SUNSHINE MINING COMPANY

Memorandum for: _____ **Date** 4-27-84

Au 1974 recovered values @ $165 /oz = $37.50/ton

possible 500,000 tons — } in 1992
probable 80,000 }

who owns now?

Josephine

Belton mine
Josephine

A

REPORT

ON

THE BENTON MINE

PROPERTY OF

THE LEWIS INVESTMENT CO.

OF

PORTLAND, OREGON.

BY

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PROFESSIONAL MINING ENGINEER

APRIL 22, 1942

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SUMMARY

The Benton Vein has proven to be a persistant vein on its strike for 2000 feet and in depth 600 feet and considerable horizontal extension and depth is expected.

Sufficient development work has been completed on the Benton Vein to expose the Nebraska and Louisiana Veins intersecting the Benton, which , coupled with other surface indications gives a picture of a vein system and considerable larger ultimate ore production than before imagined.

Five years operation produced 64,282 tons of ore averaging $8.546 per ton which should be an accurate figure on which to base future grade of ore.

An ultimate mine production of 500,000 tons can be expected on which to plan a 10 year operation of 125 tons per day.

Continued operation of mine and mill on a 60 ton basis is not economical because (1) too low recovery by present mill due to inadequate ball mill capacity and agitation time (2) too high milling cost due to small tonnage over which to spread labor costs and (3) tonnage is too small to reduce overhead costs to a minimum.

On a 125 ton basis, an estimated operating profit of $2.17 per ton could be realized with adequate mining and milling equipment. (Taxes, depletion, and amortization charges excluded.)

On a production basis of 125 tons per day with present ore reserves:

(1) Probable ore shows a profit of $66,161.13
(2) Possible ore shows a profit of $107.851.17

An expenditure of $35,656.00 of which 75% would be recovered will develop enough ore to supply a 125 ton mill 1½ years plus a possible ore reserve for an additional 2 years.

A conservative estimate of $75,000 would enlarge the capacity of the present power plant and mill to handle 125 tons per day.

The conclusion is reached that the Benton Mine is meritorious and that an expenditure of $110,000 is advisable to make available for mining ore reserves to supply a 125 ton milling operation and to enlarge mill and power plant to that capacity.

Signed Elton A. Youngberg

Elton A. Youngberg

TITLE AND LAND INFORMATION

The claims comprising the Benton Group of the Lewis Investment Company in Sec. 22, 23, and 27, T33S., R8W, W.M., Josephine County, Oregon, consist of eight patented claims and sixteen located claims.

A claim map may be found in the appendix.

Patented Claims: (Patent No.164,539 - M.S. No. 496)

Benton	Missouri
Georgia	Carson Hill
Louisiana	Texas
Ruby Hill	Arizona

Located Claims: (Recorded in Josephine County)

Nebraska	Maryland	Utah	High Ore
Berkeley	Idaho	Kansas	Nevada
Confidence	Montana	Dawn	Hazel
Posser	Washington	Colorado	Iowa

HISTORY OF BENTON MINE

During the period 1891 to 1905, Mr.J.C.Lewis purchased the J.C.L. and Benton Groups of claims. Mr. Lewis had completed approximately 5000 feet of development drifts and raises on the Benton when the project was discontinued in 1905.

With the increase in price of gold to $35.00 per ounce in 1935, development work was again resumed by the Lewis Investment Company.

A cyanide plant of 40 ton capacity was completed in Sept., 1937; the plant was enlarged to 60 ton capacity in 1940 and milling continued until April 15,1942. During this period, 64,282 tons of ore were milled having a gross value of $549,414.40

Mining and milling operations were discontinued on April 15,1942 because of Government regulations covering the purchase of supplies and high war prices of supplies and labor.

FACILITIES AND EQUIPMENT

The mine camp is adequate to care for fifty men. Thirty five men can be housed in bunk houses and fed in a well equipped cookhouse. An additional fifteen married men may be housed in Company owned houses.

The mine is well equipped with drills, double drum hoists, tugger hoists, and mine cars of the latest design to supply 60 tons of ore to the mill per day on a one shift basis. Mule tramming has been used which should be replaced by power tramming. Mechanical mucking would become economical on the 1020 Level with the use of power tramming. a 650 cu. foot compressor supplies sufficient air for all mining operations.

The mill is equipped well, however, additional grinding capacity is needed to give the required grind of 70-72% on slime product and additional agitation time is also desirable to obtain a 87.5% recovery on a 60 ton basis. The mill, as a whole, operates well with very little loss of time.

The Diesel power plant is adequate to handle a 60 ton production in the mine and mill, but in order to do this it must carry its maximum load.

A complete list of all power plant, mining, and milling equipment may be found in the appendix.

BENTON MINE GEOLOGY

Surface

The Benton Vein System is in a diorite mass approximately two thousand feet wide at the horizon of the present mine workings and extending North East and South West several miles. The East flank is in contact with a series of meta volcanic and greenstones in which the Gold Bug, Molly Hill and California Mines are located. There are indications that the diorite intrusion may extend under this area and provides the source of mineralization to this area. On the West is a series of sediments composed of schists and quartzites. There is no known vein in this area except small fissures along the contact.

Benton Vein System

The Benton System is composed of six known veins, the Benton, Georgia, Nebraska, Louisiana No. 1, Louisiana No. 2, and the Texas. The first four named have been exposed in the mine workings. The major development work and mining has been done on the Benton Vein. Approximately 200 feet of drifting was completed on the Louisiana No. 1 on the 1020 Level at its junction with the Benton Vein. a good grade of ore ($25.00) was encountered for its entire length. The ore chute extended approximately 35 feet above the level at 1020-J Raise. The best part of the ore chute is below the 1020 Level. The face of this drift is in ore. The Louisiana Vein has a strike of N 79 E and a dip lf 55° to the North West.

The intersection of the Nevraska Vein and the Benton is exposed in 700-I Raise. No drifting has been done on this structure. A diamond drill hole from the end of the West crosscut at the Main Raise on the 780 Level cut 1½ feet of ore 45 feet ahead of the present face, which is believed to be the Southward extension of the Nebraska Vein.

The Nebraska Vein has a strike of N. 60 E. and a dip of 57° to the North West.

The Louisiana No. 2 Vein has not been encountered in our present mine workings. Its intersection with the Benton Vein on it projection would be about 900 feet South of the present Benton face. I has a strike of N. 80 E. and a dip to the North.

The Texas Vein is on the Texas claim to the South of our present workings. Its strike is nearly North and dips 35-40° to the East. An ore chute is exposed containing small bodies of commercial ore.

The Benton Vein has been explored along its strike for about 1500 feet and on its dip for 600 feet. The vein has a strike of N. 20 E. to N. 40 E. and a dip of 80° to the East. This is the most Eastern North and South vein known.

Structural Features of Benton Vein

The Benton Vein is a mineralized normal fault with its structural features determining the location, shape and size of the ore bodies. The Eastern side of the block seems to have moved down-ward and to the North with relation to the West side. The major component being in the vertical plane. I would hazard a guess of 25 to 50 feet. The fault fracture is quite uneven due to the fault crossing different phases of diorite which have caused variations in strike and dip of the vein. The ore chutes are usually formed when the footwall dips greater than 80° to the East and it may at times reverse itself to as much as 80° to the West. The ore chutes also have a pronounced rake to the South - an average rake would be about 45°.

Above the 780 Level to the surface and Northward the hanging wall breaks up into adjustment blocks which were mineralized at the same time as the Benton form a network of veins and veinlets.

Two of these structures so far developed are the "C" Vein and the "F" Vein, dipping 70-80° West and a strike of N. 50-70 E. These veins and their interlacing cross veins have produced a considerable tonnage of ore. The ore developed and stoped on the 500 Level is also on this type of structure.

The Benton Vein below the 780 is confined to the Benton structure. The vein in no place has a definite hanging wall and lenses may be found as far as thirty feet from the footwall depending upon the original fracturing of the Benton Fault and to the migration of the mineralizing solutions. As many as three parallel quartz lenses may be standing side by side separated by from 2 to 6 feet of altered and mineralized diorite. This requires that the hanging wall should be checked frequently by 7 to 8 foot test holes in the stope and diamond drill holes at least every 100 feet on the levels.

Post Mineral Faulting

Some post mineral faulting has taken place along the Benton. A strike fault presists along its entire length which at times cuts the lenses of ore such as to detach part of the lenses or to cause it to have double its normal width. This movement is not great. N. 80 E. faults cut the vein at intervals of 15 to 500 feet. The movement is always to the right and may vary from a few inches to 25 feet.

Mode of Occurrence and Ore Minerals

The ore is formed by the replacement of the diorite along the Benton fault zone. The gold values are contained almost entirely in an auriferrous pyrite. The percentage of sulphides in the quartz or partially replaced diorite is usually a good criteria as to gold values. The only other sulphide readily identified by the eye is isolated segregations of molybdemite found in widely separated parts of the mine. Presence of molybdemite has usually indicated a decrease in gold values. The American Cyanamid Co. identified the presence of the following minerals under a microscope: marcosite, chalcopyrite, spholerite, magnitite, quartz, sericite, chlorite, and calcite.

MINING

Development

The Benton Vein is developed by the Kansas crosscut 1500 feet long which is used as a haulage level to the mill. A drift extends approximately 1000 feet to the South on the vein and 500 feet to the North. The main raise is used as a working raise for supplies and ore passage for the 900, 780, 700, and 500 levels. A new crosscut was started on the 1020 Level South of the mill to cut the Louisiana No. 1 Vein and then it was planned to drift on the Louisiana to its intersection with the Benton. This was to be used as a main haulage way for the ore developed on the South end of the Benton structure and also a working shaft for development of the ore below the 1020 level was to be sunk in the vicinity of the junction of the Benton and Louisiana.

In the 800, 900, 1020 Levels of the mine, the ore has been developed by drifting laterally upon the levels cutting the ore chutes, then diamond drilling at points in question short horizontal holes not over 50 feet in length to determine the position of parallel lenses in the walls.

A short raise is driven at the Northern extremity of the ore high enough to provide chute capacity for about thirty cars. A drift or rill is driven along the bottom of the ore and the ore chute is followed to the next level. Mechanical slushers being used to pull the ore to the chutes. The rills or inclined raises are used as waste passages for filling and the slushers used for mucking ore are also used for spreading waste. The ore is mined by cut and fill methods and the raise is carried up with the stope. Usually raises cannot be driven from level to level in ore as the ore chute on its rake will retreat and will be to the North of the raise before it reaches the next level.

In the North end of the mine on the 780, 700, 680, and 500 levels, diamond drilling becomes very important. Lateral drifting was usually done upon the main Benton structure and

them diamond drill holes, horizontal and inclined, 75 to 150 feet in length are drilled to the East to determine the presence or position of splits from the Benton. The junctures are almost always blended by several feet of mineralized and altered diorite. The 45° rake of the ore chutes also holds true on these splitting veins.

Mining Methods

(1) Shrinkage stoping has been tried, but has proved in general to be unsuccessful because of weak walls causing dilution and the inability to mine the ore clean due to the irregularities of the ore bodies and parallel hanging wall lenses.

(2) The inclined cut and fill and horizontal cut and fill stopes using mechanized slushers for moving the ore and spreading the waste has been used to produce the major tonnage of ore from stopes. The maximum back above filling used was 14 feet. The walls gave very little trouble and stood well. The maximum width of the back of stopes opened were 18 feet. The backs were arched and stood without timbering. When necessary, occasional stulls were used to hold slabs of waste on the wall until ore was removed by slushers.

Cut and fill stopeing was the method best adapted to the ore bodies encountered. The flexibility of the method allowed extension and retreat of the stope with the irregularities of the ore body, blasting of "horse of waste" for filling and sorting in the stope. A cheap source of waste was obtained by driving the 900-X Raise to the surface in to which diorite tailus was scraped for filling.

(3) Some square set and filling was done next to faults where the ore was broken up and both the walls and back needed supporting. Also, square setting was used where ore was underhand stoped, isolated lenses removed and filling was not readily available.

(4) Stull stoping was used successfully on the 500 Level where the vein had a dip of 45-50° and width of 3 - 5 feet. Occasional cribbing was put in where the ground became heavy.

NUMBER 1 WINZE

The No. 1 Winze was stopped because of discontinuation of mining operations at a depth of 64 feet on April 6,1942. The shaft was timbered to a depth of 55 feet, the remaining ten feet is supported by a stull and head board from foot hanging wall in the center of the shaft. Ladders were left in the manway compartment on the South side of the shaft.

The shaft has an average dip of 80° to the East. The footwall was marked by a gouge which persisted to the present depth of the shaft. The ore consisted of lenses of quartz laying on the footwall having a width of .5 feet to 5 feet and an average of probably two feet accompanied by 2 to 3 feet of sheared, replaced, and mineralized hanging wall rock. Small lenses of high grade quartz were often encountered in hanging wall sheared zone. The hanging wall should be prospected for additional parallel lenses which from experience in other parts of the mine may contain considerable tonnages of Ore.

The samples upon attached assay maps are chip samples across the quartz on the footwall and accompanying mineralized diorite in hanging wall which appeared to be of milling grade at the time of sampling. The mine car samples from the winze indicated accuracy of sampling allowing for dilution from hanging wall. The entire content of the winze excavation was milled.

At the time of stoping the shaft, the North End had two and one half feet of well mineralized quartz; the center of the winze had two feet of well mineralized quartz and the South End had four feet of highly mineralized diorite with small lenses of quartz. There were no indications which would lead one to expect the ore to cut off with additional depth.

SUMMARY OF MINE PRODUCTION

BENTON MINE OF LEWIS INVESTMENT COMPANY
Josephine County,
Grants Pass, Oregon.

Year	Month	Tons Milled	Tons Waste	GOLD BULLION Ounces	GOLD BULLION Value	Average Tail Assay	Computed Heads	Recovery	Gross Value
1937	Sept.	800	37	63.98	$2,239.30	$1.77	$4.56	61.2%	$3,648.00
	Oct.	600	49	145.49	5,092.15	1.93	10.42	81.5	6,252.00
	Nov.	906	112	129.88	4,545.80	1.04	6.06	82.9	5,454.00
	Dec.	521	54	117.16	4,100.00	0.88	7.75	88.6	4,037.75
	Total	2827	252	456.51	15,977.25	1.21	6.86	82.4	19,391.75
1938	Jan.	773	143	86.63	3,032.05	0.42	4.34	90.3	3,354.82
	Feb.	694	91	77.15	2,700.25	0.528	3.51	85.0	2,841.20
	Mar.	211	13						
	Apr.	Stopped							
	May	700	67	51.88	1,815.80	0.553	3.39	84.3	2,373.00
	June	926	98	111.76	3,911.60	0.58	4.80	87.9	4,444.80
	July	829	92	157.04	5,496.40	0.76	7.39	89.7	6,126.31
	Aug.	1035	209	323.45	11,320.75	1.03	11.97	91.4	12,388.95
	Sept.	886	164	282.65	9,892.75	1.06	12.22	91.3	10,826.92
	Oct.	1016	294	311.82	10,913.70	1.21	11.68	89.7	11,866.88
	Nov.	858	259	219.62	6,786.60	0.95	9.91	90.4	8,502.78
	Dec.	149	36	65.66	2,298.10	1.295	16.72	92.2	2,491.28
	Total	8077	1466	1,687.66	58,168.00	0.87	8.07	89.2	65,216.94
1939	Jan.	798	199	131.18	$4,591.30	$1.40	$7.28	80.7%	$5,809.44
	Feb.	876	164	172.45	6,035.89	1.54	8.43	82.7	7,381.68
	Mar.	809	118	165.99	5,809.65	1.01	8.19	87.7	6,625.71
	Apr.	668	94	109.62	3,836.70	0.78	6.52	88.2	4,355.36
	May	1113	207	297.15	10,400.25	1.24	10.49	88.1	11,675.37
	June	1307	245	285.66	9,998.10	1.14	8.79	87.0	11,488.53
	July	1258	173	243.62	8,526.70	1.01	7.79	87.1	9,799.82
	Aug.	1371	194	399.79	13,992.65	1.58	11.78	86.7	16,150.38
	Sept.	1413	234	231.50	8,102.50	0.95	6.68	85.75	9,438.84
	Oct.	1106	201	193.54	6,773.90	0.885	7.005	87.3	7,747.53
	Nov.	1432	197	316.23	11,068.05	1.46	9.19	84.1	13,160.08
	Dec.	789	116	287.81	10,073.35	2.80	15.57	82.0	12,284.73
	Total	12940	2142	2,834.54	$99,209.04	$1.30	$8.96	85.5%	115,917.47

February and March were cleaned up together. Gold Bullion Ounces are from returns of Selby Smelter. Computed heads is ounces Bullion per ton recoverd at $35.00 plus average tails for month. All dollar values are based on $35.00 gold. Gross Value is computed heads times monthly tonnage.

BENTON MINE PRODUCTION -- Page 2 ---

Year	Month	Tons Milled	Tons Waste	GOLD BULLION Ounces	GOLD BULLION Value	Average Tail Assay	Computed Heads	Recovery	Gross Value
1940	Jan.	1218	194	290.67	$10,173.45	$2.01	$10.37	80.5%	$12,630.66
	Feb.	1298	150	359.29	12.575.15	1.44	11.13	87.0	14,446.74
	Mar.	1389	90	338.52	11,848.20	1.09	9.62	88.7	13,362.18
	Apr.	1344	30	376.74	13,185.90	1.43	11.16	87.2	14,999.04
	May	1384	39	374.15	13,095.25	1.95	11.40	82.8	15,777.60
	June	1224	27	309.03	10,816.05	1.81	10.65	83.0	13,035.60
	July	1331	50	287.90	10,076.50	1.28	8.86	85.6	11,792.66
	Aug.	1301	74	301.74	10,560.83	1.73	9.85	82.4	12,814.85
	Sept.	1329	53	262.74	9,195.90	1.63	8.55	80.9	11,362.95
	Oct.	1278	80	298.99	10,464.65	1.84	10.03	81.7	12,818.34
	Nov.	1609	128	278.77	9,756.95	1.16	7.21	84.0	11,629.73
	Dec.	1524	67	261.96	9,168.60	1.22	7.24	83.1	11,033.76
	Total	16229	982	3,740.50	130,917.43	1.53	9.59	83.9	155,704.11
1941	Jan.	1897	82	291.82	10,213.70	1.367	6.747	79.8	12,799.06
	Feb.	1647	90	255.94	8,957.90	1.10	6.54	83.2	10,771.38
	Mar.	1777	113	338.85	11,859.75	1.256	7.926	84.2	14,084.50
	Apr.	1455	219	231.67	8,108.45	1.03	6.60	84.3	9,603.00
	May	1748	254	309.41	10,829.35	1.066	7.256	85.3	12,683.49
	June	1810	169	388.49	13,597.15	1.22	8.73	85.9	15,801.30
	July	1892	184	341.97	11,968.95	1.157	7.48	84.3	14,152.16
	Aug.	1901	239	364.56	12,759.60	0.998	7.71	87.0	14,656.71
	Sept.	1679	230	380.38	13,313.30	1.20	9.13	86.8	15,329.27
	Oct.	1623	270	279.17	9,770.90	0.87	6.89	87.3	11,182.47
	Nov.	1637	267	435.11	15,228.85	1.93	10.96	82.5	18,489.52
	Dec.	810 876	156	231.99	8,119.65	2.00	12.02	83.4	9,736.20
	Total	19,926	2,273	3,849.36	134,727.55	1.23	7.99	84.5	159,289.06
1942	Jan.	552	101	88.31	3,090.85	1.76	7.36	76.2	4,062.72
	Feb.	1388	201	300.41	10,514.35	1.54	9.11	83.0	12,644.68
	Mar.	1773	239	299.73	10,490.55	1.43	7.52	80.4	13,033.99
	Apr.	500	51	102.76	3,595.60	1.11	8.31	86.5	4,153.68
	Total	4213	592	791.21	$27,691.35		$8.04	81.7%	$33,895.07

Total Mine Production ..... 64,282 tons
Total Gross Value Ore Produced... $549,414.40
Average Value Per Ton Ore Milled. $8.546

Note:

Bullion Value for March and April,1942 is gold solution mill precipitation record. Smelter returns were not available at time of writing report.

ORE TREATMENT
(Milling Problems)

The ore is not complex and may be readily treated by cyanidation or flotation. A recovery of 87-90% can be obtained by a grind of 72% minus two hundred mesh and an agitation time of 72-80 hours. Flotation tests made by Pan American Company indicated a 90-93% recovery could be made by flotation with a 72% grind. Cyanidation was chosen because it gave a greater economic recovery due to the cost of hauling and shipping of concentrates to the smelter.

The distribution of the gold in the ore necessitates fine grinding in either cyanidation or flotation. The major percentage of the gold is associated with the pyrite, however, the gangue will carry .03 to .08 ounces of gold which must be recovered. This fact in regard to our cyanidation practice indicates scalping off the pyrite carrying the largest percentage of gold values and re-grinding for a batch treatment and the treatment of the gangue in the slime plant to recover their gold values.

Fine grinding to make the necessary recovery by flotation plus its lower economic return does not make this method as attractive as cyanidation, however, if the ore becomes more refractory to cyanidation in depth, flotation probably would be considered.

The present mill has been operated at a capacity of 60 tons per day. The crushing plant was operated on two shifts, producing a 3/8" ball mill feed product. The maximum grind possible with our present 5x6 mill was 60% minus 200 mesh. There was sufficient thickening and filter capacity for this tonnage. The agitation time was considerable short of 72 hours. The average recovery of

the mill operating under these conditions was 84-85%. Another factor entering into recovery was the temperature of the mill solutions. The thickeners are out in the open and during periods of sub-freezing weather, the recovery would drop 5 - 8% and precipitation would become almost impossible. The winters are too hard for an open plant - all thickeners and agitators should be enclosed.

BENTON MILL

The Benton Mill is well constructed and arranged. It is capable of handling 60 tons of ore per day with a recovery of 85%. At a capacity of 50 tons, 87.5% recovery is easily obtained.

The Flow Sheet is as Follows:

(1) Mine Ore Bin (75 tons)
(2) Allis Chalmers Blake Crusher, 9"x12"
(3) Traylor Gyratory Crusher, 1'8"
(4) Cylindrical Fine Ore Bin (100 tons)
(5) Williamson Ball Mill, 5'x6'
(6) Dorr-Duplex Rake Classifier, 3'x18'
(Slime to 7 & 8, Sands to 5)
(7) Dorr Thickener, 26'x10'
(Decant Sol. to 10, Slimes to 7A)
(8) Dorr Thickener, 20'x10'
(Decant Sol to 10, Slimes to 8A)
(7A) Dorr Agitator, 16'x12'
(Slimes to 7B)
(8A) Dorr Agitator, 12'x12'
(Slimes to 8B)
(7B) Dorr Agitator, 12'x12'
(Slimes to 7C)
(8B) Dorr Agitator, 12'x12'
(Slimes to 8C)
(7C) Dorr Thickener, 16'x10'
(Slimes to 7D, Sol. to 5)
(8C) Dorr Thickener, 16'x10'
(Slimes to 8D, Decanted Sol. to 5)
(7D) Dorr Thickener, 16'x10'
(Slimes to 9, Decanted Sol. to 7C)
(8D) Dorr Thickener, 16'x10'
(Slimes to 9, Decanted Sol. to 8C)
(9) 8'x8' Oliver centinous Drum Filter
(Sands to waste, Solution to 7D and 8D)
(10) 260 Ton Capacity Merrill-Crowe Precipitation Unit
(Barren Solution to 9, 7D, and 8D)

Detailed Mill Operating Data and costs may be found in Appendix.

OPERATING COSTS

The costs listed below are for the mine year ending Nov. 30,1941. A break down into supplies and labor may be found in the appendix.

Mining Cost

Direct Mining Cost	$2.729		
Current Development	.987		
Capital Development	.506		
		$4.22	
Milling Cost		1.643	
General Charges		.90	
Total operating cost/ton			$6.763

Future Costs

I believe the following operating costs can be obtained under progressive management, using all labor saving devices available, such as power tramming , slushers, mechanical loaders, etc., on a 125 ton basis.

Direct Mining	$2.70	
Current & Capital Development..	1.00	
Milling	1.10	
General Expenses	.50	
Total		$5.30

This means that all ore over $6.057 per ton can be handled at a profit.

MINE SAMPLING

Mine samples were taken with sampling pick by chipping about three pounds of the ore into a sample bag held by a ring. Chip samples were taken from all development faces daily and from stopes when car samples indicated grade of ore was becoming marginal. Approximated grade of ore could usually be estimated by inspection - no attempt was made to sample each face before breaking, however, samples were taken frequently of replaced amd mineralized diorite and changes in appearance of structure or vein material. The gold to pyrite ratio usually held constant for one particular stope, but in widely separated parts of the mine, the ratio changes considerably. Estimation of ore values by inspection should not be used until one has become thoroughly familiar with the ore values of each ore chute and then checked frequently.

Relationship of Sampling to Mining

The grade of ore which an ore chute will produce is not readily determined by cut samples because of the occurence of high grade lenses with in the ore chute. High grade lenses of ore occur within marginal ore. The location of these high grade lenses are not readily determined one or two high samples along an ore chute will usually indicate their presence. These high grade lenses usually occur where structural features cause a damming of the passage of solutions . The practice has been to mine the ore chute clean, marginal ore with the high grade. Stoping of marginal ore has exposed additional high grade which would have been overlooked if selective mining of exposed high grade was practiced.

STOPE AND DEVELOPMENT HEADING

SAMPLING

The accompanying stope and development production record for the mine year ending November 30,1941 is corrected to calculated heads from smelter returns plus assay tails. The correction factor for the year is: (.05% x cars trammed) plus cars trammed equals mill tonnage. Value per ton: 3.8% times value per ton equals calculated mill heads.

The production record for December,1941 to April 15,1942 has not been corrected to mill tonnage or calculated heads.

The sampling was done by the trammer by taking approximately two pounds of the fine material from each car trammed before dumping into storage raises. On the main haulage level the cars were sampled in the same way as they were dumped into the coarse ore bin. The samples were collected at the end of each day shift and brought to the assay office where they were dried, split, and resampled for assaying by quartering and the use of a Jones Splitter.

The production from each stope was calculated daily and a summary made weekly for each stope along with labor and supply costs for each stope or heading producing ore. The samples on the main haulage to mill were calculated daily to show gross value of ore trammed to mill and value per ton. No allowance was made for sorting in the coarse crushing plant as the mine haulage cars excess capacity equalled approximately the tonnage sorted.

ORE PRODUCTION

STOPE AND DEVELOPMENT HEADINGS

YEAR ENDING NOVEMBER 30,1941

PLACE	TONNAGE	TOTAL VALUE	VALUE PER TON
500 N. Drift	337	$2,941.27	$8.73
500 Stope	1871	22,628.39	12.09
680-A Raise	25	101.01	4.04
700 E	16	140.07	8.75
700 A Stope	521	3,403.46	6.53
700 E Stope	434	5,170.60	11.91
700 F Drift	266	1,626.07	7.15
700 I Raise	238	944.44	3.97
780 A South	805	4,065.56	5.04
780 AB	1694	12,780.41	7.54
780 D Raise	256	3,030.60	11.83
780 DE Stope	77	342.96	4.45
900 S Drift	348	3,828.06	11.00
900 R	238	6,636.36	28.05
900 S	317	1,682.14	5.31
1020 S Drift	1502	9,304.85	6.19
1020 A Raise	492	2,399.40	5.06
1020 B Stope	397	3,585.18	9.01
1020 B-5 Stope	437	2,402.16	5.49
1020 EB Stope	223	1,776.57	7.86
1020 B Raise	203	1,285.00	6.33
1020 CD Stope	4076	37,072.78	9.10
1020 DF Stope	3383	20,881.51	6.17
1020 FG	68	228.19	3.35
1020 GH	618	2,480.81	4.01
1020 F Raise	279	1,296.30	4.64
1020 J Raise	345	1,613.66	4.67
1020 L Raise	399	2,268.73	5.68
1020 I Raise	774	4,622.79	5.97
TOTALS ———	20639	$160,539.33	$7.78 (Average/Ton)

ORE PRODUCTION

STOPE AND DEVELOPMENT HEADINGS

DECEMBER 1,1941 THRU APRIL 10,1942

PLACE	TONNAGE	TOTAL VALUE	VALUE/ TON
500 Stope	193	$2,617.00	$13.51
680 South	68	950.60	13.98
700 A Stope	269	2,233.35	8.30
700 F Drift	186	1,523.90	8.19
700 B Raise	81	628.25	7.75
780 No. 1 Stope	701	2,841.66	4.05
780 A South	469	2,495.70	5.32
780 D Rill	223	811.15	3.63
800 Level	341	3,814.65	11.15
900 X Surface Dump	355	2,346.55	6.64
900 S	56	548.80	9.80
1020 A Raise	207	2,811.90	13.10
1020 B-5	58	288.40	4.97
1020 CD	416	9,441.25	22.69
1020 DF	398	3,618.25	9.09
1020 I	306	1,913.80	6.25
1020 F	82	662.90	8.08
No. 1 Winze	432	4,007.05	9.27
TOTALS	4841	$43,565.16	$8.999 Average/Ton

43555.16

ORE RESERVES

The ore reserves I have divided into two classes,; one probable ore,and the other, possible ore. You wil note the conspicous absence of positive ore; the ore bodies do not lend themselves to blocking out to the usual drifts and vertical raises because of their lenses nature and rake of the ore chutes. the maximum development needed before mining is the exposure of the ore chute on two levels and an inclined raise following the ore between the two levels. Ore in this stage of development has been called probable ore. Ore bodies of triangular shape where exposed on two sides I have also classed as probable ore.

