UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

Air Mail

September 19, 1951

Memorandum

To: Executive Secretary, Defense Minerals Administration

From: DMA Field Team, Region IV

Subject: Final Report, DMA Docket 1273, A. J. Hutchinson and K. C. Moon, applicants, Shannon (Copper Belle) Copper Mine, Turquoise Mining District, Cochise County, Arizona

Enclosed herewith are the original and two copies of the report on the subject docket.

We concur with the conclusions and recommendations of the examining team that the development loan of $500,000 be denied.

The brochure is enclosed.

for Paul Zellmann
J. H. East, Jr.

A. H. Koschmann
A. H. Koschmann

Enclosures

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Mining Division
Region IV

224 NEW CUSTOMHOUSE
DENVER 2, COLORADO

September 19, 1951

Memorandum

To: DMA Field Team, Region IV

From: Chief, Mining Division, Region IV

Subject: Final Report, DMA Docket 1273, A. J. Hutchinson and K. C. Moon, applicants, Shannon (Copper Bell) Copper Mine, Turquoise Mining District, Cochise County, Arizona

The application of the subject docket was for a production loan of $500,000 for the purpose of rehabilitation of the mine, and the construction of a mill and a sulphuric acid plant.

Over a period of seven years, from 1912 to 1918, the mine produced 298,732 tons of ore averaging 1.34 percent copper. Economical operation was possible only by payments for the iron and sulphur by the smelter.

The old mine workings are inaccessible, due to the mine being set on fire in 1923 in an unsuccessful attempt to roast and leach the low grade sulphur ore.

No reserves can be estimated without dewatering and rehabilitation of the mine workings, which the applicants are financially unable to perform.

The examining engineers recommend denial of the development loan, with which we concur.

Paul T. Allsman

Paul T. Allsman

Mining Division
Date Rec'd.
SEP 17 1951
BUREAU OF MINES
TUCSON, ARIZONA
Denver, Colorado

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Arizona-New Mexico Branch
SOUTHWEST EXPERIMENT STATION
Box 4097
UNIVERSITY STATION

MINING DIVISION
REGION IV

September 13, 1951

Memorandum

To : Paul T. Allsman, Denver, Colorado

From : Chief, Arizona-New Mexico Br., Mining Div., Region IV

Subject : Final Report, DMA Docket 1273, Shannon Copper Mine Exploitation Project, Turquoise Mining District, Cochise County, Ariz.

Enclosed are original and 7 copies of the above report by Charles A. Kumke and Brinton C. Brown of the Bureau of Mines. No separate geological report will be submitted.

The old Shannon (Copper Belle) mine was worked many years ago, the low-grade copper ore being sent to the Shannon smelter at Clifton, Arizona, and used as a basic flux. The grade of copper was only about 1.34 percent but the ore was valuable for its pyrite content.

The mine now is accessible only by going down the vertical Penberthy shaft which Kumke says is in poor condition and dangerous. Therefore, data for the report have been obtained from sources other than an examination of the underground workings.

This report has my approval.

Brochure is enclosed.

Walter R. Storms

Walter R. Storms

cc: F. T. Allsman (7)
C. A. Anderson
DMA-1273
DF

FOR VICTORY
BUY
UNITED STATES SAVINGS BONDS AND STAMPS

UNITED STATES
DEPARTMENT OF THE INTERIOR
OSCAR L. CHAPMAN, SECRETARY

DEFENSE MINERALS ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

DMA-1273, Shannon Copper Mine Exploitation Project

Turquoise Mining District, Cochise County, Ariz.

Chas. A. Kumke, Mining Engineer
U. S. Bureau of Mines

B. C. Brown, Mining Engineer
U. S. Bureau of Mines

September 1951

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SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Chas. A. Kumke[1] and B. C. Brown[1]

In July 1951 the Coordinating Committee, Copper Branch, Defense Minerals Administration, requested that the Field Team, Region IV, make an examination of the Shannon copper mine, Cochise County, Ariz. Lessees of the property, A. J. Hutchinson and K. C. Moon, both of Douglas, Ariz., were asking for a production loan of $500,000 to reopen the mine, build a mill (concentrator), and also to construct a sulphuric acid plant.

The Shannon (Leonard, or Copper Belle) mine is in the Turquoise Mining District, Cochise County, Ariz., only ½ mile east of the site of the old mining town of Gleeson, at an altitude of 4,940 feet above sea level.

An accurate production record of the mine covering the years 1912 to 1918, inclusive, shows that 298,732 tons, averaging 1.34 percent copper, were shipped to the Shannon Copper Co. smelter at Clifton, Ariz. This ore also averaged 0.035 oz. in gold and 1.60 oz. in silver. Generally speaking, the ore can be described as a massive pyrite. The sulphur and iron contents of the ore were of major importance to the Shannon smelter as a basic flux.

In 1918 the Shannon mine at Gleeson was closed. The ore was too low grade to be mined at a profit. Outside of a few tons shipped from a high-grading operation, the mine has remained closed.

1/ Mining Engineer, Bureau of Mines

In 1923, J. W. Bennie, the general manager, had the mine set on fire in an experiment to roast-leach any remaining ores in place. Within a year the fire slowly died out. The mine water was permitted to flood the mine and in 1926 this water was pumped out for precipitation of the copper. The result was very disappointing.

Nearly all of the mine workings were timbered. In many places where the fire destroyed the timbering, the ground has caved. All timbers were destroyed in the Leonard shaft and now, after 30 years, the timbers in the Penberthy shaft are in very poor condition and will have to be replaced to the water level (300 feet), and maybe farther. The bottom three levels, 400, 500, and 600, have been under water all these years. Applicants Hutchinson and Moon have received written notice that the examining engineers will not be permitted to go down to the 200 and 300 levels until the Penberthy shaft and hoist have been made safe enough to merit the approval of the mine inspector.

