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CUSTOM MILL PROJECT  
AND  
CERBAT METALS MINING PROJECT AND PLANS



PREPARED BY  
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This document to be regarded as strictly confidential.  
Indiscriminate disclosure of plans may jeopardize the  
economic potential of this project.

## INTRODUCTION AND ACKNOWLEDGMENTS

The purpose of this project is to attempt to find sufficient capital to construct a small custom or toll mill to process the valuable ores of the Wallapai Mining District in Mohave County, Arizona and to mine the ores from the mines leased by Cerbat Metals and to mine other leased or purchased mines in this district, as well as to purchase ore from the miners in the area and process the same. Secondly, the purpose is to construct a mill and smelter to refine the ores.

We believe that this mining-oriented project is the first of its kind where Federal, state and county governments and private individuals have cooperated in an effort to stimulate mining activity. The Arizona Bureau of Mines, the U. S. Bureau of Mines, the Arizona Department of Mineral Resources and a number of individuals contributed published bulletins, professional papers, reports of investigations, information circulars, and private and other governmental reports on mining properties and areas in Mohave County. These contributions are gratefully acknowledged.

Ores of commercial grade are available in the mines now purchased or leased by Cerbat Metals, Inc. A known deposit of valuable silver and lead ores has been confirmed by the report of Mr. John D. Warne, consulting Mining Engineer. His report is made a part of this project. Additional tonnages in the cerbat mountains is just waiting for an aggressive operation to extract, process and sell its wealth. Indications are that ore shipments would continue over a long period once a custom mill was established.

## THE WALLAPAI DISTRICT

The district is centered over the Cerbat Mountains, which extend northwestward from Kingman for about 30 miles. It includes the mining camps of Chloride, Mineral Park, Cerbat and Stockton.

Lead-zinc veins with prevalent gold and silver values were discovered in the district in the 1860's. Chloride, founded in the early 1870's, was named from the character of its rich silver ore and was the first settlement in the area. Ores rich in gold and silver yielded a large but unrecorded production in the 1870's. This fell off with the declining silver price in 1882.

Base metal ore below the oxidized surface materials were not attractive or mined in any meaningful scale until the railroad was extended to Kingman in 1899.

Lead-silver ores only were then mined until advanced technology in metallurgy allowed economical mining of the complex lead-zinc ores. Gold production increased until 1938, but gold activity in the district sharply decreased with the closing order of 1941. Production was again conducted through the 1960's.

Current activities are centered around copper mining primarily from certain economically induced investment criteria. This work focused on two porphyry copper deposits in the district which have contributed greatly to its gross production. These properties are the El Paso Natural Gas's Emerald Isle, which has a present reserve of 1.5 million tons at 0.40% copper, and Duval's Mineral Park, with 49.5 million tons of 0.30% Cu and 0.036 Mo. Mineral Park is a current producer. It produces over 34 million pounds of copper and 2.781 million pounds of molybdenum per year.

Current high precious metal prices have induced new interest in the vein deposits of the district. Unlike the porphyry copper-molybdenum deposits, the precious metal veins require a vastly different exploration technique and development plan.

## GEOLOGY AND ORE DEPOSITS

The basic underlying geology in the district is a thick series of pre-Cambrian schists, and gneisses which generally strike in a northwest to southeast direction. Included in the series are pegmatite dikes consisting of tabular masses of feldspars and white quartz.

The entire Cerbat Range appears to be a major uplift and is surrounded by thick layers of late tertiary volcanics which are in turn overlain by quaternary gravels as valley fill.

In the Stockton Hill and Cerbat areas the pre-Cambrian rocks have been intruded by a series of veins striking more or less N60°W parallel and dipping steeply to the east.

These veins were formed by rising solutions following along a system of nearly parallel fault fissures. These fissures were opened by the tensional effects of regional tectonics. Subsequent strike slip movement along the fissures locally opened passages where they were deflected to accommodate desired direction of movement and differential rock types.

These openings gave preferential flow which was manifest in ore shoots of up to two hundred feet in length and unknown depth. These shoots have been the primary interest of previous operations where mining to the surface can be seen.

From old maps and reports it is apparent that these ore shoots produced most of the district's commercial deposits. In places these shoots are up to 20 feet wide and have been mined to several hundred feet in depth and length.

These nearly parallel vein systems show many striking similarities from vein to vein. It is apparent in some cases that the ore shoots in parallel veins are almost superimposed one in front of the other in a dimension somewhat normal to the plane of the vein.

GEOLOGY AND ORE DEPOSITS (continued)

This position for the ore shoots is apparently a function of slight deflections in the strike of the vein, which, for tectonic and structural reasons, is reflected in the fabric of the precambrian rocks.

There is reason to believe that the possible location of undiscovered ore shoots can be predicted by a program of careful geologic interpretation, mapping and sampling.

### EXTENDING RESERVES

Under today's high metal prices a great deal more of the vein may be mineable.

In the absence of maps and assays from previous operations it is not possible to make estimates of how much more of any particular vein may be mineable. Furthermore, much of the vein system has not been explored. It may be estimated, however, that past production makes up less than 1/10 of the District's potential.

At least two approaches for defining potentially explorable deposits in the District are available. These targeting techniques are as follows:

1. By mapping as much of the existing workings as is known or can be surmised from old maps, reports, conversation with knowledgeable people, inspecting the workings, and geologic interpretations from aerial photographs - models can be constructed to show the extensions of known ore shoots and the possible location of ore shoots which have heretofore been undetected. These undetected ore shoots may be in known veins parallel to known ore shoots but have no outcrop and were not explored.
2. Since the term ore includes a clause implying economic viability, tonnage, thickness, access, tenor and operating parameters, estimates of these variables are functions of general economic conditions, metal prices, and a number of other factors.

The Wallapai Mining District consist of four areas -- the Cloride, Mineral Park, Cerbat, and Stockton Hill areas. The following information was obtained from reports from Gibson, Gibson, and Gibson, Mining Engineers; Coe and Van Loo, Engineers; and the United States Geological Survey Bulletin 397 by F. C. Schrader, and concerns the Cerbat area.

#### SOME OTHER MINES IN THE CERBAT AREA.

The Flores mine, a short distance below the Vanderbilt and Columbus mines, Northwest of Cerbat, comprises a group of four mining claims. The country rock is the pre-cambrian granitoid schist, and the intrusive granite porphyry seems to be present near by. The deposit is in the fissure vein about 4 feet thick, which dips 80 degree to 85 degree NE., but at the surfact, where the vein is crosscut by Flores Gulch, it locally dips in an opposite direction. The croppings are chiefly reddish and brown iron-stained quartz, and crushed or brecciated rock. Some ore averaged as high as 1400 ox silver, with appreciable amounts of gold, but the ore is mostly low grade. The ore is contained in an oxidized gangue composed chiefly of quartz and altered rock.

The ore contains gold with silver sulphide, some zinc blende and galena. It favors the hanging-wall side of the vein.

The Vanderbilt is one of the oldest mines in the Cerbat camp. It was located early in the 1860's. Located about a half a mile northwest of the Golden Gem, and a little above it, near the head of Florex Gulch, which drains westward into Sacramento Valley. The country rock is pre-Cambrian fine grained gneissoid chloritic schist, and is probably derived from diorite which has been greatly sericitized and otherwise altered. Associated with the vein on the foot-wall side is a "porphyry dike" which may represent the intrusive granite porphyry. The ore contains chiefly gold values but carries silver also. The ore occurs mainly on the hanging-wall side. The ore minerals are pyrite. The best grade will contain 1000 oz silver and appreciable amounts of gold.

The Columbus mine is about one-fourth mile northwest of the Vanderbilt mine, near the upper side of Flores Wash. The deposits are contained in a fissure vein, which has been opened principally by two shafts. The production has been several hundred tons of rich ore. . . . While it was mined as a gold property, yet there are large bodies of 20% zinc ore, which have been opened up. The zinc ore has never been mined.

The Jaylee properties have not been operated but show a veining system of much proportion. The vein is about 60 feet wide. This, of course, does not mean that it is all pay ore, but rather a large ore body can only be found where there is room for it between walls.

The ore in this vein has not shown any zinc but doubtless it will be found at depth as it is in veins on both sides of this one. This vein has not been developed to an extent to allow much of a report on it but the Geological Mineralogical Conditions present an optimistic outlook. These claims are between the Vanderbilt and the Cerbat.

The Cerbat vein and Paymaster have developed so that the country can be understood. The Cerbat mine is about a mile northeast of the old town of Cerbat and the Golden Gem Mine near the top of the ridge separating it from Long Gulch on the north at an elevation of about 4600 feet. This mine is one of the early discoveries. Two operators were killed in it by the Indians in pioneer days. It was opened in 1869 and was worked by a whim in 1875. The mine is developed by a 180 foot shaft, drifts and stops. The deposit forms a fissure vein 4 to 10 feet wide contained in the pre-Cambrian complex. The vein strikes north-northwest, with bold croppings locally rising 8 to 10 feet above the surface. The gangue is mostly quartz with some crushed and re-cemented rock. The ore contains chiefly gold, with silver and copper also. The copper occurs mainly in the form of chalcopyrite and carbonates. A conspicuous coating of malachite is now forming on the ore walls and surface of the workings in the mine. The mine is reported to contain a large amount of good milling ore.

Within one-half mile of the Cerbat Mine is the Golconda. This is one feature that seems to be characteristic of the well developed mines of the district; viz., that the ore is improved in quantity and quality in the deep workings.

There are six other mines within two miles of the Cerbat whose production has been very high. There seems to be no lack of evidence that the Cerbat Range is highly mineralized.

The Golconda mines are located in the Cerbat District, which extends from Mineral Park District southward for about  $4\frac{1}{2}$  miles and from the border of Sacramento Valley on the West to the crest of the range on the east. Maximum width is about 3 miles in the southern part.

#### TOPOGRAPHY

The elevation of the district ranges from 3000 feet in the foothills to the west to 5000 feet on the east. The country is in part rugged, the topography being of the type produced by the erosion and weathering of granite.

In the northern part the district is drained by Long Wash, which leads northward, and westward into Sacramento Valley. Todd Basin, a small depression, which opens into Long Wash, contains the Golconda Extension Mine at an elevation of 4300 feet.

#### GEOLOGY

The country rocks of the district are the pre-Cambrian granite, gneiss and schist complex and are intruded by dikes of post Cambria granite porphyry, diabase, rhyolite, basalt, minette, and other rocks, some of which are too greatly altered for determination. On the west the complex is flanked by masses of tertiary volcanic rocks, principally rhyolite.

On the property, the country rock is the so-called pre-Cambrian gneiss extensively intruded by coarse and fine grained granite porphyry dikes.

## ORES

The ore bearing veins generally occur in the pre-Cambrian granitic rocks and in places follow basic dikes and are associated with the post-Cambrian intrusions of granite porphyry. Many of the pay shoots coinciding with the intersection of fissures.

The veins are regular and persistent with well defined walls and many are wavy in the strikes but this characteristic has not extended far enough to cause many breaks.

The mode of occurrence of these veins tends to show that they were deposited by hot uprising water after a period of great igneous activity when the dikes were intruded, which caused severe fissuring of the country rock. The veins have suffered great erosion.

The metals found in these fissure veins are gold, silver, zinc, lead, copper iron, the gangue rock being chiefly quartz. The oxidized portion of the veins ranges from 50 to 250 feet. Below, the leaner primary sulphide ores come in and these are chiefly utilized at the present time. The bulk of the production of the early days was made up of the richer secondary ores, such as native silver, horn silver and in some places ruby silver and native gold, but the latter is rare.

When the water level was reached, which is on the average about 400 feet from the surface in the District, and the sulphide ores were encountered, many of the mines were abandoned. Now, with modern methods all these ores can be easily handled and afford large profits.

The Oro Plata Mine, one of the most continuous producers, is located in the eastern part of the District near the axis of the range and the head of the main gulch, at an elevation of about 4,300 feet.

The country rock is the pre-Cambrian gneiss, extensively intruded by coarse granite porphyry, a large dike of which crosses the gulch just below the mine. In the mine the granite porphyry seems to be associated with the vein, as does also a large 40 foot dike of finer grained granite porphyry. The vein, about 4 feet in width, normally dips about 80 degrees NE. It is locally enriched by intersection with another vein.

The ore which occurs chiefly in a banded quartz gangue, contains principally gold and silver. There are small amounts of Chalcopyrite, zinc, blende, pyrite, and galena. The ore shoots are said to be richer and more regular in the deeper part of the mine than near the surface. The ore averages gold 3 ounces and in silver 25 ounces to the ton, and in lead about 6 percent. There is said to be good ore in the bottom of the mine, which carries about 7 percent of lead. The value of the output of the mine is good.

Total production is reported to be about 5000 tons.