Ore bodies exposed upon one side by drifting such as ore chutes continuing below or above the levels on their rake I Have classed as possible ore. I have limited the blocks of possible ore to depths and extensions which could be developed into probable ore, or to the mining stage, by a moderate development program carried on with mining as in the past within a period of two years.

The ore reserves as I have estimated them on our past operating experience should have an average value of $8.546 per ton. This figure is based upon approximately five years operations representing 64,282 tons of ore including development rock and ore from all parts of the mine. I believe for future ore valuation estimates you will find this figure to be very close

Ore Expectations and Extensions

Th tonnage of ore which this deposit will produce is impossible to estimate, but I feel an estimate of 500,000 tons upon which to base and plan a mining operation to be conservative in view of our past operating experience. I base my estimates on the following facts: (1) The extension of possible ore to the Northward above the 700 Level to the surface is reasonable to expect in light of our stoping & drifting on the 500 Level the past year. (2) The extension of our 800,900, and 1020 Levels Southward is not limited geologically and outcrops indicate at least another 1000 feet is to be expected. (3) the ore bodies have

increased in size and no decrease in ore values in depth have been noted which would indicate pinching of the vein or limited depth of commercial ore. Veins of this type situated in grano diorites are known for their persistance in depth and another thousand feet in depth on the Benton should be anticipated. (4) Two East-West veins were exposed in the mine workings during 1941. The Nebraska in the North End of the mine and the Louisiana on the South End. Commercial ore is exposed at the surface of both veins and two hundred feet of drifting was completed on the Louisiana No. 1 on ore of milling grade. These veins should produce a substantial tonnage. (5) The Louisiana No. 2 and the Georgia veins are both underveloped, but both fissures have ore exposed which will be developed in due time as the Benton working is extended. (6) The Texas vein which is several hundred feet in elevation below our present 1020 Level may be developed from lower level as the present workings are developed in depth and extended to the South. The Texas outcrop is approximately 300 feet in length which indicates a substantial ore chute in which a considerable tonnage of commercial ore may be developed.

PROBABLE ORE

PLACE	DIMENSIONS	TONNAGE
500 Level	200x70x3x½	1750
	40x40x3	400
	100x50x3	1250
Below 500 At Air Raise	80x40x3	800
700 F Drift	110x50x5	2300
700 F Below	110x20x4	733
700 C Vein	150x35x4	437
700 IA	40x20x4	266
780 DB	45x80x3	900
780 D North	30x50x½	63
900 H Sublevel	100x35x5	1460
900 J	50x120x4	2000
900 N	40x10x3	100
900 R	25x40x8	665
900 S	40x80x5	1334
800 A	25x70x5	730
1020 A	70x60x5	1650
	25x60x4	1200
1020 EB West	60x20x4	400
1020 EB East	15x10x3	37
1020 CD	60x6x6	180
1020 DF	100x60x10	5000
1020 FG	35x70x5	1020
1020 GH	35x70x4	816
1020 I	120x35x5	1750
1020 IL	65x50x4	1083
1020 Winze South	80x65x5	2165
		30,489 total tons

2165

POSSIBLE ORE

PLACE	DIMENSIONS	TONNAGE
780 Portal	100x5x50	2083
640 F Rill	3x100x50	1250
700 FT	3x60x100	1500
600-500 over 700 F Rill	100x100x4	3334
700 C Vein	100x100x4	3334
Below 1020 AB	100x120x4	4000
Below 1020 CH	450x120x4	18000
Below 1020 IJ	100x120x4	4000
Below 1020 Louisiana	120x180x4	7200
North of Main Raise and Under 780 Level	150x100x4	5000
		49701 Total Tons

SUMMARY ORE RESERVES

Probable Ore	30,489 Tons
Possible Ore	49,701
	80,190 Tons

Value Per ton - $8.546, based on past 5 years production

Value of Ore Reserves - 80,190 X $8.546 = $685,303.74

PROPOSED NEW MINE DEVELOPMENT AND COSTS

The following development work is recommended to develop ore reserves equal to 1½ years of probable ore and three years of possible to supply a 125 ton mill.

Drift South-ward 500 feet on the 800 Level on Benton Vein.

Drift Southward 500 feet on the 900 Level on Benton Vein.

Drift Southward 500 feet on 1020 Level on Benton Vein.

Drift Northward 300 feet on 500 Level on Benton Fault.

Raise 700 A Raise 100 feet to 500 Level for working raise and drift 100 feet Northward on 600 Level from Raise.

Drift 900 feet on Louisiana No. 2 Vein to Benton workings.

Complete 800 feet of diamond drilling on 500 Level on development drift both East and West to locate splits from the main Benton.

Complete 500 feet deamond drilling from 600 Level off 700A Raise to the East; one long hole at least 200 feet in length.

Sink No. 1 Winze and additional 60 feet, cut skip pocket and 1120 Station.

Drift 500 feet Southward on 1120 Level.

Drift 100 feet Northward on 1120 Level.

Costs

3400	feet	drifting and Crosscutting	@ $9.00	$30,600
60	"	sinking	@ 40.00	2,400
100	"	raising	@ 12.00	1,200
1300	"	diamond drilling	@ 1.12	1,456
				$35,656

From our past operating experience, 75% of this development cost probably would be recovered from the development ore produced.

When this program is completed, since a great deal of your future mine tonnage will be below your 1020 Level, a main hoisting shaft must be started and completed to at least 100 feet in advance of any development work in depth. This shaft is important because it will give cheaper hoisting cost, supply costs, tramming costs, and mucking costs. The lower levels will be each three to four thousand feet in length and will necessitate mechanical tramming, also this drifting will require mechanical mucking and with properly designed shaft this equipment may be moved from level to level as needed.

The No.1 Winze should only be considered an exploration project and should not be used as a hoisting shaft except for a limited tonnage of development rock. This point is important since future mining costs must be kept to a minimum and a well planned sinking and development program will add many years to the life of this mine.

The Georgia Vein can be best developed by drifting along diamond drill hole No. 56 and raising to the Georgia Shaft at the Portal. An ore chute carrying good values occurs in the North end of the shaft near the top and extends Northward for approximately 50 feet and is exposed in the Georgia Tunnel. This work should be started when the recommended development work is completed..

OPERATING COSTS PER TON

MINE YEAR - DECEMBER 1,1940 thru NOVEMBER 30,1941

MINING

Labor	$3.15
Repairs & Replacements	.044
General Supplies	.10
Explosives	.31
Lumber & Timber	.254
Power Oil	.10
Lubricants	.002
Pipe & Fittings	.05
Drill Repairs	.026
Drill Supplies	.136
Small Tools	.033
Diamond Drill	.015
T Total Mining Cost	$4.22

MILLING

Labor	$0.823
Repairs & Replacements	.15
General Supplies	.053
Balls	.134
Milling Reagents	.114
Power Oil	.235
Lubricants	.05
Pipe & Fittings	.002
Small Tools	.012
Liners	.07
Total Milling Cost	$1.643

NUMBER 1 WINZE

PRODUCTION AND COST DATA

Total Labor Cost	$2,038.00	$31.84 per foot
Total Supply Cost	438.26	6.848 " "
Total Costs, Labor and Supplies ...	$2,476.26	$38.688 per foot
Total Ore Production	432 tons	6.762 tons per foot
Total Dollar Value Produced	$4,007.05	$62.50 per foot

Average value of Ore per ton $9.275

Direct labor & supply cost includes installation of hoist, enlarging skip pocket, and catching sill.

Shaft was sank on contract under the following schedule:

Two men working five days per week

CONTRACT PRICES DEPTH	BREAKING	TIMBERING	MUCKING
0-25'	.09/Cu.Ft.	.03/Cu. Ft.	.05/Cu. Ft.
25-50'	.10 " "	.04 " "	.06 " "
50-75"	.11 " "	.05 " "	.07 " "
75-100'	.11½ " "	.05½ " "	.08 " "

1 man on days pay operated hoist and framed shaft timbers on 40 hour week at $7.00 per day.

Dimensions of shaft; 5'x10' with a hoisting compartment and manway compartment 4'0"x3'8".

OPERATING COSTS PER TON
(Continued)

GENERAL CHARGES

Overhead	$ 0.69
Boardinghouse	.035
Camp Accomodations	.15
Shipping	.015
Total General Charges ..	$0.90

TOTAL OPERATING COST PER TON $6.763

Tons Mined	20,847
Tons Milled	20,535

MINING BREAK DOWN

FOR YEAR ENDING NOVEMBER 30,1941

	TOTAL	COST/TON	
Mining	$56,921.03	$2.729	
Development.....	20,561.95	.987	
Capital Asset Account ..	10,540.63	.506	
Total Cost per ton.....			$4.219

SUMMARY OF OPERATION

FOR YEAR ENDING NOVEMBER 30, 1941

Metal Recovery per ton (20,535 tons) $6.445
(Selby Smelter Returns)

Operating Cost Per Ton	$6.763	
Less: Charges to Capital A/C	.506	
	$6.257	6.257

Operating Profit Per Ton $0.198

MILL DATA — 1941

SUPPLIES:		Quantity Per Ton Ore
Sodium Cyanide	6,006	0.301 Lbs.
Hydrated Lime	76,465	3.837 "
Merrillite Zinc Dust	2,383	0.119 "
Lead Nitrate	135.5	0.0068 "
Forged Steel Balls	57,486	2.885 "
Ferrous Sulfate	3,585	0.179 "
Diesel Oil	66,037	3.314 Gal.

LABOR DISTRIBUTION:

Operating	$5,513.21	$0.277 per ton
Maintenance	4,203.72	0.211 " "
Crushing	2,661.55	0.1335 " "
Assaying	828.04	0.0415 " "
Supervision	2,170.21	0.1090 " "
Total	$15,376.73	$0.7720 " "

MILL DATA —— 5x6 WILLIAMSON BALL MILL

Ball Charge

11,000 Lbs.

Size of New Balls Added

50% -- 3½" Balls
50% -- 4 " "
A few 1½" Balls
All balls were forged steel
Ball consumption —— 2.885 Lbs. per ton ore milled.

Power required

50 Horsepower

Liner Consumption

End Liners —— 9½ Months
Ore ground during life ——— 14,271 tons
Weight of end liners ——— 3,087 lbs.
End liner wear per ton or ore — 0.216 lbs. per ton
or about $0.03 per ton of ore.

Side Liners ——— 15 months
Ore ground during life ---- 24,178 tons
Weight of side liners ---- 8,549 tons
Side liner wear per ton of ore;
0.353 lbs. per ton
About $0.047 per ton of ore

Tons per 24 hours

60 Tons

PROSPECTING EQUIPMENT

Diamond Drill

1 - Light Mitchell Chicago Pneumatic Diamond Drill,
Model 10E, Serial No. 287,
Complete with column, arm and saddle and rod puller.

60 - Pieces E size rod for above diamond drill in 5' lengths.

1 - 5' Core barrel, size E.

ENGINEERING EQUIPMENT

Transit

1 - C.L.Berger & Sons complete mining transit, Number 2281, complete with tripod, interchangeable auxiliary telescope, magnifying glass and two plumb bobs.

BIT SHOP

Jack Furnace

1 - Ingersoll-Rand Jackfurnace,

Size JF, Shop No. 2481, oil fired furnace,
Pyrometer equipment for controlling furnace temperatures,
Jack-bit quenching tank, size JQT, shop No. 36.

Ingersoll-Rand Shank Grinder

1 - Ingersoll-Rand shank grinder, Size 4K,
Repaired and installed new bearings July,1941

Bit Grinder

1 - Ingersoll-Rand bit grinder, size JA4, Serial No. 365.

ORE TRANSPORT EQUIPMENT

Side Dump Cars

3 - Joshua Hendy 25 cubic foot type I, 18" gauge cars equipped with Timken bearings.

1 - Joshua Hendy 25 cubic foot type I, 18" gauge car equipped with Timken bearings and brake.

2 - Joshua Hendy 25 cubic foot type I, 18" gauge cars equipped with Hyatt bearings.

End Dump Cars

4 - Joshua Hendy 20 cubic foot, Type I, 18" gauge cars, equipped with Hyatt bearings.

TIMBER TRANSPORT EQUIPMENT

Timber Trucks

2 - Timber trucks with Hyatt bearings, 18" gauge and 12" wheels.

2 - New, extra 12" wheels for Hyatt bearings.

TIMBER FRAMING EQUIPMENT

Cross Cut Saw

1 - 30" crosscut saw running at 1190 RPM powered by a 10 HP 440 Volt, 3 Phase, 60 Cycle, induction motor running at 1160 RPM. Complete with belting for overhead drive and swinging frame

1 - Power King hand framing saw, Type 10P, 110 Volt, 60 Cycles, 3100 RPM, using 10" circular saw - has two extra blades.

SLUSHING EQUIPMENT

Slushers

2 - Ingersoll-Rand, Type 250, Double Drum air slushers, size A4NN-OJ, Serial Numbers, A1042 and A1320.

INVENTORY OF MINE EQUIPMENT AS OF MARCH 11,1942

BREAKING EQUIPMENT

Stopers

7 - Gardner-Denver R104-1 self rotating stopers for use with 1" Quarter Octagon steel.
Serial Numbers: 395,388,623,394,791,431, and 186.

Drifters

1 - Gardner-Denver D89BH automatic feed drifter for use with 1-1/8" round steel, Serial Number 154.

1 - Gardner-Denver PF89-A automatic feed drifter for use with 1-1/8" round steel. Serial Number A176

HOISTING EQUIPMENT

Main Hoist

Parke-Lacy steam or air hoist. Name plate is missing, hence capacity figures are only approximate.

Bore and stroke -- 6 x 8,
Rope pull -------- 2600 lbs.,
Drum diameter ---- 24",
Drum face -------- 20½",
Rope capacity ----- 1350' of 5/8" rope.

Utility Hoists

1 - Ingersoll-Rand, Model DU Air Hoist, Serial No. A721.

750# pull @ 80# air pressure,
Rope speed --- 75' per minute,
Cable capacity -- 225' of 3/8" cable.

3-9-42

LEWIS INVESTMENT COMPANY

BENTON MINE — GRANTS PASS, OREGON.

INVENTORY MILL EQUIPMENT 3-9-42

PRIMARY CRUSHING EQUIPMENT

Crushers

(1) - Allis Chalmers Blake Jaw Crusher;
- Type "B"
- Size 15" x 9"
- Serial No. 2974
  - All bearings were re-babbitted 1-5-42
  - New check plates were installed 1-5-42
  - Swinging Jaw Plate was installed 11-7-41
  - Stationary Jaw Plate was installed 5-23-41

(2) - Traylor Gyratory Crusher;
- Type "TY"
- Size 1'8"
- Serial No. 31238
  - The eccentric bearing was re-babbitted 5-23-41
  - Both (2) pinion drive bearings were replaced 5-23-41
  - The mantle was installed new 11-6-41
    - The head nut on top of mantle should be replaced during next change.
  - The concave was installed new 5-23-41
    - One new oversize concave on hand
  - Both gears, the driving gear and the pinion gear are worn and should be re-built., or replaced.
  - The oil pump should be re-bushed.

Drag Classifier

Equipped with:
- 37 feet of elevator belting 12" wide 5/8" thick
- 1 - C.I. pulley 5' x 14" with shaft 3-7/16" by 5'8"
- 2 collars and pillow bearings 37/16"
- 1 - C.I. Gear 1½ P.,84 T., 6" F., and 3-7/16" B.
- 1 - C.I. Pinion 1½ P.,15T.,6" F., and 2-7/16" B.
- 1 C.I. Gear 1 P., 84 T., 3½ F., and 2-7/16" B.
- 1 C.I. Pinion 1 P., 15 T., 3½ F., and 1-15/16" B.
- 1 C.I. Pulley 24" by 14" with shaft 3-7/16" by 3'10"
- 2 Collars and pillow bearings 3-7/16"
- 1 Countershaft 2-7/16" by 4' with 2 collars and bearings
- 1 countershaft 1-15/16" by 3'3" with 2 collars and bearings

Motor

Fairbanks, Morse Induction Motor;
- Type HF
- Serial No. 99584
- HP - 40
- RPM - 900
- VOLTS - 440
- Amps - 50, 3 Phase, 60 Cycle

MILL EQUIPMENT INVENTORY

PRIMARY CRUSHING EQUIPMENT

Transmission Machinery (Continued from Page 2)

1 SS Pulley 15" x 3"
1 SS Pulley 24" x 10"
1 SS Pulley 48" x 10"
1 SS Pulley 12" x 6"
1 SS Pulley 28" x 6"
1 Jack Shaft #2, 1-15/16" by 9'6"
3 Self-aligning ball bearing pillow bearins 1-15/16"
1 SS Pulley 12" x 6" and 1 SS Pulley 20" x 8"

SECONDARY CRUSHING

Fine Ore Bin

12 Ft. by 22 ft. Fir Tank

Ball Mill Belt Feeder

1 - Varidrive motor #22, 224-20 VE GD, Serial No.122975, ½ HP, 6.7 to 13.4 RPM, 3 Phase, 60 Cycles, 220 to 440 Volts (U.S.Electric Motor,Inc.)
1 - Split steel pulley 8" x 16" with shaft 1-7/16" x 2'6"
2 - Rigid pillow bearings and collars 1-7/16"
Chain drive from sprocket of 60 T. to one of 16T on motor.
1 - Split steel pulley 8" x 16" with shaft 1-7/16" x 2'
2 - Style A takeups w.g.c. 1-7/16" x 6"
10- 2½" dia. anti-friction belt idlers for 16" belt.
23 - Feet of 16", 4 ply converyor belting
1 - Self contained structural steel frame with loading hopper, gate, and skirt plates.

The motor is in good condition.
The 16" belt is considerably worn.

Ball Mill

Williamson Ball Mill

Size —— 5 x 6
Type —— EHOF
Model —— CS
No.——— 210

Driven by 14-270-c Vulco Ropes from Fairbanks Morse Induction Motor

Serial No. 108664
Frame — H 16 Z
Type — HV
Phase — 3
50 HP, 720 RPM, 60 Cycles, 440 Volts

Both pulleys are grooved and all in good condition.

SECONDARY CRUSHING

Classifier

n1 - Dorr Classifier Size — 3'x18'4" with 2½" slope.

Sold

Type —— DSFR
Serial No. - U.S.-1727
With Allis Chalmers - Falk Gear Motor
2 HP, 3 Phase, 60 Cyles, 440 Volts,
1750 to 498 RPM, Ratio 3.51 to 1
Chain drive.

Classifier needs a new set of Rake blades. Needs new bell link shaft and bushings. The bottom of classifier leaks (needs repairing)

THICKENERS & AGITATORS

Thickeners

1 - Type "A" Dorr Thickener.
Complete with 26' x 9'4½" fir wood tank,
Serial No. US-4844
Equipped with:
Chain drive;
2 HP motor, Frame 225, Model 12F613, 1800 RPM,
440 Volts, 3 Phase, 60 Cycle, General Electric,
Totally enclosed, fan cooled,

Motor Reducer - XN-863J020, Frame - 5MR-225,
Serial No.1718, 2 HP, at 75 RPM,

#2 VM Dorrco Suction pumps, Serial No.US - 4845,
V-belt drive from a ½ HP motor, 1725 RPM, 440 Volts,
3 Phase, 60 Cycles, K63AC1226A, Totally enclosed G.E.

1 - Type "A" Dorr Thickener.
Sold and shipped
Complete with 19'6" x 9'4½" fir wood tank,
Serial No.US-1728,
Chain Sprocket Drive,
Steel Frame is supported on special supports outside of tank.

4 - Type "A" Dorr Thickeners,
Complete with 15'6" x 9'4½" fir wood tank,
Serial No. US-1729 to 1732 Incl.,
All chain sprocker drives,
Structural steel frame over-hangs the tank 16" and is supported on special frame.

5 - Dorrco Suction Pumps,
Type - SS, No. 3 Simplex with chain drive, Serial Nos.
US. 1733 to 1736 Incl., 1755.

MILL EQUIPMENT INVENTORY

THICKENERS & AGITATORS

Thickeners (Cont. from P-4)

Drive for 5 thickeners and pumps.
10 HP motor, Type - K2956, Serial No.5186056, 1160 RPM, 440 Volts, 3 Phase, 60 Cycle.

8 Allis Chalmers Tex Ropes B-105.
1 C.I. sheave 25" P.D., 8 groove, 2-7/16" bore.
1 C.I. sheave 5.6"P.D., 8 groove, 1-5/8" bore.
1 C.I. sprocket No. 62 14 T., 2-7/16" B.
2 Rigid pillow blocks and collars 2-7/16".
1 Shaft 2-7/16" x 78" keyseated.
3 flanged faced couplings 2-7/16".
12 rigid pillow blocks 2-7/16".
10 C.I. sprockets, No.62 14T., 2-7/16" B.
1 C.I.Sprocket No. 62 49 T., 2-7/16" bore.
5 C.I.Sprocket No.62 32 T., 2-7/16" bore.
4 C.I.Sprocket No.62 32 T., 1-11/16" bore.
1 C.I. Sprocket No.62 59 T., 1-11/16" bore.

Agitators

1 - Dorr Agitator Type "A":
Complete with 16'x12' fir wood tank.

1½ HP motor, splash proof ball bearings, G.E. Model No. K224A1019K - 224, totally enclosed, 1200 RPM, 440 Volts, 3 Phase, 60 Cycles.

3 - A-75 Texropes as drive.

1 - Dorr Agitator Type "A":
Complete with 12' x 12' fir wood tank, Serial No.1737

1½ HP motor, splash proof ballbearings, G.E., totally enclosed, 1200 RPM, 440 Volts, 3 Phase, 60 Cycles.

3 - A-75 Texropes as drive.

2 - Dorr Agitators Type "A" :
Complete with 12' x 12' fir wood tank, Serial No. 1738,1739,

Chain and sprocket drive, 3 HP Motor, Type 13THP, Serial No. 198361, 440 Volts, 3 Phase, 60 Cycles, Wagner Electric Co.,

3 Texropes A-90,
Sprockets and shafting for both agitators.

FILTER

1 - 8' x 8' Oliver continous filter 6F1; #8338L,
Includes;
8' x 8' drum filter with 1HP motor vari-speed drive,
Filter sump agitator driven by 1 HP motor,
1 - 1½" Centrifugal Pump,
Serial No. PBPMP4268,
Style 1500-A
Direct driven by a 3 HP G.E. motor, 1720 RPM,
440 Volts, 3 Phase, 60 Cycle, Model 5K225A10, Type K.

1 - 9½" x 8" Vacuum Pump,
Size - JLNT,
Serial No. - 1835,
Driven by 5 V-belts from a 7½ HP G.E. motor, 1160 RPM,
3 Phase, 60 Cycles, 440 Volts, Type KF, Model 5KF324A2.

MILL COMPRESSOR

Ingersoll-Rand Co. Air Compressor;
Type — 30
Symbol No. - 555 x 9
Size — 5" & 5" & 5" x 4"
Serial No. — 30T, 28290
Driven by 4 V-belts from a 10 HP, G.E. motor, 1750 RPM,
440 Volts, 3 Phase, 60 cycles, Type MD, Model 5KD324B 18.

MISCELLANEOUS PUMPS

Wilfley Sand Pump
Size — 2
Serial No. — C 26895
Direct driven by 5 HP, G.E. motor, totally enclosed,
1155 RPM, 440 Volts, 3 Phase, 60 Cycles, Type K, Model
5K284A162, Frame 284.
The runner and die ring are wearing out.

Mill Solution Pump
Kimball - Krogh Pump;
No. 2 x 9
Type - L
Form - E
Driven by 3 #60B V-belts from a 3 HP Allis Chalmers
Induction motor, 1740 RPM, 440 Volts, 3 Phase, 60 Cycle,
Type AR, Serial No.3094 CK - 508-4-3.

MISCELLANEOUS PUMPS

Gold Solution Sump Pump

Allis Chalmers Centrifugal Pump:
Size — 1½ x 1½.
Type — 3SLB
Serial No. 29424HK-1414LB-1-2
Direct driven by a 1½ HP Allis Chalmers motor, 1740 RPM,
440 Volts, 3 Phase, 60 Cycles, Type AR, Serial No.509D-N5056-154.

MERRILL - CROWE PRECIPITATION

Capacity — Now handling 260 tons solution in 24 hours.
Complete with:
40 bag precipitation Tank,
20" x 7' Vacuum Receiver,
Chicago Pneumatic Air cooled vacuum pump 4" x 4",
Class P6-SB, Vertical Type, 418 RPM, Driven by
2 V-belts from a 1 HP Allis Chalmers motor, 1150
RPM, 440 Volts, 3 Phase, 60 Cycles.

Drum Type Zinc Dust Feeder;
Driven by a ½ HP Master Geared Motor;
24 to 1 reduction, 1725 RPM, 440 Volts, 3 Phase, 60 Cycles.
8' by 8' Clarifier Tank with 9 6'x4' clarifying leaves,
Precipitation pump (Water sealed);
2" x 9" Krogh Pump,
Type "LE",
Speed - 1750 RPM,
Driven by 3 #60-B V-belts from a 3 HP Allis Chalmers motor,
1750 RPM, 440 Volts, 3 Phase, 60 Cycles,
Barren Solution Pump;
Allis Chalmers Centrifugal Pump,
Size — 1½" x 1½",
Type — 3SLB
Serial No. 2942HK1414LB-1-1,
Direct connected to a 1½ HP Allis Chalmers motor,
1740 RPM, 440 Volts, 3 Phase, 60 Cycles.

DIESEL ENGINES

Atlas Imperial Engine

Engine No. — 9707
Type ——— P and H
No. Cylinders — 6
Bore & Stroke — 8x9½
Equipped with;
1 - Vortox air cleaner,

1 - Alnor exhaust temperature controlling pyrometer.
Type — 2920

This engine was completely over-hauled during the period 12-15-41 to 1-20-42. Repairs as follows:

Re-grind crankshaft and install all new main and connecting rod bearings. Also all new connecting rod bolts and nuts.

Install new wrist pins and bushings in cylinders 2,3,and 4.

Install all new piston rings.

Install insert valve seats and valve guides in all 6 heads. Valve guides are standard size.

Install new bushings through out valve rocker action and short spray valve rockers.

Install all new spray valve bumbers.

Complete overhaul on governor - new spring, new body thrust bearings, rod block pins, drive bushing, quill assembly complete.

Clean and inspect high pressure fuel pump. Re-weld cams to shaft on high pressure fuel lump crankshaft. All other parts in good condition.

Install new wrist pin, bushings, and rings in auxillary air comp.

Install new water pump bearing, oil thrower, and packing. Shaft and impeller in good condition.

Clean and check oil lines and crank case. Inspect and re-set timing gear clearance.

POWER UNIT

A.C.Electric Generator

Allis Chalmers make,
Serial No. 10295
Type — Bullock
Speed — 900
Size —— 125 K.V.A.
210 Amps., 480 Volts, 3 Phase, 60 Cycle,
Re-built by Wolff Electric Works, Inc., Portland, Oregon.

Has a V-belt drive;
12 D-130 V Belts,
15" pulley on generator.

DIESEL ELECTRIC & COMPRESSOR UNIT

Fairbanks-Morse Diesel Engine

Model ——— 36A4½B
HP ——— 40
R.P.M. ——— 1200
Cylinders —— 4

Sullivan Compressor

Size ——— 11 x 10
Class ——— WG 6
Shop No. —— 12766
Speed ——— 285 RPM

Driven by a flat belt from the Diesel.

Westinghouse A.C.Generator

Serial No. —— 1353543
24 K.W., 440 Volts, 3 Phase, 60 Cycle, 1200 RPM, 39.5 Amps.
Driven by 3 V-belts from Diesel .

General Electric D.C.Generator

Type ——— CVC
Serial No. —— 37203
1.5 K.W., 1300 RPM, 115 Volts, 13 Amps.

Driven by a flat belt from the A.C.Generator.

DIESEL DRIVEN COMPRESSOR UNIT

Fairbanks-Morse Diesel

Model ——— 32 E 12
H.P. ——— 120
R.P.M. ——— 360
Serial No. — 794693
Cylinders ——— 2

Equipped as follows:

1 - Vortex air cleaner.
Model —— 2600-D
Serial No. 337345

Given a major repair job during the period 12-23-41 to 1-3-42.
Repairs as follows:

Install all new piston rings and one new con-rod bearing.
Re-line crank-shaft.
Inspect, clean, and adjust injection nozzles.
Install new wrist pins and needle bearings in both cyls.
Re-pour and scrape in #3 main bearing.
Clean and inspect all oil and fuel lines, crank-case, oil pumps, and fuel pumps.

Ingersoll-Rand Compressor

Imperial Type XRB-2
Serial No. 80366/67
Left Comp. Cyl. —— $9\frac{1}{4}$ x 12
Right Comp. Cyl. — 15 x 12
Maximum RPM ——— 250

Equipped with:

1 - Vortex Air cleaner;
Model —— 2600-D
Serial No. - 337344
Has an Imperial Inlet and Discharge Unloader.

