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A Technical Report  
from Inception to May 15, 1991

THE MUSIC MOUNTAINS PROPERTY  
PIERCE INTERNATIONAL GOLD, INC.

PIERCE INTERNATIONAL GOLD, INC.  
9250 E. COSTILLA AVE. #650  
ENGLEWOOD, CO 80112

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Property Map Music Mountains Claims  
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## SUMMARY

### HISTORY

Between 1897 and 1909 this property supported up to 10 individual small mines, with gold production estimated to have been in excess of 10,000 ounces. Sporadic work was carried out up to 1946 at which time all mining ceased and Mr. L. Neal of Kingman, Arizona, acquired the property. The Neals are major landowners and ranchers in the area and own land adjacent to the Music Mountains Property. The Neals have neither explored nor mined the claims.

In 1984, a Canadian company, which appears to have ceased operations, acquired the property and hired a Vancouver, Canada geologist (Dr. L. Bayrock) to survey the claims and produce a report. Bayrock and Assistants mapped and sampled part of the veins, calculated resources and recommended a development plan. Most sampling was done within the mines both in the back and sill, as well as at the face. Some samples were taken at the surface where veins are exposed.

Based on a report prepared by Dr. Bayrock in 1985, Pierce International (PI) estimate that there is approximately 119,000 tons of mineralized material which contains approximately 65,000 ounces of gold and 320,000 ounces of silver. This report estimates a mineable reserve of 34,000 tons at a grade of 0.516 OPT in gold and 2.27 OPT in silver.

Because of the continuity of the veins and the number of veins, additional mineralization can probably be verified by drilling and underground exploration. The vertical extent of the veins has not been well tested. Initial mining should be relatively easy as the adits and the access tunnel from previous operations are in relatively good shape, even after 60 years of virtual inactivity. In addition to the underground material, there is on the property about 15,000 tons of waste dumps which contain gold and silver, some of which may be recoverable.

### LAND STATUS

The Music Mountains Property consists of 16 patented and 3 unpatented lode mining claims located in Mojave County, Arizona about 32 miles northeast of Kingman, Arizona. PI, acquired the rights to this property, pursuant to a 25 year mineral lease agreement with an Arizona family (the Neals). This lease can be extended for an additional period of ten (10) years if PI is actively mining the property at the end of the 25 year period, and for additional 10-year periods under the same terms. PI has the right to transfer the lease to a significant third party.

The lease carried an initial payment of \$35,000 plus monthly payments of \$5,000 during the six month period March 14, 1989 through September 13, 1989. The Neals agreed to reduce the initial monthly payments by a total of \$3,600 as their share of the cost of obtaining Bayrock's data, which has been purchased.

Commencing September 14, 1989, PI must pay \$1,000 per month as advance royalty payments or the production royalty, whichever is greater. The production royalty is three percent (3%) of the gross returns from the property without deduction of any kind. In addition, starting in the second year, PI is obligated under the lease to do \$30,000 worth of assessment, development or similar work per year on the property until the year in which production and sale of ore, dore or concentrates from the mining claims actually takes place. PI has the right to terminate the lease at any time but shall be required to pay all obligations accrued to the date of termination. The work obligations for 1990 has been accomplished.

The property is also subject to overriding royalties of 0.6% of the net shelter returns due to PI and a similar overriding royalty to a non-affiliated company. Net smelter returns means the net amount paid to the PI venture by a smelter or other purchaser after deduction of certain costs charged by the smelter.

#### GEOLOGY

Most of the rocks on the property are Precambrian (Proterozoic). These have been intruded by steeply dipping North west striking diabase dikes of undetermined age. Regional forces have caused shearing primarily in the dikes but in some cases in the adjacent granite as well. Ore bearing fluids penetrated the shears and deposited quartz, gold, silver and sulfides and caused some clay and chlorite alteration in the diabase and adjacent granite. Gold is present not only in the quartz veins filling the shears but also, to some extent, in the altered zones. A number of separate sub-parallel gold and silver bearing veins are present on this property and all contain some gold and silver. These veins are remarkably persistent and several disappear under alluvial cover in areas where no exploration has taken place.

#### WATER RIGHTS

PI has acquired a water well use permit which runs concurrently with the 25 year mining lease. This permit grants the right to withdraw water from a well located within one mile of the property. Management believes that this well will provide sufficient water for mining or heap leaching activities.

## TITLE

PI has obtained a title opinion on the patented mining claims included in the Music Mountains Property and has examined the title on the unpatented mining claims to the point where management is satisfied that PI has good title to these properties.

## MINING

The enclosed report indicates that mining and processing can be profitable at a gold price of greater than \$275 per ounce. However, the mine would be short-lived unless additional exploration/development drifting is undertaken. The possibility of increasing the mineable reserve is excellent.

(A full report plus maps and extensive collateral is available in the PI office. The Table of Contents indicates the information covered in the full report which was prepared by a professional engineer).

## INTRODUCTION

This report consists of brief descriptions and comments on the geology and gold and silver resources on the Music Mountain property, Mohave County, Arizona.

### QUALIFYING REMARKS

Reference is made to L.A. Bayrock's (Bayrock Surficial Geology Ltd.) report of November, 1984 to Stellar Resource Corporation of Vancouver, B.C. and to F.C. Schrader (1909) U.S. Geological Survey Bulletin No. 397 for a more complete description of the geology, mineral occurrences, previous mining activity and sampling techniques used. The mineral resources, as stated in this report, are based on Bayrock's surveying and sampling on the Music Mountain property and assays prepared for him by the Min-En Laboratories Ltd., North Vancouver, B.C. some 467 samples were collected by personnel of Bayrock Surficial Geology Ltd.

The resources calculated herein were prepared by Edward H. Torgersen, P.E. and Dr. Richard Douglas, based on sample data obtained by Bayrock.

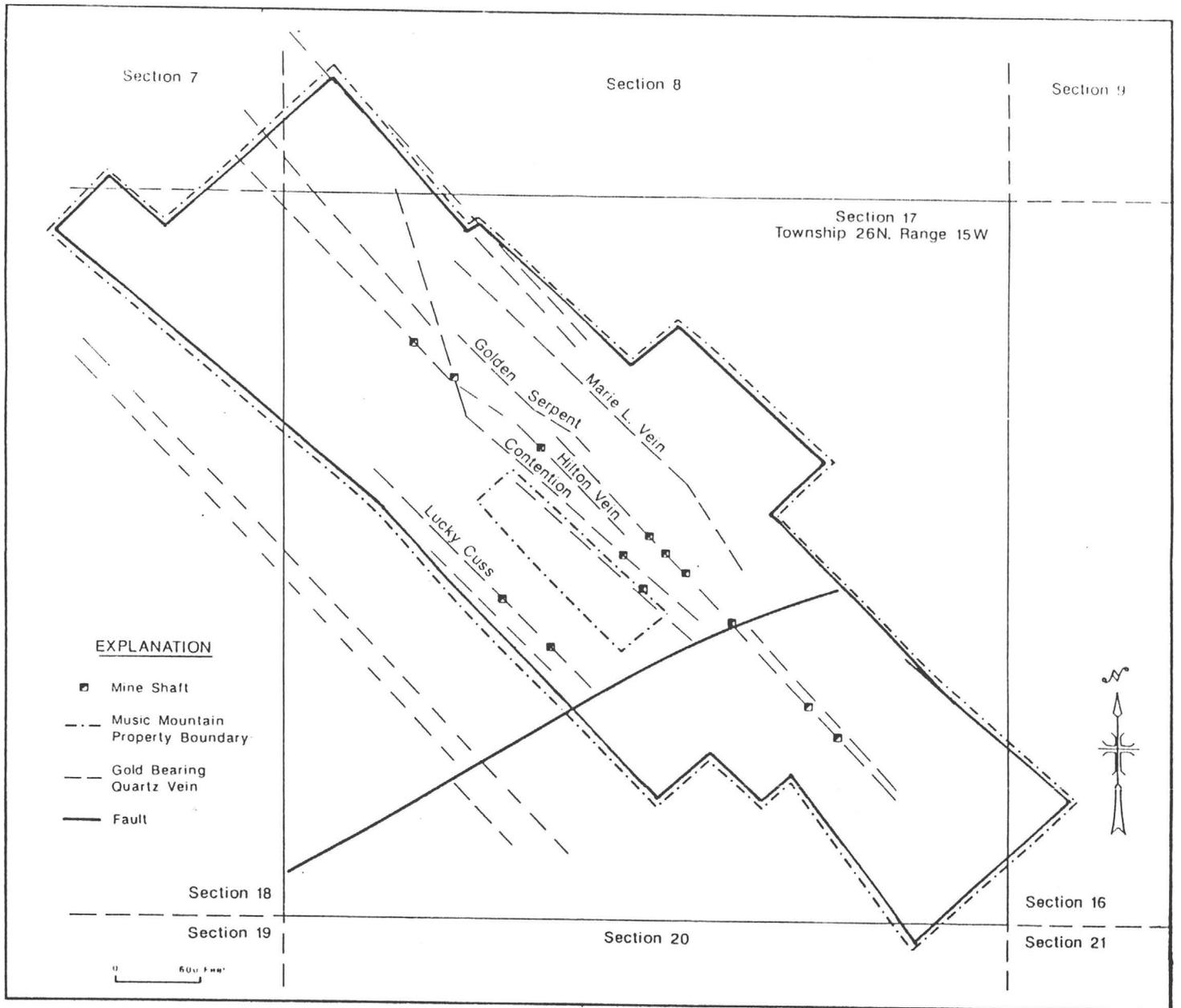
### PROPERTY LOCATION AND ACCESS

The Music Mountain property is comprised of 17 patented and 3 unpatented claims. The claims are located in Section 17, Township 26 North, Range 15 West. Some claims partially lap over into sections 16 and 20 on the southeast and sections 7, 8 and 18 on the northwest. (See property map in map pocket)

The claims, which have dimensions of 1500 by 600 feet, are laid out lengthwise in a northwest-southeast direction. The property is about 1.5 miles in length and about 1/2 mile in width.

The property is about 30 miles northeast of the city of Kingman, Arizona. The property is readily accessible by road all year round. It may be reached from Kingman by taking U.S. Highway 66 east for about 17 miles, then north on the Pierce Ferry road for about 15.5 miles. At this point the property lies one mile to the northeast. A track, which is traversable by car, leads to the property.





**Location of the Major Gold-Bearing Quartz Veins  
Music Mountains Property**

## TOPOGRAPHY AND CLIMATE

The hills on which the claims are located rise to a maximum of about 700 feet above the surrounding bajada. The hills are erosional features of the southwest edge of the Colorado Plateau.

These hills are erosional remnants of the topographic feature known as the Grand Wash Cliffs, which now has receded to a position about 2 miles east of the property.

According to Bayrock, the recession of the Grand Wash escarpment eastward is only weakly dependent on lithology and competence of the rocks. Thus, rocks underlying the bajada, north and south of the property, may be of identical composition and structure to the geology on the property.

The climate of the Music Mountain area is arid to semi-arid. Precipitation is about 10 inches per year. Vegetation is sparse, consisting of varieties of cactus, grasses and sage. The land in the region is used primarily for cattle.

## POWER

Electric power could be obtained from high voltage transmission lines located about 2 miles west of the property or from low voltage transmission lines some 6 miles to the South. Temporary power could be generated on site using diesel generators.

## WATER

Water is scarce but may be available in the Bajada Alluvium. Water has been found below the 250 foot level in the adjacent Rosebud Mine and at the 200 foot level in the Ellen Jane Mine. These occurrences may indicate the groundwater level in this area. An offsite supply may be available some 6 miles away.

Neither power requirements or water requirements have been determined.

## PREVIOUS WORK

F. Schrader provided the earliest (1909) and possibly the only report on the Music Mountain mining camp, but there have been numerous geological studies in the region. Schrader described the general geology of the area and indicated that gold was discovered in 1879. In 1909, approximately 10 mines were operating in the Music Mountain mining camp. The largest mine, at that time, was the Ellen Jane, which lies on the southern end

of the Music Mountain property. The E. J. Mine shaft has collapsed and neither Bayrock nor Pierce International Gold, Inc. (PIGI) personnel have examined the underground workings of the Ellen Jane. Schrader reported that the shaft extended to a 200 foot depth and two working levels existed in the mine, with most of the mining carried out on the 100 foot level. He also reported that high grade ore was mined on the 100 foot level.

Only sporadic mining has been carried out since 1909, and in 1946 all mining ceased. No mining activities have been carried out since.

### GENERAL

#### GEOLOGY

Mohave County lies in northwestern Arizona, contiguous to and south of the Colorado River. Major topographic features include the north-south trending Hualapai and Sacramento valleys, centrally located in the county, bounded by the Grand Wash cliffs and the western margin of the Colorado Plateau on the east and the Cerbat Mountains on the west. The alluvial valleys are intermontane basins, which are filled to depths of more than 4000 feet with alluvial deposits and volcanic rocks.

The adjacent mountain ranges to the west fall within the Basin and Range province. They are tilted fault blocks of Precambrian rocks and Tertiary volcanic. To the east lies the Grand Walsh section of Lower Proterozoic (?) granites, gneisses and metamorphics overlain unconformably by Paleozoic quartzites, shales and limestones ranging in age from Cambrian to Permian.

#### SITE GEOLOGY

Within the Music Mountain mining area, a Lower Proterozoic granite and a small area of gneiss occur. Shear zones, containing diabase dikes and/or quartz veins, locally called veins regardless of content, cut these rocks trending N. 40 W. These fractures are subparallel, but rarely cross. One prominent intersection on Music Mountain is the Contention fracture, which deviates from the northwest trend to a north trend and cuts across the Hilton fracture. Some of the faults horsetail and/or feather out within the property. The width of the major faults, where they have been filled, ranges from about 3 to 6 feet. The dip of the structures is variable and ranges from 70 degrees to near vertical. The structures dip northeast.

Taking the Music Mountain property together with the Rosebud property, which is contiguous to the west, some 23 fractures have been mapped in an area 1.5 miles long by 1.0 mile wide. The density of occurrence is, on average, about one fault every 230 feet. On Music Mountain, the density is greater, with a major fracture occurring, on average, every 160 feet. At the south end of the properties, most of the faults have been cut-off by a northeast trending fault which cuts through just south of the Ellen Jane Mine. Only 4 out of the 23 fractures extend south of this fault - two on each property. Thus, possibly 3 different ages of faulting have occurred in the area.

The structures are strong, and extend vertically for at least 600 feet. It is assumed that they go deeper.

Diabase dikes were intruded along many of the northwest trending faults. Whether these are late Precambrian or much later in age is unknown. Subsequent to their intrusion, further movement(s) fractured the dikes, providing areas for hydrothermal fluids to enter and form quartz veins, and gold - silver - sulphide mineralization; some fractures or areas of fractures contain only quartz veins.

#### MINERALIZATION

The character of the initial mineralization must have been a lead-zinc-gold-silver complex, as both lead and zinc minerals have been noted in the 2200 level and were reported to occur in the Ellen Jane. Weathering has leached the sulphides and provided enhancement of the gold-silver values in the oxide zone. Based on our observations of sulphides in the 2200 level and reports of sulphides at the bottom of the Ellen Jane shaft, we have assumed that the oxide-sulphide boundary lies approximately 200 feet below the surface.

