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Tucson, Arizona
January 9, 1968

Mr. Maurice Hedderman
4220 E. Bellevue
Tucson, Arizona

Dear Mr. Hedderman:

I have made several trips to the Allison Mine situated in the Fresnal Mining District, on the Papago Indian Reservation, Pima County Arizona. I went there for North American Mines Inc. of Boston, Mass. in 1932. At that time the Tom Reed Gold Mining Co. owned the property. They asked \$250,000.00 for the mine to be paid as follows: \$25,000.00 down, the balance to be paid in 25% royalty plus a permanent royalty of 10%. The mine had a good gold and silver vein, with ore developed, gold is the most abundant constituent of the ore, but is always accompanied with silver at the ratio of about 22 to 1 by weight. Money was scarce at the time, the metallurgy of the ore was difficult, so we turned it down.

After all these years I have returned to examine the property again, this time for you. This time keep in mind we are living in a new era, conditions have changed, the price of metals have increased, metallurgy vastly improved, thus making your property much more desirable now than it was when I was out here in 1932. Do not forget that several large low grade copper mines have been developed in the State the last few years.

I find the areas here typical of the surface manifestations of the large copper deposits. One about 500 feet wide cross through the Alice Louise No. 2, Alice Louise, Nesa, Second Chance, Matilde, and Oversight claims. This is a wide area of brecciated quarts cemented by iron oxide and carbonates, and in places shows small amounts of copper carbonates which is typical of the large copper deposits in this part of Arizona. The leaching of the copper is deep and complete because the matrix of the breccia contains no calcareous material which would precipitate the copper as carbonates, so only a small amount is seen. There is a prominent iron outcrop which marks a possible vein or deposit. This should be drilled.

There is another vein at least 25 feet wide, which crosses thru the Fourth of July No. 2. and Fourth of July claims. On the east side of the Fourth of July No. 2. thru this point up thru the Santa Margarita, Alto, and Second Chance claims. The arroyo and its sides are covered by gravel, however there is a well defined vein on the Alto claim. There is much iron float up along the northwest side of the arroyo where it crosses the Santa Margarita.

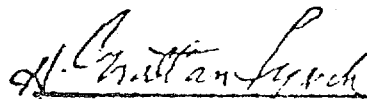
2. Allison

The course of the arroyo can well mark the covered outcrop of an irony quartz zone similar to that which runs across the Alice Louise, Nesa, Second Chance, and joins it on the Second Chance. You will recall that the east face of the Allison 200, Allison 400, and Allison 625 levels are in leached irony rock, which contains small showings of copper carbonates and iron sulfate. This rock can be the leached section of the mineralized zone.

There is a quartz and iron vein with gold and silver values which runs thru the Fourth of July No. 3. and Fourth of July No. 4. claims. This is exposed in the tunnel which was started on Fourth of July No. 3. claim and driven north-westerly to the Fourth of July No. 2. vein and it outcrops prominently on the Fourth of July claim.

In view of these showings, the history of the development of the large low grade copper deposits in the district as a result of my examination of the property, I firmly believe that the development of the as yet unexplored portion of the Allison claims with the proper expenditures will make possible the mining of these ore bodies as a whole and at a handsome profit. I would recommend that they do so.

Very truly yours,



H. Grattan Lynch
Consulting Geologist

HGL:
Certified mail

APPENDIX B

SIN MONSIEUR PRODUCTION

Date	Lot	Dry Tons	Obs. Au.	Obs. Ag.	Gross Value	Net Value Per Ton	Total Value
12/20/39	1	47.883	.365	9.96	18.34	\$ 15.84	759.50
1/2/40	2	53.015	.455	11.80	21.81	18.63	1,002.66
1/4/40	3	32.020	.38	11.37	19.75	16.77	541.42
1/9/40	4	42.0435	.375	11.13	19.43	16.49	693.38
1/25/40	5	48.021	.455	13.8	23.76	21.26	1,002.29
1/25/40	6	53.664	.29	11.35	16.82	14.32	774.76
1/29/40	7	39.127	.192	7.22	10.53	8.03	324.36
1/31/40	8	50.759	.313	8.90	15.93	13.43	681.70
2/10/40	9	53.3925	.54	11.60	25.20	22.69	1,210.94
2/10/40	10	57.5955	.636	16.25	32.94	29.66	1,714.70
2/19/40	11	54.1085	.658	19.34	40.43	36.39	1,971.71
2/26/40	12	50.299	.65	13.50	29.28	26.89	1,573.12
2/19/40	13	56.703	1.044	23.88	49.42	44.48	2,541.45
3/27/40	14	53.7616	.875	15.65	37.27	33.54	1,803.16
4/2/40	15	56.5495	.64	12.06	27.92	25.13	1,421.68
4/6/40	16	55.993	.61	11.35	27.15	24.44	1,368.47
4/15/40	17	58.429	.535	10.06	23.22	21.42	1,252.41
4/17/40	18	57.125	.402	8.55	18.55	16.03	916.08
4/24/40	19	58.8565	.468	10.40	22.60	20.10	1,183.23
5/1/40	20	60.035	.496	9.70	22.39	19.89	1,194.10
5/6/40	21	60.9115	.40	9.25	18.98	16.48	1,003.65
5/7/40	22	69.159	.441	10.30	21.01	18.51	1,035.03
6/14/40	23	61.3175	.394	9.13	18.71	16.21	993.26
6/7/40	24	14.814	.397	11.2	36.65	32.93	488.72
6/8/40	25	55.230	.305	7.9	24.07	22.17	1,223.76
TOTAL	25	1299.819	11.16	12.07	24.96	\$22.07	\$28,757

San Francisco, Calif. JUNE 28, 1950

RECEIVED OF
By

AMERICAN SMELTING AND REFINING COMPANY
SELBY SMELTING WORKS
408 MONTGOMERY ST.