The maps and records show that there are about 35,000 feet of workings in this mine, including raises. In rehabilitating the mine, the major portion of this footage would have to be regained and repaired. There is not a usable nail on the surface. A completely new mine surface plant, including headframes, would have to be built. Compressors, power lines, as well as every necessary piece of underground equipment such as haulage motors, mine cars, mucking machines, slushers, blowers, etc., would have to be purchased. In the opinion of the examining engineers, the requested loan of $500,000 would be in great part consumed in the mine rehabilitation program.

When applicants Hutchinson and Moon were informed by the examining engineers that their estimate of $75,000 for a 100-ton per day sulphuric acid plant was nearly a million dollars too low, this part of the program tentatively was dropped.

Almost complete production records are available for this mine and they indicate that the applicants have no valid reason to claim 2.5 percent copper content for 136,000 tons of measured and indicated ore.

Hutchinson and Moon are not able, financially, to repair mine openings so that a proper examination can be made. Pending the completion of this necessary repair work, it is recommended that the request for a loan of $500,000 be denied.

SHANNON COPPER MINE EXPLOITATION PROJECT
TURQUOISE MINING DISTRICT, COCHISE COUNTY, ARIZ.
DMA-1273

Engineering Report

By Chas. A. Kumke
Mining Engineer
U. S. Bureau of Mines

B. C. Brown
Mining Engineer
U. S. Bureau of Mines

September 1951

SHANNON COPPER MINE EXPLOITATION PROJECT
TURQUOISE MINING DISTRICT, COCHISE COUNTY, ARIZ.
DMA-1273

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INTRODUCTION

In July 1951 the Coordinating Committee, Copper Branch, Defense Minerals Administration, requested that the Field Team, Region IV, make an examination of the Shannon copper mine, Cochise County, Ariz. Lessees of the property, A. J. Hutchinson and K. C. Moen, both of Douglas, Arizona, were asking for a production loan of $500,000.00 to reopen the mine, build a mill (concentrator), and also to construct a sulphuric acid plant.

On August 20, 1951, Bureau of Mines engineers[1/] made a trip to Douglas, Arizona to meet the applicants. It was found that the applicants had many records, maps, weekly reports by the mine's former operating superintendent, and some churn drill data. Most of these records were brought back to Tucson by the Bureau engineers for more careful study, after which the engineers were to meet the applicants on the property at Gleeson on August 30 to examine the 2nd and 3rd levels of the mine. The 4th, 5th and 6th levels were filled with water.

The engineers returned to Tucson by way of Gleeson and made a quick examination of the present surface layout. They found the make-shift hoist unsatisfactory for hoisting men. The shaft was without ladders of any kind and the shaft timbers did not appear safe because the ground had started to cave on two sides of the collar. There was no evidence that any recent repair work had been undertaken on the shaft timbers which have been exposed to weathering and decay for over 30 years.

1/ Kumke, Chas. A., and Brown, B. C., Mining Engineers, Arizona-New Mexico Branch, U. S. Bureau of Mines.

Applicants have been notified that the mine inspection trip has been cancelled until the shaft and hoist have been made safe and will stand inspection by the State Mine Inspector, or his deputy.

R. L. Brown of Tombstone, Ariz., purchased the property for delinquent taxes. In 1943 he was granted a Reconstruction Finance Corporation loan of $5,000. Enough ore was shipped to repay about $2,500 of this loan. The amount still due, including interest, is about $3,100. One reason given by the applicant for the failure of this operation was that $5,000 was not enough to carry out the work in an efficient manner. The ore body was low grade and with only limited mining equipment he was unable to produce the tonnage that was required to keep the mine from operating at a loss.

ACKNOWLEDGMENTS

Acknowledgment hereby is made to Dr. Eldred D. Wilson of the Arizona Bureau of Mines for the information obtained from Bulletin 123, Geology and Ore Deposits of the Courtland-Gleeson Region. Acknowledgment also is made to applicants Hutchinson and Moon for their permission to study the almost complete records and superintendent's reports covering many years of the mine operations.

Acknowledgment is made to "Tex" Murray, who for approximately 10 years (1910 to 1918) was mine foreman of the property. Murray is now 77 years old. He resides in Tiger, Ariz. He is alert, has a good memory, and was able to recall figures on tonnage and grade that proved important. His figures later were confirmed by the superintendent's weekly reports. Murray also was helpful in describing the ore occurrence and related the story of setting the

pyritic ore body on fire in an effort to roast-leach in place.

Arizona Department of Mineral Resources also was helpful in furnishing a report on the property by its engineer, A. Macfarlane.

An attempt was made to locate John E. Penberthy in Warren, Ariz. He was mine superintendent at the property for over 10 years (1910 to 1922). He has the reputation of being a reliable and efficient mine superintendent. It was found that Penberthy was in poor health and had moved to San Diego, Calif.

From the DMA Docket it was clear that it would be impossible to properly examine the Shannon mine at Gleeson because the 400,500, and 600 levels were under water and a good portion of the mine workings were caved where the mine had been set on fire. For this reason a special effort was made to locate Foreman Murray and Superintendent Penberthy to obtain as much reliable oral information as possible.

LOCATION AND ACCESSIBILITY

The Shannon mine is less than ½ mile east of the old mining town of Gleeson in the Turquoise Mining District, Cochise County, Ariz. (fig. 1). It is situated in sec. 32, T. 19 S., R. 25 E., near the southwest base of Gleeson Ridge on the west side of Sulphur Springs Valley.

The mine is accessible by an 18 mile dirt road east from Tombstone, or by a 21 mile dirt road north from the Bisbee-Douglas highway (U. S. 80). During the years when the mine was most active there was a railroad connection via a spur line from Gleeson through Pearce, Ariz., to Cochise, a junction point on the Southern Pacific railroad. This spur line was abandoned sometime in the 1920's. Tombstone, 16 miles to the west, is now the nearest railroad shipping point.