No gold and/or silver minerals have been noted on surface or underground in the two brief examinations made on the property. Based on Bayrock notes, it would appear that the gold is physically very fine to microscopic. As would be expected, gold and silver values are erratically distributed. The better values appear to occur where quartz veins occur in granite rather than in diabase, and where kaolinitic alteration occurs rather than propylitic alteration.

The gold and silver appear to occur in ore shoots within the "vein" structures. Based on assay's on the Hilton and 2200 level, the ore shoots appear to plunge in a southerly direction at 40 to 50 degrees. Some ore shoots are high grade in gold but not silver, but a few contain very high grades in both, such as the Golden Serpent, where assays range up to 15oz. of gold and 26oz. of silver per ton. It should be noted that high grades occur over relatively narrow widths ranging from 4 to 12 inches.

### RESOURCES

As indicated previously, our resource calculations are based on Bayrock's sampling results. The resources are calculated on the basis of in-place volume and grade. Indicated blocks were projected 50 feet vertically from aggregate assay points. Inferred blocks were projected 50 feet horizontally or vertically from indicated blocks. No cutoff was used, although grades below 0.15 ounces of gold per ton were generally ignored. Of the total of 12 veins mapped (in part) on the property, resource calculations were carried out on only four of those veins: Lucky Cuss, Contention (in part), Hilton and Golden Serpent. We have, for example, little or no data on the Ellen Jane or the Marie E., two prominent veins in the southern part of the property, and data is lacking from underground portions of the Contention, which were inaccessible to Bayrock.

The resource, as shown on Table 1, is categorized as Indicated and Inferred (Probable and Possible). We have, in a few areas, identified Potential resources (See Table 2) but for the most part we have not as yet attempted to quantify the Potential for oxide ore. Location and spatial relationship of these resources is shown on Drawing No. 1 (in Map Pocket). In the author's opinion, the Potential is at least equivalent to the total tonnage and grade of Indicated and Inferred resources, as shown on the attached table.

We have not considered those areas which contain gold and silver intermixed with sulphides in our resource calculations. If this were done in the area between the Hilton and 2200 levels, and additional resource of some 11,000 tons grading between 0.109 to 0.315 gold would be added to the total resource as shown on the table. It appears that a significant potential for sulphide ores exists on the property.

For the most part, the oxide resources identified are readily accessible, but development work will be required on some.

TABLE 1

MUSIC MOUNTAINS PROJECT  
GOLD AND SILVER RESOURCES

<u>SHEET</u>	<u>BLOCK</u>	<u>INDICATED</u>				<u>INFERRED</u> <u>TONS (1)</u>	<u>TOTAL</u> <u>TONS (1)</u>	
		<u>TONS</u>	<u>WIDTH(IN)</u>	<u>Au (OPT)</u>	<u>Ag (OPT)</u>			
1	AF	530	8.8	0.953	7.24	530	1060	
	E-25	330	25.0	0.327	6.28		330	
4	Q	1320	34.0	0.557	2.52	1330	2650	
	E-26	1190	5.8	0.413	5.03		1190	2380
8	AA	280	16.5	0.320	2.44	280	560	
10	X	240	7.0	0.546	4.31	240	480	
	Y	1270	38.0	0.149	0.32		1270	2540
12	G	590	39.6	0.763	2.04	860	590	
	E-23	540	20.8	0.416	1.45		540	
	E-24	430	21.7	0.510	1.38		1290	
	E-28	4540	44.4	0.546	1.72		5860	10400
	E-31	160	24.0	0.199	1.04		160	320
13	E-11	350	26.5	0.361	6.09	280	630	
	E-16	350	26.5	0.361	6.09		280	630
14	AC	260	9.6	4.536	16.79	260	520	
	AD	260	9.6	4.536	16.79		260	520
15	E-19	370	29.0	0.178	0.33	740	370	
	E-21	200	29.0	0.178	0.33		200	
	E-30	530	16.2	0.479	2.82		1270	
19	U	190	14.7	2.036	5.50		190	
	E-22	20	14.7	2.036	5.50		20	
GRAND TOTAL		<u>13950</u>	<u>30.0</u>	<u>0.649</u>	<u>3.41</u>	<u>13540</u>	<u>27490</u>	

(1) AT INDICATED GRADE

TABLE 2.  
MUSIC MOUNTAINS PROJECT  
GOLD AND SILVER RESOURCES

SHEET	BLOCK	POTENTIAL				TOTAL
		TONS	WIDTH (IN)	Au (OPT)	Ag (OPT)	
4	E-26	2380	5.8	0.413	5.03	2380
	Q	1090	34.0	0.557	2.52	1090
10	Z	100	6.0	0.642	0.27	100
12	E-28	3560	40.0	0.367	1.72	3560
TOTAL:		7130	27.2	0.415	2.93	7130

### MINEABLE RESERVE

Gold and silver resources shown in Tables 1 and 2 are based on vein widths ranging from 6.0 inches to 40 inches with an average of 31.0 inches. A cutoff grade of 0.25 oz. per ton was used to estimate geologic reserves and grade end volume were diluted to a width of 36 inches for mining. Results are as follows:

<u>Category</u>	<u>Geologic</u>			<u>Dilution</u>		<u>Mineable</u>	
	<u>Tons</u>	<u>Au opt</u>	<u>Ag opt</u>	<u>Tons</u>	<u>Tons</u>	<u>Au opt</u>	<u>Ag opt</u>
Indicated	10240	0.783	3.44	5150	15390	0.521	2.27
Inferred	9870	0.783	3.44	4360	14230	0.543	2.39
Potential	4650	0.420	1.91	60	4710	0.406	1.88
Total	24760	0.715	3.15	9570	34330	0.516	2.27

Potential tonnage included with the mineable reserve is situated in juxtaposition with both indicated and inferred tonnage and will, in all probability, be mined.

Diluting tons were considered to be of "0" grade.

All tonnages were calculated using a factor of 12.5 cubic feet per ton(2.56 S.G.)

### MINING

This report is based on mining ore that is accessible from existing openings that require a minimum amount of rehabilitation. The 2200 haulage drift will require enlarging, installation of air, water and track. Access to the 2200 drift is by adit and mined ore will be loaded into 2 ton side dump cars and hauled thru the adit, dumps and reloaded onto a 5 ton truck for transporting to the processing plant.

### MINE PLAN

The plan shown in Table 3 details the sequence of mining starting with the highest grade available. Mining will occur in sequence from the most accessible to the least accessible. A total of 3 stopes will be mined concurrently producing an estimated 75 tons per day. Material below the 2200 drift will be accessed via a 10 percent decline. An LHD unit will be used to drive declines and haulage drifts as needed.

TABLE 3

## MUSIC MOUNTAINS-MINE PLAN (75 TPD)

BLOCK	LOCATION	INDICATED			INFERRED			GEOLOGIC			TOTAL	MINERABLE (36" WIDTH)			TOTAL			
		TONS	Au	Ag	TONS	Au	Ag	TONS	Au	Ag		TONS	Au	Ag	Oz Au Rec (90%)	Oz Ag Rec (85%)		
AC	GOLDEN SERPENT	260	4.536	16.79	260	4.536	16.79	-	-	-	520	4.536	16.79	1920	1.229	4.5		
E-11	SE 2200 DRIIFT ACCESS	350	0.361	6.09	290	0.361	6.09	-	-	-	630	0.361	6.09	360	0.264	4.4		
Q	NW 2200 DRIIFT ACCESS	1320	0.557	2.52	1330	0.557	2.52	1090	0.557	2.52	3740	0.557	2.52	3960	0.526	2.3		
E-23	NW 200 DRIIFT ACCESS	3900	0.546	1.72	5050	0.546	1.72	3060	0.367	1.72	12010	0.500	1.72	12010	0.500	1.7		
	YEAR 1	5830	0.715	2.33	6920	0.691	2.19	4150	0.417	1.93	16900	0.532	2.52	18750	0.569	2.2	9600	36340
E-28	NW 2200 DRIIFT ACCESS	640	0.546	1.72	810	0.546	1.72	500	0.367	1.72	1950	0.500	1.72	1950	0.500	1.7		
G	HILTON ADIT COLLAR	590	0.763	2.04	-	-	-	-	-	-	590	0.763	2.04	590	0.763	2.0		
E-23	CONTENTION VEIN	540	0.416	1.45	-	-	-	-	-	-	540	0.416	1.45	940	0.239	0.3		
E-24	CONTENTION VEIN	430	0.510	1.38	-	-	-	-	-	-	430	0.510	1.38	710	0.309	0.3		
E-25	2200 DRIIFT PORTAL	330	0.327	6.28	330	0.327	6.28	-	-	-	660	0.327	6.28	940	0.230	4.4		
AF	CONTENTION VEIN NR GREGGS SHAFT	530	0.953	7.24	530	0.953	7.24	-	-	-	1060	0.953	7.24	4340	0.233	1.7		
E-16	BELOW 2200 DRIIFT	350	0.361	6.09	290	0.361	6.09	-	-	-	630	0.361	6.09	360	0.263	4.4		
AD	BELOW GOLDEN SERPENT	260	4.536	16.79	260	4.536	16.79	-	-	-	520	4.536	16.79	1920	1.229	4.5		
E-30	TRACEY'S SHAFT	530	0.479	2.32	740	0.479	2.32	-	-	-	1270	0.479	2.32	2820	0.215	1.2		
E-22	ADIT NW HILTON VEIN	20	2.036	5.50	-	-	-	-	-	-	20	2.036	5.50	50	0.341	2.2		
U	ADIT NW HILTON VEIN	190	2.036	5.50	-	-	-	-	-	-	190	2.036	5.50	460	0.341	2.2		
	YEAR 2	4410	0.371	4.25	2950	0.912	5.24	500	0.367	1.72	7860	0.355	4.46	15580	0.433	2.2	6070	29800
	GRAND TOTAL	10240	0.783	3.44	9870	0.783	3.44	4650	0.420	1.91	24760	0.715	3.15	34330	0.507	2.2	15670	66140

## MINING METHOD

Shrinkage stoping has been chosen as the primary method of mining. The method is simple, requires little or no timber and is suitable for steeply dipping narrow veins with strong walls. Since strike length of each proposed stope has been defined from drift sampling, it will be necessary to mine an initial cut by taking a slice out of the back of the drift. Material will be picked up by overshot loaders and hauled to the portal in mine cars. A sill set will be placed and a service raise driven to the vertical extent of the ore. Extraction chutes will be installed on 20 foot centers and the intervening space lagged to support broken rock. Mining will then proceed by overhand methods with enough broken material drawn from the stage to allow access for subsequent cuts. At the conclusion of mining, material remaining between chutes will be removed by scrapers.

Since the average width of mineralization is less than the mining width, extraction should be 100 percent of estimated tonnage.

## MINING COSTS

Mining costs are based on estimating the number of people required for production and estimating supply costs as a percentage of labor. Assuming labor represents 60 percent of the total cost, stoping costs are as follows:

<u>Category</u>	<u>Number Per Stope</u>	<u>Per Year</u>
Miner	2	\$ 60,000
Mucker	2	<u>54,000</u>
Sub total		\$114,000
Supplies (40%)		<u>76,000</u>
		\$190,000

(1) Includes 20% Fringe Benefits

A similar approach was used for stope development, haulage and services. Total mining cost is estimated as follows:

<u>Category</u>	<u>Year 1 (1)</u>	<u>Per Ton</u>
Mining Ore	\$ 570,000	\$30.40
Haulage	76,000	4.05
Stope Preparation	190,000	10.10
Ancillary Services	64,000	3.40

<u>Surface Handling</u>	<u>36,600</u>	<u>1.90</u>
Sub total	936,000	\$49.90
Contingency (20%)	<u>187,200</u>	<u>10.00</u>
Total	\$1,123,200	\$59.90

(1) 18750 tons mined

Total capital and operating costs are shown,  
in detail, in Table 4.

#### MINE EQUIPMENT

The following major items of mine equipment will be required to start a 75 TPD a mining operation.

<u>ITEM</u>	<u>COST (used)</u>
1- 5T Battery Loco (w charges)	\$ 15,000
1- 600 CFM Air Compressor (Diesel)	7,500
10- Jack legs	20,000
6- 40 CF Mine Cars	9,000
3- 5 HP Tugger	4,500
1- 15HP Electric Slusher	3,500
1- Eimco Model 12B Rocker Shovel	9,500
1- 1 Cuyd LHD unit	22,500
1- 500KW Diesel Generator	35,000
1- Cat 910 F.E.L.	17,500
1- 5 Ton Truck	<u>10,000</u>
Sub total	\$ 154,000
Misc. items	\$ <u>31,000</u>
Total	\$ 185,000

#### PROCESSING

A conventional cyanide leach technique using Merrill-Crowe precipitation of gold and silver was selected for this report. At present time no laboratory tests have been made to assure the technique is viable. The process flow sheet has not been designed.

TABLE 4  
MUSIC MOUNTAINS PROJECT  
CAPITAL AND OPERATING COSTS (75TPD)

	<u>PREPRODUCTION</u>		<u>PRODUCTION</u>			<u>\$</u>
	<u>YEAR-1</u>	<u>SUBTOTAL</u>	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>TOTAL</u>	<u>PER Oz Au</u>
<u>OPERATING DATA:</u>						
MINE/PROCESS TONS	-	-	18750	15,580	34,330	-
ASSAY Au (Oz/T)	-	-	0.569	0.433	0.507	-
Oz Au (90% REC)	-	-	9600	6,070	15,670	-
ASSAY Au (Oz/T)	-	-	2.28	2.25	2.27	-
Oz Ag (85% REC)	-	-	36340	29,800	66,140	-
<u>OPERATING COST (\$):</u>						
MINEING ORE	-	-	570,000	456,000	1,026,000	65.48
HAULAGE	-	-	76,000	60,800	136,800	8.73
STOPE PREPARATION	-	-	190,000	-	190,000	12.12
ANCILLARY SERVICES	-	-	64,000	51,200	115,200	7.35
PROCESSING ORE	-	-	513,800	426,900	940,700	60.03
SURFACE HANDLING	-	-	36,000	28,800	64,800	4.14
SAMPLING/ASSAYING	-	-	64,000	51,200	115,200	7.35
ADMINISTRATION	-	-	78,000	62,400	140,400	8.96
SUBTOTAL	-	-	1,591,800	1,137,300	2,729,100	174.16
CONTINGENCY (20%)	-	-	318,400	227,500	545,900	34.84
SUBTOTAL	-	-	1,910,200	1,364,800	3,275,000	209.00
SILVER CREDIT (-)	-	-	(199900)	(163900)	(363800)	(23.22)
ROYALTY (3% GROSS)	-	-	121,200	77,800	199,000	12.70
ROYALTY (2% NET)	-	-	80,100	51,400	131,500	8.39
TREATMENT CHARGE (\$1.50/Oz)	-	-	31,600	21,200	52,800	3.50
TOTAL OPERATING COST	-	-	1,945,200	1,351,300	3,296,500	210.37
<u>CAPITAL COST (\$)</u>						
<u>ENVIRONMENTAL STUDIES</u>						
ARCHAEOLOGICAL	5,000	5,000	-	-	5,000	0.32
GROUND WATER	30,000	30,000	-	-	30,000	1.91
PERMITS	25,000	25,000	-	-	25,000	1.60
MAPPING, SAMPLING	50,000	50,000	-	-	50,000	3.19
REHABILITATION	190,000	190,000	-	-	190,000	12.12
MINE EQUIPMENT (USED)	185,000	185,000	-	-	185,000	11.80
PROCESS PLANT (60TPD)	240,000	240,000	-	-	240,000	15.32
WATER SUPPLY	25,000	25,000	-	-	25,000	1.60
SUBTOTAL	750,000	750,000	-	-	750,000	47.86
CONTINGENCY (20%)	150,000	150,000	-	-	150,000	9.52
TOTAL CAPITAL COST	900,000	900,000	-	-	90,000	57.43
WORKING CAPITAL (2 Mo's)	318,370	318,370	-	(318,370)	-	-
GRAND TOTAL CAPITAL AND OPERATING COST	1,218,370	1,218,370	1,945,200	1,032,930	4,196,500	267.80

### PROCESSING COST

Processing costs were derived from a publication of The Society of Mining Engineers entitled "Small Mines Development in Precious Metals" Chapter 29 as follows:

<u>CATEGORY</u>	<u>YEAR 1 (1)</u>	<u>PER TON</u>
Processing	<u>\$513,800</u>	<u>\$27.40</u>
Subtotal	513,800	27.40
Contingency (20%)	<u>102,760</u>	<u>5.48</u>
Subtotal	616,560	32.88
Treatment Charge (2)	<u>33,600</u>	<u>1.79</u>
Total	\$650,160	\$34.68

(1) 18750 tons processed

(2) 9600 oz. AU recovered at \$3.50 per oz.