Latest repairs:
Change piston rings —— 9-8-41
Put new diaphrams & springs in all inlet and discharge valves 9-27-41
Put new discharge check valves and check valve springs in the discharge unloader —— 11-8-41

DIESEL DRIVEN COMPRESSOR UNIT

Gasoline Air Compressor Unit (For starting Diesels)

Fairbanks-Morse & Co. "H" Compressor;
$3\frac{3}{4}$" x $3\frac{3}{4}$"
RPM ——— 475
Lbs. ——— 250

V-belt driven from Fairbanks-Morse & Co. Engine;
"Z" Style C Gas Engine,
H.P. ——— 3
R.P.M. ——— 800

2 - Air receivers 22" by 5' with 300 lb. air gauge and 250 lbs. pressure release valve.

5x6 WILLIAMSON BALL MILL DATA

SCREEN ANALYSIS

Ball Mill Feed

Mesh	Cumulative %
4	24.6
8	63.0
48	83.7
65	86.5
100	89.3
150	91.0
200	92.2
-200	100.0

Ball Mill Discharge (76% Solids)

Mesh	Cumulative %
48	34.9
65	51.2
100	66.9
150	75.9
200	79.3
-200	100.0

Classifier Overflow at 15½% Solids

Mesh	Cumulative %
100	6.3
200	38.6
-200	100.0

PRIMARY CRUSHING EQUIPMENT

Fairbanks,Morse Motor (Continued from Page 1.)

One coil in field has been removed because of a short. Both bearings are worn.
Flat pulley on motor 12" D., 12" F., 2-5/16" B.

Conveyors

Gyratory Feed Belt:

40 Ft. S-A Style X conveyor belt 18" by 4 ply
1 C.I. Pulley 18" by 20" with shaft 2-7/16" by 3'6"
2 collars and rigid pillow bearings 2-7/16"
1 C.I.Gear 1 P., 15T., 2½" F., 1-15/16" B.
1 C.I.Gear 1" P., 28 T., 2½"F., 1-15/16" B.
1 C.I.Gear 1" P., 76 T., 2½" F., 2-7/16" B.
1 C.I.Gear 1" P., 85 T., 2½" F., 1-15/16" B.
1 Countershaft 1-15/16" by 4'10" with 2 bearings and Collars
1 Countershaft 1-15/16" by 3" with Pillow bearings " "
1 SS Pulley 20" by 3", 1- 15/16" bore.
1 C.I. Pulley 18" by 20" with shaft 1-15/16" by 3'
2 Style "B" takeups 1-15/16" by 12"
1 Style #71 Return rollers for 18" Belt
5 Style 709 Carriers for 18" belt

Fine Ore Belt:

120 Feet 14" conveyor belt 4 ply rubber covered.
1 C.I. Pulley 16" by 14" with shaft 1-15/16" by 2'4"
2 Style S takeups 1-15/16" by 12"
1 C.I. pulley 20" by 16" rubber lagging with shaft 2-7/16" by 3'
2 Rigid pillow bearings and collars 2-7/16"
2 C.I.Gear 1" P., 85 T., 2½" F., 2-7/16" B.
1 C.I. Pinion 1" P., 15T., 2½" F., 1-15/16"
1 Countershaft 1-15/16" by 3'5" with pillow bearings and collars.
1- 1 HP Motor, 3 phase, 60 cycle, 900 RPM, 440 Volts, Type AR, Serial No. 509E - M5336 - 17, Frame 225 Allis-Chalmers Texrope drive, 2 V-Belts, ratio 5.56 from 860 RPM
14 Style #271 carriers for 12" Belt.
6 Style #71 Carriers for 14" Belt.

Transmission Belting:

43'6"——10", 5 ply belting—— motor
42' ——10", 5 ply belting—— jaw crusher
21'—— 5", 5 ply belting —— drag classifier
40'—— 6", 5 ply belting —— #2 line shaft
31' —— 5", 5 ply belting —— Traylor crusher
22" —— 3", 4 ply belting —— conveyor belt

Transmission Machinery:

1 line shaft #1, 2-15/16" by 16'2"
3 Self-aligning ball bearing pillow blocks, 2-15/16" DSA
1 SS pulley 42" by 6"

Josephine Benton

BENTON MINE

LOCATION

Section 22, 23, and 27, Township 33 South, Range 8 W., WM. Josephine County, Oregon

Patented Claims - 7½
Located Claims recorded in Josephine County,- 16

HISTORY

During the period 1891 to 1905 John C. Lewis did approximately 5000 feet of development work, drifts and raises, on the Benton Group of claims. This work was discontinued in 1905.

In 1935 Lewis Investment Company started development work under the direction of Mr. Albert Burch, Medford, Oregon, as consulting engineer.

In 1937 a cyanide plant, 40 tons capacity, was put on the property and this plant was enlarged to 60 tons in 1940.

Milling was discontinued April 15, 1942.

During this period 64282 tons of ore were milled, having a gross value of $549,414.40. This value of ore is based upon smelter returns plus average tails assay, which gives an average per ton of $8.564. It is proper to state that a substantial portion of this ore was from development headings as distinguished from stoping ground.

GEOLOGY

The Benton Vein System is in a diorite or granodiorite mass, which is approximately 2000 feet wide at the horizon of the main haulage level. The general strike of this diorite mass is north 20° East. Its length is approximately seven miles. The east contact is a series of meta-volcanic rocks while on the west a series of sediments composed of schists and quartzites.

There are six known veins, with a possible seventh which has been exposed during the last year. Four of these have been exposed in the mine by mine workings, but the major development work in the mine has been done on the Benton Vein. Three of these veins strike approximately north 20° east. Three of them strike north 80° east. The seventh vein has a strike of approximately south 20° east. This last vein was the one most recently exposed and just what its relation to the vein system is we have been unable to determine, although it unquestionably is a part of the main system.

The Benton Vein is a mineralized normal fault with its structural features determining the size and shape of the ore bodies. Ore shoots are usually formed when the foot wall dips greater that 80° to the east, and occasionally, particularly above the 780 ft level, it reverses its dip to as much as 80° to the west. Nearly all ore shoots in the Benton Vein so far discovered have a pronounced rake to the south, the average of which would be about 45°.

The ore in the Benton vein is formed by replacement of the diorite along the Benton fault zone. Gold values are contained almost entirely in auriferous pyrite. Ocassionally, particularly in the upper workings there has been some free gold but not enough to warrant any change in milling practice. Silver content is small. There are no other metals of importance.

The average width of the vein is about five feet, ranging from a minimum of 18 inches to an extreme of approximately 25 feet. The longest continuous ore body is in the floor of the main haulage level and extends approximately 1000 feet with a few breaks. At the north end of this ore shoot an exploratory winze was sunk. It was our intention to carry this to a depth of 120 feet, which would allow for commencement of drift on the 1120 ft. level. However, due to the War, work was stopped at a depth of 64 feet. The winze was in ore to its full depth and there was no indication of any decrease in the strength of the vein or diminuation of values.

MINING METHODS

After considerable experimentation, by and large, we have found that the inclined cut and fill and horizontal cut and fill stopes with mechanized slushers have been most practical methods of stoping.

Shrinkage stoping has not been successful, except in limited instances, because of weak walls and the possibility of ore bodies paralell with the stope in the hanging wall. Some square setting was done in the north end of the mine where ground was blocky and the mineralized zone was quite wide. A waste raise has been driven from the 900 ft. level to the surface to make available a very large quantity of cheap filling which is available for stopes below the 900 ft. level.

MILLING

Based on our experience the ore is not complex and can readily be treated either by cyanide or flotation or a combination of both methods. However fine grinding to 72%-200 mesh is indicated. We have found that increased time has considerable to do with increased extraction.

I am of the opinion that cyanidization is still the most economical method of treatment, although in the event of a larger plant the question of flotation, plus cyanidization of concentrates should be given consideration.

The cyanide plant is a standard counter-current plant equipped with Dorr thickeners and agitators. Precipitation is Merrill-Crowe.

Certain items of mill equipment were sold to War industries and these would have to be replaced before any milling could be done.

TRANSPORTATION

The Benton Mine is located thirty-nine miles ~~southwest~~ Northwest of Grants Pass, Oregon, on an all-year rock road. This road is largely maintained by the Forest Service as it is their main means of access to their lookout stations and camps in the western part of the Siskyou National Forest.

The extreme elevation of the road is about 2200 ft. Only in an exceptionally hard winter would the road be closed by snow, and then not more than for a few days. In an extremely heavy snow fall it would be no problem to keep the road open with a bulldozer inasmuch as there are no cuts that drifts would close. The extreme grade on the road is about 12% and then only for about one-half mile, the balance of the grades would probably average not to exceed 7% to 8%.

ORE RESERVES

Ore reserves are difficult to block out in the conventional sense at the Benton Mine. Based on operating experience the maximum development needed before mining is exposure of ore shoots in two levels. We have found that the conditions of ore deposition repeat themselves in an almost uniform pattern. For example -- if we find ore on the 900 ft. level and expose it horizontally for a reasonable distance, we can by projecting the rake, anticipate within comparatively small limits where this same ore shoot will show up on the 1020 level.

We have classed as probable ore 30,489 tons; as possible ore based on past experience 49,701 tons, -- making a total of 80,190 tons. ✓

We also believe that, based on operating experience over a period of five years, a substantially greater tonnage than this can be added upon which a mining operation could be based. There are a great many surface showings of ore both to the north and south of the present workings and the experience we have had in developing such showings makes us confident that they will produce a very substantial tonnage.

When we closed the mine down Mr. Youngberg and I went over all possible ore reserves very carefully inasmuch as we wanted to make a record of our ideas while everything was fresh in our minds and before the mine had been closed down too long. It is our considered opinion that if an adequate development program is followed the Benton Mine should produce 500,000 tons, based upon an operation of 125 tons per day. While a great deal of this is admitedly guess work, we both believe that our basis of estimate are sound.

ENCLOSURES

1. ~~Map of Oregon showing the location of the Benton Mine and~~ adjacent properties

2. ~~Composite plan and section.~~

HERSHEY & WHITE

Consulting Engineers

Crocker Building, San Francisco, Cal.

GEOLOGY OF

BENTON MINE

BY OSCAR H. HERSHEY.

San Francisco, California
April 12th, 1937.

Lewis Investment Company,
408 Lewis Building,
Portland, Oregon

Gentlemen:

As you know, I have made a geological study of the Benton mine, situated on the east side of Whiskey Creek, in Josephine County, Oregon. I was assisted by Mr. Albert Burch and Mr. W. Earl Greenough, to whom I am indebted for assays and other information.

So far as the rock formations are concerned the geology is comparatively simple. The mine workings are largely in a greenish gray crystalline rock of medium texture that may be called diorite, though much of it has free quartz and would probably be classed as quartz diorite. This has the form of a long relatively narrow belt that parallels Whiskey Creek on the east side and if the adjacent rocks were removed it would stand up as a high steep-sloped ridge. It was intruded into dark green basic schistose rocks. High on the ridge east of the mine this is a portion of the meta-amdesite formation that Mr. J. S. Diller mapped as

"greenstone" in Bulletin 546 of the United States Geological Survey publications. The rock on the west side of the diorite at the mine may be called chloritic schist. Near Rogue River the greenish schist east of the diorite belt is a much older formation that may be called hornblende schist. More or less serpentine and associated peridotite occur in narrow belts near the river but none were seen in the vicinity of the mine. Mr. Diller's mapping of the mine in a serpentine area is erroneous, probably due to his having been dependent on young assistants for much of the detailed mapping. Furthermore, the great fault that bounds the Dothan formation on the southeast runs under the camp on a N. 45° E. course, a matter not of any importance at present, though it might become so years later.

One other feature of the rock formations may be mentioned. When the diorite magna rose in a molten condition in the schistose rocks great slabs of the latter broke from the walls and became embedded in the diorite near the borders. Thus after one thinks he has reached the contact, coming out from the interior of the diorite mass, he is likely to find more diorite beyond a belt of schist. It is further likely that small branching arms of the diorite extend a considerable distance into the neighboring schist, but are obscure.

The Benton vein has been formed in a longitudinal fracture near the east border of the main diorite mass. It has a general course of about N. 30° E. and a steep eastward dip in general, though in No. 1 tunnel it

dips westward, It consists in large part of a zone of severely sheared diorite from several inches to 10 feet wide. Hot water arising along this shear zone deposited white quartz in thin seams and locally in pocket-like masses. The latter are rather peculiar to this vein. In places they occur several feet distant from the vein proper, in what appears to be the wall rock. At a slightly later stage the hot water deposited rather fine-grained pyrite. The gold is associated with it. The pyrite is very irregularly distributed. In some quartz masses there is little of it and assays are low. In places where there is pyrite in the schistose material of the vein zone it may assay commercial ore. Usually, however, the thicker quartz masses have most of the pyrite and [redacted] gold.

The vein is accompanied by a small fault gouge, (in some sections several gouges,) of a relative modern appearance and which may be post-mineral in age. The main gouge may be on one or the other wall or within the vein. A great many small cross faults cut the vein but I do not believe any of them has thrown the vein far enough to make it difficult to pick up beyond the fault.

The Benton No. 2 level follows the vein for about 1150 feet. I may be divided into five sections. In the first section, 600 feet in length, there is so little quarts in bunches or lenses that there is no commercial ore. In one short lens 2 feet assayed $7.20 at the old price of gold and 1 foot assayed $2.80. In another small lens 3 feet assayed $3.50 adjusted to the present price of gold. At a third lens 1.25 feet assayed $9.10 at the present price of gold. But these lenses are too small to be of any value

In the second section, about 100 feet long, the vein seems to break up into several strands which have little quartz and consist largely of the fault gouges that may be post-mineral in age. The miners seem to have been confused here and drove several drifts along different strands. The main drift is not on the vein at all for about 50 feet.

The third section, 200 feet in length, is the ore-shoot, which per Greenough's sampling averages 5.5 feet wide and $11.30 in gold content. This section is largely quartz with pyrite and presents a very attractive appearance. The main gouge is generally on the east side of the ore and dips eastward 83°. The west wall stands vertical or even is inclined steeply westward in places. That suggests thickening of the vein below the level but can hardly be continued far.

The fourth section, 200 feet in length, has much less quartz than the ore-shoot and is not regarded as commercial, although in the last 60 feet the quartz assays $15.00 to $20.00. This may increase in quartz downward or upward and be part of the ore-shoot or a separate ore shoot. I am inclined to believe that the third and fourth sections taken together, 400 feet in length consitute that portion of the Benton vein that is favorable for ore. The ore itself may be more or less lensy within this 400-foot section and on different levels may occupy different parts of it.

The fifth section has been followed about 50 feet. In it the vein is very weak, with quartz bunches small.

In the Benton No. 1 tunnel there is known to be ore for a distance of about 200 feet, said to be a little better in grade than that in No. 2 level. The vein dips westward 85°, except that in one short section it flattens to 40°. At about the north end of the ore-shoot the drift is deflected to the right along what may be the vein in a greatly weakened condition or an arm of the main vein. This is in green schist whose schistosity dips eastward 50°. I suspect strongly that the vein in the diorite has reached the border of the main mass and entered schist, which may be one of the large inclusions or may be the main belt east of the diorite intrustion. In any case, it may have acted as a sort of roof to the portion of the vein favorable to the development of ore. The contact between the diorite and the schist [redacted] of the vein should rake northward. This may cause the shoot favorable for ore to rake northward perhaps at 45° or less. This is one of the most important ideas developed by my study.

Because the known ore on No.2 level is practically under the known ore on No. 1 level, it was natural for Mr. Burch to expect to find ore on the Kansas tunnel level and when he found a very different kind or vein matter entirely under (down on the dip) the ore-shoot on No. 2 level he begain to wonder whether he had the Benton vein on the lower level. After studying the three levels in detail and making three sections I cannot escape the conclustion that the vein on the Kansas level which has been followed continuously for 375 feet, except for a short interruption between two faults, is the Benton vein, in large part slightly

flattened to 70°. But it represents the second or gougy section on No. 2 level and the ore-shoot is due farther north. In fact, the footwall side near the end of the drift has sufficient quartz in seams and pyrite to suggest that a crosscut to the left near the face might expose ore. However, it is necessary to put up a raise to No. 2 level to get ore for the nearly-completed mill, so we selected a point about 25 deet north of station 10 for the beginning of the raise. The 70° gouge seam may be used as its hanging wall. As this gouge seam is on the hanging wall of the ore on No. 2 level, following it should lead to the bottom of the ore which may be up 73 or 100 feet.

On the footwall side of the gouge on the Kansas level there are two steep fractures. One that is 45 feet out the tunnel from station 5 has been [illegible]. It has quartz and pyrite and yielded one assay as high as $9.80 across 6 inches. However, in general it is too narrow to be worth following, but it stands so steep that it could reach the main vein below No. 2 level and have made the ore by thickening of quartz at the junction of two veins. Another steep fissure was followed 40 feet from station 8. I am inclined to regard these two fissures as unimportant and to look for ore on the Kansas level near or north of the present face.

My attention was called to two other veins between the Benton vein and the mouth of the Kansas tunnel, the Missouri and the Georgia vein. The latter has been developed higher in a Georgia tunnel. It seems to be a rather indefinite zone of quartz stringers with pyrite. Individual seams

will yield good assays but in general samples taken across the vein assay below commercial values. The vein appears best near the mouth of the Georgia tunnel and in a nearby shaft and there may be a real ore-shoot extending across the creek. At some future time, when the mill is making money, I will probably suggest a crosscut from the Kansas tunnel to develop this section of the Sugar vein.

In conclusion, you will probably want me to express an opinion as to the future of the Benton mine. Of course, I cannot see into the earth and can reason only by analogy. In granitic rocks such as the diorite at the Benton mine veins and ores usually extend very deep. But the ore is inclined to be lensy. Thus No. 2 level may be the center of a big lens of quartz. It may extend to No. 1 level. On the other hand you may find out that the ore on No. 1 level is an enlargement of the $15.00 to $20.00 small lens near the north end of No. 2 level. The ore on No. 2 level may or may not reach the Kansas tunnel level. Whether it does or not, it is very likely that ore occurs in the vein on the Kansas level north of the present face. It may be a new lens. If you will keep on developing down in the 400-foot northward-raking section that I say is favorable for ore you may have a mine that will last for many years and produce many times the amount of ore that you now have in sight.

Respectfully submitted,

(OSCAR H. HERSHEY)

OHH HRL

HERSHEY & WHITE

Consulting Engineers

Crocker Building San Francisco, Cal.

SECOND REPORT ON

GEOLOGY OF BENTON MINE

BY OSCAR H. HERSHEY

San Francisco, California,
April 14th 1938.

Lewis Investment Company,
403 Lewis Building
Portland, Oregon

Gentlemen:

This report will be accompanied by three cross-sections and a longitudinal section of the Benton mine workings, prepared by Mr. E. L. Stenger to which I have added such geological features as are clearly evident from the exposures seen in the drifts and raises, only drawing on my imagination to the extent of suggesting sites for possible ore. Since my first visit about a year ago it has been demonstrated that the ore occurs in bodies of more limited extent than we supposed when our observations were confined to levels only. It was a reasonable presumption that the excellent showing on Benton No. 2 Tunnel level would extend to the excellent showing on Benton No. 1 Tunnel level and I so anticipated, though in my report I theorized somewhat on the tendency of ore in such veins to occur in lenses.

A presistent feature in the cross-sections is what we call the Main fault. It is notable that this dips eastward about 70° from the Kansas level to the vicinity of the Intermediate off the Kansas raise, above which it has a very regular dip of between 80° and 85° to the surface. In this steep portion it is accompanied by the Fenton vein proper. My impression is that below where the fault changes from the steep dip to the 70° dip it has passed into the hanging wall from the vein which accounts for the practical absence of quartz along the fault on the Kansas level.

The fault as we see it today is post-mineral in age and has crushed the quartz in its vicinity. In places it has rounded fragments of dragged ore. Where the quartz is relatively thick the fault gouge may be on one or the other side and passes obliquely through the quartz. For instance, it is on the eastern or hanging-wall side on the No. 2 level where the stope was begun and is on the footwall side at the top of the stope, hence I have represented it in section A-B as passing through the quartz, though perhaps the actual detail was a little different than I have indicated. This strike fault doubtless has had an effect in emphasizing the lensy nature of the quartz. The amount of movement is not yet entirely clear but probably was comparatively small. All the striae observed on the walls of the fault rake northward at angles from 20° to 45°. My guess is that the hanging-wall of the fault moved northward and downward a moderate amount.

Another notable feature is that a steep but sinuous line may be drawn in the vicinity of the old No.2 raise and the Kansas raise that will form the north boundary of a section of the vein that has quartz in material quantitites. The south boundary lies a short distance south of No. 2 manway and is equally steep as far as determined. This gives us two ends of a quartz shoot about 200 feet long, the southern portion of which has been commercial ore from No. 2 level up to 60 to 80 feet and the northern portion is too spotty in quartz occurrence and gold content to be minable ore. The practically vertical ore-shoot extends an unknown distance below No. 2 level. The fact of the south drift on the Intermediate level off the Kansas raise suggests approach to it. A quartz lens is coming in over the fault zone. A sample across 50 inches assayed $4.90 but was half fault material. There is a suggestion that the vein dips steeply westward toward the fault and at the top of the face the quartz is thicker and better appearing than where sampled. My first recommendation is that this south drift be advanced in the strong hope of exposing the main ore-shoot. If it does not come down this far a raise can be put up on the best part of the quartz until it reaches pay ore.

The stope was terminated upward abruptly. It has been explained to me that the vein split into two strands of quartz, one of which continued to follow the Main fault and the other diverged toward the hanging. The No. 1 manway comes up for 30 feet between the two branches of the vein and in the Intermediate level at

the top of the manway the hanging-wall strand is traceable for about 75 feet. I seems to be bending back toward the old course, dipping eastward 80° at 20 feet southwest from No. 1 manway. It seems to be thickening upward and at the south face of the old South drift off No. 2 raise a sample across 3 feet of quartz assayed $46.15 per Mr. Stenger. The quartz dips eastward 85°. This is so much stronger than anything seen elsewhere on this hanging-wall strand that I recommended that the old Southdrift be driven ahead on the quartz until far enough beyond a small fault seen in the drift to make it practicable to raise on the quartz. But Mr. Stenger thinks it will be much more convenient to extend No. 1 manway up to the old South drift level and drive to that level. What I have in mind is this: The slab of waste between the two strands of the vein may be a horse; that is, the two strands may come together again higher and make another orebody. That there are two veins on the old South drift level is proved by a short crosscut near the No. 2 raise which exposes a quartz vein that Mr. Stenger sampled across 2 feet and got a $10.00 assay. That vein dips eastward 85° and is probably not far above the main fault gouge. This vein may strengthen southward and become ore. In fact, Mr. Burch entertained the idea that is is the vein faulted that yielded the $46.45 assay acorss 3 feet at the face of the drift. However that may be, my inclination would be to go to the $46.45 face and hang to it like a bulldog to a tramp's breeches. On the strength of the possiblity

in the large block of unexplored ground between there and No. 1 tunnel.

It is now clear that the ore in the No. 1 tunnel is another handing-wall split from the Benton vein proper. It dips westward usually quite steep but in one section as low as 40°. This will cause it to be cut off at the Main fault not far below the No. 1 level as I have indicated in the cross-sections. No. 2 raise comes to the level in the wall rock on the west side of a small gouge seam and wall that form the hanging-wall to the quartz vein. At about 30 feet down the raise the Main fault appears, dipping eastward about 82°. Some quartz seems to go up along the fault zone, representing the Benton vein proper. Thence down the raise follows the fault zone accompanied by small quartz pockets and seams representing the twilight edge of the main quartz shoot. No. 8 sample taken across 42 inches assayed $13.83. Not far below that the quartz practically disappeared from the fault zone and assays became very low.

In the old North drift off No. 2 raise the vein is a narrow shear zone practically free from quartz except a few scattered small seams. The same description applies to the vein in the north drift of the Intermediate level off the Kansas raise beginning a few feet north of the raise. But in the intervening country quartz lenses extend much farther northward along the vein. On the No. 2 tunnel level there is more or less quartz almost to the end. In fact, at the time of my first visit I was informed that a section 60 feet long assayed $15.00 to $20.00 per ton. "B" raise has been put up at an

angle in an effort to cut this supposed shoot above the level. The shoot is indicated in it but much weaker than on the level, narrower quartz and very spotty assays. Down on No. 2 level the quartz is much stronger at the floor than at the roof and diverging walls suggest that it may be widening downward. This might be the upper edge of a new orebody. At a small crosscut which is about 25 feet northward from the bottom of "B" raise I recommend that a winze be put down with a windlass to learn whether the quartz ore is shallow or extends down say 40 or 50 feet. In the latter case it may then be developed by extending the north drift on the Intermediate off the Kansas raise under it and raising up to it. Before doing such expensive work I think we should feel it out a little by the winze proposed.

Two crosscuts recently driven have made plain another hanging-wall branch vein which leaves the Main fault on the No. 2 level in the vicinity of the top of the Kansas raise. The vein begins dipping westward at rather low angles but I believe it soon steepens and is exposed at the end of "A" raise and again on the Intermediate level at the top of No. 1 manway, where it has changed to an eastward dip. On the latter level there is an interruption in the quartz for a distance of about 20 feet, but driving is now proceeding northward on 18 inches of quartz said to assay $20.00 per ton. On the No. 2 level the quartz may be seen for a distance of about 60 feet, coming down to the floor of the level at the south end and rising to a height of 8 feet at the north end of the exposure. It ends at the south at a

fault whose course is northwestward and dip northeastward 70°. What this fault has done to the vein remains to be determined later. It may have dropped it down from a position higher than the roof of the level. Stoping on the hanging-wall vein will probably lead to the discovery of the vein beyond the fault.

A peculiarity of this hanging-wall vein is that much of the rock between it and the main vein has been shattered, quartz-seamed and supplied with gold-bearing pyrite so that an irregular body has been made into ore. "A" raise penetrates the heart of it and Mr. Stenger told me that on the southwest side 35 feet of the raise averaged $8.78 per ton. This irregular orebody may set in a little above No. 2 Tunnel level and extend higher than the top of "A" raise but I doubt that it will extend as high as the Intermediate level at the top of No. 1 manway, though the stope will reach that level along the quartz vein. The length and cross-section of this orebody cannot be predicted in advance of actual opening but I regard it as an important addition to the visible reserves of the mine. A stope may be opened on it, but first it seems necessary to put up a raise in the quartz vein from No. 2 level to the top of "A" raise and possibly to the Intermediate above.

Mr. Burch suggests that I mention an occurrence of ore at the top of No. 2 manway. After running along for about 30 feet as mostly fault gouge with very little quartz a lens of quartz appears over the gouge and at the southern face of the Intermediate it has a very good

Mr. Stenger says that a sample across 4 feet of sheared diorite on the hanging-wall side of the quartz assayed $1.89 per ton. The ground has been drilled and should be blasted. If the showing continues, this is another place where I think the bulldog act may be in order. "Stay with your ore" has always been good advice in gold mining.

All the recommendations I have made have been on ore or near ore and I feel that you should confine your activities in the near future to such work. Mining out the known ore and ore that may be discovered by carrying out the recommendations made in this report may develop a system of occurrence of the orebodies that may make it practicable later to do some dead-work in search of new orebodies. It my first report I suggested that the portion of the vein favorable to the development of ore may rake northward, perhaps at 45° or less. I am now inclined to see a tendency for the quartz bodies to be developed along nearly horizontal zones in the steep vein. The branching seems to have had flattish attitudes and the development of ore may be more or less connected with it, the main orebody in part being an exception.

In this connection I may mention that Mr. Burch has called my attention to a strong showing of quartz over the Benton No. 2 tunnel near the portal, whereas nothing like it appears in the tunnel. It may be a shoot of quartz that lies nearly horizontal in the vein. I have suggested that the way to investigate it would be to dig the quartz out and if possible send it to the mill. Raises may be put up from the tunnel to it.

I also suggested to Mr. Stenger that he sample the Georgia vein in the vicinity of the mouth of the Georgia tunnel and the nearby shaft to learn whether there is there an ore-shoot of sufficient strength to warrant crosscutting to it from the Kansas tunnel.

Respectfully submitted

(OSCAR H. HERSHEY)

OHH BRL

ADJACENT PROPERTIES

J. C. L. MINE

This mine consists of six patented claims lying approximately two miles by trail from the Benton. This mine was originally operated early in the 1890s by John C. Lewis, during which period a substantial amount of money was taken out.

During the last few years it was leased for a period of eighteen months, during which time a minimum of $16,000.00 was taken out with primitive and inadequate equipment.

This proerty is largely in so-called schists or prophories and there has been little geological work done, but based on what accurate information we have this property could, under an adequate development program, produce a fair amount of high grade ore with possibilities of developing into a substantial producer of ore which would run $5.00 to $8.00. This property is owned by Lewis Investment Company.

Gold Bug

This mine lies about one mile directly east of the Benton and during the period 1900 to 1910 was reported to have had a substantial production of high grade ore. It was developed entirely by a shaft which was sunk on the ore with little or no cross-cutting. There is reported to be a substantial amount of ore left in the mine and there are other surface showings that would indicate feasibility of its development in conjunction with the Benton. Owing to lack of water there is no possibility of this property being developed unless done in conjunction with the Benton Mine. The values are almost entirely gold, with a small amount of silver.

Gary Johnson Claims

These are located on top of Mt. Reuben, approximately four miles northeast of the Benton. This is purely a prospect, but appears to have possibilities. I am attaching a short description of this property which I made several years ago.

Copper-Nickel

It has been reported, although not verified, that at the head of Reuben Creek, which is approximately four miles due east of the Benton on the other side of the intervening ridge, there is a substantial vein of copper-nickel ore. I have seen samples of this ore and it is reported it carries values in gold, copper and nickel. I am merely reporting this as a matter of interest and to point out that there are prospects in the district that have never been examined.