Information concerning the production of various mines in the Wallapai District for the period 1901 to 1948 has been extracted from U.S.G.S. Bulletin 978-E as follows:

TABLE 2 - Production of gold, silver, copper, lead and zinc of selected mines in the Wallapai District, Mohave County, Arizona, cumulative from 1901 through 1948, in terms of recovered metals

(Compiled by Metal Economics Branch, U.S. Bureau of Mines, Salt Lake City, Utah)

Mine	Gold (oz.)	Silver (oz.)	Copper (lbs.)	Lead (lbs.)	Zinc (lbs.)
Alpha (m)	292	35,499	22,265	16,276	-----
Altata and Altata Extension (c)	382	36,024	136,616	7,691	-----
Badger, Hercules, and Hercules group (c)	561	12,287	1,418	331,365	52,524
Banner group (s)	1,697	79,382	21,603	2,195,983	39,948
Blackfoot (cer)	158	11,886	19,617	104,565	144,369
Blue Bell (s)	469	50,954	44,274	182,001	-----
Cerbat (cer)	42	2,055	1,153	4,120	-----
Champion (cer)	982	23,689	14,931	325,993	335,391
C.O.D. (s)	1,550	151,263	23,924	348,872	23,188
Columbus-Monroe Doctrine (cer)	646	5,083	4,370	17,322	154,533
Copper Age (c)	3	1,062	266	24,575	-----
Distaff (c)	93	55,883	1,392	149,600	-----
Elkhart (c)	662	10,385	7,482	245,197	-----
Empire and Silver Union (c)	1	2,475	122	-----	-----
Eureka (c)	7	2,311	3,371	23,861	42,714
Flores (cer)	422	366	172	512	-----
George Washington (m)	114	11,059	15,777	34	-----
Golconda (m)	20,752	510,180	354,703	2,031,719	56,226,020
Golden Eagle and Bobtail (m)	1,777	25,845	890	40,076	-----
Golden Gem (cer)	2,478	8,243	3,365	14,980	-----
Hidden Treasure (c)	251	9,074	7,897	159,861	231,345
Idaho (cer)	280	5,285	4,742	9,348	51,900
June (c)	1,239	43,128	4,517	235,498	154,138
Keystone (m)	2,703	452,049	340,778	348,845	114,063
Little Chief (s)	391	68,351	2,070	111,825	-----
Lucky Boy (c)	1,923	40,438	230	8,140	-----
Mary Bell (c)	26	955	557	19,155	28,733
Midnight (c)	44	8,533	10,746	4,122	-----
Minnesota-Connor (c)	2,890	228,129	50,702	169,722	71,053
Hint (m)	222	15,265	-----	-----	-----

<u>Mine</u>	<u>Gold (oz.)</u>	<u>Silver (oz.)</u>	<u>Copper (lbs.)</u>	<u>Lead (lbs.)</u>	<u>Zinc (lbs.)</u>
	13	3,268	1,558	136,699	31,243
New London (cer)	324	16,297	5,410	1,589	-----
Highhawk group. (m)	21	2,969	654	4,370	-----
Old Colony (s)	99	25,090	-----	-----	-----
Paymaster (cer)	128	4,104	11,694	39,928	192,137
Payroll (c)	56	14,695	55,136	3,133	-----
Pinkham (c)	2,400	34,982	4,748	313,271	22,426
Rainbow (c)	21	4,042	11,449	-----	-----
Redemption (c)	1,149	15,309	1,449	2,620	-----
Rico (s)	4,480	57,891	4,454	656,377	67,886
Samoa and Samoan (c)	24	11,142	1,050	855,841	1,496
St. Louis (cer)	24	3,550	-----	-----	-----
Silver Age (c)	708	8,842	10,722	229,949	143,594
Silver Hill (c)	42,383	1,514,187	839,837	59,897,096	66,805,907
Tennessee and Schuylkill (c)	144	6,286	2,108	5,516	-----
Towne (c)	1,012	2,119	327	2,568	-----
Vanderbilt (cer)	58	2,205	1,610	1,700	-----
Washington and Washington Extension (m)					

(c) - Chloride camp (m) - Mineral Park camp (cer) - Cerbat camp (s) - Stockton camp

PREVIOUS MINERAL PRODUCTION

Available data for the District showing mineral production for the period 1904 to 1948 has been abstracted from the U.S.G.S. Bulletin 978-I as follows:

TABLE 1 - PRODUCTION OF GOLD, SILVER, COPPER, LEAD AND ZINC IN THE WALLAPAI DISTRICT, MOHAVE COUNTY, ARIZONA 1904-48, IN TERMS OF RECOVERED METALS

<u>Year</u>	<u>Crude Ore Produced (Dry Tons)</u>	<u>Gold (oz.)</u>	<u>Silver (oz.)</u>	<u>Copper (lbs.)</u>	<u>Lead (lbs.)</u>	<u>Zinc (lbs.)</u>	<u>Value (dollars)</u>
1904	1,531	1,592.42	64,335	1,480	6,036	-----	-----
1905	5,868	1,137.00	58,751	173	112,266	-----	-----
1906	9,946	2,772.00	125,331	114,502	904,390	-----	-----
1907	13,013	5,358.62	58,895	62,917	1,229,654	30,666	229,206
1908	2,179	1,193.13	29,931	11,920	249,328	505,133	76,313
1909	11,658	2,350.77	69,966	1,774	113,112	5,264,121	374,335
1910	1,109	424.33	48,509	20,341	235,368	-----	47,908
1911	12,692	2,735.75	71,233	27,428	2,394,629	960,097	260,220
1912	4,472	1,461.87	43,761	7,828	1,350,920	799,219	174,362
1913	32,933	2,588.27	177,853	30,782	5,171,988	4,233,642	630,350
1914	22,492	1,205.41	88,951	18,297	3,708,102	4,932,108	472,695
1915	85,635	5,202.75	243,819	46,171	6,452,406	17,382,849	2,697,982
1916	104,658	6,196.90	229,237	190,807	5,825,791	17,024,626	3,007,298
1917	104,362	7,012.38	294,197	84,394	6,087,742	17,127,596	2,680,978
1918	4,739	987.82	42,098	91,596	533,462	82,853	130,558
1919	3,352	872.91	44,531	90,990	504,095	-----	111,561
1920	2,399	682.81	37,500	11,160	338,623	-----	84,133
1921	10,206	1,009.88	82,947	15,855	278,321	-----	118,393
1922	3,453	553.94	42,099	22,638	84,142	-----	61,234
1923	1,150	235.81	25,843	21,550	11,620	-----	30,047
1924	388	165.30	5,027	6,460	172,038	-----	21,398
1925	3,169	758.29	38,744	26,646	341,646	174,703	89,346
1926	10,056	2,034.39	75,470	80,728	697,805	1,669,266	281,469
1927	19,289	837.17	49,499	37,220	696,086	1,184,454	169,906
1928	995	198.45	10,770	18,450	43,791	150,319	23,617
1929	1,849	298.54	10,224	19,393	64,296	133,414	27,889
1930	342	103.06	4,181	2,411	37,640	35,104	7,620
1931	103	15.88	253	581	-----	-----	454
1932	236	193.55	3,553	2,333	17,500	-----	5,675



<u>Year</u>	<u>Crude Ore Produced (Dry Tons)</u>	<u>Gold (oz.)</u>	<u>Silver (oz.)</u>	<u>Copper (lbs.)</u>	<u>Lead (lbs.)</u>	<u>Zinc (lbs.)</u>	<u>Value (dollars)</u>
1933	333	236.11	3,517	1,422	56,946	11,024	9,927
1934	1,057	223.69	4,718	2,737	11,514	10,698	11,973
1935	14,775	1,665.20	76,519	26,506	140,725	133,205	126,970
1936	36,185	5,782.00	193,763	107,859	1,681,478	1,047,960	491,334
1937	119,246	15,348.00	528,640	400,182	4,978,220	3,428,354	1,511,063
1938	109,810	15,027.00	560,518	311,163	4,007,239	3,319,812	1,262,478
1939	68,716	9,301.00	451,325	146,077	1,406,553	1,539,692	793,253
1940	76,317	8,135.00	284,760	224,221	4,607,480	8,589,000	1,284,039
1941	70,398	7,500.00	213,577	132,700	4,816,200	4,692,000	1,056,459
1942	70,533	5,406.00	157,112	136,800	3,312,600	4,487,700	956,787
1943	43,724	1,922.00	83,695	236,500	2,784,800	3,084,000	703,019
1944	33,579	895.00	57,856	1,005,200	1,567,000	2,091,000	571,903
1945	24,462	1,063.00	49,708	454,800	1,503,000	1,367,000	420,414
1946	34,899	730.00	38,229	390,500	737,000	971,000	318,495
1947	46,224	474.00	45,253	456,100	1,308,500	1,713,200	549,046
1948	51,734	694.00	32,059	621,400	891,100	1,344,700	526,501
TOTAL	1,276,266	124,491.40	4,863,757	5,712,992	71,473,202	109,520,515	22,472,901

## FUTURE PROPOSED DEVELOPMENTS

For the purpose of developing, mining and transporting ore from mines to mill, a tunnel is proposed. This tunnel will permit lower cost mining methods and transportation than can be obtained in any other manner. It will crosscut every vein in the area and will develop an immense tonnage of ore. Besides the known veins, the tunnel is expected to open up new veins and ore shoots heretofore undiscovered.

A selective flotation mill could be built near the portal of the tunnel. Selective flotation is the most efficient method of handling and concentrating the complex sulfide ores of the Cerbat Range.

The tunnel will develop a number of mines. This operation, besides being profitable in itself, will insure a steady flow of ore to the mill.

## THE AREA OF OPERATION

The area concerned in this project is about 14 miles north of Kingman, Mohave County Arizona, which is on the main line of the Santa Fe railroad and is the nearest shipping point. The area is some three miles square and is the southern portion of the Wallapai Mining District. Through this District runs a vast system of nearly parallel veins and there are an unusual number of intersections or junctions. This is a point of exceptional interest because the more valuable ore deposits usually occur at or near these intersections. All of these veins are strong and persistent and may be traced on the surface for considerable distances. Ore shoots have been found on nearly every one of these veins, in lengths varying between 100 and 1500 feet.

The most of the properties along the course of the tunnel have never been developed below the 300 foot level. The chief reasons being inaccessibility and high mining costs. Two mines are exceptions; the Golconda, with a production record of more than two million dollars has been developed to the 1400 level and had better values at that depth than nearer the surface. The Tennessee mine is developed to the

1600 level and has a production record of more than twenty million dollars. Many properties in this district have indicated ore shoots as large or larger than the Golconda and of equal value. They may well be expected to produce a similar tonnage of equally valuable ore.

In the entire district no bottom has ever been found on any ore shoot, so it is very safe to say that ore will be encountered in these shoots at tunnel depth.

#### THE TUNNEL

The tunnel will be single track, with switches or passing tracks at suitable intervals. It will cut every known vein in the district and will pass through or near to a majority of the known ore deposits. Deposits or mines away from the course of the tunnel will be tapped by laterals. Thus every mine in the district can be operated through the tunnel.

#### TUNNEL SIZE AND COSTS

Due to rapidly changing prices for both labor and materials, it is very difficult to make an exact estimate of costs.

The tunnel will be 8 feet by 8 feet in the clear; large enough to accommodate a three ton car and electric motor. The cost of tunnel including track, pipe lines and necessary timber, will be \$350.00 per foot. The entire length is about 3.4 miles.

The dimension of the lateral tunnels need only be 5 feet by 7 feet in the clear. There will be some 2½ miles of laterals. The cost per foot is estimated at \$175.00.

Total cost of tunnel and laterals	\$8,400,000
Shops, warehouses, etc.	250,000
Compressors, pipelines, cars, electric haulage motors, drills, steel	<u>1,000,000</u>
TOTAL	\$9,650,000

The actual cost of operating the tunnel, that is, the cost of transporting cars of ore or waste to the portal and tunnel maintenance is estimated to be \$2.00 per ton.

Purchasing Mines	\$4,000,000
Tunnel	9,650,000
Mill	5,750,000
Mine Operation	2,500,000
Site Development	1,500,000
Personnel and Management	<u>1,500,000</u>
TOTAL (rounded)	\$25,000,000

#### THE MILL

The mill must be a modern selective flotation plant with a daily capacity of 1000 tons. There must also be a complete crushing and sampling plant and ore storage bins. Sufficient water for milling purposes will be furnished by the tunnel. The electric power line is a mile to the north.

An excerpt from a report and plan for milling submitted by H. Mason & Coggin of Coe and Van Loo, Engineers of Phoenix, Arizona follows:

### THE MILL

Sulfide deposits are encountered in the Wallapai District at depths of 80 to 1600 feet. Composition of the sulfide ores varies considerably with depth apparently complying to conventional zoning theory.

This theory provides that mineralogy in a particular vein system, which has been formed by hydrothermal solutions, deposits its burden according to decreasing temperature and pressures.

Metallurgically, the zoning model develops complex ores which require a multiple concentrate flotation circuit.

Variation in ore mix can be expected to change from vein to vein. Considering this great variability, it may be necessary to provide stockpiling capabilities at the mill and lead time to accommodate mill runs for a particular deposit. Reserves have been identified to provide an optimum production rate.

For present purposes, production rates of up to 500 tpd will be considered, but only because a greater reserve may be proven.