ROY H. BARNES
ROUTE 4, BOX 672
TUCSON, ARIZ.

SELBY LOT 4308

Shipping Point TUCSON, ARIZONA TRUCK	20 Sax Weighing gross Tare Iron Moisture 1.0 % Samples NET DRY WEIGHT	635.25 lbs. 21.50 lbs. 145.75 468 lbs. 4.7 lbs. lbs. 463.3 lbs.
Mark Date Rec'd 6-5-50		

ASSAYS and ANALYSIS	PERCENTAGES and PRICES	DEBITS	CREDITS
Gold 150.25 ozs. per ton	ozs. Less - % @ \$33.278595		\$ 5000 11
Silver 73.42 ozs. per ton	ozs. Less % @		
Lead %	ozs. Less % @		
Copper (wet) %	Less 5 % @ 72.75 - 1 = 71.75		51 41
Insol %	Less % @ per lb. less		
Iron %	Less units @ per lb. less		
Zinc %			
Sulphur %			
Arsenic %			
Antimony %			
Bismuth %			
ROYALTY \$1133.60 @ 10% \$113.36			
SOUTHERN ARIZONA BANK & TRUST CO., TUCSON, ARIZ. FOR CREDIT TO ACCOUNT: TOM REED GOLD MINES CO. SUITE 1220 - 412 W. SIXTH ST. LOS ANGELES, CALIF.	Base Charge Total Value Per Ton	50 00 50 00	5051 52 5001 52
CHECK ISSUED TO: ABOVE	Value of 463.3 lbs. @ \$5001.52 per ton Sampling and Assaying Reducing Burning, Grinding & Sifting Freight	25 00	1158 60
IMPORTANT! If not advised to the contrary within days from date we shall assume that returns are satisfactory and the product covered by this will be placed in process. Smelting & Refining Co.	<u>Hand Sorted Ore</u> VAL. \$5000.00 ^{APR} @ \$33.00 Per ounce Total	25 00	
	NET PROCEEDS		1133 60

ROYALTY 113.36
1020.24

ALLISON MINE

1968-69

THE ALLISON GROUP OF MINES

Baboquiviere District,
Pima County, Arizona

THE FOURTH OF JULY MINE

LOCATION: The Allison group of mines is located about 20 miles south-east of the Indian settlement of Sells, headquarters of the Papago Indian Reservation, about 80 miles from Tucson, Arizona. A good paved road connects Tucson with Sells. Thence another paved road continues toward the east, to the base of the Baboquiviera Mountains, just north of the main peak, and a few miles south of Kitt Peak, where the astronomical observatory is located.

This is in the Papago Indian Reservation, and Indian houses can be seen, in fact one Indian lives near the mines, a man who worked in the mines and was a very good all around handy man as well as miner. There is no electricity except that generated by electric plants. Water is available from wells; and sufficient water was available to operate a 100 ton mill when the mines were operating. There are good roads to the property, except the Allison workings, which road has been badly washed by rains. Repairs would not amount to much. We were able to reach the tunnel entrance with a pickup. The elevation is about 3,500 feet, and can be worked all year round. The final approach to the FOURTH OF JULY is a bit steep, but not bad, 13 claims and dam site and mill site.

GEOLOGY: The Baboquiviere mountain range is a long intrusive granite outcrop, which at the Allison mine area has been faulted, with much differential movement and slick sides. Large tension faults have made openings for large extrusions of volcanic granite or rhyolite to not only come to the surface, but project far above the surface, forming vertical cliffs. Then another stage of tectonic activity has opened up new fissures, permitting the extrusion of dark volcanic andesite, a notable harbinger of silver in Mexico and regions adjacent. The contacts between the rhyolite and the andesite have been filled with breccia and mineralizing solutions, forming strong fissure veins mainly east-west. There are from five to six good veins between the FOURTH OF JULY and the ALLISON, most of which have not as yet been tapped. There are intersecting fracture systems, for the Roberts vein runs south-east. Some of the andesite bodies are hundreds of feet wide, as are the rhyolitic bodies.

DEVELOPMENT: At the FOURTH OF JULY there is an office building, with assay office, tracks to the dump and air tank, with water tank. The hoist house has no hoist. Ore was elevated through the shaft, and dumped into cars coming out through the tunnel at the office level. The shaft is 200 feet deep and in good ore at the bottom. The entrance to the tunnel

runs north-east. At 60 feet inside it cuts the vein. The shaft has a very good ladder and the shaft is well timbered, ready to go to work. The mine is wired for electricity, and piped for air and water. The veins average from 8 to 15 feet in width, and when last worked ran about \$30.00 per ton in gold and \$20 an oz. in silver. This means about \$60.00 ore now, and at the width of the veins means profits. Some 1,000,000 tons of ore can be calculated at present. The vein dips about 85 degrees.

At the 150 foot level the vein is 20 feet in width. It has been "gloryholed". The vein is surprisingly strong and well mineralized, in quartz, with andesitic wall-rock. One streak was mined that ran 4 inches in width and carried 32 oz. in gold and 600 oz. in silver. The quantity was not too much but such rich pockets serve to sweeten the mine. The vein has been traced one mile on the surface. At the 150 foot level the ore is 200 feet in length where opened up.

At the 200 foot level a crosscut toward the Allison mine on the east side of the hill has been started about 200 feet in a N-25-E. direction. Since the bottom of the Allison at 625 feet on a 50 degree dip is still some 200 feet above the bottom of the FOURTH OF JULY, by finishing this crosscut some 300 feet much ore can be developed in the Allison. The last mining done at the FOURTH OF JULY was done profitably, and was discontinued due to the illness of the operator. However now that he is in good physical condition he would be available, to direct the renewed operation, if any. Due to the higher price of silver, the ore at present would be more profitable to mine. The break-even point being about \$16 to \$20 per ton, a very profitable operation should be in sight.