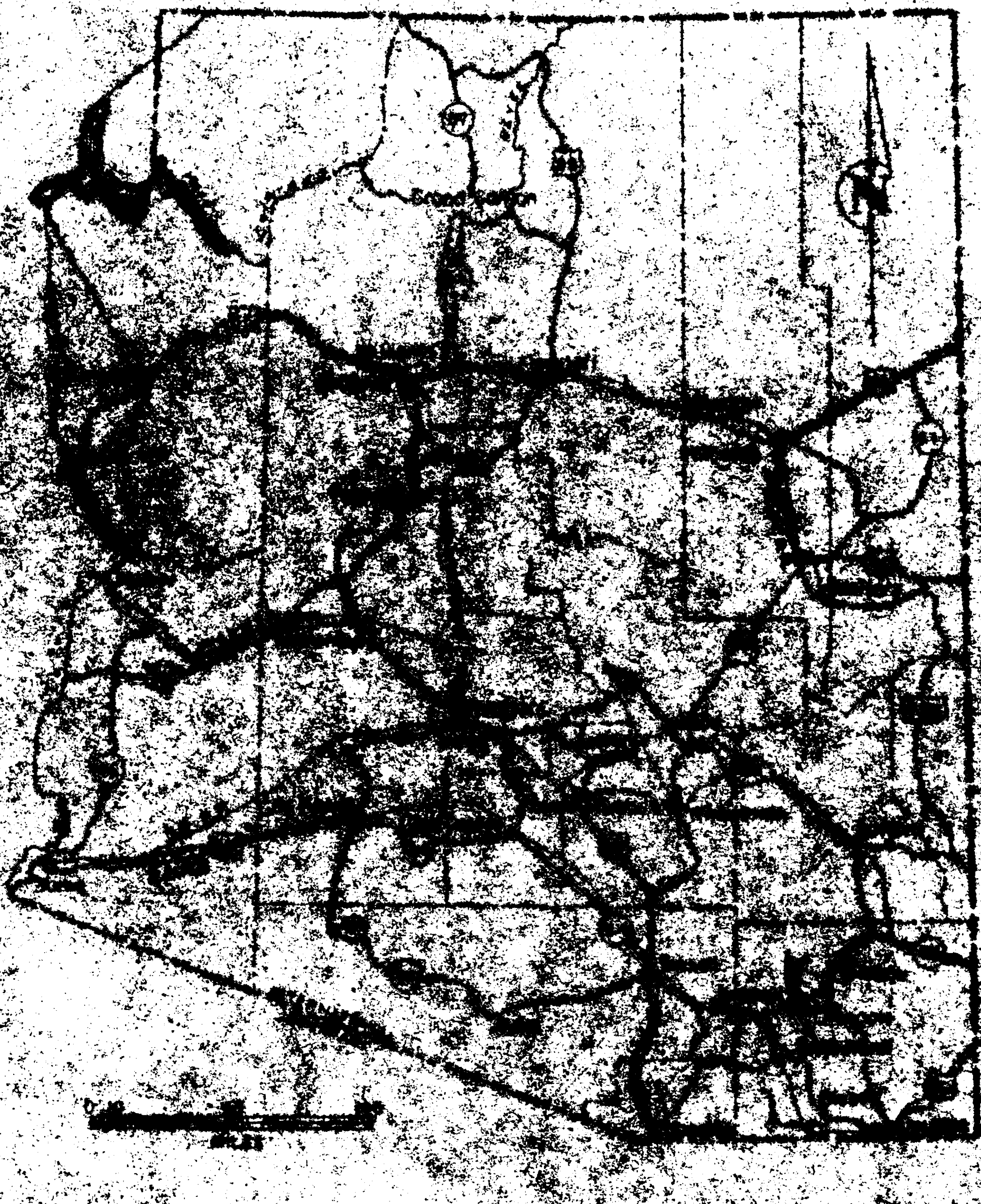


FIG I - LOCATION MAP OF SHANNON
(COPPER BELLE) COPPER MINE
Cochise County, Arizona
DMA 1273

PHYSICAL FEATURES AND CLIMATE

The Shannon mine is near the southwest base of what is known as Gleeson Ridge at an altitude of 4,940 feet above sea level. East of this ridge a broad plain known as Sulphur Springs Valley is situated. Gleeson Ridge is about 2 miles long and ½ mile wide with portions of it attaining an altitude of approximately 5,500 feet.

Like most of the southwest, the region has a semi-arid climate. Gleeson itself is high enough above the Sulphur Springs Valley to enjoy a delightful climate. Summer temperatures rarely rise above 100° F. and winters are mild with a minimum temperature of 16° F. Mean annual temperature is about 63° F. Annual rainfall averages about 14 inches, including occasional light snowfalls.[2]

HISTORY AND PRODUCTION

In 1887 or 1888 the Charleston claim was located by Kit Charleston. John Gleeson discovered the Copper Belle (or the Leonard) deposit on the Charleston claim in 1896, shortly after he had obtained the claim. It is reported that in 5 years $280,000 worth of 4 to 7 percent copper ore was shipped to the Shannon Copper Co. smelter at Clifton, Ariz. This ore was very welcome at the smelter because the ore from its own mine at Metcalfe, Ariz. was very siliceous. The smelter paid for the iron and sulphur content of the Copper Belle ore as well as for the copper content.

2/ Ariz. Bur. of Mines Bull. 123, pp. 12-14.

In order to have a steady supply of this fluxing ore, the Shannon Copper Co. took a bond and lease on the Copper Belle mine at Gleeson which was operating as the Leonard Copper Co. at that time. Later, the Shannon Copper Co. purchased the mine. After a number of years, the mine erroneously was referred to as the Shannon mine although it is really the Copper Belle mine, operated first by the Leonard Copper Co. and later by the Shannon Copper Co.

During 1907 the ore shipments to the Clifton smelter of the Shannon Copper Co. contained 64,982 pounds of copper, 20,843 ounces of silver, and 307 ounces of gold. Between 1911 and 1922 about 305,000 tons of low-grade copper ore was mined and shipped to this smelter.

In 1923, J. W. Bennie, general manager of the Shannon Copper Co. and a metallurgist with several years experience in heap-roasting and leaching at the Rio Tinto mines in Spain, attempted to roast and leach the remaining low-grade ore in place. He had the mine set on fire by igniting large quantities of fuel oil and mine timbers in the Copper Belle shaft. The fire burned satisfactorily for a few months but then slowly died out. Later the mine waters were allowed to rise in all workings. In May 1926 the mine water was pumped out for precipitation of the copper. The experiment was not successful.

