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ALGONKIAN MINES COMPANY

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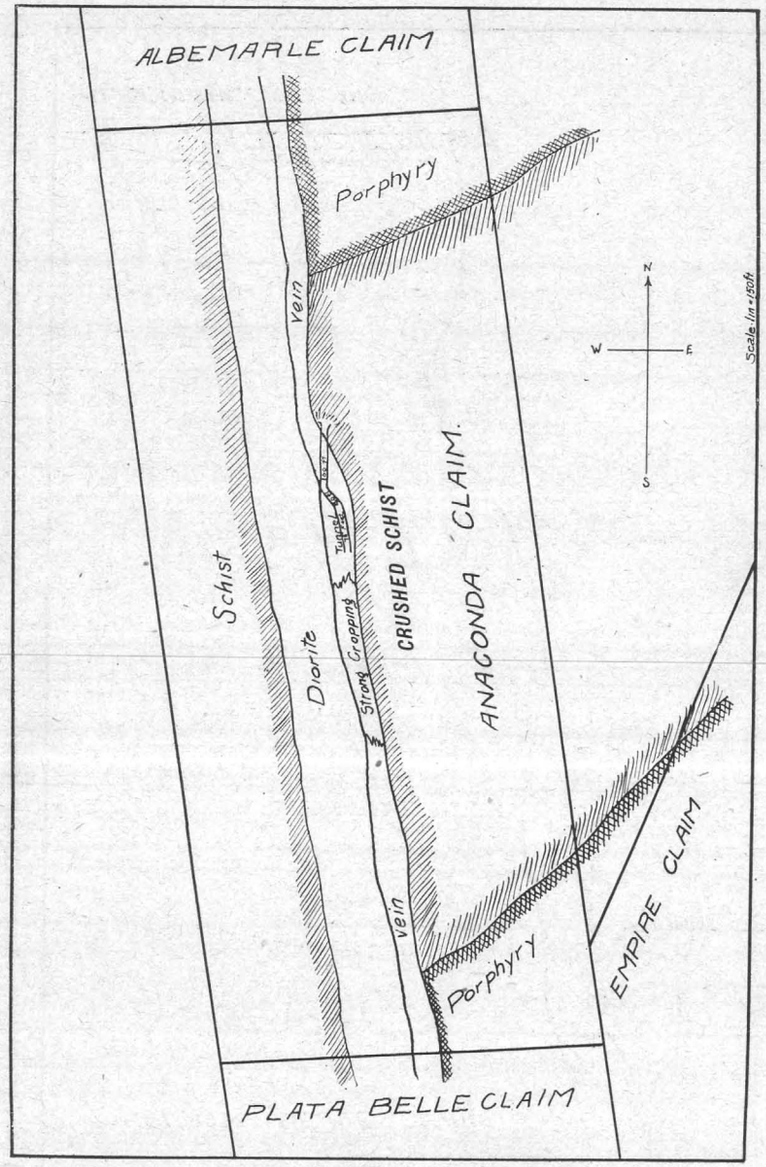
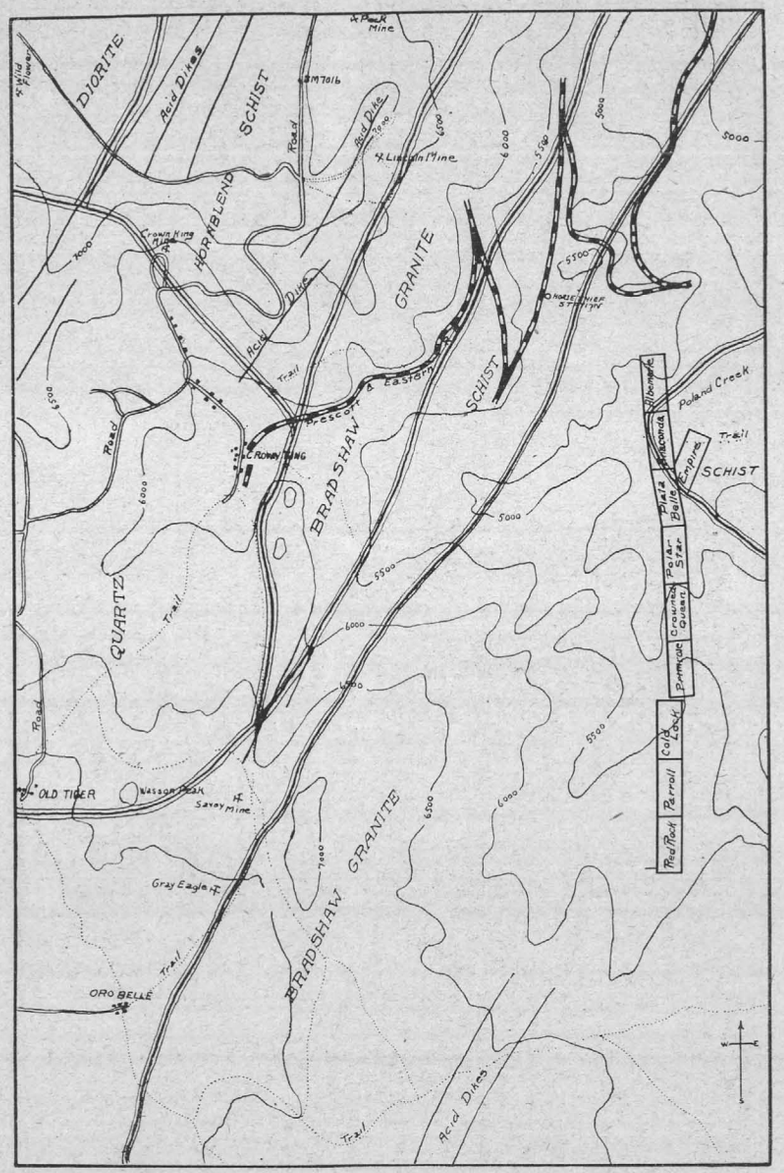
About sixteen years ago certain copper interests became familiar with the underground and geological conditions at the United Verde mine and thereafter for about three years they did a vast amount of exploratory work throughout the Yavapai schist belt in Yavapai County, Arizona, in order to find a mine which had similar geological conditions to that of the United Verde.

About this time, J. J. Fisher located the Little Daisy mine, now the famous mine owned by the United Verde Extension Mining Company, adjoining the famous United Verde mine at Jerome, Arizona, and which has proven through recent developments to be a mine of phenomenal extent and richness. The Little Daisy mine has but recently developed from a mere prospect of small average to a mine that is now earning at the rate of probably $6,000,000 per year, and will take a mine valuation of above $50,000,000.

The Yavapai schist belt on which these mines are located, extends from a point just north of Jerome, Yavapai County, Arizona, southerly through the Black Hills to a point in the heart of the Bradshaw Mountains, a distance of about forty miles, maintaining a varying width up to ten miles, and along which belt there are several copper and gold mines of considerable importance. Mr. Fisher appealed to these copper interests, above referred to, to assist him in the financing of the Little Daisy mine, and it was partly through the investigation of this property that they became familiar with the exact geological conditions on and surrounding the United Verde mine. They



ANACONDA CLAIM SHOWING EMPIRE TUNNEL AND GEOLOGICAL FORMATIONS



TOPOGRAPHICAL MAP SHOWING EMPIRE MINE AREA AND BRADSHAW MOUNTAINS RAILROAD

hesitated to take up the Little Daisy on account of its being so closely located to the United Verde, considering that it would be a hard property to finance on that account, and which conclusion has proven more than true.

They realized that the Yavapai schist belt was of such extent that there should be another point along its course somewhere, wherein the intrusive dykes had cross-cut the schist; where there was evidence of the work of an abundant mineralizing agent and would be produced a similar ideal condition for the deposition of ores on a large scale, so they set out to find a property that had these desirable factors, and, finally in 1903 their attention was called to the Empire mine, now owned by the Algonkian Mines Company, which had been located that year and partially developed by some experienced prospectors. A nominal holding was secured at that time, but it was only recently that they secured all of the outstanding interests, and were in a position to negotiate for the financing and development of the property on a comprehensive basis.

The Empire mine is owned outright in fee simple by the Algonkian Mines Company and is a patented property of five claims, four of which are located along the course of the vein system. It is situated about three miles easterly from Crown King, the terminus of the Bradshaw Mountain Railroad in Yavapai County, Arizona. The Bradshaw Mountain Railroad is a part of the Santa Fe system and the Empire mine is located only about one mile easterly from the railroad.

After these interests had secured their original holding in the Empire mine, they secured the services of Mr. J. J. Fisher in surveying and patenting the property. Upon examining the workings, Mr. Fisher

recognized the similarity of the geological conditions to those of his Little Daisy mine, and as he was desirous of financing the Little Daisy mine, he made a proposition to put the two properties into a corporation, as the consolidation would offer a more attractive method for the financing of his Little Daisy property.

These negotiations were seriously considered, but the original locaters of the Empire mine, not realizing the merit of the Little Daisy mine, refused to enter into negotiations, so they were dropped, but these interests were afterwards instrumental in assisting Mr. Fisher to raise the first money that was put into the Little Daisy mine.

THE EMPIRE MINE

The Empire mine embraces a patented area of 100.97 acres, and arrangements have practically been made whereby some ten or more additional claims of 20 acres each will be added to the group, making a large, compact and well-located area of mining ground situated along the shear zone or contact of the extensive Empire diorite dyke system and the Yavapai schist.

There is no question as to the great continuity of the Yavapai schist and copper belt. Geological Atlas No. 126 of the Bradshaw Mountain Quadrangle, issued by the United States Geological Survey treating on that subject, says:

> "The continuity and linear character of this belt of schists, and the similarity of the copper deposits at intervals along it, indicate a widespread uniformity of conditions as existing here and point to the probable existence of a more or less continuous copper-bearing zone."

MAP OF PART OF YAVAPAI COUNTY, ARIZONA, SHOWING YAVAPAI SCHIST BELT, MINES, RAILROADS, ETC.

of any mine in the Bradshaw Mountains. The climate is ideal for outdoor work the year round. Heavy pine or oak timber abounds on and adjacent to the property suitable for mine timbers, stulls, lagging, etc.

RECAPITULATION

The Algonkian Mines Company has the following advantages as a low priced copper mining investment, wherein there are the maximum number of factors favoring a success:

1.—Located in one of the most fertile high-grade copper mining fields of Arizona.

2.—Geological and mineralogical conditions indicate the development of ore bodies of richness and magnitude.

3.—The Company is very conservatively capitalized, owning outright a patented mining property with no debts or encumbrances of any kind whatsoever.

4.—Mine has good railroad and smelting facilities.

5.—Property possible of full development by expenditure of moderate amount of capital.

6.—Company controlled by business men (associated with Cameron Corporation), with copper mining experience and backed by an organization that has proven its ability to seek out profitable copper investments procurable on satisfactory and conservative investment basis.

7.—Mining engineering, financial and corporate matters conducted under guidance of the Cameron Corporation.

Respectfully submitted,

CAMERON HOLDING CORPORATION.

Upon the Empire mine is the only known instance in the Bradshaw Mountains where a prominent dyke system has completely cross-cut the schist and thus produced an extensive shear zone, and offering a most ideal condition for the deposition of ores on a large scale similar to that which has been found in the rich and extensive Verde belt at Jerome.

The surface mineralization is quite extensive and samples assaying high in copper, gold and silver are to be had. The early development work undertaken is well located and consists of a tunnel which has been run about 300 feet along the hanging wall of the vein system and which, if continued about 200 feet further, will encounter an ore zone that shows very strong on the surface, and where large bodies of good grade ore should be encountered. At one point in this tunnel the mineralization shows a total width of 20 feet, and the ore, although heavily leached, is of a very encouraging make-up, good gold values remaining in the iron pyrites. The mineralization is quite extensive along the ore zone for a distance of several thousand feet, and it has every appearance of being of such extent that deeper work will produce a widening of the shear zone and a substantial mineralization. The gigantic diorite dyke, that is no doubt the source of the mineralization, dips westerly at an angle of about 60 degrees towards the rich Crown King district, and there seems to be little doubt but this dyke will have a very important bearing on the mineralization of that immediate section, as have the diorite dykes appearing on the Verde mines at Jerome.

The schist of this section has been classified by the United States Geological Survey (Atlas No. 126) as Algonkian Schist and termed Yavapai Schist.

DEVELOPMENT AND EQUIPMENT

The Bradshaw Mountain Railroad climbs the mountains by the means of a series of switchbacks, and at one point comes within about one mile of the Empire mine. A wagon-road will be built from the mine to the end of one of the switchbacks, which is at practically the same elevation as the Empire tunnel. The switchback switching track provides excellent side-track facilities. The wagon-road will be built on a suitable grade so that at a later date it can be used to build a switch direct to the mine, thus affording direct rail transportation from the mine to the Humboldt smelter, which is located by rail at a distance of 37.4 miles.