THE ROBERTS MINE

The Roberts mine entrance is about 50 feet below that of the FOURTH OF JULY and about 300 feet south. It was worked from a tunnel 600 feet long in ore, and was stoped to the surface, with only about 100 feet of backs. The ore today would be worth about \$30 to \$40 per ton. The mine is in poor shape, and any further workings should be from a lower tunnel on the vein and ore. There are a criss-cross of Andesite dikes some running north-east and some south-east, suggesting a shearing stress from the east or south. These dike junctions occur at the FOURTH OF JULY MINE. The strength of the veins is indicated by the fact that they continue for long distances and are all in ore. In some mines the ore shoots occur in limited areas of the veins.

THE ALLISON MINE

This mine is situated on the east side of the mountain, and has both shafts and tunnel entrances, which the latter is at the 200 foot level. The main vein strikes NE-SW and dips about 50 degrees. Veins are about 15 feet in width. The shaft and mine is beautifully timbered, with the wood in perfect condition. The rails are good. I was able to descend the perfect ladders. Slickensides show up along the vein, indicating movement. The elevation at the Allison is about 4,000 feet. At the 300 foot level the vein is about 15 feet wide, and some 12,000 tons of \$30.00 ore was removed. The ore runs 22 oz. silver to one oz. gold.

At the 200 foot level some 12,000 tons of \$16.00 ore is blocked out but not removed. Some half million dollars was removed on a 10 foot vein. The foundation of a 100 ton mill is still visible.

A large body of \$50.00 ore is available on the 400 foot level as soon as a small cave-in is removed. This is developed, ready for stoping. A good profit can be made on this ore with little work. Just install machinery, and go to work, after repairing the road. Perhaps from \$50,000 to \$100,000 would be needed to put both the Allison and the FOURTH OF JULY into production. No mill needed now.

ALLISON GROUP OF MINES

In 1940 Guy W. Crane, a consulting geologist spent 23 days examining the Allison group of mines or claims, including the Fourth of July, Fourth of July #2, Alto, Santa Margarita, First Chance, Second Chance, Third Chance, Fourth Chance, Oversight, Oversight #2, Nesa, Alice Louise #1, and Alice Louise #2.

In addition to the mining claims, is a camp site with three buildings, beside running water. Up the canyon a bit is a dam, which impounds the water for use at the mine and mill.

HISTORY: The original group of claims were located by Ricks and Bourse in 1888. They were grubstaked by the Allison Brothers who bought out their interests a few years later. The Allison Brothers gave a bond and lease to an eastern group about 1898 who started development work. The surface ores were not very rich, and the mine reverted to the Allisons, who gave a 25 year lease to the Tom Reed Gold Mining Company who sunk the Allison shaft to the 625 foot level. Due to secondary enrichment, as Crane relates the ores below the 200 level picked up in values. In 1930 the El Oro Mining and Milling Company took over the property. Good ore shoots were encountered, but at the 625 foot level the vein widened to 57 feet and the ore at present is valued at about \$10.00 per ton. The production of the Allison mine to 1940 was about \$177,483.20. The most recent operators however have developed much better ore in the Fourth of July and in one vein of the Allison.

CRANE: Crane likens the Allison group of mines to those of the Oatman, Katherine, Mammoth and Kofa districts of Arizona. The two main mines of the Kofa district up to 1912 had produced \$4,600,000 and the Katherine produced over a million at the \$20.00 gold and 50¢ silver. Up to 1934 the Oatman District had produced over \$30,000,000.

Crane reports that over 3,500 feet of workings have been developed at the time of his examination. About 90 percent of the production from the Allison came from an ore-shoot 150 feet along the vein between the 300 and 500 foot levels, and at the old price of silver assayed up to \$50.00 per ton, and as low as \$16.00. Hot spots ran up to \$384.00 per ton. On the 525 foot level another ore-shoot was encountered 100 x 150 feet, but the ore averaged only about \$20.00, but since Crane reports that the silver runs 22 oz. to one of gold, at the present price of silver the ore should be double that.

Another ore-shoot was discovered on the 400 foot level with about the same values, but never mined.

Crane reports that mill recovery was about 85-90 percent. Many cars of ore were extracted that ran from \$60.00 to \$160.00 per ton. The higher grade ores were shipped to the smelter. Only one third of the ore-shoot was taken out, the rest still in the mine, but it is reported that half a million was taken from this ore-shoot alone.

THE MINING JOURNAL-JUNE 30, 1931: In this journal of that date appeared an article concerning the Allison mine, covering much the same data as the Crane Report. The article, written by A. W. Worcestor adds a bit to the geology, concerning the prevalence of andesite country rock, fractured and intruded by rhyolite, and block-faulted, which was thrust south about 200 feet. The upward movement of the rhyolite crushed and brecciated the gource, forming channelways for the movement and deposition of minerals.

A lot of water has flowed under the bridge since the appearance of these reports which did not mention any development work at the FOURTH OF JULY or the ROBERTS. Under the present owners has already noted considerable tonnage of ore has been removed from the Roberts vein for 600 feet along the strike of the vein. A shaft can be sunk and another drift driven on the ore and stoped out. However this ore is not quite as high grade as that in the Fourth of July, where the mine has been developed and mostly mined out down to the 200 foot level. The best ore to date has been found on this vein, and the mine was being profitably worked until it was closed down due to the operator's health problems. The veins seem to be converging at depth, and at that junction a large body of rich ore should be encountered. The FOURTH OF JULY is being mined at a lower level than that of the Allison, which may account for the higher values.

