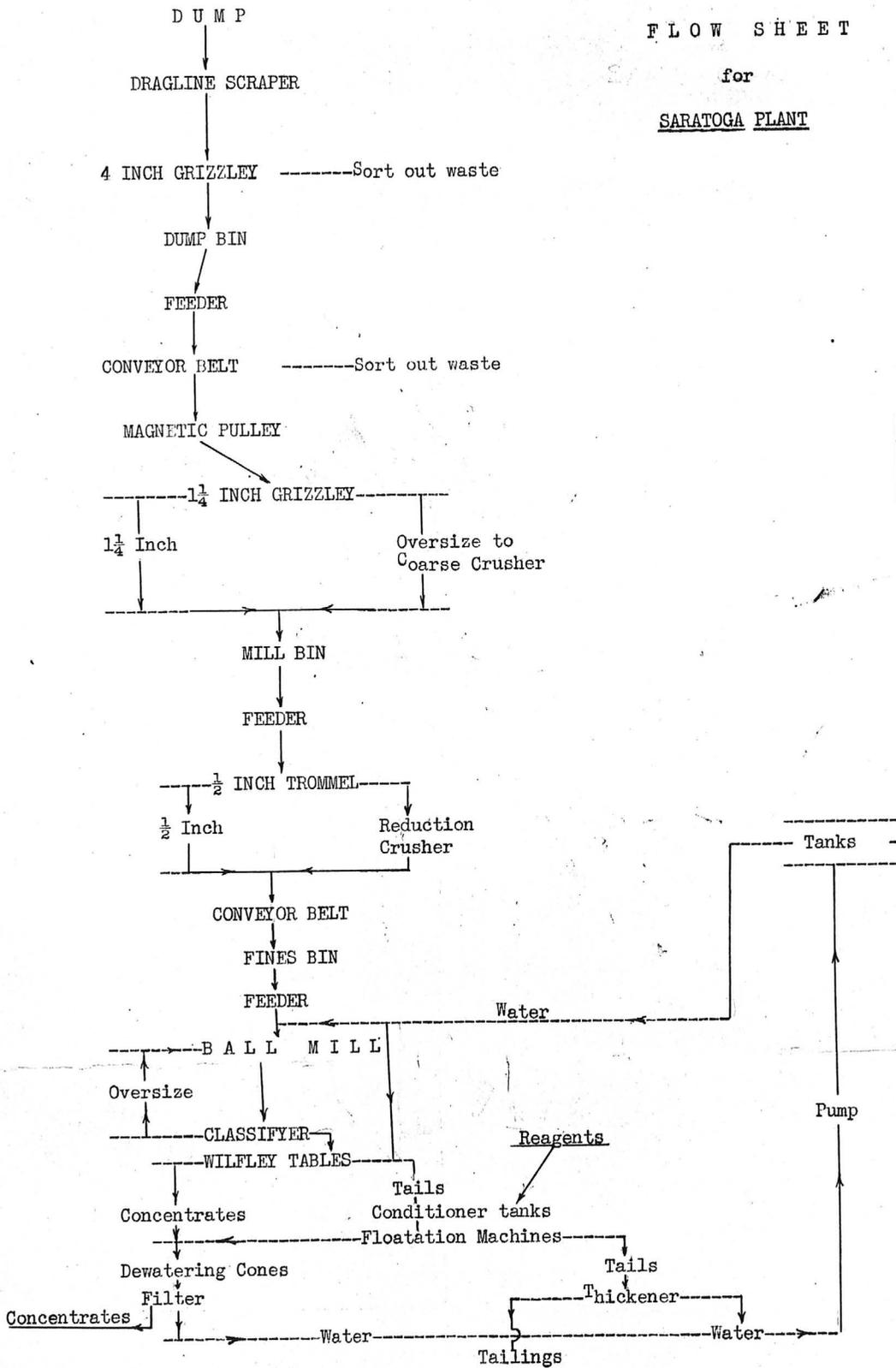
(Mr. Folts was Mine Foreman during the time the Saratoga Shaft was being sunk.)