The Empire tunnel will be retimbered and extended along the vein until it encounters and develops what is considered the main ore zone and at which point good grade shipping ores should be opened. A shaft will then be raised to the surface and a hoist installed of sufficient capacity to develop the mine to a depth of at least 1500 feet below the tunnel level. Sinking will be started as soon as possible so as to completely cross-cut the ore zone at a depth of at least 500 feet below the tunnel level, and at which point the mine should, according to all indications, prove to be a productive and very valuable one. At the United Verde mine the rich copper ores came nearly to the surface as the mine area covered the very heart of the mineralization while on the Little Daisy a depth of over 1200 feet was needed owing to the fact that the mine area was located quite a distance from the very centre of the mineralization and its highest horizon. The same conditions exist at

Butte where replacement deposits are the rule. In the heart of the Butte camp on the Anaconda the copper ores come at least 500 feet nearer the surface than in East or North Butte.

The mineralization on the Anaconda claim of the Empire mine seems to be the heart of the mineralization on this extensive vein system. The vein courses northerly and southerly the same as those on the Verde belt to the north, and crops northerly from the Empire tunnel, a distance of several miles, crossing the projected Wheeler tunnel, which Chicago capitalists propose to drive for a distance of 13,000 feet to cross-cut many promising veins in the Bradshaw Mountains. The Wheeler tunnel is located at about 1,000 feet lower elevation than the Empire tunnel. Southerly the Empire vein system extends for a distance of over one mile up the mountain-side to a plateau where, in the early days, considerable silver mining was done on the Empire vein.

The site selected for the main Algonkian working-shaft is an ideal one, as it has desirable vantage points for the development of the entire property on a comprehensive and economical scale. It will take but a short time to complete the tunnel to the main ore zone and to cut a station for the raising of the shaft to the surface, and at which point also the sinking will be started. The raising of the shaft to the surface should consume a very short time, so that the main shaft would soon be in operating condition to the tunnel level, making it possible to follow the main ore zone in depth below the tunnel level very rapidly. The mine is one that can be quickly and economically developed. It has most excellent smelting facilities right at hand. It has the best natural water facilities

Notes by S. h C 1924

CROWN KING MINE.

Concentrates from the old Crown King Mill dump shipped in '17 and 16 carried:

Au.,.... -0.8 oz.
Ag.....10. oz.
Cu. 3%
Zn. 19%
Fe.....20%
$.....30%
Insol. ...15%

They also made a zinc concentrate carrying 42% Zn. and 4% copper. All the mill dump is now gone.

The mine dump contains about 100,000 tons. An Average sampling by the Garford Engineers gave Au....0.15, and Ag. 2.00 oz. Gray's sampling showed that by screening through 1" the fine carried .07 Au. and 0.5 oz. Ag. and by some sorting this could be raised to some 20%. On a very little copper.

If this dump is concentrated a product similar to the concentrates from the mill dump might be obtained and would be a suitable smelter product for Humboldt.

2/10/35

Conference at Adams Hotel, Phoenix, with Francis and Judge Gorman, Wells, Trewark and Braughham formerly foreman at the mine.

The Co. now owns or controls 36 patented and 42 unpatented claims including the Saratoga and the Tiger (silver.)

Crown King Mine from 1892 -99 produced 35, 474 tons of ore with recovered value $27.94 per ton (present prices) Some of the Tiger ore carried 30-40 oz. in silver.

Co. has a report on the mine and dump by Richard L. Bland of L. A. (it is rubbish)

Mine makes about 40,000 gals. of water per day and it would probably cost $10,000 to dewater to the 500' level and until

that is done no information can be obtained regarding the remaining ore reserves or conditions of drifts and stopes. Ore is complex with large percentage Pb. and Zn. Possible that some good ore is left but don't think it would pay to attempt to reopen mine unless good ore could be followed down from surface.

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Mine purchased in 1936 by interests represented by Goodman, Atty, Title and Trust Bldg. Phoenix.

Ced '37.

The ~~effort~~ attempt in 1934 to reopen the old mine up dumps proved to be a flat failure as has ~~to~~ been reported.

The backers of this venture, Jones by name, is again in control of the property & is reopening portions of the old mine. In my judgment the chances are that he will lose a lot of money.

J. mc

Folder Crown King

CONSOLIDATED ARIZONA SMELTING COMPANY

HUMBOLDT, ARIZONA

MEMO. REGARDING CROWN KING MINING DUMP

Have just talked with Mr. Francis Viele on the telephone. He advises that his Company could have had this dump at any time they wished during the past few years but never considered that the dump could be worked profitably and this is his opinion at the present time. Viele states that the average values in the entire dump will hardly run $2.00 to the ton although there are places where values will run $4.00 or even $8.00 or $10.00. The character of the dump is not such as to make it readily suitable for concentration or cyaniding.

Viele states that he strongly advises against any person attempting to take over and operate this dump under present conditions as in his opinion the dump could only be worked with any hope of profit on a basis of 500. to 1000 tons per day and such operation would involve a very large capital expenditure and would almost surely be unprofitable under present working conditions and high costs.

Further, Viele is of the opinion that no one should deal with Mr. Demming, as he does not believe that Demming has a legal title to the dump in question.

Mr. Viele states that Frank Lenox worked for him for several months at Crown King and to his knowledge Lenox has made a flat failure of two or three more milling propositions and in one case lost over $20,000 for the people who backed him. He

CONSOLIDATED ARIZONA SMELTING COMPANY

HUMBOLDT, ARIZONA

Memo #2

does not consider Lenox competent to design or operate a mill, although he is a good mill man and flotation machine operator when working under proper supervision. This opinion of Lenox exactly coincides with my own.

Our own records do not show that we ever had this dump sampled. Any samples which we may have analyzed were in the nature of grabs taken at random or picked samples and must in no sense be considered as representative of the entire values in the dump.

April 8th, 1920

GMC/EEW

CROWN KING, WILDFLOWER, & TIGER

Douglas C. Corner, Box 157, Mayer, Arizona, has purchased the Crown King, Wildflower and Tiger properties formerly held by R. C. Jones of Cushing, Oklahoma. Also included in the purchase are the 75-ton flotation plant and necessary mining equipment. It is planned to operate the mill on ore from the Tiger at first, and also as a custom plant. Ore from the Crown King district will be treated, including that from the Gladiator, Del Pasco, Philadelphia, and other properties. Corner also operates the Belcher and Wizard Mines in the Big Bug district eight miles north of Mayer. He designed and built most of the large section tunnel power loading equipment which helped make so many progress records on recent aqueduct and hydroelectric tunnel jobs.

Mining Journal
5/15/42

CROWN KING MINE.

Notes by G. M. Colvocoresses.

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The backer of this venture, Jones by name, is again in control of the property and is reopening portions of the old mine. In my judgment the chances are that he will lose a lot of money.

REPORT ON CROWN KING MINE DUMP.

History

The Crown King Mining Co., in its earlier days controlled more territory than it does today. At that time it owned what is now known as the Saratoga Group. The waste rock from the mine was then dumped on the Buckeye claim of this group. Litigation amongst the owners resulted in the Saratoga Group becoming the property of a Mr. Page and with it the mine dump. With the control of the Crown King Mine passing to Mr. Murphy, lengthy controversy went on as to the ownership of the dump, but the present party in control, a Mr. Deming, says he has a quit claim deed to the mine dump from the Murphy Estate, signed by Norris.

Location of dump & main features

The dump is situated in a small canyon about one mile north of Crown King at an elevation of 6300 ft., or about 600 ft. higher than the railroad station. A wagon road from the station passes the dump; although it has been subjected to severe weather changes this road could be put into reasonable condition quickly and cheaply. From the dump to Crown King Mill is approximately 6000 ft. An aerial tramway between this mill and the Wildflower Mine passes about 500 ft. W. of the dump.

Previous attempts at treatment

Numerous attempts have been made to treat this dump, from hand sorting to mechanical sizing and treating the fines by tables and jigs and also by grinding, amalgamation, concentration and cyaniding. But due either to the smallness of operations or more likely to the inexperience of the operators, no success was met with; or lack of values.

Valuation of dump by others

From the previous attempts at treatment estimates have been placed on the dump from $1.60 to $6.00 per ton but no records are available to check these figures. Possibly the most complete sampling was done by the Garford interests, who handled approximately 1000 tons of dump material, sampled it on the dump down to 40 tons and put it through their sampling plant at Wickenburg. They got $3.00 in gold and 2 oz. silver.

Method of estimating & sampling dump.

The dump is of irregular shape. To the right of the adit is the old dump and to the left clinging to the hillside and partially filling up the canyon is the main dump. The outlines of the old dump are not very clear and only that which was clearly defined was taken into consideration. The outlines of the main dump were well defined. The dump was laid out in 9 sections and the cubic contents calculated for each. Eighteen cubic feet per ton was the factor taken. The samples were taken at 20 ft. intervals from shallow pits dug on the face and top of dump and so placed that they were representative, as closely as possible, of the bulk of the dump.

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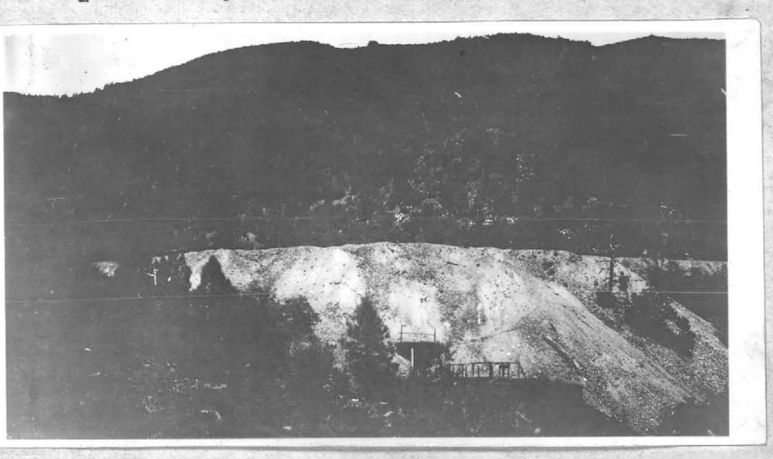


Crown King Dump.

Tonnages & Values

		Au. Oz.	Ag. Oz.	Gross Value
Old Dump	3000 tons	.024	.37	$0.85
Main "	104360 "	.065	.62	1.92

The old dump is eliminated from further consideration. The following gradings, etc., are of the Main Dump:

Gradings

Opening, Plus 1½", plus 1", plus 1/2", minus 1/2"
23.8 5.7 17.7 52.8 - 100%

The fines in the dump did not show any appreciable increase as Minus 1" product only ran $1.94; but by screening through 1" ring and sorting out the ore in the Plus 1" and adding it to the fines, it was possible to make a product running $2.43 per ton; and discarding 24% of the dump with only a loss of 4% of the values.

PLUS 1"

WASTE					ORE				
%	Au.	Ag.	Gross Value	% of Total	%	Au.	Ag.	Gross Value	% of Total
24	Tr.	0.31	$0.31	4	5.5	.285	2.62	$8.32	24

MINUS 1"

FINES				
%	Au.	Ag.	Gross Value	% of Total
70.5	.07	.54	$1.94	72

PLUS 1" ORE & MINUS 1" FINES

%	Au.	Ag.	Gross value	% of Total
76	.086	.71	$2.43	96

The values are in gold and silver. A composite sample assayed for copper gave 0.08%, small amounts of lead and zinc are also contained in the ore.

Conclusion

The sampling has shown $1.92 per ton as the gross value. By screening and sorting this can be raised to $2.43. The ore in the dump which carries the values, is considerably weathered and a recovery of 75% of the valuable contents, or $1.82 per ton, is all that could be expected. With a ratio of concentration of ten to one, the cost of treating this dump including screening, sorting, milling, freight and smelting would be approximately $2.oo per ton; so without considering plant and equipment, it is evident that under the very best conditions there is no profit to be derived from the treatment of this dump.

J.N.D. Gray

August, 1922.

Crown King Mill file

CROWN KING DISTRICT

Flotation process used by the Randolph-Gemmill Development Co. on Crown King tailings, in the Crown King Mill, Yavapai Co., Arizona. See Flow-sheet.

At my visit 12th to 14th October, 1916, operations had been suspended. Mr. David B. Gemmill informed me that he expected to be treating the Crown King tailings again by December 1st, after certain improvements had been made in the old and dilapidated mill. No change in the flow sheet was contemplated, however. (Some of the residents informed me that the operators of the tailings pile had stopped work because they had run into tree stumps and other difficulties, making the material too expensive to handle).