Manganese Division
SUNSHINE MINING COMPANY
Star Route 1
Port Angeles, Wash.

1. NAME OF PROPERTY Johnson Mine.
2. LOCATION Mt. Reuben, Oregon. T. 33S. R8W Sec. 4 ELEVATION 4000
3. IN FOREST RESERVE? yes.
4. NAME AND DISTANCE OF NEAREST RAILROAD STATION Glendale Ore. 14 miles
5. DISTANCE FROM HIGHWAY 18 miles CHARACTER OF MINE ROAD forest service road.
6. DESCRIPTION OF HOLDINGS
7. NUMBER OF CLAIMS 4 NUMBER PATENTED 0 ACREAGE HELD
8. DESCRIBE WATER SUPPLY: (A) NAME OF STREAM None.
   (B) HOW FAR FROM CLAIMS?
   (C) APPROXIMATE AVERAGE FLOW
   (D) POWER POSSIBILITIES None
   (E) AVERAGE SNOWFALL WINTER TEMP.
9. WHAT POWER AVAILABLE? None NEAREST ELECTRIC POWER 28 miles
10. AMOUNT AND KIND OF TIMBER scattered fir+pine
11. NEAREST SOURCE FOR SUPPLIES Glendale 14 miles. Grants Pass 40 miles
12. WHAT IS PREVAILING ROCK FORMATION? metavolcanic
13. WHAT OTHER ROCKS ARE PRESENT?
14. IS THERE EVIDENCE OF FAULTING? yes.
15. IS THE COUNTRY RUGGED OR FLAT? Rugged
16. TYPE OF DEPOSIT Iron Gossan

DESCRIPTION OF DEPOSIT:
   (A) EXPOSURE ON STRIKE yes. about 500'
   (B) DIRECTION OF STRIKE N 10° E.
   (C) DIP, ANGLE AND DIRECTION 60° E.
   (D) AVERAGE WIDTH 5'-10'

17. WHAT METALS, IN THE ORDER OF THEIR IMPORTANCE? Copper, Gold.
18. REPRESENTATIVE ASSAYS 3.6 % and 6% on copper. gold in these samples .06 oz
19. DEVELOPMENT WORK (NATURE, AMOUNT AND DEPTH) open cuts and shafts on hanging wall. one shaft 30' one shaft 15'
20. ORE RESERVES, IF ANY, ESTIMATE TONNAGE

Subject: Johnson Claims

Location: located at top of Mt. Reuben, in T 33 S., R 8 W. WM, Sec. 1, about 14 miles from Glendale, Oregon

History: The claims were located for gold some years ago by Gary Johnson of Grants Pass, Oregon. He ran an assay office there until his death several years ago. At that time his wife inherited the claims from him. She remarried and died shortly thereafter. In the settlement of her estate there was considerable litigation but it is my understanding that this has been cleared up. The ownership is in the hands of several heirs who are anxious to have something done with the property if possible.

Ore Occurance:

The copper occurs in the form of chalcocite. Apparently the gold was in the sulphides originally and has been left behind as free due to the leaching of the iron. As far as known no attention has ever been paid to the copper but the claims have been worked in a primitive way for gold, and in view of that the only way any recovery could have been made would be as free gold.

Geology:

The ore occurs in a shear zone ranging from a few feet to over thirty feet wide. There has been a substantial leaching of the sulphides and the only unoxidized ore occurs in the hanging wall It is apparent from the dip of the vein that most of the leaching has taken place below this pay streak. During the wet season the shafts fill with water to the collar and during the summer they are dry. It has been reported, though not verified, that in the bottom of the shaft are openings which extend quite a distance down. These openings are caused by leaching.

The country rock on the hanging wall appears to be andesite and on the foot wall what is locally known as schist. In Southern Oregon these rocks often contain veins but the veins are apt to be irregular and spotty. This applies particularly to gold. In this instance, however, it is possible that the metavolcanics may be merely a capping over diorite. This theory is based on the fact that the Benton Mine, which is about three miles air line to the south, is in diorite. The diorite is known to extend within one mile of Mt. Reuben. The Diorite is a stock which is bounded on the east and west by rocks similar to those on Mt. Reuben, and in one instance is known to extend under the metavolcanics. If this theory should be correct it is possible that a continuous and strong vein would underlie the outcrop on Mt. Reuben.

It is of further interest to note that lying to east of this deposit at the head of Reuben Creek (see map) there is reported to be a strong showing containing copper and nickel. It is possible that these deposits are related.

Prospecting

Diamond drilling is feasible and should show whether or not there is any secondary zone, It would be necessary to use a portable machine and transport water as there is none on top of the mountain.

If this deposit should appear to be worth prospecting the logical base of operation would be from the Benton Mine, which is approximately six miles by road.

Operation:

If mining operation should be justified after thorough examination, the Benton Mill and camp would be the most practical. There are complete buildings for camp and mill. There is also adequate water both for milling and camp use. While the Benton Mill was designed for a cyanide operation it could be readily adapted to flotation.

Transportation:

The location of these claims is on the summit of Mt. Reuben. They are connected by a branch road to the Forest Service Road leading to Glendale and Grants Pass. This is a rock road that is open all year except during heavy snow. A cat and bulldozer could keep the road free of snow. On the Glendale side of the mountain there is about four miles of red clay road that would have to be rocked in order to make it suitable for wet weather use.

The most practical way to handle the ore would be to truck it to the Benton Mine five hundred foot level. This is about five miles from the Johnson claims. This would permit putting the ore from the five hundred level to the main haulage way without intermediate handling. We would estimate that ore could be trucked from Mt. Reuben to the five hundred level for not over 35¢ per ton.

Conclusion:

In the event any operation should be undertaken it is the writer's belief that the Johnson claims should be combined with the Benton Mine. The latter has substantial ore reserves and in the event of a recession in demand for strategic metals the plant and equipment could be turned to gold production. This would, in the writer's opinion, permit of a more permanent operation and allow long range planning that would not be feasible if only the Johnson claims were considered.

MLBS

Mann L Bingham

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MLB bc

PRODUCTION

BENTON MINE - LEWIS INVESTMENT COMPANY

Glendale, Oregon

1937	Month	Tons Milled	Tons Waste	Gold Bullion Ounces	33.528 Value	Value Per Ton	Aver. Tail ASSAY	Comp-uted Head	Aver. Head Assay	Reco-very	Gross Value
	Sept	800	37	63.98	$2239.30	$2.788	$1.77	$4.56	$6.73	61.2%	$3648.00
	Oct.	600	49	145.49	5092.15	8.487	1.93	10.42	10.41	81.5	6252.00
	Nov.	906	112	129.88	4545.80	5.017	1.04	6.06	6.07	82.9	5454.00
	Dec	521	54	117.16	4100.00	7.871	0.88	7.75	5.81	88.6	4037.75
1938	Jan										
	Jan.	773	143	86.63	3032.05	3.922	0.42	4.34	4.27	90.3	3354.82
	Feb.	694	91	77.15	2700.25	2.984	0.528	3.51	3.70	85.0	2841.20
	Mar.	211	13								
	Apr.										
	May	700	67	51.88	1815.80	2.737	0.553	3.39	4.83	84.3	2373.00
	June	926	98	111.76	3911.60	4.224	0.58	4.80	4.88	87.9	4444.80
	July	829	92	157.04	5496.40	6.630	0.76	7.39	7.84	89.7	6126.31
	Aug	1035	209	323.45	11320.75	10.938	1.03	11.97	10.48	91.4	12388.95
	Sept	886	164	282.65	9892.75	11.166	1.06	12.22	11.39	91.3	10826.92
	Oct	1016	294	311.82	10913.70	10.472	1.21	11.68	12.08	89.7	11866.88
	Nov.	858	258	219.62	6786.60	8.958	0.95	9.91	9.72	90.4	8502.78
	Dec.	149	36	65.66	2298.10	15.42	1.295	16.72	#	92.2	2491.28
1939	Jan.	798	199	131.18	4591.30	5.878	1.40	7.28	8.01	80.7	5899.44
	S-T	11702	1916	2275.34	79636.55	6.805	0.92	7.726		88.1%	90418.13
	Feb.	876	164	172.454	5782.19	6.60	1.54		7.80	80.3	
	Mar	809	118	165.105	5535.77	6.85	1.01		6.89	85.0	
	Apr.	668	94 est.	93.62	3140.00	4.70	.78		6.32	87.6	
	T	14055	2292	2706.519	94094.51						

Gold bullion ounces are from returns of Selby Smelter.

Computed head is ounces Bullion per ton recovered at $35.00 plus aver. assay of tail for month

Average Head Assay is from daily feed samples. Recovery is based on actual bullion

Gross value is computed head times monthly tonnage Feb. and March were cleaned up together.

)Hot water
)in circuit
) 80°- 90 °

1- Name of property or company BENTON MINE

2- Location(State,county,district,section) OREGON-JOSEPHINE COUNTY See Road Map
Sec's. 22-23-27; Twp 33S; R8W. Elevation 1000'

3- If in Forest Reserve give name Siskiyou Nat'l. Forest

4- Name and distance nearest railroad station Glendale 21mi. N.E. on S.P. Reuben-15mi

5- How far from highway? 25mi. Pacific Character of mine road Good, steep

Description of holdings (quartz,placer,deeded) Quartz

7- Number of claims 13 + Fraction Number patented 9 + Fraction

8- Total acreage held 270 ±

9- Describe water supply:
(a) Name of stream Whiskey Creek & Drain Creek
(b) How far from claims? On Claims
(c) Approximate average flow 20 sec. feet. Whiskey Creek
(d) Power possibilities Good on Whiskey Creek 300-500 h.p.
(e) Average snowfall At camp not heavy Winter temperatures Moderate

10- Nearest electric power 15 mi. at Leland.

11- Amount & kind of timber available Poor timber (punky) Pine + Fir.

12- Nearest source for supplies Grants Pass. Lumber from Glendale

13- What is prevailing rock formation? Grano-diorite (vein host) See sheet 13

14- What other rocks are present? Greenstones one side; schists on other of granite

15- Is there much evidence of faulting? Some, displacement not serious

16- Is the country rugged or flat? Rugged, very steep creek walls.

17- Type of deposit (fissure, contact, replacement, dissemination,etc) Fissures, replacement shear zone See Note 17
Several of them. Benton vein very persistent. Post-mineral gouge. Second period of mineralization with enrichment of portions of Benton and branch veins

18- Description of deposit:
(a) Exposure on strike 1500'
(b) Direction of strike N 15°-20° E
(c) Dip and direction 70°-85° S.E
(d) Average width 5'

19- What metals, in the order of their importance Au.-Ag.

20- Representative assays(not specimens) See Note No. 20

21- Development work,describe nature,amount and depth obtained.Submit sketch if possible. (Costs)

Main haulage level (Kansas Tunnel) cuts vein 1500 ft. portal. Two drifts, Benton No. 1 - 530'; Benton No. 2 - 245' respectively above Kansas tunnel, with connecting raises. Numerous drifts + raises on branch veins between No. 1 + No 2 Benton tunnels - intermediate drift on Benton vein between Benton No. 2 + Kansas.

22- Production, if any, give details From Sept. 1937 to May 1, 1939 a total of (Ore Reserves) (Been producing since Aug 1937) 14,055 tons have been milled. Receipts from sale of gold precipitates amount to 2706.51 fine ounces or $90,749.28 at $33.53/oz = $4776.27 per mo. or $6.45/ton recovered.

23- What buildings on property, describe fully Assay office, mine office, Cookhouse, bunkhouse for 24 men. Warehouse, officers cabins, 2-3 cabins more.

Ore Reserves: Potential several thou. tons above Kansas level, very little blocked out on more than 2 sides. Very little stoping done, all between Benton #1 + #2.

24- Describe equipment fully Two compressors total 800 cu ft. Diesel power. Drills-tools, etc for present scale. 4 months oil capacity. 3000 gals. New G.M. pickup truck. 1- F.B. 140 h.p. Diesel - 1- F.B.M. 120 h.p. diesel 1- Atlas 140 h.p. Diesel drives 125 KVA A.C. generator All in excellent shape

25- If mill on property describe and give flow sheet Counter-current cyanide. Grinding capacity 50 tons/day - class. + settlers about 35 tons See Sketch No. 21

Other properties →

26- Nature of organization Owned by Lewis Inv. Co. Portland, Ore.

27- Title for holdings in whose name? Same.

28- Any mortgages, liens, debts or other encumbrances on claims, or company? Give details.

None Capital Investment (see Note 28)

29- If incorporated: (a) In what State? Oregon.
(b) Capitalization (number of shares) 5000
(c) Par value per share $100
(d) Assessable? No In what manner? See note no. 29
(e) Amount of stock in treasury now? (shares)
(f) Number of directors? 5
(g) Names of officer, and directors, with addresses:

C. Hunt Lewis, Pres. 408 Lewis Bldg,
Mason L. Bingham, V. Pres. + Treas. 408 Lewis Bldg. Portland
Lewis H. Mills, Portland
Sherman R. Hall "
H.E. Bowser. Merlin.

30- If not incorporated give names and addresses of principal parties:

31- Nature of proposed deal on property (sale, lease, lease & bond, straight royalty, etc.) Give all details, prices, terms, royalties, working requirements, time involved, etc.)
See letter marked Note 31
Sale price $300,000. Terms: 10% at end of 6 mo. after agreement 1st 6 mo. purchaser may operate mine + mill, pay 10% royalty to apply Bal. due in 5 equall install at 6 mo intervals. 10% royalty on all proceeds to apply.

32- Name & address of party submitting above information Albert Burch.
Report by Wm. W. Elmer, 1931
Two reports (geological) by Oscar Hershey 1937-38

33- Date & place Medford, Ore. Apr. 26, 1939

34- Remarks Suggests small C. Drill for exploration branch veins

Use additional sheets if necessary.

NOTE NO.13

The present workings are in a dioritic rock which varies from grano-diorite,or quartz-diorite to straight diorite and schistose diorite. This occurs as an elongated body trending NE-SW. From observations made on the surface it appears to be bounded on the east by greenstone,possibly of dioritic origin. On the west and south the bounding rock is a chloritic schist,probably of igneous origin. See attached sketch.

The structure and areal geology would indicate the probability of tension fractures along a general NE-SW direction,more or less parallel with the diorite-greenstone contact.

NOTE NO. 17

The ore occurs in a sheared zone,one wall of which is a fairly strong and quite persistent fault plane. The quartz bodies lie on this plane at some places and well into the hanging wall formation at other points. Apparently there has been some movement on the fault plane subsequent to the deposition of the quartz as shown by crushing and dragging. There has been more than one period of mineralization as evidenced by at least two kinds of quartz. Some of the pyrite carries very good gold values and another variety is low grade.

Minor slips and faults throughout the zone have resulted in a pronounced schistosity being imparted to the diorite, particularly on the hanging wall side of the main fault plane. The quartz and pyrite are rather definitely associated with this schistose condition and it is my belief that this is probably the favorable condition for ore deposition.

The ore consists of white, opaque quartz in which there are varying amounts of the iron sulphides, principally pyrite, some marcasite and probably lesser amounts of arsenopyrite. The gold values are associated with the pyrite,very little free gold has been noted. Where the schistosity is prominent there frequently is appreciable amounts of pyrite in the diorite and assays of this material will vary from $2 to $4 per ton.

NOTE NO. 19

Samples taken by W.W.Elmer in 1931 in No. Benton and No.2 Benton tunnels, in what he assumed to be a continuous shoot, give a very fair idea of widths and values in the vein proper. In No. 1 Benton for a distance of 140 feet, 15 samples were taken having a weighted average of 0.41 oz/ton in gold, over an average width of 2.9 feet. In No. 2 Benton tunnel, which is 285 feet below No. 1, the vein was sampled for some 160 feet and showed a weighted average gold content of 0.36 oz/ton over an average width of 4.1 feet. Subsequent mining, starting at Benton No. 2 and stoping up toward No.1 resulted in an average mill head of 0.17 oz/ton for the territory immediately above No. 2 tunnel. This stope was carried up for about 60 feet from No. 2 at which point the quartz split into small stringers and the grade became too low to mill. The foregoing figures indicate a dilution of about 1 to 1.

The operators have done a very large amount of sampling in connection with the exploration and development work, all of which is a matter of record, and a large part of which I have checked over. However, the results of milling operations are complete and detailed

NOTE NO.19 continued.

Tons milled..... 9,550
Bullion recovered..... 2,086.23 fine ounces Au
Average recover..... 87.5%
Recovered value of ore..... 0.218 oz/ton @$33.53/oz——$7.30/ton
Original head value..... 0.250 oz/ton " " ——$8.40/ton

During this period 1,793 tons of waste was sorted out at the mill; if $2 per ton is allowed for the value of the waste the average value (at $33.53 per ounce) for the past years operation is 0.193 oz/ton or $6.47/ton. Some waste was sorted out underground and it is safe to assume that as broken the dilution would be close to 30%. During this same period the weighted average of the mill heads was 0.245 oz/ton or $8.15/ton.

The gold content of the ore as sent to the mill varies between rather wide limits, for example, during the past years operation the average monthly head assay ran from a low of $4.65 to a high of $15.30 per ton. All figures indicate that the average value of the ore, as milled, is between $8.00 and $8.50 per ton. Silver is very low, but a few cents per ton.

NOTE NO. 21

Ore is exposed in several faces in the mine and at different levels, but past experience has indicated quite clearly that the shoots, or bunches, of ore are not continuous for any distance and can not be projected with any confidence for more than a few feet beyond any working face.

All ore mined and milled during the past twelve months came from exploration work; there are no blocks at this time that can be classed as positive or assured ore.

This property does have possibilities as a small tonnage, medium grade, operation. The ore, where found, is in minable widths and often of excellent grade, however, the movements that have occurred along the shear zone have resulted in breaking and shifting so much of the vein material that the cost of opening up the minable blocks is often greater than the recoveries from these blocks.

Work on the lower(Kansas) level during the past two weeks has disclosed some excellent grade ore across widths from one to four feet with values from 0.50 oz/ton to 4.90 oz/ton in gold. This ore lies below an exposure on the Intermediate drift above where the vein has been opened up for 80 feet along the drift with the face still in ore. 25 samples taken along this drift gave an average width of 5 feet and a weighted average assay of 0.189 oz/ton. The Intermediate drift is 110 feet above the Kansas level and this section may contain a block of ore, however, no work has been done in this section between the levels and it is hardly safe to assume a definite block here.

NOTE NO. 22

Detailed costs for the first quarter of 1939 were selected as being representative and reflecting present operating conditions. All ore extracted during the period came as a result of exploration work, i.e. drifts, raises, etc., no stoping was done.

1939	Tons Milled	Mining Cost	Milling Cost	Overhead Cost	Total Cost	Gold Recovered
Jan.	798	$5.20	$3.01	$1.71	$9.91	$5.50

NOTE NO. 27

Sketch No. 13 shows the location of other workings that were visited. It is evident that mineralization in the area is rather wide spread, but in most instances the veins are narrow and the values erratic. No work has been done on the outlying claims for many years, some of the tunnels and shafts are caved and it is difficult to form an opinion about the potential value of these exposures.

GEORGIA VEIN.

Considerable work has been done in a tunnel and a short shaft on this vein. Some sampling done a few years ago gave low values and widths, except for occassional specimens containing pyrite that gave good gold values. There is no definite vein structure in the tunnel and the operators did a lot of prospecting. Across Drain Creek andexposure at the road shows fair values, this maybe the same vein. In the Kansas crosscut at a point 600 feet from the portal what is presumed to be the Georgia vein has been cut; some fair assays were obtained, but there is no vein definition at this place.

LOUISIANA VEIN.

This is, according to Elmer, between one and two feet wide with values from 0.28 to 0.30 ounces Au per ton. He inspected a 24-foot shaft and states that the vein has no continuity.

TEXAS CLAIM.

A tunnel and raise had been driven on this showing a long time ago; Elmer examined and sampled this taking 17 samples over an average width of 2½ feet and a weighted average value of 0.15 oz/ton. There is a local belief that this is the southern end of the Georgia vein.

GOLD BUG PROPERTY.

This lies between 2000 and 3000 feet east of the Benton Group. It is said to be a fissure entirely within the greenstone. Ore was extracted prior to 1905 from a 600-foot shaft and treated in a 5-stamp mill. The ore is said to be quartz with pyrite, identical with Benton ores. The production record is placed at something between $750,000 and $1,250,000. This was the major producer in this section.

CONCLUSION.

From the work done during the past two years certain things have become fairly well established.

1st The ore bodies so far found are not large.

2nd The grade of the quartz and pyrite filling is, in most cases, economic, however, the dilution has been considerable and is likely to remain so unless wider bodies are found.

3rd If there is continuity of the ore shoots within the vein, or if there is any definite rake to the shoots, it has not yet been determined.

4th Practically all of the ore treated during the past twelve

5th Considering the nature of the deposit and the mill capacity, the operating costs are not excessively high, however, unless future work discloses ore in fair widths and larger tonnages the mining costs will not be reduced a great deal, and without greater mill capacity the milling costs will not be reduced at all. There is some talk of increasing the mill capacity and installing flotation equipment, the concentrate to be re-ground and cyanided. This idea is probably sound and should be thoroughly investigated if and when the ore reserves are sufficiently large to warrant the increase and change.

6th It appears highly probable that a large amount of exploration work will be necessary to prove this deposit. The use of a light diamond drill has been suggested, but the disconnected character of the ore bodies make its use of doubtful value.

7th While it is likely that the original price of $300,000 and the terms can be modified considerably it is doubtful if any deal can be made that would be more in line with the situation as outlined above. The owners feel that they are entitled to the return of at least one-half of their investment in the form of cash payments.

File No. G-11

PROSPECT CARDS

Code No.

Property Name Benton Mine

Property Owner

Submitted by

Location: State Ore.

County Josephine

Mining D.

T 33S R 8W Sec. 22, 23 27

Followup Recom. yes?

Later Review Recom.

Examined by

Company

Date

Where filed

Metals		Production Metal
	Cu	
	Mo	
	Pb	
	Zn	
	Ag	Some
	Au	X
	Fe	
	Mn	
	Cr	
	Ni	
	W	
	U	
	Re	
	P_2O_5	
	K_2O	
	Sn	
	Be	
	Coal	
	Hg	
Other		

AMS Quad

Other Quad

Production

	None	10^2	10^3	10^4	10^5	50^5	10^6
TONS							

Geology

Host Rock Granodiorite, Greenstones, and schists

Mineralization

Type qtz veins in shear zone

Trend

Ore auriferous iron sulfides

Gangue

Alteration

Type

Extent

Bibliography

USGS

USBM

Other

Remarkes: good potential for a decent tonnage, medium to low grade deposit. High grade lenses and shoots are broken up making substantially lower grade - higher tonnage ore.

Follow-up Recom.

Field Time

None

1 Day

1 Week

1 Mo

+1 Mo

Banton Mine		Gold	none
NAME	OLD NAMES	PRINCIPAL ORE	MINOR MINERALS

33 South · 8 West 22-23-27
T R S

.....Josephine..... COUNTY

.....Galice..... AREA

.....1000..... ELEVATION

.....Road & highway..... ROAD OR HIGHWAY

Glendale-19; G.P.-39 miles. DISTANCE TO SHIPPING POINT

PUBLISHED REFERENCES

Oregon Metal Minds Hdbk. 14-C

Mining World, April 1941 (?)

MISCELLANEOUS RECORDS

PRESENT LEGAL OWNER (S) .....Lewis Investment Company Address .....
.....408 Lewis Building.....
.....Portland, Oregon.....
.....
.....

OPERATOR ..Lewis Investment Company.....

Name of claims	Area	Pat.	Unpat.
Eight patented claims.			
Sixteen unpatented claims.			

Name of claims	Area	Pat.	Unpat.

EQUIPMENT ON PROPERTY 60-ton counter-current cyanide plant, Diesel power plant, and mining equipment.

MI-21

MONTHLY REPORT OF PURCHASES

SUPPLIES, MAINTENANCE ITEMS, AND REPAIRS UNDER
PREFERENCE RATING ORDER P-56

NAME OF OPERATOR Lewis Investment Company - Benton Mine

ADDRESS: P.O.Box #268, Grants Pass, Oregon. MINE SERIAL NUMBER: 33-5

PURCHASES MADE IN MONTH OF: February 1942

PURCHASES TO WHICH RATING A-8 HAS BEEN APPLIED DURING MONTH:

MATERIAL	QUANTITY	SUPPLIER
Bone Ash	100#	Braun-Knecht-Heimann Co.,
Bicarbonate of Soda, Tech.	100#	" " " "
Triple Aplanatic Magnifier	1	" " " "
Double Lense Magnifier	1	" " " "
C.P.Bromine	¼#	" " " "
Para Phenylene Diamine	1 oz.	" " " "
Muffle Rest for Braun Furnace	1	" " " "
Repair Oxygen Pressure Regulator	1	Linde Air Products Co.
Clarifier Sheets 4' x 6'	9	The Merrill Company
Inner Socks 3'4" Long	40	" " "

CERTIFICATION

The undersigned hereby certifies to the Office for Production Management, that:

(1) He executed the foregoing statement on behalf of and by authority of the above named Mine Operator.

(2) The above named Mine Operator has, during the period covered by this report, complied with all the provisions of Preference Rating Order P-56.

✓

(3) During such period the Mine Operator's Inventory of operating supplies and other material has not been greater than the minumum necessary for the efficient operation of his business, and that ratio for inventory (quantity) to current production has not exceeded the ratio of average year-end inventory (quantity) to average production for the years 1938 1939, and 1940.

(4) The facts stated herein are, to the best of his knowledge and belief, true and correct.

3-7-42 (Date) Elton A. Youngberg (Signatue of Authorized Official) Supt. (Title)

(Section 35 of the Criminal Code, 18 U.S.C. 80, makes it a criminal offense to make a false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.)

MONTHLY REPORT OF PURCHASES

SUPPLIES, MAINTENANCE ITEMS, AND REPAIRS UNDER
PREFERENCE RATING ORDER P-56

NAME OF OPERATOR: Lewis Investment Company - Benton Mine

ADDRESS: P.O.Box #268, Grants Pass, Oregon. MINE SERIAL NUMBER: 33-5

PURCHASES MADE IN MONTH OF: JANUARY 1942

1. PURCHASES TO WHICH RATING A-8 HAS BEEN APPLIED DURING MONTH:

MATERIAL	QUANTITY	SUPPLIER
#5675 Ball Bearing	1	Atlas Imperial Diesel Engine Co.
Spacer	1	" " " " "
Bearing - Sleeve	1	" " " " "
#5486 Oil Thrower	1	" " " " "
Packing	4	" " " " "
Key - Woodruff	1	" " " " "
#5482 Shaft	1	" " " " "
#X-871 Piston Pin Assembly	2	" " " " "
#928-FBH Bushing - Air Comp.	2	" " " " "
#5-2856 Finger - Unloader	2	" " " " "
#5-3143 Spring- Unloader	4	" " " " "
#5-2070 Bushing	15	" " " " "
#5910 Bushing	8	" " " " "
#YKA 4324 A Inj. valve tip	1 set	Faribanks. Morse Co..
YKA 2409 E1 Inj. valve bushing	3	" " "
YKA 202 G Inj. valve needle	3	" " "
YKA 6178 A Inj. valve tip gasket	6	" " "
YKA 6178 B " " " "	6	" " "
YKA 6505 A Body Sleeve gasket	6	" " "
YKA 6382 A1 Inj. valve body gasket	4	" " "
YKA Spring shim	8	" " "

MONTHLY REPORT OF PURCHASES

PURCHASES TO WHICH RATING A-8 HAS BEEN APPLIED DURING MONTH

MATERIAL	QUANTITY	SUPPLIER
Brushes for Electric Motor Type HV	8	Fairbanks, Morse Co.
Chuck Bolts & Insert Nuts	2	Mitchell Diamond Drill Co.
Top Rubber Seats for Pump	5	The Dorr Company
5" Large balls valve	2	" " "
3¾" Small balls valves	3	" " "
#850 Rear Linkshaft	2	" " "
#851 Bushing in bell crank	4	" " "
C.P.Silver Foil	1 oz.	Braun- Knecht-Heimann Co.
6" Reeves Angel filter paper	12 Pkgs	" " " "
10" " " " "	5 "	" " " "
200 Mesh Tyler screen scale sieves	1	" " " "
#42 Watervalve guard spring	7	Worthington Pump & Mahhinery Co.
#41 Water valve guards	7	" " " "
#50 Trip gong 6" diam.	1	Mine & Smelter Supply Co.
Mine Bell Cord - 3/16"	150'	" " " "
5 ft. lengths 1-1/8" round lyner steel	6 pcs.	Loggers & Contractors Machy.Co.
1" Q.O. drill steel	100Ft.	" " " "
J2 Forming Wheels for bit grinder	4	" " " "
Higgins Black Ink	1 Bottle	Eugene Dietzgen Co.
Wrico Stoppers	2	" " "
10x10 graph sheets	100	" " "
#2920 Camel Hair Brushes	2	" " "
#2940 Red Sable Brush	1	" " "
#3063 Fixative	1 pint	" " "
#99 Eck0 drawing paper 18"x18"	1sheet	" " "

A-3 Used

MONTHLY REPORT OF PURCHASES
SUPPLIES, MAINTENANCE ITEMS, AND REPAIRS
UNDER PREFERENCE RATING ORDER P-56

NAME OF OPERATOR Lewis Investment Company - Benton Mine

ADDRESS P.O. Box # 268 Grants Pass, Oregon. MINE SERIAL NUMBER 33-5

PURCHASES MADE IN MONTH OF: DECEMBER 1941 .