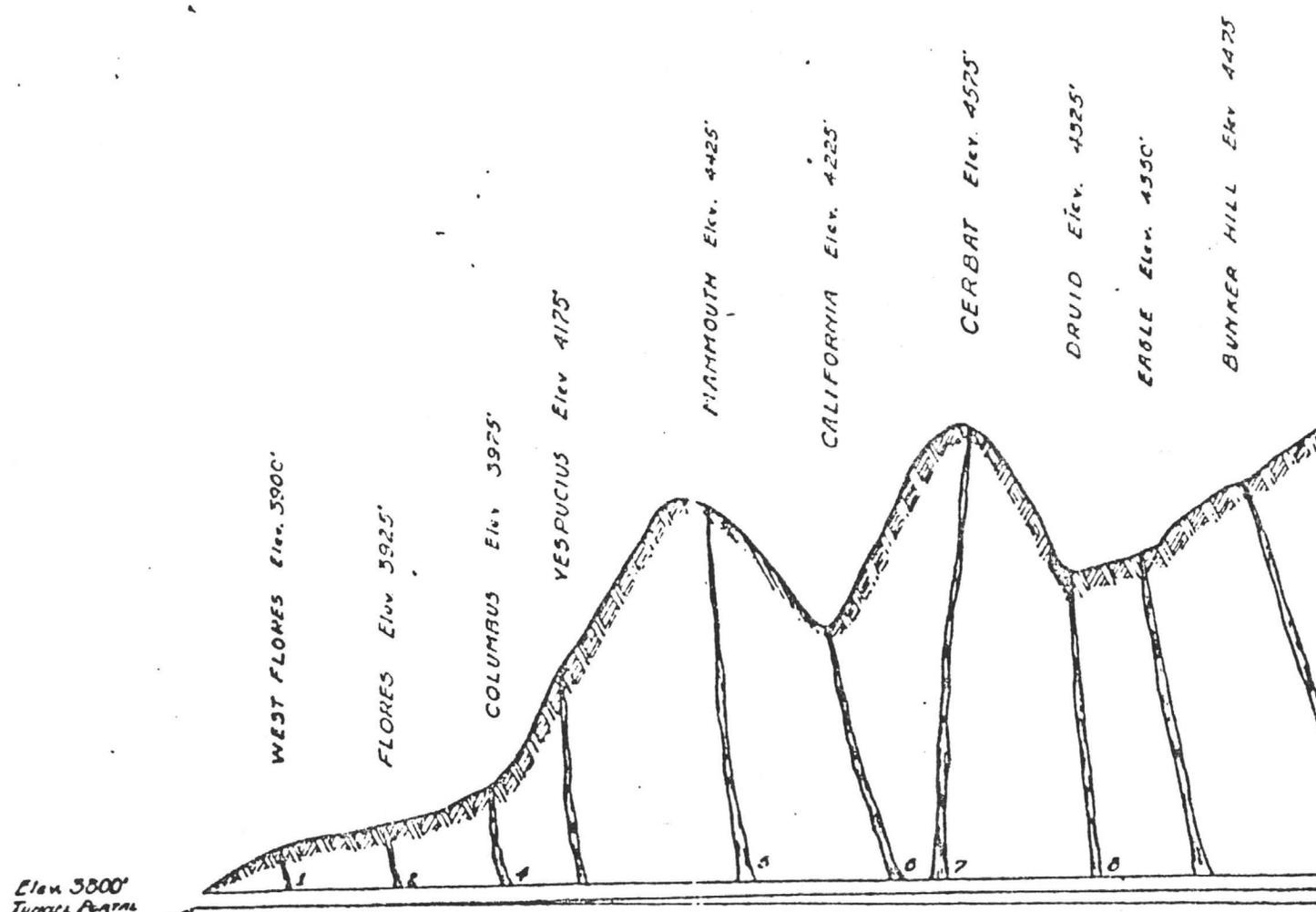
Recoveries from flotation will depend on technical competence, the nature of the ores and a variety of economic parameters. Current state of the art indicates, however, that the following ranges of recovery can be expected.

Copper	85 to 90%
Gold	90 to 95%
Silver	75 to 90%
Lead	85%
Zinc	80%

Currently, flotation mills costs are about 10,000 per daily ton, depending on the amount of new equipment used and the extent of flowsheet complexity. A mill to produce 100 TPD will cost \$1,000,000.00.

**CROSS SECTION**  
 of  
**MINERALIZED DISTRICT**  
 through which  
**CERBAT TUNNEL**

Will Pass  
 SCALES      Horizontal 1"=300'  
                  Vertical 1"=200'  
 NOTE —      ONLY IMPORTANT VEINS  
                  ARE SHOWN



Elev 3800'  
 Tunnel Portal  
 Carver Caple  
 P. O. Box 26927  
 Las Vegas, NV 89126  
 Mining Operators & Engineers  
 Kingman Arizona



MAMMOTH N<sup>o</sup> 3 Elev 4550'

HILLSIDE Elev. 4825'

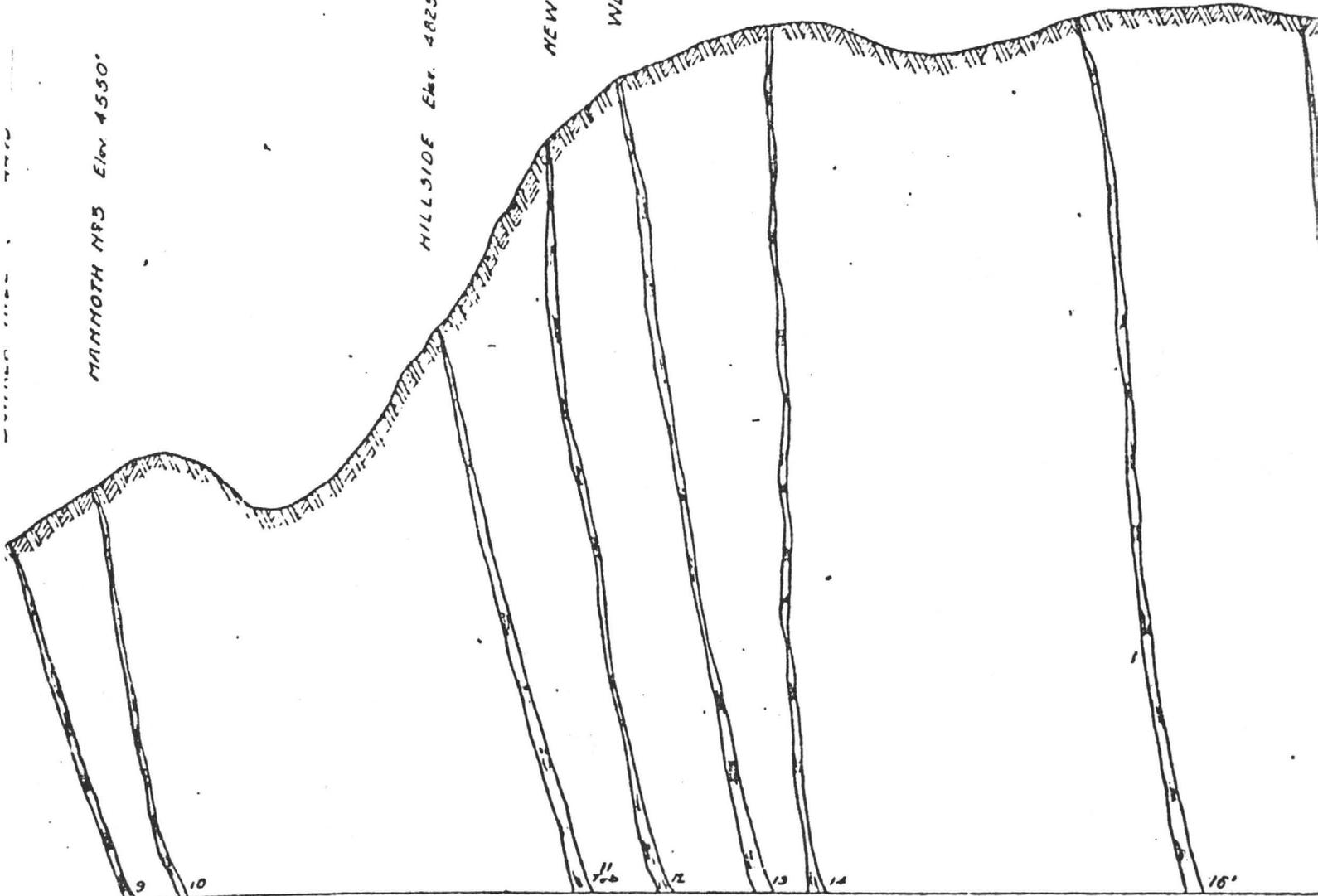
NEW COMSTOCK Elev 5175'

WESTERN SCINE Elev 5275'

NEW YORK Elev. 5325'

GEUGO Elev 5400'

WALLAHAI QUEEN Elev. 5450'



Grades .5%

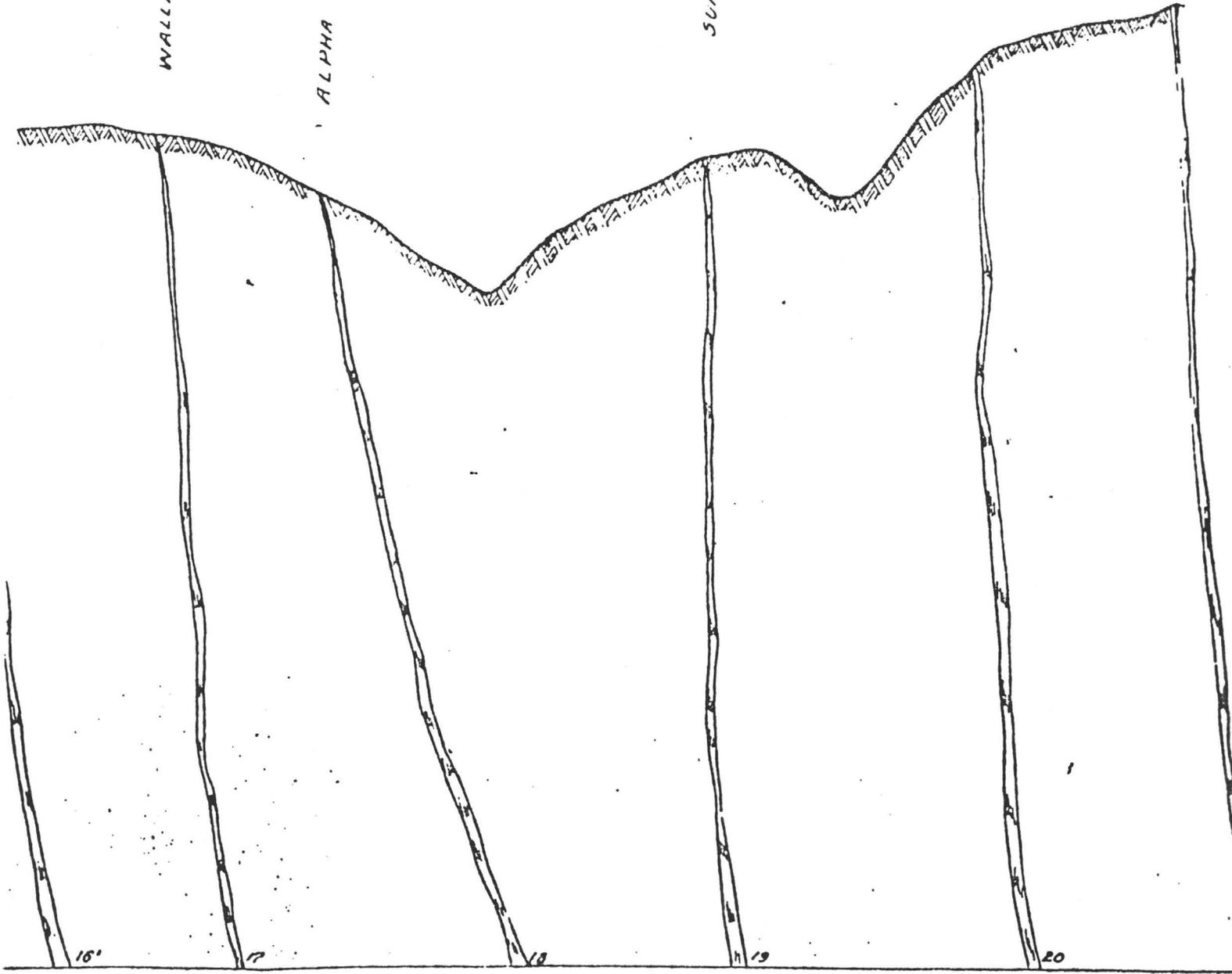
WALLAHAI QUEEN Elev. 5400'

ALPHA Elev. 5500'

SUMMIT Elev. 5400'

COPPER APEX Elev. 5375'

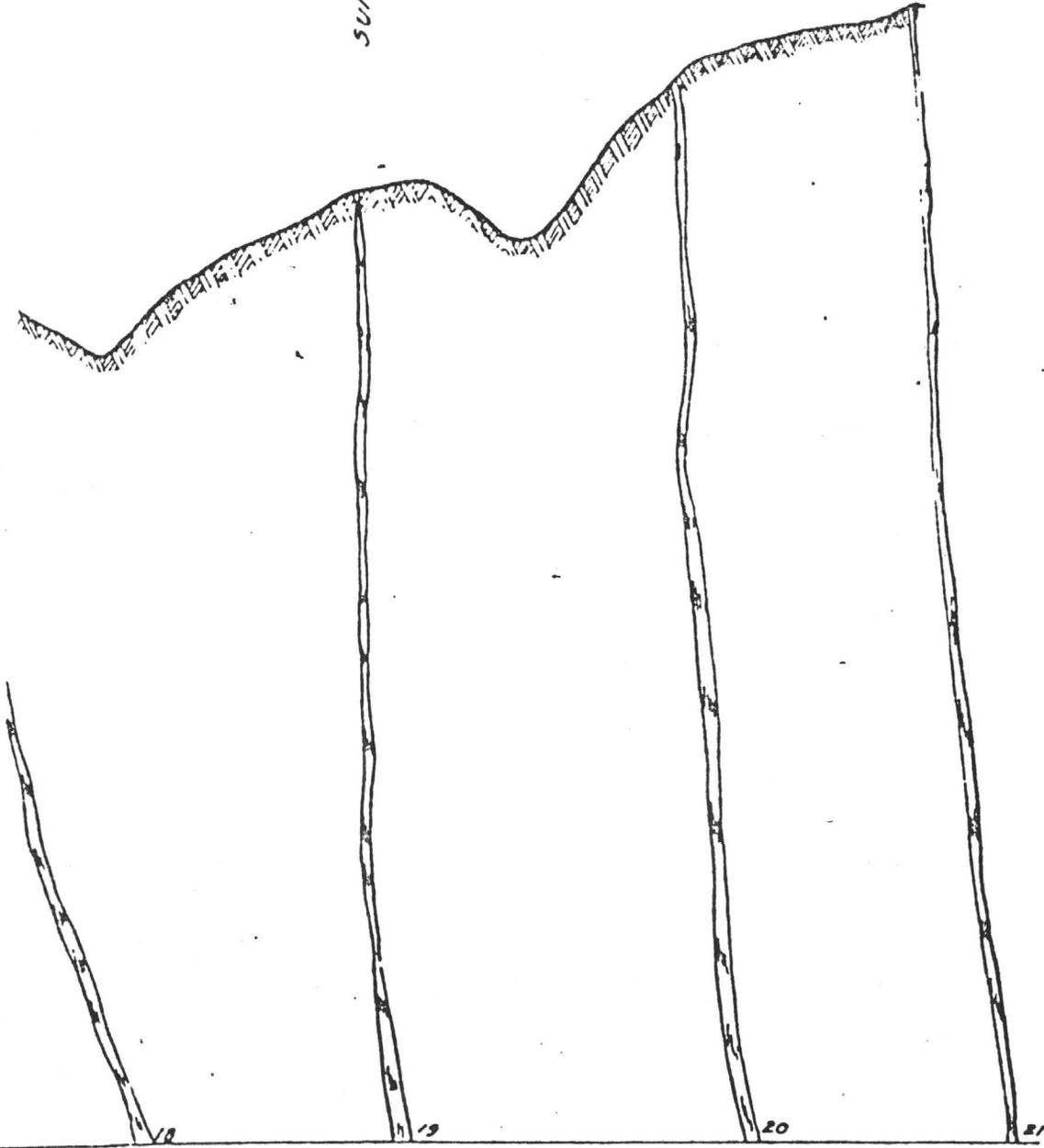
RAMCIN Elev. 5400'