The flotation cells used appeared to me to be practically the same as that described by James M. Hyde in the Mining & Scientific Press of

The following details of the flow sheet were given me by Mr. Gemmill:-

The material treated assayed:

0.30 oz. Au; 4.32 oz. Ag; 10% Zn; 8% Fe; 0.80% Cu; 53% Insol.

Only 30% would stay on 100# screen.

A dump scraper and team of horses were used to put the material on a belt conveyor, which dumped into a 150 ton bin.

Thence the material was fed automatically to a Huntington Mill, used as a mixer. About 1½ lbs. of the following mixture was added to each ton of tailings fed:

3 parts coal tar creosote
2 " Calol "C" (Standard Oil Co.)
1 " Pine Oil (#5 Gen. Naval Stores Co.)

The pulp passing thru 30# screen on the Huntington entered classifier cell No. 1, from which the froth concentrate taken off contained very little iron, and was clean enough to go direct to cleaner. table No. 3. About half the balance of material entering this cell passed out at the bottom, the exact amount being regulated by a needle valve. The other half flowed out of a hole nine inches from the top of the cell.

The part passing out of the bottom went to a Wilfley Table,

the clean iron product going direct to the iron concentrate bin, and a Zinc concentrate to the Zinc separating cell No. 7. Tailings from this table went to a Frenier pump which lifted it to classified cell No. 2

The overflow product from classified cell No. 1 passed to cell No. 2 whence a concentrate passed to cell No. 5 for cleaning.

Discharge from all regular cells was regulated by a float valve which kept the water level about 9" from the top.

The discharge from cell No. 2 went to the Frenier pump above mentioned, to be lifted to classifier cell No. 3, which made products similar to classifier cell No. 1.

1. Froth to cleaner cell No. 5.

2. Underflow to Table No. 2 where a zinc and iron product was taken off in same manner as on table No. 1. The tailings, however, from this table discharged in the general final tailing. The overflow from this cell went to cell No. 4, where a froth was taken off, the discharge from this cell going to the final tailing.

Froth from cells 2, 3, & 4 went to cell No. 5 where it was recleaned. The froth or concentrate from cell No. 5 went to cleaner table No. 4, and the underflow to the general heads.

The chief purpose of running concentrate over cleaner tables Nos. 3 & 4 was to wash out as much oil as possible. The separation of iron and zinc was not marked. Of the two products from these tables (1) Mixed iron and zinc concentrate went to cell No. 7; (2) the product of the back of the tables which contained a great deal of silica and oil went to cell No. 6, where it was recleaned, the float concentrate passing out with iron concentrate and the underflow returning to cell No.5.

On the results of the work of cell No. 7 the success of the Randolph-Gemmill process has largely depended.

The combined product as it entered this cell assayed about: 0.55 oz.Au; 11.0 oz.Ag; 30% Zn; 14% Fe; 3% Cu; 10% SiO_2.

It was found that it was very easy to float the zinc while it was rather difficult to float the iron. The zinc floated by

adding a little light vegetable oil while iron pyrite required plenty of heavy oil. The oil used was No. 350 General Naval Stores Conde Pine. Thus the zinc was floated and the iron dropped, but more copper went with the zinc, than the operators could have wished. However, two marketable products were obtained from one unmarketable concentrate by avoiding the heavy penalty for zinc above 20% in the iron concentrate and making a zinc product which could be marketed besides. The products assayed about:-

Iron Conc. 0.76 Au; 10.0 Ag; 17% Zn; 18% Fe; 2.7%Cu;20% SiO_2.
Zinc " 0.32 Au; 12.0 Ag; 44% Zn; 9% Fe; 4.5%Cu; 3% SiO_2.

The iron concentrate netted about $23.00 per ton and the zinc concentrate about $45.00 per ton. The concentrates were dried in four tanks 8' x 16' x 2' with filter bottoms similar to cyanide leaching vats, with false bottom slats covered with cocoa matting and canvas. Each tank was connected with vacuum pump. After the water had been drawn off, the cake concentrates were lifted off into a wheelbarrow and placed on a dryer made of steam pipes, which dried the concentrates to about 10% moisture. The total cost of the tanks etc. was about $600.00 and the results obtained were perhaps as good as would have been obtained with an expensive filter process.

On a basis of 70 ton of tailing treated per day, 10 tons of iron concentrate and four tons of zinc concentrate were obtained for which the receipts were:

10 tons iron concentrate	@	$23.00	$235.00
4 " zinc "	@	45.00	180.00
			415.00

The expenses per day were:-

Pay Roll	$80.00	
Fuel	30.00	
Flotation Oil	15.00	
Admin., Ins., etc.	15.00	140.00
Net profit per day		$275.00
Profit per ton		3.93
Less Royalty		1.50
Randolph-Gemmill's net profit		$ 2.43

L. F. H.

Sec Bonilla

Crown King

SPRINGFIELD MINE, Crown King, Yavapai County, Arizona.
Geo. P. Harrington & Co., Owners. Randolph-Gemmill Devel. Co., Lessees.

A fairly good wagon road has been built from Crown King to the mine, about 4 miles N.W., by the present lessees.

Visited Octo. 13, 1916 and went thru the workings with Mr.C.N. Loring, Supt. The ore body is on a porphyritic belt, probably quartz monzonite. The ore consists of chalcopyrite and chalcocite in bunches and seams. Not enough development has been done to determine the width of commercial ore. In the lower tunnel which is about 150' long is exposed an ore body four feet wide with almost pure chalcopyrite in seams from half an inch to knife blade thickness. Next to this ore body is a wider belt of very lean ground; next to this about three feet of very bunchy chalcopyrite, bornite and chalcocite. The total width of about 30' exposed by crosscuts in the tunnel would be quite low-grade but by sorting and cobbing, a moderate quantity of shipping ore could be obtained. I was informed that the ore shipped to Humboldt was a mixture of cobbed ore and "concentrate" obtained from a hand jig.

The Upper Tunnel 70' below the top of the hill is 50' above the Lower Tunnel and is connected by a winze. The strike of the quartz-monzonite is almost due North, Magnetic. Diorite crosses the strike of the quartz-monzonite and there is evidence of faulting in both tunnels.

The present intention of the operators is to determine the width of commercial ore by crosscutting and raising. They appear to have some hope of developing a large "porphyry copper" ore body but the present indications are that any considerable width will be too low-grade to be commercial.

CK

C

Crown King Trip - August 5-7, 1926. D. M. Barringer, Jr.

Left Humboldt 2 PM, August 5, arriving Crown King 5 PM.

Of the numerous properties now operating at Crown King, the following only were visited on this trip:

Silver Crown	Lincoln
~~War Eagle~~	Blue Bird
~~Gladiator~~	Del Pasco

Silver Crown: The two tunnels on the property have recently caved, and the company is now sinking an inclined shaft near the site of the old upper tunnel. The shaft, now 90' deep, is in the footwall, but has been encountering isolated patches of ore in the schist, which carry bornite, chalcopyrite, arsenopyrite, pyrite, tetrahedrite(?), and galena. The vein, which has been stoped to some extent above the level of the two tunnels, is about 10' wide at the outcrop, and is said to be a continuation of the same vein that runs through the Lincoln mine, etc. Mr. A. C. Jamersbach, president, in charge. T.M. Anderson is Mine Supt.

War Eagle: see report.

Gladiator: see report.

CK

Lincoln: tunnel caved, no work being done. Pike & Starbird are finishing a mill on the proerty, and M. A. Strain is operating a small mill on ore from the Del Pasco, q.v. He expects to start milling ore from the Blue Bird next week.

Blue Bird: On extension of the Lincoln vein (?). An old shaft and a drift tunnel above it are both inaccessible. Close to the old shaft M. A. Strain has sunk a new shaft 50', and drifted 30' at this level. The upper part of the shaft is close to old stopes from the old shaft. Below 25' the shaft and drift are both in 2½' to 3½' of milling lead ore, said to carry 40 oz. Ag and about 20% Pb. Sample taken from muck-pile of last round in drift sent to Tooele.

Del Pasco: Did not visit. Mr. Strain is milling ore from here, a sample of the concentrates from which ran: Au, 1.64; Ag, 3.2; Cu, Tr.; Fe, 32.2; Insol., 12.8. Will ship some. The mill is turning out 500# a day of these concentrates, sometimes slightly more.

Returned Humbodlt noon August 7.

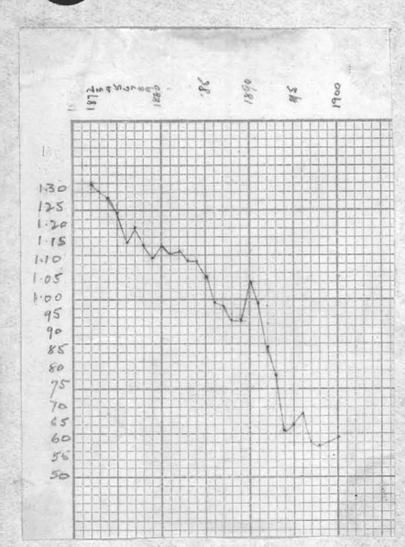
C.F.

NOTES ON CROWN KING MINING DISTRICT.

Local Geology: A stock of quartz-diorite in contact around its periphery with schist, granite, diorite and cut by porphory dykes are the outstanding geological features of the Crown King district. The trend of the dykes and fissures conforms more or less to the trend of the schists, which is N. N.E. The principal mines of the district are situated at or near the contact of the quartz-diorite and schist. The productive veins of the district may be divided roughly into three groups, from E. to W. (1) The Grey Eagle vein which runs from the Tiger Gold Group thru the Savoy, Silver Crown and possibly the Lincoln. (2) The Tiger-Crown King series and (3) The Wildflower-Springfield series. Associated with the gold bearing veins are considerable amounts of pyrite and sphalerite with a little chalcopyrite galena. In the silver veins the silver content is influenced by the amount of lead minerals present. In general, the principal silver mines have been in the quartz-diorite while the gold mines have been confined to the schists.

General Consideration: The main productive period of gold and silver was from 1873 - 1900. The later years of this period gold was the main product. The gradual drop in the price of silver from over $1.10 per oz. in 1884 to about 60¢ per oz. in 1894 was undoubtedly the main reason for the closing down of the silver mines. The gold mines continued working for some considerable time after the silver mines closed and only the exhaustion of the orebodies or impoverishment of the ore forced them to close. While the metallurgical recoveries were not so high as would be expected today, still this would be offset to some extent by lower working costs. It is justifiable in assuming that the gold mines were worked to the economic limit of the days and the possibility of easily finding a reasonable grade of ore in these mines is practically nil.

The position of the silver mines was altogether different. The steady drop in the price of silver from 1884 to 1894 with no comeback, would automatically have cut out blocks of developed ore until all but the richer portions of the veins were entirely eliminated. Then work would have been concentrated on the higher grade ore shoots and continued on them until their exhaustion. Also, portions of the vein which would have been attractive with dollar silver, as the price declined, would be given no consideration.



There is a marked unanimity amongst the old miners of the district regarding these mines, all claiming that there was considerable ore left when they were closed down and this seems to be justified by conditions explained. The greater portion of the ore developed would be able to show a profit at that time with silver at $1.00 per oz. and profitable ore then is profitable ore today.

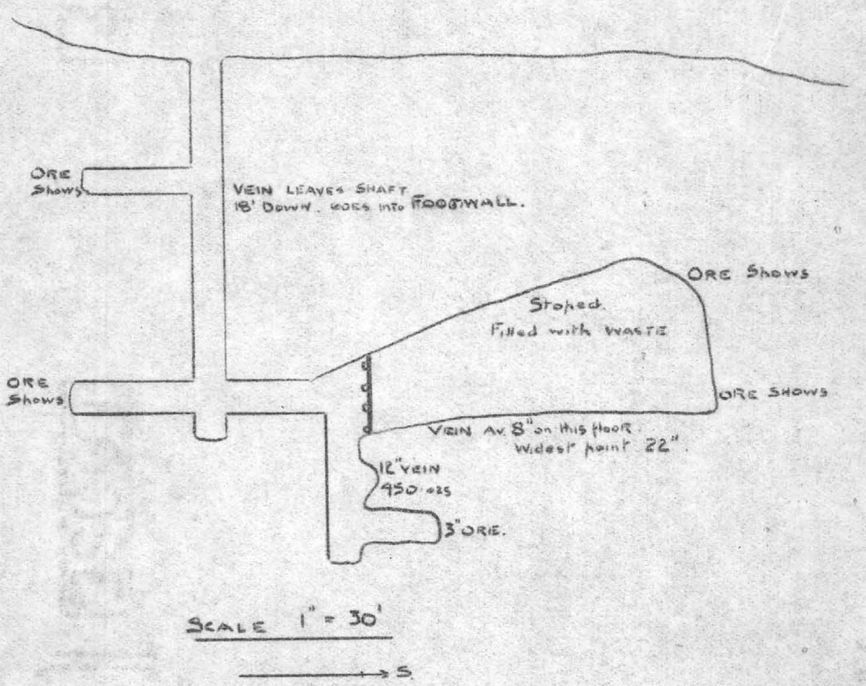
Crown King District (cont.)