Assays taken recently of the Roberts vein showed \$12.25 in gold, and 6 oz. of silver. Assays in the FOURTH OF JULY showed \$44.80 in gold, and 13.50 oz. in silver, or about \$65 ore.

The shaft should be sunk at least another 100 feet as a starter and drifts be driven from there to develop another body of ore to be stoped. As the development program develops, the 200 foot cross-cut should be driven another 300 feet to intersect the Allison vein at a depth on the dip of about 800 feet or about 200 feet below the present depth. The body of good ore now on the 400 level should extend down to there, and stoping backs to the surface should reveal a large body of ore. At the same time richer ore is being mined from the Fourth of July. Ore from the Allison can be more economically taken out through the lower FOURTH OF JULY tunnel, and that mine is more accessible.

During the last mining operation the total mining and milling operation cost was less than \$10.00 per ton, due to the high silica content of the ore for which the smelter paid \$4.00 per ton as well as treating the ore for no charge. The trucking cost to the smelter about balanced the payment for the silica, and the ore was mined for about \$7.00 per ton. With the wide veins and tenor of the ore between \$30.00 and \$60.00 per ton, there would appear to be no good reason why the Allison group of mines should not be a very profitable venture.

If the former smelter arrangement were not now available, the costs might run up to between \$16.00 and \$20.00. Mining costs, \$7.00. Transportation-\$8.00. Treatment-\$5.00, depending on what arrangements could be made with the smelter, but even so the ore could be profitably mined. The installation of a mill would greatly add to the costs, and this ore needs expert metallurgical attention. The mine could be put into production from the Fourth of July shaft for about \$50,000.00. About 100,000 tons of ore have already been mined, with an estimated 10 times as much ore yet untouched on the six veins of the group, which adds up to some 1,000,000 tons as an estimate only since the ore has not been blocked out..

By Clifford L. Burdick. Ph.D. Geologist

SETTLEMENT SHEETS: A typical settlement sheet in Feb. 1953 from the Phelps-Dodge smelter Ajo, Arizona on a shipment of 78.386 tons was computed with gold at \$35.00 per ounce and silver at 90¢. The shipment assayed .673 oz per ton in gold and 9.45 in silver. Silica-83.9%, Al-2 03-6.1%, CaO-.9%, Iron 3%.

With 50¢ per ton credit for silica after cancellation of smelting charges for the silica, the ore was worth \$31.65 after deductions. The net smelter returns amounted to \$23 0.90 for the 78 tons of ore.

The Allison property is in Pima County, Arizona in the Fresnal mining district. The Allison vein outcrops at least 1500 feet but has been developed for only 500 feet along the vein and 625 feet in depth. Due to the higher price, the present ore values would be in excess of that shown on the settlement sheet. The half million dollars worth of ore that the Tom Reed Company took out in 1898 was at \$20 gold and 30¢ silver. Would be over a million dollar production today.

REPORT by Clifford L. Burdick. Ph.D.

Clifford L. Burdick

ALLISON MINE
PIMA COUNTY, ARIZONA

Report by:
GUY W. CRANE, JUNE 20, 1940

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APPENDIX 1

EQUIPMENT: The larger units of mine and mill equipment are as follows:

The power plant includes:

- One 100 H.P. semi-diesel V type Fairbanks Morse engine.
- One 80 K.V.A. 60 cycle, three-phase generator.
- One 210 cu. ft. Chicago pneumatic, hot head, compressor.
- One 210 cu. ft. portable compressor.
- Two fuel-oil storage tanks of 12,000 gal. total capacity.
(Fuel-oil used in 27 plus and costs 8½¢ per gal. fob mine.)

The assay office equipment includes:

- One Braun Corp. 10 crucible gasoline furnace, an electrically driven crusher and pulverizer, a balance, and a full stock of supplies. The plant's capacity is 60 samples in 8 hours.

The mill equipment includes:

- A crusher, two batteries of 5 stamps each, two large amalgam plates, a ball mill, one Door classifier, two Diester tables, a dewatering tank, several water and leaching tanks and two storage bins for concentrates. Each mechanical unit is individually motorized.

The well is equipped with one Worthing triplex pump, driven by an 8 H.P. motor, capacity 60 gal. p.m. at 40 RPM.

Mine equipment includes an electrically driven hoist and five mine cars of .81 tons capacity.

GENERAL REPORT ON THE
ALLISON MINE - PIMA COUNTY ARIZONA
By G. W. Crane June - 1940.

1. LOCATION: The Allison mine is located in the east central part of Pima County, Arizona, about 21 miles southeast of Sells. It is on the north-west slope or Papago Indian Reservation side of the Baboquivari Mountains and only one mile from the Indian village of Freenal. The nearest shipping point, Tucson, is reached by a truck haul of about 8 miles. —??

2. PROPERTY: The property is owned by the Tom Reed Gold Mines Co., but is at present leased to the Tombstone Mining Co. of Tucson, Arizona. It consists of 13 lode mining claims in one contiguous group, a dam and reservoir site, and a fine cap site.

The claims have been surveyed and well staked on the ground but are as yet unpatented. They include; Fourth of July, Fourth of July No. 2, Alto, Santa Margarita, First Chance, Second Chance, Third Chance, Fourth Chance, Oversight, Oversight No. 2, Mesa, Alice Louise No. 1 and Alice Louise No. 2.

The dam and camp sites are about one mile north-east of the mine. A property and claim map will be found in the pocket at the back of this report.

3. EQUIPMENT: The mine is fully equipped with all necessary machinery and tools to mine from 50 to 100 tons of ore per day. This includes a mill, assay office, blacksmith, store house and office, oil house, fuel oil storage tanks, water tanks, diesel engine and electric generator, two air compressors, ample air receiver capacity and a light service truck.