(EXHIBIT "I")

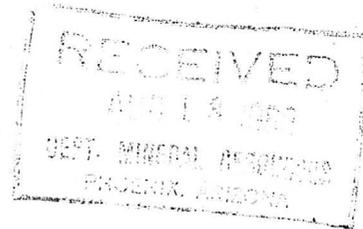
FLOW SHEET

for

SARATOGA PLANT



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



August 11, 1958

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

Union Mine or Old 94 (Yavapai County) copper, zinc, lead, gold and silver
(Property) (ore)

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

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

Frank P. Knight

FRANK P. KNIGHT,
Director.

*Glenn Van Tilborg
Crown King Arizona*

Enc: Mine Owner's Report

I have never been connected in any way with above mine. It is not operating - has not for years. Should be taken off your list. Also take my name off, as I am not interested in any mine property.

AMERICAN SMELTING AND REFINING COMPANY

SOUTHWESTERN ORE PURCHASING DEPARTMENT

810 VALLEY BANK BUILDING

P. O. BOX 2229

TUCSON, ARIZONA

BRENT N. RICKARD
MANAGER

August 15, 1942

Mr. Louis Schrade
Crown King
Arizona

LIBERTY UNION MINE, PINE GROVE DISTRICT
YAVAPAI-COUNTY, ARIZONA (Formerly Ninety-Four Mine)

Dear Mr. Schrade:

You will recall that at the time of my visit with you in June I took a sample from the concentrates on your platform. I now have El Paso Plant certificate showing the following assay and analysis.

<u>Oz./ton</u>		<u>Per cent:</u>									
<u>Gold</u>	<u>Silver</u>	<u>Lead</u>	<u>Copper</u>	<u>Ins.</u>	<u>Iron</u>	<u>Lime</u>	<u>Zinc</u>	<u>Sul.</u>	<u>As</u>	<u>Sb</u>	<u>Bi</u>
0.31	28.9	2.9	6.50	19.2	26.7	0.1	5.3	32.4	1.0	.35	.15

Except for the comparatively low zinc assay, this is very much like the concentrates formerly produced at this property by Roy Drannon and shipped to El Paso through Yavapai Finance and Realty Company at Prescott.

On the basis of present metal prices and assuming zero quota for copper, the outcome would be substantially as follows if shipped in 40-ton minimum loads.

<u>Payments</u>	<u>Smelter Settlement</u>	<u>Premium</u>
Gold	\$ 10.02	
Silver	18.97	
Copper 115.9 lbs. @.0905	10.49	
" " @ .05		\$5.80
	39.48	
 <u>Deductions</u>		
Base charge -Maximum	5.00	
Zinc penalty	.09	
Bismuth "	.50	5.59
F.o.b. El Paso	\$33.89	
Freight-- 40-ton minimum	5.04	
Net at Mayer per ton	\$28.85	
Premium on copper	5.80	
Total	\$34.65	

I enclose El Paso Schedule C outlining purchase terms used in above calculation, also outline of instructions for shippers giving the procedure for making quota application (Item 4).

Yours very truly,

Brent N. Rickard

BRENT N. RICKARD

Encs.

Union Mine

Louis Schrade

Crown King - Ariz

Liberty Union Mine
Pine Grove District

Aug 15, 1942,

Sample from concentrates on platform taken by B.N. Beckard
Cu .31, Ag 28.9, Pb 2.9%, Cu 6.50%, Zn 19.2, Fe 26.7, S 5.3, Sul 32.4 Bi. 15

Sept 4-38

Sample concentrates, Ag 18.0 g, Au .24 oz, Cu 4.49%, Pb 7.0% S 11.37%

2 tons, soft down wing, Au .23 g, Ag 31.37 g,

Chalcopyrite Ag 28.6 - Au .28

Sample drift soft down wing:

Au .24, Ag 12.36, Cu 3.01

Iron sulphide Au 0.32 Ag 17.48

* GENERAL REFERENCES

- REFERENCE 1 F1 < ABGMT-USBM FILE DATA
- REFERENCE 2 F2 < AR. DEPT. OF MINERAL RESOURCES FILE DATA
- REFERENCE 3 F3 < ABGMT CLIPPINGS FILE
- REFERENCE 4 F4 < U.S. GEOL. SURVEY BULL 782, P. 164-165