Property: Cougar Mine.

Lessee: Al. André

Notes: Located 1½ miles S. of Crown King.

Country rock a hard silicious schist. Workings on a small vein parallelling the main vein of this section. At present mining a little ore in a winze. Where the vein can be examined it is from 2" to 12" wide. A sample across 12" assayed 450 oz. Ag. When the lessor gets ahead of the game he purposes doing some further development. He claims to have some ore left in stope of the same grade as he previously shipped and which ran 450 oz. Advised him to draw some of the fill and get after it. No indications of any great tonnage; occasional shipments of high grade ore. Sketch shows development.



HEADFRAME. ORE IN FOREGROUND.

* * * * * * * * * *

Property: Lida Mine.

Lessee: Victor Carlson, Crown King.

Notes: This property adjoins the Cougar on the South. Tunnel in about 350' on a continuation of Grey Eagle Vein - vein 2 to 5 feet wide. Stoping ore from high grade streak. By sorting and screening grade can be raised to about 75 oz. Ag. Systematic sampling might show up considerable ore of milling grade. The possibilities of the property are of developing milling ore. Sample of shipping ore assayed 87 oz. Ag.

Property: Silver Crown.

Agent: Tom Anderson, Crown King

Notes: Lies close to the Crown King mill. Owner claims to have 30,000 tons of 7 oz. ore already developed. Had no opportunity to look over the ground but it should be given consideration in event of the Crown King mill being taken over.

* * * * *

Property: The M & M.

Owners: J. J. McNeil and Mrs. Reid, Crown King.

Notes: Country rock quartz-diorite, cross cut to vein 74', drift on vein 200'; 40' raise to surface, 50' winze still sinking looking for shipping ore. Vein 8' wide at bottom of winze, phrphoritic vein matter, minerals showing sphalerite pyrite galena, traces of chloride of silver and an occassional speck of native silver. Might develop some milling ore; at present the outlook is not encouraging.

* * * * *

Property: Blue Jacket.

Owner: Tom Anderson, Crown King.

Notes: Developing shipping ore, expects to begin shipments by end of August.

* * * * *

Property: Aztec.

Lessees: B. M. Gino, Crown King.

Notes: Developing small vein of 150 oz. ore. Will ship as soon as he has carload ready, possibly in about two months.

* * * * *

Property: Savoy Mine.

Owner: Bernard Cenuiff, 210 W. 44th St., New York City, N.Y.

Notes: Lies S. of Congar and Lida mines on extension of Grey Eagle vein. Tunnel in 1700' on vein; width from 2 to 15 feet. 25,000 tons of 40 oz. Ag. ore blocked out below tunnel level. Conditions of workings unknown, possibly in bad shape; tunnel blocked at entrance. Information supplied by Victor Carlson who claims to have seen assay map of mine.

* * * * *

Property: Rapid Transit.

Owner: Ed. Walsh, Crown King.

Notes: Country rock mica schist, vein 2 to 4 ft. wide, quartz with pyrite showing. Drift on vein for 300 feet within 60 ft. of surface. Some 10 oz. Ag. ore in drift. Some ore of milling grade might be developed. Not very encouraging.

Property: Oro Belle

Owner: Mrs. Barnes

Notes: Lease been given to Jack Morgan on Oro Belle claim. Will not lease Grey Eagle claim, intends to work it herself this year. 25,000 tons of 20 oz. ore said to be lost in cave at 600 ft. level. Shaft caved and surface plant completely ruined. Would require considerable expenditure to prove statements. Outlook not very hopeful.

* * * * * * *

Property: Gazelle.

Agent: J.P. Sweet, Crown King.

Notes: Lies S.W. of Oro Belle. Good strong, well mineralized outcrops, little work been done and information lacking.

* * * * * * *

Property: Crown King Mine.

Owners: Murphy Estate, Prescott, Ariz.

Notes: A.Mr. Locey has a working option at present on all the claims of the Murphy Estate. Has commenced work with two men cleaning out tunnel on this mine. The workings are at present inaccessible. Local knowledge of the conditions and ore left in this mine are conflicting. A fault at the N. end of the workings cut out the ore but understand that the ore body was picked up beyond the fault but proved low grade. All available ore of reasonable grade was undoubtedly mined. To prove any statement to the contrary would be a costly proceeding and unless there was positive evidence of sufficient ore left in mines to cover cost of reclaiming, it would not be worth while considering.

* * * * * * *

Property: Union Mining Co.

Lessees: Gemmel & Saylor were last lessees.

Notes: One mile West of Crown King.

Country rock quartz-diorite. All ore in sight taken out and mine in bad shape. Vein enters property from the Saratoga group and is an extension of the Crown King vein. The last lessees shipped 10 lots which averaged Au. $4; Ag. 30 oz., Cu. 3.40%. No work being done at present. Possibilities of ore being found below adit level but this would entail considerable development work.

* * * * * * *

Property: Saratoga Mines.

Owner: J. L. Deming, Crown King.

Notes: The Crown King mine dump is on the Buckeye claim of this group. Country rock mainly quartz-diorite. A little work done on a continuation of the Crown King vein. Property bounded on N. by Crown King Mine and on So. by Union. The schist-quartz-diorite contact is on the Buckeye Claim of this group and the Crown King Co. mined up to about the line. A 60 ft. shaft on the Saratoga side of the line is at present being unwatered and the prospects of getting

Property: Saratoga Mines (Cont).

some ore with a little work are good. Considering the promimity of this mine to the richest mine of the district and of its having the same vein running thru it, remarkably little development work has been done, but sufficient may have been done to prove that the rich ores stopped with the schist. However, on the Union mine to the S. some ore has been taken out near the surface from the same vein which ran 30 oz. Ag. with some gold and copper. It has possibilities.

* - - - - -

Property: Philadelphia Mining Co.

Supt. J.P.Sweet, Crown King.

Notes: Tunnel driven N.W. for 5000 ft., so far without tapping any orebodies. Plenty of vein matter but no values. Expect to cut the War Eagle-Gladiator vein in 150 ft. No ore of any grade available at present.

SUMMARY

Copper: The only prospect of note in the district is the Springfield and that has been fully dealt with in another paragraph.

Gold: The workings of the principal gold producers are all in bad shape. There is no reason to believe that any bodies of good grade ore were left unmined; in fact, reasoning, points to the contrary. The principal mine dump of the district does not measure up to anything like the valuation placed upon it and much of the local gossip can be discounted. To unwater and clean out these old workings for examination would entail a very considerable expenditure and unless definite evidence can be produced regarding the ore in these mines, it would be folly to go to the expense of opening them up on hearsay.

Silver: To the S. and S.W. of Crown King and within a radius of 2½ miles from the railroad station is the most promising silver section of this district. There are a few lessees working at present in a haphazard way on small veins of good grade ore. This ore comes in bunches so tonnage from these properties will be limited. Any considerable tonnage will require to come from the old mines which have been proved and developed to some extent.

From the discussion regarding operating conditions in these mines at the time of their activity, it is reasonable to assume that considerable amounts of ore of a milling grade have been left unmined. The amount left and its accessibility must be given careful consideration. It would be advisable to get together all available data from the owners of these mines before proceeding further

* * * * *

The mine which gives promise of having the most tonnage is the Tiger. In event of this property being leased it would be advisable to get control of the mill at Crown King. This mill could be put in condition at a nominal cost. The aerial tramway from the Wildflower mine to the mill should also be taken over and could be re-erected to the Tiger property if necessary. There are also possibilities of custom ore, as instanced in the Silver Crown.

J.N.D.G.

Humboldt
7-24-22

GFM

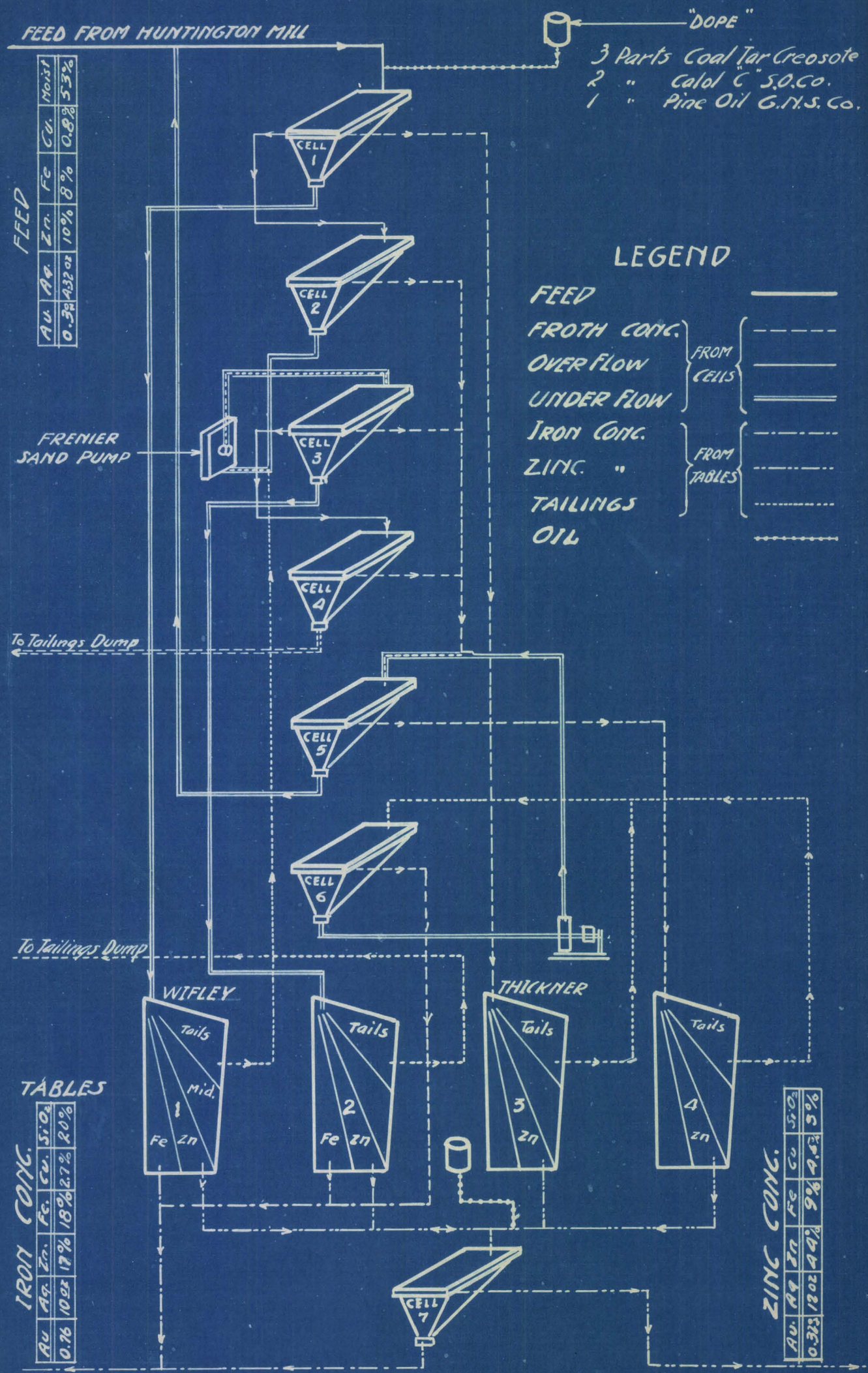
NELSON MINING COMPANY, adjacent to Crown King Mine, Yavapai Co. Mr. George P. Harrington, Manager. Visited Octo. 13, 1916. Found nobody but was informed afterwards that two men were doing some surface work. On the dump at the lower tunnel are some large pieces of ore some of them about 100 lbs. in weight, indicating that somewhere there is a streak of ore showing zinc, lead and a little copper. On his return from Prescott, Mr. Harrington informed me that this ore came out of the 250 foot raise connecting the lower and upper tunnels. I did not reach this raise when I went underground alone.

Mr. D. B. Gemmill states in a report:
"Mr. Harrington has developed in the Nelson Mine a shoot of ore from which he can maintain steady production."

It is stated to be the intention of the Nelson Mining Co. to have its ore treated in the Randolph-Gemmill Flotation Plant in the ~~Xxxx~~ Crown King Mill, when operations are resumed by the Randolph-Gemmill Co.