The adit and shaft and hoist station are electrically lighted. The shaft is equipped with an electric hoist and an automatic dumping skip which will handle about 100 tons per 8 hour shift.

Water for camp and mine purposes is obtained from a well about one mile northeast of the mine. There also is a large reservoir for the ponding of flood waters for milling purposes. (For details of equipment see appendix 1).

4. MAPS and ILLUSTRATIONS: Accompanying this report are the following maps and illustrations:

A. General property map or scale of 300 feet to 1 inch, showing claims and general surface geology.

B. Vertical section - S 45° W - through Allison shaft, on scale of 300 feet to 1 inch, showing the vein system and geology at depth.

C. Composit plan map of Allison mine on scale of 30 feet to 1 inch, showing surface and underground workings, and their relation to the Allison vein contact.

D. A set of 7 mine level assay maps on scale of 30 feet to 1 inch, showing geology, details of ore occurrence and results of sampling.

E. Four vertical sections of the Allison mine on lines A-B, C-D, E-F, and G-H, on scale of 50 feet to 1 inch, showing geology and ore occurrence.

F. Illustrations, including the following photographs:
(a) Two views of the Allison mine and plant.
(b) Two views of the dam and reservoir site.
(c) One view of the well and pumping plant.
(d) One view of the mine camp.

5. HISTORY: The Allison mine was first worked in 1898 when a 100 foot shaft was sunk and a small production of rich sorted gold ore was made. As the ore appeared to be rather superficial no further work was done until 1923 when a tunnel was driven under the old shaft.

During 1924 and 1925, considerable development work was done which resulted in new ore discoveries. A 10 stamp mill was built and though recoveries were not satisfactory, considerable gold-silver bullion was produced.

In 1926 the property was acquired by the Tom Reed Gold Mines Co. who did considerable underground work and built a small flotation mill to treat a large body of newly developed ore. Due to its high content of manganese oxide the ore proved to be rather refractory and recoveries were not satisfactory.

Production during 1926 and 1927 amounted to 2,178 ozs. gold and 44,705 ozs. silver, which at present metal prices has a gross value of \$109,960.00.

In 1930, the El Oro Mining and Milling Co. leased the property and in 1931 produced a few tons of concentrates and bullion worth about \$5,300.00. Late that year this lease was abruptly cancelled and since that time the mine has remained idle until leased by the Tombstone Mining Company in 1939.

6. PRODUCTION: The total production of the district prior to 1934 is reported by the Arizona Bureau of Mines to have been about \$142,000.00, and to have come mainly from the Allison mine. During the last 6 months the mine has shipped 1,300 dry tons of crude ore containing 696.364 ozs. gold and 15,662.6 ozs. silver, having a present gross value of \$35,433.20. Thus the recorded production of the Allison mine to June 8, 1940 is about \$177,4

7. GEOLOGY: The area immediately adjacent to the Allison mine is characterized by tilted beds of coarse, red conglomerate, which is intruded by large dikes of dark colored andesite, which in turn are entruded by younger and

smaller dikes of light colored rhyolite with which are associated ore-bearing quartz veins.

The conglomerate beds are very thick. They consist mostly of rounded pebbles of quartzite and igneous rocks and are considered of Cretaceous age. The andesite and rhyolite intrusive rocks are known to be of Tertiary age. Near the rhyolite intrusives the andesite is highly shattered in preparation for mineralization.

The gold quartz veins occur in the andesite and on or near the contact of the andesite with the rhyolite intrusives, indicating that they were formed as "vein-dike" intrusions and replacements as an aftermath of the rhyolite intrusion.

This type of vein has been very productive in Arizona and is credited with almost half of the state's gold output. It includes the highly productive deposits of the Oatman, Katherine, Mammoth and Kofa districts of Arizona and the Mogallon district of New Mexico. The veins seldom extend to depths exceeding 1500 feet below the present surface depending much on the present stage of erosion.

Up to 1933, the Katherine mine had produced a total of \$1,087,000. old price, of which 85% was in gold and 15% in silver. Prior to 1912, two mines in the Kofa district had produced gold-silver ores valued at about \$4,000,000 under the old price for gold and an average of 56¢ for silver.

The Oatman district, to the end of 1932, produced more than \$34,571.410 worth of gold from veins some of which outcropped very conspicuously but others, like the United Eastern, were scarcely noticeable at the surface. Carl Lausen* reports that, "an insignificant stringer at the surface has been found to lead to a solid vein of quartz and calcite 3 feet thick at a depth of only 30 feet on the dip and similar variations in width may be observed along the strike of the vein".

8. MINERAL VEINS: There are three major quartz veins outcropping on the Allison property which are parallel in strike and convergent in dip indicating that they form a single vein system and have a common origin in the region directly beneath the rhyolite intrusives. (See the S 45° W cross-section of the property accompanying this report.)

The three veins are known as the Allison, the Roberts and the No. 3. Their outcrops are characterized by bold ledges of banded grayish white quartz ranging from 2 feet to 12 feet in width and carrying relatively low values in gold and silver. The vein quartz usually exhibits the leached cavities of primary sulphide minerals which were probably chiefly iron and manganese. Secondary gangue minerals also include some calcite. At depths of 300 feet or more in the Allison mine the solid quartz vein gives place to a strongly mineralized zone containing stringers of quartz highly stained with iron and manganese oxides which are the products of a secondary enrichment due to the leaching and redeposition of the mineral values from the higher portions of the veins. It is in this manner that the bonanza ore shoots characteristic of this type of deposit are formed.

*Bulletin 131, Arizona Bureau of Mines, page 56.