It would seem reasonable to assume that Bennie, a capable manager, would not take such a drastic step to set the mine workings on fire unless he had reached the conclusion that the mine reserves were almost exhausted. To further support this opinion, the records show that in 1922, Bennie offered to sell the mine to the American

Smelting & Refining Co. It was after A. S. & R's failure to buy that Bennie decided to undertake the "roasting-and-leaching-in-place" experiment.

The tonnage and grade figures in the following table were furnished several years ago by Brent N. Rickard of the American Smelting & Refining Co. to R. L. Brown who bought the Copper Bell mine for taxes.

Table 1 - Ore Shipped from Copper Belle Mine at Gleeson, Ariz. to Shannon Copper Co. Smelter at Clifton, Ariz.

Year	Tons	Gold, Ounces/ton	Silver, Ounces/ton	Copper, Percent
1912	53,072	0.0417	3.0	2.7
1913	75,223	0.0417	1.4	1.09
1914	35,998	0.0117	1.39	0.88
1915	20,752	0.0220	0.87	1.44
1916	35,657	0.0287	1.10	1.78
1917	26,924	0.0363	1.42	1.90
1918	51,106	0.0446	1.36	2.27
Total	298,732	0.035	1.60	1.34

Over a period of 7 years the mine produced 298,732 tons, averaging 1.34 percent copper. Occasionally higher grade lenses were encountered. This higher grade ore would be mixed with the lower grade shipping ore to hold down freight rates. A higher grade ore of this nature raised the grade of the shipping ore during 1918. When the grade again dropped, the mine superintendent at Gleeson found it extremely difficult to hold the grade at 2.5 percent copper.

The following paragraph was taken from the superintendent's weekly report, dated December 3, 1918:

"To keep up a grade of ore from our mine averaging 2.5 percent or better requires constant and careful sampling, assaying, and selection of the ground to be mined for the reason that the copper ore bodies are not large (in width or length) and the values in these ore bodies are erratic. The mine was therefore operated during the month under very trying conditions".

OWNERSHIP AND EXTENT

R. L. Brown of Tombstone, Ariz. purchased the Shannon (Copper Belle) mine at Gleason, Ariz. for delinquent taxes about 1937. After the 5-year period for redemption passed, title to the mine was transferred to his mother, Mrs. Carrie M. Brown of Tombstone.

The property consists of 10 patented claims as follows:

Empire	Dandy
Charleston	Oak Grove
Copper Belle	Joe
Elizabeth	Katherine A
Durand	Fisk

According to the applicant, title to the property is clear of all encumbrances except a $3,100 mortgage held by the Reconstruction Finance Corporation.

In December 1950, A. J. Hutchinson, one of the applicants, took a 10-year lease on the property from Mrs. Brown with an option to purchase for $10,000. The $3,100 mortgage is to be paid at the rate of 5 percent of the net smelter returns and deducted from the purchase price. A few days after leasing the property, Hutchinson assigned an undivided one-half interest of his lease to K. C. Moen of Douglas, Ariz.

DESCRIPTION OF DEPOSIT[3]

Pre-Cambrian schist, forming the core of Gleason Ridge, is overlain by Paleozoic quartzite and shaley limestone, Carboniferous limestone, and Cretaceous sandstone and conglomerates in the general area. These beds were intruded by post-Pennsylvanian quartz monzonite, quartz monzonite porphyry, felsite, and diorite porphyry and granite. The geologic structure has been affected by normal and thrust faulting.

On the Shannon property an irregular outcrop of Carboniferous limestone about ½ mile long, ranging up to 800 feet in width, is separated from the main limestone mass of Gleason Ridge on the east by a sill of quartz monzonite, and on the southwest by a thrust fault contact. This main limestone bed dips about 45 degrees east. Three sills of altered quartz-monzonite cut approximately parallel to the bedding, so the limestone and quartz monzonite form alternate, irregular layers of approximately 250 feet maximum thickness.

A pre-mineral fault, striking north and dipping 65 degrees to the east, cuts the limestone block. Numerous pre-mineral and post-mineral faults are evident.

Most of the ore bodies are confined to the limestone and show close limitation to contacts with quartz monzonite. They are irregular lenses along these contacts, maintaining a tabular, roughly vein-like character, and are widest (or thickest) where there is a flattening of the dip.

3/ Ariz. Bur. of Mines Bull. 123, pp. 48-49.

Generally, the richness of the deposits increases with the intensity of rock alteration. The limestone-quartz monzonite contacts seem to have furnished channels for passage of mineralizing solutions coming from some other intrusive. The solutions found the limestone favorable to replacement. Approximately the top 100 feet of the ore body was oxidized by downward-percolating surface waters.

In general, the ore occurs as a massive pyrite with minor chalcopyrite and bornite, and occasionally contains very small quantities of galena and sphalerite. Oxidized ore, mined in the upper 100 feet of the deposit, included cuprite, malachite, azurite and tenorite.

MINABLE ORE RESERVES

The Bureau of Mines engineers[4] were unable to go down into the mine workings. Therefore, it would be sheer presumption on their part to attempt to estimate tonnages and grades of minable ore reserves. The applicants request the loan to unwater and rehabilitate the mine workings and are evidently not prepared to put the mine in shape for proper examination at their own expense.

CONCLUSIONS

As the underground workings cannot be examined at this time, there is only one way to judge the advisability of further considering the granting of the loan and that is by studying past performance records and marshalling the important facts in such a manner that a definite conclusion is indicated.

4/ Emmke, Chas. A., and Brown, B. C.