1. PURCHASES TO WHICH RATING A-8 HAS BEEN APPLIED DURING MONTH:

MATERIAL	QUANTITY	SUPPLIER
Re-babbitt Conn. Rod	1	Fairbanks Morse & Company
#374B Tracing Paper Sketch Pad	1	Eugene Dietzgen Co.
#5754 Timber Scribe	1	" " "
#53706 Metallic Tape Filler 50'	1	" " "
#3222 4 in 1 Multi-File	1	" " "
#3263 Mongol Colored Indelible Pencils	1 Set	" " "
#2894 Sharpening Stone	1	" " "
#2799 1Qt. Best Test Rubber Paper Cement	1 Qt.	" " "
Loose Leaves 386-2 Cross Section Ruled Like 400 For 382 Binder 36" Wide	2 Sets	" " "
#128 Madison Tracing Cloth	10 Yards	" " "
#142 Pounce	1 Can	" " "
D89BH15B Valve Plug DUYBG	1	Gardner Denver Company
D89BH-16 Automatic Valve DUYSB	1	" " "
D89-15D Valve Cheat Key DUFAM	1	" " "
399L74 Steel Holder Belt Bushings	2	Ingersoll-Rand Co. " "
451L74 Steel Holder Spring Washers	2	" " "
D288L74 Steel Holder Springs	2	" " "
582 549 Steel Holder Bolt Guide Washers	2	" " "
4 Point - Center Hole #1 Thread Sibley Type Bits	2500	" " "
Cast Hy-Steel Grinding Balls	10 Tons	The Mine & Smelter Supply Company
{ A 3 Applied } Hy-Steel Cast Grinding Balls	10 Tons	" " "

MONTHLY REPORT OF PURCHASES

MATERIAL	QUANTITY	SUPPLIER
#5681 Bearing Thrust Ball For Body	2	Atlas Imperial Diesel Engine Company
Set Screw Control Lever S-3193	2	" " "
Spindle With Extension 6850# KXH	3	" " "
Nozzles 864 E	6	" " "
Gasket Spray Valve 860 E	6	" " "
Spring 858 E	3	" " "
Bearing Ball Thrust 5686	4	" " "
Gland 866 E	6	" " "
PURCHASES TO WHICH RATING A-3 HAVE BEEN APPLIED; PARTS FOR PUMP # 229.268 5½ X 3½ X 5 as Follows:		
{A3 Applied #77 Air Cock	1	Worthington Pump & Mach. Co.
#78 Blow Cocks	4	" " " "
#20 Spool	1	" " " "
Water Valves - Rubber	8	" " " "
#44 Water Valve Seat	1	" " " "
#42 Water Valve Guard Spring	1	" " " "
#41 Water Valve Guard	1	" " " "
#21 Spool Pins	2	" " " "
5/8" Round Iron Rod	21 Lbs.	Rogue River Hardware Co.
3/4" Round Iron Rod	30 "	" " " "
16 Gauge Galv. Iron Sheeting	15 "	" " " "
5/8" Cold Rolled Shafting	80 Ft.	" " " "
3/4 " Cold Rolled Shafting	60 "	" " " "
7# Nitric Acid C. P.	2	Braun Knecht Heimann Co.
Carboy Acid Hydrochloric Commercial	1	" " " "
Litharge Commercial	200 Lbs.	" " " "
Asbestos Gloves	1 Pr.	" " " "
Dome "C" For Type 40# Furnace	1	" " " "
Deflecting Brick "L"	1	" " " "

MATERIAL	QUANTITY	SUPPLIER
Scoop Lip Hi Hard	2	Williamson Company
Back Plates	2	" "
Feed End Liner #4035 AR	1	" "
" " " #4035 BR Plus	1	" "
" " " #4035 DR	3	" "
" " " #4035 ER	3	" "
Discharge End Liner #4035 AR Plus	1	" "
" " " #4035 BR	1	" "
" " " #4097 C	3	" "
" " " #4097 D	3	" "

CERTIFICATION

The undersigned hereby certifies to the Office of Production Management, that:

(1) He executed the foregoing statement on behalf of and by authority of the above named Mine Operator.

(2) The above named Mine Operator has, during the period covered by this report, complied with all the provisions of Preference Rating order P-56;

(3) During such period the Mine Operator's inventory of operating supplies and other material has not been greater than the minimum necessary for the efficient operation of his business, and the ration of inventory (quantity) to current production has not exceeded the ratio of average year-end inventory (quantity) to average production for the years 1938, 1939, and 1940;

(4) The facts stated herein are, to the best of his knowledge and belief, true and correct.

1/20/42 — (Date)

Mann L. Bonfils — (Signature of Authorized Official)

Pres. — (Title)

(Section 35 of the Criminal Code, 18 U.S.C. 80, makes it a criminal offense to make a false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.)

MONTHLY REPORT OF PURCHASES
SUPPLIES, MAINTENANCE ITEMS, AND REPAIRS UNDER
PREFERENCE RATING ORDER P-56

NAME OF OPERATOR Lewis Investment Company - Benton Mine

ADDRESS P.O.Box #268, Grants Pass, Oregon. MINE SERIAL NUMBER 33-5

PURCHASES MADE IN MONTH OF: November 1941

1. PURCHASES TO WHICH RATING A-8 HAS BEEN APPLIED DURING MONTH:

MATERIAL	QUANTITY	SUPPLIER
For 6x9½ P&H Engine (Atlas) Piston Ring Extractor Tool	1	Atlas Imperial Diesel Eng. Co.
30 Gram Crucibles	80 pcs.	Braun-Knecht-Heimann Co.
20 Gram Crucibles	96 "	Braun-Knecht-Heimann Co.
Deflecting Brick fro Type 40 Furnace	1	" " " "
Burner Boss For Type 40 Furnace	1	" " " "
#21745 Beaker Clamp Safety Tong	1	" " " "
#13912 - 250Ml. Beakers	6	" " " "
Carbon Tetrachloride, Tech.	10 Lbs.	" " " "
No.36662 Ultra Violet Lamp-Less Globe	1 Lamp	" " " "
Babbitted Bush.#LIA55 Fron	1	" " " "
Babbitted Bush.#LIA56 REAR	1	" " " "
600 CC Beakers, Griffin #13912	8	" " " "
#D89BH-1FS Drifter Cylinder Comp.	1 Complete Cyl.	Gardner-Denver Company
#FF89-70 Feed Rack for Drifter	1 Feed Rack	" " "
#D89BH-1FS Cylinder Liner	2	" " "
#D89-32C Air Connecting Springs	2	" " "
#D89-7BN Chuck Driver Nut	2	" " "
#D89-7C Chuck Sleeve Bushing	2	" " "
#7-10-50 Rifle Nut	2	" " "
#7-10-38 Rifle Nut	2	" " "
#7-11A Pawl	8	" " "

MONTHLY REPORT OF PURCHASES

MATERIAL	QUANTITY	SUPPLIER
#7-11B Pawl Plungers	8	Gardner-Denver Company
#107-13A Water Connection Screen	4	" " "
#107-13BA Water Connection Screen Gask.	6	" " "
#107-13G Water Spud Washers	6	" " "
#AF-89-27 Water Tubes	6	" " "
#107-29 Water Tube Gland	2	" " "
#GG-12 Water Tube Gland Gasket	6	" " "
#7-29B Water Tube Gasket	12	" " "
#17-29 Water Tube Washer	12	" " "
#H81-28 Filler Plug	6	" " "
#AF79-45 Piston Housing Screen	4	Gardner-Denver-Company
#AF89-48 Piston Bushing	3	" " "
#AF89-50 Automatic Feed Valve	2	" " "
#AF89-72 Feed Pawl	8	" " "
#7-11B Feed Pawl Plunger	6	" " "
#AF89-74 Feed Pawl Spring	6	" " "
#h81-28 Cylinder Oil Filler Plug	3	" " "
#R104-IL Cylinder Liners	3	Gardner Denver Company
R104-F6 Lubricator Plunger	2	" " "
#R104-15-D Valve Chest Dowel	2	" " "
R104-16 Automatic Valve	2	" " "
#H81-18S Control Valve Spring	3	" " "
#R107-7N Chuck Driver Nut	2	" " "
#R104-11A Pawl	8	" " "
#R104-11C Pawl Spring	8	" " "
#R104-27 Water Tubes	12	" " "
#37-29 Water Tubes Gland	2	" " "

MONTHLY REPORT OF PURCHASES

MATERIAL	QUANTITY	SUPPLIER
#107-13A Water Connecting Screen	6	Gardner-Denver Company
#107-13BA " " Gasket	6	" " "
#778-5D Feed Piston Point	3	" " "
#R104-22 Clutch Ring	2	" " "
#R111-20LV Cup Leathers	12	" " "
#891-36 Side Rod Gaskets	24	" " "
#H-81-38 Filler Plugs	4	Gardner-Denver Company
12" Rope Sheave with Shaft & Jornal	1	Mine & Smelter Supply Co.
Felts for Carbide Lamps	12	" " " "
Jewel Tips for Carbide Lamps	12	" " " "
Reamers for Carbide Lamps	12	" " " "
Gaskets " " "	12	" " " "
Tip Cleaners for Carbide Lamps	12	" " " "
Safety Hook & Chain for 3/8" Rope	1	" " " "
PARTS FOR MODEL 32-E-12 Fairbanks Diesel Engine as Listed Below:		
Piston Pin	2	Fairbanks, Morse & Co.
Piston Pin Bushing	2	" " "
Piston Pin Needle Bushing	2 Sets	" " "
Connecting Rod Shims (.031)	2	" " "
Connecting Rod Shims (.062)	2	" " "
Connecting Rod Shims (.015)	2	" " "
Connecting Rod Box Capwick	4	" " "
Connecting Rod Box Cap Wick Supp.	4	" " "
Con. Rod Box Cap Wick Support Spr.	8	" " "
Bearing Body Cap Shim 314A	12	" " "
Bearing Body Cap Shim 314B	8	" " "
Bearing Vertical Adjust. Shim	4	" " "

MONTHLY REPORT OF PURCHASES

MATERIAL	QUANTITY	SUPPLIER
Bearing Vertical Adjust. Shim 1861A	2	Fairbanks, Morse & Co.
" " " " 1861B	2	" " "
Mine Car Wheels 12" Diameter	3	Joshua Hendy Iron Wks.
20 foot lengths stock 7/8" drill steel	2 -20' Lgths.	Machinery Co. Loggers & Contractors
7/8" Hex. Chuck for Jackhammer	1	Ingersoll-Rand Company
Sibley Side Hole No.1 Bits - 2½"	35 Doz.	" " "
" " " " " - 2"	2 Doz.	" " "
" " " " " - 1-7/8"	2 Doz.	" " "
" " " " " -1-6/8"	1 "	Ingersoll-Rand Company
First Oversize concave 1'8"Ty	1	Balzer Machinery Co.
Chicago Seal No.845	1	Balzer Machinery Co.
Cheek Plates for 15"x9" Blake Crusher	2	Allis-Chalmers Mfg. Co.
Chuck Bolts with Insert Nuts	2	Mitchell Diamond Drill Co.

CERTIFICATION

The undersigned hereby certifies to the Office of Productiion Management, that
(1) He executed the foregoing statement on behalf of and by authority of the above named Mine Operator.
(2) The above named Mine Operator has, during the period covered by this report, complied with all the provisions of Preference Rating Order P-56;
(3) During such period the Mine Operator's inventory of operating supplies and other material has not been greater than the minimum necessary for the efficient operation of his business, and the ration of inventory (quantity) to current production has not exceeded the ratio of average year-end inventory (quantity) to average production for the years 1938,1939, and 1940;
(4) The facts stated herein are, to the best of his knowledge and belief, true and correct.

12-11-41 (Date) Elton A. Young Jr. (Signature of Authorized Official) Supt (Title)

(Section 35 of the Criminal Code, 18 U.S.C. 80, makes it a criminal offense to make a false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.)

BENTON MINE
BENTON VEIN
BOTTOM OF WINZE
64' BELOW 1020 LEVEL

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

702 WOODLARK BUILDING
PORTLAND 5, OREGON

General Laboratory Number P 3607 Date received May 14 1945

Spectrographic Laboratory Number 1215 Sample received from F. W. Libbey

QUALITATIVE SPECTROGRAPHIC ANALYSIS
(Quantities estimated to nearest power of ten)

1. **Elements present in concentrations over 10%.**

   Silicon, iron, sulphur

2. **Elements present in concentrations 10% - 1%.**

   Calcium

3. **Elements present in concentrations 1% - 0.1%.**

   Aluminum, magnesium, sodium

4. **Elements present in concentrations 0.1% - .01%.**

   Manganese, titanium, gold, chromium, barium, strontium

5. **Elements present in concentrations .01% - .001%.**

   Vanadium, nickel

6. **Elements present in concentrations below .001%.**

   Molybdenum, silver

H. C. Henderson, Spectroscopist

E. N. Bull

BENTON MINE
LOUISIANA VEIN (E.W VEIN)

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

702 WOODLARK BUILDING
PORTLAND 5, OREGON

General Laboratory Number P 3606 Date received May 14 1945

Spectrographic Laboratory Number 1214 Sample received from F. W. Libbey

QUALITATIVE SPECTROGRAPHIC ANALYSIS
(Quantities estimated to nearest power of ten)

1. **Elements present in concentrations over 10%.**

   Silicon

2. **Elements present in concentrations 10% - 1%.**

   Iron, sulphur

3. **Elements present in concentrations 1% - 0.1%.**

   Aluminum, magnesium, calcium

4. **Elements present in concentrations 0.1% - .01%.**

   Sodium, manganese, chromium

5. **Elements present in concentrations .01% - .001%.**

   Titanium, molybdenum, vanadium, nickel, barium, strontium

6. **Elements present in concentrations below .001%.**

   Silver

[redacted]

E. N. Bailey

BENTON MINE
BENTON VEIN
BOTTOM OF WINZE
64' BELOW 1020 LEVEL

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

702 WOODLARK BUILDING
PORTLAND 5, OREGON

General Laboratory Number P 3607 Date received May 14 1945

Spectrographic Laboratory Number 1215 Sample received from F. W. Libbey

QUALITATIVE SPECTROGRAPHIC ANALYSIS
(Quantities estimated to nearest power of ten)

1. **Elements present in concentrations over 10%.**

   Silicon, iron, sulphur

2. **Elements present in concentrations 10% - 1%.**

   Calcium

3. **Elements present in concentrations 1% - 0.1%.**

   Aluminum, magnesium, sodium

4. **Elements present in concentrations 0.1% - .01%.**

   Manganese, titanium, gold, chromium, barium, strontium

5. **Elements present in concentrations .01% - .001%.**

   Vanadium, nickel

6. **Elements present in concentrations below .001%.**

   Molybdenum, silver

H. C. Henderson, Spectroscopist

E. N. Bull

Josephine County

J. C. L. Group

Lewis Investment Company, Portland, Oregon.

The Lewis Investment Company owns 8 patented mining claims, a total of 164.74 acres in Secs. 34, and 35, T. 33 S., R. 9 W. Information on this property will have to be secured from the Portland Office of this company . Caretaker does not know anything about it and without a permit it was impossible for informant to visit the property.

Informant: J. E. Morrison. October, 1937.

The Benton Group consists of 8 patented claims, 151½ acres in Secs. 22, 23, 27, T. 33 S., R. 9 W. and belongs to the same Company.

February 7, 1942

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

Josephine Co.

BENTON MINE

Mr. Youngberg gave me disturbing news to the affect that the Benton mine may shut down within the next six months. The main difficulties are priorities and labor. There seems to be no question about adequate ore reserves, and financially, the mine is in good shape. Mr. Youngberg gave this information in strict confidence, and I believe it should not be released.

Ray C. Treasher
Field Geologist
2/7/42

CONFIDENTIAL

Transmittal

QUANTUM Environmental

Engineering and Geologic Consulting

South 2195 Silver Beach Loop ◆ Coeur d'Alene, Idaho 83814

208 ◆ 765-2308 ◆ Phone ◆ Fax

March 4, 1994

Frank Hladky

Oregon Department of Geology and Mineral Industries

5375 Monument Drive

Grants Pass OR 97526

Description:

Copy of article from the past. Thought you might like to see it.

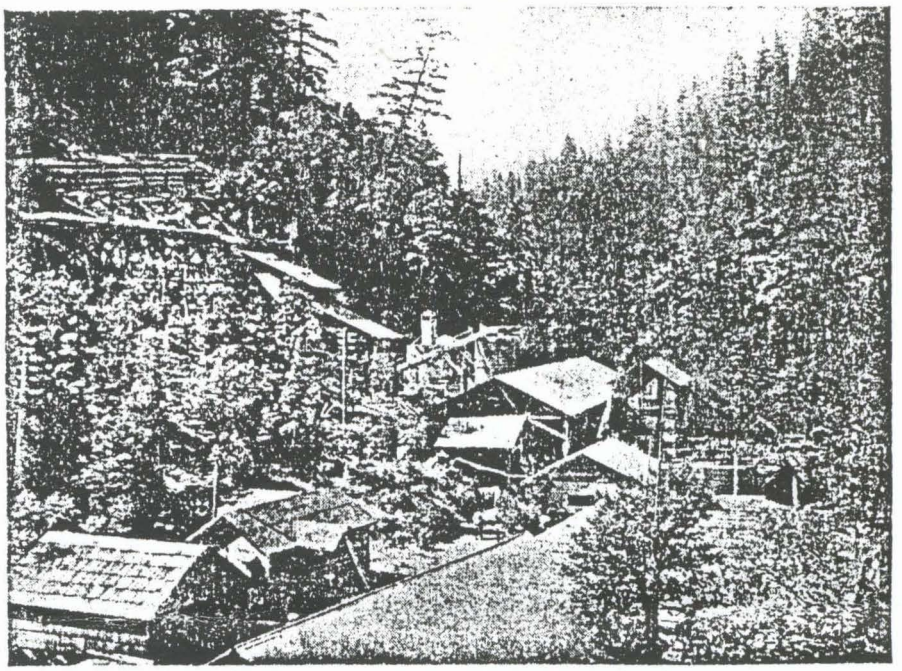
Remarks:

Do you have access to the following out of print articles:
B-7 The gem minerals of Oregon
B-14C-II Oregon metal mines Handbook (applicable sections)
B-34 Mines and prospects of the Mt. Reuben mining district

Sincerely: _____

James S. De Smet

Surface plant of the Lewis Investment Co.'s Benton Mine near Galice, Ore. The buildings are modernly constructed with split-ring timber connectors.

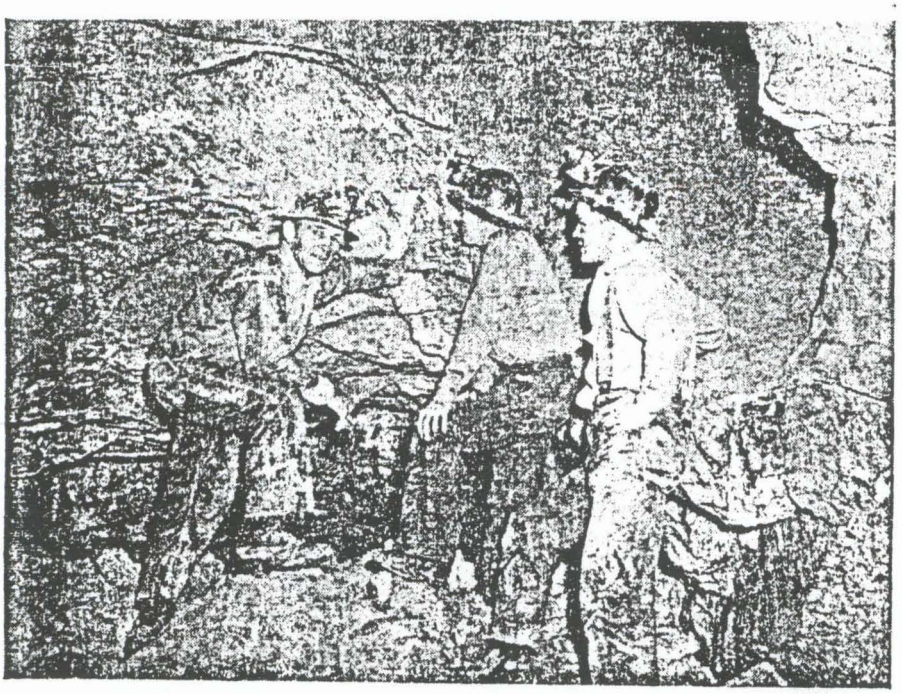


Below, Ray Shaver, mine foreman, left, with Walter Bonney and Ralph Minter, diamond driller, in the CE stope on the 1000 level of the Benton Mine. The "C" rill, driven through to the level above on a 45-degree angle, is seen on the right. Waste for the horizontal cut-and-fill stoping is introduced through the rill.

The BENTON Mine

ROGUE River and its tributaries saw the beginnings of gold mining in Oregon. As early as the 1850's, Whiskey Creek, near Mount Reuben, was the scene of extensive placer workings. This area is made up of very rugged mountains, even today far removed from modern highways.

In 1891 J. C. Lewis began mine development in some of this mountainous country adjacent to Whiskey Creek and continued this work for several years. During this time, adits were driven at several levels and, in some instances, extended several hundred feet into the mountain, generally following a quartz vein, but at times crosscutting hard country rock. These "old timers" worked out 3000' of crosscuts, drifts and adits. Although the work was all done by hand, they did not stint on the size of the openings. Backs are high enough to permit a 6' man to walk upright throughout most of the workings. Stalactites are forming on the ceilings of some of the oldest of these crosscuts at the present time.



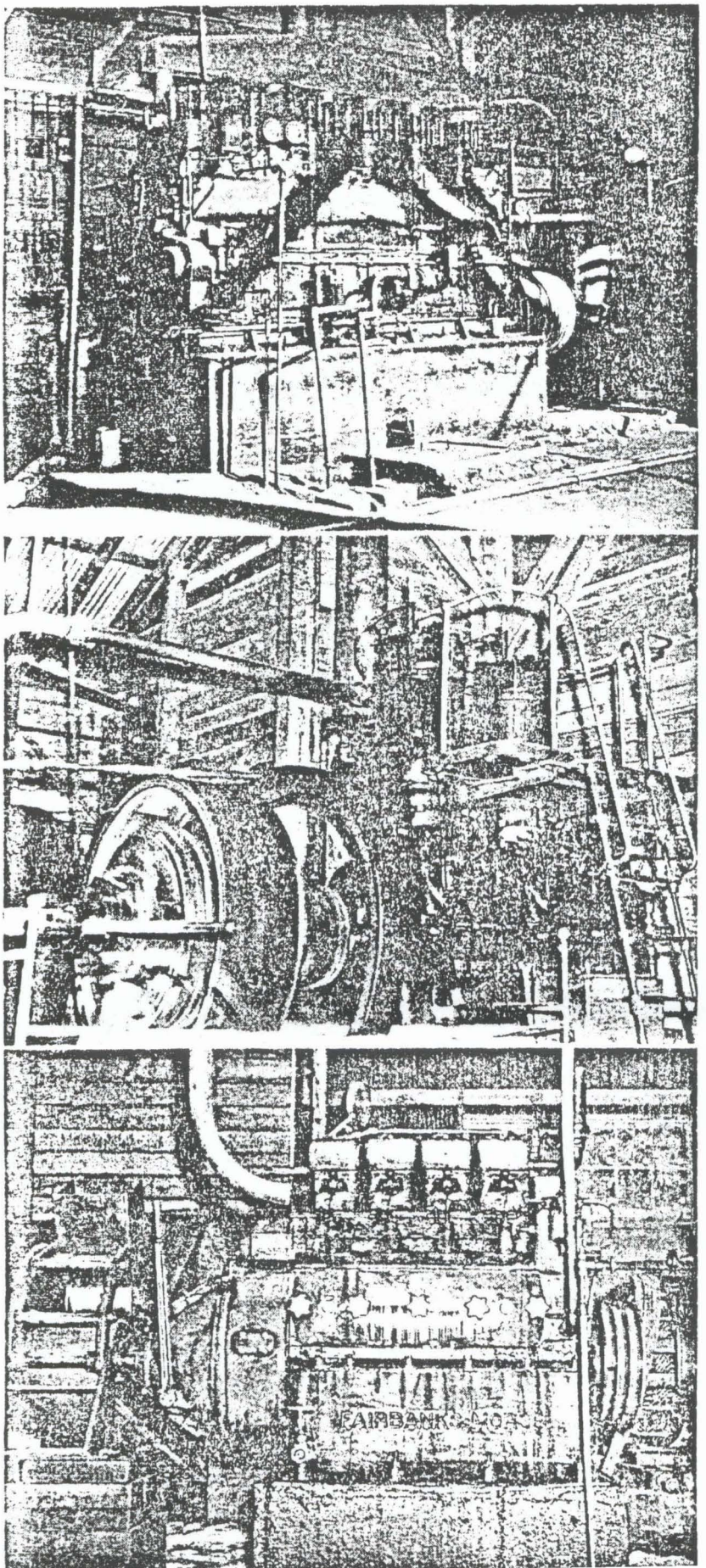
Mr. Lewis' development work progressed and in 1910 he patented seven and a fraction claims known as the "Benton Group". In 1935, after the mine had been idle more than two decades, development work was again pushed and a 1500' crosscut on the 1020' level was driven. Indications derived from this piece of work led directly to the erection of a 50-ton cyanide plant in 1936. Today this, the Benton Mine, is one of the largest gold producing lode mines in Oregon. Since the construction of the mill, 5500' of drifts and raises, and 1500' of rills have been driven, giving a total development of 7000' in the period.

With the completion this last year of a new road from Grants Pass, the Benton Mine is accessible by automobile the year round. Previously all travel had been confined to the Glendale road, which crosses the summit of Mount Reuben and is snow-bound for five months of the year. The new road was a CCC project and has proven to be highly advantageous in the winter months. The mine is 39 miles from Grants Pass and 18 miles from Glendale. Head office of the Lewis Investment Co., owning the mine, is in the Lewis Building, Portland.

Even though development work was started about 50 years ago and the mine has grown to its present size, 50% of the work is still development. High grade stopes are mined with the

low grade stopes, keeping the mill heads to an average milling grade.

The mineralized zone in the Benton Mine is along a contact in an intrusive diorite formation. Structure on the west side of the vein is granodiorite and on the east side it is a dark diorite porphyry. Gold is associated in the ore with pyrite. There is very little free gold. The vein minerals include chalcopyrite, marcosite, sphalerite, magnetite, quartz, sericite, chlorite, calcite, and dolomite.



The three diesel engines which furnish the power for the Benton Mine and mill. At the top, Atlas-Imperial 6-cylinder, 9 by 12, engine developing 140-hp. It drives a 125-kva. Allis-Chalmers generator, 440-volt, 60-cycle, furnishing electricity for the mill and camp. In the middle, a Fairbanks-Morse 2-cycle engine developing 120-hp., which powers the main compressor. Below, Fairbanks-Morse 40-hp. diesel used for standby. It can operate an Allis-Chalmers generator or Sullivan compressor for emergency duty.

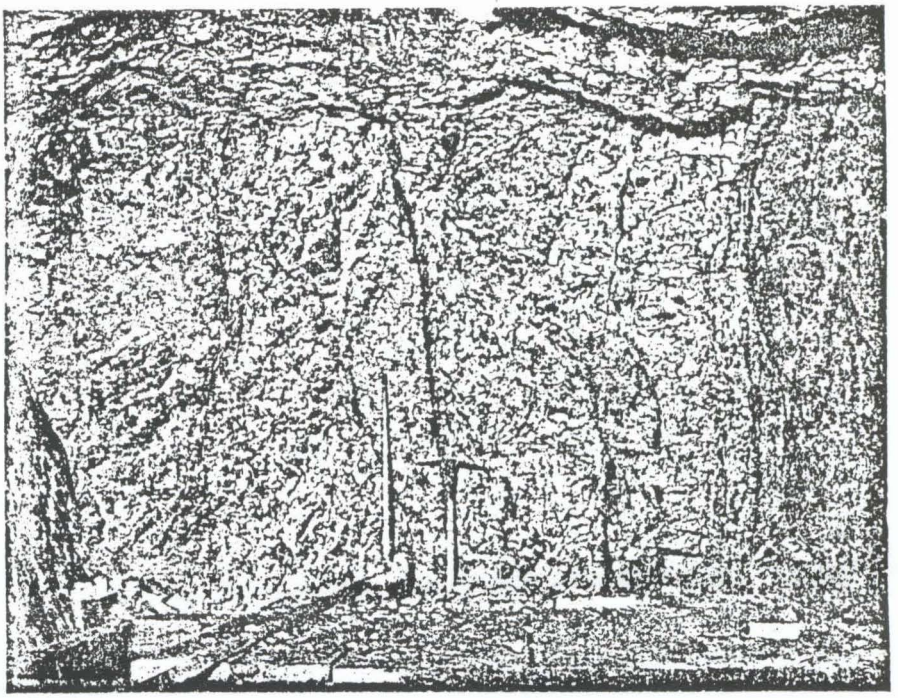
Ore occurs in numerous lenses within an ore shoot, all of which rake upward to the North. The vein varies from 1½ to 6′ in width and strikes between N. 10° and N. 40° East and dips to the East approximately 72°.