### ADMINISTRATION

A small administrative staff will be necessary. The staff includes a manager, timekeeper, assayer and sampler. The managers duties will include engineering planning, surveying and purchasing.

### ADMINISTRATIVE COSTS

<u>CATEGORY</u>	<u>YEAR 1 (1)</u>	<u>PER TON</u>
Administration	\$ 78,000	\$ 2.27
Assaying, sampling	<u>64,000</u>	<u>1.87</u>
Subtotal	\$142,000	\$ 4.14
Contingency (20%)	<u>28,400</u>	<u>0.83</u>
Total	\$170,400	\$ 4.97

### CAPITAL

Capital requirements for 75 tons per day production were derived from several sources including U.S. Bureau of Mines publications "Bureau of Mines Cost Estimating Systems Handbook, Parts 1 and 2." Breakdown is as follows:

<u>CATEGORY</u>		<u>TOTAL COST</u>
Environmental		\$ 60,000
Archaeological	\$ 5000	
Ground Water	30000	
Permits	25000	
Mapping, Sampling		50,000
Rehabilitation (Existing Drifts etc.)		190,000
Mine Equipment (Used)		\$ 185,000
Process Plant (60TPD)		240,000
Water Supply		<u>25,000</u>
Subtotal		\$ 750,000
Contingency (20%)		<u>150,000</u>
Subtotal		\$ 900,000
Working Capital (2 months operating)		<u>318,370</u>
Total		\$1,218,370

#### PERSONNEL

A list of personnel required to produce 75 tons per day is as follows:

<u>CLASSIFICATION</u>	<u>#</u>	<u>\$ HOUR</u>	<u>TOTAL</u> <u>\$ PER YEAR (1)</u>
Miner	7	12.50	\$ 210,000
Mucker	7	11.25	189,000
Motorman	1	12.50	30,000
Brakeman	1	11.25	27,000
Tool Nipper	1	9.00	21,600
Equipment Op.	1	12.50	30,000
Mechanic	1	15.00	36,000
Sampler	1	8.00	19,200
Timekeeper	<u>1</u>	<u>8.00</u>	<u>19,200</u>
Subtotal Hourly	21	11.55	582,000
Manager	1	18.00	432,000
Assayer	<u>1</u>	<u>12.50</u>	<u>30,000</u>
Subtotal Salary	<u>2</u>	<u>15.25</u>	<u>732,000</u>
Total	23	\$ 11.87	\$ 655,200

Overall productivity at 75 tons per day (including management) is 3.25 tons per man-shift.

(1) Includes 20% fringe benefits

### OTHER PRODUCTION RATES

Production schedule for 25 tons per day is shown in Appendix 1. Capital and Operating Costs are shown in Appendix 2. Personnel requirements are 15 total, 13 hourly and 2 salary.

Production schedule for 50 tons per day is shown in Appendix 3, capital and operating costs are shown in Appendix 4. Personnel requirements are 19 total, 17 hourly and 2 salary.

### FUTURE DEVELOPMENT

The cost of exploring for additional resources has not been added to operating costs for this study. Dr. Bayrock (Bayrock Surficial Geology LTD) identifies at least 12 shear zones (veins) on the Music Mountains Claims. Based on assessment of existing resources, it is estimated that at least 2000 feet of drifting and crosscutting per year would be required to develop sufficient resources to maintain a 75 ton per day production.

### SUMMARY OF MINE PLAN

Sampling of existing openings, some surface sampling and geologic projections has identified some 35,000 tons of gold/silver bearing mineralization containing 16,000 ounces of gold (recoverable) and 66,000 ounces of silver (recoverable).

Initial capital requirements for 75 tons per day production would be \$1220,000 including \$318,000 working capital.

Total cost of producing an ounce of gold (after silver credits) would be \$268 before taxes.

Mine life, at projected production rates, would be 1 year and 10 months.

APPENDIX 1  
MUSIC MOUNTAINS - MINE PLAN (25TPD)

BLOCK	LOCATION	GEOLOGIC									MINERABLE			TOTAL				
		INDICATED			INFERRED			POTENTIAL			TOTAL			(36" WIDTH)		Oz Au Rec	Oz Ag R	
		TONS	Au	Ag	TONS	Au	Ag	TONS	Au	Ag	TONS	Au	Ag	TONS	Au	Ag	(90%)	(85%)
AC	GOLDEN SERPENT	260	4.536	16.79	260	4.536	16.79	-	-	-	520	4.536	16.79	1920	1.229	4.55	-	-
E-11	SE 2200 DRIFT ACCESS	350	0.361	6.09	280	0.361	6.09	-	-	-	630	0.361	6.09	860	0.264	4.46	-	-
Q	NW 2200 DRIFT ACCESS	1160	0.557	2.52	1170	0.557	2.52	960	0.557	2.52	3290	0.557	2.52	3470	0.528	2.39	-	-
	YEAR 1	1770	1.103	3.67	1710	1.13	3.55	960	0.557	2.52	4440	0.995	470	6250	0.707	3.34	3980	17740
Q	NW 2200 DRIFT ACCESS	160	0.557	2.52	160	0.557	2.52	130	0.557	2.52	450	0.557	2.52	490	0.512	2.31	-	-
E-28	NW 2200 DRIFT ACCESS	1870	0.546	1.72	2420	0.546	1.72	1470	0.367	1.72	5760	0.005	1.72	5760	0.500	1.72	-	-
	YEAR 2	2030	0.547	1.78	2580	0.547	1.78	1600	0.382	1.79	6210	0.504	1.78	6250	0.501	1.77	2820	9400
E-28	NW 2200 DRIFT ACCESS	2030	0.546	1.72	2630	0.546	1.72	1590	0.367	1.72	6250	0.500	1.72	6250	0.500	1.72	2810	9140
	YEAR 3	2030	0.546	1.72	2630	0.546	1.72	1590	0.367	1.72	6250	0.500	1.72	6250	0.500	1.72	2810	9140
E-28	NW 2200 DRIFT ACCESS	640	0.546	1.72	810	0.546	1.72	500	0.367	1.72	1950	0.500	1.72	1950	0.500	1.72	-	-
G	HILTON ADIT COLLAR	590	0.763	2.04	-	-	-	-	-	-	590	0.763	2.04	590	0.763	2.04	-	-
E-23	CONTENTION VEIN	540	0.416	1.45	-	-	-	-	-	-	540	0.416	1.45	940	0.239	0.83	-	-
E-24	CONTENTION VEIN	430	0.510	1.38	-	-	-	-	-	-	430	0.510	1.38	710	0.309	0.84	-	-
E-25	2200 DRIFT PORTAL	330	0.327	6.28	330	0.327	6.28	-	-	-	660	0.327	6.28	940	0.230	4.41	-	-
AF	CONT. VEIN NR GREGGS SHAFT	140	0.953	7.24	140	0.953	7.24	-	-	-	280	0.953	7.24	1120	0.231	1.76	-	-
	YEAR 4	2670	0.556	2.54	1280	0.534	3.50	500	0.367	1.72	4450	0.529	2.72	6250	0.375	1.93	2110	10250
AF	CONT. VEIN NR GREGGS SHAFT	390	0.953	7.24	390	0.953	7.24	-	-	-	780	0.953	7.24	3220	0.233	1.77	-	-
E-16	BELOW 2200 DRIFT	350	0.361	6.09	280	0.361	6.09	-	-	-	630	0.361	6.09	860	0.263	4.44	-	-
AD	BELOW GOLDEN SERPENT	260	4.536	16.79	260	4.536	16.79	-	-	-	520	4.536	16.79	1920	1.229	4.55	-	-
E-30	TRACE'S SHAFT	40	0.479	2.82	60	0.479	2.82	-	-	-	100	0.479	2.82	250	0.215	1.27	-	-
	YEAR 5	1040	1.631	9.07	990	1.698	9.15	-	-	-	2030	1.664	9.11	6250	0.542	2.97	3050	15780
E-30	TRACEY'S SHAFT	490	0.479	2.82	680	0.479	2.82	-	-	-	1170	0.479	2.82	2570	0.215	1.27	-	-
E-22	ADIT NW HILTON VEIN	20	2.036	5.50	-	-	-	-	-	-	20	2.036	5.50	50	0.841	2.27	-	-
U	ADIT NW HILTON VEIN	190	2.036	5.50	-	-	-	-	-	-	190	2.036	5.50	460	0.841	2.27	-	-
	YEAR 6	700	0.946	3.62	680	0.479	2.82	-	-	-	1360	0.716	3.23	3080	0.319	1.44	860	3770
	GRAND TOTAL	10240	0.783	3.44	9870	0.783	3.44	4650	0.42	1.91	24760	0.715	3.15	34330	0.507	2.27	15650	66080

APPENDIX 2  
MUSIC MOUNTAINS PROJECT  
CAPITAL AND OPERATING COSTS - 25TPD

OPERATING DATA:	PREPRODUCTION		PRODUCTION						TOTAL	\$ PER OZ Au
	YEAR 1	SUBTOTAL	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6		
MINE/PROCESS TONS	-	-	6250	6250	6250	6250	6250	3,080	34,330	-
ASSAY Au (Oz/T)	-	-	0.707	0.501	0.500	0.375	0.549	0.317	1	-
Oz Au (90% REC)	-	-	3980	2,320	2,810	2,110	3,090	890	15,700	-
ASSAY Au (Oz/T)	-	-	3.34	1.77	1.72	1.93	2.99	1.43	2	-
Oz Ag (85% REC)	-	-	17740	9,400	9,140	10,250	15,380	3,790	66,200	-
<u>OPERATING COST (\$):</u>										
MINING ORE	-	-	190,000	190,000	190,000	190,000	190,000	95,000	1,045,000	66.56
HAULAGE	-	-	76,000	76,000	76,000	76,000	76,000	38,000	412,000	25.52
SLOPE PREPARATION	-	-	95,000	95,000	95,000	190,000	95,000	-	570,000	36.31
ANCILLARY SERVICES	-	-	64,000	64,000	64,000	64,000	64,000	32,000	352,000	22.42
PROCESSING ORE	-	-	230,500	230,500	230,500	230,500	230,500	115,300	1,252,300	80.78
SURFACE HANDLING	-	-	36,000	36,000	36,000	36,000	36,000	18,000	198,000	12.62
SAMPLING/ASSAYING	-	-	64,000	64,000	64,000	64,000	64,000	32,000	352,000	22.42
ADMINISTRATION	-	-	78,000	78,000	78,000	78,000	78,000	39,000	429,000	27.33
SUBTOTAL	-	-	833,500	833,500	833,500	828,500	833,500	369,300	4,632,300	295.05
CONTINGENCY (20%)	-	-	166,700	166,700	166,700	185,700	166,700	73,900	925,400	59.01
SUBTOTAL	-	-	1,000,300	1,000,300	1,000,300	1,114,300	1,000,300	443,200	5,558,700	354.06
SILVER CREDIT (-)	-	-	(97,600)	(51,700)	(50,300)	(56,400)	(87,300)	(20,300)	(364,100)	(23.19)
ROYALTY (3% GROSS)	-	-	50,700	35,400	35,200	27,000	39,700	11,300	199,300	12.59
ROYALTY (2% NET)	-	-	33,500	23,400	23,300	17,900	26,300	7,500	131,900	8.40
TREATMENT CHARGE (\$3.50/Oz)	-	-	13,900	9,900	9,800	7,400	10,300	3,100	54,900	3.50
TOTAL OPERATING COST	-	-	1,000,300	1,017,300	1,018,300	1,110,200	989,300	444,300	5,580,700	355.46
<u>CAPITAL COST (\$)</u>										
ENVIRONMENTAL STUDIES										
ARCHAEOLOGICAL	5,000	5,000	-	-	-	-	-	-	5,000	0.32
GROUND WATER	30,000	30,000	-	-	-	-	-	-	30,000	1.91
PERMITS	25,000	25,000	-	-	-	-	-	-	25,000	1.59
MAPPING, SAMPLING	50,000	50,000	-	-	-	-	-	-	50,000	3.19
REHABILITATION	190,000	190,000	-	-	-	-	-	-	190,000	12.10
MINE EQUIPMENT (USED)	117,000	117,000	-	-	-	-	-	-	117,000	7.45
PROCESS PLANT (20TPD)	80,000	80,000	-	-	-	-	-	-	80,000	5.10
WATER SUPPLY	25,000	25,000	-	-	-	-	-	-	25,000	1.59
SUBTOTAL	522,000	522,000	-	-	-	-	-	-	522,000	33.25
CONTINGENCY (20%)	104,000	104,000	-	-	-	-	-	-	104,000	6.52
TOTAL CAPITAL COST	626,000	626,000	-	-	-	-	-	-	626,000	39.57
WORKING CAPITAL (2 Mo's)	166,300	166,300	-	-	-	-	(166,300)	-	-	-
GRAND TOTAL CAPITAL AND OPERATING COST	792,300	792,300	1,008,300	1,017,300	1,018,300	1,110,200	823,000	278,000	5,206,700	335.53

APPENDIX 3  
MUSIC MOUNTAINS - MINE PLAN (50TTP)