One of the examining engineers[5/] was employed by the Shannon Copper Co. for 5 years (1908-1912). In 1912 after having completed 6 churn drill holes for the company on the Zonia copper property in Yavapai County, Ariz., Kumke moved the churn drills to Gleeson, Ariz. to drill a number of holes on the Shannon property there. Ten holes were completed, varying from 300 to 600 feet in depth. The results were very disappointing (see table 2). During this drilling program, Kumke made several trips underground and became familiar with the Copper Belle mine. He knew the members of the Shannon organization who were responsible for the production, viz.: J. W. Bennie, General Manager; H. H. Dyer, Mine Superintendent, 1909 and 1910; John E. Panberthy, Mine Superintendent, 1911 to 1923; Kinter K. Koonts, Chief Engineer, 1908 to 1911; Everhard Leland, Chief Engineer, 1911 to 1918; "Tex" Murray, Mine Foreman, 1908 to 1918.

Without exception, every member of the above group was well known and well spoken of in Arizona mining circles. They were capable men and furnished the best assurance that the Copper Belle mine was not being mismanaged.

John E. Panberthy and "Tex" Murray are the only ones of the group still living. About 10 years ago, Panberthy returned to Warren, Ariz. from the Belgian Congo mines. He has been in ill health and recently moved to San Diego, Calif.

"Tex" Murray, the mine foreman, now 77 years old, is living in Tiger, Ariz. He was interviewed by the examining engineers.

5/ Kumke, Chas. A.

Table 2. - Summary of Churn Drill Exploration Program

Churn Drill Hole No.	Elev. Collar	Depth of hole-feet	Copper percent	Remarks
1	4928	383 - 390	0.81	
		390 - 395	1.12	
		395 - 400	1.67	
		628		Bottomed in granite.
2	4995	135		Lost hole in limestone.
3	4995	360		Bottomed in porphyry.
4	4958	355		" " "
5		550		" " "
6	4906	300		Bottomed in granite.
7	4932	545		Bottomed in shale.
8	4956	310	1.8	Bottomed in copper mineralization.
9	4974	597 - 600	1.1	
		641		Bottomed in granite.
10	4969	380 - 385	0.48	
		385 - 390	0.98	
		390 - 443		Less than 1% copper.
		635		Bottomed in granite.

They found Murray alert and in possession of a very good memory, especially pertaining to facts and figures of Copper Belle mine production during the 10 years of his association with the Shannon Copper Co. Murray was very positive in his assertion that, with the exception of one or two years when they had some "sweetener" ore to mix with the shipments, the average grade of all ore shipped to Clifton during his time would not be over 1.50 percent copper. Murray explained that the Clifton smelter had to have this fluxing ore even though the grade dropped below 1 percent. Murray's figures were substantiated later when Brent Ricard's figures were found in

the records (see table 1). During a period of 7 years of steady operation 298,732 tons had averaged 1.34 percent copper. On several occasions Penberthy mentions in his weekly reports that the production of a commercial grade of copper ore was getting more and more difficult to maintain.

A further indication that the ore reserves were about depleted was the attempted sale of the mine to the American Smelting & Refining Co. in 1922. When that deal fell through, the manager, J. W. Bennie, made preparations to set the mine on fire as has already been described in a previous section on History and Production. All workings, even the stopes, were square-set. In some places, where the timbers were destroyed by fire, the ground since has caved. It would be expensive to reclaim these workings.

Among the old records, nothing was found to show how much minable ore remained in the mine workings. All indications are that the grade of ore was too low to operate the mine on its own merits. Only the need for basic flux at the Shannon smelter kept this property in operation at any cost.

Table 3. - Summary of Workings in 1918 6/

Level	Linear Feet of workings	Remarks
100 - feet	4,213	
200 - feet	8,961	
300 - feet	12,232	
400 - feet	8,658	Much of this work was in fruitless prospecting.
500 - feet	1,536	A total of 3,272 tons of ore was produced from this level
600 - foot	645	No production was made from this level
	1,405	Includes shafts, raises, winzes.

Applicants have no valid reason to claim a 2.5 percent copper content for 136,000 tons of measured and indicated ores as they state in their application. In fact the positive and probable ore reserves are almost certain, in the opinion of the examining engineers, to be considerably less.

The proposed project will be costly. There are no buildings of any kind, or no head frame. The entire Fenberthy shaft will have to be retimbered at least to water level and perhaps beyond that point. Another exit will be required according to law, so the old Leonard shaft, now burned out, will have to be rehabilitated. All levels will have to be reopened between these two shafts. The caved part of the workings may be more extensive than anticipated. Development work would have to be pushed on the two lower levels and shaft sinking would follow in the not too distant future. The examining engineers believe that the cost involved in such an undertaking would be considerably in excess of the sum requested for this work by the applicants.

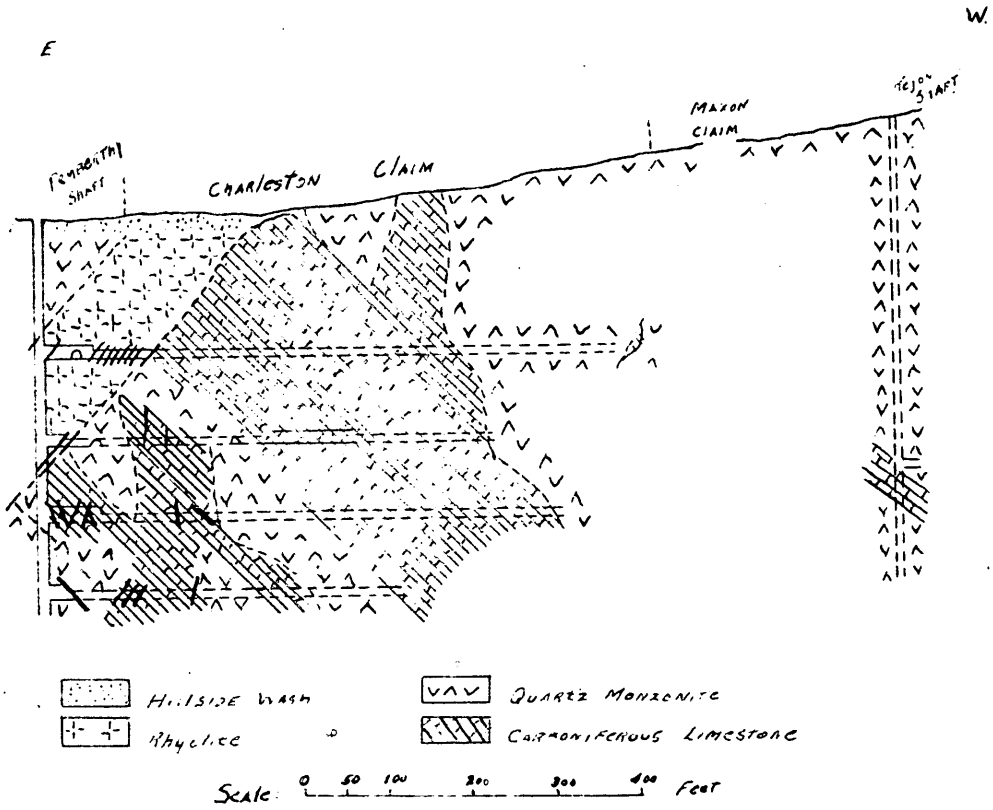
6/ Previously mentioned, footnote 2.