Mining as now carried on consists of horizontal cut-and-fill, as well as some square-set stoping. To develop a section of ground for stoping, raises are begun about every 100′ on the levels. These raises are extended up about 10 or 15′ then a 4 by 7′ rill is driven at 45° on the vein, usually to the North. These rills extend to the next level and are later used to bring in waste for the horizontal cut and fill stoping. Timber drift sets are kept to a free height of about 7′.

Where the vein narrows down, the waste is blasted separately from the ore and left in the stope for filling. Mucking is done by hand, and until last summer tramming was done by hand. Since June, 1940, mule power has been used on the main level of the mine for pulling the 22 c.f. Hendy Matteson cars to the mill. Joshua Hendy cars of 18 c.f. capacity are used in the drifts. Track throughout the mine is 18″ gauge.

Several ore shoots have been opened up on the 1020′ level. The 900′ level has 950′ of drifts; the 780′ level has 1500′ feet of drifting and there is 850′ of drifts on the 700′ level. On the 630′ level are 320′ of drifts and on the top or 500′ level there are 450′ of drifts, all of which were driven by the "old timers".

The ever-important item of ventilation has been cared for by the installation of an electrically driven air



A 9-ft. face of quartz in the "H" stope above the 815-ft. level of the Benton Mine. This picture was taken by Lee Sanderson, night jigger boss.

blower on the lower level for forcing air in to dead ends. During the summer use of the ventilating system was discontinued because the workings within the mine are such as to render them well ventilated from the natural flow of air during the summer season.

The mine and crushing plant are operating on a one shift (8 hour) basis. The mill operates three 8-hour shifts per day. One mill operator and one power plant operator are on duty each shift in the mill.

Du Pont and Atlas explosives are employed for the underground blasting at the mine. Forty per cent special gelatin in 1⅛ by 8" sticks is used for drifting and raising; and 45 per cent Gelex is used for stoping.

Six Gardner-Denver stopers, Model 104; two Gardner-Denver drifters, Model PF89; and one Gardner-Denver drifter, Model D89, are used in the mine. Octagon steel is used for the stopers and round steel for the drifters. The main hoist in the mine is a Park & Lacy, air-driven, single drum, with 8" piston and 6" stroke. Water is supplied to four drills on the 500' and 700' levels by a two-cylinder (cylinders in parallel) air-driven water pump manufactured by Dean Brothers of Indianapolis, Ind.

Ingersoll-Rand jackbits have been used in the mine for the past few years.

At present, the jackbits are checked out to each man when he goes on shift and are checked back in at the end of the shift. All of the bits are expected to be turned back in to the jackbit tender, even though a bit may have been damaged beyond repair. The same number of bits are required to be on the rack when it is checked in as were on it when it was taken out.

The bits are 2¼" gauge when new. Bits are retempered in an Ingersoll-Rand jack-furnace, size JF, when the diameter of the bit is reduced through use to 1⅞". All bits are checked in after being used and are calipered and segregated into size groups before being re-sharpened on the Ingersoll-Rand jackbit sharpener. Bits are sharpened without previously being heated except those which are to be retempered. With each use the bit gauge is reduced about 1/16".

Not only are the bits checked in at the bit-shop after each use, but each rack is checked for the following points: (1) number of bits dulled; (2) number of bits broken; (3) number of bits discarded—all these are checked against the footage drilled for cost purposes.

During the past three years the bit consumption has held to about 90 dozen bits per month, but for the past three monthly periods consumption has declined steadily from 96 dozen to 46 dozen to 23 dozen.

Bits are averaging 2.25' of hole drilled per each sharpening, and the life of the bits is averaging nine usages, under the present system of checking and reconditioning. This gives an average of 22.5' of hole drilled in the life of each jackbit.

The Benton mill is located just a few hundred feet from the entrance to the main level of the mine, and is the only cyanide gold mill successfully operated in the southwestern Oregon region. At present it is running about 45 tons of ore in 24 hours. The mill was designed by Pierre R. Hines of Portland in 1936.

The mill buildings were modernly constructed, largely with the split-ring timber connectors manufactured

George Gage, Benton mining engineer. Albert Burch of Medford, dean of Oregon mining engineers, is consultant.

Elton Youngberg, general superintendent of the Benton operations. M. L. Bingham of Portland is general manager.

by The Timber Engineering Co. All tanks are of wood, being National Tank Company products. Tanks include five thickener tanks, three agitator tanks, three solution tanks, one ore bin, a sump tank, and one main ore tank. The fine ore bin, made of 3" fir sides and 4" fir bottom is 12 x 22'. Extra heavy steel bands gird the tank thus maintaining the necessary strength factors.

As the ore arrives at the mill it is dumped into a 50-ton coarse ore bin, from which it is drawn onto a double-decked shaking screen. In the screening process it is washed with heavy water sprays. Screen oversize, plus ¼", passes along a sorting belt from which coarse waste is run to the dump, while coarse ore passes to an Allis-Chalmers 9 by 12" Blake type jaw crusher and then to a 20" Traylor gyratory reduction crusher set to ½", which delivers to the fine ore bin.

Primary slimes and minus ¼" material passing the washer go to a dewatering drag classifier, which discharges overflow slimes to waste and the dewatered fine ore to the fine ore bin.

A U. S. Motors Varibelt feeder delivers the fine ore to a 5 by 6' Williamson ball mill which is in a closed circuit with a 3 by 18' Dorr classifier. Here the ore is ground in cyanide solution to minus 100 mesh.

Approximately 40% of the gold is extracted in the ball mill-classifier circuit.

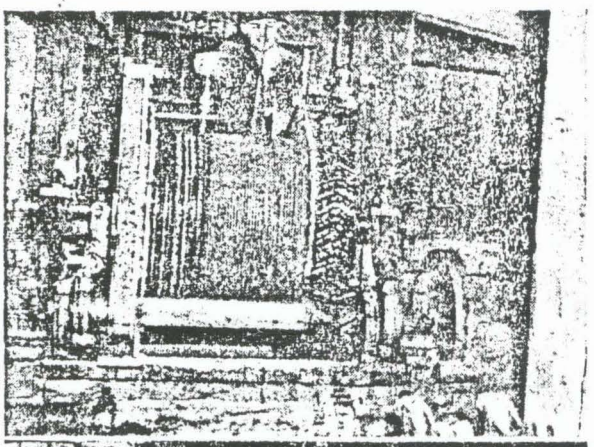
A General Engineering Co. lime feeder between the classifier and the ball mill dispenses lime periodically to keep the solution alkaline for the most efficient and effective use of the cyanide.

The cyanide plant is a counter-current decantation system using five Dorr thickeners and three Dorr agitators. Between thickener No. 1 and No. 2 there are two agitators in series. Between thickener No. 2 and No. 3 there is one agitator. The first thickener is 20' in diameter; Nos. 2, 3, 4, and 5 are all 16' in diameter; the agitators are all 12' tanks.

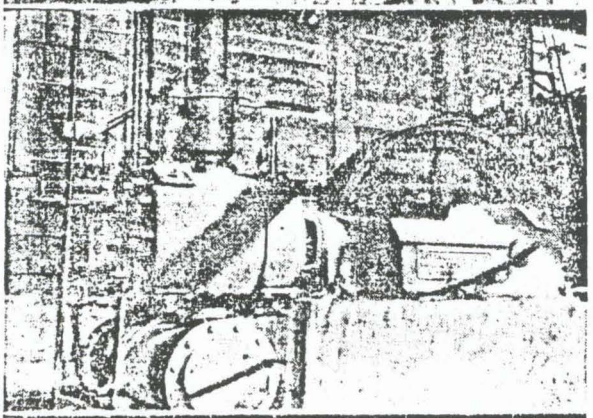
As indicated in the accompanying flow sheet, the pulp is removed from the thickeners by Dorr diaphram mud pumps. The pulp is pumped out and released as tailings from the last tank after it is treated by ferrous sulphate to neutralize the cyanide solution.

Following the general practice in the counter-current system, the wash water enters the system at tank No. 5. The overflow of this tank feeds into tank No. 4 where a barren-solution stream also enters from the barren-solution storage tank. No. 4 overflows into No. 3, which in turn overflows to No. 2. The overflow is then pumped to a mill solution tank where cyanide is added before it again goes to the ball mill and classifier.

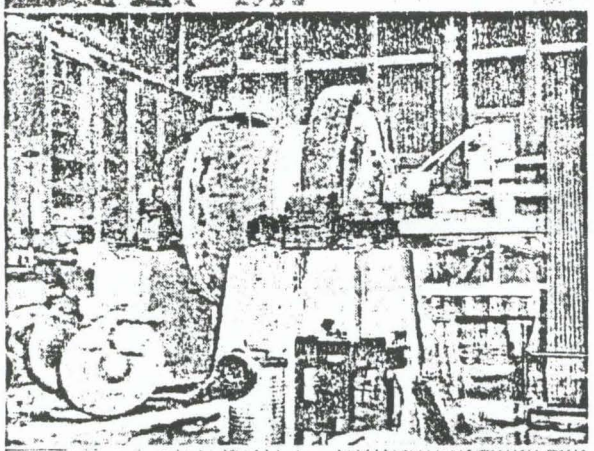
The pregnant solution flows from the No. 1 thickener as overflow to the gold tank, which is storage space made available for use when any one part of the plant is shut down, permitting the rest of the mill to operate uninterruptedly. An Allis-Chalmers centrifugal pump forces the solution to a 9-leaf clarifying filter tank and then through a Merrill-Crowe vacuum tower tank. Immediately follow-



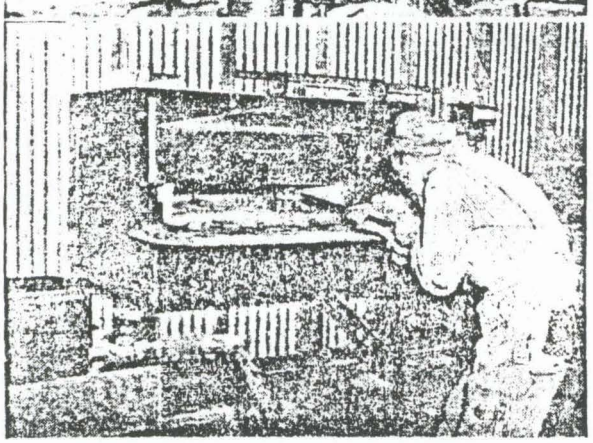
Parke & Lacy air-driven single drum hoist at the Benton Mine. The air engine is 6" stroke by 8" piston.



Ingersoll-Rand Imperial type compressor which is the principal compressed air source for the Benton Mine. It is 12 by 15 by 9¼ and delivers 650 cu. ft. of air per minute at 90 lbs. pressure.



The 5 by 6' Williamson ball mill which handles Benton mill grinding. Its feed is minus ½" hard quartz. Drive is through 13-strand Texrope belt from a 50-hp. Fairbanks-Morse motor.



Rosser T. Garrison, master mechanic, loading the Ingersoll-Rand jackfurnace with jackbits, which are used throughout the Benton Mine. A careful record of bits is kept and miners are required to check in the same number as taken out.

ing the vacuum treatment, powdered zinc with lead nitrate is added to precipitate the gold, which is caught by bags in the Merrill precipitator. A precipitation capacity of 175 tons of solution per day is maintained.

Precipitates are shipped to the American Smelting & Refining Co. at Selby, Calif., for refining.

In the milling process, alkalinity tests are taken every two hours in three different places. Another test determines density of the overflow of the ball mill, indicating fineness of the grind as well as ascertaining the cyanide content. The standard method of the smaller Canadian gold plants for determining the amount of gold in the ore is utilized at the Benton Mine. Weight of the ore is determined every hour and the total tonnage treated per day is computed. The average weight of gold per ton for the 24-hour period, times the total tonnage, should determine closely the amount of gold in the day's ore. Samples are made of the tailings every 10 minutes. These are filtered and both the dissolved and undissolved losses are determined.

Power for the mine, mill and camp is distributed from a central diesel-air and diesel-electric plant. An Atlas Imperial 9 by 12", 6-cylinder diesel engine of 140-hp. drives an Allis-Chalmers generator at 900 r.p.m., developing 125 kva. This power unit provides electricity for the mill, offices and camp.

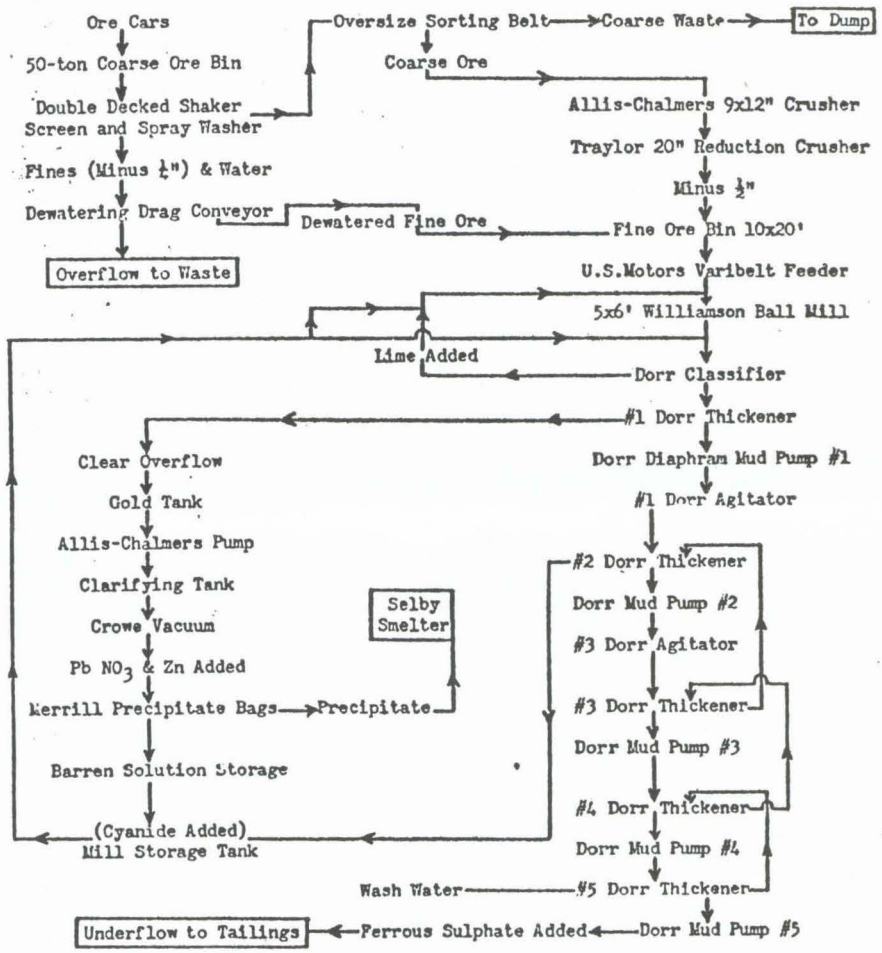
Compressed air is supplied to the mill and mine by a 2-stage Ingersoll-Rand Imperial compressor, type XRB. The first-stage cylinder is 15 by 12" and the second-stage cylinder is 9¼ by 12". This unit has a capacity of 650 c. f. of air per minute at a 90-lb. pressure. Power for the compressor is provided by a Fairbanks-Morse 2-cylinder diesel engine, Model 32E12, which develops 120 hp. at 360 r.p.m.

Supplementing the diesel-electric, diesel-air plants, is an emergency unit to generate electricity or furnish compressed air in event either of the primary power supplies fail. The stand-by unit is a Fairbanks-Morse 40-hp., 4-cylinder diesel engine, Model 36A4¼S.

In case of an emergency, this diesel engine can be used to drive either of two pieces of auxiliary equipment—an 11 by 10" Sullivan Machinery Co. compressor or a Westinghouse 24 kw. generator. The Sullivan compressor is driven by flat belt. V-belt drives are used on the primary and stand-by generators, and also to power the ball mill.

Assaying equipment at the mine includes a Braun gasoline fire assay

Benton Mill Flow Sheet



A glance into the Benton powder magazine shows it loaded full of 40% DuPont Special Gelatin. On the right, the grinding department of the assay office, with a Braun chipmunk crusher, and a Braun pulverizer on the left.

furnace, Model 40; also a Braun Chipmunk crusher and a disc pulverizer. The crusher is Type VC and the pulverizer Type UA, both powered by a Cros-Line 2-hp. electric motor.

Diesel fuel is stored at the plant in tanks with total capacity of 24,000 gals. Shell Oil Co. fuel is burned in the diesel engines, and Standard Oil Co. lubricants are used in the mill.

Daily reports are kept of all tests and accomplishments throughout the milling and mining operations. Each day's reports indicate the tons of ore processed, the ounces of gold recovered, amount of chemicals and reagents used, and amount of supplies bought, as well as other pertinent information.

Several of the key men of the organization are graduate mining engineers—most of the degrees coming from the Montana School of Mines.

M. L. Bingham of the Lewis Investment Company of Portland, Oregon, is general manager of the Benton Mine; Albert Burch of Medford, consulting engineer; Elton A. Youngberg, general superintendent; George Gale, mill superintendent; Clarence Schrader, junior mining engineer; Rosser Garrison, master mechanic; Scott Valentine, bookkeeper and purchasing agent; and Ray Shaver, mine foreman.

Mindanao Mother Lode Mines Doubling Ore-Milling Capacity

Equipment being installed in the gold mill of Mindanao Mother Lode Mines, Inc., at Surigao, Mindanao, P. I., will double its capacity, bringing daily tonnage to 400, according to Phil Holdsworth, mill superintendent, who returned to the Philippines in April after spending his leave in this country.

While here he placed an order with the Colorado Iron Works for a 54" Akins duplex classifier of the submerged weir type, which will overflow 95% minus 200-mesh. Another item of new equipment is an Allis-Chalmers cone crusher, Type R-322.

D. C. McKay is general superintendent of the company, which employs 900 natives, while the white staff numbers nine men. The mill was built in September, 1937, with Mr. Holdsworth associated with it from the beginning. L. E. Smith is mine superintendent.

In the present mill flotation tails are cyanided, but the new mill will be straight flotation. Heads carry about 1% copper, but even in the current operation this is removed by flotation to an extent which does not impair success of cyanide treatment.

Approximately 20% of the ore mined is discarded on the picking belt, sorting cost being approximately 25c per ton of material removed. The overall milling cost is $1.35 per ton. The mine and mill draw their power from a six-engine diesel-electric plant equipped with Chicago-Pneumatic and Worthington engines.

Acid mine water presents something of a problem, but Worthington alloy-lined pumps with rubber hose discharge lines to the surface handle 1,200 gpm. satisfactorily.

The mine at present is 700' below the surface, and a new shaft is being put down to the 1000' level, which will be 550' below sea level.

Mean surface temperature is about 82°, with 90% humidity. The mine is not deep enough to be very hot, but in the old, oxidized stopes near the surface temperatures are high.

The mine presents some interesting problems. Sixty faces are worked to produce 200 tons per day, the vein being small, with widths down to 2" mined, in which case extraction is by resuing with the vein broken first. Old filter cloths from the mill are placed on the filled stopes to receive the high-grade ore broken in such circumstances.

Philip Holdsworth, mill superintendent, Mindanao Mother Lode Gold Mines, in Seattle on his way back to the Islands for a second three-year hitch.

The ground is quite soft and tends to spall rather than squeeze. Mining is by modified square set, locally called a sill set, with 7000 fbm. of timber going into the mine daily. Temporary timbering is done with 4x8" soft wood, while 8x8" tropical hardwood is used for more permanent structures.

Bunker Hill Orders Sink-Float Section

Bunker Hill & Sullivan Mining & Concentrating Co. has concluded arrangements to install an H. H. Sink-and-Float section of 1400 tons daily capacity in its mill at Kellogg, Idaho, according to an announcement by The Sink and Float Corporation, which controls the American patent rights to this British process.

The H. H. process uses buoyant effect of a suspension of galena in water to effect a preliminary concentration of ores by producing a heavy medium on which the light gangue materials will float and be removed, while metallic minerals sink.

The process has been used successfully abroad, but the Bunker Hill installation will be the first employment of the H. H. process in this country, although somewhat similar applications of the same general principles are in use in Mississippi Valley mining districts.

Sink and float tests have been made on an experimental basis for some months by the Sullivan Mining Co. at Burke, Idaho. The Bunker Hill & Sullivan Mining & Concentrating Co. owns a half interest in the Sullivan company.

"Sun-Con" Low Level Crosscut Strikes Ore

Ore was entered late in the afternoon of March 20 in the crosscut driven to the vein of Sunshine Consolidated, Inc., from the 3100 level of the Sunshine Mining Co.

The crosscut, approximately 2000' in length, paralleled Big Creek almost due south from Sunshine ground. This exploration followed favorable indications in a diamond drill hole and affords interesting confirmation of the tendency shown by some veins in the "dry belt" of the Coeur d'Alenes to develop values at substantial depths.

The 3100 horizon of the Sunshine mine is about 250' below sea level.

Merger Plans Drilling

Contract involving a substantial amount of diamond drilling from the extremity of the crosscut driven to its vein on the 1200 level of the Coeur d'Alene Mines Corporation has been let by the Merger Mines Corporation, according to Morris Pearson, president.

The company's property is adjacent to that of the Coeur d'Alene company in the easterly end of the "dry ore belt."

	Initials	Date
Prepared By		
Approved By		

LIST OF SAMPLES COLLECTED AT BENTON MINE, JOSEPHINE COUNTY, OREGON ON NOVEMBER 9 & 10, 1982 BY JIM BROWNE AND BILL KOPP.

S.N. 2512

Combined two sacks. 46 foot chip sample taken along northwest side of road cut located about 600 feet north of 500 Level Portal on north side of main Wiskey Creek road.

11/9/82 46 feet Au .004 Ag No

SN. 2513

Large road cut on vein on access road to Texas workings. Chip cut on 4.5' vein (Texas vein ?). Vein consists of crushed, white massive quartz and red (hematitic) clay gouge.

11/9/82 4.5 feet Au .480 Ag .057

SN. 2514

Same road cut as 2513. Chip cut on 4.6' vein of crushed quartz + red gouge. Texas vein ?

11/9/82 4.6 feet Au .437 Ag .154

SN. 2515

Same road cut as 2513 Chip cut on 3.6' vein of crushed quartz w/heavy red clay gouge. Texas vein ?

11/9/82 3.6 feet Au .173 Ag No

SN. 2516

Same road cut as 2513 Chip cut on 4.6' of sheared and altered meta diorite in footwall of Texas (?) vein at same point as SN 2515. 11/9/82 4.6 feet Au .147 Ag .021

	Initials	Date
Prepared By		
Approved By		

Benton Mine Samples Continued.

SN. 2517

Same road cut as 2513. Chip cut on 5.5' section of sheared meta diorite in hanging wall of Texas vein (?) at same point as 2513. Minor crushed quartz veinlets and pods.

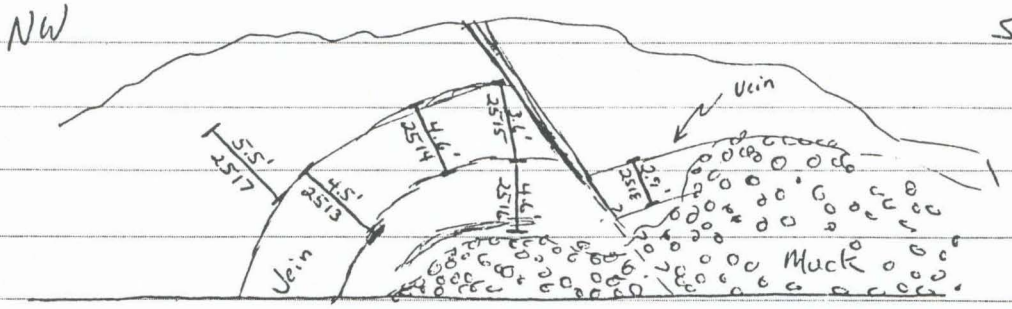
11/9/82 5.5 feet Au .039 Ag. .071

SN. 2518

Same road cut as 2513. Chip cut on 2.9' quartz vein (Texas vein ?) in south side of offsetting shear zone (H.W. side of fault).

11/9/82 2.9 feet Au .170 Ag. .047

Sketch for samples 2513 through 2518



X-Section of Road Cut.

Not to scale.

SN. 2519

Texas Vein - South Adit. Short x-cut adit across Texas vein. 1.6' chip sample on hanging wall shear zone of Texas vein. ~ 15' in from portal on south rib of x-cut.

11/9/82 1.6 feet Au .029 Ag. No

	Initials	Date
Prepared By		
Approved By		

Benton Mine Samples Continued.

SN. 2520

Texas Vein – South Adit. Chip cut on 2.3' quartz vein with minor pyrite; at same location as 2519. South rib.

11/9/82 2.3 foot Au .420 Ag. .162

SN. 2521

Benton Vein 800 Level Adit. Chip cut on 0.8' quartz vein with moderate pyrite (mod. FeO_x) on west rib of drift about 1' above sill. Located ~14' north of raise chute CL.

11/10/82 0.8 foot Au .386 Ag. .054

SN. 2522

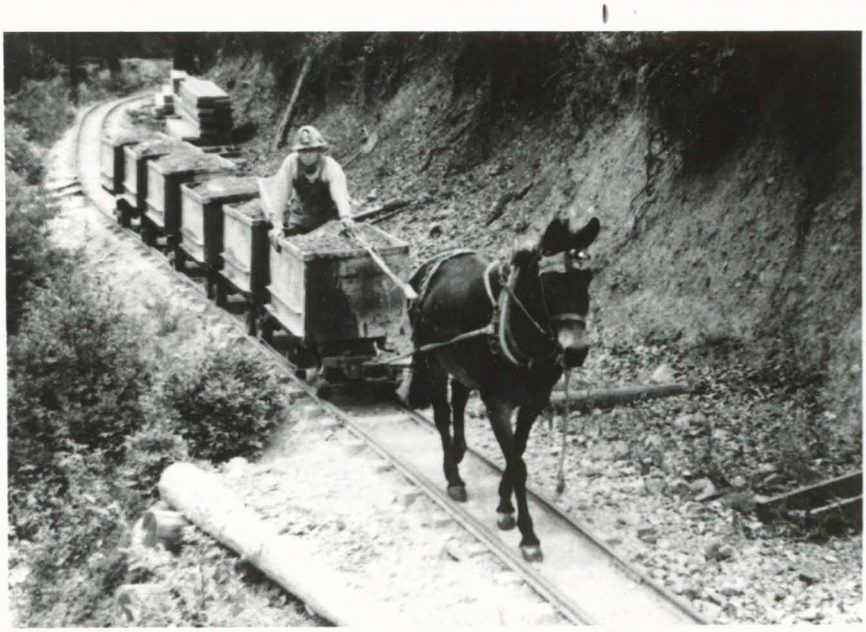
Benton Vein 800 Level Adit. chip cut on 0.6' quartz vein with moderate pyrite (mod. FeO_x) on west rib of drift about 1' above sill. Located ~22' north of CL of raise chute.

11/10/82 0.6 foot Au .709 Ag. .014

SN. 2523

Benton Mine 800 Level Adit chip cut on 2.2' quartz vein with moderate pyrite. Vein strikes ~ N 30° W + intersects main Benton vein. Located ~22' north of CL of raise chute.

11/10/82 2.2 feet Au .633 Ag. .113



BENTON MINE (gold) GALICE DISTRICT

Owners: Agent Lewis Investment Company, Portland, Oregon. C. H. Lewis, pres.; M. L. Bingham, v.p. & treas.; R. L. Sabin, Jr., secry.

Location: secs. 22, 23, 27, T. 33 S., R. 8 W., on Drain Creek. Elev. of mine, 1000 ft. It is about 2½ miles from mine to road forks which have an elev. of 2300 ft.

Area: Seven and a fraction patented claims and eight unpatented claims located in 1935, 1937, and 1940; recorded at Grants Pass, Oreg.

History: The mine was located originally in the 1890's by Reuben Jones who did location and assessment work. No production until Sept. 1936 when the Lewis Investment Company began active operations. The mine has been in production ever since except for n normal shut-downs.

Development: Underground workings total 10,000 ft. 320 ft. on the 500 level; 500 ft. on the 700 level; 1200 ft. on the 780 level; 800 ft. on the 900 level; 1200 ft. on the 1020 level. The Kansas adit cross cut is the main haulage way, 1500 ft. There are several hundred feet of adit in the Georgia and Texas levels. Ore is being pulled from all levels. Stopes are about 80 ft. to 90 ft. long.

Equipment; Mine; The mine is self-ventilating. Trackage totals 4500 feet of 12 lb. rail. Compressed air line totals 5000 feet, - the main line being 3-inch diameter. Compressor is an Ingersoll-Rand, 650 cubic foot capacity, powered by a Fairbanks-Morse 120 h.p. Diesel; main receiver is 6 ft. x 3½ ft. There are 5 R104 Gardiner-Denver stopers; 1 D89 and 2 PF89 Gardiner-Denver drifters; 1 I-R jackhammer; drill steel sharpener and jack-bit furnace. Jack-bits are used throughout. Haulage equipment is six

Equipment: Mine (continued)

22 cubic foot mine cars and six that are 16 cubic foot. Main-haulage power is mule.

Mining follows cut and fill stoping with a small amount of narrow stopes.