F5 < DEWITT, ED, 1976. UNPUB M.S. THESIS, UNIV. OF ARIZ, 150 PGS

U.S. CRIB-SITE FORM
RECORD IDENTIFICATION

RECORD NUMBER B10 < _____ > RECORD TYPE B20 < X, I, M > DEPOSIT NUMBER B40 < _____ >
 REPORT DATE G1 < 8, 1, 8, 0, 9 > INFORMATION SOURCE B30 < 1, 2, _____ > FILE LINK IDENT. B50 < US6M 004 025 1728 >
YR. MO.
 REPORTER(SUPERVISOR) G2 < DEWITT, ED, H. > (last, first, middle initial)
 REPORTER AFFILIATION G5 < ABGMT > SITE NAME A10 < SARATOGA MINE >
 SYNONYMS A11 < SARATOGA CLAIM >

LOCATION

MINING DISTRICT/AREA A30 < TIGER DISTRICT >
 COUNTY A60 < YAVAPAI > STATE A50 < A, Z > COUNTRY A40 < U, S >
 PHYSIOGRAPHIC PROV A63 < 1, 2, 4, _____ >
 DRAINAGE AREA A62 < 1, 5, 0, 7, 0, 1, 0, 2, 4, _____ > LAND STATUS A64 < 0, 0, 4, _____ >
 QUADRANGLE NAME A90 < CROWN KING > QUADRANGLE SCALE A100 < 1, 9, 6, 9, _____ >
 SECOND QUAD NAME A92 < _____ > SECOND QUAD SCALE A91 < _____ >
 ELEVATION A107 < 6, 4, 0, 0, 4, F, T >

UTM
 NORTHING A120 < 3, 7, 8, 7, 4, 0, 0 >
 EASTING A130 < 3, 7, 6, 0, 0, 0 >
 ZONE NUMBER A110 < 1, 2 >

*ACCURACY
 ACCURATE ACC (circle)
 ESTIMATED EST < LOCATION TO SOUTH OF CROWN KING MINE, TO WITHIN 0.25 MILES >

GEODETIC
 LATITUDE A70 < 3, 4, -1, 3, -1, 5, N >
 LONGITUDE A80 < 1, 1, 2, -2, 0, -4, 7, W >

CADASTRAL

TOWNSHIP(S) A77 < 0, 1, 0, N, _____ > RANGE(S) A78 < 0, 1, W, _____ >
 SECTION(S) A79 < 10 >
 SECTION FRACTION(S) A76 < NE >
 MERIDIAN(S) A81 < GILA AND SALT RIVER >

POSITION FROM NEAREST PROMINENT LOCALITY A82 < 1.2 MILES NORTH OF CROWN KING, ARIZONA >
 LOCATION COMMENTS A83 < THIS LOCATION DATA SAYS SARATOGA IN 10W, 1W, 11SW. LAND GREEN (1926) SHOWS IT TO ADJOIN CROWN KING CLAIM AT CROWN KING MINE, THEREFORE SARATOGA PROBABLY IN SEC 10, NOT SEC 11. UTM APPROXIMATE >

* ESSENTIAL INFORMATION
 + ESSENTIAL SOMETIMES OR HIGHLY RECOMMENDED

ARIZONA TESTING LABORATORIES

A DIVISION OF CLAUDE E. McLEAN & SON LABORATORIES, INC.
 PHONE 254-6181 817 WEST MADISON ST. P. O. BOX 1888 PHOENIX 1
 PHONE MAIN 3-3331 1516 EAST 20th ST. P. O. BOX 2508 TUCSON

Chemists... Engineers

For _____ Date **March 28, 1963**

Sample of **Ozs** Received: **3/21/63**

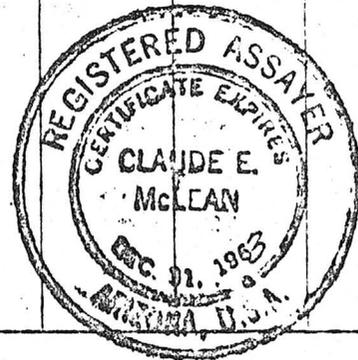
Submitted by: **Same**

ASSAY CERTIFICATE

Gold figured at \$ **35.00** per ounce.