The Nelson Mining Co. appear to be notorious for poor management.

J. F. Holland



FLOW SHEET - CROWN KING MILL

OCT. 19. 1916

NOTES ON CROWN KING DISTRICT

Property: Springfield Group.

Agent: J. P. Sweet, Crown King.

Notes: This property consists of 6 Claims located two miles W. of Crown King R.R. station or 3½ miles by wagon road.

The country rock is quartz-diorite. Ore has been discovered on three claims of this group under the same conditions. The ore occurs in a porphory dyke. Local fracturing in this dyke and subsequent depositions of copper in the form of chalcopyrite, and iron pyrite resulted in these orebodies.

The Venus Claim has been given more attention than the others of the group and it is stated that the Bradshaw Reduction Co. spent $30,000 on it.

GORILLA CLAIM: The possibilities of this claim were apparently overlooked. The early work was confined to opening up an 18" vein of high grade copper ore by a tunnel 300 ft. long and stoping to surface. About 50 ft. in on this tunnel a fractured zone appeared and a small body of ore, 20' x 20' was outlined by drifting around it. A 50' winze was sunk at the N.E. corner of this block and the orebody outlined again; at this depth it was 27' x 45'. Some ore was stoped from the 50' level and screened. This ore would probably be taken from the best looking face. Twenty tons of screenings were shipped to Humboldt and gave a return of 8½% copper. The rejects, or coarse ore, was sampled and ran 5% copper. The mineral is chalcopyrite and iron pyrite cementing the fractures in the porphory with a little of it showing throughout the whole mass. The workings below the adit were filled with water but the owners claim to have developed 2000 tons of 4% copper ore. If the dimensions given are correct there would be nearer 3300 tons, than 2000 tons, outlined. The fractured zone increasing as it does from the surface to a depth of 50 ft. below adit level, it is reasonable to assume that this condition will continue for some depth and undoubtedly if the fracturing is there the cementing mineral will be found also. The orebody trends N.E. and the area at a depth of 50 ft. is three times greater than that at the adit level, so, should conditions, already found, continue, then a considerable tonnage can be made quickly available

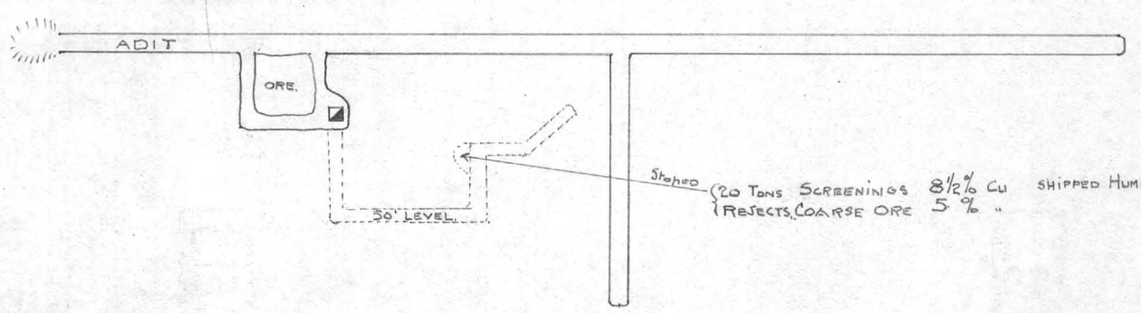
VENUS CLAIM: A vertical shaft 175 ft. deep, a 200 ft. tunnel connected to shaft at 80 ft. and a 200 ft. drift S. at bottom of shaft is all work done on this claim. Shaft was sunk most of the way in 6% ore which was sorted up to 12%; at the bottom of the shaft ore only runs 2% Cu. Equipment consists of 15 H.P. F.M. Gasoline hoist, 2½ HP Gas Engine and pump, hoisthouse and blacksmith shop, and plentiful supply of hand steel and tools.

URANUS CLAIM: Two 50 ft. tunnels show a brecciated porphory zone 30' wide, cementing material quartz and iron pyrite, very little chalcopyrite showing. It looks as if the copper minerals had been leached & replaced by quartz and pyrite.

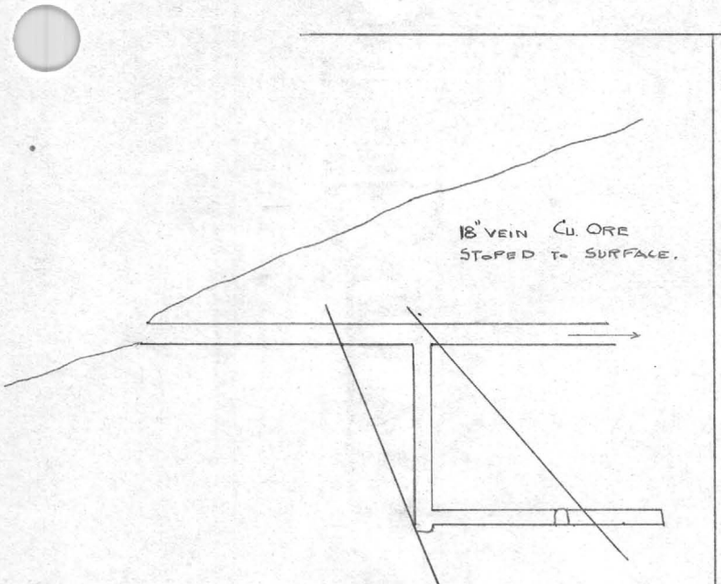
Springfield Group

The workings on the Gorilla Claim were available for inspection at the adit level. From the appearance of the orebody at this point it would easily run the 4% Cu. the owners claim for it. On account of the very friable nature of the valuable contents, small scale sampling would be unreliable and misleading and bulk sampling will be necessary. The workings below adit level can be unwatered in a week. I would advise having this done and the orebody bulk sampled. Provided the ore below is of the same grade as can be seen at present, by shipping the sample (2 carloads) to Humboldt, at least 60% of the cost of this work can be met. Mr. J.P.Sweet of Crown King is in control and he is anxious to have the mine proved and I feel sure exceptionally good terms can be made in event of the sampling proving satisfactory.

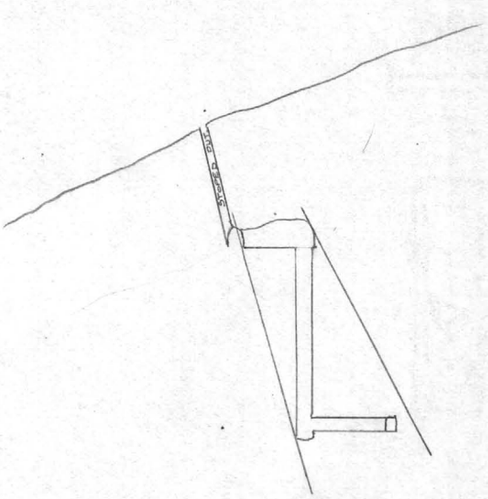
There is camp accommodation for 15 men. The road to Crown King can be put in shape for $500.00 so that a truck could run over it. A 3' x 3' Ball Mill, about 20 ton capacity, and a 10 x 7 jaw crusher are at Crown King and owned by Mr. Sweet. The frame work of a small ore bin is erected at the mouth of the adit. The completion of this small mill would be the logical way of sampling this orebody. The workings were recently in good condition so they should be accessible after unwatering.



PLAN.



LONG. SECTION & ADIT.
OREBODY OUTLINED



X SECTION IN ADIT.
OREBODY OUTLINED

GORILLA TUNNEL.
SCALE 1" = 50'.

SKETCHES FROM INFORMATION FURNISHED by J.P. SWEET, CROWN KING, ARIZ.

CROWN KING DISTRICT

Note by G. M. Colvocoresses,
October, 1937.

The report by Gray in 1922 covers the following mines or prospects regarding which I might add the following notes to bring the record up to date:

COUGAR: Shipped a little high grade ore from a rich pocket. Now idle for many years.

LIDA: Idle and worthless to the best of my knowledge.

SILVER CROWN: Some work done here about 1929 but no good result.

M & M: Idle and probably worthless.

BLUE JACKET: Shipped a little ore from pocket at intervals.

AZTEC: Small shipper at intervals.

SAVOY: An old mine which may have merit and should be operated in conjunction with the Oro Belle and Gray Eagle (E.V.).

RAPID TRANSIT: Probably worthless.

ORO BELLE: See special reports.

GAZELLE: No further activity as far as I know.

CROWN KING MINE AND DUMP: See special report.

UNION MINING COMPANY: An effort to reopen this mine was made in 1936 by Moore and Maguire; they soon became discouraged and quit.

SARATOGA MINE: See data on Crown King Mine & Dump.

PHILADELPHIA: Never found any pay ore.

The brief notes by Barringer bring the situation up to 1926 in respect to the Silver Crown, Lincoln, Blue Bird and Del Pasco.

I have personally visited the Crown King district on several occasions, and looked over many of the mines and prospects and discussed them with several competent engineers.

The camp has a bad name and has been passed over by

the larger companies so that practically all of the operations during the past twenty years have been undertaken either by wholly inexperienced concerns or without proper financial backing and technical advice.

The entire district is well mineralized and high grade ore has been produced from many veins. I do not think that any large mine is likely to be developed but I do believe that the chances are good for a profitable production of gold, silver, lead and copper ores, and I feel that this district as a whole merits a thorough investigation and reappraisal on the basis of present prices and modern metallurgical methods.

COUGAR MINE

Crown King District

Shipped some high grade silver ore (87 oz.) and a little more of similar grade might be obtained.

G.M.Colvocoresses

August 11, 1944

CROWN KING OPERATIONS

Met Douglas Comer who said that he had arranged to proceed with his operations with the financial backing of a man named Silverman who formerly owned and operated the Trench Mine before he sold it to the A. S. & R.

Comer's option on the Gladiator Mine has expired so that this is not included in the deal and chances for the success of Comer's project look very slim especially if he is obligated to repay to the Metals Reserve Corporation their loan of some $40,000.00 or more. (Advise Morton)

Put in Old Tiger file.

NOTES RE CROWN KING May 7, 1943

Visited Old Tiger Mine (Tiger) see file.

Opened up from Hammon and Riggs Tunnel which is some distance south of old shaft and will give back of some 200' on two parallel veins each about 4' wide and developing gold, silver, copper, lead zinc ore with gross value $14-15 per ton.

About 25,000 tons of ore developed in these two veins above the adit and every reason to expect that it will go down. Corner has completed road to bin at portal of adit and will truck ore some 6 miles to Crown King Mill now owned by Corner (subject to payment of his note) and mine should be able to produce 40-50 tons of ore per day and milling may start in early June.

Treatment will be complicated and it is not yet sure that a satisfactory recovery can be made altho it is hoped that they will get 80% in the two products, i.e. a lead-copper and a zinc concentrate and that the bulk of the gold silver values will go with the copper-lead.

Corner has a Govt. loan of $160,000. — cut off Crater about 50 ars.

Percy Helm is operating the Springfield on the Gorilla Claim.

The old Harrington Tunnel is in the Jack-Pot Claim and it was supposed to have branched and cut thru the War Eagle (Gladiator) vein in which no pay ore was found.

Road via Senator is in fair shape and only 42 miles to Prescott as against 65 or more via Cleator.

Del Paseo Mine is operating on the Joker Claim.

Corner may later work on the Wildflower in which there still remains some rather low grade ore but he is not likely to do anything at the Crown King Mine. There is an old mill building on the Oro Bille which can be seen from the Crown-King-Horse Thief Road.

The Swastike Mill is still intact and Kingdom is trying to develop a copper vein which lies some 150-200' west and south of the main workings and can be reached by an underground cross-cut. Probably they will try to get a Govt. loan to carry on this work.

Corner's work is being done on the 2nd Extension Tiger Claim near to the Wild Cat and the Union Claims.

Swastika Mill still intact in July of '44.

Corner has sold his interest in the Tiger and Crown King to Silverman who once owned the Trench Mine at Patagonia.

LIST OF MINES IN CROWN KING DISTRICT ON WHICH REPORTS ARE SENT.