SUMMIT Elev. 3400'

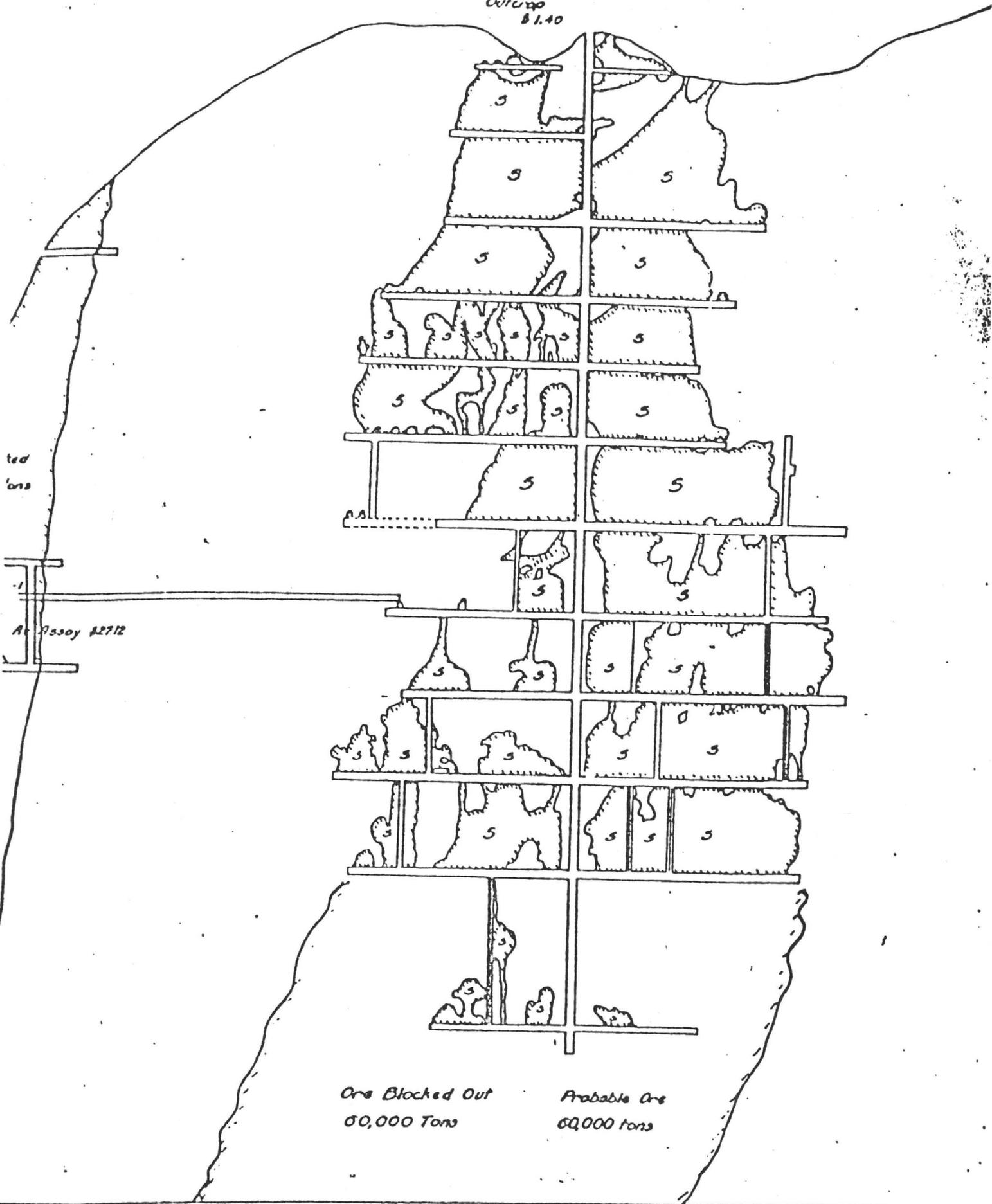
COPPER APEX Elev. 3325'

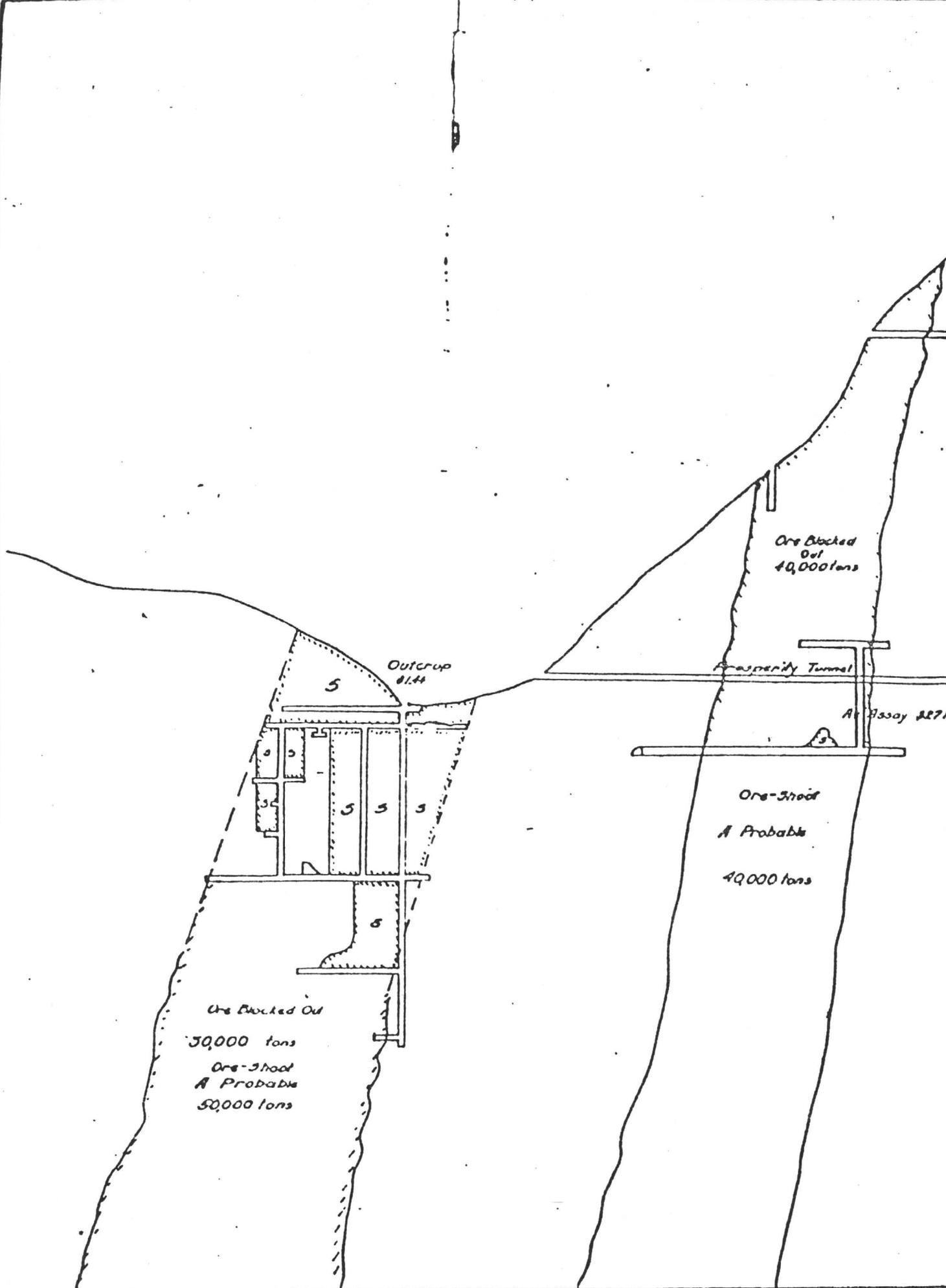
ARMCHAIR 1400 5/4 W.



1916

Outcrop  
81.40





GOLCONDA EXTENSION SEPT. 1926

MIDDLE GOLCONDA

1916

Outcrop 9240

Dump 9225

Ore-Stock  
A Probable  
140,000 tons

U  
v  
U

1916

Antero 1210

PLATE Nº 18

Dump

1329

00

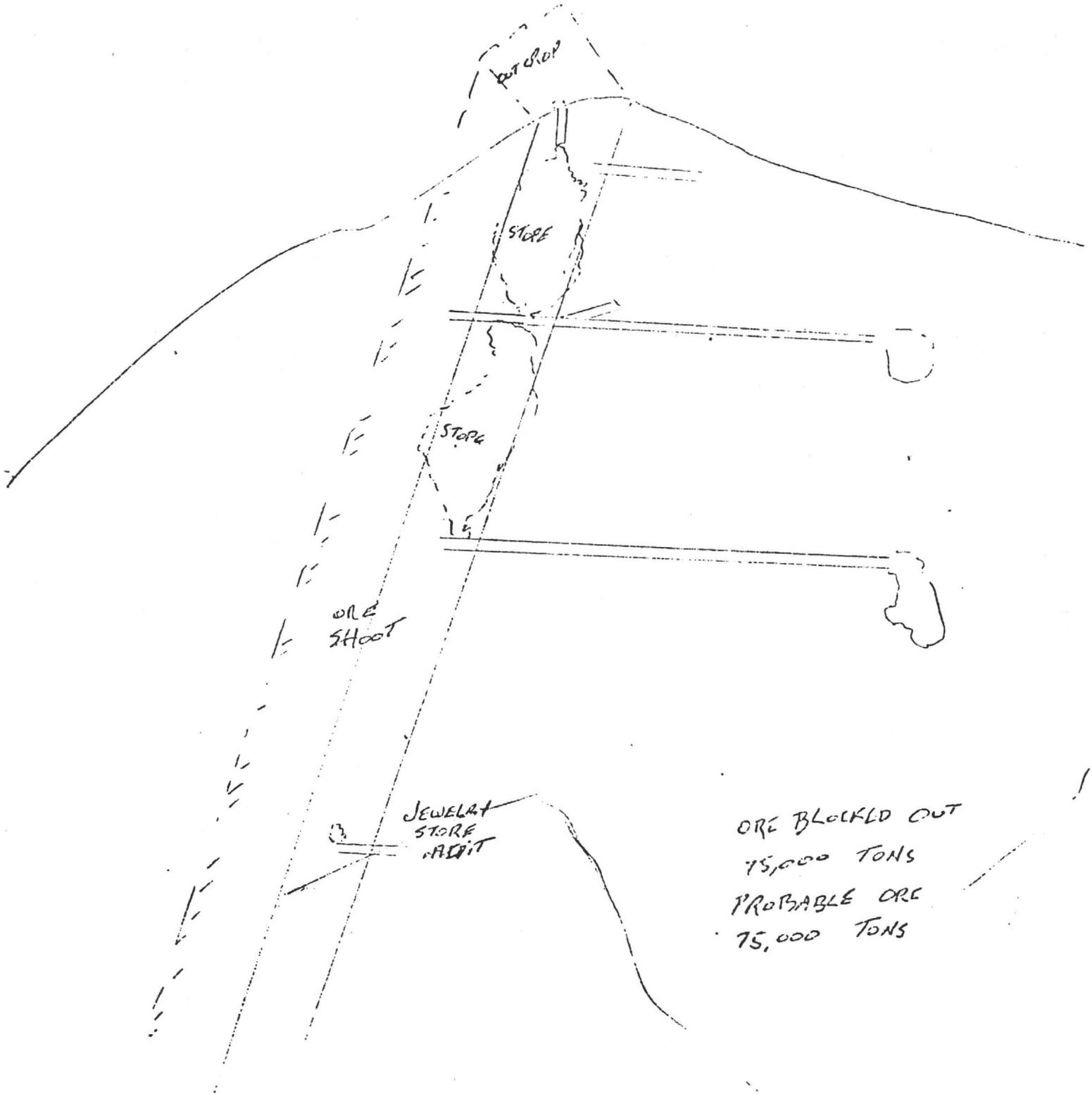
Ore-Shoot  
A Probable  
140,000 tons

Ore-Shoot  
A Probable  
300,000 tons

DE LA



ST. LOUIS



*Copy of this  
Report in St Louis  
mine file.*

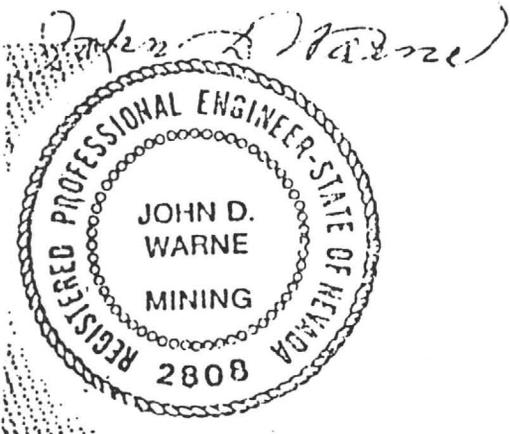
REPORT ON  
ST. LOUIS MINE PROPERTY  
MOHAVE COUNTY  
ARIZONA

EVALUATION AND GEOCHEMICAL SURVEY

JULY 31, 1980

by

JOHN D. WARNE, P.E.  
Consulting Mining Engineer  
Professional Engineer - Mining No. 2808, Nv.  
712 East Musser Street  
Carson City, Nv. 89701



