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~~Application of~~

~~G. W. Grom~~

8. History and Present Condition: Affidavits.

17
Tucson, Arizona
September 30, 1945

County of Pima)
State of Arizona) ss

J. W. Mills, being duly sworn, under oath, deposes and says:

That during most of the work at Helmet-Peak Area, he was timber man and in charge of the work for the Helmet-Peak Mining and Milling Company, until most of the 400 ft. level in its main shaft was accomplished:

That he is familiar with the ore occurrences on the surface and underground, including the 70 ft. zinc shaft, and the 52 ft. Billing's Shaft, and the main shaft.

That the southeast drift of the 52 ft. Billing's Shaft showed and was entirely in good copper ore and the stope from the old Billing's shaft showed highgrade copper ore:

That nearly all the work in the main shaft, the Billing's Shaft, and the zinc shaft was on the Camden No. 2 Patented Claim:

That the drift on the 150 ft. level in the end crosscut towards the Billing's shaft was entirely in highgrade copper ore, showing bunches of Bornite or Peacock Copper ore;

That the material all around the copper ores was lead, zinc, copper ores:

That the Company did a lot of prospect work over a large area, and if the work had been confined to the better ore exposures, very good grades of ores could have been produced:

That the limits of these better grade ore areas have not been explored at all:

And that a width of 150 ft. of good lead, zinc, copper ore was crosscut on the 250 ft. level north.

J. W. Mills
J. W. Mills
Subscribed and sworn to before me this 29 day of September, 1945, by J. W. Mills.

Edward F. Felt
Notary Public

My commission expires:
8/5/47

(21)

Property of Fred Fickett
Mr. Fred W. Fickett,
Box 2568
Tucson, Arizona

229 Live Oak St.,
Miami, Arizona
September 12, 1945

My dear Fred:

I have yours of August 31st. returning the Helmet Peak level map.

Since the receipt of your letter I've been searching, when I found the time, for the data you requested and the assay records. Please do not think that this has been hard work; on the contrary, it has been a matter of going through several carton boxes of mining reports and note books which I have wanted to do for over a year.

The diamond drill holes were put down on the claim just east of Joe Flannery's Olivette and so far as my records show, these holes are on a claim owned by Joe. The surface drill casings are still showing at the surface and are plugged with wooden plugs. These cores were stored in the little Helmet Peak office for years and are in wood cases. The records showed numerous pyritic veinlets, manganese stain, some very low grade copper but little of importance to a depth of about 200ft. when we encountered a terrific fractured structure and our efforts met with nothing but constant caving. The lime showed strongly and a decomposed granite. This latter shows on the surface about 200ft. north of the shaft on the Olivette. Dr. Leonard considered this very significant; it being somewhat of an intrusion into the andesite. I do not have any record of the log.

When we were working on the Helmet Peak group we took dozens of samples and these records were kept by Capt. King, one of the directors of the company. From memory they ran from 2% to 12% copper with a good showing of silver. On the map which you returned, you will note many X indicated; all where the location of the sampling taken by Sarles or some person under him. Leonard and I walked through from the 50ft level to the 400ft., not once but many times. The better grade was above the 200ft. The shaft is almost entirely in andesite.

The Billings Shaft is just as indicated on the map. It shows nothing but very high grade. Note assays. Most surely it leads into the area just southeasterly and was never properly worked by any owner to date. The old company wandered about in the country instead of mining good ore only a few hundred feet from the main shaft. This high grade came from below and probably is an intrusion through the andesite.

I have enclosed a copy of the Ransome report; three assays; and two more small Sarles drawings (trace the latter and return for my record, please)

22
You will note that the veins run from the Wellington, westerly through the Camden, Prosperity, Contention, etc. This Wellington might be worth looking in to; it is perfectly lousy with lead-silver.

If, after you have reviewed this data, you would like to drive up; you will be most welcome. I may get down before you find the time.

Best personal regards.

Yours very truly
W. H. Ransome

From Jacobs -

43540

Aug 22 1945

Judge Fred W. Gickett

Gold Gold Silver
Value 1000

Lead

107526

#6

0.03

1.05

18 $\frac{3}{10}$

-

2 $\frac{3}{10}$

-

(25)

This assay from
surface on Prosperity
Claim a little West of
Record shaft - west of
Road - reddish buggy
quartz with some yellow.
Taken with prospectors pick by Fort

3500

250

Ben P. Jacobs

CAMDEN MINE By C. F. Cron *at mine*

History and Present Condition:

The original Billings' Shaft was sunk in 1916, and a shipment of high grade copper ore was made in September, 1917. Court records show that Billings stated he had taken \$500.00 net off the property in September, 1917. He lost the suit over title and possession of the claims in the same court action. Later ore was shipped out of this shaft, but records are not available.

The Helmet Peak Mining and Milling Company was organized in the middle 20's, and sank a 52 ft. compartment and a half shaft near the old Billings' Shaft, which was completely caved in and did about 125 ft. of drifting both northerly and southerly, cutting into the old stops of the old shaft to the north. This showed very high grade copper ore in a larger mass of lead, zinc, copper ores.

They also sank the main shaft, the collar of which is about 20 ft. higher and 200 ft. to the northeast, to a depth of 612 ft., and did several thousand feet of development work on the different levels. These workings exposed a very large tonnage of lead, zinc, copper ores in an Adessite Breccia zone estimated to be over 1,000 ft. long and more than 200 ft. wide in places. In this area sections showed higher copper areas and other areas were higher in lead and zinc. The copper ores and the lead ores were reported to be good enough in some sections to be shipped separately to lead smelters and copper smelters. (See Libbey's Supplemental Report.)

Very little of the old shipping records are available. In December, 1928 one shipment to the Copper Queen Lead Smelter at Douglas, Arizona, showed:

26.93 tons assaying: Gold \$.70, Silver 16.16
ozs., Lead, 28.8%, Copper 1.05% and Zinc 8.7%

Another showed:

11.46 tons assaying: Gold \$0.35, Silver 5.33
ozs., Copper 8.84%, Lead 2.1%, Zinc 1.3% This
was shipped to the Copper Furnace.

The Helmet Peak Company were developing for a large mine and mill, but failed to finish financing after the stock market crash in 1929, and Fred W. Fickett acquired the patented claims by cash purchase from the treasurer's office, after more than 10 years of delinquent taxes.

The large shaft is inaccessible, being full of water to the 100 ft. level. The 160 ft. level is caved and inaccessible. The present Billings' shaft with 125 ft. of drifts on the 50 ft. level is full of water and debris and muck above the top of the drifts. The timbers are out of the shaft and the head frame is gone. These are probably hi-graded.

It is estimated that this shaft could be opened at a much cheaper cost than the main shaft and the high grade copper ores shipped to a copper furnace, and the lead, zinc, copper ores trucked to the Custom Mill at Sahuarita, on the Southern Pacific Railroad. At the time of the development of this property no lead, zinc, copper mill was available.

"The ore body which the company is developing underlies, as far as yet outlined, the westerly end of the Camden No. 2 claim. Here an elongate, roughly oval hill, long axis lying about 20' east of north, rising perhaps fifty feet above the wash along its westerly side, caps the ore body. The rock of which this hill is composed, has on first inspection the appearance, in texture and light color, of an altered rhyolite or quartz porphyry. It is probably a highly altered and sillified, brecciated andesite. This interpretation is borne out by the large angular masses of andesite encountered in the ore body beneath in mine development." (See C.J. Sarle's Report, page 11.)

Tucson, Arizona,
September 30, 1945.

County of Pima) ss.
State of Arizona)

J. W. Mills, being duly sworn, under oath deposes and says:

That during most of the work at Helmet-Peak Area, he was a timber man and in charge of the work for the Helmet-Peak Mining and Milling Company, until most of the 400 ft. level in its main shaft was accomplished:

That he is familiar with the ore occurrences on the surface and underground, including the 70 ft. zinc shaft, and the 52 ft. Billings' Shaft, and the main shaft.

That the southeast drift of the 52 ft. Billings' shaft showed and was entirely in good copper ore and the stope from the old Billings shaft showed high grade copper ore.

That nearly all the work in the main shaft, the Billings shaft, and the zinc shaft was on the Camden No. 2 patented claim.

That the drift on the 150 ft. level in the end crosscut towards the Billings shaft was entirely in high grade copper ore, showing bunches of Bornite or Peacock Copper ore.

That the material all around the copper ores was lead, zinc, copper ores;

That the company did a lot of prospect work over a large area, and if the work had been confined to the better ore exposures, very good grades of ores could have been produced.

That the limits of these better grade ore areas have not been explored at all;

And that a width of 150 ft. of good lead, zinc, copper ore was crosscut on the 250 ft. level north.

J. W. MILLS
J. W. Mills

Subscribed and sworn to before me this 29th day of September, 1945, by J. W. Mills.

FRED W. FICKETT
Notary Public.

My commission expires 2/15/47
(Notarial Seal)

1 Long since the development of the Helmet Peak, the
2 Eagle-Picher Company acquired the large holdings just north
3 of this property, known as the San Xavier and Mineral Hill
4 Area, and have put in a 350 ton per day lead, zinc, copper
5 mill at Sahuarita, handling Custom ores. They are besides
6 mining, drilling, the area with two diamond and one churn drill.
7 Reports indicate they are drilling up to 900 ft. in depth and
8 are getting good results.

9 All early reports advise the running of adequate ore
10 tests. J.M. Libbey, in his main report on page 8, under the
11 paragraph on Selective Mining, states, "Tests have been made
12 which show the ores to be amenable to concentration and the
13 product marketed at a marginable profit."

14 On page 2, under "Character of Ore," he states:

15 "The ores developed at this time are essentially
16 complex in nature; but are not refractory in character."

17 "Tests have shown that the ore would yield readily
18 to modern metallurgical treatment."

19 In Bright's report, page 4, he states:

20 "The problems of the past do not exist on this
21 property as metallurgical difficulties have been solved, the
22 water, a valuable asset for milling, being present for flota-
23 tion purposes."

24 Besides present facilities for handling gold and
25 silver complex ores nearby by modern metallurgical plant, work
26 is being done with the idea of successfully eliminating a
27 large percentage of waste in a coarse form in the lower grades
28 of ores on the property by such methods as modern sink-float
29 treatment in heavier than water medium, such as used at the Mascot
30 Mines of the American Zinc Company, of Tennessee, who produce
31 annually 1,250,000 tons of zinc ore, carrying 5% blend. They
32 treat 4,000 tons per 24 hours and 60% of the mined ore is re-
jected at from 2" to 3/8" size. Also jig table preliminary
treatment might be used if found to eliminate a considerable
percentage of the ore in coarse sizes. Such methods might make
large low grade areas previously considered too low grade,
available for treatment. Some success is indicated for such
processes.

33 C. J. Barle states, page 11:

34 "Many other assays have been taken, especially in
35 the main cross-cut from the foot of the 150 foot shaft. These
36 all show a general mineralization of this large brecciated
37 zone, though not of a grade high enough for milling."

38 The present development, considering the size of the
39 ore body, cannot be considered as more than indicating a part
40 of the milling ore which will be found between the 50 and 150
41 foot levels."

42 And on page 14:

43 "While the present workings have shown the ore ex-
44 posed to be a portion, merely the apex, of a large ore body,
45 widening downward, the work cannot be considered as in any
46 direction reaching the limits of the ore zone or as showing

1 how large the area underlain by ore may be."

2 Libbey's report shows:

3 "The boundaries of the shear zone, outlined by
4 the surface and underground development, indicate a zone of
5 mineralization approximately 200 feet in width, with a length
6 traceable for several hundred feet on either side of the work-
7 ing shafts."

8 And page 3:

9 "Sections which showed distinct mineralization and
10 appeared to be ore, were mainly sampled."

11 "Approximately fifty per cent of the lateral devel-
12 opment footage shows distinct mineralization and has been sam-
13 pled as ore."

14 Water Supply:

15 (a) IT IS PROPOSED:

16 TO INSTALL HEAD FRAME, COLLAR SET, IN THE 52
17 FT. BILLING'S SHAFT, AND TO TIMBER IT WITH 6"
18 x 6" and 2" x 12" TIMBERS:

19 TO INSTALL MINE CAR AND TRACK AND ORE HOPPER
20 TO LOAD ORE FROM;

21 TO INSTALL PUMP AND PUMP OUT WATER (ESTIMATED
22 150 FT. OF WORKINGS);

23 TO RENT AND INSTALL HOIST AND CAGE;

24 TO MUCK OUT AND RETIMBER THE ENTIRE LEVEL;

25 TO PUT IN MINE CAR AND TRACK UNDERGROUND AND
26 PORTABLE COMPRESSOR AND DRILLS AND START MIN-
27 ING AREAS OF DIRECT SHIPPING AND MILLING ORES.

28 IT IS PROPOSED:

29 TO MINE AREAS AS INDICATED AS ORE BODY, START-
30 ING FROM THE POSITION OF SAMPLE # 8, AND GRADUALLY
31 DEVELOP AND REMOVE THE WHOLE ESTIMATE AS CONDITIONS
32 WARRANT.

33 C.J. Sarle's report, page 11, Paragraph 3 (last
34 half)

35 "The bottom of the 52 ft. shaft lies 18 ft.
36 from the hanging wall in ore. From it a
37 drift has been run both ways, one diagonally
38 to the hanging wall, the other into the body
39 of the ore. (See Geological Sketch Map.)

40 This same ore body is shown: By assays of the
41 copper ore in the Billings' stope.

42 NO. 67370 Gold 0.01 ozs., Silver 25.6 ozs. Copper
37.1%, Lead 2.60%, Zinc 2.20%.

No. 67434 Gold 0.02 ozs., Silver 28.0 ozs. Copper
27.6%, Lead 4.6%, Zinc 11.2%.

This body is also shown by assay No. 20, 70 ft. zinc shaft, sample cut across 20 ft.

No. 20 Gold 0.01 ozs., Silver 0.8%, Copper 0.32%, Lead 0.9%, Zinc 4.0%.

This ore body is also shown by assays Nos. 5, 6, 7, 8 and 9 on the 50' level, Billings shaft, and Nos. 12, 13 and 14 on the same zone. 50 ft. ahead of No. 8, and approximately 75 ft. below on the 150 ft. level of the main shaft.

No. of Assays	% Cu.	% Pb.	% Zn.	Ozs. Au.	Ozs. Ag.	Width Cut.
5	0.66	1.4	2.5	0.02	3.4	5.3 feet
6	0.65	1.4	4.0	0.01	1.8	6.0 "
7	0.41	1.2	2.3	0.01	1.1	5.7 "
8	4.05	0.3	1.0	0.01	2.1	14.5 "
9	1.62	2.0	3.9	0.08	3.8	11.7 "
12	2.11	0.2	0.5	Tr.	0.8	5.0 "
13	4.92	0.3	1.8	0.01	2.7	4.8 "
14	2.75	0.2	1.8	0.01	2.0	12.0 "

(See C.J. Sarle's Geological and Assay Map.)

By considering assay No. 8 (50' deep), representing the last 15 ft. in the southeast drift of the Billings' 52 ft. shaft, and samples Nos. 12, 13 and 14, on the last crosscut in the end of the 150 ft. level of the main shaft, and the area between of 50 ft. or better on an ore zone estimated to be 40 ft. wide by these same engineers, this material could all be shipped to a copper smelter by starting at the shallower Billings' shaft and gradually reopen the deeper areas as the production proceeded. These samples are all low in lead-zinc and indicate a product of 3½ to 5% copper ore, especially if selected areas are mined.

From C.J. Sarle's report, under "Ore Reserves" the above area proposed to open up is set forth as follows:

"From the present workings Mr. Harper, Supt., estimates that there can be produced 100,000 tons of milling ore, with a gross value of \$8.00 per ton. I have carefully gone over these estimates with him, both underground and on the map of workings, and have taken check assays."

"The accompanying tabulation gives these assays, footage and values, and the number of the Geological Sketch Map show their positions."

If the areas out in taking assays Nos. 1 to 9 and 12 to 14, inclusive, and No. 20, representing the 50, 70 and 150 foot levels, are considered, it is believed safe to regard these as roughly defining a curved zone of milling ore, 325 feet long, approximately 40 feet wide and 100 feet deep, lying between the 50 and 150 ft. levels. Based upon the average value per foot of openings available, this block containing 100,000 tons would have a gross value of \$10.00 per ton. As stated, the samples are averaged according to the width of the ore they represent, and constitute as accurate an average of this zone as the present development permits. Mr. Harper's estimate is therefore regarded as very conservative."

1 "There are zones of much higher grade ore than
2 this average; for example, assay No. 8, cut across 14.5
3 feet, runs \$14.88; No. 9, across 11.7 feet, \$16.61; and No.
13, across 4.5 feet, \$18.87."

4 Under initial Quota, No. 627, Camden, the "A"
5 quota prices for Copper, lead and zinc, are: Copper 17¢
6 per lb., Zinc 11¢ per lb., Lead 9¢ per lb. This would
7 result in a much larger dollar value per ton gross than
the above amounts quoted by Sarle. For the purposes of
this report values are given in metal content per ton rather
than dollar values.

8 Trucking to the Custom Mill at Sahuarita, or to
9 the railroad loading ramp, can be contracted for @ 0.75 per
ton.

10 Custom freight rates to Arizona smelters range
11 from \$1.80 per ton on \$15.00 ore up.

12 Custom smelting rates on copper ores in Arizona
13 range from \$3.50 to \$4.50 per ton for \$15.00 ore, with 10%
increase on higher values until a maximum charge of \$6.00
is reached.

14 Deduction of 8-10 lbs. copper per ton ore is made
15 for slag loss, and from 2¢ to 2½¢ per lb. of copper from the
16 N.Y. quotation, for shipping and refining and selling of the
copper.

17 Custom milling at Sahuarita, will range from \$2.50
18 to \$4.00 per ton ore depending on the grade and tonnage avail-
able.

19 The old company developed a large area figuring on
20 handling hundreds of feet in width. By limiting these areas
21 considerably widths up to 40 ft. and in cases some times as
22 high as 150 ft. can be had that are of a very high grade
milling ore or a good grade shipping ore, where the natural
segregation of values permit. It is now figured that under
present conditions milling ore of 5% combined lead-zinc
content could be handled in fairly large tonnages.

23 C.J. Sarle's report, page 12, under "Development
24 Advised":

25 "The Billings shaft thus deepened will then insure
26 good ventilation and drainage of the mine, and also can be
used in raising waste, thereby relieving congestion at the
main shaft, while handling ore.

27 "This program carried out, besides greatly increas-
28 ing ore output, should raise the grade of ore, facilitate se-
29 lective mining and milling of the ore, and at the same time
furnish ample water for milling."

30 Under Bright's report (which see) page 3:

31 A great part of the drifting has been driven in an
32 Andesite Breccia, in contact with the Andesite intrusion, and
is not a mineralizing contact, the mineralization being the
result of deposits from mineralized solutions from the fissures,
which is the proper place to look for ore, although I believe
that profitable bodies of ore will be found in the vicinity of
the Billings shaft as indicated by a shoot or pipe of copper

1 (bornite) located there, by following the ore shoot."

2 "I believe that by continuing the drift of the 150
3 foot level by Billings ore body will develop a nice body of
4 high grade ore, and also continue the drift from the 350 foot
level, following the ore to the Prosperity vein."

5 "In the above mentioned section there is a large
tonnage of good milling ore, that can be easily developed."

6 In Libbey's main report, he states:

7 "The boundaries of the shear zone, outlined by the
8 surface and underground development, indicate a zone of min-
9 eralization approximately 200 feet in width, with a length
traceable for several hundred feet on either side of the work-
ing shafts." These shafts are over 500 feet apart.

10 "Replacement action in brecciated areas and favor-
11 able sections of the sheeted Andesite by solution bearing
12 silver, copper, lead and zinc has forced the ore bodies now
exposed in the mines.

13 "Extended development work has emphasized the re-
14 lation of the cross-fracturing and sheeting of the rock mass
to the nature of the ore deposits.

15 "Throughout the underground workings is shown the
16 tendency for the better class of ore to be found in the sheet-
ed blocks adjacent to certain well defined shear planes or
fissures.

17 "The valuable minerals Galena, Chalcopyrite, Tetra-
18 hedrite and Sphalerite occur throughout the ore measures in
the form of disseminated minerals, nodules and segregated
19 masses.

20 "A strong tendency is shown for like minerals to
21 group together, that is, to segregate into nodules and lenses
of separate minerals."

22 Also in Libbey's main report, page 6, under "Selective
23 Mining," he states:

24 "In the area tributary to the Billings shaft, good
25 assay values are shown and it is reported that commercial ore
was being uncovered in the lower workings at an earlier time."

26 "It seems that certain sections could be mined selec-
27 tively at a margin of profit, either through the shaft itself
28 or by connecting up with the underground workings of Shaft No. 1.

29 "A cross-cut tunnel driven from the 150' level a
30 distance of about 125 feet would cut the general formation be-
neath the Billings shaft and prove up this area effectively."

31 Much larger and higher grade areas are available in
32 deeper areas of the mine and will be opened in the future de-
velopment.

In Libbey's Supplemental Report, October, 25, 1927,
Page 1, he states:

"Approximately 500 feet of additional drifting and
cross-cutting has been done in the westerly section of that

1 level and an extensive area of mineralized ground has been
2 encountered therein, which materially increases the available
tonnage of commercial ore in the mine.

3 "General conditions, in evidence, are favorable
4 for the continuance of the metal values through the further
extension of the lateral and vertical dimensions.

5 "Assured Ore:

6 "The mineralized area in the westerly section of
7 the 250 ft. level, as outlined by present development, and
8 which can be classified as commercial ore, has a vein area
of approximately 5,250 square feet.

9 "The ore-bearing rocks, lying in a sheeted or
10 bedded form, have been exposed, by the work, to a thickness
of 60 feet; supplying the factor of known vertical extent.

11 "The resultant content of the block, indicated by
these factors is seen to be approximately 26,000 tons.

12 "The mineralization, of commercial value, occurs in
13 the form of Sulphides of Copper, lead and Zinc, with addition-
al values in Silver and Gold.

14 "The character of the ore bearing material and the
15 mineralization is similar to the ore area in the northerly
section of this level.

16 "Samples were cut from the ore exposures within
17 the westerly block and assayed with the following results:

18 "Average of samples No. 25 to 31. Incl., Length
19 of cut, 10 ft., Interval between cuts, 4 ft. from westerly
end of block - Gold .16 oz., Silver 2.10 oz., Copper .5%
Lead 1.69%, Zinc 3.83%.

20 "Average of samples No. 32 to 37, Incl. Length of
21 cut 8 to 12 ft. Interval between cuts- 4 ft. from northerly
22 end of block. Gold. 16 ozs., Silver 1.12 oz., Copper 0.5%,
Lead, .2%, Zinc 3.05%.

23 "In General:

24 "The most westerly section being developed at the
25 time of the sampling, showed a strong tendency for the minerals
26 to segregate into bands, or veins, and the samples taken from
the ore exposures showed an unusual degree of enrichment in
spots.

27 "It will not be surprising to find the ore occurring
28 in veins and deposits of workable size and of a value sufficient
to permit of direct shipment to the smelter."

29 One shipment to Lead Furnace - - - - 28.8% Lead
One Shipment to Copper Furnace8.84% Copper

30 Libbey's Supplemental Report, page 1, (Assured Ore)
31 speaks of additional values in gold and silver located in
the new area developed on the 250 ft. level.

32 "The mineralization of commercial value, occurs in
the form of sulphides of copper, lead and zinc, with additional
values in silver and gold.

"Average of samples No. 26 to 31 incl., length of cut - 10 ft., Interval between cuts - 4 ft, from northerly end of block - Gold .15 oz. Silver 2.10 oz. Copper .5% Lead 1.69%, Zinc 3.83%."

Gold values in October, 1927, at \$20 an oz. would make this ore valued at about \$ 3.00 Gold. At the present time at \$35.00 an oz. this value would be \$5.25 Gold per ton. With the silver this would make an important area on account of its size.

An old assay sheet on a preliminary concentration test shows that the gold content could be recovered in a marketable form in the lead concentrates although the concentrates were too low grade in zinc to be marketable, later flotation tests show a very good grade of zinc concentrate can be made, (See Eagle-Picher late ore test.)

	Au Ozs.	Ag Ozs	Pb %	Zn %	Cu %	Fe %	Insul %
Pb Conct	.12	44.6	61.5	4.5	3.00	5 .8	2.0
" Mid	.04	26.8	14.7	11.8	1.38	17 .2	
Zn Conct	.01	3.6	.6	56.5	.42	4. 7	2.8
" Mid	.01	9.5	2.0	8.1	.37	15. 0	
Tails	.002	.41	.13	.35	.03	1. 9	
Heads Total	.01	5.9	6.4	8.4	0.40		
Oxide			0.18	0.48			

It is evident that the Copper-Iron ores showed considerable increased gold content.