COUGAR

LIDA

SILVER CROWN

M & M

BLUE JACKET

AZTEC

SAVOY

RAPID TRANSIT

ORO BELLE

GAZELLE

CROWN KING MINE AND DUMP

UNION MINING COMPANY

SARATOGA MINES

PHILADELPHIA

LINCOLN

BLUE BIRD

DEL PASCO

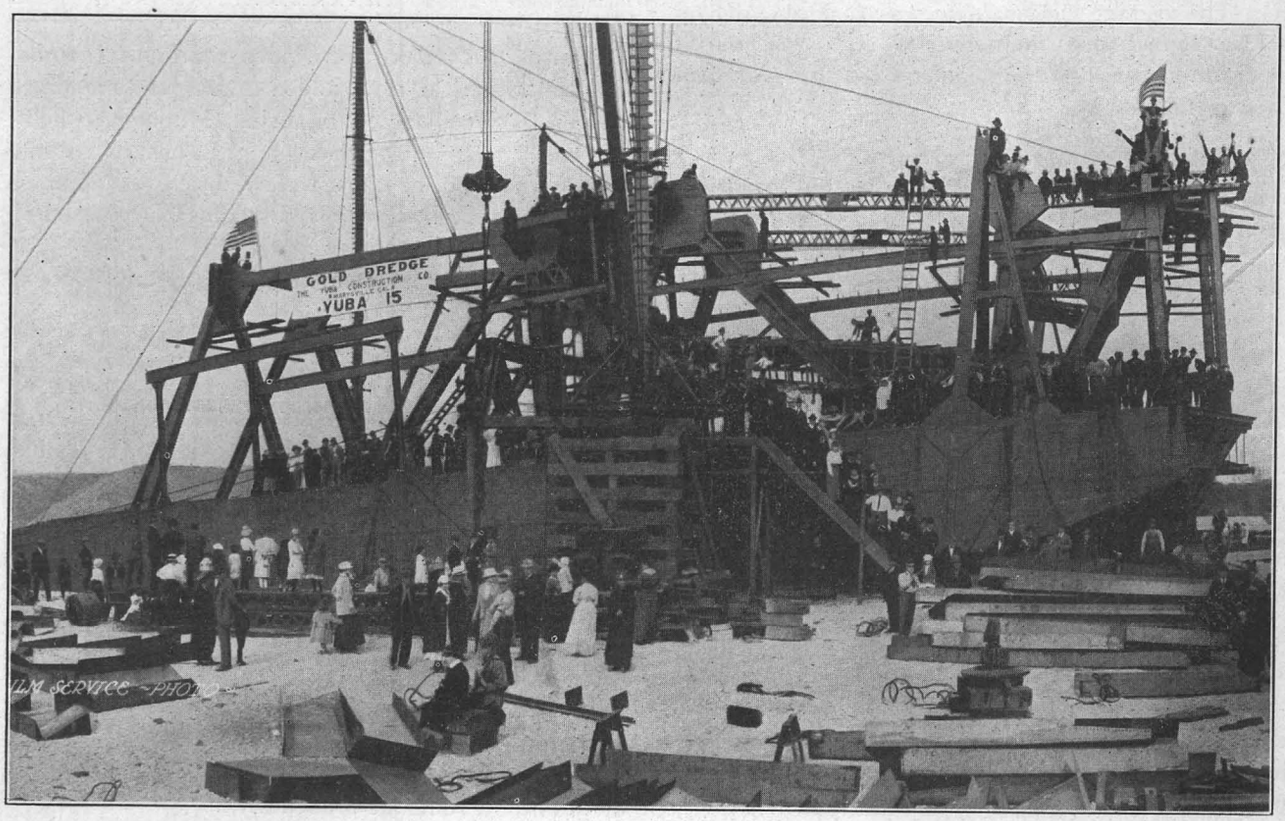
Treating Mill Tailings in Arizona.

Randolph-Gemmill Development Co., Prescott, Ariz., is successfully treating the dump of mill tailings at the Crown King mill. These tailings accumulated 12 to 15 years ago, as the result of jig and table concentration of a complex ore from Gold King mine. Their contents are as follows: Gold, 0.3 oz.; silver, 4½ ozs.; iron, 10%; zinc, 11%; copper, 0.8%; insolubles, 53%. The method is first to make a bulk concentrate over tables and by oil flotation, in the ratio of 4 in 1. That is, out of 100 tons of tailings there would be a bulk concentrate product of 25 tons. The latter is retreated, the zinc and iron being separated, giving as products 9 tons of zinc and 16 tons of iron concentrates. The zinc product carries 45% zinc, 10% iron, 4½% copper, 13 ozs. silver and 0.35 oz. gold; the iron product runs 0.8 oz. gold, 12 ozs. silver, 15% zinc, 18% iron, 3% copper, and 25% insoluble. largely due to Mr. Gemmill's efforts. The plan is to These products are shipped-to the smelter at Humboldt. After paying a royalty of $1.50 per ton for the tailings, and paying all operating expenses, the company has made a net profit of $2.50 to $3 per ton of tailings treated, handling 70 to 80 tons per day. Work was begun on this dump last fall, and, after being closed during a few weeks of cold weather, the operations began about March 1. The dump of tailings will be exhausted by September.

The Randolph-Gemmill Co. is made up of M. P. Randolph, president; F. S. Viele, vice-president, and David B. Gemmill, engineer. The successful working out of a profitable method of treating the complex material composing Crown King mill tailings was apply these methods to the complex ores of Crown King district generally, and to carry this plan through the Randolph-Gemmill Development Co. will erect a custom mill at Crown King, which is at the railroad terminus of the Bradshaw mountain branch of the Santa Fe.

New Gold Dredges for Yuba Con.

Yuba Construction Co., San Francisco, which for some time has had under construction Yuba gold dredges Nos. 15 and 16 for Yuba Con. Goldfields, launched dredge No. 15 on March 26, and it will be ready for operation late in May. Dredge No. 16 will be launched and put in service later in the summer. The two dredges, which are the same in design and capacity, have 16-cu. ft. buckets, steel hulls, steel decks and gold-saving tables of steel. The machinery, including three pumps, screens and stacker for each dredge, will be operated by eight motors, aggregating 1000 hp. They are being built at Hammonton on Yuba river, 12 miles from Marysville, Cal., and will be operated at this place in ground that runs about 80 ft. depth to bedrock. The rated capacity of each dredge is 10,000 yds. per day.



LAUNCHING NO. 15 YUBA DREDGE.

A Recent Method of Poling Copper Baths.—Copper in the reverberatory furnace is rabbled with air towards the end of the run to oxidize impurities such as arsenic, sulphur, etc. In this way some of the copper becomes an oxide and goes with the slag. To reduce the copper back to its elementary state, large green poles are put in the furnace and the copper bath is poled. In U. S. patent 1,183,736, E. C. King holds that this reduction may be accomplished by introducing hydrocarbon oil, air-free, through a pipe with its nozzle or open end placed below the surface of the copper bath.

The Calumet & Hecla Co. in 1915.

The Calumet & Hecla Mining Co. earned $63.50 per share on its 100,000 shares in 1915, out of which dividends of $50 per share were paid. The company's surplus increased from $6,902,866 to $8,256,445.

According to the annual report for the year ending Dec. 31, 1915, there was a production of 72,613,320 lbs. of copper, of which 1,582,802 lbs. were recovered from the sand bank at Torch lake, produced at a cost of 9.33 cts. per pound. The previous year's production totaled 53,691,562 lbs. at a cost of 11.35 cts. The average yield in 1915 was 22.28 lbs. of copper per ton of rock compared with 20.70 lbs. in 1914. Operating results of the company for the year compare as follows:

	1915.	1914.	1913.
Tons rock treated	3,188,583	2,592,462	2,035,625
Mining cost	$1.71	$1.85	$2.38
Pounds refined copper	71,030,518	53,691,562	45,016,890
Pounds copper per ton	22.28	20.70	22.11
Cost per lb. construction	.47c	1.00c	1.54c
Total cost per lb.	9.33c	11.35c	14.25c
Price received	18.11c	14.01c	15.77c

The balance sheet as of Dec. 31, 1915, compares as follows:

Assets:	1915.	1914.	1913.
Cash	*$6,552,165	$3,784,662	$3,840,161
Bills receivable	.....	533,729	334,845
Sinking fund inventory	1,599,823	463,340	446,466
Due from subsidiary companies.	.....	772,084	537,919
Calumet Transp. Co.	.....	348,511	348,511
Supplies	1,391,293	1,529,907	1,772,324
Total	$9,543,283	$7,432,236	$7,280,230
Liabilities:			
Drafts in transit	$ 29,541	$ 80,132	$ 516,408
Accounts payable	828,390	449,237	209,828
Reserve for freight smelting, refining, etc.	428,905	.....	.....
Surplus	8,256,445	6,902,866	6,553,964
Total	$9,543,283	$7,432,236	$7,280,230

*Includes accounts receivable, copper and silver sold but not delivered.

Dividends received from other mining companies exceeded the interest paid on Calumet & Hecla notes by $737,816, compared with $78,962 in 1914 and are not credited in costs. Dividends paid by company to Dec. 31, 1915, aggregate $129,250,000. Dividends received from subsidiaries follow:

	Isle Royale.	Ahmeek.	Osceola.	Allouez.	Total.
Through 1911	.....	$ 49,600	$ 999,282	.....	$1,048,882
In 1912	.....	443,400	409,375	.....	852,775
In 1913	$32,300	539,264	243,875	.....	915,439
In 1914	.....	147,072	98,250	.....	245,322
In 1915	.....	563,776	262,000	$41,000	866,776
Total	32,300	1,743,112	2,112,782	41,000	3,929,194

There were $4,134,000 4% 10-year notes dated Feb. 18, 1909, outstanding Dec. 31, 1915, of which $1,370,000 are in company's sinking fund, against $450,000 on Dec. 31, 1914.

Reclamation Plant.

The above comparison does not include the results of operations on the sand bank at Torch lake. The reclamation plant is now at work on the Calumet sand bank going into commission in June, but was interrupted by power difficulties in July and August. Since September it has been running continuously, the number of mills in commission gradually increasing, though full capacity was not reached until December. At present there are 48 Hardinge mills in this plant regrinding sand bank tailings; this will be increased by 16 Hardinge mills now handling stamp mill tailings as soon as the old (or No. 1) recrushing plant is remodeled to handle all current tailings from the stamp mills.

With three-quarters of the plant in commission, production at present is at the rate of 5,000,000 lbs. of copper annually.

The results from the operation of the reclamation plant follow:

Tons tailings treated	181,732
Pounds per ton in material treated	21.80
Pounds copper saved per ton	8.71
Pounds copper produced	1,582,802
Cost per pound, excluding smelting and selling	4.02c

During 1915 there were 3000 shares of Calumet Transportation Co. stock added to company's holdings in subsidiary companies. Laurium Mining Co. holdings were increased 273 shares to 37,823 shares. White Pine Copper Co. holdings were reduced 100 common shares to 42,602 and preferred holdings increased 18,460 shares to 34,259 shares.

Operating results from conglomerate and Osceola lodes compare as follows:

	Product.		Lbs. copper ton rock. Cost lb.			
Lodes:	1916.	1915.	1916.	1915.	1916.	1915.
Conglomerate	51,738,588	37,996,045	29.74	26.38	8.69	10.42
Osceola	19,291,930	15,695,517	13.32	13.62	9.71	10.20

Stamp Mills.

Operating results of the new No. 2 recrushing plants and old No. 1 plant follows:

	1915		1914	
	No. 1 plant.	No. 2 plant.	No. 1 plant.	No. 2 plant.
Tons coarse tailings crushed.	337,243	168,461	351,929	75,630
Lbs. per ton in material treated	13.14	13.14	11.52	11.84
Pounds copper saved per ton.	4.01	4.73	3.74	4.59
Pounds copper product	1,352,869	796,858	1,316,704	347,363
Cost per pound, excluding smelting and selling	6.52c	4.36c	7.38c	5.66c

No work has been done in the Kearsarge lode since July, 1913, and no work done last year on St. Louis or Manitou-Frontenac branches.

The openings on Osceola lode show about the same grade of rock as last year. The product secured from footwall stopes was about 31½% of the total product from this branch. Shaft openings are so far in advance of drifts that no sinking has been done during the year.

About 51 drills have been at work on conglomerate lode during the year removing shaft pillars and cleaning up arches and the backs of old stopes. A total of 379,201 tons has been secured from these operations. There is not much change in the character of the openings in the Hecla and South Hecla branches.

Mazda lamps are superseding the old carbon electric lamps; they give better light for less current. It is sometimes possible to reweld one of these Mazda lamps; that is, occasionally the little wires in the globe become detached, by tilting the lamps until the curve meets the holding wire, when the current is on it will weld itself and give service as before.

Crown King Trip - August 5 - 7, 1926. D. M. Barringer, Jr.

Of the numerous properties now operating at Crown King, the following only were visited on this trip:

Silver Crown
Lincoln
Blue Bird
Del Pasco

Silver Crown: The two tunnels on the property have recently caved, and the company is now sinking an inclined shaft near the site of the old upper tunnel. The shaft, now 90' deep, is in the footwall, but has been encountering isolated patches of ore in the schist, which carry bornite, chalcopyrite, arsenopyrite, pyrite, tetrahedrite (?), and galena. The vein, which has been stoped to some extent above the level of the two tunnels, is about 10' wide at the outcrop, and is said to be a continuation of the same vein that runs through the Lincoln mine, etc. Mr. A. C. Jamersbach, president, in charge. T. M. Anderson is Mine Supt.