BLOCK	LOCATION	GEOLOGIC											MINERABLE			TOTAL		
		INDICATED			INFERRED			POTENTIAL			TOTAL			(16" WIDTH)			Oz Au Rec	Oz Ag Rec
		TONS	Au	Ag	TONS	Au	Ag	TONS	Au	Ag	TONS	Au	Ag	TONS	Au	Ag	90%	85%
AC	GOLDEN SERPENT	260	4.536	16.79	260	4.536	16.79	-	-	-	520	4.536	16.79	1920	1.229	4.55	-	-
E-11	SE 2200 DRIFT ACCESS	350	0.361	6.09	280	0.361	6.09	-	-	-	630	0.361	6.09	860	0.264	4.46	-	-
Q	NW 2200 DRIFT ACCESS	1320	0.557	2.52	1330	0.557	2.52	1090	0.557	2.52	3740	0.557	2.52	3960	0.526	2.38	-	-
E-28	NW 2200 DRIFT ACCESS	1870	0.546	1.72	2420	0.546	1.72	1470	0.367	1.72	5760	0.500	1.72	5760	0.500	1.72	-	-
YEAR 1		3800	0.632	2.66	4290	0.779	2.49	2560	0.448	2.06	10650	0.709	3.00	12500	0.604	2.56	6800	27200
E-28	NW 2200 DRIFT ACCESS	2670	0.546	1.72	3440	0.546	1.72	2090	0.367	1.72	8200	0.500	1.72	8200	0.500	1.72		
G	HILTON ADIT COLLAR	590	0.763	2.04	-	-	-	-	-	-	590	0.763	2.04	590	0.763	2.04		
E-23	CONVENTION VEIN	540	0.416	1.45	-	-	-	-	-	-	540	0.416	1.45	940	0.239	0.83		
E-22	CONVENTION VEIN	430	0.510	1.38	-	-	-	-	-	-	430	0.510	1.38	710	0.309	0.84		
E-25	2200 DRIFT PORTAL	330	0.327	6.28	330	0.327	6.28	-	-	-	660	0.327	6.28	940	0.230	4.41		
AF	CONVENTION VEIN NR GREGGS SHAFT	140	0.953	7.24	140	0.953	7.24	-	-	-	280	0.953	7.24	1120	0.231	1.76		
YEAR 2		4700	0.552	2.19	3910	0.542	2.30	2090	0.367	1.72	10700	0.512	2.14	12500	0.438	1.83	4930	19440
AF	CONVENTION VEIN NR GREGGS SHAFT	390	0.953	7.24	390	0.953	7.24	-	-	-	780	0.953	7.24	3220	0.233	1.77		
E-16	BELOW 2200 DRIFT	350	0.361	6.09	280	0.361	6.09	-	-	-	630	0.361	6.09	860	0.263	4.44		
AD	BELOW GOLDEN SERPENT	260	4.536	16.79	260	4.536	16.79	-	-	-	520	4.536	16.79	1920	1.229	4.55		
E-30	TRACEYS SHAFT	530	0.479	2.82	740	0.479	2.82	-	-	-	1270	0.479	2.82	2820	0.215	1.27		
E-22	ADIT NW HILTON VEIN	20	2.036	5.50	-	-	-	-	-	-	20	2.036	5.50	50	0.841	2.27		
U	ADIT NW HILTON VEIN	190	2.036	5.50	-	-	-	-	-	-	190	2.036	5.50	460	0.841	2.27		
YEAR 3		1740	1.355	6.88	1670	1.202	6.57	-	-	-	3410	1.280	6.73	9330	0.469	2.46	3940	19510
GRAND TOTAL		10240	0.783	3.44	9870	0.783	3.44	4650	0.420	1.91	24760	0.715	3.15	34330	0.507	2.27	15670	66150

APPENDIX 4  
MUSIC MOUNTAINS PROJECT  
CAPITAL AND OPERATING COSTS - 50TPD

	<u>PREPRODUCTION</u>		<u>PRODUCTION</u>				<u>\$</u>
	<u>YEAR-1</u>	<u>SUBTOTAL</u>	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>	<u>TOTAL</u>	<u>PER Oz Au</u>
<u>OPERATING DATA:</u>							
MINE/PROCESS TONS	-	-	12500	12,500	9,330	34,330	-
ASSAY Au (Oz/T)	-	-	0.604	0.438	0.469	0.507	-
Oz Au (90% REC)	-	-	6800	4,930	3,940	15,670	-
ASSAY Au (Oz/T)	-	-	2.56	1.83	2.46	2.27	-
Oz Ag (85% REC)	-	-	27200	19,440	19,510	66,140	-
<u>OPERATING COST (\$):</u>							
MINING ORE	-	-	380,000	380,000	285,000	1,045,000	66.69
HAULAGE	-	-	76,000	76,000	57,000	209,000	13.34
STOPE PREPARATION	-	-	95,000	95,000	-	190,000	12.13
ANCILLARY SERVICES	-	-	64,000	64,000	48,000	176,000	11.23
PROCESSING ORE	-	-	393,100	393,100	294,800	1,081,000	68.98
SURFACE HANDLING	-	-	36,000	36,000	27,000	99,000	6.32
SAMPLING/ASSAYING	-	-	64,000	64,000	48,000	176,000	11.23
ADMINISTRATION	-	-	78,000	78,000	58,500	214,500	13.69
SUBTOTAL	-	-	1,186,100	1,186,100	818,300	3,190,500	203.61
CONTINGENCY (20%)	-	-	237,200	237,200	163,700	638,100	40.72
SUBTOTAL	-	-	1,423,300	1,423,300	982,000	3,828,600	244.33
SILVER CREDIT (-)	-	-	(149,600)	(106,900)	(107,300)	(363,800)	(23.22)
ROYALTY (3% GROSS)	-	-	86,100	62,400	50,500	199,000	12.70
ROYALTY (2% NET)	-	-	56,900	41,200	33,400	131,500	8.39
TREATMENT CHARGE (\$3.50/Oz)	-	-	23,800	17,300	13,800	54,900	3.50
TOTAL OPERATING COST	-	-	1,440,500	1,437,300	972,400	3,850,200	245.70
<u>CAPITAL COST (\$)</u>							
<u>ENVIRONMENTAL STUDIES</u>							
ARCHAEOLOGICAL	5,000	5,000	-	-	-	5,000	0.32
GROUND WATER	30,000	30,000	-	-	-	30,000	1.91
PERMITS	25,000	25,000	-	-	-	25,000	1.60
MAPPING, SAMPLING	50,000	50,000	-	-	-	50,000	3.19
REHABILITATION	190,000	190,000	-	-	-	190,000	12.12
MINE EQUIPMENT (USED)	151,500	151,500	-	-	-	151,500	9.67
PROCESS PLANT (40TPD)	160,000	160,000	-	-	-	160,000	10.21
WATER SUPPLY	25,000	25,000	-	-	-	25,000	1.60
SUBTOTAL	636,500	636,500	-	-	-	636,500	40.62
CONTINGENCY (20%)	127,500	127,500	-	-	-	127,500	8.14
TOTAL CAPITAL COST	764,000	764,000	-	-	-	764,000	48.76
WORKING CAPITAL (2 Mo's)	273,220	273,220	-	-	(237,220)	-	-
GRAND TOTAL CAPITAL AND OPERATING COST	1,037,220	1,037,220	1,440,500	699,180	699,180	4,614,200	294.46

REPORT  
on the  
CERBAT TRANSPORTATION DEVELOPMENT  
AND  
DRAINAGE TUNNEL

GIBSON, GIBSON & GIBSON

Mining Engineers

KINGMAN, ARIZONA

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Following is a list of the patented claims  
enroute of the tunnel. All others shown on map  
are unpatented.

Flores West  
Flores  
Flores North  
Flores North #2  
Golden Nugget  
Broken Hills  
Idaho  
Golden Gem  
Exchequer  
R. A.  
Mohawk  
Paymaster General  
Booby  
Little Boy  
Vanderbilt  
Cerbat  
Red Dog  
Rolling Wave (Fredonia Group Pat. applied for)  
Side Hill View  
Side Hill  
New Comstock  
Mountain Top  
Western Scene  
Virginia  
Tub  
Golconda  
Little Jimmie  
Big Bethel  
Silver  
Prosperity  
Todd  
Wedge  
Mariposa  
De La Fontaine  
New York  
Manhattan  
Wallapai Queen  
Magnolia  
Alpha  
Omega  
Silver Monster  
Summit  
Fortunatis  
Night Hawk (Skyscraper Pat. applied for)  
J.F.T. & Copper Annex (Gold-Silver-Little  
Queen and Crystal-patents all applied for).

KINGMAN, ARIZONA

Mr. Henry Leeds,  
41 Pine St., N.Y. City.

My dear Sir:

In forwarding the enclosed report on the CERBAT TRANSPORTATION, DEVELOPMENT AND DRAINAGE TUNNEL, it may be of interest to mention briefly the law affecting the undertaking. The Federal Statutes concerning tunnels cover the matter. They afford ample freedom of action for its prosecution, development and operation. They were in fact enacted expressly to encourage such projects, and are well adapted and easy of application to the purpose intended. They provide a practical means of discovery, development and mining where ordinary methods often fail. The inducements offered are fully equal to those of other mining laws. Section 2323, Revised Statutes of the United States, May 10, 1872, embodies the principal law on the subject.

The courts, both State and Federal, have construed it in enough cases to establish and make clear its meaning, and in the kind of controversies involving those conditions which are likely to obtain in its general application. They have settled most of the questions requisite to a sound code of tunnel mining rights. From a legal standpoint the way is clear and without difficulties.

Lindley on Mines, Volume 2, Third Edition, Chapter LV, Pages 1092-1135, treats the subject fully.

Arizona has no tunnel law other than the right of eminent domain when needed in their construction, and its general mining enactments whenever applicable to tunnel construction and operation. These are favorable, and encourage mining in all its branches and forms.

Touching our corporation laws, I regard them as good, meeting all essentials of corporate operations, and imposing no undue burdens of any kind. They are well adapted to this enterprise. The branch devoted to Blue Sky is sane and wholesome, and under the management of an efficient elective commission that protects alike the corporation and the stockholders. If brought under its supervision--which may, or may not be done, depending upon the manner of financing--no legitimate company with a project of merit will be unduly hampered in its efforts. Instead, it will meet with cheerful and helpful cooperation by both Commission and the laws which it administers.

I shall be pleased at any time to respond to any special inquiries which you or others interested, may care to make.

With kind personal regards, I remain

Very sincerely yours,

by K. E. ARMOUR  
A t t o r n e y

KEA:ELS

C O P Y

ATCHISON, TOPEKA & SANTA FE RAILROAD

COAST LINES

860 S. Main St., 348 Kerchoff Bldg.,  
Los Angeles, California

A. M. Reinhardt,  
Asst. Gen. Freight Agt.

Refer to  
P-40-37

March 9, 1920

Ore and Concentrates, CL. Cerbat  
Arizona, to Humboldt, El Paso,  
Bartlesville, Canyon City, San Fran-  
cisco and Selby.

Messrs. Gibson, Gibson & Gibson  
Kingman, Arizona

Gentlemen:

Your letter of March 5th.

The rates on ore and concentrates, carload, from  
Cerbat, Arizona, are as follows:

Rates in Cents per Ton of 2000 Pounds.

	V A L U E S   P E R   T O N				
To:	\$25.00	\$35.00	\$50.00	\$75.00	\$100.00
Humbolt, Arizona	\$3.10 :	\$3.80 :	\$4.40 :	\$7.40 :	\$7.40
El Paso, Texas	7.80 :	8.80 :	9.40 :	10.00 :	11.30
Bartlesville, Okla.	7.00 :	8.80 :	10.00 :	11.30 :	11.30 :
Canyon City, Colo.	9.10 :	9.40 :	10.60 :	11.90 :	11.90
San Francisco, Cal.	6.60 :	8.10 :	8.80 :	9.40 :	10.60
Selby, California	6.60 :	8.10 :	8.80 :	9.40 :	10.60

All freight charges subject to three per cent. War Tax.

Yours truly,

(signed) A. M. REINHART  
A. G. F. A.

SCHEDULE OF ASSETS

And Their Estimated Value

Of The

CERBAT TRANSPORTATION, DEVELOPMENT & DRAINAGE TUNNEL.

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1. Preliminary surveys, staking, sampling, maps, charts, blue prints, photographs, drawings, locations, initial development, general data and expenses to date	\$20,000.
2. One quarter section of mineral and other land at the Tunnel Portal for Townsite and other Company purposes and operations	\$25,000.
3. Mill site of the usual size, five acres, properly selected and located near the Tunnel Portal	\$ 5,000.
4. Stock interest in Companies owning mines and mineral lands along the line of the tunnel	\$75,000.
5. Title and contractual interest in mines and mineral lands along the line of the Tunnel	\$75,000.
6. Tunnel site and tunnel rights	<u>\$100,000.</u>
TOTAL conservatively estimated value of present assets	\$300,000

-----

GIBSON, GIBSON & GIBSON  
Mining Operators  
And Engineers

KINGMAN, ARIZONA

Following is list of claims enroute of the tunnel which will come in under the conditions set opposite their names.

On part of these, we have signed contracts; the rest having signified their intention of coming in as soon as actual operations are assured.

Columbus & Monroe Doctrine. Cash \$10,000.  
Vanderbilt. Gives 20% interest when side lines are entered.  
Vespuccius. \$2,500. in tunnel company stock.  
Last Chance. One-half interest as soon as side lines are entered.  
Rough Neck. \$2,500. in tunnel company stock.  
M. S. M. \$2,500. in tunnel company stock.  
California. One-half interest in corporation when side lines are entered.  
Cerbat, Red Dog, Rolling Wave: \$30,000 each.  
Druid. \$1,000. cash.  
Paymaster. \$5,000. cash.  
O. D. M. \$2,500. in tunnel company stock.  
Doc McRae. \$2,500. in tunnel company stock.  
Minnehaha. \$2,500. cash.  
Mammoth #1-2-3 and 4. Oro Fino & Fredonia. (Golconda Annex).  
One-half interest in Co. as soon as side lines are entered.  
Hillside. Side Hill, Mountain Top, New Comstock, Western Scene:  
One-half interest of outstanding stock as soon as side lines are entered.  
Gold Reserve. \$3,000. cash.  
New York & Manhattan. One-half interest when side lines are entered.  
93 Fraction, Limelight. One-half interest when side lines entered.  
B & D, D & H, Cuego, Porphyry Copper. \$10,000. cash.  
Blue Bell. One-third interest, \$3,000. cash.  
Daddy Copper. \$3,500 cash.  
Magnolia, Wallapai Queen, Alpha & Omega. One-half interest as soon as side lines are entered or \$18,000. cash.  
Normandy, Tasmania, McAllister, Savannah. \$8,000. cash.  
Summit. \$10,000. cash.  
Silver Monster and Skyscraper. \$6,000. cash.  
Pay Dirt and Big Ben. One-half interest when side lines are entered.  
Barney Group. 7 claims. \$1,500 cash; \$7,000 tunnel stock.  
Copper Apex and J. F. T. Onethird interest. \$1,000. cash.  
America, Pacific, Blue Dick, Smuggler, Rex No. 1 & 2, Center and Armour. One-half interest when side lines are entered.