Echel's "Geology of Mineral Hill," 1930, reports; page 24:

"There are the usual rumors that Mineral Hill was first worked by the Spaniards who exploited the gold found close to the surface."

Page 27:

"The slag dump remaining from early smelter operations was sampled for gold, silver and copper. Silver is present in very small amounts, but one sample showed 80 ozs. gold per ton. The values are very irregularly distributed through the slag and average far less than the figure given, which is included only to show that at one time gold must have been found in considerable quantities."

Page 30:

"Silver values in the slag are small, as is gold in general, but there are spots where the gold content runs to phenomenal figures. This is probably due to single pots of slag in which extraction was incomplete."

Mayuga's Reports: "Ore Deposits of the Helmet Peak Area."

"Two early furnaces of Mineral Hill ran 9600 tons of ore. Produced 800,000 lbs. of matte, averaging 65 to 70% copper and \$25.00 to \$45.00 gold and silver."

1 In 1893, silver dropped to 43% per oz., and
2 lead to 3 $\frac{1}{2}$ ¢ per lb. This caused the shut down of the
district.

3 Mayuga's Report: States that the gold-iron veins
4 towards the Alpha (Just south of this property), have not
been investigated and have had very little work done on
5 them.

6 In copies of letters from Flannery, Fritz, Brown
and Bogan are important statements concerning the gold and
silver values on this old ground and the district.

7 Flannery's letter states:

8 "Replying to your inquiry regarding the Prosperity
9 Mine, (adjoins this claim in the north side) I have known
this mine since its location cometime in the nineties. The
10 main shaft is down some 320 feet and I do not recall the
amount of drifting that has been done. This shaft was start-
11 ed about 1898 and was worked by the owners, Mike and Luke
Corda, until the drop in the price in silver in 1903. During
12 this time the Cordas became work about fifty thousand dollars
apiece from the profits of the mine. They had no hoise on
the property, but after the shaft became too deep for a wind-
13 lass, they operated it with a whim drawn by mules."

14 "The first 60 feet of the shaft was a chloride ore
that was not shipped and is probably still on the dumps. At
15 60 feet sulphides were encountered that assayed 30 ozs., silver
and a few dollars gold. The ores became steadily richer as
16 the shaft was sunk, and at the bottom of the shaft assayed
300 ozs., silver and 1 oz gold. I took a sample on the 200
17 foot level that assayed 200 ozs. silver and about \$12.00 gold."

18 Fritz's letter states:

19 "When we were working on the Helmet Peak group we
took dozens of samples and these records were kept by Capt.
20 King, one of the directors of the company. From memory they
ran from 2% to 12% copper with a good showing of silver. On
21 the map which you returned, you will note many X indicated.
All were the location of the sampling taken by Sarles or some
22 person under him. Leonard and I walked through from the 60 ft.
level to the 400 ft., and not once but many times - the better
23 grade was above the 300 ft. The shaft is almost entirely in
andesite."

24 "The Billings' shaft is just as indicated on the
map. It shows nothing but very high grade. Note assays.
25 Most surely it leads into the area just southeasterly and was
never properly worked by any owner to date. The old company
26 wandered about in the country instead of mining good ores only a
few hundred feet from the main shaft. This high grade came
27 from below and probably is an intrusion through the andesite."

28 Dr. Raymond J. Leonard was a prominent Geologist with
the Department of Geology and Mineralogy at the College of
29 Mines and Engineering, of the University of Arizona. Mr.
Albert L. Fritz was a Civil Engineer and head of the Fritz-
30 Hamilton Development Company, which was interested at one time
in developing the Helmet-Peak and entire Olive Camp.

31 Brown's letter states:

32 "I was the original owner and locator of the Annette

1 claim, which adjoins the Olivette. I took out of this
2 claim over \$65,000.00 worth of ore. In 1893, owing to
3 the low price of metals at that time, the mine closed down
4 and has never been operated. The shaft has not been de-
watered since the mine shut down. My operation of the mine was
entirely without machinery."

5 "At the time the mine closed down, in 1893, oper-
6 ations were in 100 ounce silver ore in a winze at the bottom
and 250 ounce ore in a drift to the west."

7 "My brother, J.K. Brown, was one of the locators
8 and owners of the adjoining claim, the Olivette, and there
was shipped from this claim, the Olivette, over \$750,000.00
of ore, and good ore left in the bottom when operations were
discontinued."

9 "I am not the owner nor interested in any mining
10 property in Pima Mining District."

11 The claim described in Brown's letter immediately
12 adjoin this property to the north.

13 Bogan's letter states:

14 "In the later eighties, I was one of the leasors
operating the Olivette Mining Claim. We shipped one car
load which netted us over \$7,000.00 and shipped ore running
15 as high as 350 ounces of silver to the ton."

16 "I was familiar with the adjoining claim, the Annette,
and it is my understanding that this claim produced about
17 \$200,000.00 of ore."

18 "Both mines shut down in 1893, owing to the low price
of silver and thereafter became to a certain extent caved in,
19 and have never since been re-opened or unwatered."

20 "In my opinion, both mines are as good as they ever
were and full worth re-opening and working."

21 By study of the enclosed reports in regard to
22 this district it is evident very good gold and silver values
were had in practically all the fissures and fractures of this
23 area.

24 C.J. Sarle's report, page 10, states:

25 "Estimates by oldtimers, of the total production
of these partially worked veins of Olive Camp approximate, in
26 round figures, \$3,000,000"

27 In John Carter Anderson's report on the Swastika,
this is the figure also given by the Allison Brothers, from
the period 1886 to 1893. They operated the mines, leased and
28 operated a general store, in the camp during that period.

29 The silver and gold content is also evidenced in
the many assay sheets, and data, showing a large amount
30 of work in the main shaft. A picked sample by the company on
the 400 ft. level shows:

31 Sample No. 52842, Gold 0.06 ozs., Silver 140.0 ozs.,
32 Copper 2.3%, Lead 12.5%, Zinc 3.4%

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1 A slight stain of manganese on the surface and
2 fractures of the formation may account for the lower surface
3 values in gold and silver and the pickup shown below water level
4 in many of the ores.

5 This data is submitted to show the large past gold
6 and silver production of the area and the possibilities of
7 the future should the old district be re-opened.

8 Assays on the higher grade Copper-Iron ores of
9 the Camden Area show that areas much higher in gold and silver
10 have actually been opened and sampled over substantial widths
11 and need but detailed development to result in considerable
12 production. It is proposed to do this, starting on the most
13 readily accessible area and then proceeding to the deeper
14 areas which show better promise on the deeper levels.

15 A 4% copper ore (as indicated in the southeast drift
16 of the Billings' 52 ft. shaft), shipped to the Douglas,
17 Arizona smelter, at the present time would show the following
18 cost and returns per ton:

(See C.J. Sarle's report, page 12):

19 "The ore in the drift along the footwall, on the
20 150 foot level, and in the crosscuts from it, shows a dis-
21 tinct tendency to zonal arrangement of the metals. For the
22 first three to four feet out from the wall, the copper con-
23 tent of the ore is high. The zinc content then increases and
24 then gradually the lead. This arrangement is also apparent
25 in the drift, from the bottom of the Billings' shaft, to the
26 hanging wall. An apparent exception to this arrangement of
27 the metals is seen in copper-rich ore encountered in the last
28 15 feet of the cross-cut, extending into the ore, from the
29 bottom of this shaft, the copper values still showing strong
30 in the breast of the cross-cut."

31 This is represented by Sarle's assay No. 8 (Sarle's
32 Assay Map). which run 4.06% Copper, 0.01 ozs. Gold, 2.1 ozs.
Silver, across 14.6 ft.

4% copper equals 80 lbs. per ton.

10 lbs. deducted by smelter for slag loss leaves 70 lbs.
copper paid for per ton.

12¢ ceiling price pays 11.775¢ per lb.

11.775¢ minus 2¢ for refining of bullion equals 9.775¢ per
lb. paid for.

70 lbs Copper at 9.775¢ per lb. equals - - - - \$ 6.84 per ton
2.1 ozs. Silver less 0.5 ozs. equals 1.6 ozs.

@ 71¢ equals - - - - \$ 1.16 per ton
(Now 90.5¢) 7.99

Costs:

Trucking to railroad and loading - - - - \$0.75 per ton

Freight - Sahuarita to Douglas - - - - 1.80 " "

Smelting charges - - - - 3.50 " "

TOTAL \$8.05 " "

\$ 6.05 per ton

BALANCE DUE DHIPPER - - - \$ 1.94 " "

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Forward	\$1.94
("A") Bonus :	
97% of 80 lbs. equals 77 lbs. @ 5¢ per lbs. equals \$3.85 per ton	<u>3.85</u>
TOTAL	5.79 "

As shown by the enclosed assays, much higher grades of ore may be expected in places, by additional development, that will pay a better margin of profit. Also, lower grade ore could be produced where the mining costs would be bettered, down to 3½%, 3% or even 2%, with some gold and silver content, under very favorable tonnage conditions.

Gross metal market values show these ores, under present prices to be much better than when the enclosed reports were made. For instance, 250 ft. level - west (See Assay Map 250 ft. level, samples Nos. 25-31, inclusive, given as \$ 9.55 per ton gross by Libbey, would show \$20.00 per ton gross content at present. After deducting freight, smelter, slag loss, refining, etc. and considering "A" Bonus Payments, this would be equal to \$12.69 per ton.

These figures are as follows:

Gold 0.15 ozs. @ \$35.00 equals	\$5.25 per ton
Silver 2.10 ozs. @ 0.72 equals	1.50 per ton
Lead 1.6% @ 9½¢ per lb. equals	3.13 per ton
Zinc 3.83% @ 11¢ per lb.	8.42 per ton
Copper 0.5% @ 17¢ per lb.	<u>1.70 per ton</u>
Total	\$20.00 per ton

Considering the amount realized from the smelters on high-grade products from the mill and after all deductions are made:

Lead 1.6% @ \$0.63	\$ 1.08 per ton
Zinc 3.83% @ 0.58	2.22 " "
Copper 0.5% @ 1.06	0.55 " "
Gold 0.15 ozs.	4.80 " "
Silver 2.1 ozs. @ 0.58	<u>1.22 " "</u>
Total	\$ 9.82 " " 9.82

("A") Bonus

Lead 1.69% equals 34 lbs. @ 86¢ equals		
29 lbs. @ 2.75¢	\$ 0.80	"
Zinc 3.83% equals 77 lbs @ 77¢ equals		
59 lbs. @ 2.75¢	1.62	"
Copper 0.5% equals 10 lbs. @ 87¢ equals		
9 lbs. @ 5¢	<u>0.45</u>	"
Total	\$ 2.87	" 2.87
Grand Total		\$ 12.69

	Grand Total	\$12.69
For this amount:		
Mill loss - 10% of \$20.00	\$ 2.00 per ton	
Milling cost,	<u>2.50</u> " "	
Total	4.50 " "	4.50
Grand Total		<u>\$ 8.19</u>
Total mining and development cost per ton		<u>5.00</u>
Net Profit - - - - -		3.19

Under present conditions this property may be opened up very fast to the large amount of available development, and it may develop into an important producer. Geological indications are that this area may be underlain by important limestone formations and/or contact with important mineralizers such as intrusive granite.

C.J. Sarle's report states:

"It has been stated that the ore bodies of the Pima Mining District were formed by mineralizing solutions escaping from the molten, crystallizing granite magma, into older roof rocks, during a late state in the uplift of the Sierrita Mountains."

"The copiousness of these solutions and their richness in metallic elements is attested by the large bodies of copper-iron and copper-iron-zinc sulphides mixed with garnet, found in limestone, where the magma contacted the Paleozoic sedimentary rocks, as in the Mineral Hill - San Xavier and Twin Buttes Camps. Also by the large body of ore, as in the San Xavier mine, formed by metasomatic replacement of limestone, caused by solution migrating to a distance from the granite magma to more soluble portions of the lime."

"Although no occurrence of either of these types of ore deposits have yet been found in Olive Camp, its intermediate position and closeness to these camps and the evidence of widespread mineralization shown by the many argentiferous-galena and argentiferous-tetrahedrite veins, which have been worked in this camp, together with the subjacent occurrence of the common mineralizer, the granite, implies a high degree of probability that large ore bodies will be discovered in the Olive Camp once deep and systematic mining is undertaken there."

"In other words, these veins may well be investigated today as it will almost certainly prove that some if not all of them are but the upper attenuated ends of larger bodies of base ores."

"Unworked veins occur, and probably many which are blind will be encountered when systematic exploration and development of the camp is undertaken. Several showings on the company's holdings deserve careful investigation. The camp was abandoned only when the price of silver and lead fell. But, as stated, valuable as these ores are, and well worth developing, the major future values of this camp, in my opinion, are likely to lie in the development possibilities of huge bodies of base ore with depth. There is no reason to suppose that, with all these surface showings, mineralization within this area was not as intensive as that indicated by the large

1 contact-metamorphic and metasomic replacement ores of
2 the district, given the right conditions for the entrance
and catchment of the mineralizer.

3 In lieu of the easily replaceable limestone
4 and considering the relatively inhospitable nature of the
5 andesite and mesozoic sediments to replacement, some other
6 favorable offsetting condition must be afforded. These re-
7 quirements seem to have been met by the occurrence of zones
8 of close fracturing and brecciation in these rocks, permitting
a diffusion of the mineralizing solutions, and the formation
of disseminated ores in breccia. One such example, apparently,
has been discovered in the large ore body now being developed
by the Helmet Peak Mining and Milling Company."

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10 rocks of Olive Camp are deeply underlain by the Paleozoic
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tions to the granite magma were right, may occur beneath Olive
Camp and the company's property, quite as large or larger than
any of the similar known deposits of the Mineral Hill - San
Xavier and Twin Buttes Camps.

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14 veins which have been mined superficially for their rich lead-
15 silver ores in Olive Camp, proves it beyond question to be an
16 exceptionally richly mineralized area. That these veins in
17 the majority of cases lead down to much larger bodies of com-
18 mercial base ores has been explained. The large bodies of
19 contact-metamorphic and metasomatic replacement ores of copper
20 and copper-zinc sulphides, mined in contiguous camps, point,
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these metals, of the same order of magnitude, existing at
depth in Olive Camp. The central position of the Helmet Peak
Mining and Milling Company's property, in this area, the excel-
lent showing development of their ore body has already made,
and other strong surface indications, found on their large
holdings, warrant confidence that their mining operations will
meet with gratifying economic results.

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in the ore deposits of Arizona."

24 "The presence of intrusive granite associated with
25 the sedimentary rocks form an ideal condition for large depos-
26 its of ore. Where these conditions exist with a great number
of mineralized veins encountered over the surface, it is almost
a certainty of immense deposits of commercial ore, only requir-
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31 "The more recent development on the lower levels of
32 this mine substitute this theory as the proportion of copper
minerals in the unaltered primary ore is gradually increasing
as the work approaches the underlying Granite rocks to the south-
ward and below."

"As this basal structure is approached at depth the

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3 "Neighboring mines of the Twin Buttes area on the
4 east end and the Mineral Hill area on the north have at times
5 produced large quantities of high grade copper ore."

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7 granitic rocks than the workings of the Helmet Peak Company
8 and it is therefore safe to predict that the latter company
9 will find improved mineralizing conditions at a lower geolog-
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13 that fissures and sheeted rock masses will become more gener-
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29 some extent by wall-rock replacement, in the near-surface
30 Cretaceous sedimentary and volcanic formations. In areas to
31 the north and south important copper and zinc ore developments
32 have been made and from which considerable tonnages of ore
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34 replacement bodies in Paleozoic limestones. It appears, there-
35 fore, that replacement bodies in limestone form the important
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38 and thickness of formations forming that structure, thus appear
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2 structures in this area and that immediately to the north, in
3 the San Xavier area, justify the statement that this strati-
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6 mapping in this area to the immediate north."

7 "The Olive camp area appears to be a depressed geologic
8 structure- either a down-warped (synclinal) or a down-faulted
9 area. The Paleozoic limestone formations of the San Xavier
10 area distinctly dip to the south (20 - 25°), apparently
11 plunging under the Olive camp area. The contact between Paleo-
12 zoic limestone and Cretaceous arkosic beds occurs along the
13 southern border of the San Xavier area. The origin of this
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16 sediments which formed the beds, or it may be a fault contact,
17 produced by a major rupture. If this contact is an unconformi-
18 ty, as the first case suggests, the limestones extend to the
19 southward uninterruptedly below the Olive Camp area. In the
20 event that it is a fault contact, the limestones with their
21 overlying sedimentary beds and volcanic formations, in the
22 Olive Camp block have been faulted downward."

23 "There is some basis, of course, for expecting that
24 additional underground development may disclose other high-
25 grade silver-lead ore shoots, such as were formerly worked in
26 the area, or perhaps larger veins and breccia bodies of ore
27 of commercial grade and size."

28 "The problem of developing possible large ore bodies
29 in the Olive Camp area thus resolves itself, in this opinion,
30 to first ascertaining the presence or absence of underlying
31 limestone beds. Preferably, such development should be carried
32 on by drilling operations. And in so doing, if the location
33 of drill holes is carefully planned, it is probable that rela-
34 tively near-surface vein or breccia type deposits of value may
35 be encountered while the deeper prospecting is in progress."

36 "The depth at which the limestone, if present, may
37 occur is highly problematical; if in a synclinal structure, it
38 may be comparatively shallow, if block-faulted, it may lie
39 much deeper - 2,000 feet or more."

C. L. Orem

4/18/47
Mining, Metallurgical Engineer
and Geologist
c/o 30 W. Wilson, Tucson, Arizona

Milling cost,	Total	2.50	"	"	4.50
	rand Total	4.60	"	"	\$ 8.19
Total mining and development cost per ton					5.00
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21 overlying sedimentary beds and volcanic formations, in the
22 Olive Camp block have been faulted downward."

23 "There is some basis, of course, for expecting that
24 additional underground development may disclose other high-
25 grade silver-lead ore shoots, such as were formerly worked in
26 the area, or perhaps larger veins and breccia bodies of ore
27 of commercial grade and size."

28 "The problem of developing possible large ore bodies
29 in the Olive Camp area thus resolves itself, in this opinion,
30 to first ascertaining the presence or absence of underlying
limestone beds. Preferably, such development should be carried
on by drilling operations. And in so doing, if the location
of drill holes is carefully planned, it is probable that rela-
tively near-surface vein or breccia type deposits of value may
be encountered while the deeper prospecting is in progress."

"The depth at which the limestone, if present, may
occur is highly problematical; if in a synclinal structure, it
may be comparatively shallow, if block-faulted, it may lie
much deeper - 2,000 feet or more."

C. L. Orem

Mining, Metallurgical Engineer
and Geologist
630 W. Wilson, Tucson, Arizona

4/18/47

28
Application of
G. L. Orem

(Exhibit "A" (e) 1. Reports)

REPORT

on the property of the

HELMET PEAK MINING AND MILLING COMPANY.

Dr. G. J. Sarle.

LOCATION:

The property of the Helmet Peak Mining and Milling Company is situated in the Pima Mining District, Pima County, Arizona, near the northeasterly edge of the Sierrita Mountains, at an elevation of about 3,600 feet above tide, and 21 miles south and west of the city of Tucson. The property centers about the corner to Sections 10, 11, 14 and 15, in Township 17 South, Range 12 East. Locally, this portion of the Pima District is known as "Olive Camp".

An excellent highway between Tucson and the mining camp of Twin Buttes, four miles to the south, passes the property, a mile to the east of the mine, with which it is connected by a good mine road. Sahuarita, eight miles east, a station on the Tucson-Nogales Branch of the Southern Pacific, is the shipping point.

HOLDINGS:

The property comprises 12 unpatented lode claims, six owned by the company and six held under bond and lease. Those claims owned by the company are collectively known as the "Harper-Martinez Group", and are named: South Camden, South Camden Nos. 1 and 2, Refugia, Refugia Nos. 1 and 2. The claims under bond and lease comprise the "Emory Group", and include the Tit-For-Tat, Contention, Prosperity, Camden, Camden Nos. 2 and 3. These twelve claims are contiguous and have an area of nearly 240 acres, extending eastward and westward for about a mile and three quarters and with a maximum width of almost half a mile.

TOPOGRAPHY AND GENERAL GEOLOGY OF THE
REGION AND SIERRITA MOUNTAINS.

The dominant relief features in the topography of this general region are north-south to northwest-southeast trending fault-block mountain ranges, with broad, intervening, alluvial-floored valleys or plains.

The Sierrita Mountains form one of several relatively small mountains, roughly aligned, which separate the Altar-Abra Valley, on the west, from the Santa Cruz Valley, on the east. These mountains, like the ranges paralleling them to the eastward and westward, were formed by crustal fracturing and uplift in late Tertiary and early Pleistocene times.

Since then, weathering and erosion have profoundly modified their form and relief. Thus, by erosion, the original Sierrita Mountain mass has been deeply dissected and its flanks have retreated several miles from their original position. Over this area, an outwardly sloping rock floor, a lowland, has been developed about a mere remnant of the original mountain mass. From the summit of the flat cone, or mountain pediment, thus developed by erosion, the remnant stands as an irregular, declivitous ridge seven to eight miles in length and four to five miles in width, dominated slightly by Samaniago Peak, whose summit rises to approximately 6500 feet above tide. Here and there, however, peaks of more resistant rocks, due to differential erosion, rise above the plain. For example, on the westerly side, the central mass is flanked by a narrow belt of foothills. At other points, as on the eastern side, other eminences rise from this plain, such as the Twin Buttes, Helmet Peak, San Xavier Ridge, Democrat Peak, and Mineral Hill. Peripherally, the rock plain passes beneath alluvial slopes, detritus deposited by ephemeral streams, formed by stormwaters running from the mountain slopes to the Altar-Abra and the Santa Cruz valleys. Far out on these alluvial slopes, the only visible indications of the nature of the rock floor beneath, or for that matter, that the Sierrita Mountains formerly extended so far valleyward, are a few hills of rock, left by circum-erosion. But towards the mountain axis the detritus covering this beveled rock slope become a mere veneer, through which low hills and ridges, between sand-filled wash-bottoms, reveal extensively the underlying rock formations.

The profound erosion to which the Sierrita Range has been subjected has laid it open to its core, revealing its innermost structure and constituent formations. Great thicknesses of rock, once covering the entire uplift, have been wholly removed from the central area and reduced to disconnected marginal remnants or scattered inliers, many of these fragments only escaping due to their position in the fault mosaic.

A reconnaissance of the range shows the rock series in order of age to be as follows:

Resting upon a basement of much older Pre-Cambrian granites, gneisses, and some schists, generally much cut by aplitic and pegmatitic dikes and sometimes by grano-diorite, is a Paleozoic marine series of strata, mainly limestones, originally several thousand feet in thickness, referable in age to Upper Cambrian, Devonian, Mississippian, and Permo-Pennsylvanian. Mesozoic strata, once originally many thousand feet in thickness, overlie the Paleozoic series. This series consists of an almost endless alternation and repetition of layers and benches of arkosic conglomerates, arkosic sandstones and shales with occasional zones of thin limestones. This is mainly a fresh water continental deposit, as shown by its lithological character and fossils. Marine, Commanchean, Cretaceous fossils, found in this series in the Patagonia Mountains, some fifty miles to the southeastward, however, establish the age of the series. Mantling the eroded surfaces of the older formations are remnants of a thick series of Tertiary andesites and rhyolites - surface flows. Of these, there appears to have been an older and younger series. Dikes and sills of related type, found cutting the older underlying formations, particularly the Mesozoics, are probably syngenetic. Upon these, but more localized, were early Quarternary volcanics, - mainly basalt, though including some andesites and interbedded rhyolitic tuffs.

The core of the range is a great Tertiary granite batholith, varying in phase from a coarse, porphyritic biotite granite to a fine grained biotite granite, and to a highly silicious coarse grained rock containing little biotite. The first phase is most typically developed in the Piedmont area along the eastern side of the central mass and in the vicinity of Twin Buttes. The second phase shows in the eastern and western slopes of the central mass. The third phase is found in the Olive Camp region. Probably some of the porphyritic minor intrusives of the area are genetically connected with this granite.

FORMATION OF THE SIERRITA MOUNTAINS:

The formation of the Sierrita Mountains probably should be considered as a process, initiated early in Tertiary time, passing through a climacteric stage in closing Tertiary and early Pleistocene times, - a very long period, though short geologically considered.

The process began with a general elevation or crustal upwarping of the country, and the opening of large fissures in the rock crust, through which ascending lavas, reaching the surface, spread widely. Finally, crustal readjustments began in which faulting played the leading role and the region, so to speak, collapsed to essentially its present attitude. In this adjustment the thick Tertiary lava cap, as well as the underlying older formations, were heaved into linear and anastomosing ridges, of tilted fault blocks, with parallel trending, depressed areas between, thus forming the present mountain ranges and valleys.