## C O N T E N T S

INTRODUCTION

CONCLUSIONS

RECOMMENDATIONS

LOCATION AND ACCESSIBILITY

HISTORY AND PROPERTY OWNERSHIP

DESCRIPTION OF THE DEPOSIT

DEVELOPMENT

SAMPLES AND ANALYSIS

REFERENCES

### I L L U S T R A T I O N S

- FIG. NO. 1 RECOMMENDED EXPLORATION AND DEVELOPMENT
- FIG. NO. 2 HAULAGE TUNNEL PLAN (CONCEPT DRAWING) FIG. 2-A
- FIG. NO. 3 ESTIMATED ORE RESERVES (ILLUSTRATED BLOCKS)

### M A P S

- MAP NO. 1 LOCATION OF ST. LOUIS MINE
- MAP NO. 2 PORTIONS OF U.S.G.S. QUADRANGLES (Cerbat & Stockton Hill) - IN ST. LOUIS MINE AREA
- MAP NO. 3 GEOLOGIC MAP OF THE WALLAPAI MINING DISTRICT, MOHAVE COUNTY, ARIZONA
- MAP NO. 4 NORTHWEST PORTION OF ST. LOUIS MINE AREA, SHOWING PROPOSED EXPLORATION & DEVELOPMENT
- MAP NO. 5 ST. LOUIS MINING CLAIMS (Sketch)
- MAP NO. 6 CLAIM MAP OF WALLAPAI MINING DISTRICT, MOHAVE COUNTY, ARIZONA (Sketch)
- MAP NO. 7 COMPOSITE PLAN & PROFILES OF UPPER ST. LOUIS UNDERGROUND MINE WORKINGS - SHOWING SAMPLE LOCATIONS
- MAP NO. 8 ST. LOUIS MINING CLAIMS - ORIGINAL PLAT BY A. T. LIETZOW
- MAP NO. 9 ST. LOUIS MINE - UNDERGROUND WORKINGS - ORIGINAL SKETCH BY A. T. LIETZOW

## INTRODUCTION

A preliminary examination of the St. Louis Mine property of Jewelry Mountain Mines, Inc. by John D. Warne, accompanied by Mr. Nicholas M. Hughes and Mr. Carver Caple, was accomplished during the period June 17 and 18, 1980.

The examination was made for the present owners to guide future management in the exploration and development; and to satisfy current Government regulations pertaining to the holding of unpatented mining claims (Appendix A). Preliminary evaluations of the character and extent of the deposit was made (Appendix B). Recent acquisition of the mine property by the present owners, justification of initial operating funds, and impending plans of operation also prompted this examination.

An attempt is made in this report to properly assemble numerous data regarding previous mining and history of the property. Future engineering and mapping procedures are suggested, and a preliminary evaluation of the deposit is made. Some analysis are made to determine the character tenure, and metallurgical properties of the ore.

A jeep reconnaissance of the Wallapai Mining District was made during the examination. The general attitude and location of the St. Louis Mine deposits with relation to the other important mines and mills in the district was observed. Also, photographs were taken (Appendix C) of various mines and scenic views of the district and ore samples from several mine dumps were taken.

## CONCLUSIONS

1. Sufficient shipping grade lead-silver ore is now exposed within the "Jewelry Store" shaft, drift and surface open-cut to allow mining at current market prices. Preliminary estimates, based on present sample sites are: 90 tons of "positive or measured ore", 540 tons of "indicated ore" and 2,160 tons of "inferred ore". Using a net value of the ore (F. O. B. at smelter) of \$322.00 per ton, a total of about \$898,380.00 worth of ore of all classes exists in the "Jewelry Store" deposit (Appendix B). Future development and exploration could appreciably increase these ore reserves.
2. Mapping, sampling, exploration and rehabilitation of other favorable previously mined sites (within the upper levels of the St. Louis Mine) will develop an unknown additional quantity of mineable grade ore.
3. Drifting southeastward along the "Jewelry Store" vein; and core drilling from both surface and underground sites will:

- (a) Allow an immediate production of about 20 tons per day of shipping ore.
  - (b) Establish actual ore reserves, grades, mining costs, and mode of future exploration and development.
  - (c) Delineate the limits of this vein deposit, and possibly locate extensions of ore below other previously mined veins.
4. Favorable features of the St. Louis ore deposits are:
- (a) Sufficient shipping grade ore now exposed to begin immediate mining.
  - (b) Excellent stable wall rocks, on both hanging and foot-walls, to allow low cost overhead or shrink stoping, and minimum supports.
  - (c) Good access roads to mine and mill sites.

#### RECOMMENDATIONS

##### 1. Engineering:

- (a) Prepare surface and underground maps of sufficient scale to use as working maps, showing: claim monuments, surface and underground features, exploration, development sites and work progress.
- (b) Employ sufficient engineering talent to guide exploration, development, and drilling, and to implement Government regulations.

##### 2. Exploration:

###### Stage I (Fig. No. 1)

- (a) Drive haulage tunnel-drift about S. 35 Degrees E. along strike of "Jewelry Store" vein, about 1,000 feet in length.
- (b) Simultaneously core-drill holes at 60 Degrees Southwest and vertical from surface open-cut at portal to explore for ore at about 50 foot and 100 foot depths below portal.

###### Stage II (Depending on results of Stage I)

- (a) Sink vertical shaft 100 feet in foot-wall of vein.
- (b) Cross-cut thru vein on 50 foot and 100 foot levels to explore and provide drill stations in hanging-wall.
- (c) Core-drill angle holes to explore "Jewelry Store" vein and flat holes in N. E. and S. W. directions to explore for the 7 or 8 other known veins and possibly more.

3. Development: (See Figs. Nos. 1 and 2)
- (a) Development drifts to be driven in foot-wall parallel to vein (or within vein).
  - (b) Over-head open or shrink stopes to remove ore. Development may employ sub-level drifts in ore, and finger-raises from tramming levels at 50 to 100 foot intervals.

#### LOCATION AND ACCESSABILITY

The St. Louis Mine is located within the Wallapai Mining District, Mohave County, Arizona. It is situated near the southern end of the Cerbat Mountains, about 8 airplane miles north of Kingman, Arizona about half a mile east of the old Cerbat town site. (Maps Nos. 1 & 2) The claims lie in Sections 7, 8 and 17, Township 22 North, Range 17 West, G. & S. R. B. & Mer. at an elevation of about 4200 to 4800 feet above sea level.

From Kingman, the property is reached by ordinary passenger vehicle by traveling northward along U. S. Highway No. 93 a distance of 8.9 miles to historical marker describing "Cerbat Mining Town", mile-post No. 62 via an improved graveled county road. Jeep access roads traverse various mines within the district.

The dumps and adit portals to various levels of the mine can be seen from near the Eastern terminus of Cerbat Canyon, near the Southern end of the mining district. The lower mine workings on the St. Louis claims and "Jewelry Store" workings are accessible by jeeproads leading from Cerbat Canyon.

The main line of Atchison, Topeka and Santa Fe Railroad affords ore shipping facilities at Kingman, Arizona. Both Kingman, (11 miles South) and Las Vegas, Nevada (100 miles North) via U. S. Highway No. 93 are the nearest sources for mining supplies.

#### HISTORY AND PROPERTY OWNERSHIP

The St. Louis Mine was discovered about 1865 according to F. C. Schrader<sup>1</sup>. During his inspection of the mine, in 1905, mining operations were under the St. Louis Consolidated Mining and Milling Company of Los Angeles, California (owners).

Previous mining work was on a moderate scale, during intermittent periods. Development work was principally by drift adits and shafts within a vertical range of about 400 feet below the upper mountain exposures. Five distinct veins were exploited within the upper levels. The major north and south veins and some of the cross veins. No mining or exploration was done at depths below the strong ore exposure within the "Jewelry Store" drift near the base of the mountain, at the access road level, about 4150 feet in elevation.

Records of past operations and production from the mine are incomplete, but production records compiled by the U. S. Bureau of Mines from 1901 through 1948 are listed by Schrader (page 147).

During 1942 the property was examined by an Arizona State engineer<sup>2</sup> in company with Mr. A. T. Lietzow (the last mine owner and operator, prior to the present owners). About 400 tons of ore had been produced by this operator prior to that time.

The mine property consists of ten un-patented claims named: St. Louis and St. Louis Nos. 2 through 10, inclusive (Map Nos. 5 and 8). They were purchased from the estate of A. T. Lietzow.

Map No. 5 is a recorded plat of the ten un-patented mining claims, filed in Mohave County, Arizona about the time of aquisition of the mine property by the present owners.

A composite claim map: Claim Map of the Wallapai Mining District, Mohave County, Arizona (Map No. 6), depicts the St. Louis Mining Claims at the extreme Southern end of the district.

The general history of mining and production from the Wallapai District is outlined in U. S. Geological Survey Bulletin No. 871.

Map No. 7 shows previous underground mine development on the property and Maps Nos. 8 and 9 (prepared by Mr. A. T. Lietzow, former owner) show the original claim map and underground workings. These maps are included in an attempt to compile all pertinent records of the property.

#### DESCRIPTION OF THE PROPERTY

The geology and descriptions of deposits in the Wallapai Mining District are expertly described by Mr. McClelland G. Dings<sup>3</sup> in U. S. Geological Survey Bulletin No. 978-E and others. (See list of references at the end of this report).

Deposits previously mined on the upper levels of the St. Louis Mine are described by Schrader (Page 105-106) in 1909: "The two veins being worked are known as Numbers 2 and 3. They are about 3 feet wide and the ore varies from 4 to 16 inches in width ...the ore is said to average 60 percent Lead and \$2.00 in Gold and 14 ounces of Silver to the ton." Ore was shipped as mined during that period.

The report by E. B. Holt<sup>2</sup> lists the grade of ore shipped as typical of a 46.8785 ton shipment on April 6, 1933 as follows: Copper 0.22%, Lead 50%, Zinc 2.70%, Silver 8.6 oz, Gold 0.02 oz/ton, Insolvents 14.1%, Iron 8%, Sulphur 11.8% and Lime a trace.

The most promising ore deposit presently exposed on the property is termed the "Jewelry Store" vein. This vein on the St. Louis Number 2 claim averages about 3 feet in width, strikes South 35° East, and dips about 75° Northeast. Bulk samples taken from a surface open-cut exposure of this vein contains approximately 60oz. of silver and 57% lead per ton (See sample analysis). Run-of-mine, or shipping grade ore, should average over 15 oz. of silver per ton, and 60% lead, with some gold.

Edson S. Bastin<sup>4</sup> describes the mineral deposits of the Cerbat Mountains (page 18), as worked mainly for their silver content. They are described as many veins of prevailing northerly and northwesterly strike and steep dip. Most of the wall rocks are granites, gneisses, schists and amphibolite. "Cerargyrite (Horn Silver) and native silver are the dominant silver minerals of these ores. In the lower part of the oxidized zone ruby silver (Proustite) was commonly present." Most of the rich oxidized ores have been previously mined, and the silver values are contained in the high lead sulphide (galena) veins. Bastin made exhaustive studies of the mineral constituents within the ores of the district. He concludes that the rich silver bearing ores could extend to many hundreds of feet in depth due to their primary origin. Insofar as they occur throughout the shallow previously mined range exploration at greater depths is encouraged by him (U. S. G. S. Bulletin No. 750).

## DEVELOPMENT

### 1. Previous Development:

Principal development of the ore deposits at the St. Louis Mine consisted of a lower tunnel or adit at 4500 feet above sea level, and a middle adit driven at 181 feet higher in elevation. Mineralized portions of some veins or ore shoots exceed 175 feet in length; and extended throughout a vertical range of about 400 feet below the surface exposures. Some mining was done at higher elevations by short drift adits and shafts.

Most of these mines are still accessible and show remnants of excellent grade ore in veins from several inches to over 4 feet in width. Good wall rock allowed open stoping (without supports) throughout the mine, however, some timber above drifts was used to allow for waste gob. Veins average from South 20° to 45° East and generally dip steeply in a Northeast direction (See Fig. No. 2).

The "Jewelry Store" vein development consists of an inclined shaft about 48 feet in depth, on the St. Louis Number 2 claim. This is the lowest and most promising ore exposure on the property. The vein dips about 75° Northeast and strikes about 35° Northwest.

### 2. Planned Development:

Planned development projected to begin during the last quarter of 1980, or early 1981, will consist of a large dimension adit haulage tunnel with base of portal at about 4120 feet above sea level, (see Figs.

Nos. 1 & 2) approximately 20 foot above the floor of Cerbat Canyon. This large drainage/haulage tunnel will have an ore back of 700 feet with raises to sub-level drifts at approximately 50 foot intervals above the 4120 level crosscutting 5 major veins in a SE/NW direction with stopes developed for safe shrinking and most efficient ore removal.