Mr. Henry Leeds,  
41 Pine St., N. Y. City.

Dear Mr. Leeds:

Relative to your letter of the 26th ultimo, the following is an outline of details as desired.

The tunnel project is designed to produce a commercial product from the low-grade ores that are found in the Cerbat Range. Because of the rebelliousness of the ore, the transportation and cost of handling each mine individually, it is impossible at present to make these mines produce at a profit.

With one exception along the tunnel site, none of the properties have been developed to a depth of more than 300 feet. The ore is always zincy, carrying lead, gold, and silver values to the extent of about \$12. to \$20. per ton.

The only method of handling this ore will be through a tunnel that will allow the mining at a very low cost and transportation not to exceed \$1.00 per ton, to the concentrator. It was at first deemed advisable to make several products in the concentrator, but we have recently received a bid for our material which will permit us to market the concentrates, if they run even as high as 40% zinc, and all of the values will be paid for.

There has not been a thorough development of the ore throughout the entire route of the tunnel for the reasons as stated above, that it was impossible to mine this ore under the present conditions, but we will take as an example what the ore bodies can probably produce, by the one developed property close to the tunnel site which is 1400 feet deep. The Golconda, while not a heavy vein as ore bodies go in this district (its average width being only about four feet) produced 20,000 tons of ore to every 100 feet of depth, that was sufficiently high-grade to be milled. This was the average for fourteen levels, practically 300,000 tons. If this mine which was worked to this depth through a one-compartment shaft, the collar of which was situated at such an elevation that two separate tramways were necessary to reach the mill, which lay along

(one line omitted)

had been operated through a tunnel, a great deal of ore could have been worked that is now in the stopes, so in all probability the average ore body in this district will produce at least 200,000 tons for each 1000 feet of overhead that it has. There, of course, will be exceptions, such as the Night Hawk, the Black Foot and New Comstocks, which are narrow veins. However, their values run much higher than the larger bodies of low-grades, such bodies as are found in the Alpha tunnel, which is from 6 to 20 feet wide; the De La Fontaine, which is from 4 to 10 feet wide; the Cerbat, which is from 10 to 20 feet wide; and there are others which will make ore bodies that will be 3 or 4 times as large as was found in the Golconda, with values of from \$12. to \$25., and make a very desirable concentrating product.

The book of blue prints, showing the size and value of deposits, which were very brief and condensed, will now be followed by a separate report on each plate, which will substantiate what has gone before. There will be besides, reports gathered from other sources on various mines enroute of tunnel, by the writer personally.

Apparently some of these reports will be a repetition, but as the condition at one mine in this district is probably the same as conditions at a half dozen others, this repetition, of course, must follow.

Plate No. 6, the Flores property, which is cut at only a shallow depth by the first 300 feet of a tunnel was located in 1875; two mills have been erected, and I am told that it has produced about \$300,000. from ore which averaged some \$30. to \$40. per ton; the mills on this property treated only oxidized ores at first, and when the primary ores were reached, the property became zincy and closed down. We were not able to make a full survey of the property, and part of our information was obtained from old miners who worked the ore. On the north end, the vein shows a small tonnage of ore that will develop, if mined.

Following is the report of the U.S. Geological Survey by Mr. F. C. Schrader, Page 96, Bulletin 397:

"The Flores mine is located in the foothills on the upper part of Flores Wash, a short distance below the Vanderbilt and Columbus mines, Northwest of Cerbat, and about 700 feet above Sacramento Valley. The property comprises a group of four mining claims."

"The mine was first located in 1871 by a party of prospectors from Nevada, but owing to the hostility of the Indians, actual mining did not begin until 1875 or 1876. At one time the mine was known as the Five Forks mine, from the ramification of the north end of the vein into five parts."

"One of the early operators was Charles M. Gross, Sr., a resident of Mineral Park, who afterwards became owner of the mine. In 1888 it was acquired by the Flores Mining Co. of Philadelphia. This company at once installed a 14-ton double-rocker mill, hoist and other machinery, and worked the mine until 1893, when, owing to financial difficulties, the mine closed and was sold for taxes. It was bought by W. N. Gurley, whose widow still owns it. The mine has not been operated since 1893, and is now filled with water to the 100 foot level."

"The mine is reported to be developed to a depth of about 300 feet, with but little stoping. The principal surface equipments are a 5 stamp mill, and a steam hoist. The mill is equipped for fine crushing and amalgamating as the ore contains free gold."

"The production is reported to have been considerably more than \$200,000. The country rock is the pre-Cambrian granitoid schist, and the intrusive granite porphyry seems to be present near by. The deposit is in a fissure vein about 4 feet thick, which dips 80 degrees to 85 degrees NE., but at the surface, where the vein is cross cut 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."

"Though some ore averaging as high as \$1,000 to the ton has been produced, the ore is mostly of too low a grade to ship. It 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. Mr. Gross is reported to have handled ore averaging \$60. or more only, but the Flores Company, with the mill now on the ground, profitably handled ore ranging as low as \$6.00 a ton."

The writer presumes that Mr. Schrader is wrong in his assertion that the Flores handled \$6. ore in their small mill at a profit.

Plate No. 9. The Vanderbilt mine, which is some 300 feet deep, we found to have an average body of ore 2 to 3 feet wide, running \$18. a ton, in gold and silver values. There has been but little work done in this property, as far as stoping the ore, but a great deal of ore has been developed in search for high grade chutes. Under present conditions it would cost \$30. a ton to mine and mill this ore. This property was thoroughly sampled, and we think that the values are an average of what will be found as the tunnel proceeds, though not in size.

Following is copied from the U.S. Geological Survey Bulletin 397, page 95:

"The principal mine of the group is the Vanderbilt Mine, located about half a mile northwest of the Golden Gem, and a little above it, near the head of Flores Gulch, which drains westward into Sacramento Valley. The Vanderbilt is one of the oldest mines in the camp. It was located early in the sixties, and is now producing. It is developed principally by a 300 foot shaft and 800 feet of drifts and cross-cuts.

"The country rock (locally called syenite) is pre-Cambrian fine-grained gneissoid chloritic schist, and is probably derived from a 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 deposits occur in a fissure vein, which, like the Golden Gem vein, dips about 80 degrees N.E., and is supposed to represent the northward continuation of the Golden Gem and Idaho veins beyond their point of junction."

"The ore, as in the Golden Gem Mine, 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 is reported to average about \$500. or more to the ton. Galena occurs from the surface down to the 200 foot level, below which no lead ore has yet been found. From the upper levels the mine is reported to have produced \$150,000. and it has also yielded considerable ore to the present company."

The Columbus Mine, which adjoins the Vanderbilt, is developed to a certain extent by tunnels, while it was mined as a gold property, yet there are large bodies of 20% zinc ore, which have been opened up. There has evidently been about 1000 or 1800 tons of ore stoped out of this property, and it is said to have produced about \$30,000. in gold. The zinc ore has never been mined. The U.S.G.S. Bulletin #397 says:

"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 reported to be 175 and 200 feet deep and by 500 feet of drift. The production is said to be several hundred tons of rich ore."

The Last Chance and Mammoth Veins. These properties have not been operated but show a veining system of much proportion. At the Mammoth shaft the vein is about 60 feet wide. This, of course, does not mean that it is all pay-ore, but a large ore body can only be found where there is room for it between walls.

The ore in this vein as far as development has gone, 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. (See plate 10 as to size of Mammoth vein.)

Plate No. 11. The California. This vein as shown on the photo is also of large proportions. In the lower part of the vein it is said that ore, valued at \$25. a ton has been mined in shafts, but it was not possible for me to enter. The vein here is some 8 to 14 feet wide. (See plate No. 12).

The Rough Neck has only an out-cropping on it with an occasional assessment work. The whole outcrop is strong, however.

Plate No. 13. The Cerbat Vein. The two properties Cerbat and Paymaster have developed this vein so that the country can be understood. We are presenting reports and blue prints on this property made by others and find them reasonably correct. We quote from U.S.G.S. Bulletin 397 by F. C. Schrader.

"The Cerbat mine is about a mile northeast of Cerbat, and the Golden Gem mine, in the foothills, on a side gulch of Cerbat Wash and 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. About 1880 a large mill was installed in the gulch below the mine, but operations have now been suspended for some time. The mine is owned by the Cerbat Mining and Milling Co. It is credited with a production of about \$300,000.

"The mine is developed principally by a 180 foot shaft, drifts and stopes. The principal surface equipment is the large mill abovementioned. 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. Most of the rich ore seems to have been taken out, but the mine is reported to contain a large amount of good milling ore.

REPORT ON CERBAT MINE  
by P. R. Whytock

Cerbat, Arizona  
Oct. 25, 1916

GENERAL REMARKS:

The Cerbat Mine is situated in the Cerbat Range, 15 miles from Kingman, Arizona. The Cerbat Mine is favorably situated as may be seen after briefly reviewing the property surrounding it. Within one-half mile of the Cerbat Mine is the Golconda. In a report of the U.S.G.S. quoted above, the Golconda mine is described in one paragraph, of 7½ lines; however, today, sinking below the 1000 foot level is in progress and from the 800 foot level to the bottom, there is more and better ore than in any of the upper levels. 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 from \$200,000 to \$800,000 which is on record on smelter sheets that are now available, but there seems to be no lack of evidence

that the Cerbat Range is highly mineralized.

#### SURFACE EQUIPMENT:

The surface equipment of the Cerbat Mines Company consists of the following: 25 HP Hoist, #22 blower, Blacksmith shop, timber, framing shed and full complement of tools.

#### WATER:

There is a heavy flow, from the Cerbat shaft, on the Rolling Wave. At the mill there is a continuous flow of water, from a 50-foot shaft, just to the north of the mill. Another water supply, from an entirely different source, runs through the George claim. It was from this latter that the old town of Cerbat received its water when the population was numbered in hundreds. On the Rolling Wave claim, there are the remnants of a 5-stamp mill; the stone foundation is still in good condition, and may save the builders of the next mill considerable money.

#### RECENT WORK ON THE PROPERTY:

Work on the Cerbat Mines Company began April 1, 1916, by investigating the ore on the surface for the purpose of getting better acquainted with the Cerbat ore deposit. An open cut was started until it reached the dimensions shown on the attached drawing. The old shaft was then in poor condition, but was enlarged and re-timbered to the bottom, which at that time was 180 feet from the surface. Following this another 100 feet of shaft was sunk. There is now a well-timbered shaft 275 feet deep.

All ores on the lower level have occurred in the hanging-wall side of the vein. From the 242 foot level a cross cut was run showing a 34% zinc ore. On the 180 foot level, the drift was continued 129 feet, which cut through a 7-5/10% zinc ore carrying about \$5. in gold and silver. A study of the plan of the 175 foot level presents an encouraging outlook of gold and silver values. It further suggests the probability of more and other shoots further to the northwest, or under the big outcrop.

#### THE OUTCROP:

The position of an ore deposit is often marked by an imposing outcrop; this is true in the Cerbat vein. It is not necessary that values shall be found throughout an outcrop, because a few ore shoots are uniform and continuous through the enclosing vein; the finding of, or rather the assurance of ore, throughout an outcrop, is attractive by its prominence.

55 samples, taken from the prominent parts of the outcrop, averaged \$1.80 while 49 contained nothing. The open cut, showing in plan, is only 20 feet below the outcrop and 65 samples from it averaged \$15. with silver at 56 cents.

The value of an outcrop, however, is not so much in the amount of ore it contains as it is in being an indicator of the direction in which ore may be found, and in this respect the Cerbat outcrop has been true to its owners.

#### THE CERBAT ORE-SHOOT:

The early work, performed by the present owners, was guided by data offered by previous owners, which was wrong. Work on and persistent sampling of the 75 foot level suggests an entirely different shape to the ore-shoot, a continuation of the enrichment further to the northwest or probably another rich ore-shoot.

That there has been good ore near the shaft is evidenced by the result

of 23 samples, taken from various distances within 30 feet southeast of the shaft, which averaged \$75. with silver at 56 cents.

The Cerbat vein probably contains other ore-shoots worthy of opening, but the distribution of values is such that further work with a view of exposing them would seem the safest kind of mining venture.

Respectfully submitted,

by P. R. Whytock (signed)  
E.M.

THE PAYMASTER

---

Quoting U.S.G.S. Bulletin 397, Page 98.

"The Paymaster mine is located in the southern part of Union Basin at the head of Long Wash, about half a mile north of the Cerbat mine, at an elevation of about 4,500 feet. It is an old mine and was profitably worked in the seventies, when the cost of mining supplies and of the reduction of ore was many times what it is now. It is owned by the Victor-Paymaster Mining Company, of Los Angeles, and is now producing. The total production is reported to be about \$200,000."

"The mine is developed principally by a 230 foot, 60 degree inclined shaft and about 1200 feet of drifts, with upraises and stopes. It produces considerable water. The principal surface equipment is a steam hoist and a pump. At the time of visit a gasoline hoist and new machinery were being installed for more expeditious work."

"The vein is contained in the pre-Cambrian complex, strikes N. 70 degrees W., and dips 75 degrees NNE. Locally it attains a width of about 15 feet. The gangue is chiefly mineralized quartz, in which the ore occurs principally in sheets, ranging from 16 to 24 inches in width.

"The quartz contains principally silver values, with some gold. Much of the silver is in the form of ruby silver. The ore is said to range from \$50. a ton upward. Some of it contains about 500 ounces of silver to the ton.

---

MINING AND ASSAY OFFICE  
OF  
A. M. MACDUFFEE

Chloride, Arizona  
July 23, 1904

Mr. V. P. McDowell  
Los Angeles, California.

Dear Sir:

I herewith mail to you report on Paymaster Mine. As I have been absent and very busy since my return, it was impossible for me to make new one, so will give in this letter what additional changes have been made since the report was written.

Owners have just shipped from 22 to 25 tons of ore, their controlled sample of which I have assayed today, giving one-half ounce gold, and 165 ounces silver, which will figure up to \$95. per ton or better, at present low price of silver. Since these people have the mine there have been but two men there, and only one in the mine most of the time. During the time (a year) they have shipped something over \$4000. which they got mostly below the main level between the two winzes toward

the far end, shown to be stoped thus:

As I have stated in my report, there are some thousands of tons of low grade ore in all the workings, running \$15. or more per ton. A careful sample of waste broken and left in stopes show 1/4 oz. gold and 24 ozs. silver, which would be better than \$17. to the ton. When it is remembered that the vein is 10 feet or more in places, it will be seen that the amount of low grade will be almost unlimited, while the possibilities for important discoveries of high grade ores, to say the least, more than even up.

The present owners have not done one day's prospecting. They have applied the little work thus far done to taking out ore already in sight, therefore they know no more of its value than at the time they became its owner. In justice to them, however, I will say that just at the time they were preparing to begin operations, they met with severe financial loss by fire, which crippled them to such an extent that they were unable to proceed with their original plans.