This mountain-forming process was by no means cataclysmic, but involved a long period of time, even for its last stage of final minor adjustment. It was not so rapid but that many antecedent streams in southern Arizona were able to maintain their uninterrupted way, erosional down-cutting of their channels keeping pace with the growth of the mountains athwart their courses. Likewise, in the case of the Sierrita Mountains, the uplift outstripped the agencies of degradation, general erosion had made deep inroads into the mass before active uplift had ceased. Moreover, structural readjustments, within and about the range, may still be expected at intervals as time goes on.

THE SIERRITA GRANITE BATHOLITH, AND ITS GENETIC CONNECTION WITH ORE DEPOSITS:

Simultaneously with the final faulting and uplift of the Sierrita Range, a subjacent, upward movement of acidic lavas, on a gigantic scale, took place. This extremely hot, viscous, fluidal mineral-solution, under enormous rock pressure, hydrostatically buoyed up the fault blocks, wedging itself upward between their bases, forcing them upward and outward in all directions. Many blocks, loosened from their neighbors, are seen to have foundered in the still pasty mass beneath, and others, top-heavy, turned over on their side, some even partially inverting. The magmatic movement may have occurred in successive stages, the intervals between permitting a certain amount of magmatic differentiation.

The batholith imparted a dome shape to the Sierrita uplift. This is obscured now, however, by its present dissected condition.

Another effect of the ascent of the magma was to dynamically metamorphose the sedimentary rocks, now exposed in the

residual foothill ridges, along the western base of the central mass. Here sediments and accompanying intrusives were greatly compressed against a large upfaulted mass of Pre-Cambrian granite which abuts their western side. The rocks were folded and contorted, the limestones squeezed into segments, often showing flow-structure and marbleization. The terrigenous rocks were extensively mashed and sheared, and in places converted into slates and even schists. Closely following this, ascending mineralizing solutions, emanating from the underlying granitic magma, deposited the ores, now being prospected in this belt, in the Papago Mining District.

On the eastern side of the range, in the Pima Mining District, though the rock formations are locally contorted and folded, yet the evidences of dynamic metamorphism, such as schistosity and slaty cleavage, are practically wanting. The evidences of igneous metamorphism, on the other hand, are seen almost everywhere. The alteration was mainly effected by a suffusion of the rocks by hot solutions, - perhaps gases and vapors, - the volatile constituents of the granitic magma making their way upward, in part forced out by its gradual crystallization, or congelation, into granite.

Through the action of these solutions, considerable portions of the limestones have been crystallized into marble, silicified and garnetized; portions of clayey limestones have been extensively altered to garnet and epidote; sandstones converted into quartzites, epidotized and garnetized; arkosic sandstones in places leached and the contained feldspars recrystallized into sericite, until it is often difficult to distinguish them in the field from altered quartz-porphyry, or a mashed and reconstructed rhyolite; shales extensively hornfelsitized, porcelainized and silicified; and large masses of the rock have been charged with finely disseminated pyrite, which in weathering has widely stained the rocks. But such alteration is by no means as universal as this list of igneous metamorphic changes might suggest, for many of the rocks superficially show little alteration -- well-preserved fossils even being found in some of the limestone masses.

Such widespread evidence of intrusive igneous metamorphism of the rocks of a region usually presages the presence of ore deposits. The significance to us of the occurrence of this granite batholith is the large number of valuable deposits of ore found in the disrupted and intruded overlying older rock formations, formed by mineralizers escaping into them, or forced into them, from the fluid granite magma before and during its crystallization.

Thus where the fluid acid magma came directly into contact with steep wall-like faces of the fault blocks, especially if limestone or calcareous shales, contact-metamorphic ore bodies were formed, large masses of garnet and sulphide ores being formed along the contact at the expense of the latter rocks. At the same time ore solutions working through the mineralogically more congenial portions of the rock and into the shattered zones, made extensive metasomatic replacement of ore in them, often reaching such areas by traveling some distance from the contact through fissures and along fault contacts.

In this manner the large contact ore bodies in the Paleozoic limestones at Mineral Hill and the Vulcan Mine, two miles north, and the partially developed ore bodies of the west and South San Xavier, a mile to the north and east of Helmet Peak Mining and Milling Company's property, were formed; likewise, the ores in limestone of the Glance, Queen, North Star, and Senator Morgan mines at Twin Buttes, four miles to the south.

The large and valuable ore deposits of the San Xavier Mines, a mile to the north of the Company's property, in gray Pennsylvanian limestone, was formed by solutions ascending from the subjacent magma, following the fault plane between this limestone and upedged Mesozoic sandstones, shales, and intruded sills of volcanic rock.

Again, where the solutions ascended through fissures in less soluble roof rocks, the walls confined the solutions and valuable veins and shoots of ore were formed. Many veins of this type have been worked in the Olive Camp. Examples of such veins are the Olivette vein, Annette, Wedge, Richmond, Emma E. and Schumacker, located just north of the Company's holdings; the Tit-for-Tat, Contention and Prosperity veins on their ground; the Freis veins and the Alpha vein to the south; and the Paymaster veins to the southwest. Other veins, cropping, have not yet been worked, and many not showing at the surface, doubtless will be encountered in cross-cutting, as the district is more systematically developed.

A fourth and very important type of ore deposit is found in the district. At present it is represented by a single known occurrence, though with future exploration and development in depth of Olive Camp it is confidently expected to become the source of a large production of base ores. There are bodies of disseminated ores occurring in crushed and brecciated zones in the less easily permeable and replaceable rocks. Of this type, is the ore body now being developed by the Helmet Peak Mining and Milling Company on their property. Here the mineralizing solutions, ascending from the granite magma, have formed a large ore body in brecciated andesite.

The contact-metamorphic ores of the district are essentially copper-iron sulphides, with depth; though a zonal arrangement of ore minerals is found to take place upward, where erosion has not destroyed the upper portions of deposits. In this sequence the relatively pure copper-iron ores give place upward to a mixture of copper and zinc, then to zinc-copper-lead and zinc-lead-silver, and lastly, to lead-silver. In this case the low temperature minerals have ascended to the higher or peripheral zone.

As a result of the magmas of Southern Arizona in general being relatively copper-iron rich, and as these minerals come down at a relatively high temperature, and precipitation and enrichment are heaviest near the source of the mineralizing solutions, it is the rule that these ore bodies increase in size downward. The lead-silver end of the series usually carries the higher values, but the copper ores, though of lower grade, generally make up for this many times over in quantity.

The fissure veins of the Olive Camp, essentially lead-silver and tetrahedrite-silver-lead ores, which were worked be-

tween 1886 and 1893, should be regarded as the upper, attenuated ends of ore bodies, grading downward through zinc-copper ores to copper-iron ores of much greater volume. Discontinuance of operations on these veins was due mainly to encountering the mid-zone of copper-zinc ores, which because of their complexity, and no practical way of treatment at that time, could not be economically handled. The abandonment of the camp, however, was due to the falling price of lead and silver.

GEOLOGY OF OLIVE CAMP AND COMPANY'S PROPERTY.

Olive Camp lies in the northeastern part of the pedimentary area, or flanking, erosional lowland of the Sierrita Mountains. Low, flat divides, rising here and there into rounded rocky hills, separate shallow, eastwardly draining washes and arroyos. Patches of alluvium occur, but in general the rock formations are fairly well exposed,

On the north and northeast the area is bounded by faults, along which rise eroded blocks of Paleozoic strata, whose visible portions are composed of great thicknesses of Pennsylvanian (Carboniferous) and Permo-Pennsylvanian gray limestones. Helmet Peak on the northeast, one of these fault-blocks, rises several hundred feet above the general plain, while crossing the area on the north, in east-west line, are San Xavier Ridge, on the east, and Marble Mountain, on the west.

The formations flooring Olive Camp consist of Mesozoic sedimentary rock, early Tertiary andesite and late Tertiary granite. (See Geological Map of Olive Camp).

The Mesozoic strata form a belt nearly a mile wide, which underlies the northern end and the eastern side of the Camp. Southward the outcrop broadens, its westerly edge swinging southwestward. The strata stand nearly vertical and aggregate many hundreds of feet in thickness. Their strike and dip is variable. In the northern part of the belt the strike ranges from 40° to 65° east of north; southwestward it departs widely from this in places. Considerable portions of the rock are so shattered, weathered and metamorphosed that their original structural planes are recognized with difficulty and frequently the formation has been mistaken for an igneous rock.

The rock varies from heavy-bedded arkosic conglomerate and gritty arkosic sandstone, often quartzitized and sericitized; to, usually thin-bedded, fine-grained, gray sandstone or quartzite, interbedded with purple shale. There are also some thin beds, of gray to brown, impure gritty limestone.

Occasionally sills of felsite or porphyry and sometimes of more basic rock occur in plane with the stratification.

The andesite in Olive Camp fills a broad bay-like re-entrant in the western edge of the Mesozoic belt. Its northern edge, curving to the southeast, crosses the property of the Helmet Peak Mining and Milling Company about three hundred feet northeast of the mine. The western half of the Company's holdings, therefore, lies on the Tertiary andesite and the eastern, on the Mesozoic

sedimentary rocks. The andesite as a whole is massive, though portions, distinguished by containing andesite fragments congealed in the andesite, therefore an andesite breccia, may be stratiform.

Whether the contact of the andesite with the Mesozoic sediments is intrusive, or brought about by faulting, has not been fully determined. Andesites do occur, however, intrusive into the Mesozoics. In some cases though these occurrences, especially where the rock is coarsely porphyritic, are judged to be of a later period than that of the formation of the major mass of andesite. In places the contact between andesite and sedimentary rock is marked by a zone of brecciation and superficially, at least, by leaching.

The granite forms a sinuous southwestward trending contact along the western edge of both the Mesozoic rock and the andesite of this area. Thence it spreads widely as the floor of the pediment.

The granite, in its typical development, is a gray, medium-grained, biotite granite, containing large feldspar phenocrysts. Near contacts with the older formations it is often very silicious, the mica appearing much reduced in amount. In some cases observed of actual intrusion of the granite into the older rocks the difference appears to be merely textural, the grains a little finer and the large feldspar phenocrysts absent.

Half a mile northeast of the Helmet Peak Mine, a small area of outcropping granite occurs in the midst of the up-edged Mesozoic strata. It represents a tongue of the molten magma which penetrated these rocks some hundreds of feet, before slowly crystallizing and cooling. Other examples of intrusion of the granite magma into the Mesozoic strata may be seen in the sides of a deep arroyo, just south of the U. S. Mineral Monument No. 2, situated on Democrat Hill, a mile north of the Company's property. A short distance west of the property is an occurrence of the granite intruding the andesite.

These examples of intrusion, by upwelling granite magma, of the older formations observed in Olive Camp and elsewhere, together with the wide area of granite, which erosion has exposed in the heart of the Sierrita Mountains, shows the whole Pima Mining District as underlain at depth by this granite, and that the fault-blocks, formed by the breaking up of the old Paleozoic and Mesozoic sediments and Tertiary volcanic country rock, rest upon or are imbedded in its surface. (See Stereogram of Olive Camp).

ORE DEPOSITS OF OLIVE CAMP:

It has been stated that the ore bodies of the Pima Mining District were formed by mineralizing solutions escaping from the molten, crystallizing granite magma, into older roof rocks, during a late stage in the uplift of the Sierrita Mountains.

The copiousness of these solutions and their richness in metallic elements is attested by the large bodies of copper-iron and copper-iron-zinc sulphides mixed with garnet, found in limestone, where the magma contacted the Paleozoic sedimentary rocks, as in the Mineral Hill-San Xavier and Twin Buttes Camps. Also by the large body of ore, as in the San Xavier Mine, formed

by metasomatic replacement of limestone, caused by solutions migrating to a distance from the granitic magma to more soluble portions of the lime.

Although no occurrences of either of these types of ore deposits have yet been found in Olive Camp, its intermediate position and closeness to these camps and the evidences of widespread mineralization shown by the many argentiferous-galena and argentiferous-tetrahedrite veins, which have been worked in this camp, together with the subjacent occurrence of the common mineralizer, the granite, implies a high degree of probability that large ore bodies will be discovered in the Olive Camp once deep and systematic mining is undertaken there.

Mention has been made of a more or less definite arrangement of the ore minerals, recurrently met in the ore deposits of Southern Arizona. This circumstance is often voiced in the expression, "She'll go to copper with depth". In this sequence, somewhat overlapping, relatively pure copper-iron minerals at depth give place upward to copper-iron-zinc, copper-zinc-lead, and zinc-lead-silver to lead-silver ores.

At the same time the ore bodies usually increase in size with depth. This is partially due to the magmas of the region being relatively rich in the base metals, and also high temperature minerals which precipitate comparatively near the source of mineralization and at greater depth, while the lead-silver ores, relatively low temperature minerals and in lesser amount, are precipitated as the much reduced upward continuation of the ore body.

Work on many of the veins of Olive Camp was discontinued after the high grade silver ores were mined out and the complex base ores had begun to appear with depth - between 200 and 300 feet. On many of these veins work was carried far enough, however, to indicate that the zonal arrangement of ores, or metals, holds here and that at some greater depth, had mining been continued, the pure copper-iron sulphides would have been encountered, and presumably in volume which would more than have made up for their lower tenor, had the methods of milling of these ores been as well understood at that time as it is today.

In other words, these veins may well be investigated today as it will almost certainly prove that some if not all of them are but the upper attenuated ends of larger bodies of base ores.

The veins of Olive Camp vary in trend between northeast and east. Some cross veins, like the Olive, occur. They occur in fractures and fault planes, in both the Tertiary andesite and the Mesozoic argillo-arenaceous sediments; in the latter of ore in plane with the bedding.

The major part of the worked veins of Olive Camp have been listed on page 6 of this report. Some lie north of the Helmet Peak Mining and Milling Company's property, some south. The property lies at about the center of the vein area. The Tit-for-Tat-Contention vein and the Prosperity vein are on the company's property.

The Tit-for-Tat-Contention vein lies west of the Helmet Peak Mine. It is in the andesite and stands vertical and trends N. 65° E., and was developed for about five hundred feet and to a depth of perhaps two hundred feet. The Prosperity workings lie three hundred to four hundred feet north of the mine, in a Mesozoic quartzite conglomerate. It apparently lies in the plane of stratification, striking N. 70° E., approximately, and dipping north at a 50° angle, which flattens considerably with depth. The vein was worked from three inclined shafts, to a depth, on the incline, of 310 feet. Some good shipping ore is said to have been left in the bottom of these workings.

I have been unable to ascertain what the production of either of these veins was. The dumps are large and the production probably compared favorably with that of similar veins of the camp, having dumps indicating about the same amount of development.

The Annette vein, about 1200 feet northeast of the Prosperity vein, strikes N. 80° E., dipping 55° N., is in Mesozoic strata and is said to have produced \$65,000 in ore. The Olivette, adjoining, but with strike S. 20° E., and dip 70° W., is reported to have yielded \$750,000 in shipped ore.

These mines were worked between the years 1886 and 1893. Since that time, none of them have been operated, except the Richmond, which is now being developed by the Swastika Copper and Silver Mining Company.

Estimates by oldtimers, of the total production of these partially worked veins of Olive Camp, approximate, in round figures, \$3,000,000.

Unworked veins occur, and probably many which are blind will be encountered when systematic exploration and development of the camp is undertaken. Several showings on the company's holdings deserve careful investigation. The camp was abandoned only when the price of silver and lead fell. But, as stated, valuable as these ores are, and well worth developing, the major future values of this camp, in my opinion, are likely to lie in the development possibilities of huge bodies of base ore with depth. There is no reason to suppose that, with all these surface showings, mineralization within this area was not as intensive as that indicated by the large contact-metamorphic and metasomatic replacement ores of the district, given the right conditions for the entrance and catchment of the mineralizers.

In lieu of the easily replaceable limestone and considering the relatively inhospitable nature of the andesite and Mesozoic sediments to replacement, some other favorable offsetting condition must be afforded. These requirements seem to have been met by the occurrence of zones of close fracturing and brecciation in these rocks, permitting a diffusion of the mineralizing solutions, and the formation of disseminated ores in breccia. One such example, apparently, has been discovered in the large ore body now being developed by the Helmet Peak Mining and Milling Company.

In many cases conditions recognizable by the geologist, followed by systematic drilling, will almost certainly develop other similar ore bodies on the company's property.

Some confidently hold the view that the surficial rocks of Olive Camp are deeply underlain by the Paleozoic sedimentary series. If so, then bodies of contact-metamorphic and metasomatic replacement ores in limestone, where the relations to the granite magma were right, may occur beneath Olive Camp and the company's property, quite as large or larger than any of the similar known deposits of the Mineral Hill-San Xavier and Twin Buttes camps.

PRESENT DEVELOPMENT OF THE PROPERTY:

About 1300 feet of linear work has been done in developing the ore body. This includes a main shaft, 150 feet deep, sunk in the ore, its bottom about 25 feet from the footwall; a 70 foot shaft in the ore body, near the hanging wall, opposite and 125 feet from the main shaft; and a 52 foot shaft, 175 feet from the main shaft and 125 feet along the hanging wall side from the 70 foot shaft. Drifts have been run from all of these.

From the bottom of the main shaft, a drift cutting to the footwall, turns westerly, in ore, following the wall. From this two crosscuts have been carried into the ore. From the foot of the 70 foot shaft a drift has been run diagonally into the ore. The bottom of the 52 foot shaft lies 18 feet from the hanging wall, in ore. From it a drift has been run both ways, one diagonally to the hanging wall, the other into the body of the ore. (See geological sketch map).

ORE BODIES OF HELMET PEAK MINING AND MILLING COMPANY:

The ore body which the Company is developing underlies, so far as yet outlined, the westerly end of the Camden No. 2 claim. Here an elongate, roughly oval hill, long axis lying about 20' east of north, rising perhaps fifty feet above the wash along its westerly side, caps the ore body. The rock of which this hill is composed, has on first inspection the appearance, in texture and light color, of an altered rhyolite or quartz porphyry. It is probably a highly altered and silicified, brecciated andesite. This interpretation is borne out by the large angular masses of andesite encountered in the ore body beneath in mine development.

This capping portion contains considerable lead carbonate, sulphate and oxide; but below, within 20 to 25 feet, carries in the grayish mass, finely disseminated pyrite; then shortly in the angular spaces in the breccia, the sulphides of lead, zinc and iron appear prominently. The presence of considerable calcite and gypsum, and the fairly friable character of the gangue, would suggest, on first consideration, that this upper portion represents a partially leached zone. But while it is evident that some leaching has occurred, these lime minerals with some quartz druses may quite as well have been produced by ascending hot solutions, largely robbed of their high temperature ore minerals at a lower level in their ascent. The action of the residual mother liquor may have leached the lime from the feldspars of the andesite and deposited it partially as a carbonate and partially as a sulphate. The ores show little if any secondary alteration, and all are sulphides and certainly have the appearance of being primary.

However, solutions of metals, produced for primary sulphide ores in the leaching zone, descending and reprecipitated in the presence of abundant pyrites, should again take the sulphide forms, but most of them would be in forms recognizable as secondary sulphides.

The brecciated zone carrying these ores lies between two well defined steeply inclined fault planes. The footwall on the southwesterly side is somewhat irregular and has an average dip of about 85° . The hanging wall dips at about 70° . They diverge in strike slightly towards the west. The width of the brecciated zone, as shown by the crosscut, from the bottom of the 150 foot shaft, is approximately 150 feet. The difference in dip of foot and hanging wall makes the ore body perceptibly widen downward. The ore is disseminated through this brecciated mass. The walls so far as present development shows, confined the ascending mineral solutions and defined the upper part of the ore body.

The ore in the drift along the footwall, on the 150 foot level, and in the crosscuts from it, shows a distinct tendency to zonal arrangements of the metals. For the first three to four feet out from the wall, the copper content of the ore is high. The zinc content then increases and then gradually the lead. This arrangement is also apparent in the drift, from the bottom of the Billings' shaft, to the hanging wall. An apparent exception to this arrangement of the metals is seen in copper-rich ore encountered in the last 15 feet of the crosscut, extending into the ore, from the bottom of this shaft, the copper values still showing strong in the breast of the crosscut.

Bunches of argentiferous-tetrahedrites are appearing on the 150 foot level, and it is confidently expected, from many observed occurrences of this ore, that it will increase in amount for the next 100 feet, before beginning to decrease.

The orebody, as depth is gained and water level is approached, may be expected to become of higher grade. But, as the ore is primary, no real significance can be attached to the position of the present water level and an influence upon ore values. It is believed that as primary ore the values then obtaining may be expected to hold to depths comparable to that of the large bodies of contact-metamorphic and metasomatic replacement ores of the district, and to increase in size downward. Centrally, the lead-silver values should be expected to persist in this ore body to depths as great at least as in the smaller ore shoot in the fault and fissure veins of the camp. Zinc should increase in amount before giving way to the copper-iron and iron sulphides.

The wash along the southeast flank of the hill, in which the shaft is sunk, appears to have developed on a line of structural weakness, in the rocks and other ore bodies, in zones of shattered and brecciated andesite should be sought by cross-cutting. When sufficient depth in the main workings has been reached with depth and consequent more intensive mineralization, such lateral ore bodies may become more or less confluent with the present ore body.

TABULATION OF ASSAYS.

Showing
Width Cut,

NOTE: The position of these assays is shown on the accompanying geologic sketch map, of the Helmet Peak Mining and Milling Company. (See Exhibit "A" (a) 1. Maps)

Number of Assay	% Cu.	% Pb.	% Zn.	Oz. Au.	Oz. Ag.	Width Cut	Gross Value.
1	1.05	0.2	1.0	Trace	0.5	6.0 ft.	\$5.09
2	0.20	1.1	1.4	"	0.5	21.0 "	4.89
3	0.46	1.0	1.6	"	0.6	9.0 "	5.79
4	2.40	1.0	3.2	0.01	1.6	9.0 "	8.80
5	0.66	1.4	2.5	0.02	3.4	5.3 "	10.55
6	0.65	1.4	4.0	0.01	1.8	6.0 "	11.52
7	0.41	1.2	2.3	0.01	1.1	5.7 "	7.55
8	4.05	0.3	1.0	0.01	2.1	14.5 "	14.88
9	1.62	2.0	3.9	0.02	3.8	11.7 "	16.61
10	0.05	tr.	0.7	0.01	0.1	14.2 "	1.43
11	0.61	0.4	1.5	0.01	1.2	4.7 "	5.58
12	2.11	0.2	0.5	tr.	0.8	5.0 "	7.52
13	4.92	0.3	1.8	0.01	2.7	4.5 "	18.87
14	2.75	0.2	1.8	0.01	2.0	12.0 "	12.17
15	0.59	0.2	0.9	0.01	1.1	12.0 "	4.22
16	0.25	0.5	2.9	0.01	1.2	12.0 "	5.48
17	0.15	0.1	2.5	tr.	0.5	12.0 "	4.59
18	0.05	0.1	0.5	0.01	0.2	13.0 "	1.39
19	0.11	0.3	1.8	tr.	0.4	18.5 "	3.74
20	0.32	0.9	4.0	0.01	0.8	26.0 "	9.08

Assays by E. A. Jacobs,
Registered Assayer,
Tucson, Arizona.

(Prices based on market
quotations for Aug. 25th,
1926, E.&M.J.P., Cu. 14.025,
Pb. 8.90, Zn. 7.35, Ag. 62 5/8).

When mining has been carried, say, to the 400 foot level in the mine, it might be advisable to drift beneath the old Prosperity workings, cutting possible ores along the contact in the brecciated zone, between the andesite and the Mesozoic sedimentaries, and opening up the base ores of the Prosperity vein at depth.

Knowledge gained in the continued development of the Helmet Peak ore body may be expected to furnish information of service in looking for similar ore bodies elsewhere on the property.

The curving contact between the andesite and Mesozoic clastics is regarded as potential ore ground. A tunnel which has been started in the base of the "Red Mill", near the western end of the South Camden No. 2 claim, E. 500' S. from the Helmet Peak shaft, in a leached and brecciated zone in this contact, offers possibilities warranting continuing of work. Should expectations be realized, and ore found with depth here, it will probably lead to development of this contact back around toward the mine.

There are other good surface indications of metalization on this large property, which should be given more study. I prophesy that eventually a careful geological study and mapping of the structures of these twelve claims will be made, and a careful exploration with the drill will be carried out; for conditions indicate that the chances for valuable ore bodies with depth are exceedingly good in Olive Camp and on this property in an area which past developments have proved highly mineralized.

ORE RESERVES:

From the present workings Mr. Harper, Superintendent, estimates that there can be produced 105,000 tons of milling ore, with a gross value of \$8.00 per ton. I have carefully gone over these estimates with him, both underground and on the map of the workings, and have taken check assays. The accompanying tabulation gives these assays, footage and values, and the numbers on the Geologic Sketch Map show their positions.