### SAMPLES AND ANALYSIS

Analysis and description of the following samples were taken during this examination and at various other times, in the St. Louis Mine property, to demonstrate the character of ore:

Sample No.	Oz. Gold	Per Ton Silver	% Lead	Description
1.		122	62	Bottom of Jewelry Store shaft
2.	.02	43	55	Taken from dump
3.	.01	129.9	52	Dozer cut on lower level
4.		15.8	22	Upper dump
5.		122.82	48	Second level drift
6.	.03	53.02	61	Jewelry Store drift
7.		96	63	Chip sample- Jewelry Store
8.	.04	190	58	15' from shaft in drift
9.		10.4	83	Upper level
10.	.04	30.7	66.8	Surface open cut
11.	.01	68.2	57.1	Surface open cut
12.	.01	36.3	33.1	Lower surface dozer cut
13.		108.8	67.15	Rear of Jewelry Store drift
14.		53.3	35.82	Open cut $\frac{1}{4}$ mesh
15.	.01	60.3	61	Jewelry Store drift bottom
16.	.03	624.1	80.7	No. 1 stope upper level
17.		25.16	18.65	Dump
18.	.01	57.1	61.1	Selected 1" mesh AG PB

Value \$916.00/ ton

Appendix D\* to this report contains data relating to samples and analysis taken from the St. Louis Mine property.

Samples numbers 1, 5, and 7 above consist of 3 portions of a 75 pound bulk sample, from the "Jewelry Store" vein, surface open-cut, about 40' NW of the underground exposure of the vein. This sample was taken for future ore-dressing and metallurgical testing. A portion of this sample was recently delivered to the U. S. Bureau of Mines, Reno, Nevada for spectroscopic identification of mineral content. Results will be added to this portion of this report when completed.

\* Appendix D - to be retained by owner - to contain miscellaneous analytical data pertaining to confidential information relating to the testing, assaying, recovery, flow systems and matters privy to the owners.

## REFERENCES

1. Schrader, F. C. , 1909, Mineral Deposits of the Cerbat Range, Black Mountains, and Grand Wash Cliffs, Mohave County, Arizona: U. S. Geological Survey Bulletin 397.
2. Holt, E. B., 1942, Department of Natural Resources, State of Arizona.
3. Dings, McClelland G., 1951, The Wallapai Mining District, Cerbat Mountains, Mohave County, Arizona: U. S. Geological Survey Bulletin 978-E.
4. Bastin, E. S. , 1924, Origin of Certain Rich Silver ores near Chloride and Kingman, Arizona: U. S. Geological Survey Bulletin 750, pp 17-39.
5. U. S. Geological Survey Bulletin 871, 1936, Mineral Resources of the Region Around Boulder Dam (Various Authors).
6. Robert L. Peterson, Chief, Branch of Records and Data Management, Bureau of Land Management. Letter dated June 3, 1980 to Nicholas M. Hughes, President of Jewelry Mountain Mines, Inc. (See page 23)

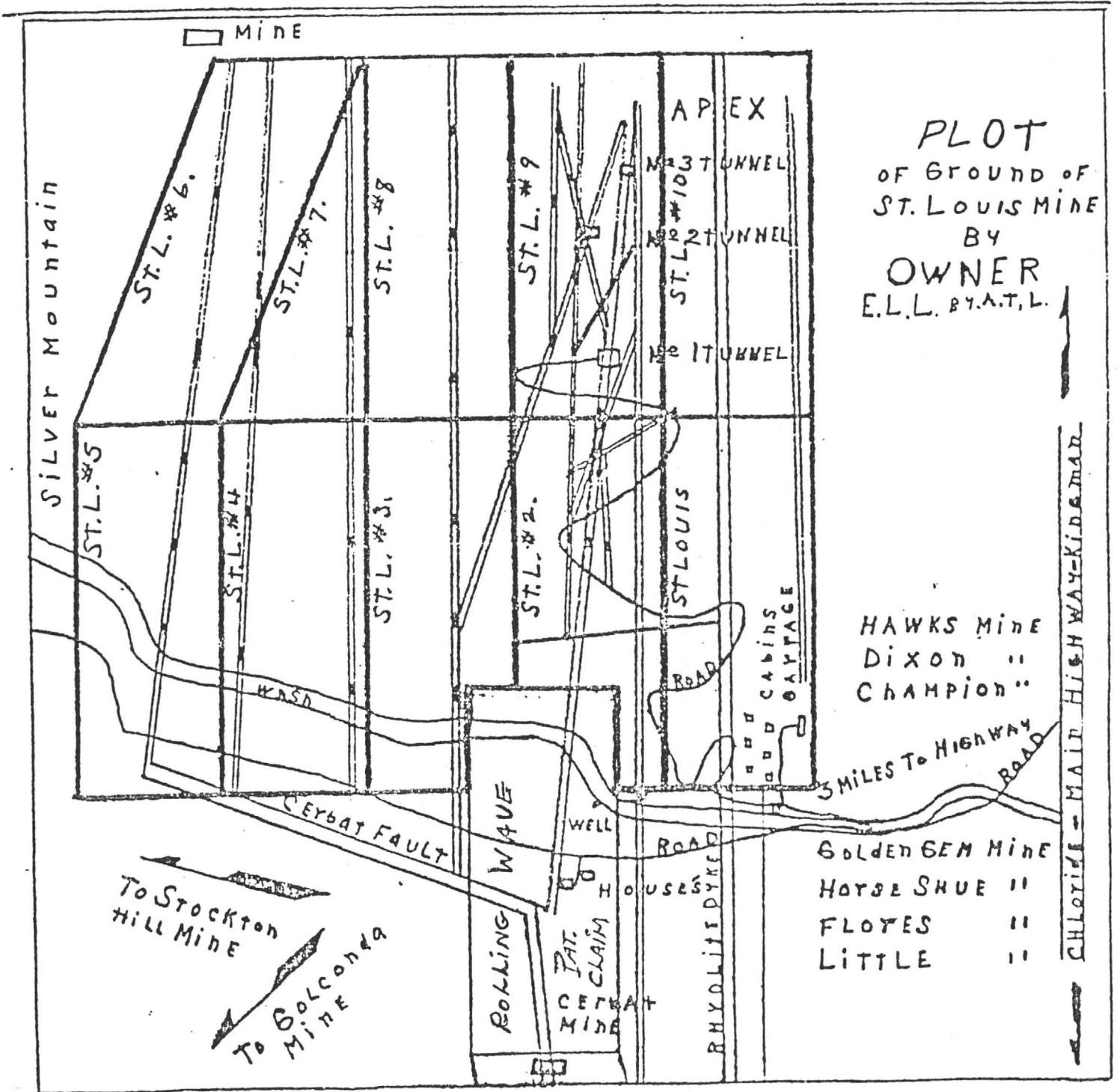
I L L U S T R A T I O N S

- FIG. NO. 1 RECOMMENDED EXPLORATION AND DEVELOPMENT
- FIG. NO. 2 HAULAGE TUNNEL PLAN (CONCEPT DRAWING)
- FIG. NO. 2A HAULAGE TUNNEL ALTERNATE PLAN
- FIG. NO. 3 ESTIMATED ORE RESERVES (ILLUSTRATED BLOCKS)

(Also page B-2 - Appendix B)

MAP NO. 8

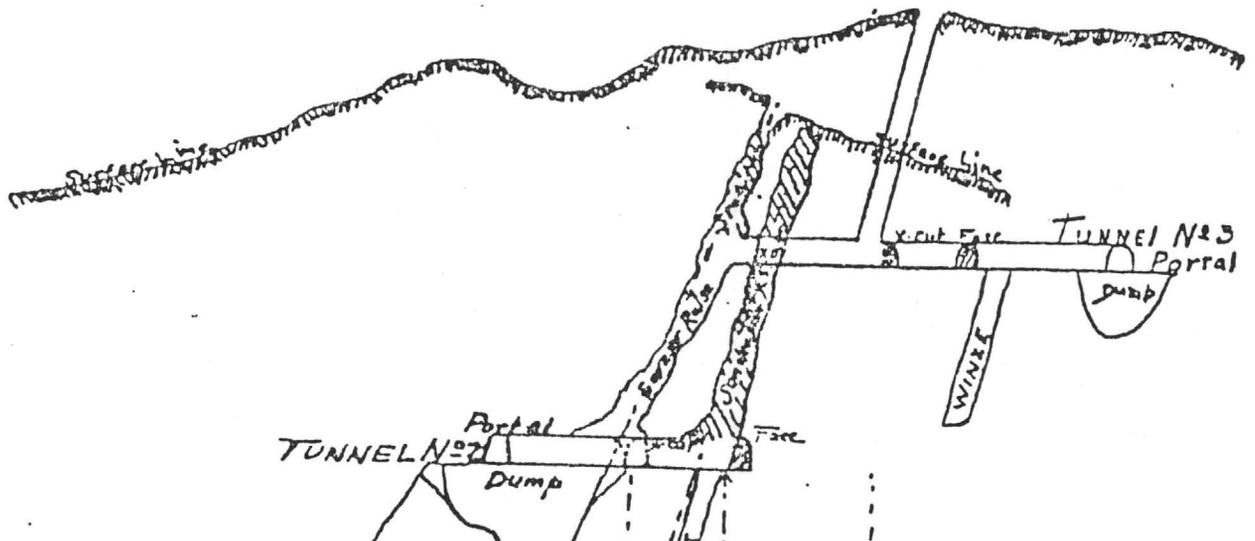
ORIGINAL CLAIM MAP OF THE ST. LOUIS CLAIMS AS LAID OUT BY A.T. LIETZOW AND STAKED BY HIM FOR E.L. LIETZOW IN 1931.



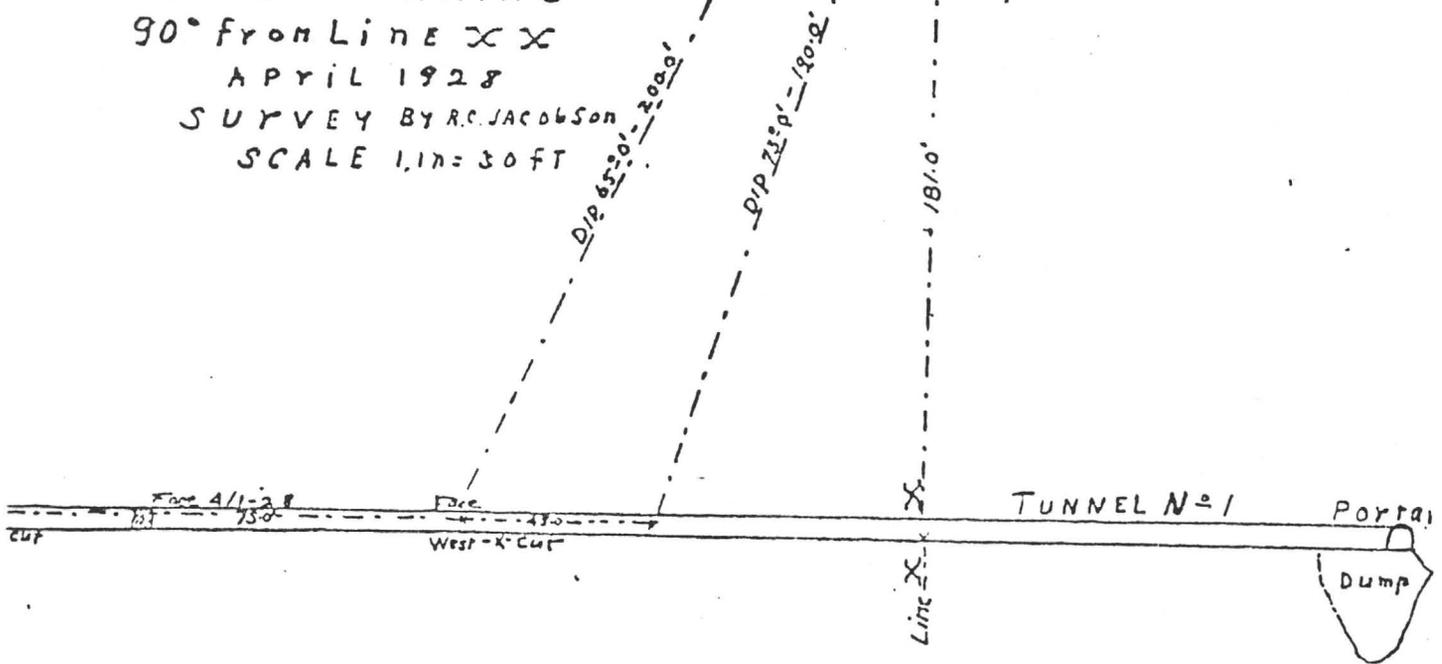
PLOT  
 OF GROUND OF  
 ST. LOUIS MINE  
 BY  
 OWNER  
 E.L.L. BY A.T.L.