I would like to say that since having made the report, I have talked with several miners who did the last work in the shaft, men well versed in mining, who tell me that the round of shots broke into rich ore showing Native and Brittle Silver, and of which neither the owner or foreman were aware, as for some unexpected reason, those two miners were the last persons in the bottom, and this was about 4 years ago.

I have always considered from the geological view after careful study, that there should be a shoot of ore to the N.W., dip of which would carry it into the shaft in this immediate vicinity. This, I find from the long study of local conditions in this district, occurs where there are a series of shoots, the foot or under shoot carries the great value in gold.

When we consider the tonnage of low grade on the dumps, and in the workings, which can be made to pay by some cheap method of extraction, in addition to what may reasonably be expected here from a few more feet of mining, together with continued exploiting of the rich shoot which thus far produced a great deal of money from a small expenditure of capital, I unhesitatingly predict that with the judicious outlay of a few thousand dollars, it will prove one of the best mines in the district.

Yours sincerely,

by A. M. MacDuffee (signed)

We found in the Cerbat Mine about 30,000 tons of ore ready to mine, which would average \$15. a ton and was from 6 to 20 feet wide. The lower workings were in very high grade zinc, but the precious values had come down to \$8. a ton. This need not be of any serious nature, though, as any mine runs poor at some levels. The vein was still strong and mineralized with no indication of diminishing in size. The Paymaster was caved in and we could make no examination of it. A pile of ore of some ten tons was on the dump, and ran \$56., and the waste dump ran \$10. The owner told us that pumping costs closed him down.

When this vein is reached by the tunnel, there is no doubt that there will be some large bodies of ore opened for transportation through tunnel and for mill treatment.

Plate Number 16. - Druid Vein.

This is a promising vein, but located beyond all hope of surface transportation, so that but a few prospect holes were the only workings. However, in one end, a nice body of ore 5 feet wide was opened by several 100 foot shafts, showing 5 feet of ore averaging \$20. The dip of this vein was 45 degrees. It will probably make a tonnage producer if developed in the right manner.

Alexander Group:

The Alexander group of mines is located just northeast of the Paymaster mine, on northwestward slopes between 4400 and 5000 feet in elevation. It comprises 4 claims, the Alexander Nos. 1 and 2, Lazy Man and Cranfield. The two former are situated on the same vein and the two latter on separate veins. The veins were discovered in 1889 by Captain Lane, of Lane Springs Basin, and located in 1890 by James Dundon of Cerbat, who is the present owner. The production of the property is reputed to exceed \$5000, the main part being derived from Alexander No. 1 claim.

The Alexander No. 1 is developed by 3 shafts and drifts. The shafts are 80, 80, and 230 feet deep. The shaft of the Alexander #2 is 100 feet deep. The Lazy Man contains a tunnel 125 feet in length, and 2 small shafts. On the Cranfield claim the vein is opened by two inclined shafts, 35 and 100 feet deep and 500 feet apart.

The country rock is the pre-Cambrian gneiss complex. The veins strike northwesterly and dip northeasterly at angles of 60 degrees to 80 degrees. They range from 2 to 4 feet in thickness, and are oxidized down to water level, which lies at about 80 feet below the surface.

The gangue is mostly kaolin, with some quartz. It is hard in the oxidized zone, but soft below water level. The ore usually favors the hanging wall and is said to occur in a nearly continuous shoot, about 15 inches in width. It contains silver, gold, iron, and lead. In the oxidized zone it contains principally soft horn silver and gold, with a little oxide of iron and carbonate of lead, the silver in places averaging about 500 ounces to the ton. Below water level, the ore is chiefly sulphide, the lead occurring in the form of galena and the iron as pyrite, and there is reported to be an increase in the amount of silver, with little or no decrease in the amount of gold.

The Bunker Hill and Mohawk veins are of questionable character. We have made several trips there since the original report was made. The latter has had a production of very high grade gold ore, but in our samplings, we did not come upon it. The Bunker Hill has high grade spots, but there has not been enough development to know if the tonnage it will furnish will be of high enough grade to mine in a big way. Only development will tell.

From the last named vein to where the Oro Fino will be cut by the tunnel is an overflow of granite; if there are any veins there they are covered. The Oro Fino was not in shape to survey or sample, so I am following this with a letter by Mr. John Boyle, the man who made the Golconda in the face of big odds. There are some thirty houses on this property, and it is surrounded on three sides by the Golconda. There is also some hoisting machinery in good shape on grounds at shaft.

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KINGMAN, ARIZONA

Nov. 5, 1915.

Mr. Frank P. Peard,  
Los Angeles, California.

Dear Sir:

As the principal owner of the Golconda Mine, before disposing of it last Spring under an option for \$320,000. to the present owners, and therefore thoroughly acquainted with the surrounding country adjacent to the Golconda property, I unhesitatingly say that in the two Fredonia claims taken over by your Company, you have what I consider are two of the best mining properties I know of in the Cerbat Country. The surface showings on the Fredonia properties, I can say, are greater in width than those found by me on the original Golconda claims, and with the values that have been found in the assays taken from the 35 foot shaft by Mr. A. W. Clapp, on Fredonia Number One, there seems to be an excellent chance for these two claims developing into a splendid mine.

Knowing this territory as well as I do, I am qualified to speak both by observation, investigation and experience.

Yours very truly,

by John Boyle, Jr. (Signed)

Golconda, Golconda Ext., Middle Golconda, Wallapai Precious Metals, and De La Fontaine have been gone into fully from the writer's standpoint on Plate 19, so that we are adding reports on Golconda Ext., Golconda, and a former report on the Arizona Butte, which the writer made about a year ago.

While the latter does not bear directly on the Cerbat Tunnel, yet it is a tunnel project to enter the mountains from the eastern side of the range, following one vein with several others in the vicinity that can be cross out. It differs from the Cerbat in that the latter will cross out all the veins in the range, some of which are 400 feet deeper, and whereas the Arizona Butte will have a "back" or overhead of 700 or 800 feet (this is a lot of ground) the Cerbat tunnel will have an average of 2000 feet or more, besides having the mouth of the tunnel 13 miles closer to railroad transportation. The writer, however, endorses the A. B. project without exceptions. Following is Mr. Wanvig's letter, regarding the Golconda.

LOS ANGELES, CALIF.  
March 28, 1919.

Mr. Tom L. Gibson  
c/o Hotel Brunswick,  
Kingman, Arizona.

RE: SALE OF GOLCONDA MINE

Dear Mr. Gibson:

In accordance with our conversation of March 26, I am handing you herewith data on the Golconda Mine, with statements of our operations and mine and property maps.

As shown on the first statement, the Golconda Mine produced 31,000,000 pounds of zinc, with gold and silver values, during the three years we operated it, for which we were paid \$2,117,435. and received \$1,761,126. net from the smelter after deducting freight and smelting charges.

You will note a great increase in the residue (gold and silver) value: during 1915 we received \$34,765.79 for residues in 13,513 dry tons shipped, an average of \$2.67 per ton, and in 1917 we received \$111,003.02 for residues in 11,735 dry tons shipped, an average of about \$9.46 per ton. The high precious metal value is a factor of great moment in the operation of a zinc mine.

A statement of our 1917 operations giving the tonnage mined, milled and produced is also attached, so that you may have actual data of our last operations up to the time of the destructive fire, which destroyed the entire milling plant and mine bins, October 4, 1917. We immediately engaged mill designers and proceeded to draw up plans and specifications for a new mill, but after nearly three months' time, in the plant at that time, due to the very greatly increased cost of labor, machinery and materials brought about by the war, the uncertainty of equipment deliveries and consequent unusual length of time it would take to rebuild the plant under the extraordinary conditions at that time, the uncertainty of the smelter market and the high cost of reducing smelter ore, it was not considered likely that mine operations would be resumed until after the war, and before conditions were again normal, which it was then believed would require four or five years' time; and we therefore dismantled the entire mine plant, and disposed of the equipment with the idea of resuming mine operations with a plant at the 500 tunnel level, instead of at the collar of the shaft, and with new and more modern equipment suitable for our mine operations.

Regarding ore reserves, we did not make any detailed estimates, owing to the fact that development work had not been sufficiently advanced, and the mine is not in shape for anyone to estimate actual ore reserves. Perhaps you will understand this better if I mention that during the high price of zinc, we made every effort to produce every pound the mine could stand, sacrificing development work for the momentarily high price of zinc, and at the time of the fire the development work was just reaching a stage where we would be able to block out larger areas than had ever been done in the history of the mine. By referring to the stope map you will note that the shaft is below the 1400 level, thus making available 300 feet of ground below the 1100 level, and we were just ready to start drifting on the 1400 level when the fire terminated operations.

In line with former ore estimates, we based our conclusions of ore reserves on the continuance of the ore zone and past operations of the mine, which had been borne out by our results. The Golconda vein has produced about 20,000 tons of concentrating ore for each 100 feet of depth along the vein below the 700 level; using this basis for the ore zone opened, or more than 300 feet below the 1100 level, there should be 60,000 tons of concentrating ore in the stoping zone along the Golconda vein above the 1400 level.

The Tub vein also offers attractive possibilities, and while it is sure that we did not work along this vein during the last year of our operations, our final study of this vein, when we had more time for such investigations after the fire, leads us to believe that the Tub workings of the 700 level were unattractive, due to being in a fault zone which closely follows in dip and strike the course of the Tub vein.

Further development of this vein will undoubtedly show a continuance of the large ore bodies opened above, also an extension of the Golconda vein southward beyond the intersection with the Tub fault shown on the 700, 800, 900, 1000, and 1100 levels.

As far as ore reserves are concerned, when we took over the property, we estimated slightly over 5000 tons of concentrating ore as actually blocked out--not much more than one month's operation, but this did not discourage us as we were well aware of the previous history of the mine as far as ore reserve was concerned, and it is a fact that we mined at the rate of more than 4000 tons a month for nearly three years after taking over the property.

The results of development work so far on the 1200 level--the lowest level in the mine--were disappointing but not altogether discouraging as we had seen similar conditions on practically every one of the lower levels, such as the 900, 1000 and 1100 levels, and yet obtained our full quota of ore from the stoping areas above these levels. It is a singular fact that development headings all told at Golconda were rarely attractive or conducive of any great expectations of ore returns, and yet the mine has produced fully 70,000,000 pounds of zinc with gold and silver values.

Against the unattractiveness of the 1200 level drifts, is the fact that above 1500 feet below the 1200 level a body of high grade was entered in the shaft which opened to a width of 6 feet of solid high grade ore, and continued for about 60 feet in depth. This exemplifies a condition which is found throughout the mine, and the fact that these orebodies are usually continuous in the ore zone, and have only local pinches, is the reason that the entire ore zone is eventually stoped out in the operations above each level.

On the property map attached, the Virginia, Tub, Golconda, and Prosperity claims are already patented; we are awaiting patent papers on the Little Jimmie claim, and the other claims have all been surveyed for patent and are now in the process of being patented.

Yours very truly,

by John W. Wanvig, Jr. (signed)

John W. Wavrig's letter (continued)

P. S.

The portion colored in red on the mine maps is the advance made in 1917. Address me: c/o C. O. Wavrig, 88 West Water St., Milwaukee, Wisc.

SMELTER RETURNS AND PRODUCTION.

	1915	1916	(9 mos.) 1917	TOTAL
Amt. paid for Zinc ship'd.	\$664,486.83	\$718,640.90	\$488,958.66	\$1,892,088.39
Amt. paid for Residues	54,765.78	79,578.12	111,003.02	225,346.92
Total paid for metal	<u>719,252.61</u>	<u>798,219.02</u>	<u>599,961.68</u>	<u>2,117,433.31</u>
R.R. Freight to smelter	130,486.82	126,708.76	99,111.34	356,306.92
Net smelter returns	<u>\$588,765.79</u>	<u>671,510.26</u>	<u>500,850.34</u>	<u>1,761,126.39</u>
Dry tons	13,513	13,410	11,735	38,658
Pounds zinc contained	10,601,501	10,689,576	9,884,829	31,175,906
Ounces silver	106,308	130,196	149,028	385,532
Avg. smelter quot. per lb.¢	11,017	11,678	9,046	10,619
Avg. silver quot. per oz.¢	50,002	67,558	79,980	-----
Ounces gold	4,567	6,215	6,735	17,498

1917 OPERATIONS (9 MONTHS)  
M I N I N G

DEVELOPMENT WORK -- Advanced

3,857 ft.

Mined-Concentrating Ore

33,959 Dry Tons

High Grade Ore

34 " "

Total Ore Mined

33,993

From Development Work

8,650

From Stopping

25,343 Dry Tons

M I L L I N G

CRUDE ORE -- Treated

33,786 Dry Tons

Sorted - High Grade Ore

37

Sorted - Waste

1756

1,793 " "

CONCENTRATES PRODUCED

31,993 Dry Tons

9,186 " "

FEED ASSAYS: CRUDE ORE

14.3%

DUMP TAILINGS

6.0%

RECOVERIES: CRUDE ORE

87.5%

DUMP TAILINGS

53.1%

RATIOS OF CONCENTRATION

Crude Ore

3.49 into 1

Dump Tailings

12.29 into 1

1917 OPERATIONS (9 MONTHS) Cont.

MILLING -- Cont.

DUMP TAILINGS -- Treated	25,536 Dry Tons
Concentrates Produced	2,088 Dry Tons
Total Concentrates Produced	11,256 Dry Tons

PRODUCTIONS

High Grade Ore	71 Dry Tons
Concentrates	11,256 Dry Tons
Total Production	11,327 Dry Tons

SMELTER SHIPMENTS AVERAGED

Zinc	42.12 percent
Gold, Ounces per ton	.57 percent
Silver, Ounces per ton	12.70 percent
Iron	9.93 percent
Manganese	.66 percent
Insoluble	12.13 percent
Lead	1.38 percent
Copper	1.33 percent

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The following is a report by F. C. Schrader:

The Oro Plata Mine

The Oro Plata Mine, one of the heaviest and 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. It is reached by wagon road. The mine was first located and owned by Mexicans, under whom it began to be worked early in the seventies. It was next owned by J. P. Lane, whom the tailings are said to have netted \$70,000. but whom, in 1882, sold it to a party of ranchers under the lead of H. Wilson. These men worked it and shipped ore to the smelters in Colorado, and finally sold the mine to J. W. Garrett in 1895. In 1897 and 1898 the mine produced \$150,000. Recently it has been purchased by the Oro Plata Mining Co. of St. Louis.

The mine is developed to a depth of 280 feet, principally by shafts, drifts, adit drifts, tunnels and stopes, aggregating, it is said, about 7,000 feet of underground work distributed on three levels. The mine produces considerable water, ample for all milling purposes. The principal surface equipments are a 20 horsepower steam hoist and an air compressor. At the time of visit, ground was being broken for a new mill.

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. (See fig. 14).

The ore, which occurs chiefly in a banded quartz gangue, contains principally gold and silver. There are small amounts of chalcopryite, 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 in 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 from July 14, 1896, to February 18, 1901, as shown by the sheets of the Arizona Sampler Co., which bought the ore at Kingman, was approximately \$206,000., (2,927 tons of ore, averaging \$80. to the ton) of which about 75 percent was in gold and the balance in silver and lead. The price paid in the recent purchase of the mine was based on the assumption that the ore on the whole averaged \$37. to the ton, including the large bodies of moderate grade ore left in the mine above the 280-foot level during earlier work.