If the areas out in taking assays Nos. 1 to 9 and 12 to 14, inclusive, and No. 20, representing the 50, 70 and 150 foot levels, are considered, it is believed safe to regard these as roughly defining a curved zone of milling ore, 325 feet long, approximately 40 feet wide and 100 feet deep, lying between the 50 and 100 foot levels. Based upon the average value per foot of openings available, this block containing 100,000 tons would have a gross value of \$10.00 per ton. As stated, the samples are averaged according to the width of ore they represent, and constitute as accurate an average of this zone as the present development permits. Mr. Harper's estimate is therefore regarded as very conservative.

There are zones of much higher grade ore than this average: for example, assay No. 8, cut across 14.5 feet, runs \$14.88; No. 9, across 11.7 feet, \$16.61; and No. 13, across 4.5 feet, \$18.87.

Many other assays have been taken, especially in the main cross-cut, from the foot of the 150 foot shaft. These all show a general mineralization of this large brecciated zone, tho not of a grade high enough for milling.

The present development, considering the size of the ore-body, cannot be considered as more than indicating a part of the milling ore which will be found between the 50 and 150 foot levels.

DEVELOPMENT ADVISED:

The present drift in ore along the footwall, on the 150 foot level should be carried on in exploration of the ore in this direction. From this drift a crosscut should be driven to a point beneath the Billings (the 52 foot) shaft and a raise made, connecting through it with the surface.

The main shaft should be sunk as rapidly as possible to waterlevel, probably another 100 feet. The footwall, allowing for dip, should here be perhaps 10 or 12 feet from the bottom of the shaft. Cutting to the footwall, drifts should be run both ways. A crosscut also should be driven from the shaft to the hanging wall, and other crosscuts made on either side of it at 50 foot intervals, from the footwall across the ore body. Then, as soon as development permits, a raise should be driven from this level to the 150 foot level to connect with the Billings shaft.

The Billings shaft thus deepened will then insure good ventilation and drainage of the mine, and also can be used in raising waste, thereby relieving congestion at the main shaft, while handling ore.

This program carried out, besides greatly increasing ore output, should raise the grade of ore, facilitate selective mining and milling of the ore, and at the same time furnish ample water for milling.

The exploration work being done in the brecciated and leached zone at the contact between Mesozoics and andesites at the foot of the "Red Hill", on the westerly end of the South Camden No. 2 claim, should be continued, - a shaft sunk and a crosscut run.

For the development of several other ore possibilities observed on this property, plans later can be evolved.

Sufficient capital should be assured, before this program of immediate development is started, to insure its economical execution.

All development work should be pushed as fast as possible to place the mine on a large producing basis, in the shortest possible time. This will require experienced, competent mine operators, eager for results.

Much credit is due the present Superintendent, Mr. Harper, for the able manner in which he has succeeded, under great economic difficulties, in opening up and showing the merits of the property.

Detailed geological maps should be made of the surface and of the present workings, and the map kept up to date as a guide to the most economical development of the property.

The development work should be followed closely

by accurate and systematic assaying. All of the data thus secured should be placed on an assay map for future reference, to further insure the economical mining of the ores as developed and as an aid in the opening up of the better sections of the new ground.

Accurate Metallurgical tests should be run on average representative lots of the ore, by a reliable metallurgical engineer, to determine the best methods of treatment, before selecting equipment for the mill.

PRESENT EQUIPMENT:

The present mining equipment consists of a 50 h.p. Commercial Engine, an 8" x 10" Rand Duplex Compressor, a 6 h. p. Fairbanks-Morse Hoisting Engine, a Stoper, two Jackhammers, two mounted rock drills, (all of Ingersoll-Rand make), and a Denver Rock Drill. The 150 foot, compartment and a half, Main Shaft is well timbered. A No. 3 Worthing Blake Knowles type pump is installed in this shaft at the 150 foot level, and it is equipped with air and water pipe lines. There are about 500 feet of laid track, one mine car, two mine trucks and three mine buckets. The hoist and compressor are housed in a 23 by 31 foot building. There is also a 1500 gallon water tank. A Ford, one-ton, truck, owned by the company, is used for hauling equipment and supplies from Tucson.

ADDITIONAL EQUIPMENT REQUIRED:

A larger hoist will be required in deepening the main shaft to waterlevel and to handle the ore and waste when development starts on the deeper level. The 6 h.p. hoist now in use should be installed at the Billings shaft. Then as soon as a raise has been driven connecting with this shaft it can be used in raising waste from the 150 foot level.

As soon as drifting and crosscutting on the new level has been started, a 50 ton pilot mill should be erected. Milling of the ore mined in this development should cover a considerable part of the expense of operation, and increasingly so as the work is extended and new faces are opened.

The ore reserve of 105,000 tons, estimated from present development, will supply a mill of 50 tons capacity, without allowing for lost time, over five years. So soon as sufficient water has been assured, the capacity of the mill can be increased by adding a second 50 ton unit.

WATER AND TIMBER:

From evidence derived from mining on adjoining properties, water adequate for milling may be expected from development of the mine at a depth not to exceed 300 feet.

Timber and fuel will have to be hauled either from Sahuarita station, 8 miles, or from Tucson, 21 miles.

CONCLUSIONS:

The present development work shows a property of great promise, justifying liberal financing for the purpose of further development.

While the present workings have shown the ore exposed to be a portion, merely the apex, of a large ore body widening downward, the work cannot be considered as in any direction reaching the limits of the ore zone or as showing how large the area underlain by ore may be.

Ample cheap labor, low haulage and shipping costs, and ore bodies permitting of cheap stoping methods in mining and other conditions as favorable as in other camps in the country, all make for reasonable mining and milling costs.

Under average market prices of metals and the comparatively recent improvements made in the milling of such complex ores, a good profit is assured from the large tonnage of the present and better grades of ore, which development may be confidently expected to open up at depth.

The large number and wide distribution of strong veins which have been mined superficially for their rich lead-silver ores in Olive Camp, proves it beyond question to be an exceptionally richly mineralized area. That those veins in the majority of cases lead down to much larger bodies of commercial base ores has been explained. The large bodies of contact-metamorphic and metasomatic replacement ores of copper and copper-zinc sulphides, mined in contiguous camps, point, with a high degree of probability, to other ore bodies of these metals, of the same order of magnitude, existing at depth in Olive Camp. The central position of the Helmet Peak Mining and Milling Company's property, in this area, the excellent showing development of their ore body has already made, and other strong surface indications, found on their large holdings, warrant confidence that their mining operations will meet with gratifying economic results.

Signed: C.J. SARLE
C.J. Sarle,
Mining Geologist.

Tucson, Arizona,
August 26th, 1926.

Return to
FRED W. FICKETT
P.O. Box
2568
TUCSON

CAMDEN MINE

Summary by
C. L. Allen

History and Present Condition:

The original Billings' Shaft was sunk in 1916, and a shipment of high grade copper ore was made in September, 1917. Court records show that Billings stated he had taken \$500.00 net off the property in September, 1917. He lost the suit over title and possession of the claims in the same court action. Later ore was shipped out of this shaft, but records are not available.

The Helmet Peak Mining and Milling Company was organized in the middle 20's, and sank a 52 ft. compartment and a half shaft near the old Billings' Shaft, which was completely caved in and did about 125 ft. of drifting both northerly and southerly, cutting into the old stope of the old shaft to the north. This showed very high grade copper ore in a large mass of lead, zinc, copper ores.

They also sank the main shaft, the collar of which is about 30 ft. higher and 200 ft. to the northeast, to a depth of 612 ft., and did several thousand feet of development work on the different levels. These workings exposed a very large tonnage of lead, zinc, copper ores in an Andesite Breccia zone estimated to be over 1,000 ft. long and more than 200 ft. wide in places. In this area sections showed higher copper areas and other areas were higher in lead and zinc. The copper ores and the lead ores were reported to be good enough in some sections to be shipped separately to lead smelters and copper smelters. (See Libbey's Supplemental Report.)

Very little of the old shipping records are available. In December, 1928 one shipment to the Copper Queen Lead Smelter at Douglas, Arizona, showed:

26.93 tons assaying: Gold \$0.70, Silver 15.16
ozs., Lead 28.8%, Copper 1.05% and Zinc 8.7%

Another showed:

11.46 tons assaying: Gold \$0.35, Silver 5.33
ozs., Copper 8.84%, Lead 2.1%, Zinc 1.0%. This
was shipped to the Copper Furnace.

The large shaft is inaccessible, being full of water to the 100 ft. level. The 150 ft. level is caved and inaccessible. The present Billings' shaft with 125 ft. of drifts on the 50 ft. level is full of water and debris and muck above the top of the drifts. The timbers are out of the shaft and the head frame is gone. These were probably hi-graded.

It is estimated that this shaft could be opened at a much cheaper cost than the main shaft and the high grade copper ores shipped to a copper furnace, and the lead, zinc, copper ores trucked to the Custom Mill at Sahuarita, on the Southern Pacific Railroad. At the time of the development of this property no lead, zinc, copper mill was available.

"The ore body which the company is developing underlies, as far as yet outlined, the westerly end of the Camden No. 2 claim. Here an elongate, roughly oval hill, long axis lying about 20' east of north, rising perhaps fifty feet above the wash along its westerly side, caps the ore body. The rock of which this hill is composed, has on first inspection the appearance, in texture and light color, of an altered rhyolite or quartz porphyry. It is probably a highly altered and silicified, brecciated andesite. This interpretation is borne out by the large angular masses of andesite encountered in the ore body beneath in mine development." (See C. J. Sarle's Report, page 11.)

Tucson, Arizona
September 30, 1945.

County of Pima)
State of Arizona) ss.

J. W. Mills, being duly sworn, under oath deposes and says:

That during most of the work at Helmet-Peak Area, he was a timber man and in charge of the work for the Helmet-Peak Mining and Milling Company, until most of the 400 ft. level in its main shaft was accomplished:

That he is familiar with the ore occurrences on the surface and underground, including the 70 ft. zinc shaft, and the 52 ft. Billings' Shaft, and the main shaft.

That the southeast drift of the 52 ft. Billings' shaft showed and was entirely in good copper ore and the stope from the old Billings shaft showed high grade copper ore.

That nearly all the work in the main shaft, the Billings shaft, and the zinc shaft was on the Camden No. 2 patented claim.

That the drift on the 150 ft. level in the end crosscut towards the Billings shaft was entirely in high grade copper ore, showing bunches of Bornite or Peacock Copper ore.

That the material all around the copper ores was lead, zinc, copper ores;

That the company did a lot of prospect work over a large area, and if the work had been confined to the better ore exposures, very good grades of ores could have been produced.

That the limits of these better grade ore areas have not been explored at all;

And that a width of 150 ft. of good lead, zinc, copper ore was crosscut on the 250 ft. level north.

J.W. MILLS
J. W. Mills

Subscribed and sworn to before me this 29th day of September, 1945, by J.W. Mills.

My commission expires 2/15/47
(Notarial Seal)

FRED W. FICKETT
Notary Public

Long since the development of the Helmet Peak, the Eagle-Picher Company acquired the large holdings just north of this property, known as the San Xavier and Mineral Hill Area, and have put in a 350 ton per day (now 500 ton) lead, zinc, copper mill at Sahuarita, handling Custom ores. They are besides mining, drilling, the area with two diamond and one churn drill. Reports indicate they are drilling up to 900 ft. in depth and are getting good results.

All early reports advise the running of adequate ore tests. J. M. Libbey, in his main report on page 6, under the paragraph on Selective Mining, states, "Tests have been made which show the ores to be amenable to concentration and the product marketed at a marginable profit."

On page 2, under "Character of Ore, "he states:

"Tests have shown that the ore would yield readily to modern metallurgical treatment."

In Bright's report, page 4, he states:

"The problems of the past do not exist on this property as metallurgical difficulties have been solved, the water, a valuable asset for milling, also being present for flotation purposes."

Besides present facilities for handling gold and silver complex ores nearby by modern metallurgical plant, work is being done with the idea of successfully eliminating a large percentage of waste in a coarse form in the lower grades of ores on the property by such methods as modern sink-float treatment in heavier than water medium, such as used at the Mascot Mines of the American Zinc Company, of Tennessee, who produce annually 1,250,000 tons of zinc ore, carrying 5% blend. They treat 4,000 tons per 24 hours and 60% of the mined ore is rejected at from 2" to 3/8" size. Also jig table preliminary treatment might be used if found to eliminate a considerable percentage of the ore in coarse sizes. Such methods might make large low grade areas previously considered too low grade, available for treatment. Some success is indicated for such processes.

C. J. Sarle states, page 11:

"The present development, considering the size of the ore body, cannot be considered as more than indicating a part of the milling ore which will be found between the 50 and 150 foot levels."

And on page 14:

While the present workings have shown the ore exposed to be a portion merely the apex, of a large ore body, widening downward, the work cannot be considered as in any direction reaching the limits of the ore zone or as showing how large the area underlain by ore may be."

Libber's report shows:

"The boundaries of the shear zone, outlined by the surface and underground development, indicate a zone of mineralization approximately 200 feet in width, with a length traceable for several hundred feet on either side of the working shafts."

And page 3:

"Sections which showed distinct mineralization and appeared to be ore, were mainly sampled."

"Approximately fifty per cent of the lateral development footage shows distinct mineralization and has been sampled as ore."

C. J. Sarle's report, page 11, Paragraph 3 (last half)

"The bottom of the 52 ft. shaft lies 18 ft. from the hanging wall in ore. From it a drift has been run both ways, one diagonally to the hanging wall, the other into the body of the ore." (See Geological Sketch Map.)

This same ore body is shown: By assays of the copper ore in the Billings' stope.

No. 67370 Gold 0.01 ozs., Silver 25.6 ozs., Copper 37.1%, Lead 2.60%, Zinc 2.20%.

No. 67434 Gold 0.02 ozs., Silver 28.0 ozs., Copper 27.6%, Lead 4.6%, Zinc 11.2%.

This body is also shown by assay No. 20, 70 ft. zinc shaft, sample cut across 26 ft.

No. 20 Gold 0.01 ozs., Silver 0.8%, Copper 0.32%, Lead 0.9%, Zinc 4.0%.

This ore body is also shown by assays Nos. 5, 6, 7, 8 and 9 on the 50' level, Billings shaft, and Nos. 12, 13 and 14 on the same zone. 50 ft. ahead of No. 8, and approximately 75 ft. below on the 150 ft. level of the main shaft.

No. of Assays	% Cu.	% Pb.	% Zn.	Ozs. Au.	Ozs. Ag.	Width Cut.
5	0.66	1.4	2.5	0.02	3.4	5.3 feet
6	0.65	1.4	4.0	0.01	1.8	6.0 "
7	0.41	1.2	2.3	0.01	1.1	5.7 "
8	4.05	0.3	1.0	0.01	2.1	14.5 "
9	1.62	2.0	3.9	0.08	3.8	11.7 "
12	2.11	0.2	0.5	Tr.	0.8	5.0 "
13	4.92	0.3	1.8	0.01	2.7	4.8 "
14	2.75	0.2	1.8	0.01	2.0	12.0 "

(See C. J. Sarle's Geological and Assay Map.)

By considering assay No. 8 (50' deep), representing the last 15 ft. in the southeast drift of the Billings' 52 ft. shaft, and samples Nos. 12, 13 and 14, on the last crosscut in the end of the 150 ft. level of the main shaft, and the area between of 50 ft. or better on an ore zone estimated to be 40 ft. wide by these same engineers, this material could all be shipped to a copper smelter by starting at the shallower Billings' Shaft and gradually re-open the deeper areas as the production proceeded. These samples are all low in lead-zinc and indicate a product of $3\frac{1}{2}$ to 5% copper ore, especially if selected areas are mined.

From C. J. Sarle's report, under "Ore Reserves", the above area proposed to open up is set forth as follows:

"From the present workings Mr. Harper, Supt., estimates that there can be produced 105,000 tons of milling ore, with a gross value of \$8.00 per ton (now about \$16.00 per ton). I have carefully gone over these estimates with him, both underground and on the map of workings, and have taken check assays."

"The accompanying tabulation gives these assays, footage and values, and the number of the Geological Sketch Map show their positions."

"If the areas cut in taking assays Nos. 1 to 9 and 12 to 14, inclusive, and No. 20, representing the 50, 70 and 150 foot levels, are considered, it is believed safe to regard these as roughly defining a curved zone of milling ore, 325 feet long, approximately 40 feet wide and 100 feet deep, lying between the 50 and 150 ft. levels. Based upon the average value per foot of openings available, this block containing 100,000 tons would have a gross value of \$10.00 per ton (now about \$20.00). As stated, the samples are averaged according to the width of the ore they represent, and constitute as accurate an average of this zone as the present development permits. Mr. Harper's estimate is therefore regarded as very conservative."

"There are zones of much higher grade ore than this average: For example, assay No. 8, cut across 14.5 feet, runs \$14.88 (now \$22.66); No. 9, across 11.7 feet, \$16.61 (now nearly \$25.28); and No. 13, across 4.5 feet, \$18.87." (now \$28.61).

Under present market prices of 15¢ per lb. for lead, 10½¢ per lb. for zinc, and 21½¢ per lb. for copper, the dollar value per ton gross would be much greater than that taken by Sarle during the period he sampled the mine.

With the better class of Government bonuses (average 15.75¢ per lb. for lead, 16.75¢ per lb. for zinc and 27¢ per lb. for copper), the dollar value of these ores would still be further greatly increased.

For the purposes of this report values are given in metal content per ton rather than dollar values.

Trucking to the Custom Mill at Sahuarita, or to the railroad loading ramp, can be contracted for @ 0.75 per ton. Custom freight rates to Arizona smelters range from \$1.80 per ton on \$15.00 ore up.

Custom smelting rates on copper ores in Arizona range from \$3.50 to \$4.50 per ton for \$15.00 ore, with 10% increase on higher values until a maximum charge of \$6.00 is reached.

Deduction of 8-10 lbs. copper per ton ore is made for slag loss, and from 2¢ to 2½¢ per lb. of copper from the N. Y. quotation, for shipping and refining and selling of the copper.

Custom milling at Sahuarita, will average \$4.00 per ton ore.

The old company developed a large area figuring on handling hundreds of feet in width. By limiting these areas considerably widths up to 40 ft. and in cases sometimes as high as 150 ft. can be had that are of a very high grade milling ore or a good shipping ore, where the natural segregation of values permit. It is now figured that under present conditions milling ore of 5% combined lead-zinc content could be handled in fairly large tonnage.

C. J. Sarle's report, page 12, under "Development Advised:"

"The Billings shaft thus deepened will then insure good ventilation and drainage of the mine, and also can be used in raising waste, thereby relieving congestion at the main shaft, while handling ore."

"This program carried out, besides greatly increasing ore output, should raise the grade of ore, facilitate selective mining and milling of the ore, and at the same time furnish ample water for milling."

Under Bright's report (which see) page 3:

"A great part of the drifting has been driven in an Andesite Breccia, in contact with the Andesite intrusion, and is not a mineralizing contact, the mineralization being the result of deposits from mineralized solutions from the fissures, which is the proper place to look for ore, although I believe that profitable bodies of ore will be found in the vicinity of the Billings shaft as indicated by a shoot or pipe of copper (bornite) located there, by following the ore shoot."

"I believe that by continuing the drift of the 150 foot level the Billings ore body will develop a nice body of high grade ore, and also continue the drift from the 350 foot level, following the ore to the Prosperity vein."

"In the above mentioned section there is a large tonnage of good milling ore, that can be easily developed."

In Libbey's main report, he states:

"The boundaries of the shear zone, outlined by the surface and underground development, indicate a zone of mineralization approximately 200 feet in width, with a length traceable for several hundred feet on either side of the working shafts." These shafts are over 500 feet apart.

"Replacement action in brecciated areas and favorable sections of the sheeted Andesite by solutions bearing silver, copper, lead and zinc, has formed the ore bodies now exposed in the mines."

"Extended development work has emphasized the relation of the cross-fracturing and sheeting of the rock mass to the nature of the ore deposits."

"Throughout the underground workings is shown the tendency for the better class of ore to be found in the sheeted blocks adjacent to certain well defined shear planes or fissures."

"The valuable minerals Galena, Chalcopyrite, Tetrahedrite and Sphalerite occur throughout the ore measures in the form of disseminated minerals, nodules and segregated masses."

"A strong tendency is shown for like minerals to group together, that is, to segregate into nodules and lenses of separate minerals."

Also in Libbey's main report, page 6, under "Selective Mining", he states:

"In the area tributary to the Billings shaft, good assay values are shown and it is reported that commercial ore was being uncovered in the lower workings at an earlier time."

"It seems that certain sections could be mined selectively at a margin of profit, either through the shaft itself or by connecting up with the underground workings of Shaft No. 1."

"A cross-cut tunnel driven from the 150' level a distance of about 125 feet would cut the general formation beneath the Billings shaft and prove up this area effectively."

Much larger and higher grade areas are available in deeper areas of the mine and will be opened in the future development.

In Libbey's Supplemental Report, October 25, 1927, Page 1, he states:

"Approximately 500 feet of additional drifting and cross-cutting has been done in the westerly section of that level and an extensive area of mineralized ground has been encountered therein, which materially increases the available tonnage of commercial ore in the mine."

"General conditions, in evidence, are favorable for the continuance of the metal values through the further extension of the lateral and vertical dimensions."

"Assured Ore:

"The mineralized area in the westerly section of the 250 ft. level, as outlined by present development, and which can be classified as commercial ore, has a vein area of approximately 5,250 square feet."

"The ore-bearing rocks, lying in a sheeted or bedded form, have been exposed, by the work, to a thickness of 60 feet; supplying the factor of known vertical extent."

"The resultant content of the block, indicated by these factors is seen to be approximately 26,000 tons."

"The mineralization, of commercial value, occurs in the form of Sulphides of Copper, lead and zinc, with additional values in Silver and Gold."

"The character of the ore bearing material and the mineralization is similar to the ore area in the northerly section of this level."

"Samples were cut from the ore exposures within the westerly block and assayed with the following results:

"Average of samples No. 25 to 31, Incl., Length of cut, 10 ft., Interval between cuts, 4 ft. from westerly end of block - Gold .15 oz., Silver 2.10 oz., Copper .5%, Lead 1.69%, Zinc 3.83%."

"Average of samples No. 32 to 37, Incl. Length of cut 8 to 12 ft. Interval between cuts- 4 ft. from northerly end of block. Gold .15 ozs., Silver 1.12 oz., Copper 0.5%, Lead 1.2%, Zinc 3.05%."

"In General:

"The most westerly section being developed at the time of the sampling, showed a strong tendency for the minerals to segregate into bands, or veins, and the samples taken from the ore exposures showed an unusual degree of enrichment in spots."

"It will not be surprising to find the ore occurring in veins and deposits of workable size and of a value sufficient to permit of direct shipment to the smelter."

One shipment to Lead Furnace - - - 28.8% Lead
One shipment to Copper Furnace - - - 8.84% Copper

Libbey's Supplemental Report, page 1, (Assured Ore) speaks of additional values in gold and silver located in the new area developed on the 250 ft. level.

"The mineralization of commercial value, occurs in the form of sulphides of copper, lead and zinc, with additional values in silver and gold.

"Average of samples No. 25 to 31 Incl., length of cut - 10 ft., Interval between cuts - 4 ft, from northerly end of block - Gold .15 oz. Silver 2.10 oz. Copper .5%, Lead 1.69%, Zinc 3.83%."

Gold values in October, 1927, at \$20 an oz. would make this ore valued at about \$3.00 Gold. At the present time at \$35.00 an oz. this value would be \$5.25 Gold per ton. With the silver this would make an important area on account of its size.

An old assay sheet on a preliminary concentration test shows that the gold content could be recovered in a marketable form in the lead concentrates, although the concentrates were too low grade in zinc to be marketable, later flotation tests show a very good grade of zinc concentrate can be made, (See Eagle-Picher late ore test.)

	Au Ozs.	Ag Ozs.	Pb %	Zn %	Cu %	Fe %	Insul %
Pb. Conct	.12	44.6	61.5	4.5	3.00	5 .8	2.0
" Mid	.04	26.8	14.7	11.8	1.38	17 .2	
Zn Conct	.01	3.6	.6	56.5	.42	4.7	2.8
" Mid	.01	9.5	2.0	8.1	.37	15. 0	
Tails	.002	.41	.13	.35	.03	1. 9	
Heads Total	.01	5.9	6.4	8.4	0.40		
Oxide			0.18	0.48			

It is evident that the Copper-Iron ores showed considerable increased gold content.

Echel's "Geology of Mineral Hill, "1930, reports; page 24:

"There are the usual rumors that Mineral Hill was first worked by the Spaniards who exploited the gold found close to the surface."