Equipment: Mill; Mill equipment and flowlsheet consists of a 50 ton ore bin with a shaker-screen washing table - to a Blake-type 9 x 12 Allis-Chalmers type B crusher that crushes to 2½ inch - to a conveyor belt 16 inch, 20 feet between centers - to a Traylor type TY gyratory crusher to minus 3/4 inch - conveyor belt to fine-ore bin, 12 inch wide by 60 inch between centers and inclined 16 degrees - fine ore bin 100 ton capacity - - conveyor belt 16 inches wide by 12 feet between centers controlled by a U. S. variable-speed drive motor - to a 5 ft. x 6 ft. Williamson ball mill having a 10,000 lb. ball load - to a 3 x 18 Dorr Duplex Classifier powered by a 50 h.p. 900 rpm motor with a General Engineering lime feeder having a 500 lb. capacity; Classifier discharges through a flume to cyaniding tanks.

Cyanide equipment is all Dorr make. #1 thickener is 20 ft. x 10 feet; #1 agitator is 12 ft. x 12 ft; Other thickeners are 10 ft. by 16 ft. and agitators are 12 ft. by 12 ft.

Solution goes to metering device and is them pumped to a 175 ton Merrill-Crowe precipitation plant. The clarifier is in an 8 ft. tank with nine 4 x 6 leaves. Vacuum tower (de-aeriation tower) is 6 x 2. Merrill-Crowe type chrome-zinc feeder using cone and drum. 40 bag precipitation unit. Thepprecipitate from the socks is shipped to Selby.

Equipment: Power; A 140 h.p. 8 x 9½ Atlas marine, type P & H, six cylinder Diesel motor turns a 125 KVA generator

Equipment-Power; (continued)

that delivers 440 volt, 60 cycle A.C. Stand-by equipment is a 40 h.p. Fairbanks-Morse 4 cylinder Diesel that powers a small single-stage Sullivan compressor and a 35 KVA generator.

Equipment-General; Buildings include an assay laboratory and mine office, a cook house-mess hall, nine bunk houses, four staff houses, and a change room.

Fuel-oil storage tanks have a capacity of 30,000 gallons that will run the mine and mill operations for about three months.

Mining Facilities: Water system is all gravity from Drain Creek and Bannister Gulch. Water is covered by water rights which include Whiskey Creek. Mine timbers are shipped in from Grants Pass and are all sawed-timber. Shipping points are Grants Pass, 39 miles, and Glendale, 18 miles. The Grants Pass road is open practically the year 'round.

All power is generated at the mine by Diesel engines.

Geology: (subject to revision when Galice Survey works at the mine) (dearly in September.)

Country rock is diorite; that on the east is darker than that on the east. There is a well-defined vein system; the main quartz veins trend north-south, and are cut by east-west veins. Metallization is the result of metasomatic replacement. Some metallization in the footwall but all veins seem to end at the hanging wall.

The ore minerals have been determined and are:

Pyrite	(approx. 95%)
Marcasite	(approx. 4 plus %)
Chalcopyrite	
Sphalerite	
Magnetite	
Gold	

with quartz, sericite, chlorite, calcite and dolomite as gangue minerals

Geology: (Continued)

Chalcopyrite, sphalerite, and magnetite, are in combined percentage of much less than 1%.

Pyrite occurs in knots and seams within the quartz and in some instances it is possible to judge approximate grade of ore by the "looks" of the pyrite. Again, it is impossible to assume any reasonable estimate of ore valuation from hand specimens. Some of the footwall diorite is mined as ore.

The country rock has been identified by thin-section methods as a quartz diorite or grano-diorite that has been altered and silicified to a certain extent. From the main workings, it is about 1000 feet westward to the Dothan (?) formation contact, and about 1500 feet eastward to the serpentine contact.

Informant: Lewis Investment Company and RCT, July 31, 1940.

Report by: RCT 8/3/40

CRIB MINERAL RESOURCES FILE 12

RECORD IDENTIFICATION
RECORD NO..... M060704
RECORD TYPE..... X1M
COUNTRY/ORGANIZATION. USGS
DEPOSIT NO..... ODGMI 100-11
MAP CODE NO. OF REC..

REPORTER
NAME..... JOHNSON, MAUREEN G.
UPDATED..... 81 02
BY..... SMITH, ROSCOE M.
FERNS, MARK L. (BROOKS, HOWARD C.)
FERNS, MARK L. (BROOKS, HOWARD C.)

NAME AND LOCATION
DEPOSIT NAME..... BENTON

MINING DISTRICT/AREA/SUBDIST. MT. REUBEN

COUNTRY CODE..... US
COUNTRY NAME: UNITED STATES

STATE CODE..... OR
STATE NAME: OREGON

COUNTY..... JOSEPHINE
DRAINAGE AREA..... 17100310 PACIFIC NORTHWEST
PHYSIOGRAPHIC PROV..... 13 KLAMATH MOUNTAINS
LAND CLASSIFICATION..... 01 41

QUAD SCALE	QUAD NO OR NAME
1: 62500	GALICE

LATITUDE	LONGITUDE
42-40-54N	123-37-37W

UTM NORTHING	UTM EASTING	UTM ZONE NO
4725456.2	448642.1	+10

TWP..... 33S
RANGE.... 08W
SECTION.. 22, 27
MERIDIAN. W.M.

ALTITUDE.. 1100

COMMODITY INFORMATION

MINOR PRODUCTS.. AG

OCCURRENCE(S) OR POTENTIAL PRODUCT(S):
POTENTIAL.....
OCCURRENCE..... CU ZN MO

ORE MATERIALS (MINERALS,ROCKS,ETC.):
GOLD, PYRITE; CHALCOPYRITE, SPHALERITE; MOLYBDENITE, MARCASITE

COMMODITY SUBTYPES OR USE CATEGORIES:
14.89 AU:AG

EXPLORATION AND DEVELOPMENT
STATUS OF EXPLOR. OR DEV. 4

DESCRIPTION OF DEPOSIT

DEPOSIT TYPES:
VEIN/SHEAR ZONE *
FORM/SHAPE OF DEPOSIT: LENS

SIZE/DIRECTIONAL DATA
SIZE OF DEPOSIT..... SMALL
STRIKE OF OREBODY.... NE
PLUNGE OF OREBODY.... 45
DIRECTION OF PLUNGE.. SOUTH
COMMENTS(DESCRIPTION OF DEPOSIT):
LENS CONTAIN MARGINAL ORE WITH LOCALIZED BODIES OF HIGH GRADE.

DESCRIPTION OF WORKINGS
SURFACE ADITS TO 1020 LEV. RAISES
UNDERGROUND

PRODUCTION
YES

ANNUAL PRODUCTION (ORE,COMMOD.,CONC.,OVERBURD.) YES

ITEM		ACC	AMOUNT	THOUS.UNITS	YEAR	GRADE,REMARKS
1	ORE	ACC	64.854	TONS	0.22 TO 0.35 OZ AU	
2	AU	MED	13.520	OZ	.208 OZ/T	
3	AG	SML	.391	OZ	.014 OZ/T	
23	ORE,	ACC	64.282	TONS	1935-1942	0.22-0.35 AU, 0.01 AG

PRODUCTION YEARS..... 1935 -1942

SOURCE OF INFORMATION (PRODUCTION).. USBM

PRODUCTION COMMENTS LARGEST MINE IN SOUTHWEST OREGON DURING THIS PERIOD

RESERVES ONLY

ITEM	ACC	AMOUNT	THOUS.UNITS	YEAR	GRADE OR USE
1		DEEP ORE		1947	INF

GEOLOGY AND MINERALOGY

AGE OF HOST ROCKS..... JUR
HOST ROCK TYPES..... QUARTZ DIORITE

AGE OF ASSOC. IGNEOUS ROCKS.. JUR
IGNEOUS ROCK TYPES..... QUARTZ DIORITE; HORNBLENDE GABBRO

PERTINENT MINERALOGY..... QUARTZ; MAGNETITE, SERICITE, CHLORITE

GEOLOGICAL DESCRIPTIVE NOTES. GREENSTONE IN CONTACT WITH QUARTZ DIORITE

LOCAL GEOLOGY
NAMES/AGE OF FORMATIONS,UNITS,OR ROCK TYPES
1) NAME: ROGUE VOLCANICS
AGE: JUR
2) NAME: DOTHAN
AGE: JUR

NAMES/AGE OF IGNEOUS UNITS OR IGNEOUS ROCK TYPES
1) NAME: OPHIOLITE?
AGE: JUR

SIGNIFICANT LOCAL STRUCTURES:
TENSION CRACKS

COMMENTS (GEOLOGY AND MINERALOGY):
MINERALIZATION IS ADJACENT TO A MAJOR THRUST FAULT WHICH HAS BEEN COMPLEXLY INTRUDED BY BODIES OF DIORITE, GABB
AND SERPENTINE

GENERAL COMMENTS
RECORD NUMBER (MO13313) HAS BEEN MERGED WITH THIS RECORD AND DELETED FROM THE OREGON FILE.

GENERAL REFERENCES
1) RAMP, L. AND PETERSON, N.V., 1979, GEOLOGY AND MINERAL RESOURCES OF JOSEPHINE COUNTY, OREGON; ODGMI BULL. 100
P.27.
2) BROOKS, H.C. AND RAMP, L., 1968, GOLD AND SILVER IN OREGON; ODGMI BULL. 61, P.207
3) OREGON METAL MINES HANDBOOK, 1942, ODGMI BULL. 14-C, VOL. 2, SEC. 1, P.26
4) YOUNGBERG, E.A., 1947, MINES AND PROSPECTS OF THE MOUNT REUBEN MINING DISTRICT, JOSEPHINE COUNTY, OREGON; ODG
BULL. 34, P.31

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

702 WOODLARK BUILDING
PORTLAND 5, OREGON

August 24, 1946

ample submitted by F. W. Libbey

ample received on August 9, 1946

nalysis requested Gold, Silver assay

Analysis by:

L. L. Hoagland

Assayer

Lab. No.	Sample Marked	Results of Analysis		Remarks
		Gold (Au)	Silver (Ag)	
P-5107	No. 2 - 90 ft	Trace	Trace	Benton s.z. - W. middle section
P-5108	No. 3 - 100 ft	0.16 oz.	0.20 oz.	Benton east middle section
P-5109	No. 4 - 60 ft	0.02 oz.	Trace	East section
P-5110	No. 5 - 6 ft	0.03 oz.	0.30 oz.	Ruby Hill shear O-cut
P-5111	No. 6	0.035 oz.	Trace	Ruby Hill shear small cut
P-5112	No. 7	0.02 oz.	0.20 oz.	Picked pieces on Benton road
P-5113	Cal gulch	0.04 oz.	0.16 oz.	Across 8 feet - ridge
P-5114	W. sec. 70 ft	Nil	Trace	Benton shear zone
* * *	* * * *	* * * * * * * * * * * * *		* * * * * * * * * * * * *

The Department did not participate in the taking of this sample and assumes responsibility only for the analytical results.

February 7, 1942

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

BENTON MINE

Mr. Youngberg gave me disturbing news to the affect that the Benton mine may shut down within the next six months. The main difficulties are priorities and labor. There seems to be no question about adequate ore reserves, and financially, the mine is in good shape. Mr. Youngberg gave this information in strict confidence, and I believe it should not be released.

Ray C. Treasher
Field Geologist
2/7/42


61145


61146

THE BENTON GOLD MINE

NEAR GRANTS PASS, OREGON

INTRODUCTION

Students of mining engineering schools wish to obtain employment during their summer vacations but it seems to be relatively difficult for them to achieve that objective.

Early in the spring of 1940 I attempted to secure a summer job at a western gold mine. Subsequent correspondence resulted in what I considered an almost definite promise of a job. However, my trip was fruitless and I was told to begin "rustling." The manager of the mine told me never to mention that I was a student because such a statement would prevent my being hired. The foremen of all the mines visited asked for men who had experience. The three months instruction at school in drilling and blasting--secondary to the mine surveying--can not be termed experience in the true sense of the word.

A student could tell a "cock and bull" story of having worked in some mines, hoping that the foreman would not check his references but such a practice is clearly opposed to the ethics that should be inculcated in all mining engineers as set forth in the "Manual for Student Associates and Affiliated Societies" published by the Institute. The members of the Institute who are in charge of mines seem to present a paradox because they expect students to have high ethics but when they try to get jobs as lowly muckers, they are almost forced to make questionable statements if they

are to be hired.

Surely there must be a solution to the matter. Many coal and oil companies have adopted a policy of employing students during their summer vacations but to the best of my knowledge the metal-mining companies have not instituted such a program. Is that an indication that those companies do not want graduates of mining schools?

It may appear that students want jobs handed to them on the proverbial "silver platter" but such is not the case. All that is asked is a little encouragement. The present shortage of skilled labor due to the defense program may temporarily alleviate this condition but after the program is completed students probably will not be able to obtain summer employment in metal mines unless the companies change their attitude.

After a month and a half of fruitless "rustling", I obtained a job at the Benton gold mine through the influence of a friend. Most of the information forming the basis of this paper was gained while working there.

As I expect to graduate in May, 1941 I will not again be in the position of a student seeking summer employment but other students will be and unless the condition is remedied, they will have the same experience as I did.

ACKNOWLEDGEMENTS

Grateful acknowledgement is extended to E. A. Youngberg,

George Gale, and C. O. Schrader for their aid. Thanks are particularly due Superintendent Youngberg for permission to write about the mine.

LOCATION

The Benton mine is situated in the Mt. Reuben district of the Siskiyou National Forest, the claims which constitute the Benton group are found in sections 22, 23, and 27 of T 33 S, R 8 W, Josephine County, Oregon. (See Plate 1)

HISTORY

In the past the area has been known as either the Galice, Merlin, Glendale or Rogue River district. From 1854 to 1890 the mining consisted of placer operations. Since that time quartz veins have been found which were probably the source of the gold.[1] The Mt. Reuben district experienced activity between 1891 and 1907. The J.C.L. and Benton claims were developed then by J. C. Lewis but only the latter group, consisting of seven and a fraction claims, were patented. No further work was done because the production was unprofitable until 1930 when a small crew worked a high-grade ore shoot for a short time.[2] In 1937 work was resumed with a profitable output of 45 tons per day which was to have been increased to 55 tons by a mill addition in the autumn of 1940.

TOPOGRAPHY

Josephine County is in the Klamath Mountains. The

Rogue River is the main stream of the area and flows into the Pacific Ocean; it has cut a sharp valley into the rock but there are places along its course where it has formed a broad stream bed as a result of flowing over soft rocks. The Benton claims are on Drain Creek which flows into Whisky Creek as the latter passes through the camp. The camp--bunkhouses, homes, mess hall, and mill--is situated in the bottom of a little valley.

GEOLOGY

In the Mt. Reuben district Jurassic sediments have been intruded by a greenstone which is probably a tonalite. Serpentine has been found to cut the masses of tonalite and seem to have been an important factor in the ore deposition in the tonalite but the serpentine itself holds little gold. The igneous activity is presumed to have occurred between the Jurassic and Cretaceous periods. Generally, the oxidized zone is 100 feet deep although it may be greater than 200 feet.[3]

The shearing action was general and produced narrow fissures in the greenstone but very often ceased upon reaching the contact between that rock and the serpentine. The gold in the veins probably came from the Siskiyou batholith which is south of the district.

The strike of the vein of the Benton claims follows the direction of the shear belt and varies from N 10°E to

N 40°E; the dip is 70° to the eastward. On the west side is a granodiorite and to the east is found a diorite porphyry. The ore occurs in bunches which is not unusual for that district; in places the vein splits and pinches out on one of the branches of the split. The minerals found with the gold and quartz in the vein are chalcopyrite, marcasite, sphalerite, magnetite, sericite, chlorite, calcite, and dolomite. Comminution of the ore is necessary because the gold is finely divided in pyrite which with the other sulphides constitutes 3% of the ore.

STAFF

The direction of the mining and milling operations is under the supervision of E. A. Youngberg. His subordinates are George Gale, the mill superintendent, and C. O. Schrader, who has charge of the mining. These two also survey and map the mine. The general manager has his office in Portland, Oregon.

MINE

Employment

An average of twenty-six men including the foreman work underground. Sixteen of these are engaged in drilling, two men being attached to each machine. The rest of the day crew consists of four muckers, a trammer, and a timberman. The latter is not always employed as such but may work as either a driller's helper or a mucker. Whenever it is necessary to operate the diamond drill, two experienced miners are called upon to handle the assignment. Two or

three men are employed as muckers on the night shift; they are the only workers in the mine at that time.

Description

Before mining operations were resumed in 1931 there were 5000 feet of workings which have since been extended to 12,000 feet.

The tunnels and drifts have been known by various names in the past, originally designated by states, later by numbers as at present. The practice is to indicate the levels according to the distance each is above the main or 1020 level, formerly termed the Kansas. Plate 2 illustrates portal of the main level. There are five levels, i.e., 1020, 900, 780, 700, and 500; all are joined by rills and raises. The uppermost or 500 level, previously called the Texas, cross cuts 300 feet from a hillside to the vein where drifts are run. The 900 and 700 levels are not accessible directly from the surface; one must enter one of the other three tunnels in order to reach either of these two levels. By means of a shaft which is used very little at present it is possible to descend to the 500 level from the surface.

The Georgia cross cut, driven a number of years ago, is the only working that has not touched ore. Diamond drilling has proved that it would be fruitless to extend that cross cut any farther. All other workings are in profitable ground.

To date no sinking has been done; all operations have

Portal of 1020 Level

Plate 2

been kept above the main level. However, before all the upper ore has been removed, the management plans to extend the workings below the 1020 level.

Two of the raises have hoists for handling material and supplies; there are no hoists for hoisting men. The main hoist extends from the 1020 level to the 780 level; a Parke and Lacy, single-drum, 8 by 6-inch air engine lifts a three-sided skip in a wooden slide inclined slightly from the vertical. The other engine, also air driven, hoists material from the 780 to the 700 level. Racks of bits, explosives, and timber for the 500 level are transported by truck up a mountain road to the tunnel.

Ventilation

The ventilation is natural; in summer the air moves from the upper workings down to the lowest level while the opposite is true during winter. At times the night crew may find it necessary to open an air line leading to a heading in order to remove powder smoke before mucking out the round. Notwithstanding the fact that the air supply is turned off after the day crew leaves the mine, there is usually enough air under pressure in the system to blow out the smoke in a heading.

Mining Practice

Development

At present 75% of the mine operations is considered as

development. The management plans to devote 50% of the work in the future to that phase if the mine is to continue in operation.

Part of the development is accomplished by means of a diamond drill; however, it is not in operation every day.

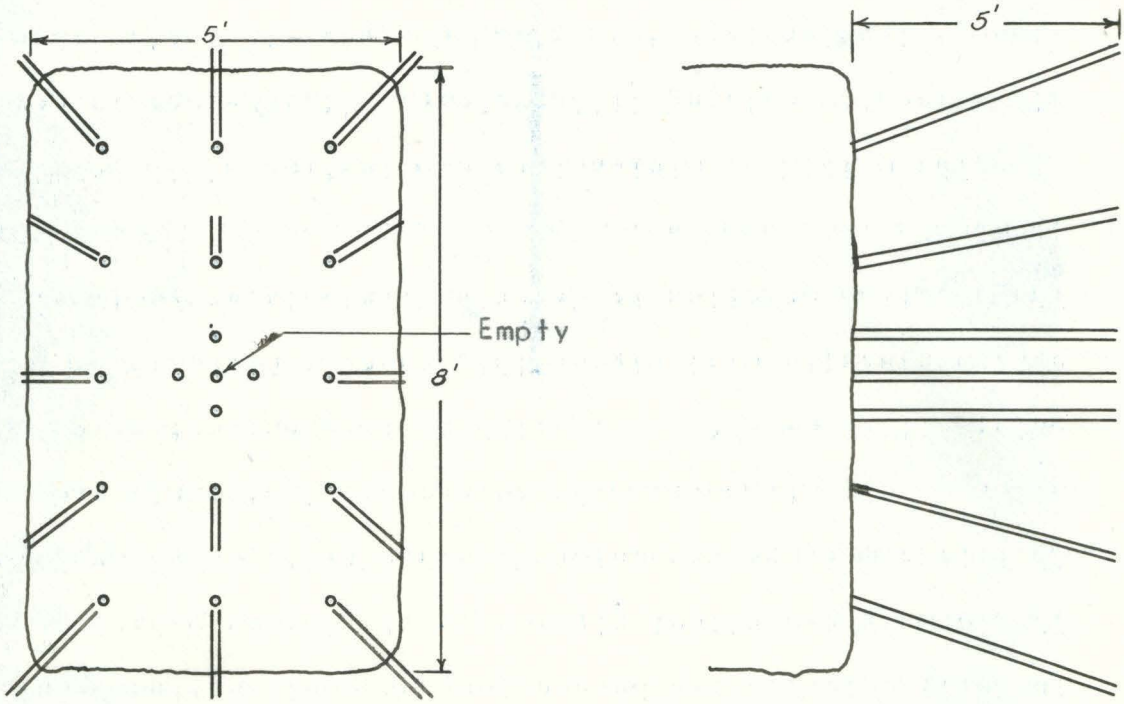
The other form of development is drifting. Three crews are constantly engaged in such work. The control of this phase is exercised by means of face samples taken after each round has been blasted. The samples are not correlated with the mill feed because of dilution of the ore in the chutes and during transportation to the mill. Samples are taken in the stopes also but they are utilized merely as checks on the progress of those workings.

Two types of rounds (see Figure I, page III) are used in drifts, i.e., the "burned" or burn out and the V-cuts. The former is particularly adapted to the very hard ground that is sometimes encountered. The drifts are 4 by 7 feet after placing timbers. The sets consist of posts and a cap only; sills are not used. Timbering is not extensively used because in most places the ground requires no support. The blasting practice is described in a later section.

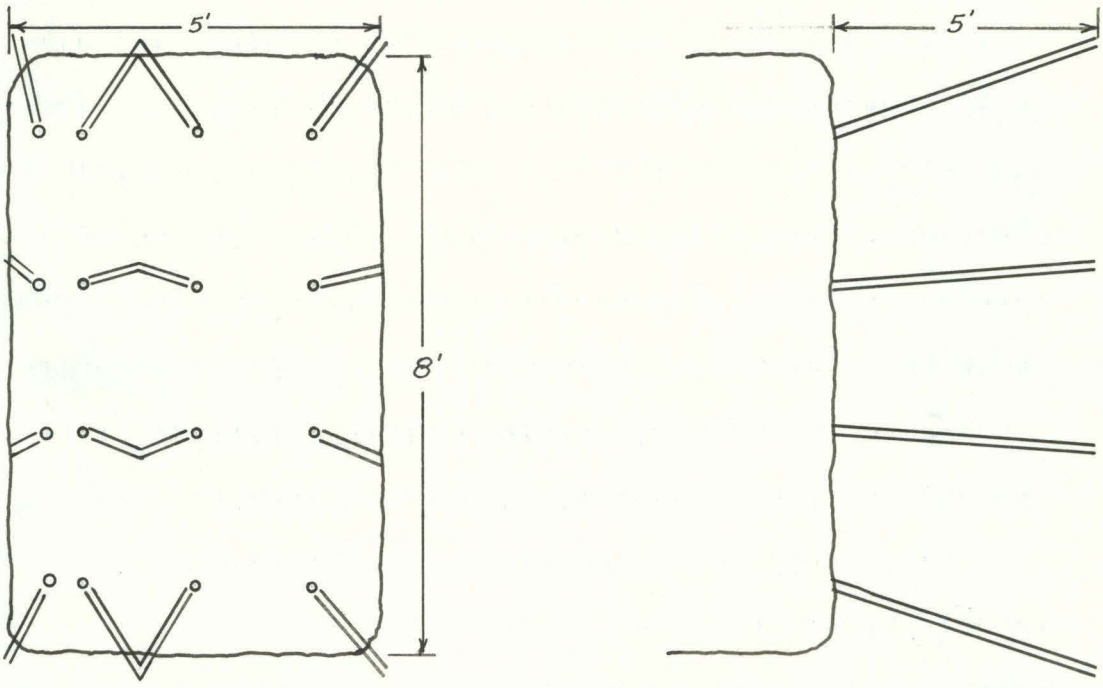
Stoping

The method of mining is a combination of the rill stope and the cut and fill systems. At 100-foot intervals along a level raises are extended upward 15 feet. Then a

DRIFT ROUNDS



Burn Out Round



V-Cut

Figure 1

4 by 7-foot rill is begun in the vein at an inclination of 45°, usually toward the north. The rill is prolonged to the next level above. A stope is also started at the lower level and after it has been enlarged to an appropriate size, waste from the upper level is brought in by way of the rill for the horizontal cut and fill operations. The latter method is employed to remove the ore in a stope. Where the vein is narrow, the practice is to muck the ore from each round into a chute and then place the waste as filling material with planks as a covering over the waste. The succeeding round is blasted down onto the planks. After the ore has been transferred to the ore chute, the planks are removed, more waste is gobbed as fill, and the planks are replaced as flooring. In wider stopes--10 to 15 feet--a number of rounds can be shot before the ore must be mucked into a chute.

The raises are extended up to the next level as are the ore chutes located on both sides of the raises. The ore chutes are offset slightly from the level to facilitate the filling of ore cars. A simple chute-gate is used; two or three boards set vertically in cleats act as a gate. When loading a car, the trammer forces the boards up and down to regulate the flow of the ore.

In all stopes above the 780 level the usual practice is for the miner and his helper to muck out a round, and

then drill and blast another. The next day they repeat the cycle. The same procedure is followed on the lower levels except that the night crew--two or three men--muck out a round. While removing a round the men sort the ore, throwing the waste aside to be used as fill. If a piece of ore is larger than 15 inches in any dimension, it is broken with a double-jack hammer. Any piece of ore smaller than that size can pass through the chute-gates and through the grizzly above the coarse ore bin at the mill.

The drilling is carried out by means of six Gardner-Denver stopers. Figure 2, page 14 illustrates the type of round used in stopes and rills. The V-cut in the latter sketch is particularly adapted to veins that have gouge on either side because the soft clayey material acts as a lubricant for breaking the first wedge or slab of a round.

More powder is used in raises and rills than in drifts. The customary practice is to insert three or four sticks in each hole, the primer being the second from the top with the cap pointing in the direction of the maximum part of the charge. In the past, 40% and 45% Atlas and Dupont gelatin dynamites were used but in August, 1940 the decision was made to standardize on 45% Dupont gelatin which is delivered in boxes of 150 sticks instead of the usual 100 per 50 pounds. The management feels that stemming drill holes is not worth the time required to fill stemming bags with

RILL ROUND

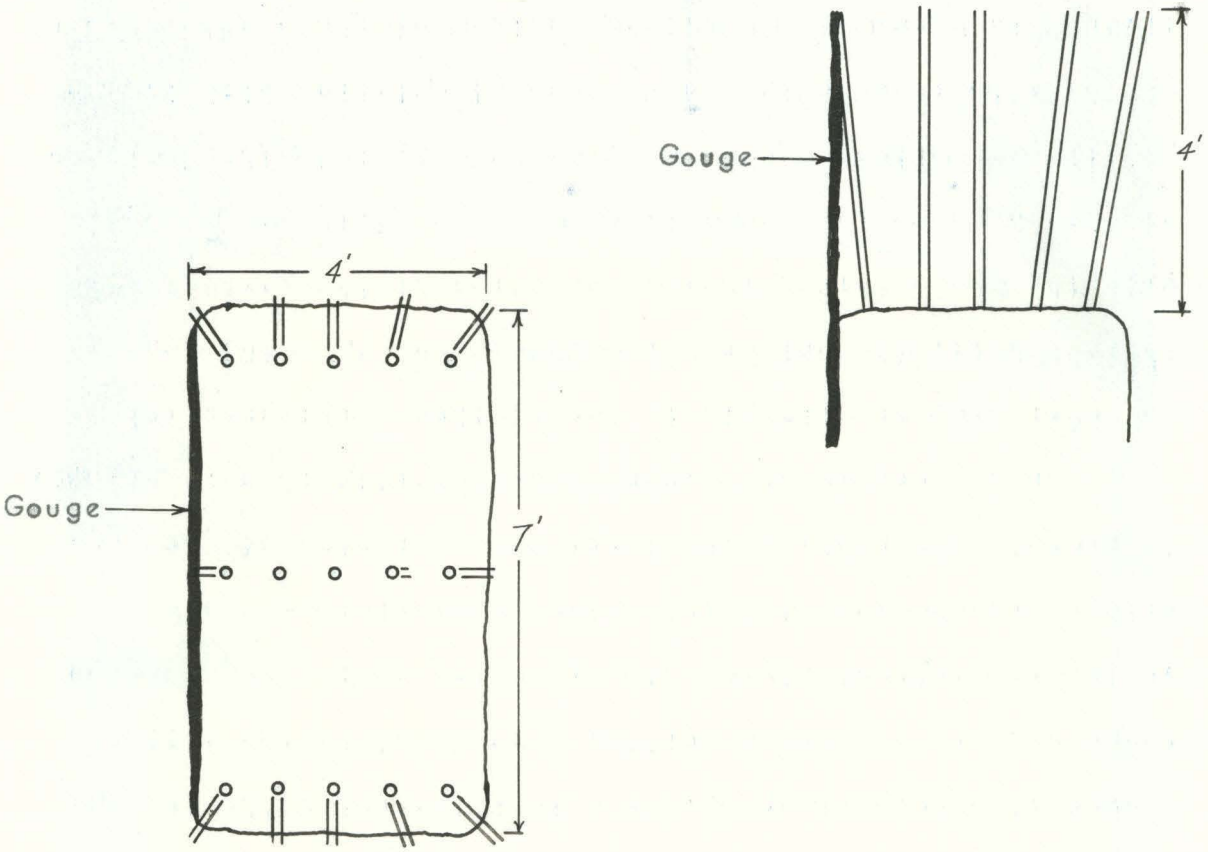


Figure 2

the necessary material. For July, 1940 the powder cost was $386 and the caps $28.70. The blasting caps are not tied to the sticks of powder but are inserted into either the ends or the sides. The fuse burns at the standard rate of 15 inches per minute. During the same month 12,000 feet of fuse were used at a cost of $76.80.