(a) Allison Vein: The Allison vein outcrops on the First Chance and Second Chance claims for a distance of about 1200 feet, with a strike of S 45° E and a dip of 50° to the SW. Its width ranges from 2 to 12 feet and averages about 6 feet. Throughout its length it is a contact vein with a hanging-wall of rhyolite and a foot-wall of crushed andesite. In the Allison mine it has been partially developed for a length of 500 feet on the strike and 625 feet on the dip and is responsible for all production to date from the Allison property.

(b) Roberts Vein: The Roberts vein, ranging from 2 feet to 12 feet in width, outcrops for a length of about 2500 feet on the Fourth of July and Fourth of July No. 2 claims. Its strike varies somewhat but over its entire length averages S 45° E which is parallel to the Allison vein. Its dip is that of a warped plane, ranging from 85° NE to its SE end to 85° SW at its NW end, thus averaging close to vertical. At points nearest the Allison workings the dip is approximately vertical. Over its entire length both the foot and hanging wall of the vein consists of intrusive andesite.

Developments on the Roberts vein are limited to a 100 foot shaft, a 130 foot tunnel and a dozen or more shallow cuts across the outcrop, which when sampled, all showed values in both gold and silver but no ore of commercial value. The vein, however, in all its surface aspects is like the Allison and should prove equally productive.

(c) No. 3 Vein: About 300 feet SW of the Roberts vein, and parallel to it, is a 2 foot ledge of vein quartz which is traceable for 200 feet on the outcrop and dips about 53° northeasterly towards the Roberts vein. This ledge I shall refer to as the No. 3 vein. Developments are limited to a single small surface pit which is partly filled. No samples were taken and the extent of its mineralization is not known but in general character and geological occurrence it is of the same type and age as the Roberts and Allison veins. On its dip it should intersect with the Roberts vein at about the 700 foot level.

9. DEVELOPMENTS: The Allison vein has been explored by an incline shaft to a depth of 625 feet with lateral workings on the vein at the 100, 200, 300, 400, 450, 500, 525, and 625 levels. All told about 3500 feet of development work has been done.

The shaft was sunk on an incline of about 50° following the vein and the hanging-wall contact to the 525 level, thence on an incline of about 68° to the 625 level where it is about 45 feet from the contact.

The mine is operated through a 450 foot adit tunnel which connects with the shaft and underground hoist chamber at the 200 level. The ore is hoisted to pockets above the 200 level and trammed by hand to the surface storage bins, mill, or stockpile. Direct shipping ore is hauled by truck to the railroad at Tucson. The lower grade ore of \$8.00 to \$10.00 per ton value is added to the milling ore stockpile awaiting the development of a satisfactory milling process now being diligently sought.

10. ORE SHOOTS: Pay ore is not found everywhere on the vein, but only at intervals on its strike and dip due to certain structural conditions which have led to its concentration in well defined ore-shoots. Two such major ore shoots have been opened up in the Allison mine, No. 1 to the northwest, and No. 2 to the southeast of the shaft. No ore of importance was found in the shaft below the 100 level except at the 550 level, and the relation of this to either ore shoot has not been determined.

(a) The No. 1 ore shoot has been opened up from the 300 to the 500 foot level and for a length of about 150 feet on the strike. It has produced about 95% of the total ore shipped from the property. Carload shipments have ranged from \$16.00 to \$50.00 per ton. (For a list of shipments see appendix 2.)

Only the richest portions of this ore shoot have been mined and it is far from being exhausted. Recent developments on the 500 level have opened up ore assaying as high as \$334.00 per ton, a reliable indication of further extension at depth.

(b) The No. 2 ore-shoot, southeast of the shaft is still in the initial stage of development, but has been exposed for 100 feet on the dip and for 150 feet on the strike. This work was all done from the 525 foot level where 3 small stopes have been started. Developments directly below on the 625 level indicate the No. 2 shoot to extend to and below that level. The general grade of the ore from the No. 2 shoot is not as good as that from No. 1 shoot. However, the last 155 tons taken from the No. 2 shoot averaged \$19.69 per ton.

(c) There is considerable evidence of a third ore shoot in the vicinity of the old discovery shaft and about 300 feet northwest of the No. 1 ore-shoot, but the vein structure is irregular in that area and considerable new work will need to be done to prove its position and importance. An old map prepared by the El Oro Mining and Milling Company shows ore averaging about \$20.00 per ton near the north end of the 400 level. This portion of the level is now inaccessible and I was not able to check these reports.

11. CHARACTER OF ORE: The mineral composition of the vein consists largely of quartz and calcite with minor quantities of hematite and pyrolusite. Probably due to oxidation, the sulphides are rarely found in the vein.

Gold is the most abundant constituent of the ore, but is always accompanied with silver at the ratio of about 22 to 1 by weight. The gold, however, constitutes on the average about 70% of the ore values. High-grade ores frequently show free gold occurring in aggregates of small _____ grains or as thin plates which show up plainly in the pan. In the past several attempts have been made to mill this ore, but with little success, particularly as to the recovery of the silver, which is generally attributed to the presence of the iron and manganese always abundant in the better grade ores. However, I am informed that recent mill tests have shown recoveries of 85% to 90% of the combined gold and silver values.

OCCURRENCE OF ORE: The Allison ore-shoots are tabular in form and follow the plane of one or more of the foot-wall slips in the brecciated foot-wall andesite. The richer ore bodies range from 3 to 5 feet in width but are generally encased in ore of lower grade, the whole constituting a lode 10 to 15 feet wide for the length of the shoot. The lateral limits of a shoot is usually the result of a pinch in the vein caused by the junction of two foot-wall slips.

The ore generally lies within 15 feet of the hanging-wall contact, but in some instances, as at the double raise, is as much as 30 feet in the foot-wall. It seldom lies directly on the contact but is generally separated from it by a foot or two of nearly barren fault gouge.