Page 27:

"The slag dump remaining from early smelter operations was sampled for gold, silver and copper. Silver is present in very small amounts, but one sample showed 80 ozs. gold per ton. The values are very irregularly distributed through the slag and average far less than the figure given, which is included only to show that at one time gold must have been found in considerable quantities."

Page 30:

"Silver values in the slag are small, as is gold in general, but there are spots where the gold content runs to phenomenal figures. This is probably due to single pots of slag in which extraction was incomplete."

Mayuga's Reports: "Ore Deposits of the Helmet Peak Area."

"Two early furnaces of Mineral Hill ran 9600 tons of ore. Produced 800,000 lbs. of matte, averaging 65 to 70% copper and \$25.00 to \$45.00 gold and silver."

In 1893, silver dropped to 43¢ per oz., and lead to 3½¢ per lb. This caused the shut down of the district.

Mayuga's Report: States that the gold-iron veins towards the Alpha (Just south of this property), have not been investigated and have had very little work done on them.

In copies of letters from Flannery, Fritz, Brown and Bogan are important statements concerning the gold and silver values on this old ground and the district.

Flannery's letter states:

"Replying to your inquiry regarding the Prosperity Mine, (adjoins this claim in the north side) I have known this mine since its location sometime in the nineties. The main shaft is down some 320 feet and I do not recall the amount of drifting that has been done. This shaft was started about 1898 and was worked by the owners, Mike and Luke Corda, until the drop in the price in silver in 1903. During this time the Cordas became worth about fifty thousand dollars apiece from the profits of the mine. They had no hoist on the property, but after the shaft became too deep for a windlass, they operated it with a whim drawn by mules."

"The first 60 feet of the shaft was a chloride ore that was not shipped and is probably still on the dumps. At 60 feet sulphides were encountered that assayed 30 ozs. silver and a few dollars gold. The ores became steadily richer as the shaft was sunk, and at the bottom of the shaft assayed 300 ozs. silver and 1 oz. gold. I took a sample on the 200 foot level that assayed 200 ozs. silver and about \$12.00 gold."

Fritz's letter states:

"When we were working on the Helmet Peak group we took dozens of samples and these records were kept by Capt. King, one of the directors of the company. From memory they ran from 2% to 12% copper with a good showing of silver. On the map which you returned, you will note many X indicated. All were the locations of the sampling taken by Sarles or some person under him. Leonard and I walked through from the 50 ft. level to the 400 ft., and not once but many times - the better grade was above the 300 ft. The shaft is almost entirely in andesite."

"The Billings' shaft is just as indicated on the map. It shows nothing but very high grade. Note assays. Most surely it leads into the area just southeasterly and was never properly worked by any owner to date. The old company wandered about in the country instead of mining good ores only a few hundred feet from the main shaft. This high grade came from below and probably is an intrusion through the andesite."

Dr. Raymond J. Leonard was a prominent Geologist with the Department of Geology and Mineralogy at the College of Mines and Engineering, of the University of Arizona. Mr. Albert L. Fritz was a Civil Engineer and Head of the Fritz-Hamilton Development Company, which was interested at one time in developing the Helmet-Peak and entire Olive Camp.

Brown's Letter states:

"I was the original owner and locator of the Annette claim, which adjoins the Olivette. I took out of this claim over \$65,000.00 worth of ore. In 1893, owing to the low price of metals at that time, the mine closed down and has never been operated. The shaft has not been dewatered since the mine shut down. My operation of the mine was entirely without machinery."

"At the time the mine closed down, in 1893, operations were in 100 ounce silver ore in a winze at the bottom and 250 ounce ore in a drift to the west."

"My brother, J. K. Brown, was one of the locators and owners of the adjoining claim, the Olivette, and there was shipped from this claim, the Olivette, over \$750,000.00 of ore, and good ore left in the bottom when operations were discontinued."

"I am not the owner nor interested in any mining property in Pima Mining District."

The claim described in Brown's letter immediately adjoin this property to the north.

Bogan's letter states:

"In the later eighties, I was one of the leasors operating the Olivette Mining Claim. We shipped one car load which netted us over \$7,000.00 and shipped ore running as high as 350 ounces of silver to the ton."

"I was familiar with the adjoining claim, the Annette, and it is my understanding that this claim produced about \$200,000.00 of ore."

"Both mines shut down in 1893, owing to the low price of silver and thereafter became to a certain extent caved in, and have never since been re-opened or unwatered."

"In my opinion, both mines are as good as they ever were and full worth re-opening and working."

By study of the enclosed reports in regard to this district it is evident very good gold and silver values were had in practically all the fissures and fractures of this area.

C. J. Sarle's report, page 10, states:

"Estimates by old timers, of the total production of these partially worked veins of Olive Camp approximate, in round figures, \$3,000,000"

In John Carter Anderson's report on the Swastika, this is the figure also given by the Allison Brothers, from the period 1886 to 1893. They operated the mines, leased and operated a general store, in the camp during that period.

The silver and gold content is also evidenced in the many assay sheets, and data, showing a large amount of work in the main shaft. A picked sample by the company on the 400 ft. level shows:

Sample No. 52842, Gold 0.06 ozs., Silver 140.0 ozs., Copper 2.3%, Lead 12.5%, Zinc 3.4%.

A slight stain of manganese on the surface and fractures of the formation may account for the lower surface values in gold and silver and the pickup shown below water level in many of the ores.

This data is submitted to show the large past gold and silver production of the area and the possibilities of the future should the old district be re-opened.

Assays on the higher grade Copper-Iron ores of the Camden Area show that areas much higher in gold and silver have actually been opened and sampled over substantial widths and need but detailed development to result in considerable production. It is proposed to do this, starting on the most readily accessible area and then proceeding to the deeper areas which show better promise on the deeper levels.

At 4% copper ore (as indicated in the southeast drift of the Billings' 52 ft. shaft), shipped to the Douglas, Arizona Smelter, at the present time would show the following cost and returns per ton: (See C. J. Sarle's report, page 12):

"The ore in the drift along the footwall, on the 150 foot level, and in the crosscuts from it, shows a distinct tendency to zonal arrangement of the metals. For the first three to four feet out from the wall, the copper content of the ore is high. The zinc content then increases and then gradually the lead. This arrangement is also apparent in the drift, from the bottom of the Billings' shaft, to the hanging wall. An apparent exception to this arrangement of the metals is seen in copper-rich ore encountered in the last 15 feet of the cross-cut, extending into the ore, from the bottom of this shaft, the copper values still showing strong in the breast of the cross-cut."

This is represented by Sarle's assay No. 8 (Sarle's Assay Map), which ran 4.05% copper, 0.01 ozs. Gold, 2.1 ozs. Silver, across 14.5 ft.

4% copper equals 80 lbs. per ton.

10 lbs. deducted by smelter for slag loss leaves 70 lbs. copper paid for per ton.

21.5¢ market price pays 21.275¢ per lb.-

21.275¢ minus 2¢ for refining of bullion equals 19.275¢ per lb. paid for

70 lbs. Copper at 19.275¢ per lb. equals - - - \$13.4925 per ton

2.1 ozs. Silver less 0.5 ozs. equals 1.6 ozs. @ 90.3¢ equals - - - - - \$ 1.4448 per ton

\$14.9373

Costs:

Trucking to railroad and loading - - - -\$0.75 per ton
Freight - Sahuarita to Douglas - - - - - 1.80 " "
Smelting charges - - - - - 3.50 " "

TOTAL \$6.05 " " \$6.05 per ton

BALANCE DUE SHIPPER - - - \$8.88 " "

Forward - - - \$8.88
 Under a 27¢ bonus rate: this would equal - - - - - \$4.23
 TOTAL- - - - \$13.11

As shown by the enclosed assays, much higher grades of ore may be expected in places, by additional development, that will pay a better margin of profit. Also, lower grade ore could be produced where the mining costs would be bettered, down to $3\frac{1}{2}\%$, 3% or even 2%, with some gold and silver content, under very favorable tonnage or bonus conditions.

Gross metal market values show these ores, under present prices to be much better than when the enclosed reports were made. For instance, 250 ft. level - west (See Assay Map 250 ft. level, samples Nos. 25-31, inclusive, given as \$9.55 per ton gross by Libbey, would show \$22.52 per ton gross content at present.

Under present conditions this property may be opened up very fast to the large amount of available development, and it may develop into an important producer. Geological indications are that this area may be underlain by important limestone formations and/or contact with important mineralizers such as intrusive granite.

C. J. Sarle's report states:
 "It has been stated that the ore bodies of the Pima Mining District were formed by mineralizing solutions escaping from the molten, crystallizing granite magma, into older roof rocks, during a late state in the uplift of the Sierrita Mountains."

"The copiousness of these solutions and their richness in metallic elements is attested by the large bodies of copper-iron and copper-iron-zinc sulphides mixed with garnet, found in limestone, where the magma contacted the Paleozoic sedimentary rocks, as in the Mineral Hill - San Xavier and Twin Buttes Camps. Also by the large body of ore, as in the San Xavier mine, formed by metasomatic replacement of limestone, caused by solution migrating to a distance from the granite magma to more soluble portions of the lime."

"Although no occurrence of either of these types of ore deposits have yet been found in Olive camp, its intermediate position and closeness to these camps and the evidence of widespread mineralization shown by the many argentiferous galena and argentiferous-tetrahedrite veins, which have been worked in this camp, together with the subjacent occurrence of the common mineralizer, the granite, implies a high degree of probability that large ore bodies will be discovered in the Olive Camp once deep and systematic mining is undertaken there."

"In other words, these veins may well be investigated today as it will almost certainly prove that some if not all of them are but the upper attenuated ends of larger bodies of base ores.

"Unworked veins occur, and probably many which are blind will be encountered when systematic exploration and development of the camp is undertaken. Several showings on the company's holdings deserve careful investigation. The camp was abandoned only when the price of silver and lead fell. But, as stated, valuable as these ores are, and well worth developing, the major future values of this camp, in my opinion, are likely to lie in the development possibilities of huge bodies of base ore with depth. There is no reason to suppose that, with all these surface showings, mineralization within this area was not as intensive as that indicated by the large contact-metamorphic and metasomic replacement ores of the district, given the right conditions for the entrance and catchment of the mineralizer.

In lieu of the easily replaceable limestone and considering the relatively inhospitable nature of the andesite and mesozoic sediments to replacement, some other favorable offsetting condition must be afforded. These requirements seem to have been met by the occurrence of zones of close fracturing and brecciation in these rocks, permitting a diffusion of the mineralizing solutions, and the formation of disseminated ores in breccia. One such example, apparently, has been discovered in the large ore body now being developed by the Helmet Peak Mining and Milling Company."

"Some confidently hold the view that the surficial rocks of Olive Camp are deeply underlain by the Paleozoic sedimentary series. If so, then bodies of contact-metamorphic and metasomatic replacement ores in limestone, where the relations to the granite magma were right, may occur beneath Olive Camp, and the company's property, quite as large or larger than any of the similar known deposits of the Mineral Hill - San Xavier and Twin Buttes, camps.

"The large number and wide distribution of strong veins which have been mined superficially for their rich lead-silver ores in Olive Camp, proves it beyond question to be an exceptionally richly mineralized area. That these veins in the majority of cases lead down to much larger bodies of commercial base ores has been explained. The large bodies of contact-metamorphic and metasomatic replacement ores of copper and copper-zinc sulphides, mined in contiguous camps, point, with a high degree of probability, to other ore bodies of these metals, of the same order of magnitude, existing at depth in Olive Camp. The central position of the Helmet Peak Mining and Milling Company's property, in this area, the excellent showing development of their ore body has already made, and other strong surface indications, found on their large holdings, warrant confidence that their mining operations will meet with gratifying economic results.

Bright's report states:

"The intrusive granite is the principal mineralizer in the ore deposits of Arizona."

"The presence of intrusive granite associated with the sedimentary rocks form an ideal condition for large deposits of ore. Where these conditions exist with a great number of mineralized veins encountered over the surface, it is almost a certainty of immense deposits of commercial ore, only requiring capital and intelligence in development work to locate them."

"There is evidence of large deposits of commercial ores, on the contact of the granite and paleozoic rocks, by development of the Mineral Hill, Vulcan and other properties."

Libbey's report states:

"The more recent development on the lower levels of this mine substitute this theory as the proportion of copper minerals in the unaltered primary ore is gradually increasing as the work approaches the underlying Granite rocks to the southward and below."

"As this basal structure is approached at depth the degree of mineralization and proportionate value of the minerals should be increased."

"Neighboring mines of the Twin Buttes area on the east end and the Mineral Hill area on the north have at times produced large quantities of high grade copper ore."

"Their relative position is closer to the basal granitic rocks than the workings of the Helmet Peak Company and it is therefore safe to predict that the latter company will find improved mineralizing conditions at a lower geological horizon.

"It is assumed in reason, that mineralization will be more intensified as the source thereof is approached and that fissures and sheeted rock masses will become more generally ore-bearing and show a relatively increased concentration of the contained minerals."

"The origin of the mineralization undoubtedly lies within a zone between the ore areas now manifest and the granitic sill which underlies the series, and the mineralizing fissures may be simply offshoots from much larger ore bodies below."

Leonard's report states:

"It is fairly certain that intrusive granitic rocks underlie at variable depth the entire district of which Olive Camp area forms a part. These intrusive rocks were probably the sources of all primary mineralization in the district. The ore deposits that have been developed in the past in the Olive Camp area have been chiefly small high-grade silver-lead bodies, formed mainly by fissure-filling, but perhaps to some extent by wall-rock replacement, in the near-surface Cretaceous sedimentary and volcanic formations. In areas to the north and south important copper and zinc ore developments have been made and from which considerable tonnages of ore have been mined in the past. These deposits are principally replacement bodies in Paleozoic limestone. It appears, therefore, that replacement bodies in limestone form the important type of ore deposits for the district."

"The questions of major structure, and character and thickness of formations forming that structure, thus appear to be the essential questions relative to the probability of extensive ore occurrences at depth in the Olive Camp area."

"If the ore-bearing limestone formations of the Mineral Hill - San Xavier area to the north and of the Twin Buttes area to the south are continuous or occur under Olive Camp, then the probability of occurrence of important commercial ore deposits at depth in the latter area is greatly increased."

"The problem would then become one of probable depth to the favorable horizon and the determining of dominant or master fracture zones."

"Mr. John Carter Anderson, in his report on the Swastika property, page 4, sets forth certain evidence and a statement of belief that limestone does occur below the superficial formations of the area. That there is more than a possibility that these Paleozoic limestone formations do exist below the surface formation in the Olive Camp is not an idle statement nor one made for convenience."

"Even a brief field study of the stratigraphy and structures in this area and that immediately to the north, in the San Xavier area, justify the statement that this stratigraphic condition might exist. But more convincing still are similar indications in the results of recent detailed geologic mapping in this area to the immediate north."

"The Olive camp area appears to be a depressed geologic structure - either a down-warped (synclinal) or a down-faulted area. The Paleozoic limestone formations of the San Xavier area distinctly dip to the south (20° - 25°), apparently plunging under the Olive camp area. The contact between Paleozoic limestone and Cretaceous arkosic beds occurs along the southern border of the San Xavier area.

The origin of this contact is not clearly indicated, it may be normal formational contact, produced by a break or time interval in the deposition of sediments which formed the beds, or it may be a fault contact, produced by a major rupture. If this contact is an unconformity, as the first case suggests, the limestones extend to the southward uninterrupted below the Olive Camp area. In the event that it is a fault contact, the limestones with their overlying sedimentary beds and volcanic formations, in the Olive Camp block have faulted downward."

"There is some basis, of course, for expecting that additional underground development may disclose other high grade silver-lead ore shoots, such as were formerly worked in the area, or perhaps larger veins and breccia bodies of ore of commercial grade and size."

"The problem of developing possible large ore bodies in the Olive Camp area thus resolves itself, in this opinion, to first ascertaining the presence or absence of underlying limestone beds. Preferably, such development should be carried on by drilling operations. And in so doing, if the location of drill holes is carefully planned, it is probable that relatively near-surface vein or breccia type deposits of value may be encountered while the deeper prospecting is in progress."

"The depth at which the limestone, if present, may occur is highly problematical: if in a synclinal structure, it may be comparatively shallow, if block-faulted, it may lie much deeper - 2,000 feet or more."

C. L. OREM
Mining, Metallurgical Engineer
And Geologist
630 N. Wilson - Tucson, Arizona

4/18/47

Application of
G. L. Orem

(Exhibit "A" (e) 5. Reports)

Olive Camp, Pima County,
Arizona
Oct. 9, 31

Mr. Wm. J. Bishop,
Tucson, Arizona.

Dear Mr. Bishop:

Complying with your instructions I have made an examination of the Helmet Peak Copper Company mining property, and submit the following facts.

Location.

The property is located in Pima Mining District, Pima County, Arizona, twenty miles southwest from Tucson, on the old Tucson-Nogales highway. On the north is the property of the Empire Zinc Co. a developed mine. On the south is the property of Twin Buttes Mines, with a shipping record in excess of five million dollars and with immense tonnage of ore developed.

Geology.

Geologic conditions indicate large deposits of high grade Silver-Lead, Zinc, and Copper which cover an area of six or more miles, equal and possibly superior to any district in the southwest.

Owing to the limit of time to my disposal I am giving you the results as complete as possible:

The geology of an area of several miles has been examined by a number of eminent geologists, their reports being reliable and thorough, may be obtained by applying at the office of the Helmet Peak Copper Company. The company having spared no effort to obtain all possible data of the mineral content of the district.

The geology of the district is practically the same as many of the large copper mines of the United States, Mexico, and South America, consisting of areas of sedimentary deposits, intruded by later granatoid igneous rocks.

On the north we find the precambrian granite in places showing through the soil. South of this the paleozoic rocks appear as in small areas of quartzite and Martin limestone, and South and West Mesozoic sediments as far as my examination extends.

The intrusive granite is the principal mineralizer in the ore deposits of Arizona.

The presence of intrusive granite associated with the sedimentary rocks form an ideal condition for large deposits of ore. Where these conditions exist with a great number of mineral-

ized veins encountered over the surface, it is almost a certainty of immense deposits of commercial ore, only requiring capital and intelligence in development work to locate them.

There is evidence of large deposits of commercial ore, on the contact of the granite and paleozoic rocks, by development of the Mineral Hill, Vulcan and other properties.

There has been several million dollars worth of ore shipped from the district.

The Helmet Peak Copper Company's property consists of a group of sixty two claims, approximately 1240 acres.

Mineralization.

There are two principal vein systems traversing the property, one striking north 10 degrees east, dipping to the west, and the other running north 80 degrees east dipping northwest.

That the zonal theory is correct in these veins is very evident, high grade Silver, Lead, Zinc, and copper ores are and will be encountered as depth is gained.

The veins are continuous in trend and have well defined walls and give evidence of continued depth.

Development.

The development consists of efforts to take out ore at a comparatively shallow depth, which proves without question the wide distribution of valuable ore at the surface of the property.

All of the surface exploration or development was accomplished by the original owners, who did the work without the aid of machinery or scientific principles of mining.

The Helmet Peak Mining & Milling Company formerly owning a portion of the property now owned by the Helmet Peak Copper Company sunk two shafts in an Andesite intrusion, both shafts are vertical, number 1 having a depth of 600 feet, number 2 a depth of four hundred feet and about 500 feet apart. A great part of the drifting has been driven in an Andesite Breccia, in contact with the Andesite intrusion, and is not a mineralizing contact, the mineralization being the result of deposits from mineralized solutions from the fissures, which is the proper place to look for ore, although I believe that profitable bodies of ore will be found in the vicinity of the Billings shaft as indicated by a shoot or pipe of copper (bornite) located there, by following the shoot.

I believe that by continuing the drift of the 150 foot level the Billings ore body will develop a nice body of high grade ore, and also continue the drift from the 350 foot level, following the ore to the Prosperity vein.

There is an abundance of evidence of valuable ore bodies along the vein running through the Prosperity claim, which can be developed economically by drifting from number 1 shaft at the 350 foot level, a continuation of the present drift will necessitate approximately 140 feet to cut this vein, after this has been accomplished, drifting in both directions to open the ore body and provide stopping ground.

In the above mentioned section there is a large tonnage of good milling ore, that can be easily developed.

It is a good policy to locate ore bodies by diamond drilling, which is far more economical than sinking shafts, by which to locate bodies of copper ore, as copper deposits lie in zones.

Almost all of the big mines of today were operated on a small scale and developed in the early stages without machinery or scientific direction, extracting the high grade ore near the surface in a small way until the depth was too great, or the ore became complex, or no metallurgical process for profitable treatment at the time and other causes which delayed development for many years in some cases.

The problems of the past do not exist on this property as metallurgical difficulties have been solved, the water, a valuable asset for milling, being present for flotation purposes.

The geology indicates immense bodies of ore as depth is attained.

All indications in Olive Camp as well as Pima mining district point to one of the largest and most profitable copper camps in Arizona, and possibly in the United States, or Mexico, with development and depth.

The Helmet Peak Copper Company are making great efforts to develop the property correctly.

Mr. James A. Hamilton who is president of the company and a mining man of many years experience and thoroughly competent to develop and operate the property with great economic results, having the advantage of knowing that there is ore in the drifts at depth in the development of the former operators, is advantageous to the present plan of development.

The plans as discussed with the officers of the company for the future development are carefully laid, conservative, and along approved engineering plans.

Respectfully submitted,

Wm. Bright. E. M.

Application of
G. L. Orem

(Exhibit "A" (e) 2. Reports)

REPORT ON THE PROPERTY

of

THE HELMET PEAK MINING AND MILLING COMPANY

J. M. Libbey.

The property of the Helmet Peak Mining & Milling Company is situated in the well known "Olive Camp" section of the Pima Mining District, Pima County, Arizona.

Situated a distance of about 21 miles in a Southwesterly direction from Tucson, the property is easily accessible by good roads.

A well maintained highway, leading from Tucson to Sahuarita, Amadoville, Nogales and other points on the Nogales Branch of the Southern Pacific Lines, passes within a mile distance of the Helmet Peak Company's property.

A good road connects with the highway affording available shipping points along the line as may be required.

The Twin Buttes Camp, two or three miles to the Eastward, has railroad connection with the Nogales Line at Sahuarita, providing a convenient outlet for the surrounding country.

PROPERTY HOLDINGS

THE property held by the Helmet Peak Company, comprises a group of seventeen mining claims.

Seven of these claims are patented and the balance are being held under contiguous claim locations.

GENERAL STRUCTURE

THE surface ground of the property lies mainly within the area of older Andesites, although in some parts, out-croppings of highly altered sedimentary rocks are in evidence.

Considerable folding and shearing action is observable and the older sedimentaries and basal aggregates show evidence of extensive intrusions by later igneous rocks.

The metal bearing areas are found in the brecciated sections of the Andesite aggregates where cross faulting and shearing has accompanied the intrusion of Granitic and Dioritic porphyries and the subsequent adjustment in place.

The mineralizing solutions have undoubtedly had their origin in the underlying intrusive mass and in their migrations therefrom have caused a partial replacement of the contiguous formation in such parts as were favorable for that action.

ORE OCCURENCE

The mineralized area within which the most important development work has been done, lies within an extensive shear zone having a Southwesterly Northeasterly trend through the Camden No. 2 and Elsie claims.

Secondary fissuring and cross-faulting accompanying the shearing and adjustment periods has resulted in extensive areas of brecciated rock mass which furnished favorable locations for replacement action and the deposition of ore bodies.

The boundaries of the shear zone, outlined by the surface and underground development, indicate a zone of mineralization approximately 200 feet in width, with a length traceable for several hundred feet on either side of the working shafts.

The ore measures outlined by the present stage of development lie within the shear zone, with considerable regularity and demonstrate that mineralizing solutions have traversed certain series of fissures closely related to the faulting and intrusive periods.

Replacement action in brecciated areas and favorable sections of the sheeted Andesite by solutions bearing Silver, Copper, Lead and Zinc has formed the ore bodies now exposed in the mines.

Extended development work has emphasized the relation of the cross fracturing and sheeting of the rock mass to the nature of the ore deposits.

Throughout the underground workings is shown the tendency for the better class of ore to be found in the sheeted blocks adjacent to certain well defined shear planes or fissures.

This condition is analagous to the occurrence of replacement ore bodies in the bedding of sedimentary rocks.

CHARACTER OF ORE

The ores developed at this time are essentially complex in nature; but are not refractory in character.

Tests have shown that the ore would yield readily to modern metallurgical treatment.

The valuable minerals Galena, Chalcopyrite, Tetrahedrite and Sphalerite occur throughout the ore measures in the form of disseminated minerals, nodules and segregated masses.

A strong tendency is shown for like minerals to group together, that is; - to segregate into nodules and lenses of separate minerals.

In some areas the Copper-silver minerals will predominate in value and in others the Lead-Silver or Zinc-Silver will predominate.

It is the accepted theory, that; in this section of Arizona the copper minerals will finally replace the Lead Zinc minerals at depths approaching the origin of mineralization and that the resultant primary ores will be essentially copper bearing.