Silver figured at \$ **1.00** per ounce.

Lab. No.	Identification	Gold		Silver		Percentages	
		Oz. per Ton	Value	Oz. per Ton	Value	COPPER (Cu)	
156113	No Mark	0.30	\$10.50	10.70	\$10.70	0.35	



Respectfully submitted,
 ARIZONA TESTING LABORATORIES

[Handwritten Signature]
 Claude E. McLean

ARIZONA TESTING LABORATORIES

A DIVISION OF CLAUDE E. McLEAN & SON LABORATORIES, INC.
 PHONE 254-6181 817 WEST MADISON ST. P. O. BOX 1888 PHOENIX 85001

Chemist. Eng. 10000

For

Date **June 23, 1967**

Sample of **Ore**

Received: **6/22/67**

Submitted by: **Samo**

ASSAY CERTIFICATE

Gold figured at \$ **33.00** per ounce

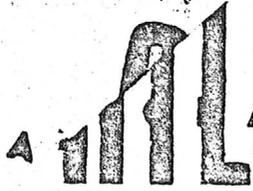
Silver figured at \$ **1.29** per ounce

LAB. NO.	IDENTIFICATION	GOLD		SILVER		PERCENTAGES	
		OZ. PERTON	VALUE	OZ. PERTON	VALUE	COPPER	LEAD
1512	No Mark	.04	\$1.40	6.40	\$8.26	0.55%	0.10%

Respectfully submitted,

ARIZONA TESTING LABORATORIES

Claude E. McLean



ARIZONA TESTING LABORATORIES

A DIVISION OF CLAUDE E. McLEAN & SON LABORATORIES, INC.

PHONE 254-6181

817 WEST MADISON ST.

P. O. BOX 1888

PHOENIX 1

PHONE MAIn 3-3331

1516 EAST 20th ST.

P. O. BOX 2508

TUCSON

Chemists... Engineers

For

Date **March 20, 1964**

Sample of **Ore**

Received: **3-18-64**

Submitted by: **Same**

ASSAY CERTIFICATE

Gold figured at \$ 35.00 per ounce.

Silver figured at \$ 1.00 per ounce.

Lab. No.	Identification	Gold		Silver		Percentages	
		Oz. per Ton	Value	Oz. per Ton	Value	COPPER (Cu)	
158295	IDA Claim	0.10	\$3.50	10.80	\$10.80	0.25	



Respectfully submitted,

ARIZONA TESTING LABORATORIES

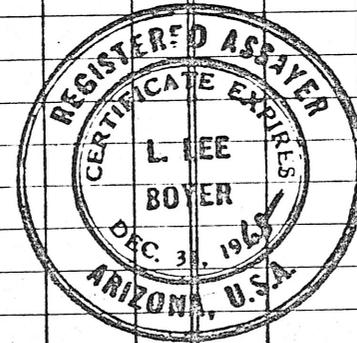
Claude E. McLean

**VALLEY ASSAY OFFICE
AND ORE TESTING LABORATORY
MEMORANDUM OF ASSAY**

Tempo, Arizona, May 6, 1968

Made for _____

SAMPLE NO.	PER TON OF 2000 POUNDS AVOIRDUPOIS								COPPER, OR			LEAD, OR			ZINC			TOTAL	
	GOLD				SILVER				AT 0.38 PER LB.			AT PER LB.			AT PER LB.			\$	CTS.
	AT 35.00 PER OUNCE				AT 2.00 PER OUNCE				%	\$	CTS.	%	\$	CTS.	%	\$	CTS.		
OZS.	100's	\$	CTS.	OZS.	100's	\$	CTS.												
1	0.09		3	15	6.10	12	20	3.9	29	64								44 99	
																		<i>April 28</i> 43.70	
REMARKS:																			



NO. _____

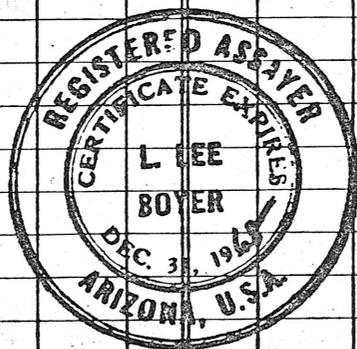
BY L. Lee Boyer
Registered Assayer.