MAP NO. 9

UNDERGROUND WORKINGS  
ORIGINAL SKETCH BY A.T. LIETZOW FROM  
THE SURVEY BY R.C. JACOBSON



VERTICAL SECTION  
THRU  
ST. LOUIS WORKINGS  
90° from Line XX  
APRIL 1928  
SURVEY BY R.C. JACOBSON  
SCALE 1, IN = 30 FT



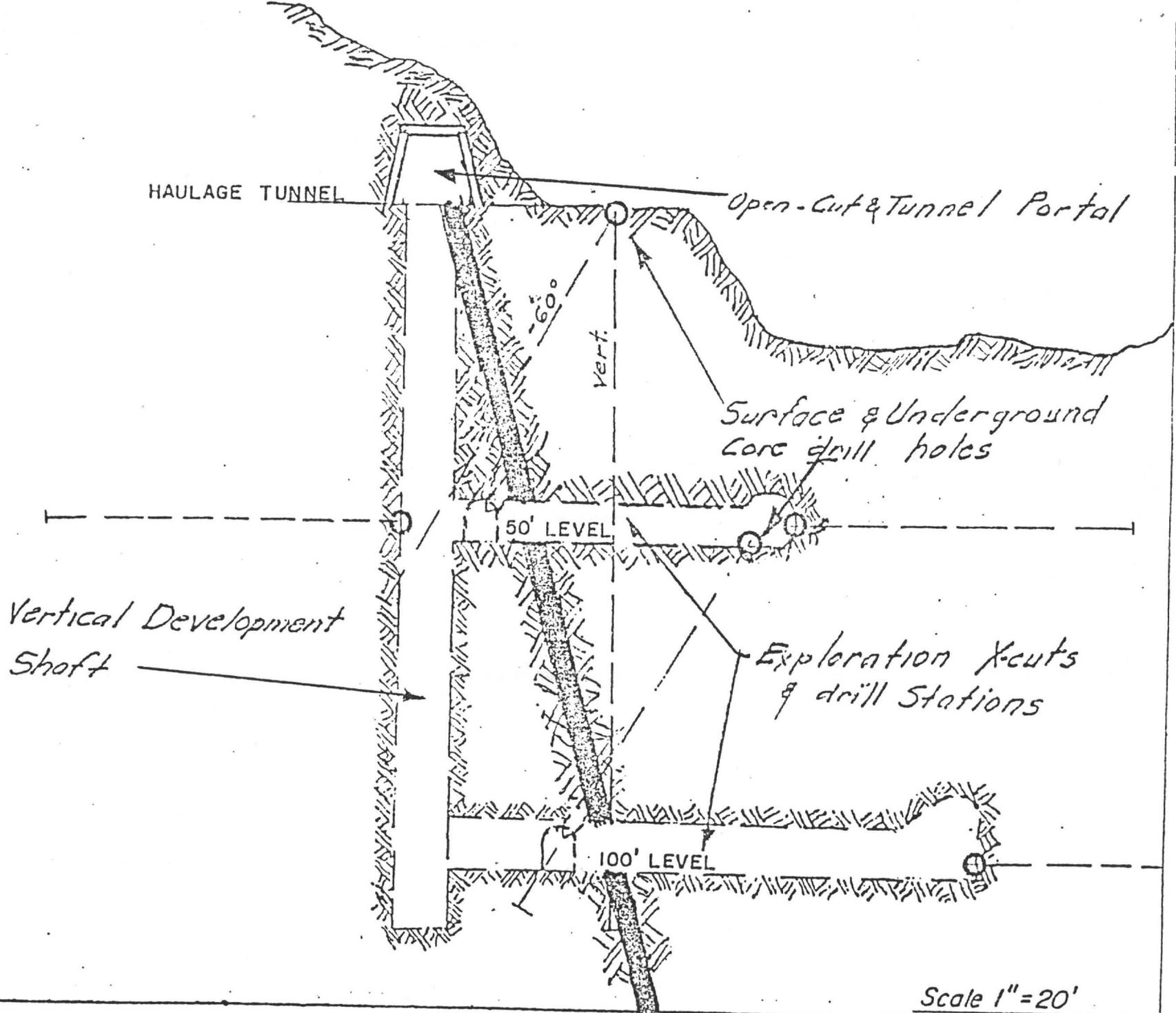
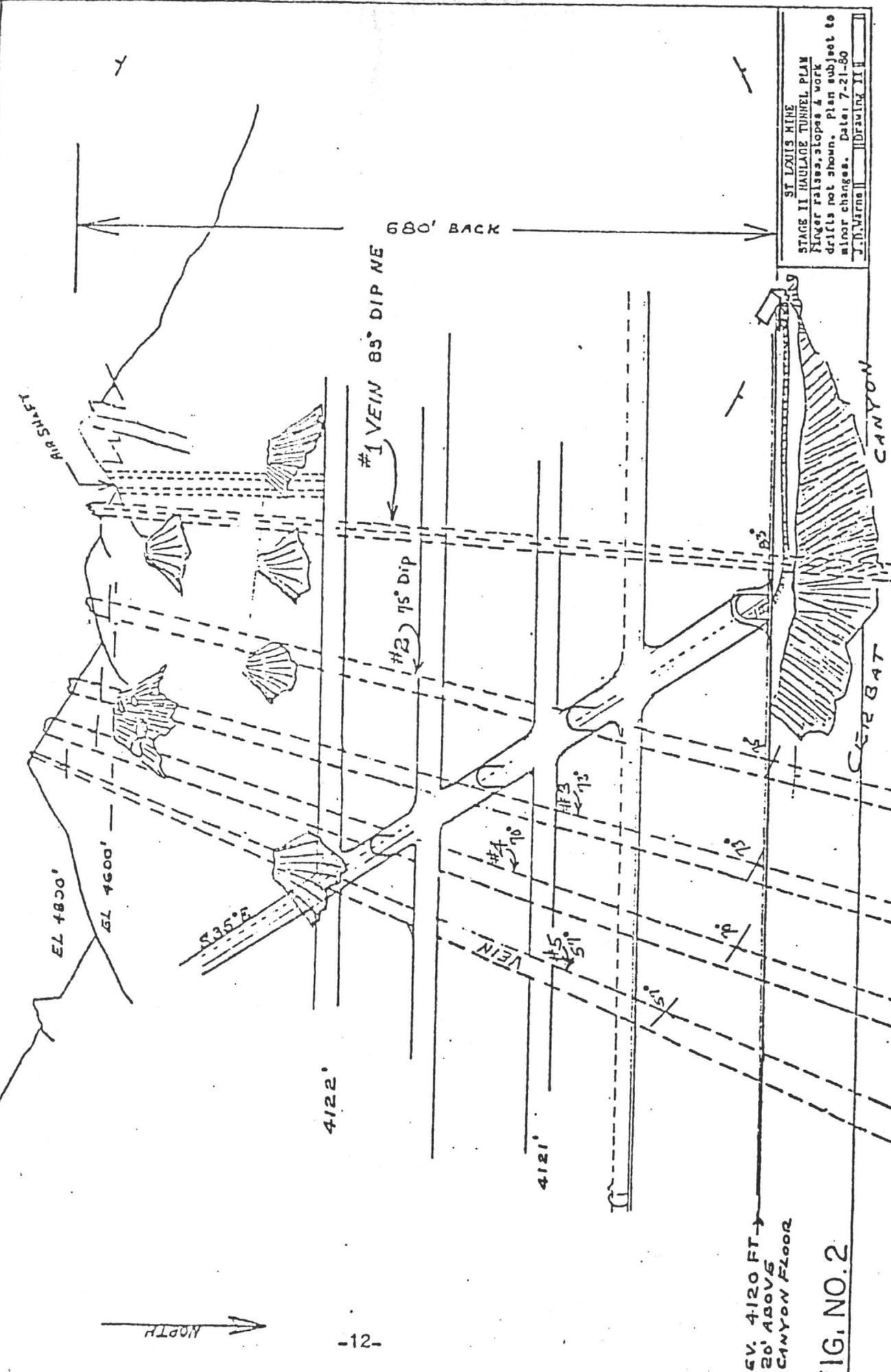


FIG. NO.1 — RECOMMENDED EXPLORATION & DEVELOPMENT

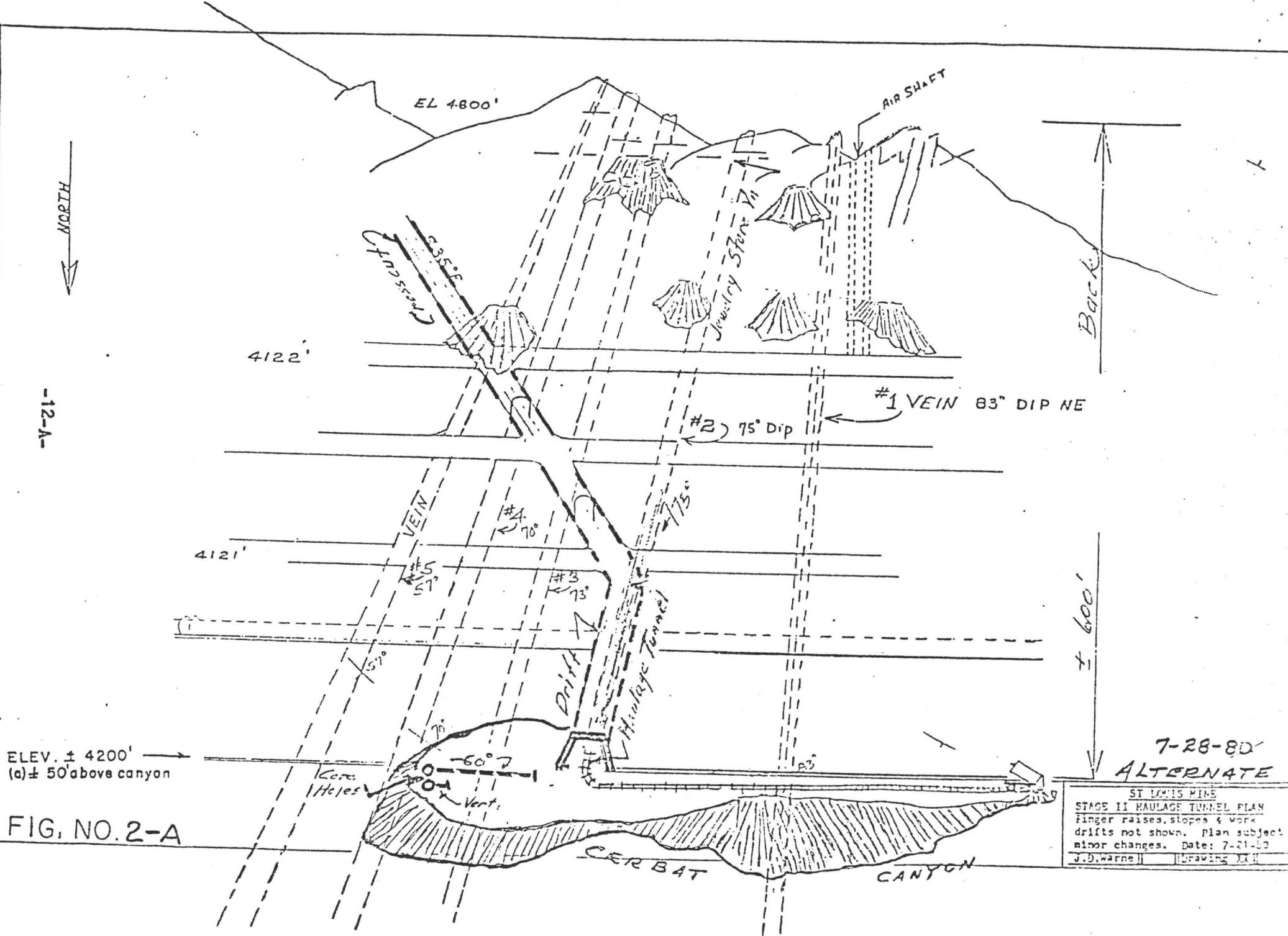
Scale 1"=20'



ST LOUIS MINE  
 STAGE II HAULAGE TUNNEL PLAN  
 Major raises, slopes & work  
 drifts not shown. Plan subject to  
 minor changes. Date: 7-21-80  
 J. H. Varns

ELEV. 4120 FT →  
 20' ABOVE  
 CANYON FLOOR

FIG. NO. 2



-12-A-

FIG. NO. 2-A

7-28-80  
ALTERNATE

ST LOUIS MINE	
STAGE II HAULAGE TUNNEL PLAN	
finger raises, slopes & work drifts not shown. Plan subject to minor changes. Date: 7-21-80	
J.D. Warner	Drawing 111