The more recent development on the lower levels of this mine substantiate this theory as the proportion of copper minerals in the unaltered primary ore is gradually increasing as the work approaches the underlying Granitic rocks to the Southward and below.

As this basal structure is approached at depth the degree of mineralization and proportionate value of the minerals should be increased.

Neighboring mines of the Twin Buttes area on the East and the Mineral Hill area on the North have at times produced large quantities of high grade copper ore.

Their relative position is closer to the basal granitic rocks than the workings of the Helmet Peak Company and it is therefore safe to predict that the latter company will find mineralizing conditions at a lower geological horizon.

DEVELOPMENT

The principal development work has been done within the ore zone upon the Camden No. 2 Claim and the Elsie Claim.

Work has been done at other points; but that is not covered in detail at this time.

The Billings Shaft, about fifty feet in depth has been previously worked on a moderate scale and the portion now accessible shows about one hundred feet of lateral development work.

The Zinc Shaft, about seventy feet in depth has been sunk near the westerly edge of the ore zone.

Shaft No. 1 on the Camden No. 2 Claim, is 600 feet in depth, well timbered the full length, equipped with station platforms, ladders and all accessories necessary for development work or mining.

Shaft No. 2 on the Elsie Claim about five hundred feet Southwesterly from Shaft No. 1, is 400 feet in depth, well timbered all the way and fully equipped for work.

Tributary to Shafts No. 1 and No. 2 about 3500 feet of lateral has been done in the ore zone.

ORE MEASURES

During the course of development a number of assay samples have been taken from time to time in order to determine the tenure of metal content and value of ores encountered.

Sections which showed distinct mineralization and appeared to be ore; were mainly sampled.

Approximately fifty percent of the lateral development footage shows distinct mineralization and has been sampled as ore.

Owing to the fact that the various ore areas, outlined on the levels have not been connected up directly with upraises or zinses, the actual thickness of the ore areas which would govern the actual amount of ore contained in the blocks, is more or less problematical.

In the estimate of tonnages the apparent thickness of the mineralized sheeted rock mass as disclosed by the sample outs is a factor that can be effectively used for the third dimension.

50' LEVEL - BILLINGS SHAFT & 150' LEVEL

The available ore in the Billings Shaft area and sections of the 150' Level of Shaft No. 1 has been previously estimated at 100,000 tons.

An average of assays shown on this section, -

Gold	Silver	Copper	Lead	Zinc
.01 oz	1.2 oz	.25%	1.9%	3.8%

The gross value of the metallics contained is \$8.90 per ton.

250' LEVEL SHAFT NO. 1 AND SHAFT NO. 2

The development work on the 250' Level has opened up an extensive mineralized area between Shaft No. 1 and Shaft No. 2.

The estimated amount of ore in this area as outlined by the openings and assay sampling is approximately 100,000 tons.

An average of the metallic content of the area as shown is, -

Gold	Silver	Copper	Lead	Zinc
.01 oz	1.5 oz	0.27%	1.3%	3.0%

The value of the metallics by this average is \$7.37 per ton.

250' LEVEL TO 300' LEVEL

Later development work upon the 300' Level and 400' Level of Shaft No. 2 has opened up an interesting section.

The general formation exposed on these levels is more uniform in texture, shows less alteration by circulating ground waters and the sheeting is more pronounced.

The minerals in the ore on these levels show more of a tendency to segregate into bunches and bands of higher grade ore.

The block of ground lying between the 250' Level and the 300' Level, tributary to shaft No. 2, indicates an available tonnage of approximately 15,000 tons.

The average of assays taken along the exposures of this block shows a metallic content of, -

Gold	Silver	Copper	Lead	Zinc
.02 oz	1.3 oz	.72%	1.5%	3.5%

The gross value of these metallics is \$9.78 per ton.

300' LEVEL TO 400' LEVEL SHAFT NO. 2

Between the 300' Level and 400' Level at Shaft No. 2 the present stage of development outlines a block of ore which would contain approximately 5,000 tons.

An average of the assays taken on this block shows
 metallics, -

Gold	Silver	Copper	Lead	Zinc
.02 oz	.53 oz	0.82%	0.9%	6.4%

The gross value of the metallics in this average is
 \$12.53.

400' LEVEL SHAFT NO. 1

On the 400' Level of Shaft No. 1 a partially developed
 ore body is outlined; which from the area and exposures sampled
 is estimated to contain approximately 5,000 tons.

The average metallic content of the samples taken is, -

Gold	Silver	Copper	Lead	Zinc
.01 oz	.9 oz	.64 %	0.8%	3.1%

The gross value of metallics contained is \$7.67 per ton.

SUMMARY OF ORE MEASURES

Assays

Location	Gold oz.	Silver oz.	Copper %	Lead %	Zinc %
50' & 150'	.01	1.2	1.07	.7	1.9
250' North	.01	1.2	.25	1.9	3.8
250' 1 & 2	.01	1.5	.27	1.3	3.0
250' to 300'	.02	1.3	.72	1.5	3.5
300' to 400'	.02	.5	.82	.9	6.4
400' Shaft No. 2	.01	.9	.63	.8	3.1
General Average	.01	1.3	.50	1.2	3.3

Tonnage

Location	Estimated Tons	Gross per ton	Gross value
50' & 150'	100,000	\$ 7.60	\$780,000.00
250' North	35,000	8.90	311,500.00
250' 1 & 2 Shafts	100,000	7.37	737,000.00
250' to 300' No. 2	15,000	9.78	146,700.00
300' to 400' No. 2	5,000	12.53	62,650.00
400' Shaft No. 1	5,000	7.67	38,350.00
	<u>260,000</u>		<u>2,056,200.00</u>

600' LEVEL SHAFT NO. 1

The section of the shaft between the 400' Level and the
 600' Level being temporarily impassable, conditions there can not
 be definitely described at the time.

From reports of daily work it is evident that the rock
 structure on this level becomes more regular and conformable and
 the action of circulating water not so evident.

Mineralization similar to the levels above was found in
 some sections and undoubtedly a continuance of development, at
 this level, would be of vital importance and furnish valuable data
 regarding the possible change in the mineralizing action at in-
 creased depth.

SELECTIVE MINING

Taken in the aggregate, the large tonnage represented in the ore measures is of a grade which anticipates the recovery of the metallic values by metallurgical treatment.

Tests have been made which show the ores to be amenable to concentration and the product marketed at a margin of profit.

In the vein areas certain sections show sampling values sufficient to suggest the possibility of developing and mining these sections separately and incidentally blocking out the true ore measures.

Along this line of development an upraise could be driven from the 400' Level, west of Shaft No. 2, at the point from which samples No. 404 and 405 were cut, to follow the inclination of the sheeted ore deposit toward the 300' Level above.

In a similar manner an upraise could be run from the 300' Level to the 250' Level above to good advantage.

Upraises following the apparent slope of the ore deposits, from one level to another, would add valuable data concerning the possible continuity of the ore bodies indicated at the various levels.

In the area tributary to the Billings Shaft, good assay values are shown and it is reported that commercial ore was being uncovered in the lower workings at an earlier time.

It seems that certain sections could be mined selectively at a margin of profit, either through the shaft itself or by connecting up with the underground workings of Shaft No. 1.

A cross-cut tunnel driven from the 150' Level a distance of about 125 feet would cut the general formation beneath the Billings Shaft and prove up this area effectively.

GENERAL

It is the consensus of opinion, that; the future of this property, in the light of a potential shipping mine, depends on the degree of concentration of the metal content either through a construction of the boundaries or a more general segregation of the mass value at an increased depth.

From the results obtained from the extensive development work that has been done upon the property to date, it is evident that the factor of increased depth of exploration is of primary importance.

It is assumed in reason, that mineralization will become more intensified as the source thereof is approached and that fissures and sheeted rock masses will become more generally ore-bearing and show a relatively increased concentration of the contained minerals.

The origin of the mineralization undoubtedly lies within a zone between the ore areas now manifest and the granitic sill which underlies the series, and the mineralizing fissures may be simply offshoots from much larger ore bodies below.

To effectively prove the truth or fallacy of the supposition a vertical section of the rock series to the Granite sill beneath should be obtained.

This could be arrived at most economically and effectively by drilling the ground.

The logical action would be to send down a drill hole, as a pilot, from some point of vantage and the subsequent development be regulated according to the results obtained from the drilling.

Judging from the large area and tonnage of milling ore now exposed in the mines, it is a logical belief that ores of more concentrated mineralization will surely be found at some point in the ore zone.

EQUIPMENT & MACHINERY

The mines of the Helmet Peak Company are well equipped on the surface and underground to carry on mining and development operations.

Shaft No. 1 Surface equipment consists of a 25 H.P. Fairbanks Morse Gasoline Hoist, a 50 H.P. Commercial Gasoline Engine with duplex belt driven air compressor, blacksmith shop and necessary tools.

The machinery is well housed and an office building and small cook shack is provided.

Shaft No. 2, Surface equipment consists of a 25 H. P. Fairbanks Morse gasoline hoist and a Chicago Pneumatic hot head air compressor.

Both shafts have good headframes dumping chutes and surface equipment for handling ore and waste and pumps are installed in Shaft No. 1 in favorable locations to handle all water encountered in both shafts.

An adequate equipment is maintained for drilling in either or both shafts or tributary lateral work.

All arrangements are made so that development work or ore extraction could be carried on effectively and economically on a scale commensurate with the size of the plant and equipment.

Respectfully submitted

(Signed) J. M. Libbey
Registered Mining Eng'r.

Tucson, Arizona
September 1st, 1927

Application of
G. L. Gram

Exhibit B. (b) 5 - Assays.

ASSAYS AND ANALYSIS CERTIFICATES ON 250 FT. LEVEL.
HELMET PEAK MINING AND MILLING COMPANY
Feet indicate distance to face of drift from shaft cross-cut.

	Gold.	Silver.	Copper.	Lead.	Zinc.	Total Value.
Dec. 9th.						
#6 East Drift 28 ft.	.01	.7	.05	2.8	1.4	8.67
#6 East Drift 29 ft.	.01	.8	.12	3.6	2.1	9.67
Dec. 15th						
#7 East Drift 32 ft.	.01	.7	.05	3.6	6.5	13.56
#8 East Drift 36 ft.	.01	.8	.02	1.2	6.2	11.28
#9 East Drift 40 ft.	.02	1.2	.02	2.4	7.1	13.27
Dec. 18th.						
#10 East Drift 44 ft.	.02	.9	.02	2.4	5.6	12.00
#11 East Drift 48 ft.	.01	1.0	.02	1.1	6.2	11.20
#12 East Drift 56 ft.	.02	1.2	tr.	1.8	5.2	10.58
#1 A.	.03	1.6	.25	3.1	7.1	17.01
#13 East Drift 60 ft. 4ft. wide.	.01	.9	.05	2.6	4.5	11.25
#14 East 65 ft. 4 ft. "	.01	.8	.02	2.5	6.5	12.75
Dec. 28th						
#15 East 71 ft.	.01	.6	.05	1.7	2.4	6.69
#16 East 78 ft. 4ft. "	.02	3.2	1.5	2.5	3.8	15.60
#1 B.						
assorted ore.	.03	18.1	3.5	9.5		33.70
Jan. 15th						
#18 G.C. #2 East 100 ft. West	.02	1.2	.05	2.9	3.0	9.43
Jan 20						
#19 West 168 to 190 ft.	.02	2.2	.05	1.5	3.1	8.03
#20 West 168 to 190 ft.	.02	.6	.05	2.5	2.1	7.58
#2 A.						
168 to 190 ft.	.01	.8	tr.	3.2	1.9	7.94
Jan 25						
#21 East 86 ft.	.02	1.2	tr.	2.7	4.4	10.57
#22 East 94 ft.	.02	1.4	"	3.8	4.2	11.56
#23 West 193 ft.	.01	4.4	.05	2.3		6.23

TABULATION OF ASSAYS

NOTE: The position of these assays is shown on the accompanying geologic sketch map.

Number of Assay	%	%	%	Oz.	Oz.	Width	GROSS VALUE		
							Then	Now	Best Bonus Basis
1	1.05	0.2	1.0	Trace	0.5	6.0 ft.	\$ 8.09		
2	0.20	1.1	1.4	"	0.5	21.0 "	4.89		
3	0.46	1.0	1.6	"	0.6	9.0 "	5.79		
4	0.40	1.0	3.2	0.01	1.6	9.0 "	8.80	\$13.23	\$17.72
5	0.66	1.4	2.5	0.02	3.4	5.3 "	10.55	16.05	20.01
6	0.65	1.4	4.0	0.01	1.8	6.0 "	11.52	17.29	23.29
7	0.41	1.2	2.3	0.01	1.1	5.7 "	7.55	11.53	15.03
8	4.05	0.3	1.0	0.01	2.1	14.5 "	14.88	22.66	28.41
9	1.62	2.0	3.9	0.02	3.8	11.7 "	16.61	25.28	32.23
10	0.05	tr.	0.7	0.01	0.1	14.2 "	1.43		
11	0.61	0.4	1.5	0.01	1.2	4.7 "	5.58		
12	2.11	0.2	0.5	tr.	0.8	5.0 "	7.52	11.44	14.21
13	4.92	0.3	1.8	0.01	2.7	4.5 "	18.87	28.61	36.24
14	2.75	0.2	1.8	0.01	2.0	12.0 "	12.17	18.35	23.66
15	0.59	0.2	0.9	0.01	1.1	12.0 "	4.22		
16	0.25	0.5	2.0	0.01	1.2	12.0 "	5.48		
17	0.15	0.1	2.5	tr.	0.5	12.0 "	4.59		
18	0.05	0.1	0.5	0.01	0.2	13.0 "	1.39		
19	0.11	0.3	1.8	tr.	0.4	18.5 "	3.74		
20	0.32	0.9	4.0	0.01	0.8	26.0 "	9.08	13.55	19.03

Assays by E. A. Jacobs,
Registered Assayer,
Tucson, Arizona

177.97 229.83

Average 17.79 22.98

(Prices based on market
quotations for Aug. 25th,
1926, E. & M. J. P., Cu. 14.025,
Pb. 8.90, Zn. 7.35, Ag. 62 5/8)

Application of
C. L. Orem

8. History and Present Condition: Affidavits.

Tucson, Arizona
September 30, 1945

County of Pima)
State of Arizona) ss

J. W. Mills, being duly sworn, under oath, deposes and says:

That during most of the work at Helmet-Peak Area, he was timber man and in charge of the work for the Helmet-Peak Mining and Milling Company, until most of the 400 ft. level in its main shaft was accomplished:

That he is familiar with the ore occurrences on the surface and underground, including the 70 ft. zinc shaft, and the 52 ft. Billing's Shaft, and the main shaft.

That the southeast drift of the 52 ft. Billing's Shaft showed and was entirely in good copper ore and the stope from the old Billing's shaft showed highgrade copper ore:

That nearly all the work in the main shaft, the Billing's Shaft, and the zinc shaft was on the Camden No. 2 Patented Claim:

That the drift on the 150 ft. level in the end crosscut towards the Billing's shaft was entirely in highgrade copper ore, showing bunches of Bornite or Peacock Copper ore;

That the material all around the copper ores was lead, zinc, copperores:

That the Company did a lot of prospect work over a large area, and if the work had been confined to the better ore exposures, very good grades of ores could have been produced:

That the limits of these better grade ore areas have not been explored at all:

And that a width of 150 ft. of good lead, zinc, copper ore was crosscut on the 250 ft. level north.

J. W. Mills
J. W. Mills

Subscribed and sworn to before me this 27th day of September, 1945, by J. W. Mills.

Edna Tubett
Notary Public

My commission expires:

7/15/47

Application of
C. L. Orem

Exhibit A, 8. (e) Reports (Cont'd)
Copy of 7, Letter of Joseph Flannery:

Tucson, Arizona
October 25, 1934.

Capt. W. S. King,
90 North Church Street,
Tucson, Arizona.

My dear Captain:

Replying to your inquiry regarding the Prosperity Mine: I have known this mine since its location sometime in the nineties. The main shaft is down some 320 feet and I do not recall the amount of drifting that has been done. This shaft was started about 1898, and was worked by the owners, Mike and Luke Corda, until the drop in the price of silver in 1903. During this time the Cordas became worth about fifty thousand dollars apiece from the profits of the mine. They had no hoist on the property, but after the shaft became too deep for a windlass, they operated it with a whim drawn by mules.

The first 60 feet of the shaft was a chloride ore that was not shipped and is probably still on the dumps. At 60 feet sulphides were encountered that assayed 30 ozs. silver and a few dollars gold. The ores became steadily richer as the shaft was sunk, and at the bottom of the shaft assayed 300 ozs. silver and 1 oz. gold. I took a sample on the 200 foot level that assayed 200 ozs. silver and about \$12.00 gold.

The shaft follows the vein down, and flattens out in places, so that it is very crooked. The vein is better than three feet in width, and the pay streak 8 to 10 inches or better. The balance of the vein was milling ore carrying some chlorides that was thrown on the dump.

Luke Corda died in 1922, and I was administrator of his estate. Among his effects were scrap books containing assays, bills of lading and smelter returns covering the entire operation of the Prosperity. I kept these records for some years, but unfortunately, later I destroyed them.

Very truly yours,

Signed: Joseph Flannery.

12

The Helmet Peak Mine

The Helmet Peak Mining Property consists of fifty-seven claims, (seven of which are patented) and is situated twenty one miles Southwest of Tucson, with a good road all the way, and is seven miles due west of Sahauriia station on the Nogales R. R.

There is one six hundred foot shaft, and one four hundred foot shaft about four hundred feet apart, connected on the two hundred fifty and four hundred foot levels. Both are fully equipped with hoist, air compressors, blacksmith shop, etc and also seven air jack hammers and drilling steel. Just north of the shaft, running east and west thru the property, is a Mother vein of lead-silver-gold ore, with several shafts, one of which is three hundred twelve feet deep. These were worked several years ago by hand, but owing to the low price of silver, work was stopped, and they are now somewhat caved, and have considerable water in them. The claims were taken up by two miners, who shipped ore as they needed money. The first sixty feet was left on the dump, but below that the ore was sorted and shipped. The vein is thirty-six inches wide, nine inches or more of high grade ore. At the 200 foot level, the ore run 200 ozs. silver, one half oz. gold, and twenty to twenty-five per cent lead; at the three hundred feet, three hundred ozs. silver one oz. gold, and twenty to twenty-five per cent lead.

From the six hundred foot shaft, a drift was run on the three hundred fifty foot level to within one hundred forty feet of this vein, and the work was ordered stopped by George Gay, who it appears, did not want to get into shipping ore. It is proposed to continue this drift the rest of the way to the vein, get out the ore, sort it, and ship the high grade, until we can pay dividends, and accumulate a sufficient surplus to put in a suitable mill. To continue the drift and take out at least two cars of shipping ore, it will cost twenty to twenty-five thousand dollars, which is all the money needed to put the mine in operation and keep it going.

Attached is a copy of Joe Flannery's report, and we also have several engineers reports on the property.

Respectfully submitted

W. S. King, Pres. Helmet
Peak Copper Company.

WAK/r

Application of
C. L. Orem

Exhibit A, 8. (e) Reports (Cont'd)
Copy of 8, Letter of Albert L. Fritz:

229 Live Oak St.,
Miami, Arizona
September 12, 1945

Mr. Fred W. Fickett,
Box 2568
Tucson, Arizona

My dear Fred:

I have yours of August 21st. returning the Helmet
Peak level map.

Since the receipt of your letter I've been searching, when I found the time, for the data you requested and the assay records. Please do not think that this has been hard work; on the contrary, it has been a matter of going through several carton boxes of mining reports and note books which I have wanted to do for over a year.

The diamond drill holes were put down on the claim just east of Joe Flannery's Olivette and so far as my records show, these holes are on a claim owned by Joe. The surface drill casings are still showing at the surface and are plugged with wooden plugs. These cores were stored in the little Helmet Peak Office for years and are in wood cases. The records showed numerous pyritic veinlets, manganese stain, some very low grade copper but little of importance to a depth of about 200 ft. when we encountered a terrific fractured structure and our efforts met with nothing but constant caving. The lime showed strongly and a decomposed granite. This latter shows on the surface about 200 ft. north of the shaft on the Olivette. Dr. Leonard considered this very significant, it being somewhat of an intrusion into the andesite. I do not have any record of the log.

When we were working on the Helmet Peak group we took dozens of samples and these records were kept by Capt. King, one of the directors of the company. From memory they ran from 2% to 12% copper with a good showing of silver. On the map which you returned, you will note many X indicated, all were the location of the sampling taken by Barles or some person under him. Leonard and I walked through from the 50 ft. level to the 400 ft., not once but many times - the better grade was above the 300 ft. The shaft is almost entirely in andesite.

The Billings Shaft is just as indicated on the map. It shows nothing but very high grade. Note assays. Most surely it leads into the area just southeasterly and was never properly worked by any owner to date. The old company wandered about in the country instead of mining good ores only a few hundred feet from the main shaft. This high grade came from below and probably is an intrusion through the andesite.

Application of
C. L. Orem

Exhibit A. S. (e) Reports (Cont'd)
Copy of S. Letter of Albert L. Fritz (Cont'd)

I have enclosed a copy of the Ransome report, three assays, and two more small Garle drawings (trace the latter and return for my record, please)

You will note that the veins run from the Wellington, westerly through the Camden, Prosperity, Contention, etc. This Wellington might be worth looking into, it is perfectly lousy with lead-silver.

If, after you have reviewed this data, you would like to drive up, you will be most welcome. I may get down before you find the time.

Best personal regards.

Yours very truly,

/s/ Albert L. Fritz

Application of
G. D. Orem

Exhibit "A" 8. - Copy of Letter of Seward E. Brown 9.

Statement of Seward Brown, relative to the
Annette Mining Claim, Pima Mining District,
Pima County, Arizona.

I was the original owner and locator of the Annette claim, which adjoins the Olivette. I took out of this claim over \$65,000.00 worth of ore. In 1893, owing to the low price of metals at that time, the mine closed down and has never since been operated. The shaft has not been dewatered since the mine shut down. My operation of the mine was entirely without machinery.

At the time the mine closed down, in 1893, operations were in 100 ounce silver ore in a winze at the bottom and 250 ounce ore in a drift to the west.

My brother, J. K. Brown, was one of the locators and owners of the adjoining claim, the Olivette, and there was shipped from this claim, the Olivette, over \$750,000.00 of ore, and good ore left in the bottom when operations were discontinued.

I am not the owner of nor interested in any mining property in Pima Mining District.

Seward E. Brown.

Application of
C. L. Orem

Exhibit "A" 8. - Copy of Letter of A. E. Bogan 10.

Statement of A. E. Bogan Relative to the
Olivette Mining Claim, Pima Mining Dis-
trict, Pima County, Arizona.

In the later eighties, I was one of the leasors
operating the Olivette Mining Claim. We shipped one car
load which netted us over \$7,000.00 and shipped ore run-
ning as high as 350 ounces of silver to the ton.

I was familiar with the adjoining claim, the
Annette, and it is my understanding that this claim pro-
duced about 200,000.00 of ore.

Both mines shut down in 1893, owing to the low
price of silver and thereafter became to a certain extent
caved in, and have never since been re-opened or unwatered.

In my opinion, both mines are as good as they ever
were and full worth re-opening and working.

A. E. Bogan

Dec. 10, 1928.

Application of
C. L. Orem

(Exhibit "A" (e) 3. Reports)

Helmet Peak Mining & Milling Co.
Tucson, Arizona.

Gentlemen:

Since your mine was sampled and reported upon, as of September 1st, 1927, a considerable amount of extended development work has been done upon the 250 Ft. Level.

Approximately 500 feet of additional drifting and crosscutting has been done in the Westerly section of that level and an extensive area of mineralized ground has been encountered therein; which materially increases the available tonnage of commercial ore in the mine.

General conditions, in evidence, are favorable for the continuance of the metal values through the further extension of the lateral and vertical dimensions.

Assured Ore

The mineralized area in the Westerly section of the 250 Ft. Level, as outlined by present development, and which can be classified as Commercial Ore, has a vein area of approximately 5,250 square feet.

The ore-bearing rocks, lying in a sheeted or bedded form, have been exposed, by the work, to a thickness of 60 feet; supplying the factor of known vertical extent.

The resultant content of the block, indicated by these factors is seen to be approximately 26,000 tons.

The mineralization, of commercial value, occurs in the form of Sulphides of Copper, Lead and Zinc, with additional values in Silver, and Gold.

The character of the ore bearing material and the mineralization is similar to the ore area in the northerly section of this level.

Samples were cut from the ore exposures within the westerly block and assayed with the following results, -

Average of samples No. 25 to 31 Incl., Length of cut-10 ft., Interval between cuts - 4 feet, from westerly end of block, -
Gold .15 oz. Silver 2.10 oz. Copper .5%, Lead 1.69%, Zinc 3.83%.