CHARGE \$ 7.00 Pd.

**VALLEY ASSAY OFFICE
AND ORE TESTING LABORATORY
MEMORANDUM OF ASSAY**

Made for James Nicastle Tempo, Arizona, May 6, 1968

SAMPLE NO.	PER TON OF 2000 POUNDS AVOIRDUPOIS								COPPER, OR			LEAD, OR			ZINC			TOTAL	
	GOLD				SILVER				AT 0.38 PER LB.			AT PER LB.			AT PER LB.			\$	CTS.
	OZS.	100%	\$	CTS.	OZS.	100%	\$	CTS.	%	\$	CTS.	%	\$	CTS.	%	\$	CTS.		
1	0.99		3.15		6.10	12.20			3.9	29.64								44.99	
																		<i>april 28</i> 43.70	
REMARKS:																			



NO. _____ BY J. Lee Boyer Registered Assayer.
 CHARGE \$ 7.00 Pd.

SURVEY OF OPERATING MINES

MAY 28th, 1942,

By A. C. Nebeker

UNION MINE, OR OLD 94

Union Mine.

Louis Schrade Owners and
Vic. Carlson Lessee

P.O. Crown King

Union Mine,

Located one mile north of Crown King, by good road. Yavapai CO, Ariz.

This property is not now shipping, nor did it ship last year .

The present operators are busy getting the plant repaired and then will go after the ore.

They have 4 claims, two of these are leased and two are owned.

The property is developed by one 100 ft shaft and one shaft 110 ft, and 700 Ft tunnel with a 50 ft winze. They have started to stope a little ore.

It is claimed that \$18,000 worth of ore has been shipped from this property in the past.

The vein is from 18 inches to 4 feet thick in walls of Granite, or Granodiorite, The dip is 70 degrees N.E. with a N. E. S. W. strike.

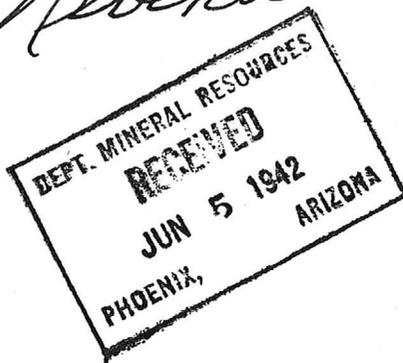
Principal Metals, Copper, Zinc, Lead, Gold and Silver.

Assaying .24 Ozs gold, 30 Ozs silver, 4 to 5 per cent copper, 10 per cent zinc, the lead not tested.

On the property is an old Gasoline Engine driven flotation mill, having a crusher, ball mill, small classifier and 4 Denver cells, rated capacity 25 tons.

These boys are not now worried about funds, but will consider a Government Loan in order to get into bigger production. They are doing all the work themselves.

A. C. Nebeker



JSC

THE PINE GROVE DISTRICT
CROWN KING AREA

ONE OF THE OLD MINING DISTRICTS OF THE STATE. LOCATED IN THE HEART OF THE BRADSHAW MOUNTAINS AT AN ELEVATION OF FROM 6,000 TO 7,000 FEET, IT IS A WELL TIMBERED, WELL WATERED AREA. THE SUMMERS ARE COOL AND WINTERS ARE NOT SEVERE ENOUGH TO SERIOUSLY HINDER OPERATIONS.