Lincoln: Tunnel caved, no work being done. Fike and Starbird are finishing a mill on the property, and M. A. Strain is operating a small mill on ore from the Del Pasco, q.v. He expects to start milling ore from the Blue Bird next week.

Blue Bird: On extension of the Lincoln vein (?). An old shaft and a drift tunnel above it are both inaccessible. Close to the old shaft M. A. Strain has sunk a new shaft 50', and drifted 30' at this level. The upper part of the shaft is close to old stopes from the old shaft. Below 25' the shaft and drift are both in 2½' to 3½' of milling lead ore, said to carry 40 oz. Ag. and about 20% Pb. Sample taken from muck-pile of last round in drift sent to Tooele.

Del Pasco: Did not visit. Mr. Strain is milling ore from here, a sample of the concentrates from which ran: Au. 1.64; Ag. 3.2; Cu. Tr.; Fe. 32.2; Insol. 12.8. Will ship some. The mill is turning out 500# a day of these concentrates, sometimes slightly more.

FLOW SHEET - CROWN KING MILL

OCT. 19, 1916

REPORT

on

CONCENTRATION TESTS

on

CROWN KING DUMP

Crown King File

SUMMARY

At the outset of the experimental work, it was the intention to make commercial grades of concentrates in the simplest manner.

Only one method of carrying this to completion, experimentally, was at hand; that was Differential Flotation. Since Tabling had been tried, previously, with poor results, Differential Flotation under various conditions was attempted. From results, given in report, it is seen that this attempt was a failure.

A sample of the dump was sent to the Campbell Magnetic Separating Co. for treatment. The intention was to see if some magnetic separation or combination could be effected. This also was a failure.

Direct methods having failed, Mass Flotation was worked out and found successful in raising the minerals together as the following recoveries show:-

Zinc recovery	=	92-95%
Copper "	=	89-91%
Iron "	=	60-70%
Gold "	=	80-90%
Silver "	=	80-90%

This is as far as we are able to go. To determine whether or not a commercial separation of the concentrate is possible; experimental work on a larger scale will be required.

However several methods of treatment were thought out and information was sought on others. A synopsis of the most likely methods is given in the report and a combination Flotation and Table Method is suggested as the best commercial treatment; all things considered.

Definite conclusions arrived at are:-

First; The dump is uniform thruout in both size of material and mineral content.

Second; Further grinding of the dump is unnecessary and offers no advantage for Mass Flotation.

Third; No results can be obtained with Differential Flotation.

Fourth; It is unnecessary to heat the pulp as no better results can be obtained by its application.

Fifth; The ratio of concentration, by Mass Flotation, will be approximately two to one.

REPORT ON CONCENTRATION TESTS ON CROWN KING DUMP.

Location

The Crown King Dump is located about 200 yards fromtthe Crown King Station on the Bradshaw Mountain Branch of the Santa Fe,P. & P. R. R. at Crown King, Yavapai County, Arizona.

Description

It is a residue from a Gold-Silver-Zinc Mill and it is situated adjacent to this mill. It contains about 13,000 tons of material. Five samples, as described below, were taken:-

#2 - South Side of Dump.

#3 - Two Pits near Centre of Dump.

#4 - North Side of Dump.

#5 - Tunnel on North Side of Dump.

#6 - Portion of Composite of Pipe Samples of Dump.

This last sample was from previous sampling.

These samples were all similar in appearance. The gangue seemed weathered but an assay of #6 Sample showed no Zinc Sulphate which shows that the minerals, if weathered at all, are only slightly so.

Dump Gradings & Values.

Sizing Tests, run on the above samples, show the uniformity of the entire dump and are given below.

Sizing Test of Sample # 2.

Mesh	% by Weight	Assay			% Mineral.		
		Zn	Fe	Cu	Zn	Fe	Cu
On 35	2.5	4.39	4.06	0.62	1.3	1.5	1.3
On 65	22.5	6.00	5.89	0.80	15.5	19.2	15.2
On 100	17.5	7.50	7.92	0.92	15.1	19.1	13.6
On 200	22.5	10.60	8.12	1.34	27.5	25.1	25.5
Thru 200	35.0	10.07	6.90	1.50	40.6	35.1	44.4
Total	100.0	8.68	6.88	1.18	100.0	100.0	100.0

Sizing Test of Sample # 3.

Mesh	% by Weight	Assay			% Mineral.		
		Zn	Fe	Cu	Zn	Fe	Cu
On 35	2.5	6.32	5,48	0.74	2.3	2.0	1.8
On 65	20.0	4.93	6.04	0.62	14.1	17.7	12.1
On 100	15.0	6.86	6.70	0.70	14.8	14.7	10.3
On 200	25.0	6.96	7.51	1.10	25.0	27.6	26.8
Thru 200	37.5	8.14	6.90	1.34	43.8	38.0	49.0
Total	100.0	6.97	6.82	1.03	100.0	100.0	100.0

Sizing Test of Sample # 4.

Mesh	% by Weight	Assay Zn	Assay Fe	Assay Cu	% Mineral. Zn	% Mineral. Fe	% Mineral. Cu
On 35	5.0	6.64	5.25	0.90	3.5	3.2	3.5
On 65	20.0	6.40	7.68	0.74	13.3	18.6	11.7
On 100	15.0	8.89	9.69	1.02	13.9	17.5	12.1
On 200	27.5	11.57	9.69	1.44	30.2	29.2	31.2
Thru200	32.5	10.72	7.47	1.62	39.1	31.5	41.5
Total	100.0	9.59	8.29	1.27	100.0	100.0	100.0

Sizing Test of Sample # 5.

Mesh	% by Weight	Assay Zn	Assay Fe	Assay Cu	% Mineral. Zn	% Mineral. Fe	% Mineral. Cu
On 35	5.0	9.80	6.87	1.18	3.7	3.6	3.8
On 65	20.0	9.54	8.48	1.08	14.4	17.7	14.0
On 100	15.0	10.50	10.10	1.12	11.9	15.8	10.9
On 200	25.0	15.43	11.72	1.68	29.1	30.5	27.2
Thru200	35.0	15.54	8.89	1.94	40.9	32.4	44.1
Total	100.0	13.27	9.60	1.54	100.0	100.0	100.0

Sizing Test of Sample # 6.

Mesh	% by Weight	Assay Zn	Assay Fe	Assay Cu	% Mineral. Zn	% Mineral. Fe	% Mineral. Cu
On 35	2.5)						
On 65	15.0)	6.32	7.3	0.70	10.4	15.9	10.3
On 100	15.0	8.47	9.3	0.86	12.0	17.4	10.9
On 200	25.0	12.33	8.7	1.26	29.1	27.1	26.5
Thru200	42.5	12.12	7.5	1.46	48.5	39.6	52.3
Total	100.0	10.61	8.04	1.19	100.0	100.0	100.0

Of the above samples, # 6 was assumed to be the most representative because of the nature of taking of the sample and hence all work done was on this sample.

Dump Analysis.

An analysis of Sample # 6 follows;

Au	Ag	Cu	Insol	Fe	Zn	$ZnSO_4$	Pb	Al_2O_3	CaO	MgO
0.30	4.30	1.16	49.6	8.1	10.82 (10.8%)	Nil	Trace	0.4	5.1	1.74

Condition of Au & Ag.

In order to determine if the gold and silver were free or associated with the iron or zinc, an analysis and an amalgamation test was made of some old concentrates found in the Crown King Mill. The following are the results;-

	Before Amalg. Au	Before Amalg. Ag	After Amalg. Au	After Amalg. Ag	Difference Au	Difference Ag
Iron Conc.	1.90	17.56	1.40	16.40	0.50	1.16
Zinc Conc.	0.52	8.60	0.46	8.60	0.06	0.00

The above analysis shows that most of the gold and silver is associated with the iron. Therefor it is most important that a good recovery be made of the iron.

Treatment.

The complexity of this material is evident after a glance at the analysis of Sample # 6. The analysis indicates the commercial separation to be a high grade Zinc Concentrate to be shipped and a Copper-Iron-Gold-Silver Concentrate to be treated locally.

This method of treatment was attempted previously by means of tables. Consequently the remaining mineral is fine. Retabling was tried and proved a failure. As was shown by the dump sizing tests, 77% of the Zinc; 66% of the Iron; and 79% of the Copper mineral values were thru 100 mesh. These sizing tests prove conclusively that neither a section nor a portion of the dump can be eliminated.

On account of the fineness of the mineral, some method of treatment, other than tabling is necessary for the majority of the mineral.

Differential Flotation. Hot & Cold Circuit Method.

Differential Flotation was first tried. It was attempted to remove the Iron and Copper in cold solution and the Zinc later by the addition of heat. This was an absolute failure for several reasons.

First; In order to remove any iron in the cold solution, so large a quantity of oil had to be added that the pulp became overcoagulated and hence gangue and mineral form equal parts of the froth when heat was added later.

Second; The Zinc floats more readily than the Iron. Hence we have a condition which precludes all possibility of making a Copper-Iron Concentrate without a high percentage of Zinc. The only differentiation possible is a Copper-Iron-Zinc Concentrate and an Iron Concentrate. There was always a considerable amount of Iron, and hence Gold and Silver, leftin the tailing even after the best work done.

Differential Flotation. Chemical Circuit Method.

The next attempts at differential flotation were by means of various chemical circuits. These circuits were of various strengths of Lime, Sodium Acetate, Caustic Soda and Sulphuric Acid. Many combinations of oils were tried with the above circuits. Acid solution causes a violent effervescence due to the 5.1% of CaO and 1.74% MgO. This forms a gas which kills the first froth for it contains very little mineral and considerable slime.

The best differential result is given below. It is hardly worthy of mention but is given since it illustrates the difficulty well. The test was run in a strong alkaline (Caustic Soda) solution to see ff it would drop the Zinc.

Test on Slide Machine.

Oil- Crude Wood Creosote in Caustic Soda Solution.

Pulp- 3 parts water to 1 of solids by weight.

Two froths taken off.

Prdt.	% Solids	Assay				% Mineral Recovered.			
		Cu	Fe	Zn	Insol	Cu	Fe	Zn	Insol
Head	100.0	1.16	8.1	10.82	49.6	100.0	100.0	100.0	100.0
Conc.	42.6	2.38	8.7	20.3	34.6	87.5	45.7	79.9	29.7
Tail	57.4	0.32	7.8	3.1	60.7	15.0	55.4	16.4	70.3
Total	100.0	1.19	8.2	10.42		102.5	101.1	96.3	100.0

Here attention is again called to the fact that Copper and Zincfloat more readily than Iron.

Step Method.

Next Step Flotation was tried, that is one oil is added to float one mineral and another added later to float another. A great many combinations of oils were tried but no results were obtained. The best obtained by this method is given below;

Test on Slide Machine

Pulp- 3 parts water to 1 of solids by weight.

Oils- First; Stove Oil and Refined Wood Creosote were added in acid circuit. 5 froths were taken off and called 1st Conc.

Second; Kerosene Acid Sludge, Anthracene and Refined Wood Creosote were added. 2 froths were taken off and called 2nd Conc.

Prdt	% Solids	Assay Cu	Fe	Zn	Insol	% Mineral Recovered. Cu	Fe	Zn	Insol
Head	100.0	1.16	8.1	10.82	49.6	100.0	100.0	100.0	100.0
1st C	35.0	3.04	10.10	25.51	26.0	91.7	43.6	82.5	18.3
2nd C	17.4	0.94	16.36	7.93	38.7	14.1	35.2	12.8	13.6
Tail	47.6	0.09	2.98	0.48	70.9	3.7	17.5	2.1	68.1
Total	100.0	1.27	7.8	10.54		109.5	96.3	97.4	100.0

It can be said that no Differential Flotation results were obtained. So little encouragement was met in this direction that this plan of treatment was abandoned for Mass Flotation.

Mass Flotation. Cold Circuit

The scheme of Mass Flotation was to float, in a cold solution, the sulphides with as good a recovery and as little contamination of the concentrates as possible with the attendant idea of separating the mineral in the concentrate by some further treatment. The best commercial test was as follows;-

Test on Slide Machine.

Pulp- 3 parts water to 1 of solids by weight.

Oils- Anthracene and Penetration Oils in Acid (H_2SO_4) Circuit of about 12 pounds to the ton.

5 froths were taken of as Concentrate and then Kerosene Acid Sludge was added and one froth taken off as Middling.