At the present price of metals, the Gross Value would be \$9.55 per ton.

Average of samples No. 32 to 37 Incl. Length of cut 8 to 12 ft. Interval between cuts - 4 ft. from Northerly end of block, - Gold .15 oz. Silver 1.12 oz. Copper .05%, Lead .2%, Zinc 3.06%.

At the present price of metals the Gross Value would be \$5.01 per ton.

The average value of the block outlined would be \$7.45 per ton Gross.

From the estimated tonnage of 26,000 a Gross Value of the Block is calculated at approximately \$194,700.

To summarize the amount of available ore in the mine, assured at this time, we have in, -

The 250' Level North - 35,000 tons	
@ \$8.53 gross	\$298,550

The 250' Level West - 26,000 tons	
@ \$7.45 gross	194,700

The Billings Shaft - 3,500 tons @	
\$8.13 gross	<u>28,450</u>

And a gross total of 521,700

The above estimates are based on the present low market price of metals.

As previously stated, - by inspection, the ores should yield readily to treatment and adequate laboratory tests would indicate the amount of margin of profit to be expected from mining and milling of the ore.

Possible Ore

In the new area opened up by the later development work, the proportion of the commercial ore bears a ratio of 30% to the whole area.

Assuming that the ore zone extends to the surface, a supposition amply justified by visible conditions, then it is assumed that the commercial ore ratio will maintain throughout the ore zone extended.

With these factors as a basis, the calculated amount of commercial ore to be anticipated within the extension of the Westerly block will be approximately 97,000 tons.

To summarize the Possible Commercial ore in the mine, to date, from the 250' Level to the surface, we have in, -

The 250' Level North - 110,000 tons	
@ \$8.53 gross	\$ 938,300

The 250' Level West - 97,000 tons	
@ \$7.45 gross	722,650

The Billings Shaft - 3,500 tons	
@ \$8.13 gross	<u>28,450</u>

And a Gross Total of 1,786,400

In round numbers the anticipated gross value of commercial ore in the mine from the 250' Level to the surface, as outlined by present development, may be set at between \$1,750,000 and \$2,000,000.

Extended development at greater depth will naturally increase the actual amount of available ore and will also greatly augment the theoretical amount of possible ore to be anticipated.

In General

The most Westerly section being developed at the time of the sampling, showed a strong tendency for the minerals to segregate into bands, or veins, and the samples taken from the ore exposures showed an unusual degree of enrichment in spots.

It will not be surprising to find the ore occurring in veins and deposits of workable size and of a value sufficient to permit of direct shipment to the smelter.

It is a noticeable fact that considerable leaching action has taken place along the shear planes and jointings of the rock and this action has undoubtedly impoverished the ore deposits on this horizon, to a considerable extent.

Development at greater depth will, no doubt, show that the ore zone will be more uniformly mineralized and that the ore deposits will be more dependable in form and degree of mineralization.

The various areas opened up by the development work done upon the 250' Level of the mine, indicate very plainly that the ore deposits occur within a well defined mineralized zone, having a linear extent of over five hundred feet and which will extend downward to a depth well worthy of consideration.

Conclusion.

The results obtained from this later work have surely justified the expenditure and also assure the ultimate success of more extended development at greater depth and lateral extension from all levels.

Respectfully Submitted
(Sgd) J M Libbey

Tucson, Arizona
October 25th, 1927

Registered Professional Engineer No. 235

Application of
C. L. Orem

(Exhibit "A" (e) 4. Reports)

UNIVERSITY OF ARIZONA

TUCSON

COLLEGE OF MINES AND ENGINEERING

DEPARTMENT OF GEOLOGY AND MINERALOGY

Dr. Raymond J. Leonard

November 21st, 1929.

Mr. Albert L. Fritz, Civil Engineer,
Tucson, Arizona.

Dear Sir:

In accordance with your request, I have presented an opinion on certain phases of the geology of the Olive Camp area of the Pima Mining District, Pima County, Arizona.

It is the intention to discuss here not the detailed geology of individual properties, but rather the larger geological features of the area and district generally, which are of fundamental importance in the matter of ore occurrence.

The discussion and opinion are based on brief personal observations made in the field, aided by a study of reports prepared by mining engineers and geologists for mining companies, by reports and maps prepared in the course of advanced degree studies by graduate students in Geology at the University of Arizona, and by the literature and government maps of the area and region.

The rocks of the immediate area comprise Pre-Cambrian (?) granite, Mesozoic (Cretaceous) arkosic sedimentary beds, intrusive granitic rocks, and volcanic rocks which are chiefly andesite. The volcanics are either late Cretaceous or early Tertiary in age. Just outside of the area, particularly to the northward, occur thick formations of Paleozoic limestone and quartzite.

The major structure of the area can not be definitely determined by available surface and near-surface geology. It is clear, however, that a great amount of fracturing, accompanied no doubt by at least some faulting has occurred throughout the area.

It is possible that folding is the most extensive type of minor deformation within the area and the cause of fracturing and faulting. Or it may be that the fractures were generated by stresses resulting from the uneven settling of a large crustal block following the transfer of a large volume of volcanic material from depth-seated to superficial positions. Or perhaps vertical upthrust of intruding magmas may have caused fracturing and faulting.

Mineralization apparently has been widespread. The rocks

along fractures observed, whether on the surface or underground, have been more or less extensively altered. Ore deposition, in varying degrees, seems to have occurred wherever a master fracture was available to act as a channel way for ore-bearing solutions. The ore deposits are, in the main, of the fissure-filled type, localized along major fractures, at the intersection of fractures, and in brecciated zones.

It is fairly certain that intrusive granitic rocks underlie at variable depth the entire district of which Olive Camp area forms a part. These intrusive rocks were probably the source of all primary mineralization in the district. The ore deposits that have been developed in the past in the Olive Camp area have been chiefly small high-grade silver-lead bodies, formed mainly by fissure-filling, but perhaps to some extent by wall-rock replacement, in the near-surface Cretaceous sedimentary and volcanic formations. In areas to the north and south important copper and zinc ore developments have been made and from which considerable tonnages of ore have been mined in the past. These deposits are principally replacement bodies in Paleozoic limestone. It appears, therefore, that replacement bodies in limestone form the important type of ore deposits for the district.

The questions of major structure, and character and thickness of formations forming that structure, thus appear to be the essential questions relative to the probability of extensive ore occurrences at depth in the Olive Camp area.

If the ore-bearing limestone formations of the Mineral Hill-San Xavier area to the north and of the Twin Buttes area to the south are continuous or occur under Olive Camp area, then the probability of occurrence of important commercial ore deposits at depth in the latter area is greatly increased.

The problem would then become one of probably depth to the favorable horizon and the determining of dominant or master fracture zones.

Mr. John Carter Anderson, in his report on the Swastika property, page 4, sets forth certain evidence and a statement of belief that limestone does occur below the superficial formations of the area. That there is more than a possibility that these Paleozoic limestone formations do exist below the surface formations in the Olive Camp is not an idle statement nor one made for convenience.

Even brief field study of the stratigraphy and structures in this area and that immediately to the north, in the San Xavier area, justify the statement that this stratigraphic condition might exist. But more convincing still are similar indications in the results of recent detailed geologic mapping in this area to the immediate north.

The Olive Camp area appears to be a depressed geologic structure - either a down-warped (synclinal) or a down-faulted area. The Paleozoic limestone formations of the San Xavier area distinctly dip to the south (20° to 25°), apparently plunging under the Olive Camp area. The contact between Paleozoic limestone and Cretaceous arkosic beds occurs along the southern border of the San Xavier area. The origin of this contact is not clearly indicated; it may be normal formational contact, produced by a break or time interval in the deposition of sediments which formed the beds; or it may be a fault contact, produced by a major rupture. If this contact is an unconformity, as the first case sug-

gests, the limestones extend to the southward uninterruptedly below the Olive Camp area. In the event that it is a fault contact, the limestones with their overlying sedimentary beds and volcanic formations, in the Olive Camp block have been faulted downward.

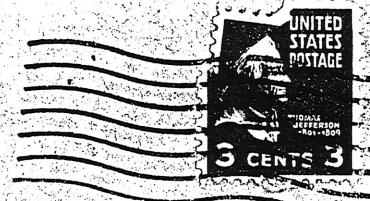
There is some basis, of course, for expecting that additional underground development may disclose other small high-grade silver-lead ore shoots, such as were formerly worked in the area, or perhaps larger veins and breccia bodies of ore of commercial grade and size. But it is more logical to expect that, if commercially important ore deposits are to be developed in the area, they will occur as metasomatic replacement and contact deposits in limestone.

The problem of developing possible large ore bodies in the Olive Camp area thus resolves itself, in this opinion, to first ascertaining the presence or absence of underlying limestone beds. Preferably, such development should be carried on by drilling operations. And in so doing, if the location of drill holes is carefully planned, it is probable that relatively near-surface vein or breccia type deposits of value may be encountered while the deeper prospecting is in progress.

The depth at which the limestone, if present, may occur is highly problematical; if in a synclinal structure, it may lie comparatively shallow, if block-faulted, it may lie much deeper-2,000 feet or more.

Yours very truly,
(Signature)
Raymond J. Leonard.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
304 HOME BUILDERS BUILDING
PHOENIX, ARIZONA



RETURNED TO MILLING CO.
UNCLAIMED
TUCSON, ARIZ.
Helmet Peak Mng.
90 Church Street
Tucson, Arizona

RECORDS SEARCHED, NO
ADDRESS ON FILE

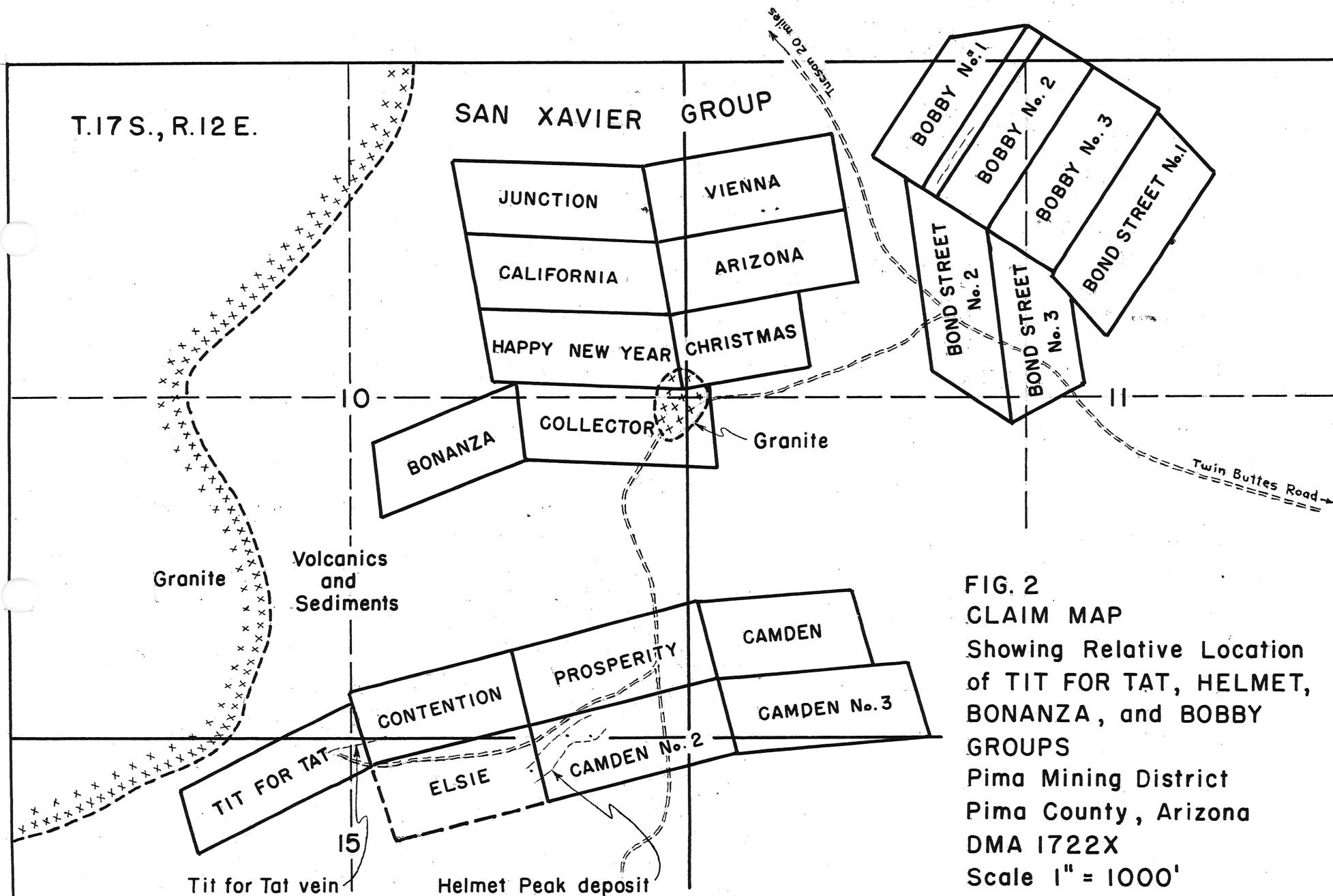






FIG. 2
CLAIM MAP
Showing Relative Location
of TIT FOR TAT, HELMET,
BONANZA, and BOBBY
GROUPS
Pima Mining District
Pima County, Arizona
DMA 1722X
Scale 1" = 1000'

Geological Map of olive Camp and

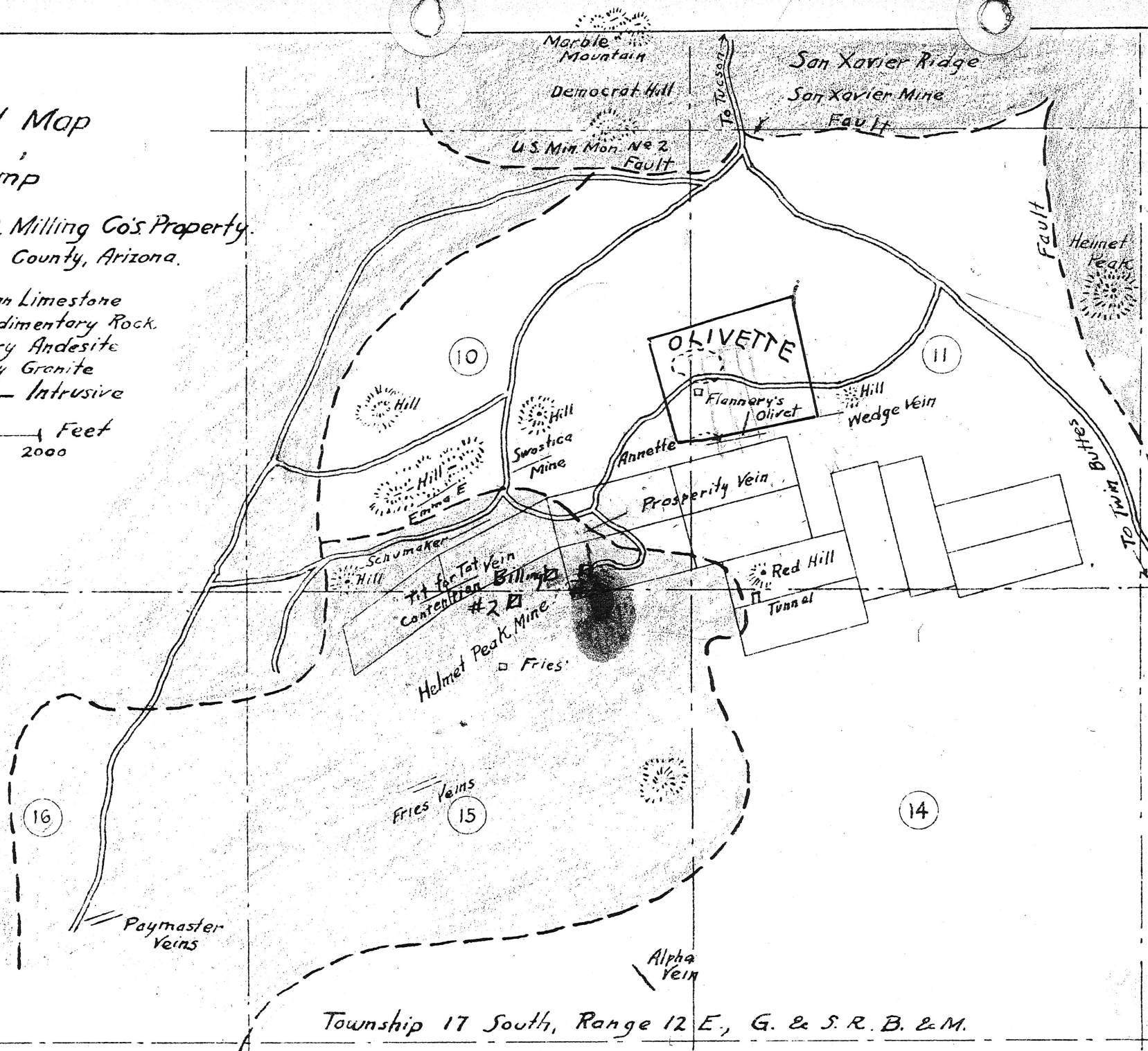
Helmet Peak Mining & Milling Co's Property.
Pima Mining Dist, Pima County, Arizona.

-  Pennsylvanian Limestone
-  Mesozoic Sedimentary Rock.
-  Early Tertiary Andesite
-  Late Tertiary Granite

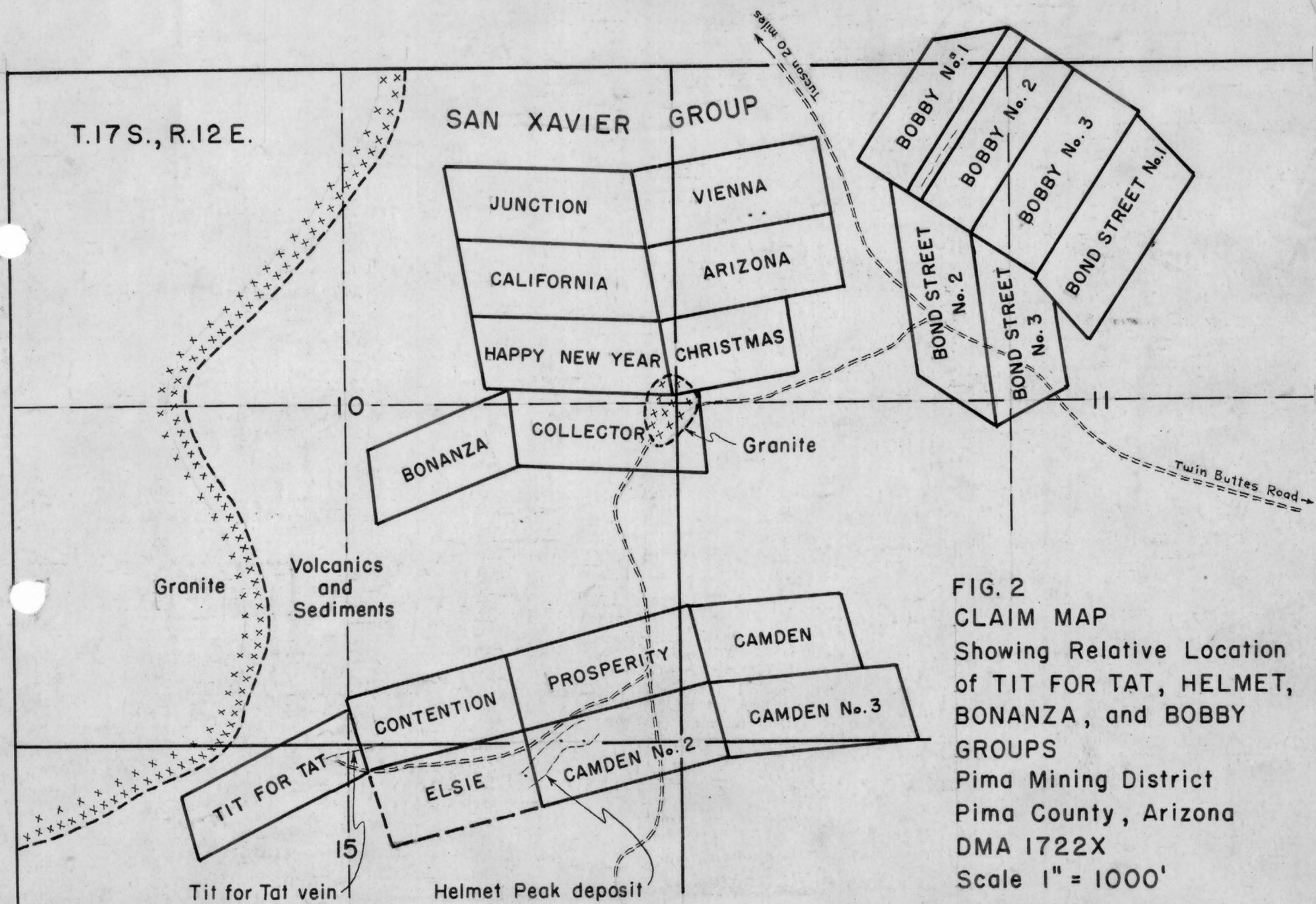
--- Contacts --- Intrusive

Scale 0 1000 2000 Feet

By C. J. Sarle,
Mining Geologist,
Tucson, Arizona
9-11-26

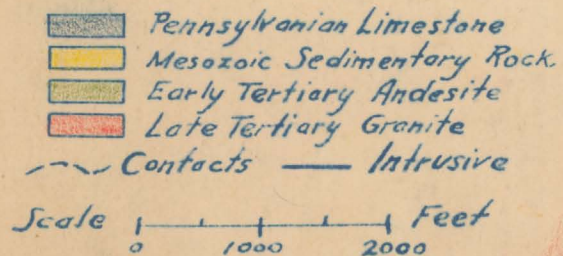


Township 17 South, Range 12 E., G. & S. R. B. & M.

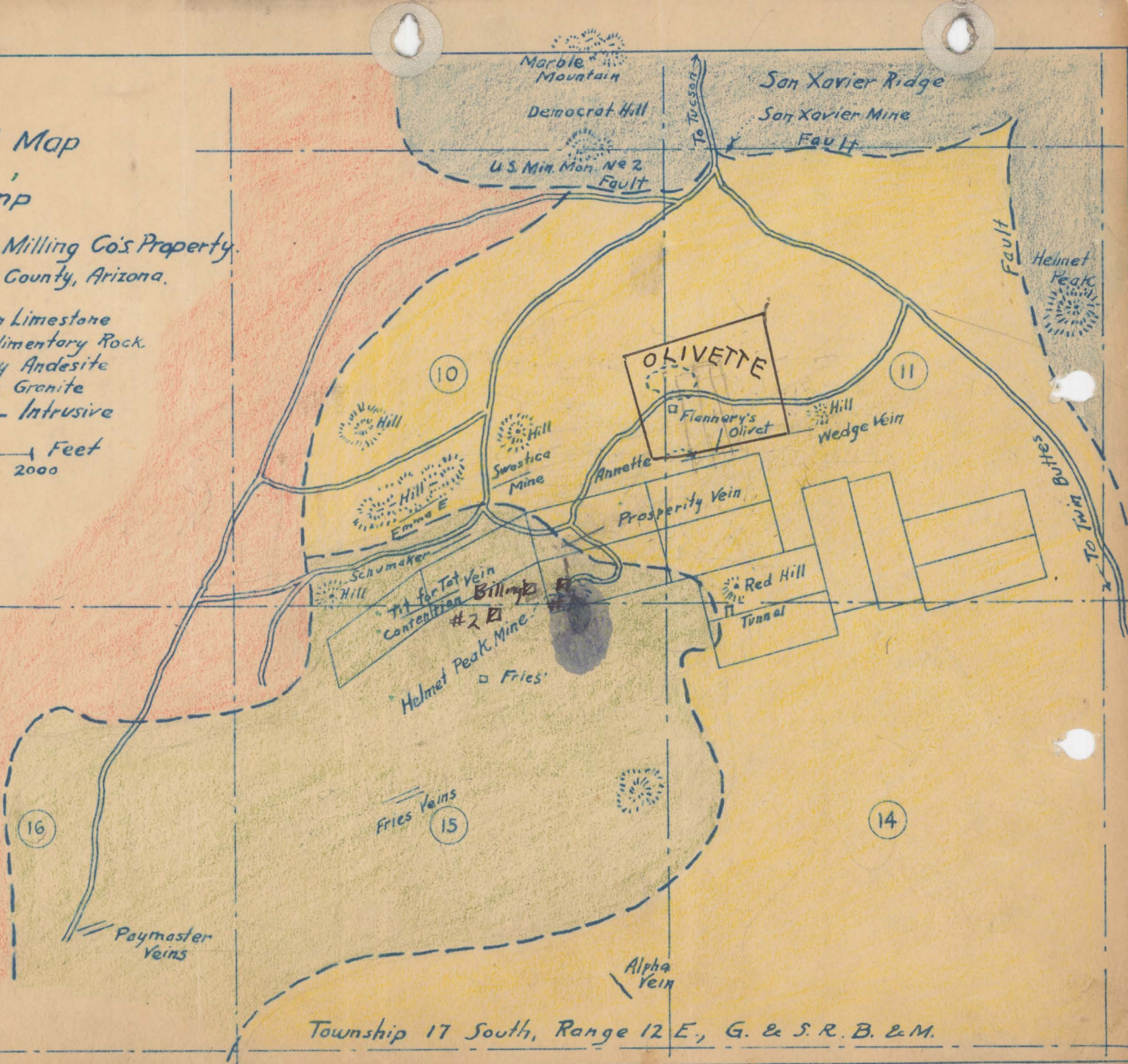


Geological Map of Olive Camp and

Helmet Peak Mining & Milling Co's Property.
Pima Mining Dist, Pima County, Arizona.