ITS GEOLOGY IS DESCRIBED IN U. S. GEOLOGICAL SURVEY BULLETIN 782, AS A MASS OF GRANO-DIORITE THREE TO FOUR MILES IN DIAMETER INTRUDED INTO THE BRADSHAW GRANITE AND EARLIER YAVAPAI SCHIST. THESE FORMATIONS ARE CUT BY A SERIES OF LIGHT COLORED RHYOLITE DYKES WITH WHICH THE VEINS ARE THOUGHT TO HAVE A GENETIC RELATION. THE GENERAL TREND OF THE VEINS AND DYKES IS NORTHERLY AND THE DIP IS ABOUT SIXTY DEGREES TO THE WEST. THE VEINS ARE ABOUT FIVE FEET IN WIDTH. THE ORE SHOOTS CONTAIN PYRITE, CHALCOPYRITE, GALENA, SPHALERITE WITH SOME TETRAHEDRITE WITH A QUARTZ GANGUE. THEY PITCH TO THE NORTH. THE DISTRICT WAS MOST INTENSIVELY WORKED WHEN GOLD AND SILVER WERE THE SOUGHT-AFTER METALS AND RECOVERY BY AMALGAMATION. THIS WAS FOLLOWED BY RATHER INEFFICIENT METHODS OF CONCENTRATION RESULTING IN LOW YIELD RECOVERY.

MINES FLOURISHED AS LONG AS THE RICH SURFACE AND PARTLY-OXIDIZED DEPOSITS HELD OUT, BUT WHEN THE LOWER-GRADE SULPHIDES WERE ENCOUNTERED AT GREATER DEPTHS, COSTS OVERTOOK GROSS RECOVERIES, THE MINES SHUT DOWN AND ACTIVITY PRACTICALLY CEASED. WITH MODERN METHODS OF RECOVERY, BETTER ROADS, SMELTING FACILITIES, AND ELECTRIC POWER, IT IS ALTOGETHER REASONABLE TO PREDICT THAT THESE OLD PRODUCERS WILL SOMETIME BE RE-OPENED AND YIELD MORE THAN THEY DID IN THEIR BONANZA ORE DAYS.

ESTIMATED PRODUCTION OF THE DISTRICT HAS BEEN PLACED AT \$3,000,000.00. OF THIS AMOUNT, APPROXIMATELY \$1,500,000.00 WAS PRODUCED BY THE CROWN KING MINE.

TOWER
MOUNTAIN
ROAD

CADILLAC
GROUP

CROWN
KING
MINE

MERTON

golden

Eagle

UNION
MINE

TOWN OF
CROWN
KING

THE PROPERTY LIES AT THE JUNCTION OF TOWER MOUNTAIN ROAD AND THE ROAD LEADING TO THE CROWN KING MINE WHICH IS APPROXIMATELY 1 MILE FROM THE TOWN OF CROWN KING.

ARIZONA TESTING LABORATORIES

A DIVISION OF CLAUDE E. McLEAN & SON LABORATORIES, INC.
 PHONE 254-6181 817 WEST MADISON ST. P. O. BOX 1888 PHOENIX 85001

Chemist... Engineers

For: _____ Date: May 24, 1966

Sample of: Ora Received: 5-20-66

Submitted by: Same

ASSAY CERTIFICATE

Gold figured at \$ 35.00 per ounce

Silver figured at \$ 1.29 per ounce

LAB. NO.	IDENTIFICATION	GOLD		SILVER		PERCENTAGES	
		OZ. PERTON	VALUE	OZ. PERTON	VALUE	COPPER	
A-650	HA Privateer <i>sample # 1</i>	0.26	\$9.10	11.4	\$14.71	0.45%	

Respectfully submitted,

ARIZONA TESTING LABORATORIES

Claude E. McLean

ARIZONA TESTING LABORATORIES

A DIVISION OF CLAUDE E. McLEAN & SON LABORATORIES, INC.

PHONE 254-6181 817 WEST MADISON ST. P. O. BOX 1888 PHOENIX 85001

Chemists... Engineers

Date June 1, 1966

Sample of Ore

Received: 5-31-66

Submitted by: Same

ASSAY CERTIFICATE

Gold figured at \$ 35.00 per ounce

Silver figured at \$ 1.29 per ounce

LAB. NO.	IDENTIFICATION	GOLD		SILVER		PERCENTAGES		
		OZ. PERTON	VALUE	OZ. PERTON	VALUE	COPPER	LEAD	ZINC
A-662	No Mark <i>Sample #2 Powder top of the vein</i>	0.14	\$4.90	4.60	\$5.93	0.45%	0.25%	0.05%

Respectfully submitted,

ARIZONA TESTING LABORATORIES

Claude E. McLean, Jr.

Claude E. McLean, Jr.