Prdt	% Solids	Assay Cu	Fe	Zn	Insol	% Mineral Recovered. Cu	Fe	Zn	Insol
Head	100.0	1.16	8.1	10.82	49.6	100.0	100.0	100.0	100.0
Conc.	32.0	3.40	12.7	28.7	16.2	93.8	50.2	84.9	10.4
Mid.	14.0	0.94	17.0	6.0	47.1	11.3	29.3	7.8	11.8
Tail	54.0	0.35	3.6	0.48	72.1	16.3	24.0	2.4	78.5
Total	100.0	1.41	8.4	10.28	49.9	121.4	103.5	95.1	100.7

Hot Circuit

Next a test was tried with the same conditions except that the circuit was heated to find out if any improvement was to be made by the application of heat. The following test shows approximately the same results.

Test on Slide Machine.

Pulp- 3 parts water to 1 of Solids by weight.

Oils- Anthracene and Penetrations Oils in hot acid circuit. (About 12 lbs/ton of H_2SO_4)

5 froths were taken off as concentrate and then Kerosene Acid Sludge was added and 1 froth was taken off as Middling.

Prdt	% Solids	Assay				% Mineral Recovered.			
		Cu	Fe	Zn	Insol	Cu	Fe	Zn	Insol
Head	100.0	1.16	8.1	10.82	49.6	100.0	100.0	100.0	100.0
Conc.	37.0	3.00	14.5	27.10	16.4	95.7	66.2	92.7	12.2
Midd.	14.0	0.66	8.7	4.50	50.1	8.0	15.0	5.8	14.2
Tail	49.0	0.13	3.3	0.40	74.5	5.5	20.0	1.8	73.6
Total	100.0	1.26	8.2	10.85		109.2	101.2	100.3	100.0

It can be seen from the above test that no advantage is to be obtained from the application of heat.

It is to be noted that the feed in all the above tests was treated, without further grinding, just as it came from the dump as shown by the Sizing Test of Sample # 6.

It might be mentioned that two other schemes were tried.

After Grinding.

The first of these was to grind the material approximately thru 65 mesh and see if any better results could be obtained. After grinding, the sample showed the following by Sizing Test. (Sample # 6)

Mesh	% by Weight	Assay				% Mineral			
		Cu	Fe	Zn	Insol	Cu	Fe	Zn	Insol
On 65	2.8)								
On 100	18.0)	0.96	9.09	9.75	50.5	15.5	22.6	17.4	22.8
On 200	30.2	1.32	9.29	12.10	45.2	30.8	33.6	31.3	28.9
Thru200	49.0	1.42	7.47	12.20	47.0	53.7	43.8	51.4	48.8
Total	100.0	1.29	8.37	11.66	47.1	100.0	100.0	100.0	100.0

The preceeding differential and mass experiments were tried on this sample but with results no better nor different from the unground material. This is a very important result since grinding machinery has been proved unnecessary.

Separation of Sand & Slime.

Because of the troublesome nature of the slime, the idea was tried of separating the above mentioned ground material into sands (On 200) and slimes (Thru 200) so that each product might be treated under the best conditions. While theoretically this idea seemed promising, practically it showed nothing of value. No better results were obtained with either the sand or the slime.

Further Treatment.

Due to the lack of facilities for testing, no definite plan of treatment could be worked out. Also the complexity of the material makes a simple flowsheet impossible if the best extraction is desired. However the small size of the dump does not warrent a complex flowsheet with its expensive equipment.

Several methods of separation were thought out and the more feasible ones with their difficulties are given below.

Magnetic & Flotation.

(1) Roasting and Magnetic Separation followed by Flotation

Magnetic separation should extract Iron and Copper and leave a product to be floated from which could be made a clean Zinc Concentrate. With this idea in view, a sample was sent to the Campbell Magnetic Separating Company. The result of the test follows;-

Material given a 2 minute roast before separating.

	Weight.	Cu	Insol	Fe	Zn
Heads before Roasting.	300.	1.16	49.6	8.1	10.82
Magnetic Prdt.	80.	2.80	33.8	16.7	9.7
Non- " " .	200.	0.82	53.6	5.0	12.6

As can be seen at a glance, this test accomplished nothing and rather discourages this plan of proceedure.

Mass Flotation Roast Conc. & Refloat.

(2) Mass Flotation followed by retreatment of Concentrate with Flash Roast and Reflotation.

This under ideal conditions should give a clean Zinc Concen-

trate and leave a Copper-Iron-Insoluble Residue after the Reflotation. This method offers the difficulty of drying and roasting the bulk concentrate. To begin with the process of retreatment would entail considerable testing. The process requires careful manipulation at all times as the roasting is a delicate process. This method, however, has possibilities if it can be done cheaply.

Flotation, Roasting & Magnetic Separation.

(3) Mass Flotation followed by Roasting and Magnetic Separation.

Theoretically, this mass flotation concentrate should separate magnetically into a Zinc Concentrate and a Copper-Iron Concentrate. However, we have been informed, thru the Huff Electrostatic Process, that to date this has not been a satisfactory method of treatment due to the oil coating on the surface of the mineral.

On account of these three methods being rather delicate of manipulation and requiring rather extensive installations their advisability is doubtful.

Flotation & Tabling.

(4) Their remains a fourth method of proceedure which is a combination table and flotation treatment. No table testing equipment is at hand and hence no definite recommend ation can be offered. However, as a suggestion, probably a separation of the coarser mineral could be made by tabling first. This would be followed by flotation with separation of the flotation concentrate by tabling. Lastly it is possible that the flotation tailing would require tabling to catch the remaining coarse iron with its associated gold and silver. With the tables on hand, at the dump, and the simplicity of such an installation, as compared with other methods, this would seem to be the most practical and commercial plan of treatment.

Before such a plan is adopted it would be well to have some testing done in order to see whether or not sufficient separation could be effected to pay for the additional treatment over the profit of sending a direct combined flotation concentrate to a Copper Smelter.

Bradshaw
Crown King

CROWN KING MINE

Crown King, Ariz.

1906. Shipped many cars of concentrates to Humboldt.

Gold	1.0	oz.
Silver	10.0	oz.
Copper	2.8	%
Insol.	10.4	%
Fe.	21.0	
Zn.	20.0	

We have no report on the Crown King Mine in our files, merely a letter dated Aug. 20th, 1911 from H. J. Meany, Supt. Yavapai Consolidated Gold-Silver-Copper Co. to F. M. Murphy, recommending the expenditure of $20,000.00 for development at specified points.

August 1915, Mr. G. M. Colvocoresses made Murphy a proposition to buy 500 tons or more, a month, of tailings, commencing in November at $1.50 per ton, dry weight, on the dump. These were the Crown King Mill tailings of which it was estimated that there were about 13,000 tons. Mr. Murphy replied that Randolph and Gemmill were to try to concentrate the tailings by flotation and tabling. From results of test work they anticipate making a concentrate carrying about $25.00 in Au., 2% Cu., 12 to 13% Zn., low insoluble and heavy Fe.

October 1915 - August 1916. Randolph-Gemmill shipping concentrates to Humboldt now at the rate of two cars a week. Au. .80 oz.; Ag. 10.0 oz.; Cu. 2½ to 3%; Insol. 15%; Fe. 20%; Zn. 19%; S. 30%. For every four cars of iron concentrates shipped, they ship one car of zinc concentrate containing 42% Zn., 4 to 5% Cu.

NELSON MINING COMPANY, adjacent to Crown King Mine, Yavapai County. Mr. George P. Harrington, Manager. Visited Oct. 13, 1916. Found nobody but was informed afterwards that two men were doing some surface work. On the dump at the lower tunnel are some large pieces of ore some of them about 100 lbs. in weight, indicating that somewhere there is a streak of ore showing zinc, lead and a little copper. On his return from Prescott, Mr. Harrington informed me that this ore came out of the 250 foot raise connecting the lower and upper tunnels. I did not reach this raise when I went underground alone.

Mr. D. B. Gemmill states in a report: "Mr. Harrington has developed in the Nelson Mine a shoot of ore from which he can maintain steady production."

It is stated to be the intention of the Nelson Mining Co. to have its ore treated in the Randolph-Gemmill Flotation Plant in the Crown King Mill, when operations are resumed by the Randolph-Gemmill Co.

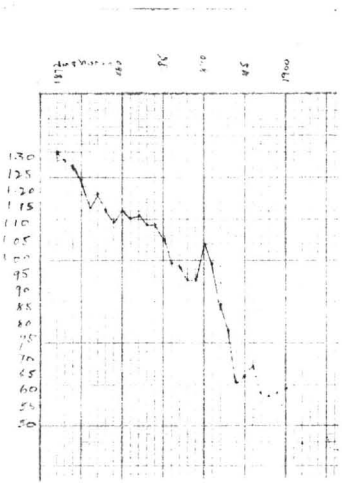
The Nelson Mining Co. appear to be notorious for poor management.

L. F. S. Holland.

NOTES ON CROWN KING MINING DISTRICT.

Local Geology: A stock of quartz-diorite in contact around its periphery with schist, granite, diorite and cut by porphory dykes are the outstanding geological features of the Crown King district. The trend of the dykes and fissures conforms more or less to the trend of the schists, which is N1 N.E. The principal mines of the district are situated at or near the contact of the quartz-diorite and schist. The productive veins of the district may be divided roughly into three groups, from E. to W. (1) The Grey Eagle vein which runs from the Tiger Gold Group thru the Savoy, Silver Crown and possibly the Lincoln. (2) The Tiger-Crown King Series and (3) The Wildflower-Springfield series. Associated with the gold bearing veins are considerable amounts of pyrite and sphalerite with a little chalcopyrite galena. In the silver veins the silver content is influenced by the amount of lead minerals present. In general, the principal silver mines have been in the quartz-diorite while the gold mines have been confined to the schists.

General Consideration: The main productive period of gold and silver was from 1873 - 1900. The later years of this period gold was the main product. The gradual drop in the price of silver from over $1.10 per oz. in 1884 to about 60¢ per oz. in 1894 was undoubtedly the main reason for the closing down of the silver mines. The gold mines continued working for some considerable time after the silver mines closed and only the exhaustion of the orebodies or impoverishment of the ore forced them to close. While the metallurgical recoveries were not so high as would be expected today, still this would be offset to some extent by lower working costs. It is justifiable in assuming that the gold mines were worked to the economic limit of the day and the possibility of easily finding a reasonable grade of ore in these mines is practically nil.



The position of the silver mines was altogether different. The steady drop in the price of silver from 1884 to 1894 with no comeback, would automatically have cut out blocks of developed ore until all but the richer portions of the veins were entirely eliminated. Then work would have been concentrated on the higher grade ore shoots and continued on them until their exhaustion. Also, portions of the vein which would have been attractive with dollar silver, as the price declined, would be given no consideration.

There is a marked unanimity amongst the old miners of the district regarding these mines, all claiming that there was considerable ore left when they were closed down and this seems to be justified by conditions explained. The greater portion of the ore developed would be able to show a profit at that time with silver at $1.00 per oz. and profitable ore then is profitable ore today.

CROWN KING DISTRICT

Note by G. M. Colvocoresses,

October, 1937.

The report by Gray in 1922 covers the following mines or prospects regarding which I might add the following notes to bring the record up to date:

COUGAR: Shipped a little high grade ore from a rich pocket. Now idle for many years.

LIDA: Idle and worthless to the best of my knowledge.

SILVER CROWN: Some work done here about 1929 but no good result.

M & M: Idle and probably worthless.

BLUE JACKET: Shipped a little ore from pocket at intervals.

AZTEC: Small shipper at intervals.

SAVOY: An old mine which may have merit and should be operated in conjunction with the Oro Belle and Gray Eagle (E.V.).

RAPID TRANSIT: Probably worthless.

ORO BELLE: See special reports.

GAZELLE: No further activity as far as I know.

CROWN KING MINE AND DUMP: See special report.

UNION MINING COMPANY: An effort to reopen this mine was made in 1936 by Moore and Maguire; they soon became discouraged and quit.

SARATOGA MINE: See data on Crown King Mine & Dump.

PHILADELPHIA: Never found any pay ore.

The brief notes by Barringer bring the situation up to 1926 in respect to the Silver Crown, Lincoln, Blue Bird and Del Pasco.

I have personally visited the Crown King district on several occasions, and looked over many of the mines and prospects and discussed them with several competent engineers.

The camp has a bad name and has been passed over by

the larger companies so that practically all of the operations during the past twenty years have been undertaken either by wholly inexperienced concerns or without proper financial backing and technical advice.

The entire district is well mineralized and high grade ore has been produced from many veins. I do not think that any large mine is likely to be developed but I do believe that the chances are good for a profitable production of gold, silver, lead and copper ores, and I feel that this district as a whole merits a thorough investigation and reappraisal on the basis of present prices and modern metallurgical methods.