Because of their pronounced and often highly slickensided character, the foot-wall slips are very apt to be mistaken for the hanging-wall contact and this has lead to confusion in tracing the ore from level to level. As an aid in this particular I have constructed cross-sections A-B, C-D, E-F and G-H, which show the position of the ore developments on the several levels with reference to the major structural features.

13. BONANZA STOPES: The foot-wall slips are the locus of a series of bonanza ore bodies ranging from 3 to 5 feet in width and extending for 50 feet or more on both strike and dip. This is the result of secondary enrichment due to the leaching of the outcrop and higher portions of the vein and the redeposition of the values in well defined tabular bodies at greater depth, usually below the 300 level.

The No. 1 ore-shoot has provided several fine ore bodies of the bonanza type. Typical of these is the 400 level stope from which, on March 8, 1940, were mined 19 mine cars of ore averaging \$161.00 per ton; the 500 stope, 12 cars of \$60.48 per ton, the 450 stope producing 15 cars averaging \$61.00 per ton, etc. However, to avoid the higher royalty rates, in making lot shipments, the high grade ore is mixed with lower grade material to maintain a gross average of about \$25.00 per ton shipped. The mine's production of shipping ore for the first five months of 1940, is to be found in appendix 2 at the back of this report.

14. ORE RESERVES: There are three classes of ore reserves at the Allison mine:

1. Ore mined and in stock.
2. Developed ore in place.
3. Prospective ore developments.

As shipping ore I include any product containing gold and silver values exceeding \$15.00 per ton which when mixed with higher grade material can be made to average about \$25.00 per ton. As milling ore I include material ranging from \$5.00 to \$15.00 per ton which, when mined, can be made to average about \$10.00 per ton. Ten dollar ore is considered a minimum profitable mill head when recoveries do not exceed 80%.

All assays on the maps accompanying this report were made at the company's plant. Sample numbers prefixed with the letter "C" were taken by the writer. Those without prefix were taken by or under the supervision of Superintendent R. H. Barnes.

All samples, except those representing broken ore, were of the groove type cut across the vein and were measured at right angles to the dip of the vein. Assay values are gross with gold at \$35.00 and silver 71¢ per ounce. In computing the value of the several bodies of proven ore, all assays on a level within the limits of the ore shoot are reduced to an arithmetic foot-cut or ton basis, and the values obtained for the several levels involved are treated likewise to obtain the average grade of the ore-shoot as a whole.

(a) One in Stock: During recent months and in the course of mining the higher grade ores, considerable low-grade material has been added to the mill-head stockpile to await the discovery of a satisfactory milling process. According to the mine operating records, the amount of such ore now in stock is approximately 556 tons which averages about \$3.25 per ton. Present mining operations are adding daily to this tonnage.

(b) Developed Ore: The No. 1 and No. 2 ore-shoots have been worked primarily for the high-grade shipping ore but some low-grade material was also mined and milled. Perhaps all told about 10,000 tons have been removed from the two ore-shoots of which 8,000 tons were shipped direct, and 2,000 tons were milled.

As now developed the No. 1 ore-shoot represents a block of ore 130 feet long on the strike, 200 long on the dip and about 15 feet in average width, which on the basis of 15 cu. ft. of ore in place to the ton, represents an original 30,000 tons. Deducting from this the 9,000 tons of ore earlier mined chiefly from this area, we have a balance of 21,000 tons still in place and now regarded as a very valuable ore reserve.

Although much of the high-grade has been removed, the value of what remains as shown by the arithmetic average of 88 samples cut across the vein on 3 levels is \$14.25 per ton.

Mining operations on the 450 and 500 levels are reported to be opening daily new ore of a high-grade character from which crude ore shipments will be made, but by this operation, as in the past, further extensions of the body of milling ore will result.

No. 2 ore-shoot, as earlier mentioned, is only in the initial stages of development and may ultimately reach several times its present size. As now opened up on the 525 level, the shoot has a length of 150 feet on the strike, 100 feet on the dip, and an average stopping width of 5 feet. Its probably present tonnage, after allowing for the 1000 tons already removed, is approximately 4,000 tons. The grade of this 4,000 tons, as shown by the arithmetic average of 19 samples, is about

\$12.00 per ton. The last 155 tons of ore mined from the No. 2 shoot had an average assay value of \$19.60 per ton which probably is fairly representative of the shoot as a whole.

(c) Total Present Reserves: As computed for the two ore shoots and in stock at the mill, total present ore reserves are as follows:

Source	Wet Tons	Value Per Ton	Gross Value
No. 1 ore-shoot	21,000	\$14.35	\$299,250.00
No. 2 ore-shoot	4,000	12.00	48,000.00
Stockpile at mill	566	8.25	4,669.50
Total assured ore	25,566	\$13.75	\$351,919.50

15. PROSPECTIVE ORE RESERVES: Because of the 3,000 feet or more of mineral vein on the Allison property that is still undeveloped and the splendid production record of what has been developed, I regard the property's prospect for a long life and a profitable operation as excellent.

The Allison vein has been explored for less than half its length so far and the Roberts vein almost not at all. Wherever sampled, these veins have shown gold and silver values in quantities sufficient to prove their true mineral character. As mentioned earlier in this report, it is an important fact that this type of gold bearing vein is seldom productive at the outcrop or in its leached upper few hundred feet but mainly at depth where it is enriched by the process of oxidation and redeposition of values leached from near the surface. It has also been pointed out, that here as at Oatman, the absence of pay ore on the outcrop was no indication that this type of vein would not be productive at depth. On the contrary, the experience has been that relatively slight mineralization at the surface is almost unfailing evidence of valuable deposits at depth. This is a very important fact to keep in mind in considering the future exploration of the Allison property.