Applicants' estimate for a 100-ton sulphuric acid plant was given as $75,000. After the examining engineers informed Hutchinson and Mann that they had underestimated the capital cost of the acid plant by approximately $1,800,000, this part of the proposal tentatively was dropped.

In case of a critical shortage of sulphuric acid, the district as a whole should be considered. The Gleason hill has three mines, the Tejon property, the Castello group, and the Shannon property. Together they would form one large group that could be counted upon to furnish fairly large tonnages of massive iron sulphides.

RECOMMENDATIONS

Hutchinson and Mann are not able financially to repair mine openings so that a proper examination can be made. Pending the completion of this necessary repair work, it is recommended that the request for a loan of $500,000 be denied.



EAST-WEST VERTICAL SECTION THROUGH PEMBERTY SHAFT OF COPPER BELLE MINE
AFTER LOCKE AND WILSON

FIG. 6
DMA 1273

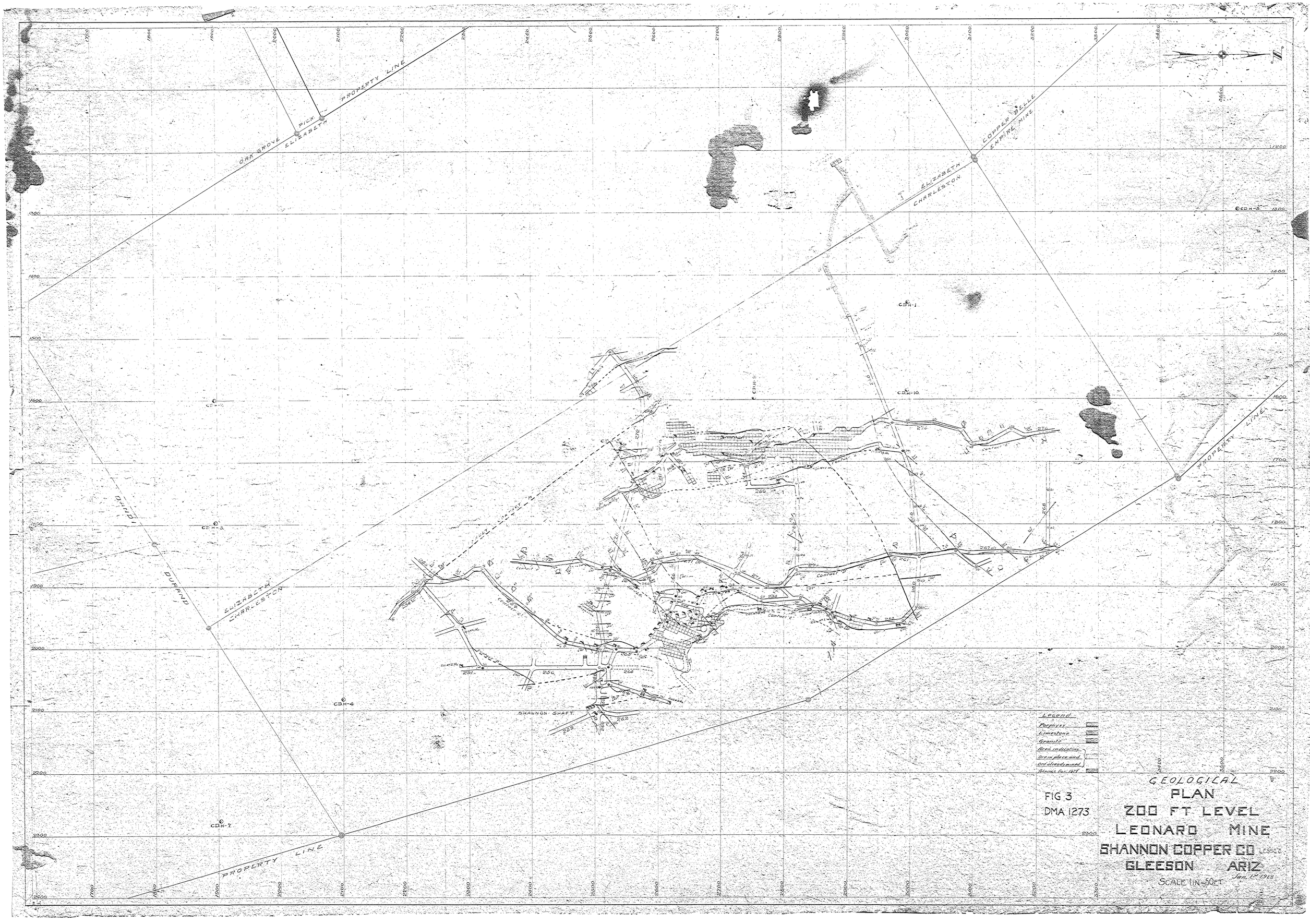


FIG 3
DMA 1273

GEOLOGICAL
PLAN
200 FT LEVEL
LEONARD MINE
SHANNON COPPER CO LESSEE
GLEESON ARIZ
Jan 1st 1918
SCALE 1 IN = 50 FT

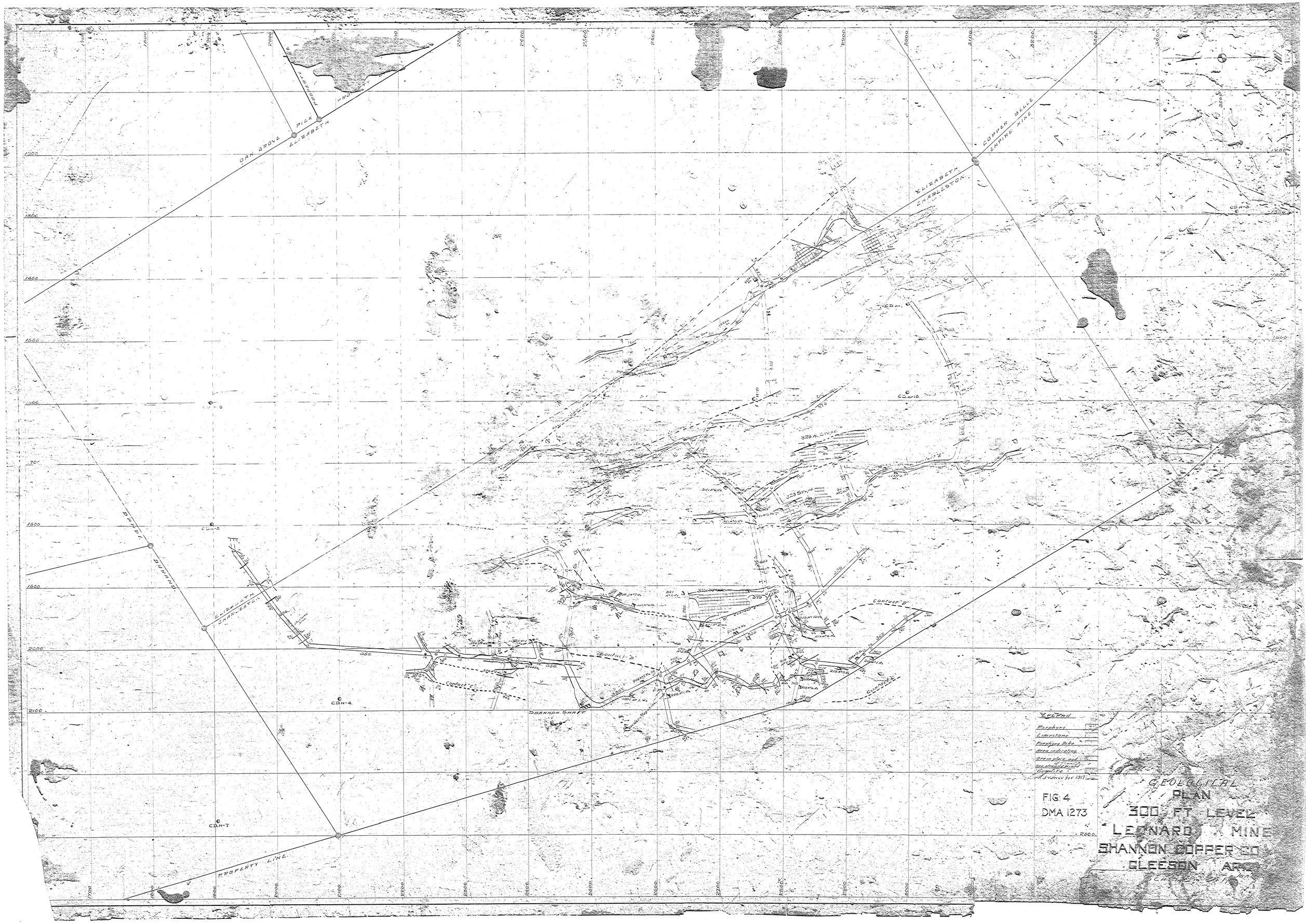


FIG. 4
DMA 1273

GEOLOGICAL
PLAN
300 FT LEVEL
LEONARD MINE
SHANNON COPPER CO.
GLEESON, ARIZ.