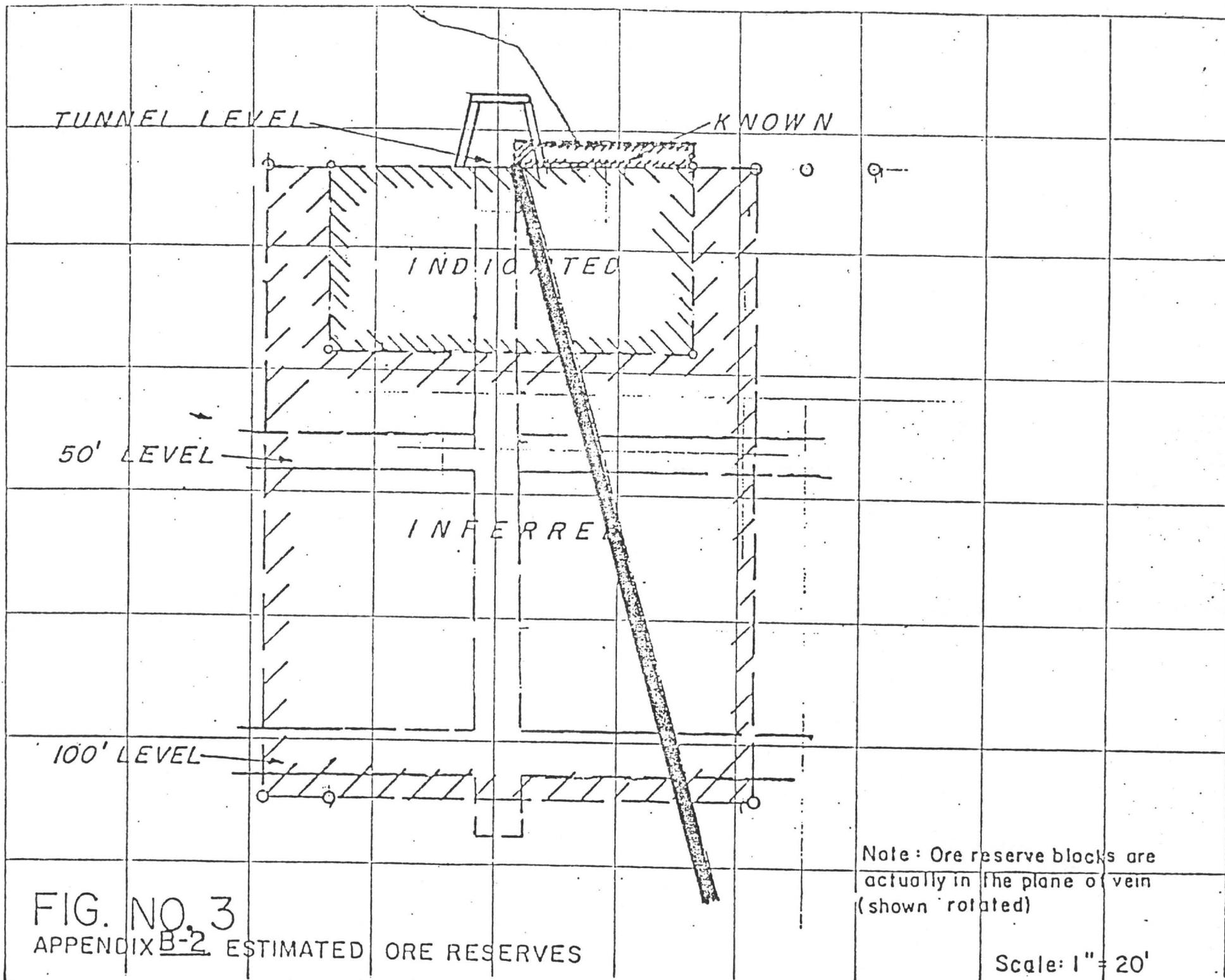
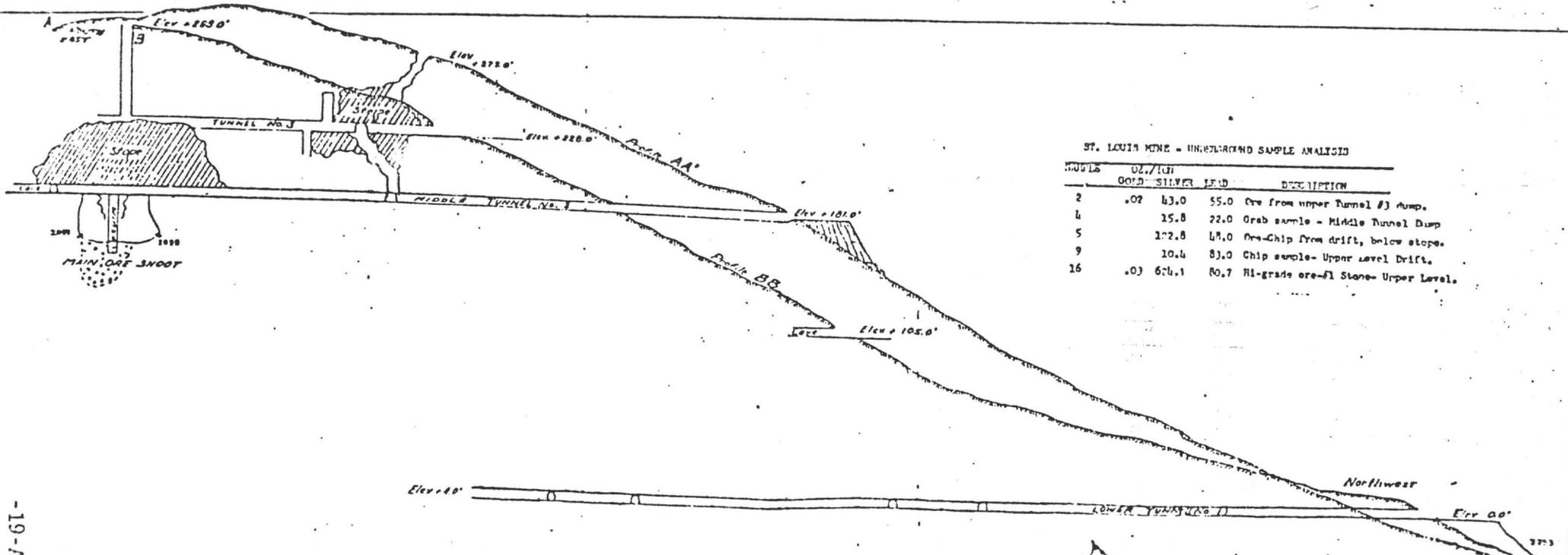


FIG. NO. 3  
APPENDIX B-2 ESTIMATED ORE RESERVES

Note: Ore reserve blocks are actually in the plane of vein (shown rotated)

Scale: 1" = 20'

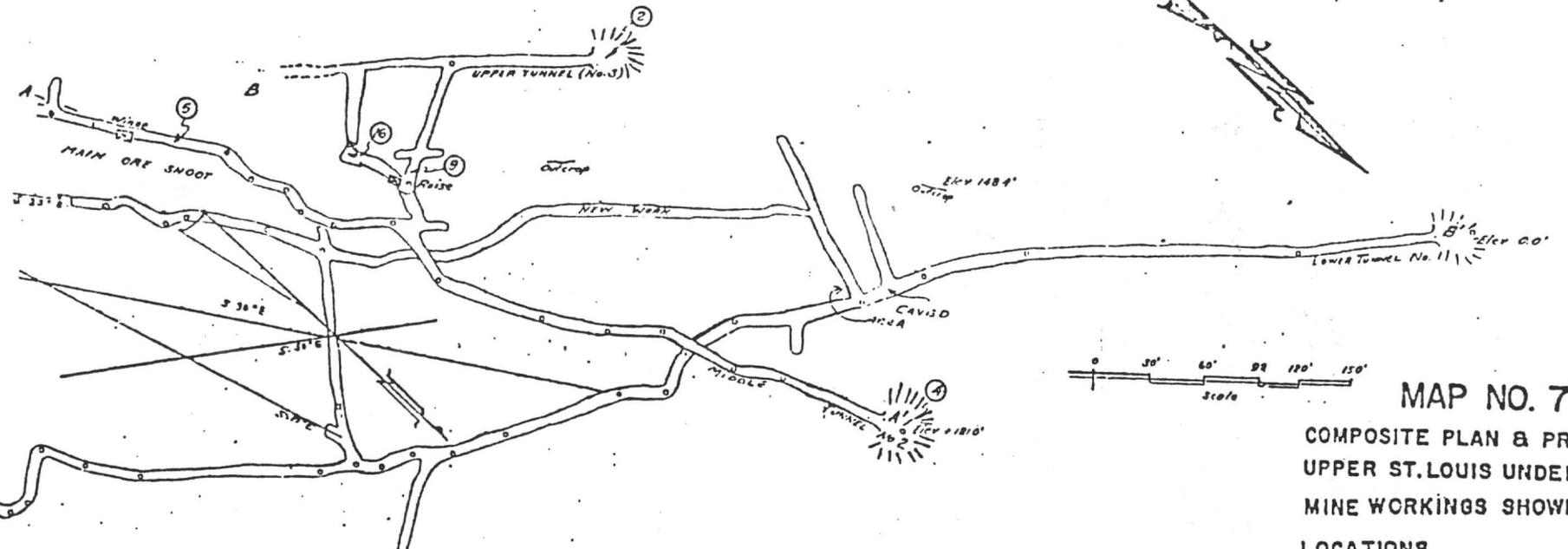




ST. LOUIS MINE - UNDERGROUND SAMPLE ANALYSIS

SAMPLE	OZ./TON		LEAD	DESCRIPTION
	GOLD	SILVER		
2	.02	43.0	55.0	Ore from upper Tunnel #3 dump.
4		15.0	22.0	Grab sample - Middle Tunnel Dump
5	1.2.0		48.0	Ore-Chip from drift, below slope.
9		10.4	83.0	Chip sample- Upper level Drift.
16	.03	64.1	80.7	Hi-grade ore-fl Stone- Upper Level.

-V-61-



-19-A-

MAP NO. 7

COMPOSITE PLAN & PROFILES OF  
UPPER ST. LOUIS UNDERGROUND  
MINE WORKINGS SHOWING SAMPLE  
LOCATIONS.

LONGITUDINAL SECTION AND PLAN - SAINT LOUIS MINE MOHAVE COUNTY, ARIZONA after Map by R.C. Jackson

A P P E N D I C E S

APPENDIX A - PROOF OF LABOR - ASSESSMENT WORK 1980

APPENDIX B - PRELIMINARY ESTIMATE OF ORE RESERVES

APPENDIX C - PHOTOS OF ST. LOUIS MINE AREA & VICINITY

Appendix C - Photos to be retained by  
owner.

A P P E N D I X A

1. PROOF OF LABOR UPON MINING CLAIM 1980
2. ASSESSMENT WORK  
(As outlined under regulations pertaining to  
mining claims under General Mining Laws of 1872.  
BLM Circular No. 2289, Par. 3851.2, P. 19

APPENDIX A (2)

ASSESSMENT WORK

1. NAME OF CLAIM: St. Louis and St. Louis numbers 2 thru 10  
(10 Lode Claims):  
BLM Serial Numbers A MC 29470 thru A MC 29479  
Sections 7, 8 and 17, Township 22 North, Range 17 West, Gila and  
Salt River Base and Meridian, Mohave County, Arizona, and recorded  
in the Office of the Mohave County Recorder, Book 3N, Pages 109 to 118.
2. LABOR AND IMPROVEMENTS:  
  
Proof of labor upon mining claims (attached)  
  
Preliminary report by John D. Warne, P. E. , registered Professional  
Engineer No.2808 (Mining), State of Nevada. Employing geological,  
chemical and mining engineering techniques of sampling, and evaluation  
analysis of mineral deposits on the St. Louis Mining Claims  
  
Date: July 31, 1980 Value: \$1,850.00
3. Basic findings of the surveys: (1) Sampling and analysis indicate  
ore values in excess of 10 oz/Ag. per ton and 60% Pb exist on the St.  
Louis No. 2 claim. An estimated 2790 tons of mineable grade ore  
exists on the "Jewelry Store" vein, on the St. Louis No. 2 claim  
(Appendix B).
4. Work conducted by John D. Warne, P. E. Consulting Mining Engineer,  
712 E. Musser Street, Carson City, Nevada 89701  
  
Education: B. S. Mining Engineering, University of Texas, College  
of Mines and Metallurgy, 1938.  
Professional Engineer (Mining), Certificate No. 2808  
Date: May 16, 1969, State of Nevada.  
Copy of Resume attached.
5. The above outlined survey work to satisfy required annual assessment  
under:  
  
Regulations pertaining to mining claims under General  
Mining Laws of 1872, P. L. 85-876, act of September 2,  
1958 (72 Stat., 1701 30 U.S.C. 28-1-2) BLM Circular No.  
2289, Part 3850, Par. 3351-2 and Circular No. CFR 3833.2.

EMPLOYMENT RECORD AND RESUME

JOHN D. WARNE  
Consulting Mining Engineer  
712 E. Musser Street  
Carson City, Nevada 89701  
Telephone: (702) 882-6394

PROFESSIONAL ENGINEER - MINING  
NEVADA NO. 2808

GENERAL INFORMATION

BIRTH DATE: 1-25-16, El Paso, Texas.

EDUCATION: 8-38; B.S. Mining Engineering, University of Texas, College of Mines and Metallurgy. Civil Engineering, Mt. San Antonio College, Walnut, California, 1961-1963.

GENERAL: Married, 8-41 to present; four children (married).  
Travel status: single. Weight: 195; Height: 6'1";  
Health: Good.  
Residence: 712 E. Musser St., Carson City, Nevada;  
land in Douglas Co., Nevada.

PROFESSION: Mining Engineer. Registered Professional Engineer  
No. 2808 Nevada, 1969 (written examination).  
SS# 527-05-2637.

EXPERIENCE

1936-37 Miner - A.S. & R. Co., Silver City area, New Mexico.

1937-38 Jr. Mining Engineer - Nevada Cons. Cooper Corp.,  
Ray, Arizona.

1938-39 Surveyor - Construction Q.M., U.S.G.S., El Paso,  
Texas.

1939-41 Inspector Core Boring - U.S. Engineer Office, Texas,  
Arkansas, Missouri.

1941-48 Mining Engineer, and Project Engineer - U.S. Bureau  
of Mines. Major exploration projects (with published  
Reports of Investigation) under my supervision:

- (1) ARKANSAS, Batesville: Manganese - 7000' tunnels,  
2500' shafts, 36" bucket drilling, and churn  
drilling (Project Foreman and Engineer).

- (2) COLORADO, Boulder: Tungsten - 10,000' core-drilling, trenching, mine rehab., and drifting.
- (3) Silver Plume: Lead, Zinc, Silver - 3000' underground core-drilling, rehab., drifting.
- (4) Northgate: Fluorspar - 3000' core-drilling, trenching, shafts, & drifts.
- (5) UTAH, Moab: Vanadium & Uranium - 5000' core-drilling.
- (6) ALABAMA, Gadsden: Red Iron Ore - 8000' rotary drilling, to 1500' depth.
- (7) FLORIDA, N. Central Portion: Titanium, & heavy minerals in sand, 1200 holes drilled by rotary and drive methods.

My published, Bureau of Mines, REPORTS OF INVESTIGATION Nos. 4106, 4243, 4515, & 4973 describe some of the above projects.

- 1948-51      Shaft and Tunnel Foreman - L.A. Dept. of Water & Power, 11 miles of large bore water power tunnels near Bishop, California.
- 1951-59      Mine Examination & Exploration Engineer - U.S. Bureau of Mines and Office of Mineral Exploration, Nevada, California and Hawaii. Examination of mines and mining areas, planning and supervising exploration projects for many minerals.
- 1959-62      Supervisory Highway Engineer; Valuation Engineer (mining); Department of Interior, Bureau of Indian Affairs & Land Management, Nevada and Wyoming. Supervising surveys, planning and construction of roads; evaluation of mines and minerals on Government lands.
- 1962-74      Civil Engineer - Los Angeles County Regional Engineer - Mapping Division - Detailed surveys, calculations and preparation of accurate coordinate maps of areas, streets, freeways, tracts, flood control, channels, sewers, deeds, etc.
- 1974-Present      Consulting Mining Engineer - 712 E. Musser Street, Carson City, Nevada. Examinations, evaluations, mapping and exploration of mines.