The total production is reported to be about \$500,000. and about 5000 tons of second-class ore, said to average about \$20. a ton, lie on the dump."

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KINGMAN, ARIZONA  
April 24, 1919

Mr. H. S. Stowe,  
Kingman, Arizona.

Dear Sir:

Agreeable to your request, that I examine the property of the Arizona Butte Mines Company in order to see if I would confirm the reports of Messrs. Croasdale and Morgan, I beg to submit the following:

In general, I find their statements to be correct, so will not take up, in detail, the geology, mine-workings, etc., referred to in their reports. However, I wish to call to your attention the fact that while Mr. Croasdale states that it will cost \$5. to mine and mill this ore, there will besides this be a loss of \$2. in the milling and \$1. per ton, of crude ore, for shipment and smelter treatment. In other words, a total cost of \$8. per ton for handling this ore.

The mine run of ore will average not less than \$12. per ton, and, I think, will generally go more than \$15., but the former figure will be used as a basis in giving my opinion on this property.

The property is now being worked in a small and expensive manner and can continue to make a little money and work along for the next hundred years as it has done for the last fifty.

As there is no reasonable doubt as to there being plenty of ore for large operations, the mine should be developed to a point where it can produce ore up to its capacity.

Attached you will find a blueprint showing the known ore deposits and in all probability there will be as much more found when the proper development has been done, but should there be no new bodies of ore encountered there is sufficient ore, in the known ore deposits, to justify the completion of the proposed tunnel and the erection of a large mill.

It is simply a matter of how much money the Company has available for development as to how much the property can be made to produce.

The tunnel which is at present under way should at least be driven to the Banner shaft, a distance of about 5000 feet, as this will be driven along the vein, and will open up new ore bodies and will pass through the known shoot of ore in the St. George, and while it is probable that there will be enough ore developed before the Banner shaft is reached, yet it is possible that there will be not enough water developed for a big mill; until it is, it would also not be good mining to quit short of this objective as a known great ore body exists there.

The deep tunnel will develop the ore bodies to an average depth of 700 feet or more, and will pick up new ore bodies and materially reduce the cost of handling the ores. It will also allow prospect tunnels to be run to parallel veins, at a small cost, and while it will drain the properties of the Company, it will also leave the adjoining properties without water which they might find themselves in need of for milling purposes; therefore the tunnel company will dominate the situation in the entire district. Ore which may be mined in adjoining claims will come through the tunnel and will be a source of revenue to the company, as they will have no water, all low grade ores, and perhaps the whole output will go into the Company mill.

With a 500 ton mill at the mouth of the tunnel and with adequate development twenty-five percent of the Company's present capitalization should be realized yearly for a good many years.

In addition to the ore in this mine, the Company is fortunate in having a real manager in charge, in the person of Mr. N. M. Crowther. I have great confidence in his ability and integrity. In my opinion he would make a mine, much less pretentious than this one, pay.

I am gratified that after looking over a number of other properties for you, and disappointing you by "turning them down", that I have seen one which is good, and I will state that unless some act of Providence intervenes, this will be a successful project.

There are a number of interesting details which I could give you regarding this property, but they would occupy a lot of space and be more or less confusing, so I am simply giving you my general opinion regarding it. If you desire a full report I will make it for you but the report of Messrs. Morgan and Croasdale, referred to in the opening paragraph of this letter, covers most of the points.

Very truly,

Tom L. Gibson (signed)  
Mining Engineer.

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Golconda Extension Mining Co., Directors,  
Kingman, Arizona.

Gentlemen:

Pursuant to your instructions, I have examined the property of the Golconda Extension Mining Company, formerly the Oro Plata, and submit the following report. I have divided the report into four parts, General Description, The Property and Its Value, Future Operations, and Conclusions. I have made the report as short as possible, eliminating all unnecessary detail but still covering the ground in a thorough manner.

## Part 1.

### GENERAL DESCRIPTION.

#### LOCATION

The property of the Golconda Extension Mining Co. is located in the Cerbat Mountain Range of Mohave County, Arizona, twenty-two miles by wagon road from Kingman, on the main line of the Atchison, Topeka and Santa Fe R.R., and 4 miles by wagon road to Mineral Station on the branch of the A.T. & S.F. This wagon road is in fair condition and is down hill all the way from the mine to the station. Mineral is the shipping and receiving point for the surrounding district.

The district in which the property is located is called the Cerbat District, and extends from the Mineral Park District southward for about  $6\frac{1}{2}$  miles and from the border of Sacramento Valley on the west to the crest of the range on the east, and maximum width being 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 of 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-Cambrian 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 Golconda Extension property, the country rock is the so-called pre-Cambrian gneiss extensively intruded by coarse and fine grained granite porphyry dikes.

#### ORE AND THEORY OF DEPOSITION

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, 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.

#### HISTORY OF THE GOLCONDA EXTENSION, OR ORO PLATA

The Golconda Extension Mine was known in the early days as the Oro Plata, and was one of the heaviest and most continuous producers. The estimates of the amounts of ore shipped vary from \$300,000. to \$500,000. but I am inclined to believe that it even exceeded the latter figure after examining the mine's extensive workings. Part of this production of high grade is shown by the attached sheet of the Arizona Sampler Co., which bought the ore at Kingman.

#### PART 2.

#### THE PROPERTY AND ITS VALUE.

##### MINERAL LAND

The list of claims following are owned outright by the Golconda Extension Mining Co. free and clear of encumbrance: Valley View, Valley View #1, Goldsmith, Oro Plata, Mariposa, Wedge, Todd, Baid Bine #1 (?), Ing Fraction, Todd #2, Mispah and Mispah #1, 2, 3, 4, 5, 6 and 7 (See Plate).

The following are held under option for 2 years: Daddy, King, Lane and Stone Cabin.

The following are patented: Todd, Mariposa, and Oro Plata. This map attached shows the location of the claims and the number of veins showing.

##### VEIN FORMATION

On the Golconda Extension property there is a system of veins that is closely associated with the intrusive granite dikes. First, we have the Mariposa Vein denoted by BOC on the map attached, showing the vein formation. All of the workings of the Golconda Extension Mine are on this vein between the points B-C and high grade ore has been stoped to an approximate depth of 280 feet and for a length of about 600 feet. The Prosperity Tunnel of the Golconda Mine adjoining is one the same vein denoted by F-G. It is 2240 feet from the mouth to the Golconda Shaft, which it cuts at a depth of about 600 feet. This tunnel has produced large amounts of high grade ore.

The Mariposa Vein B-C-E is well defined, and lies in an area approximately 100 feet in width, which is well mineralized, and contains many rich pipes or off shoots. This area is denoted by D-C on the map.

The main vein on the property is the Todd Vein, which lies on and has the same dip as the intrusive porphyry dikes. This vein is about 20 feet in width in places and is very productive of goodgrade lead ore on the Golconda property, especially so where it intersects the Mariposa Vein at the point E south of the Golconda shaft. This Todd Vein has never been cut on the Golconda Extension Mine but one of the first shipments from Mohave County was made from this vein, the ore being taken from the vein at the point A in the canyon where the vein and porphyry dikes intersect, and are broken, causing a change in strike. It may be reached by extending the drift on the 40-foot level, about 40 feet farther, and on the 180-foot level, by extending the drift about 100 feet. At these points of intersection of the two veins there should be a very enriched zone similar to the one south of the Golconda shaft at point E. The Mariposa Vein probably owes its enrichment to hot mineral

bearing solutions from the Todd or primary vein, at the time of igneous activity, and fissuring when the vein matter was deposited.

#### ESTIMATION OF ORE RESERVES OF GOLCONDA EXTENSION MINE

As explained above, the workings of the Golconda Extension Mine are approximately 280 feet deep, and 600 feet long. These workings have been stoped; the high grade iron sulphides, containing large values in gold and silver, being shipped as they contain very little zinc, not enough to be penalized for smelting; the lower grades, being a mixture of zinc, lead and iron sulphides, were left in the stopes.

The high grade values occur in a banded quartz gangue, in three distinct pipes through the length of the workings, the ground between being a good milling grade zinc ore. These rich pipes, or streaks, run from 4 inches to 3 feet in width and usually are found on the hanging wall side of the vein, and sometimes on both hanging and foot wall, the vein matter between being milling zinc ore.

In my estimates following, I have been very conservative and the true value of the ore reserves is probably twice the value I have found.

Taking a vertical depth of 250 feet, and a length of 350 feet, and 3 feet as the width of stope, we have in the stopes most of which are nearly full,  $250 \times 350 \times 3$ , equaling 262,500 cubic feet of broken ore. This ore runs about 13 (?) cubic feet to the ton.

262,500 cubic feet of ore is approximately 20,000 tons. Assuming the stopes are only half full gives 10,000 tons. This ore runs about \$20. per ton in value, or \$20. times 10,000 tons, which equals \$202,000.

Milling ore in places in the mine that can easily be broken down from the walls in old stopes and vein matter that has not been stoped, can be taken as 15,000 tons having a value of \$20. per ton.

The above estimates are for ore values about the 280 level and do not include the ore that will be opened up by drifting on the new lower level. This lower level will open up virgin territory 67 feet in depth and 600 feet in length which will carry the high grade values as well as the low grade milling ores.

The probable tonnage and value in this area will be  $600 \times 67 \times 3$ , which equals 10,060 tons.

#### EQUIPMENT OF THE PROPERTY

##### Mill

The present mill on the property is not operating. The equipment may be used, however, with a few additions, as an experimental plant. It is as follows:

- 1 Gas Engine, 25 H.P.
- 1 Grizzly Screen
- 1 Blake Crusher for coarse ore
- 2 Nissen Stamps--1200 pounds per stamp
- Stamp Screens
- 2 Wilfrey Tables, 1 Dynamo, 10 K.W., 115 V.
- 1 Elec. pump for pulp
- 2 Horizontal Tubular 45 H.P. Boilers
- 1 Compressor 125 cubic feet free air per minute
- Will run two Jackhammer drills.
- 1 Steam Hoist 25 H.P. Drum Capacity 1000 feet 7/8" rope.

Other Equipment:

1 #7 Cameron sinking pump  
1 #6 Cameron sinking pump  
1 fire assay outfit  
Blacksmithing outfit, trucks, cars, tools,  
drills, etc.  
5 buildings with accommodations for 35 men.

Cost of Labor:

Plenty of men can be obtained for all labor requirements.  
Miners: \$4 to \$4.50 per shift  
Muckers: \$5.50  
Pumpmen: \$6.  
Engineers: \$4 to \$4.50  
Carpenters: \$4  
Topmen: \$3.50

Cost of Power:

Fuel oil can be laid down at mine for 2 cents per gallon.  
Electric power can be furnished at \$12. per H.P. per month at present. Within 2 or 3 years electric power will be reduced to \$4.50 to \$5. per H.P. per month, power coming from the Government site on the Colorado River.

Cost of Timber:

Timber can be laid down at the mine in carload lots at \$23. to \$28. per thousand feet.

The present two-compartment shaft, each compartment being 4 x 4 feet in the clear, is too small for a large daily output, but can be used to advantage in hoisting high grade ore, about 20 tons being hoisted per shift, or 60 tons every 24 hours. One compartment only is used for hoisting the other as man-way and pipe-way.

TUNNEL AND TUNNEL SITE

The property should be opened by a tunnel and a site has been located on the Mispah claim. This tunnel when run will cut five veins between the portal on the Mispah claim and the shaft on the Mariposa claim, and 2 more on the Valley View and Valley View #1, or 8 in all, including the Mariposa Vein, on which the mine workings are located. From all of these veins, shipments have been made. The tunnel will cut the Todd or main vein of the district at a point that will give about 600 feet of backs on the dip of the vein.

This tunnel should be double track, and by survey will cut the Mariposa vein at a point 1620 feet from the portal and 40 to 50 feet below the present bottom level of the mine. Working 3 machine drills in the face 10 to 12 feet per day can be made at a cost per foot, not to exceed \$10. The territory opened up will be large, and the veins cut at tunnel depth should produce a good tonnage of shipping grade ore as well as large tonnage of milling grade. I am inclined to believe after studying the mineralization in the district, that enough shipping ore can be removed from this tunnel, while it is being driven, to pay for the cost of the work and advise starting the work as soon as working capital permits.

## DEVELOPMENT IN THE PRESENT MINE

While the mill is being put in operation and the tunnel work started, development should be carried forward in order to block out enough ore to warrant the expenditure for a mill equipment that will be able to handle 100 to 200 tons per day. This mill will be located at the portal of the new tunnel.

### Part 4.

#### CONCLUSION.

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At the time of my visit to the Golconda Extension Mine, the work was being carried forward on the lower level to intersect the rich high grade ore found on the upper levels. This pay streak shows on the floor of the 280 foot level and can be underhand stoped at present at the rate of 5 to 10 tons per day, but I would not advise mining this ore until it is out on the lower level where it can be overhand stoped at small cost. The lower level is in good ground, milling grade zinc ore showing in the drift, and from calculations made from survey, taking into account the dip of the rich ore on the level above the high grade body, should be encountered at 115 feet from the shaft. The drift is now in about 100 feet, and advancing at the rate of 4 to 5 feet per day.

There is enough ore in sight in the mine to warrant the expenditure of the small amount necessary to equip and put the mill in operation, and this alone should show a profit of \$300,000. Regarding the values holding at depth the production of the Golconda mine adjoining proves that they go down to a good depth, and as explained in former paragraphs, the fissuring was severe at the time the igneous dikes were intruded into the country rock. The Golconda is now mining at 950 feet below the collar of the shaft, and the values have increased with depth. I am told that the production is around \$200,000. per month, a good percent coming from the Todd vein which can be easily opened up at depth at the Golconda Extension Mine.

Another mine proving this contention is the Tennessee a few miles away, but in the same mountain range and a similar vein formation. This company is now mining at 1400 feet, and it is said that the richest ore is found in the bottom, and that the production was around \$875,000. in January, 1916, the ore averaging \$200 per ton in carload lots.

The Golconda Extension Mine is favorably located, and conditions will be ideal when it is opened up and developed by the proposed tunnel as this will do away with a steep haul in bringing in supplies and should open up very large ore reserves and do away with all pumping costs, besides furnishing enough water for all mill requirements, as water is not always obtainable in this semi-desert district, and is a valuable asset.

Upon my trips underground during my examination, I was surprised at the amount of ore showing in a mine that is not at present producing. The mine has produced heavily in the past, and still it is only what miners term "scratched".

The Golconda Extension Mine, formerly the Oro Plata, had the reputation of being the largest and heaviest producer in the past in this district, and I believe it may again take the lead as the largest and heaviest producer in the Cerbat Mountain Range for the class of ore mined.

As a mining engineer, I consider the Golconda Extension Mine as excellent property, and believe that it will have many profitable years of production, when developed for large scale operations.