By C. J. Sarle,
Mining Geologist,
Tucson, Arizona.
9-11-26



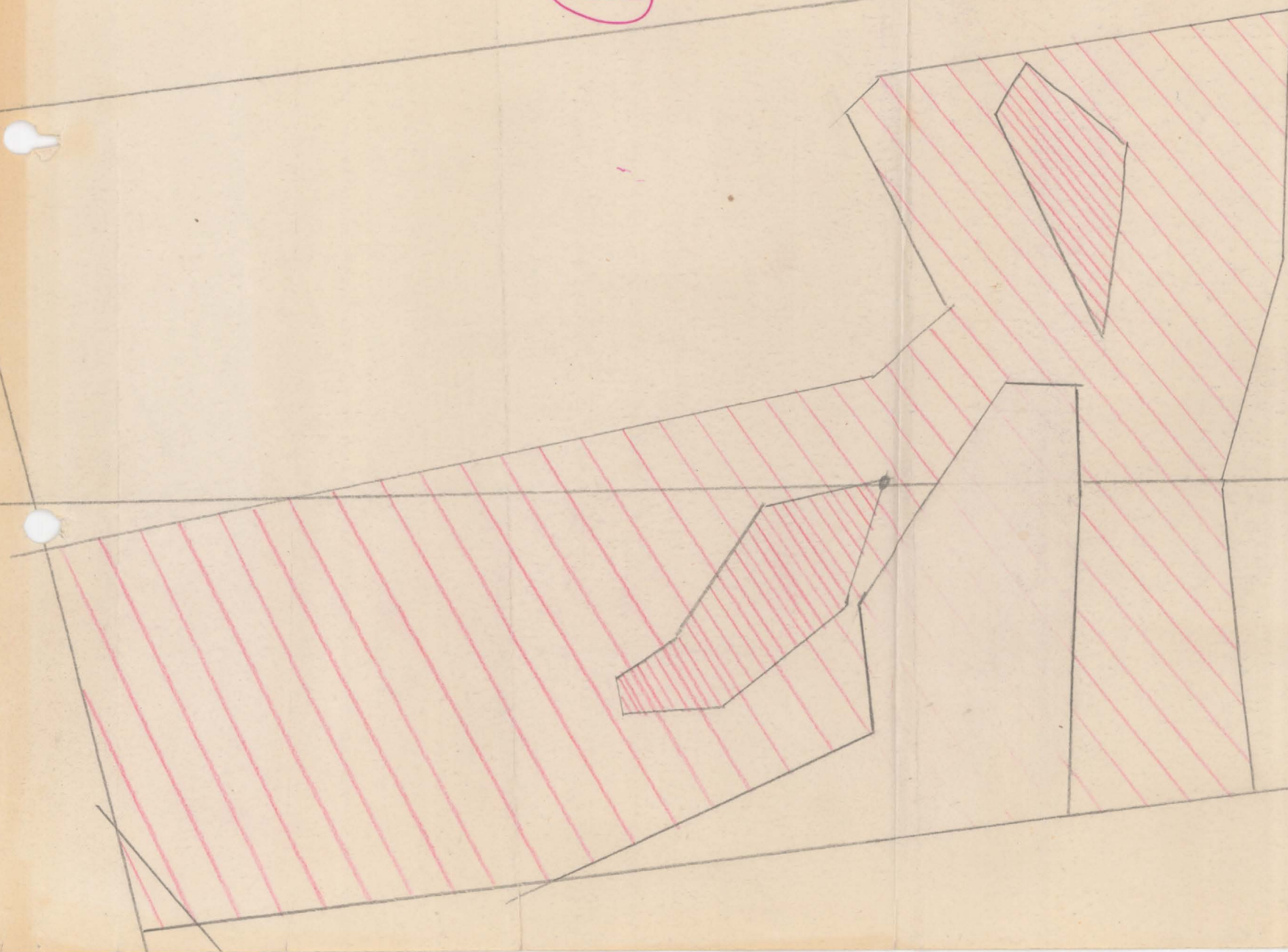
Township 17 South, Range 12 E., G. & S. R. B. & M.

PROBABLE ORE OCCURENCE
on DAN HARPER CLAIM
from GEOPHYSICAL RECONNAISSANCE
by D. G. CHILSON

SCALE 1" = 100"

SECTION 11 T17 SR 12E
SECTION 14
FORMATION: Siliceous sedimentary
MINERALS: Probably has values in Lead,
Silver, Copper, Antimony
DEVELOPMENT: None

Commercial ORE: NO ore showing
RADIO survey indicates sulphide
Area which may contain ore of
Commercial value at depths
below 200 feet.

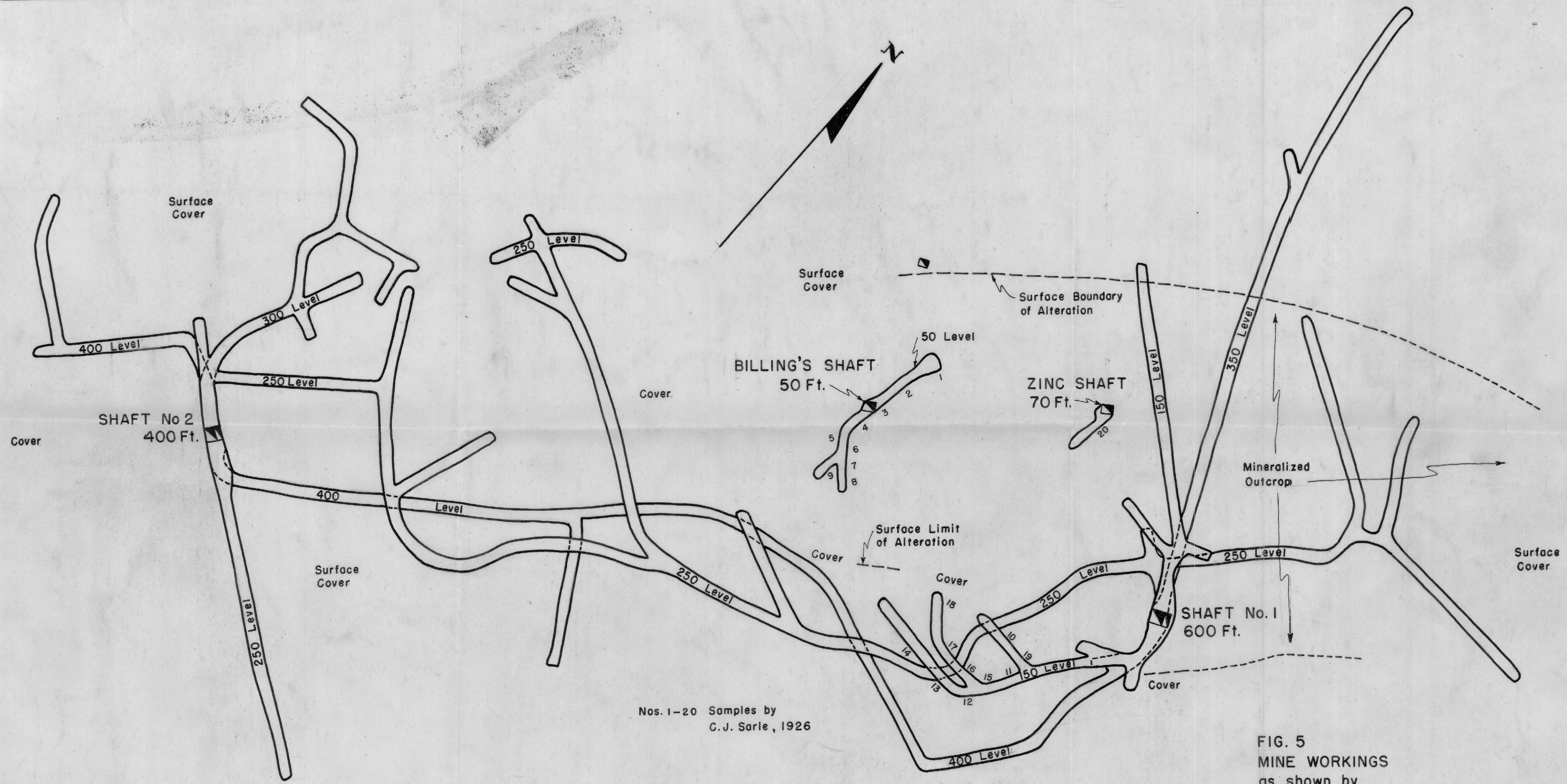


711

4

7

8



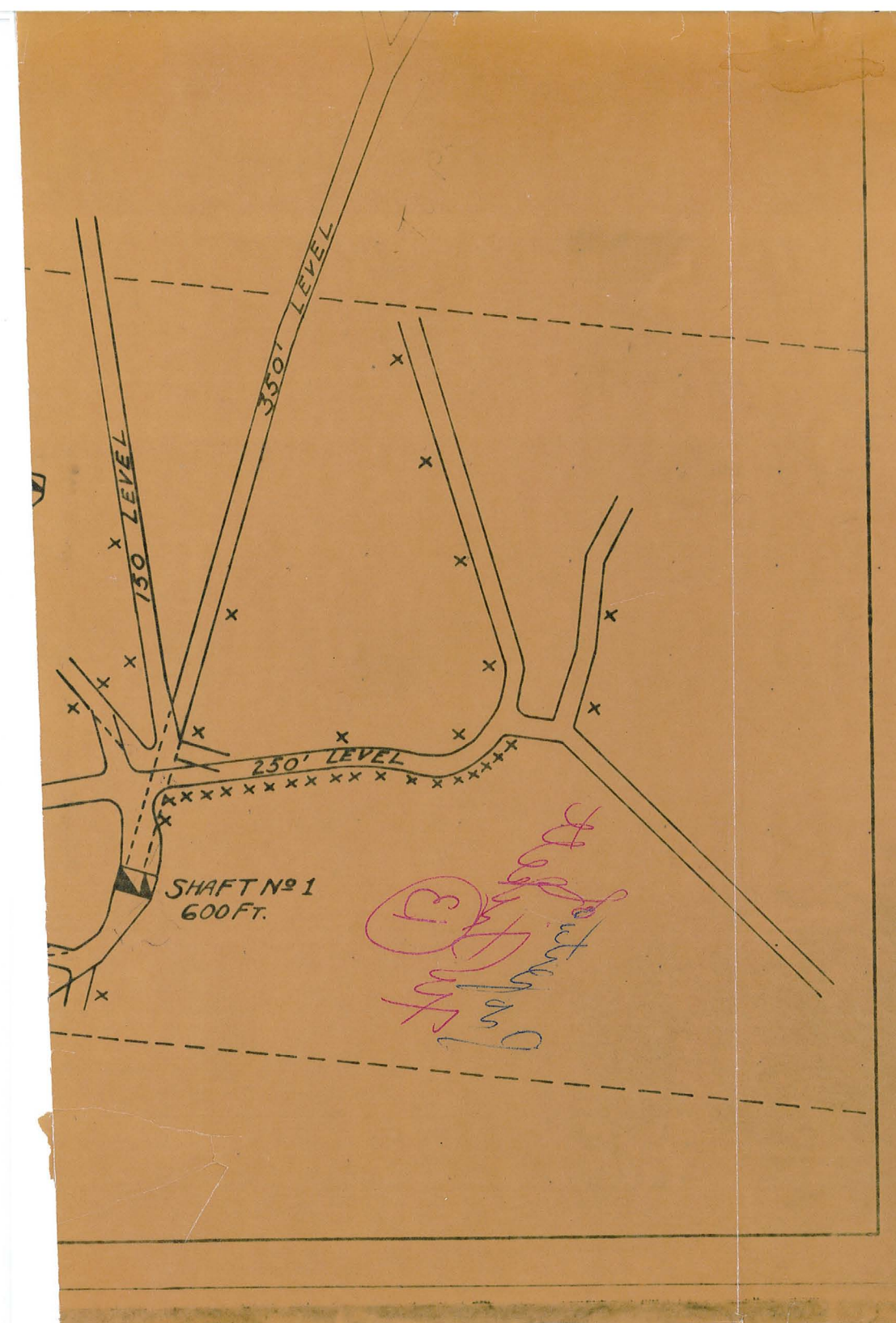
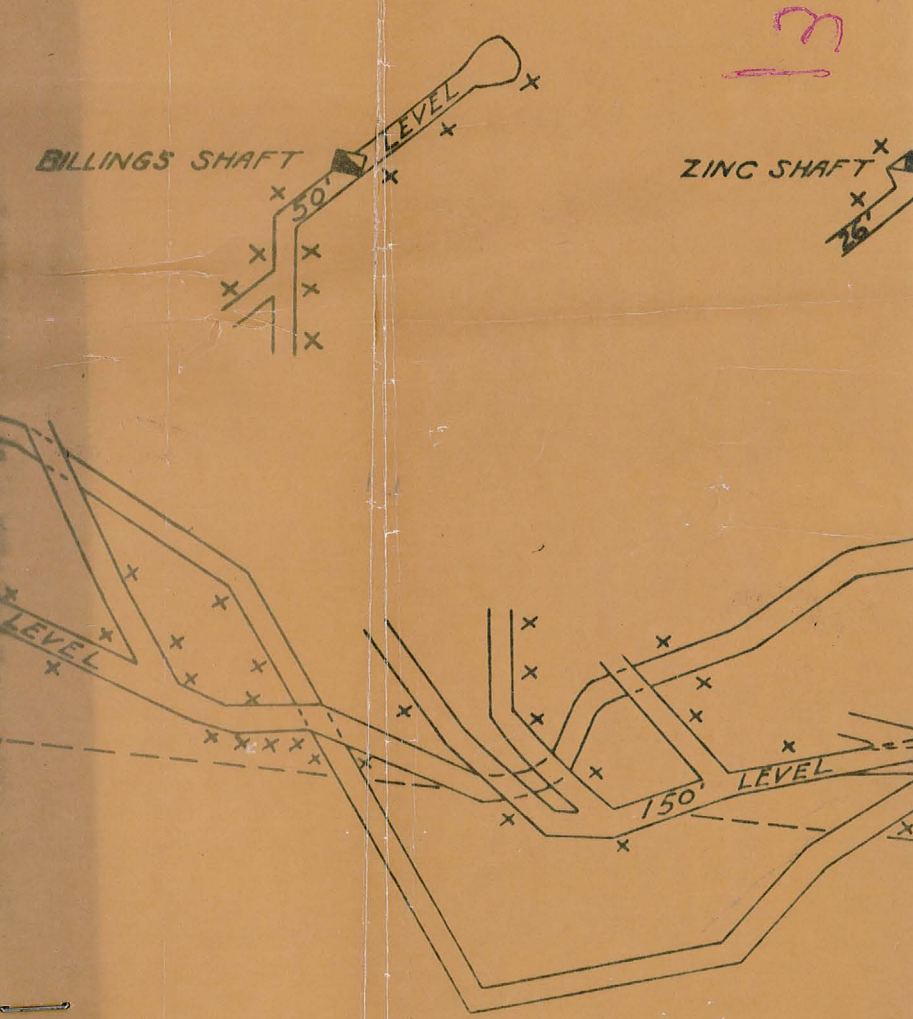
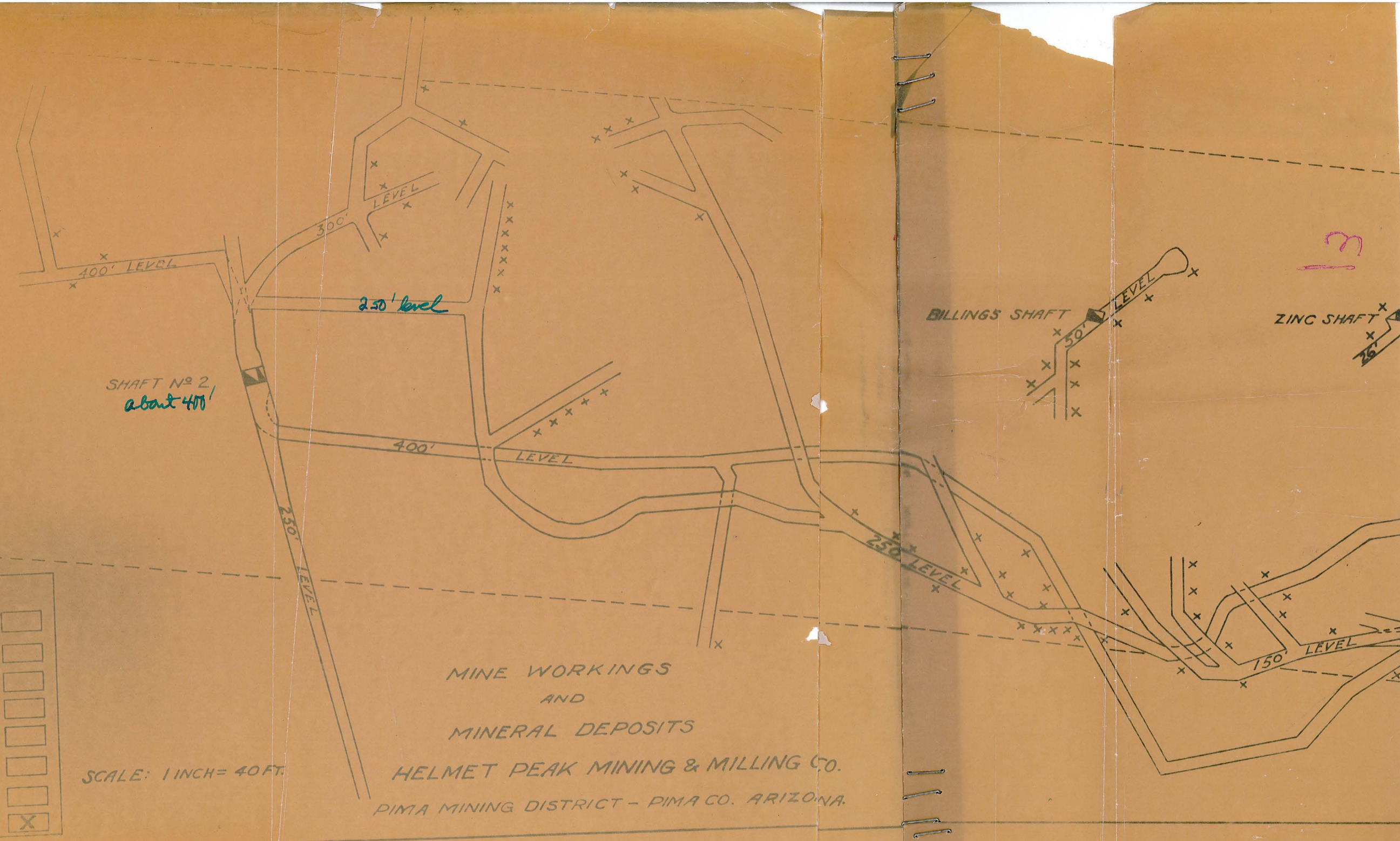
File under T-1-Fot-Tot (Camden)

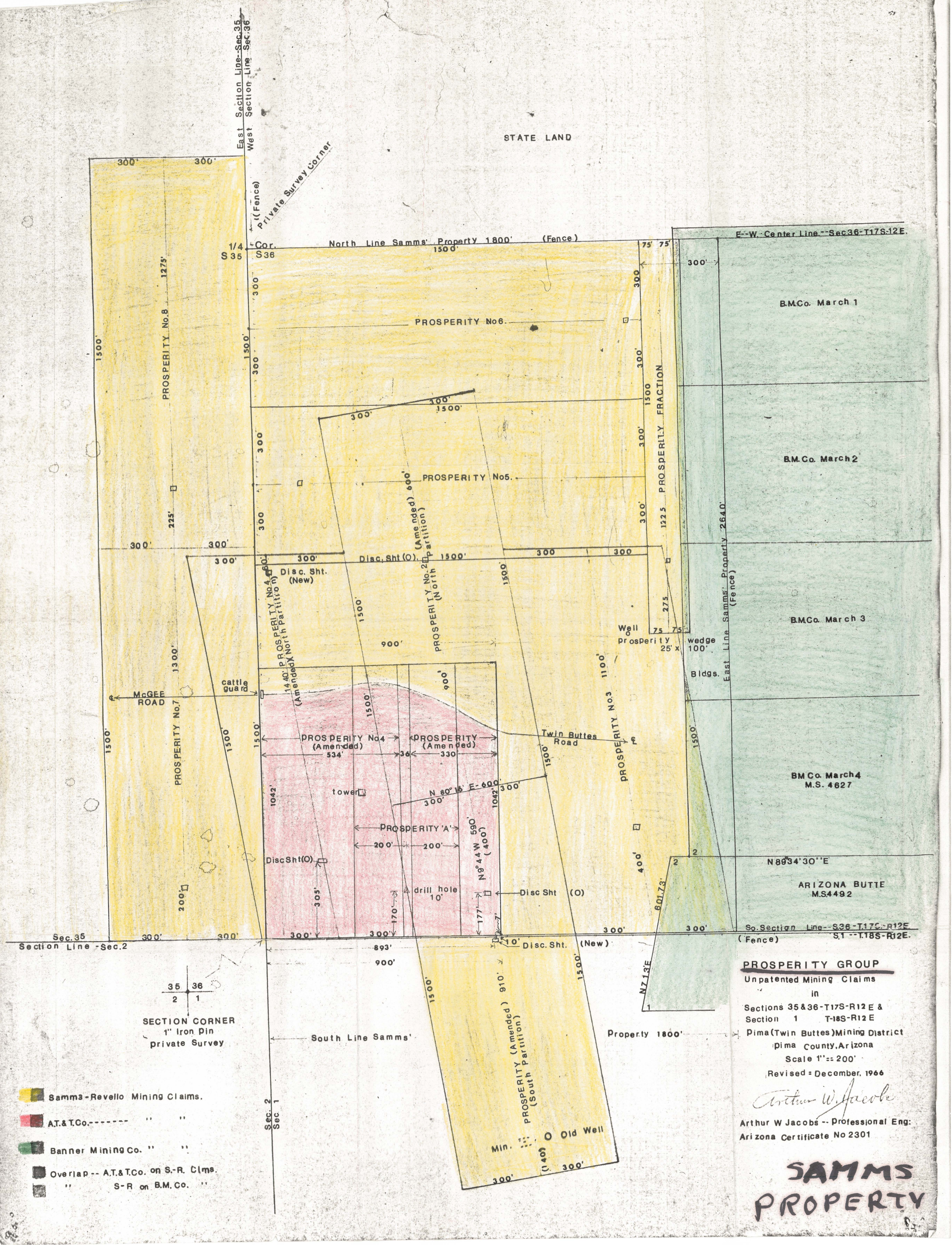
Map of underground workings - Chandler

LEGEND	
50' LEVEL	<input type="checkbox"/>
150' "	<input type="checkbox"/>
250' "	<input type="checkbox"/>
300' "	<input type="checkbox"/>
350' "	<input type="checkbox"/>
400' "	<input type="checkbox"/>
600' "	<input type="checkbox"/>
MIN. ZONE	<input checked="" type="checkbox"/>

SCALE: 1 INCH = 40 FT.

MINE WORKINGS
AND
MINERAL DEPOSITS
HELMET PEAK MINING & MILLING CO.
PIMA MINING DISTRICT - PIMA CO. ARIZONA.





- Samms-Revello Mining Claims.
- A.T. & T. Co. " "
- Banner Mining Co. " "
- Overlap -- A.T. & T. Co. on S-R. Clms.
- " " S-R on B.M. Co. " "

PROSPERITY GROUP
Unpatented Mining Claims
in
Sections 35 & 36-T17S-R12E &
Section 1 T-18S-R12E
Pima (Twin Buttes) Mining District
Pima County, Arizona
Scale 1" = 200'
Revised - December, 1966
Arthur W. Jacobs -- Professional Eng.
Arizona Certificate No 2301

**SAMMS
PROPERTY**