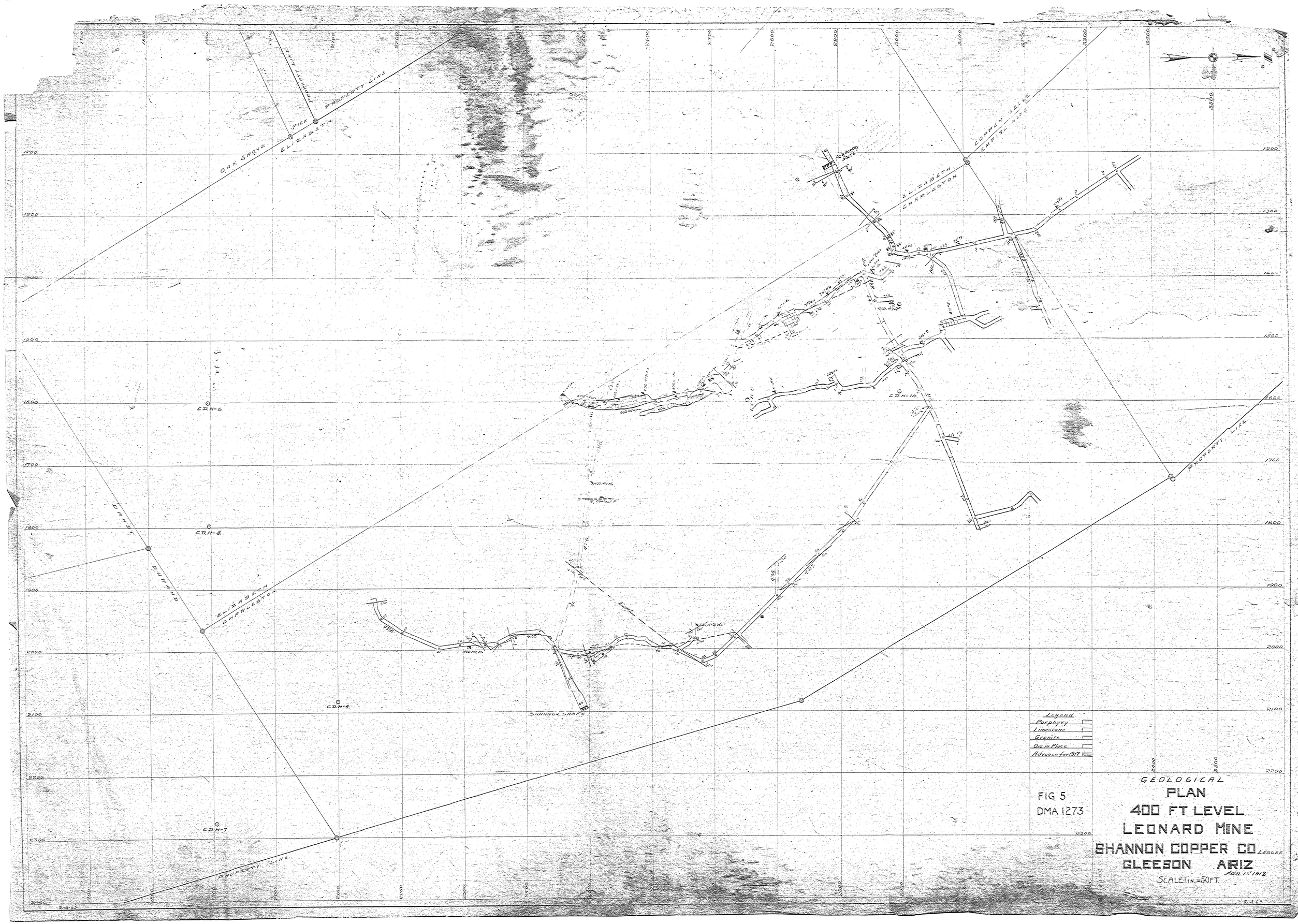


FIG 5
DMA 1273

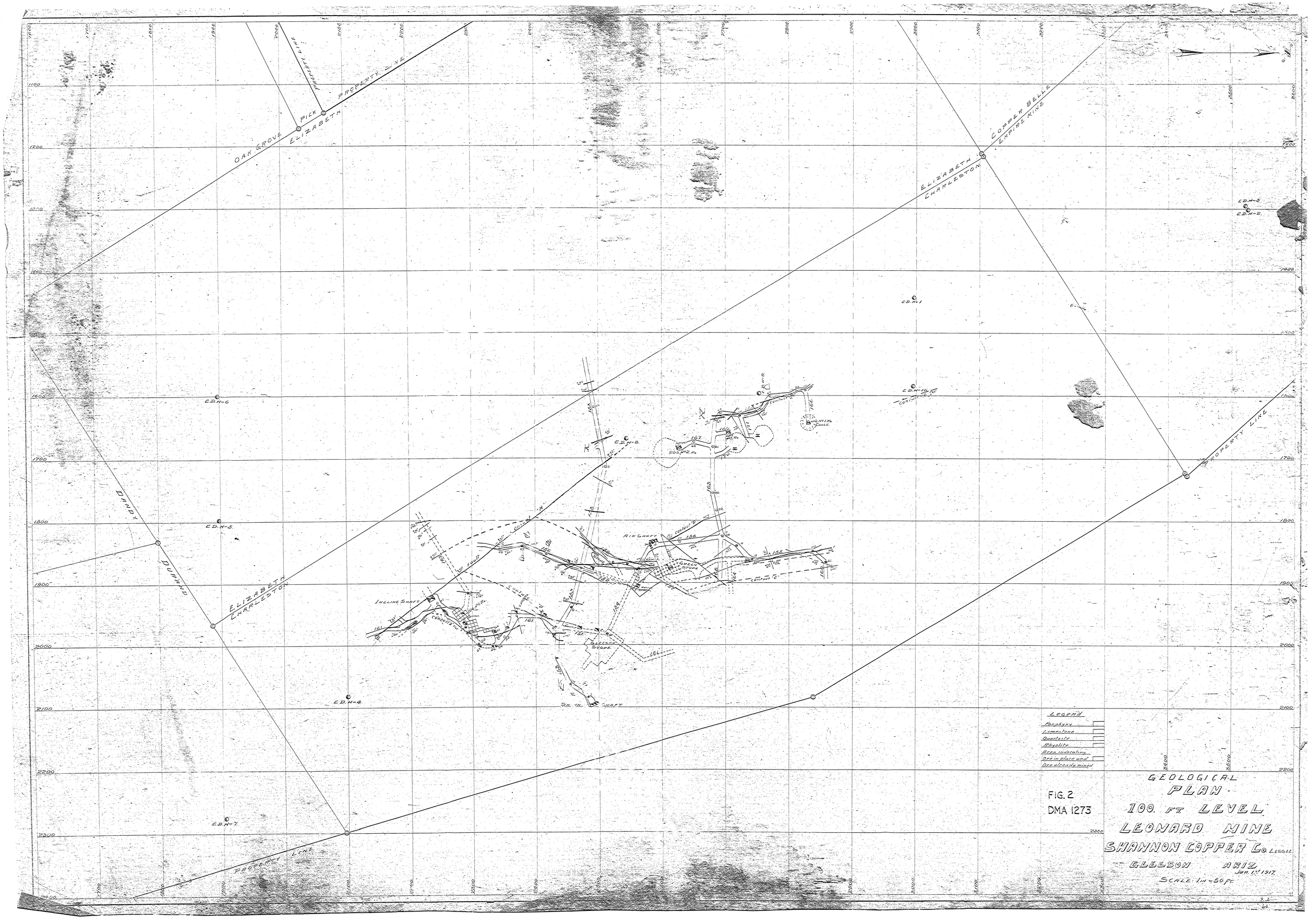


FIG. 2
DMA 1273

GEOLOGICAL
PLAN
100 FT LEVEL
LEONARD MINE
SHANNON COPPER Co. LESSEE
GLEESON ARIZ
Jan. 1st 1917.
SCALE: 1in = 50 ft.