Exploration on the northwestern half of the Allison vein has shown the existence of two ore-shoots near the shaft with a gross production something like \$177,000.00 and a proven ore reserve of about \$352,000.00, also a possible third ore-shoot in the largely unexplored area beneath the old discovery shaft.

As a result of my examination of the property, I firmly believe that the development of the as yet unexplored portion of the Allison vein will at least duplicate, possibly crebble, its past production.

What I have said regarding the Allison vein applies with equal force to the Roberts vein which is not only well mineralized but has an outcrop about twice its length and in every other respect, is similar to the Allison vein. Consequently, even in its present state of undevelopment, I think we may expect a production from the Roberts vein equal to that predicted for the Allison vein.

16. WATER SUPPLY: The Allison water project includes a concrete dam and reservoir located about one mile northeast of the mine and about 1/4 mile northeast of the mine camp. During the rainy season the reservoir is reported to accumulate sufficient flood waters to operate a 50 ton cyanide or flotation mill.

The dam is 35 feet high and 6 feet wide at the top, but due to very favorable topographic conditions is only 43 1/2 feet long. The capacity of the present reservoir is much restricted because of having been filled with silt to within 5 feet of the top of the dam. However, by increasing the height of the dam only 10 feet and its top length to 60 feet, at relatively small cost, the capacity of the reservoir can be increased about five-fold which should be sufficient to meet all prospective milling requirements.

At present, the water supply for mine and camp is coming from a well at the damsite. This is a dug well 20 feet deep, of 4' x 6' section supply of about _____ gallons p.m., which is more than adequate for all mining and camp purposes.

The water is pumped to storage tanks at the camp and mine through a 3 inch pipe line by an electrically driven worthing triplex pump operated by a 6 H.P. motor, which, at the rate of 40 RPM, will deliver 80 gallons p.m. By sinking this well to bed-rock, or by digging additional wells, it is probable that this source of supply could be greatly increased and that several wells in conjunction with the reservoir will furnish a supply of water adequate for all future mining and milling needs.

17. PROPOSED DEVELOPMENTS: In all mining operations it is advisable to keep ore developments well ahead of production, and this is particularly so where the project depends upon milling operations. In order to assure a continuous supply of good milling ore for the Allison mill when and if a satisfactory treatment for the ore is found, and I understand that recently very encouraging metallurgical results have been obtained, I propose that as soon as practical the following line of developments be undertaken.

1. On the 625 level of the Allison mine, work should be done to trace the No. 1 ore-shoot to that level in the foot-wall to the hanging-wall contact where there is a large area that has not been prospected.

2. On the 400 level S.E. drift, work should be done farther in the foot-wall to locate the No. 2 ore-shoot in the foot-wall of the major slip.

3. On the 625 level S.E. drift, work should be done in the foot-wall of the present workings to make other contacts with the No. 2 ore-shoot.

4. On the 400 level N.W. drift, the inaccessible portion of this

drift should be opened up and some cross-cutting done where ore is reported in an effort to open up a third ore-shoot, both above and below that level.

5. On the 525 level, the S.E. heading should be extended southeasterly on the ore horizon for several hundred feet as a general prospect for a fourth ore-shoot in the area below the good ore showings at tunnel C.

6. The above proposed developments represent the more immediate and less costly projects for which a large part of the work is already done, and from which quick returns can be expected. As a more ambitious and extended campaign of development to be undertaken after adequate financing, I propose the exploration of the Roberts vein at a depth of about 400 feet beneath the collar of the Roberts shaft. This can be done by sinking a shaft on the Roberts vein to a depth of 300 or 400 feet and by drifting on the vein from that shaft. Or it can be done from the Allison workings by sinking the Allison shaft on the contact to the 900 level from where a cross-cut driven in a S.W. direction should tap the Roberts vein at a distance of about 540 feet.

7. The No. 3 vein is important also, but its exploration at this time would be premature, and should await the development of the Roberts vein as outlined above.

18. DEVELOPMENT COSTS: The developments proposed for the Allison vein and in the Allison mine, paragraphs 1 to 5 inclusive, should not cost more than \$3,000, and as it is probable that considerable good ore will be opened up in the process, it is not unlikely that much of it can be paid for by current production.

The two plans of development proposed for the Roberts vein, paragraph 6, are of a long-range character and contemplates some outside financing. A shaft could be sunk 300 feet on the Roberts vein for approximately \$4,000, but to do the work proposed from the Allison shaft would cost at least \$12,000.00. This plan, however, would facilitate deeper development on the Allison vein and when completed would make an ideal operating unit for the development of the whole property.

19. CONCLUSIONS: The three veins on the Allison property were formed at the same time by the same geologic processes and are all mineral bearing at depth. They belong to the type of deposit found in the Oatman, Katherine, Mammoth and Kofa districts of Arizona, which are characterized by bonanza ore-shoots and have produced nearly one-half the gold output of the state. While the outcrops of these veins are seldom profitable due to leaching, they become so at depths of 200 to 300 feet and below to about the 1000 level due to redeposition of the leached values.

The ore has proved refractory, but I believe a satisfactory milling process will be found which will make possible the mining of these ore bodies as a whole and at a handsome profit due to a low mining cost thus obtainable.

Ore reserves at the Allison mine are now approximately 26,000 tons of an average grade of \$13.75 per ton. The No. 1 ore-shoot will be found to extend to greater depth and the No. 2 shoot will develop to several times its present size.

By intelligent development the production of the Allison vein can be greatly increased, and that of the Roberts vein should equal the Allison's, assuring the property of a long and profitable operation.

Respectfully submitted,

Guy W. Crane
Consulting Geologist

June 20, 1940
Salt Lake City, Utah