George W. Danchy (signed)  
E.M.

On the Golconda Extension on Plate #19 referred to, there will be found a long section of the deepest working in this vicinity. A second reference on Plate #2 will show five veins running parallel, some being within a hundred feet of each other. On examination of this immediate section there will be nine veins found that have produced, or are thoroughly mineralized. From the New York claim to the Oro Fina, the veining system will supply ore in tonnage lots daily to supply full capacity for the tunnel by themselves. The Golconda, while it is still a good mine and can be worked at a profit (if through a tunnel and only by this method), yet there are other close deposits which are virgin and will duplicate what the former has done. The Golconda itself would have paid for tunnel.

PLATE 25:

The Black Foot was not open to inspection because of cave-ins. However, the writer learned that this vein only had one ore chute exposed in the Black Foot workings. This had high values in it (about \$60. ore), yet the vein was only about 8 inches wide. The ore, after it reached the primary state, was steady in values and width. Of course, this would not make a tonnage for mill, yet it could be mined on a narrow vein, if put through a tunnel and efficiency shown in the work. The sample taken from the dump was what had been cobbled out.

On the Hill Side, a shaft was sunk to 150 feet, but nothing was found. It has been learned lately that they expected to cross out to the Tub vein, but it would have been better mining to have sunk in the latter, even if transportation was more difficult.

The Polaris is on a vein about 10 feet wide; just where the chute is was never thoroughly determined, or where the pay streak was. It might either be a low grade heavy tonnage, or of the Black Foot type. There is not enough work on it to determine this point. However, between the walls, there is a big loose range (?), which could contain big tonnage.

PLATE 26:

The Annex is a good looking claim. An odd occurrence takes place here as the primary ore is exposed in an outcrop about 4 to 5 feet wide, running in reasonable values of \$22. per ton.

THE NEW YORK:

A sample of the out-cropping here ran \$150. but a shaft which reached the primary ore produced \$34. in values. The vein is about 5 feet wide of pay ore, but 9 feet between walls. It will be remembered, as we proceed, that all of these properties were worked under every possible disadvantage--no water, no wood for fuel, and transportation almost impossible, but work was carried on somehow.

It might be wondered if there are any veins in this section except those that show values; there are, but we are reporting only on those that do, and there is a chance that the ones that look unproductive, at depth will have large pay deposits in them.

PLATE #27--THE MINT:

This mine was always locked when we have been there, so we had to ask the owners in regard to it. They reported 4 feet of ore that ran \$15. and as it was but little higher than the dump samples we took, we thought they might be about right, so we cut their estimate down one-half, and took our own values for our estimate.

THE LITTLE BOY:

This property is one of the real good looking claims, and is at present being worked with much zeal by a new man, but he will fail to make a profitable producer of it, because of the transportation question, which will eat him up both in the hauling to the property and the hauling from it. However, the ore sampled up very well, and the vein is from 4 to 10 feet wide. We were not able to go over much of the workings because they were old, but sampled the dumps from the different holes, and had an average of more than \$20. per ton. Of course, by sorting it is probable that this could be brought up, but it is proposed that with the tunnel to use, everything that looks as though it will make even a little money will be mined so that we can produce a tonnage and not be bothered with hand sorting in any way. It is said to have produced about \$250,000. The property can be secured when we desire it.

PLATE 28--THE NIGHT HAWK:

There are 2 veins here that lie very close to each other; one is high grade, but small in width, only being about 6 inches. From it was shipped a lot of ore that ran from \$300 to \$800 per ton. While this is not detrimental, at the same time where the vein is small, it does not have

the continuity that a larger vein has, and so cannot be depended upon to make a continuous tonnage producer as a large vein. The other ledge on this property has not been worked to much extent, as it was of lower grade running, only about \$18., which of course could not be worked with the physical conditions that surrounded it. We quote from U.S.G.S. Bulletin 397 by F.C. Schrader, page 103.

"The Night Hawk and Rip Van Winkle, two adjoining mines, are situated about half a mile southeast of the Alpha mine, both on the same vein in the steep northwest slope of the mountain, at an elevation of about 5000 feet. The country rock is pre-Cambrian gneiss. The vein strikes northwesterly. In the Night Hawk, it is reported to be developed principally by a drift 1400 feet in length, whose face is located about 700 feet beneath the apex of the vein. The vein is said to be large and to contain a "pay streak" of sulphide ore ranging from 6 to 18 inches in width.

The ore shoot in two localities has feathered out, and in both has been recovered with its usual values by cross cutting into the foot wall. Much of the ore is rich; some of it is reported to have averaged \$2,000 a ton in carload lots. According to record sheets of the Sampler Co., who bought most of the output from April, 1887, to January 20, 1900, the ore averages about 3 ounces of gold and 300 ounces of silver to the ton; the production during this period was 464 tons, containing values of about \$244. a ton, amounting to about \$113,000. The total output of the mine is reported to be \$180,000. and was produced at intervals during the last seventeen years."

THE CUEGO is an undeveloped property on the crest of the range and has the continuations of both veins from the Night Hawk. The outlook is good for a future producer. The veins are strong and the outcrop appears favorable. The cost of transportation has cut off all hope of the future of the property and like others it has prohibited any development.

PLATE #29:

This will be one of the real prizes of the whole tunnel. The ore bodies here are very large, and the veins are often 150 feet from the hanging to the foot wall. Do not consider though, that there will be continual values as given in sample for the entire distance, but it has the best outlook for the most enormous tonnage that the writer has ever seen outside of the copper and iron deposits. These veins are a porphyry and at this point the character of ore seems to change as most of the values are in copper. The shoots of ore are as long as a thousand feet, which is certainly remarkable. This statement might be doubted, being so unusual, but through this territory of Plate 29 passes one of the veins on which the Banner ore shoot is being worked, and which has one continuous stope 1800 feet long. On the Porphyry Copper, the outcrop, which carries itself like the comb of a rooster, has been mined by just

shooting the outcrop off. Some ore from which the good ore has been sorted was left on the dump and was sampled; out of this we got \$28. in one place and \$14. from another vein worked in the same way on the same claim.

THE ALPHA:

The Alpha is one of the developed properties and has produced to some extent, and the vein is very large but it is not high grade. The part of the mine we were able to enter had gold and silver values through about 8 feet that sampled \$5.(?) in the upper tunnel, while to the east of this point in the shafts, we got \$44. and \$16. in precious values. In the lowest tunnel the body of ore was of width enough to allow the tunnel to be driven in without either side of the ore being reached. The books of the company show (the last organization that worked it) that 500 tons ore was shipped that ran \$25. in gold, silver and copper to the ton, and that the transportation and smelter treatment ran them in the hole \$1.50 per ton. The letter following is from Mr. Tom McGraw who was the last foreman on the mine, who is now on one of the neighboring mines worked by this firm, and he has volunteered this information.

Gibson, Gibson & Gibson  
Kingman, Arizona.

Gentlemen:

Regarding the workings of the Alpha, the lower tunnel runs back about 900 feet, where we took out ore where the ore shoot was 200 feet long. The ore was still in the face of the drift, and both sides of this drift were in ore.

The values in the ore shipped was some \$25. in gold and silver, the silver being about  $\frac{4}{5}$  of the value, and at that time silver was selling at 56¢. We took a stope of one hundred feet for  $\frac{1}{2}$  feet high, and took out 800 tons and shipped it as mined. Just at this time, all of the buildings at the mine burned, and the road was washed out, and as there were not any returns from the ore shipped, the mine was closed down.

Respectfully yours,

Tom McGraw (signed)

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The following is copied from the U.S.G.S. Bulletin by Schrader, p. 103:

"The Alpha mine is located in the eastern part of the basin, at an elevation of about 5,000 feet. It is owned by Peter Cooper, Oscar F. Dennis, and Mrs. Smith. It is developed principally by two drifts, the upper one 400 feet, and the lower one 200 feet in length, both of which trend about S 30 degrees E. along the vein, almost directly across

the strike of the pre-Cambrian gneiss complex. The croppings are a prominent reef of black iron and manganese stained quartz. The vein varies from 4 to nearly 20 feet in width, and consists principally of a gangue of imperfectly banded, fine-grained, sulphide bearing quartz, in which the ore occurs. The ore contains silver sulphide, pyrite, galena, zinc blende, and chalcopryite.

The mine is reported to have been a good producer. A consignment of 400 tons of ore is reported to have netted \$125. a ton."

#### THE BLUE BELL:

The Blue Bell, while only a prospect, looks very live indeed and from a very thorough sampling it showed an average of over \$30.(?) for a long distance on the vein. Plate 31 shows the width of this vein, while Plate 30 shows the vein on the Porphyry Copper where the ore had been mined out of the outcrop.

#### PLATE #32--THE SUMMIT PROPERTY

The Summit property is the only one developed in this group to any extent. The outcrop here ran \$2, about half way down the values had increased to \$6., and down at the bottom of the shaft, which was about 200 feet deep, there was a vein of ore nearly 15 feet wide, that ran \$12. At the bottom of this shaft, I understand that a water level was hit which, while it did not raise the water above the level sampled, yet it was hard to keep it pumped out and work was stopped. If this width would continue, and there is no reason why it should not, to the tunnel level with the shoot of ore as long as it is, it alone will keep the mill at the mouth of the tunnel in ore for a long time.

The other properties are not exposed enough to make reasonable reports on them. The Silver Monster is part of the ore shoot on the Summit, the Skyscraper has some values (\$4.) in a little workings with a wide ledge of mineralized quartz, while the Minera Hope, as far as could be determined, leaves little hope as far as values are concerned.

The next property down the hill, however, has some very good values in it, and it is possible that with depth the Hope will encounter some ore.

PLATE #33: The tonnage on this property will be beyond all conception if the size of the veins hold out, and it is apparently strong enough to hold its own against any intrusion of other rocks. It might fault or bend, but it will stay for a long distance.

PLATE 34:

While a little indistinct, shows its proportions, as it travels through the country.

PLATE 35:

The Armour Mine is another shaft that can be followed down with much interest. At the surface, the ore ran hardly a trace, but as it deepened, it showed a continual improvement both in values and width. For at the bottom there is a pretty vein of ore well defined, and running \$13. in precious values. It would make concentrating ore very fast even if the vein did not widen any more, but it apparently will continue to enlarge, judging from the conditions one sees as he examines the geological conditions in the shaft.

Just to the east is the Rico, which is in a state of development. In the lower workings, which is on a differen vein from the Armour, there are about 2 feet of ore that will run \$30. Bordering the Rico is the C.O.D., which has produced very heavily of high grade ore down to 600 feet and is now being operated.

On personal examination of these properties along the route of the tunnel, there will be found properties that will be interesting, but are not mentioned in this report, because it would be tiresome to go into the details of them all, and the best are shown in this report and are enough to justify the driving of the tunnel, to its proposed limits.

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MILL: As to the mill, it will contain only such machinery used in general up to date concentration.

POWER: The power can be produced for about 1¢ per K.W.

LABOR CONDITIONS: The labor conditions are such as are found in most western camps at present.

TRANSPORTATION: The transportation from the mill to the railroad should be done by a switch 3 miles long from the Santa Fe Railroad, which would reach its terminus at a 3 percent grade. The cost of this and terms are noted on separate page.

ORE VALUES AND PRODUCTION: The value of the ores, wherever mined to any extent, range from \$12. (?) up to \$50. The average value will be from \$15.

to \$25. mine run. Of this class of ore, when the tunnel is completed, there should be some thousand tons or more mined every day.

COST: The cost of the project which will include 5 miles of tunnel, and 2 miles of laterals, with ventilations, should amount to \$350,000. A power plant for doing this work will probably be installed at a cost of \$25,000. When the project is in full blast a larger power plant will have to be installed, but for \$25,000. all power needed for development and some mining can be had. For the equipment there will be needed some \$100,000. which will include the water, air, and power pipelines, cars, trackage, drills, steel, and incidentals.

EARNINGS: This will supply a tonnage of at least 1000 tons a day for a mill, which should be built to this capacity for not to exceed \$400,000. which will have concentration by tables and flotation. The tunnel should transport 1000 tons of ore a day for which it should receive at least \$1. per ton, at an actual operation cost of about 20¢ per ton, besides rock for which it should be paid some 25¢, which is small margin above cost. The mill should make a profit of at least \$2. per ton, and if the ores average only \$12., which is a low estimate, there should be some \$3. per ton profit in the mining, or in other words, it should not cost to exceed \$7. per ton for handling this ore when mined through a tunnel, milled in a large plant, connected with the trunk line by standard gauge switch. So under this heading the mining operation should net \$3,000. per day, transportation \$800. and mill \$2000. per day. From this amount 10% should be taken for depreciation and 10% for interest, leaving a net income of \$1,600.00.

TUNNEL CONSTRUCTION COSTS: In figuring the costs of this tunnel we find that they are lower than the costs of other such work, from \$5. to \$10. a foot. This is because as the tunnel proceeds, part of the work done will be charged to the mining end, and not to the tunnel work alone. For instance, the overhead amounts to some \$3. a foot or more, if the tunnel were to be driven along (alone?), but if there were veins being opened up and actual mining taking place, no matter if it was only development in the blocking out of ore, the overhead would be charged partially to that work, the same engineering (power) force supplying the power for mining as well as for the driving of the tunnel work. The haulage could be charged partially to the mining for the same motor that would haul out cars from the face

of the tunnel would pull ore at such times as it was not doing tunnel work. The same ventilation system would sever branches, and as the tunnel will cut several veins by the time it has entered a thousand feet, and continue to cross new veins up to the end of the work, these costs will be divided.

The following costs will be charged up to the driving of the tunnel with the understanding that the costs of driving the tunnel will soon be only the addition of power for the drills, timber and powder, for there will probably be a hundred men working in the actual mining, while there will only be 4 to 8 in the face of the tunnel.

However, for the first mile the work can be estimated in the following for two shifts:

4 machine men at \$6. per day	\$24.00
4 muckers at \$5. per day	20.00
1 engineer at \$7. per day	7.00
Powder	10.00
Timber	20.00
Incidentals	20.00

Two shifts should drive 10 feet a day, which makes it less than \$15. per foot for the driving of the tunnel properly.

#### CONSTRUCTION OF TUNNEL:

The tunnel will be constructed to proportions of 5 by 7. This seems small at first glance but will allow the clearance of a two-ton car. Switches will be put in for the passage of trains. At such times as conditions call for double track, the tunnel can be enlarged. This will cut initial cost. Timbering will be needed where the tunnel crosses veins. In running laterals they should be run parallel with the veins, and a short cross cut made to them when wanted. This will save timbering, which is costly in this country.

EQUIPMENT: The cost of equipment is a matter which will grow as the mining operations enlarge. For the tunnel proper, three machines would be enough to drive it, two active and one auxiliary, while to make the mine produce a thousand tons of ore, and carry development ahead, there should be 150 machines which will cost from \$200. to \$300. each, depending on the size and work they are expected to do.

The piping for ventilation with the power carrying pipe and piping for water for drills will come to at least \$15,000., the rails \$6,000., cars \$25,000., drills \$37,000. The foregoing is full equipment for completed