Carbide lamps provide illumination in the mine; each month approximately 350 pounds of carbide are furnished by the company.

Transportation

A gauge of 18 inches is used on the track throughout the mine. On all levels except the 1020, one-ton cars are trammed by hand. Mule haulage (see Plate 3, page 16) is used on the lowest level; two mules working alternately are for this work. A mule can haul five 1¼-ton cars. If the night crew is working on the lowest level, each man trams two such cars. On the right of plate 3 is shown the track leading to the dump for waste rock withdrawn from chutes on the 1020 level. The ore is trammed to the mill 700 feet distant from the main portal. Plate 4 on page 17 shows a trammer dumping a carload of ore into the coarse-ore bin.

A simple but effective switch is pictured in Plate 5, page 18. It is easily constructed by welding onto a steel plate slightly smaller than the track gauge two short pieces of rail and beveling one end of each rail by means

Mule Haulage

Plate 3

Unloading an Ore Car

Plate 4

Track Switch

Plate 5

of a cutting torch. The switch is held in place by a pin driven into the ground or into a tie. It is easily thrown with the foot.

Drainage and Water Supply

A small dam is on Drain Creek above the point of entry into the stream of the drainage from the upper three levels. The resulting reservoir serves as a source of water for the drills and for drinking purposes in the mine. It is pumped to the three higher levels but flows by gravity to the rest of the mine. The mine water from the lower workings flows to the 1020 level and thence into Drain Creek.

Mine Shop

Quarter octagon steel is used in the stopers and round lugged steel in the drifters. A hole is normally collared with a two-foot steel and finished with a six-foot length using changes of 16 inches. Thus, each machine uses five different lengths of drill steel.

Jackbits are used throughout the mine. A detailed accounting system is used in connection with the bits. Each miner is given bits in racks having twenty-five in five successive gauges. After each use the miner returns the rack of bits to the shop together with a report listing the name of the driller, the date, the rack number, the number of bits broken, and the footage obtained with the rack. A rack contains the correct number of bits for drilling five

holes of six-foot depth. However, it is possible in the right type of ground for the miner operating a stoper to drill six holes with a six-foot depth using only four bits to the hole; seven holes can be obtained in that manner when using a drifter.

A report on each rack must be made by the shop man after he examines the rack of bits; the report includes the number of bits dulled, the number broken, the footage of the rack, the number discarded, the date out and date in, the name of the miner and the rack number.

Six gauges are used; they range from 2¼ to 1-5/8 inches, the gauge change being 1/8 inch. Each bit is used approximately six times. It has been found that 1½ bits are broken per rack used. Almost all of those are of the smallest size.

Between 75 and 100 bits are reground each day with a maximum of 250 having been sharpened when the miners were drilling in hard ground. Approximately 1000 bits are hardened every fifteen days and none of them are smaller than 1-7/8 inches.

MILL

Crushing

The crusher plant consists of a 9 by 15-inch Blake jaw crusher, a 20-inch Traylor gyratory, and a belt drag classifier. The ore from the mine is stored in a 50-ton bin

from where it is withdrawn onto a shaking screen passing ¼-inch. A man stationed at the screen sorts the ore and regulates the rate of feed to the jaw crusher. (See Plate 6, page 30) The fines are classified by an Esperanza classifier dragging the ore to a belt conveyor which carries the crushed ore to a 12 by 22-foot cylindrical bin having a capacity of 100 tons. From the jaw crusher the ore is carried by a belt to the Traylor gyratory set at ½ inch. The product of the secondary crusher is transported to the fine-ore bin by the belt conveyor. All this machinery is powered by a 40-hp Fairbanks-Morse motor. The crusher plant is operated on the day shift only.

Grinding

The ore is fed from the cylindrical bin to the ball mill by a short belt feeder. The feed is quite uniform in weight; nevertheless it is checked by weighing a portion each hour. The ore fed to the mill each day is 45 tons but that is an overload of 10 tons. The value of the feed is secured by assaying the combined hourly samples taken during each 24-hour period, each sample being a scoopful of the feed to the ball mill.

The grinding circuit consists of a 5 by 6-foot Williamson ball mill and a 3 by 18-foot Dorr rake classifier. The mill is V-belt connected to a 50-hp Fairbanks-Morse motor which revolves the mill at 23 rpm. Steel balls

are added to the mill in 1½, 3½, and 4-inch sizes, the amount of each added being governed by screen analyses of the classifier overflow and classifier sands. Lime is added to the sands returning to the ball mill.

The ideal grind for the ore is 70% minus 200-mesh. With the addition of another thickener the grind will probably be lowered to 60% and thus permit a greater tonnage, 55 tons. The extraction of gold by the grinding circuit amounts to 40%.

Tailings

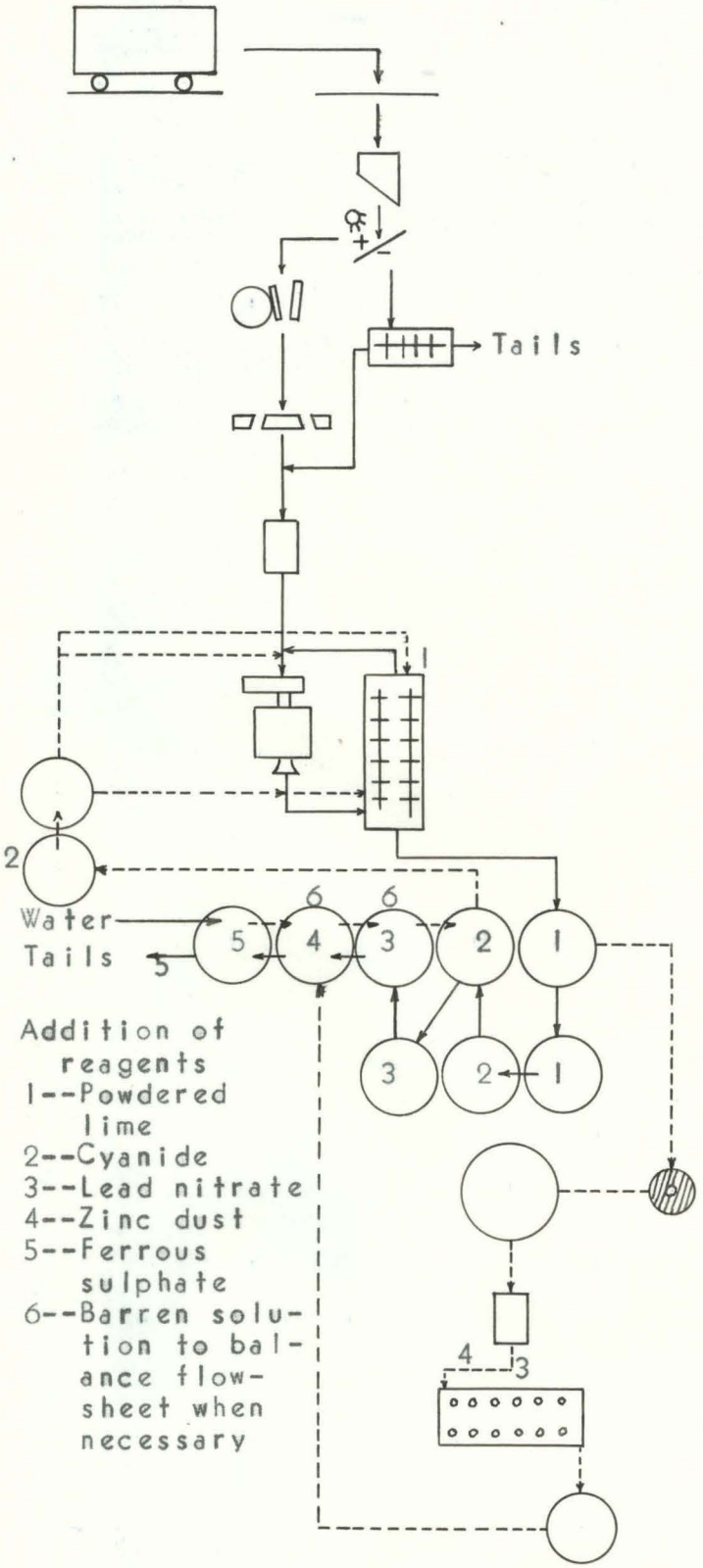
The flow of the pulp after overflowing the classifier is shown in Figure 3 on page 23. The pulp from the last or no. 5 thickener is tailings and flows into Whisky Creek. Ferrous sulphate is added to tailings to neutralize the cyanide which might have a detrimental effect upon the animal life in the stream.

Cyanidation

Figure 3, page 23, is the flowsheet of the Benton Mill. Figure 4, page 24, illustrates the flowsheet as it is since the addition of a thickener, an agitator, and a filter.

Continuous counter-current decantation in cyaniding is the method of gold recovery used in the mill. The numbers on the first flowsheet indicate the addition of various reagents. The most economical strength of the gold solution is 1.05 to 1.10 lb per ton of ore for cyanide and for lime 0.90 to 1.00 lb per ton. The tails strength can vary from

FLOWSHEET OF BENTON MILL



Run of mine

15-in. grizzly

50-ton coarse ore bin

Water spray
Shaking screen passing $\frac{1}{4}$ in.

Blake jaw crusher, 9 by 15 in.
Esperanza classifier

20-in. Traylor gyratory crusher

100-ton, 12 by 22-foot cylindrical ore bin

5 by 6-foot Williamson ball mill
3 by 18-foot Dorr rake classifier
14 by 10-foot mill solution tank

Storage tank

Dorr thickeners
#1--20 by 10 feet
#2, #3, #4, #5--16 by 10 feet

Dorr agitators
#1, #2, #3--12 by 12 feet

175-ton mill-solution orifice, excess tonnage passes to storage tank

Clarifier

Vacuum tower

Precipitation tank

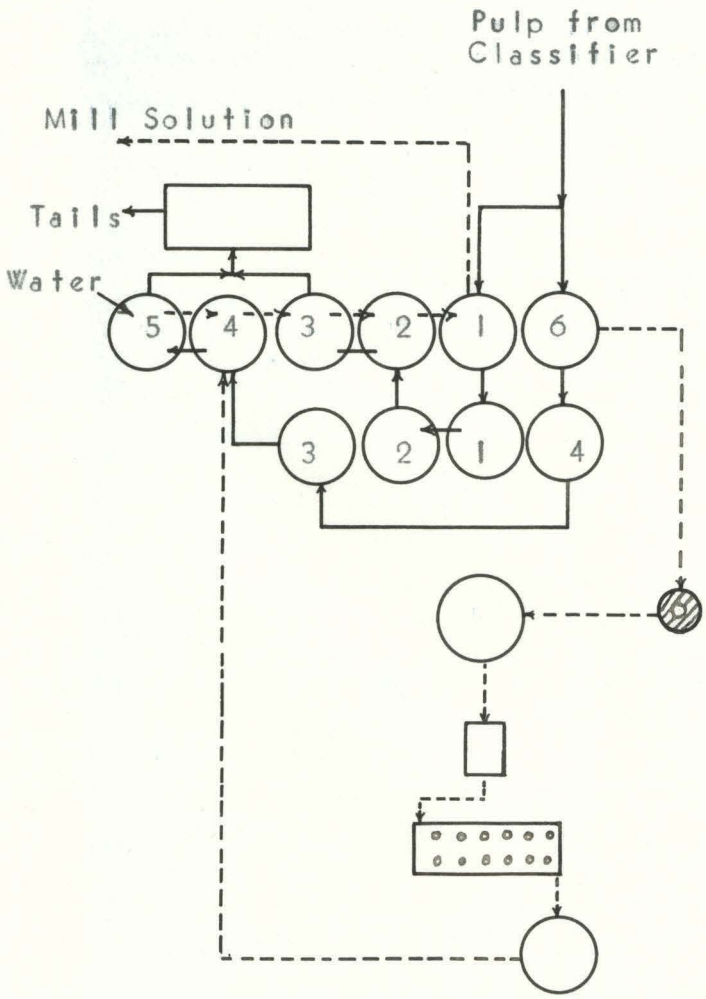
14 by 10-foot barren solution tank

Flow of ore and pulp (_____)
Flow of solution (-----)

Figure 3

FLOWSHEET OF BENTON MILL

With New Equipment
(#6 Thickener, #4 Agitator, Oliver Filter)



Oliver filter

Dorr thickeners
#1--20 by 10 feet
#2, #3, #4, #5--16 by 10 feet
#6--26 by 10 feet

Dorr agitators
#1, #2, #3--12 by 12 feet
#4--16 by 12 feet

175-ton mill-solution orifice, excess tonnage passes to storage tank

Clarifier

Vacuum tower

Precipitation tank

14 by 10-foot barren solution tank

Figure 4

0.40 to 0.90 lb per ton for cyanide and for lime 0.35 to 0.85 lb per ton.

During the day shift air for the agitators is furnished by a large compressor which also serves the mine; in the night the air is delivered by a single-stage Sullivan compressor powered by a 40-hp merine diesel engine.

Immediately following are values of the ore, pulp, and solution taken at various points in the mill for three months of 1940

	May	June	July
Mill heads, average assay	$12.49	$10.81	$11.08
Tails " "	1.95	1.81	1.28
Tails sands, " "	1.41	1.41	1.06
Average soluble loss	0.54	0.40	0.22
Net recovery	84.4%	83.2%	88.4%

Obviously the tailing loss was high; the reason was that the mill could not handle the tonnage being sent through it. Overloading the plant caused "mud lines" to occur in the thickeners; a "mud line" is the depth to the pulp and should be 15 inches or more. Whenever the line is within less than 15 inches of the surface, the pulp must be bypassed that particular thickener. Such bypassing eventually throws some of the gold into the tails before it has combined with the cyanide. The management believes that the additions to the plant will improve the recovery.

The canvas bags in the clarifier must be washed off every two weeks; each bag must be replaced after three weeks of service because holes have developed in it by that time. It is necessary to "milk down" the socks in the pre-

cipitation tank; if the sediment adhering to the inner surface of the socks is not manually forced to the bottom, the air pressure may be built up above the allowable. After six weeks of operation the sludge is cleaned from the socks and shipped to a smelter owned by American Smelting and Refining Company at Selby, California for refining.

For each shift one man is in charge of the mill; at intervals of two weeks the men rotate. The mill is operated continuously with cessations occurring when "clean-ups" are made and when the power plant is stopped.

Water for the mill is pumped from Whiskey Creek.

POWER PLANT

Air Compressors

Air for the rock drills in the mine is produced by a two-stage, two-cylinder--15 by 12 inches and 9½ by 12 inches--Ingersoll-Rand compressor delivering 650 cubic feet of air per minute at a pressure of 90 pounds per square inch. This machine is driven by a two-cylinder--12 by 15 inches--120-hp Fairbanks-Morse diesel engine. The compressor is operated on the day shift because the drills are used during that time only. There are two air receivers, one near the compressor at the mill and the other in the mine. The object of the latter is to catch any water that may be in the air lines.

The single-stage Sullivan compressor furnishes air, as mentioned previously, for the agitators during the two night

shifts.

Electric Power

Electricity for the camp and mill is produced by a 210-ampere, 480-volt, a-c Allis-Chalmers generator and a 24-kilowatt, a-c generator. The purpose of the latter is to replace the large generator when it is not operated. The large dynamo is motivated by a six-cylinder, 140-hp Atlas Imperial diesel engine. At two-week intervals the engine is stopped one-half hour to change oil; each month it is stopped for four hours to repair the scoop on the ball mill. A complete overhaul of the engine is made twice a year.

The 40-hp marine diesel engine operates either the Sullivan compressor or the small generator.

V-belt drives are used on all the above equipment. The large compressor has a flat-belt drive. The suction pumps for the thickeners and agitators are chain-driven by a small motor.

Shell diesel fuel is stored in 24,000-gallon tanks on the hillside above the mill. The lubricants are Standard Oil products.

CAMP

There are approximately nine houses for the men with families. One or two families live a few miles away from the camp. For the single men the company has provided eight frame bunkhouses, each of which serve as living quarters for four employees. The bunkhouses are one hundred yards

from the mill and are situated on the east bank of Whisky Creek. Plate 7 on page 29 is a view of the camp looking toward the north.

The company provides a mess hall for the men, the cost of the meals being deducted from their wages. A small canteen in the mess hall dispenses soda, candy, and tobacco. A truck is sent to Grants Pass almost every day for the mail and various supplies for the mine or mill.

A change house adjoins the row of bunkhouses affording a convenience for the employees. Ample sanitary facilities are provided. A washing machine is in the change house in order that the employees can launder their clothes.

Amusements are rather restricted but fishing and hunting are recreations that can be enjoyed in that area.

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Benton Mine Camp

Plate 7

Sorting Feed to Jaw Crusher

Plate 6

Min 50,000 ton
3000' work development

Total Ore & Waste 11,320 Tons

Mill Records Benton Mines.

Av Value Head of Waste in Tailings Pond

Ore Head by Assay

		Days	% Running Time	Dry Tons Milled	Rate Daily	Waste Tons	Gold oz Bullion	Gold Value $	Gold Rec per Ton Milled	Au Assay Tail per Ton	Au Value Head Computed	Assay Value Head	Recovery Bullion	Recovery Assays	
Sept	37		70.0	800		37	63.98	223930	2.788	1.77	456	673	612	73 7	800 x 45
Oct	"		77.0	600		49	145.49	509215	8.487	1.93	1092	1041	815	79 1/2	600 x 10
Nov	"		99.1	906		112	129.88	454580	5.017	1.64	606	607	829	83	906 x 6
Dec	"		98.3	521	32.6	54	117.16	410060	7.871	0.88	775	581	886	85	521 x 7
Jan	38		98.0	773	30.3	143	86.63	303205	3.922	0.42	434	427	903	90	773 x 4
Feb	"		92 1/2	694	24.8	91	77.15	2700 25	2984	Check 1.54 328 1.26 1.151	351	370 665 439	850	93 7	905 x 3.1
Mar	"	7	95	211		13									
April	"	—	—	—	—	—	—	—	—	—	—	—	—	—	—
May	"	29		700		67	51 88	181580	2737	0553	339	483	893	886	700 x 339
June	"		99	926	33.8	98	111 76	391160	4224	0.58	480	488	879	89	926 x 4.80
July	"		99	829	31.9	92	157 04	549640	6630	076	739	754	897	91	829 x 73
Aug	"		978	1035	33.4	209	323.45	11,320 75	10938	103	1197	1048	914	90 2	1035 x 11
Sept	"			886		164	282.65	989275	11165	106	1222	1139	913	90 7	886 x 12
Oct	"		99.5	1016	32.8	294	311.82	1091370	10472	121	1168	1208	897	900	1016 x 11.9
Nov	"	30	97.8	858	28.6	258	219.62	768660	8.958	95	991	972	90.4	903	858 x 9.91
Dec	"	6		149		36	65.66	229810	1542	1295	1672	—	—	—	149 x 16.42
Jan	39	25	89.3	798	30.7	199	131.18	459130 75 045 65	5878	1.40	728	801	807		798 x 8.0
Feb	39	28	98.0	1187.6	31.6	164	172.45	603589	6890	154	843	780	827	803	
March	31	25	84.0	809	32.4	118	165.11	577868	7143	101	815	689	876	85	809 x 8.10

Mill Record Benton Mine Texas Investment

1937	Days	% Running Time	Tons Milled	Daily Rate	Waste	GOLD oz	Gross Value	Bullion $ per ton	Av Tail	Assay Head	To Rec	Sol Loss	Cyanide	Lime	lb per ton Zn	Balls # per ton	Fuel Oil Gal per ton
Sept	34	70%	800		37	63.98	$2,239 30	2.788	1.77	4.56	6.73	61.2		1.57	4.2	.123	4.0	
Oct	30	77.0	600		49	145.49	5,092 15	8.487	1.93	10.42	10.41	81.5	0.930	1.6	3.9	.230	4.0	3.90
Nov	30	99.1	906		112	129.88	4,545 80	5.017	1.04	6.06	6.07	82.9	0.310	.99	6.11	.130	3.5	4.26
Dec	16	98.3	521	32.6	54	117.16	4,100 60	7.871	0.88	.775	5.81	88.6	0.160	1.2	6.8	.140	4.3	4.40
1938																		
Jan	26	98	773	30.3	143	86.63	3,032 05	3.922	0.42	4.34	4.27	90.3	0.020	89	5.64	120	2.96	5.10
Feb	28	92½	694	24.8	91	77.15	2700 25	2.984	.528	3.51	4.39	88.0	0.012	6	6.5	140		
Mar	7	95	211		13													
April	—		—		—	—												
May	24		700		67	51 88	1,181 50	2.737	553	339	4.83	84.3		1.6	12.6	095	6.1	4.12
June	30	99	926	33.8	98	111 76	3,911 60	4.224	.58	4.80	4.88	87.9	0.060	1.15	10.8	.080	3.7	3.68
July	29	99	829	31.9	92	157 64	5,496 40	6.630	.76	7.39	7.84	89.7	0.060	1.32	11.1	.100	4.0	3.70
Aug	31	97.8	1035	33.4	209	323 95	11,320 75	10.938	1.03	11.97	10.48	91.4	0.042	1.05	7.9	120	3.88	3.56
Sept	30		886		164	282 65	9,892 75	11.165	1.06	12.22	11.39	91.3	0.040	0.9	6.32	.117	4.51	3.82
Oct	31	"	1016	32.8	294	311 82	10,913 70	10.472	1.21	11.68	12.08	89.7	0.054	.93	5.22	0.090	3.35	3.81
Nov	30	97.8	858	28.6	258	219 62	7,686 60	8.958	.95	9.91	9.72	90.4	0.04	1.12	6.1	0.095	3.15	4.5
Dec	6		149		36	65.66	2,298.10	15.42										
Jan	25	89.3	798	30.7	199	131.18	4591 30	5878	1.40	7.28	8.01	80.7	0.28	915	4.95	.103	4.82	5.55
Feb	28	98.0	876	31.6	169	172.45	6,035 89	6890	1.54	8.93	7.80	82.7	0.33	.890	5.82	.116	3.84	4.34

.758
463
.295 = 1.04

October

averaged orig ore feed after 5" balls

8190 Oct 8-31
83.4 Oct 1-8 83.4

						tons x heads	tons x tail	Tail density	Cass overflow	Grind		Mill
1	15.7	.440	.089	6.80	1.40	692	140	54	19.4	73	75	16
2	16.5	.860	.091	14.18	150	1420	150	44 1/2	19.5	71	80	21
3	19.8	.450	.088	8.92	174	892	174	44	18.5	66	80	19
4	21.7	.520	.067	11.08	146	11.27	146	45	18	62	75	20
5	23.1	.340	.088	7.85	204	788	205	46	18	[illegible]	[illegible]	19
6	16.4	.276	.076	4.53	125	454	1.25	51	17	75	34	17
7	7.5	.776	.070	581	52	582	53	55	16.6	78	62	17
8	20.2	.366	.057 av. .758	740	115	740	115	46	15	71	72	17
9	21.8	.160	.056	349	122	348	122	44	15	50	81	16
10	25.2	.486	.041	1224	104	1227	103	36	15	80	86	16
11	28.2	.210	.068	594	182	615	191	34	15	74	85	16
12	9.2	.210	.033	194	31	194	30	45	15 1/2	74	86	16
13	20.2	.370	.051	748	102	750	103	48.6	14.7	81	83	15
14	23.6	.290	.038	684	90	684	90	50	15	56	79	16
15	25.2	.280	.049	709	124	708	124	48	16	83	82	15
16	12.1	.150	.044	172	53	182	53	52	15	84	84	15
17	22.4	.306	.047	687	105	685	69	47	15 1/2	56	81	16
18	19.5	.290 av .361 $12.60	.070	565	133	568	137	42	15	83	85	15
19	15.7	.200	.146	760	512	314	229	38 1/2	14 3/4	85	93	15
20	16.25	.166	.1588	581	578	272	258	42	15	87	83	15
21	12.6	.280	.0740	980	252	353	93	47	15	79	67	15
22	20.0	.280	.062	984	218	560	144	49	15	76	84	15
23	23.3	.184	.068	695	238	430	159	52	15	60	74	15
24	12.0	.180	.048	630	168	216	58	51	16	81	80	16
25	23.9	.236	.048	829	168	563	115	51	16	77	82	16
26	23.6	.160	.050	560	175	378	118	42	15	81	85	1
27	16.5	.186	.031	[illegible]	[illegible]	[illegible]	51	39	15	[illegible]	[illegible]	[illegible]

$1.04 av. improvement 172 (8 days)
371
8390

			mill h	h mhr		-200	balls	balls	heads	
										17
Dec	28	12 tons	13 1/2	10 1/4				8000	.16	5.60
	29	36 "	24	24	17%	70%	63	63	.16	5.60
	30	30 1/2	24	22 1/2	16%		760	760	.13	4.55
	31	40	24	24	16.4		3625	3125	.14	4.90
	1	25	24	24	16.5				.12	4.20
	2	26 1/2	24	23 1/4	16.5				.13	4.55
	3	28 1/2	24	24	16.5				.11	3.75
	4	29	24	23	17.0				.08	2.80
	5	20	24	19 3/4	16.7				.09	3.15
	6	22 1/4	24	20	18%				.06	2.10
	7	26	24	22 1/2					.126	4.42
	8	34	24	22 1/2	17 1/2				.14	4.90
	9	38	24	24	18%				.28	9.80
	10	24	24	16	17 1/2				.20	7.00
	11	14 2	24	12 3/4	19 1/2				.13	4.55
	12	25	24	15 2	19%				.21	7.37
	13	39.6	24	24	19%	81.8%			.154	5.40
	14	28.0	24	17	20%				.12	4.20
3 1/4	15	15.2	24	10 1/4	20%	74%			.146	5.20
	16	22.3	24	15	22%	83%			.186	6.50
x	17	29.0	24	14 1/4	20 1/2	74%			.24	8.40
	18	11.5	24	7 3/4	21.6	68%			.384	13.40
	19	22.2	24	14 3/4	21 1/2	63%			.164	5.75
	20	17.0	24	12 1/4	19 1/2	69%			.210	7.32
	21	28 1/2	24	19 1/2	20.3	75%	76		.454	15.90
	22	16 4	24	12	20 1/2	78%	77		.404	14.00
2 1	23	6	24	3 1/2	21%	82%	82	reduced 6500	334	11.70

Recovery of 86.37 would be OK.

Day reading 11:30 pm		Head #	Tail #	Head oz/an	Tail oz/an	Tons	Gold Sol $	oz	Tail Sand oz	Sol Loss $	GRIND #6	GRIND #8	Density #4	Density #8	Mill ore	CaO	CaO	Labor $10.10
1.	30	5.78	0.81	4.94 oz	0.69 oz	118	$1.31	4.71 oz	.020 ✓	$0.105	73.9	73.2	16.7	42.8	1.44	1.03	0.55	44.71
2	33	12.60	1.33	11.90	1.26	110	1.16	3.63	.027 ✓	.385	67.4	72.2	16.8	43.5	1.53	0.99	0.55	38.83
3	33	7.00	1.02	6.60	.96	110	1.54	4.81	.025 ✓	.140	70.9	70.9	16.9	44.0	1.61	1.07	0.56	41.24
4	34	5.60	0.84	5.47	.82	110	1.64	5.12	.015 ✓	315	69.1	70.7	16.6	44.8	1.53	1.04	057	33.08
5	30	8.40	0.98	7.20	.84	104	1.12	3.31	.022 ✓	.210	75.7	74.0	16.7	44.5	1.53	1.00	050	36.27
6	—		1.05	—		110	1.12	3.53	.022 ✓	.280		85.7	—	44.0	1.53	1.00	047	27.83
7	—		0.89	—		110	0.81	2.53	.023 ✓	.084		80.2	—	44.5	1.52	0.99	046	37.08
8	20	7.00	0.83	4.00	.53	103	1.40	4.05	.022 ✓	.060	69.0	78.6	16.8	46.0	1.48	0.82	042	41.74
9	32	4.00	0.92	3.65	.84	108	167	5.15	.025 ✓	.050	68.7	80.9	16.5	40.0	1.43	0.92	0.38	38.58
10	32	5.46	1.11	5.00	1.08	110	134	4.21	.030 ✓	.060	69.4	72.4	16.9	45.0	1.48	0.89	0.51	43.33
11	33	5.60	0.94	5.30	0.94	110	132	4.09	.028 ✓	018	77.2	78.1	16.7	45.0	1.47	1.09	.059	39.33
12	34	3.98	0.62	3.88	0.60	110	114	3.55	.017 ✓	.030	72.1	76.3	16.6	47.0	1.58	1.24	0.77	42.99
13	34	4.90	0.63	4.76	.61	110	114	3.57	.013 ✓	.175	71.9	74.7	16.6	47½	1.52	1.31	0.76	42.33
14	39	5.94	1.16	5.79	1.12	110	126	3.96	.021 ✓	.420	75.5	74.1	16.6	50½	1.54	1.41	0.62	35.71
15	29	4.90	0.97	4.06	0.97	110	1.10	3.43	.027 ✓	.150	74.1	72.5	16.6	50	1.46	1.31	053	41.74
16	34	5.05	0.61	4.97	0.60	110	1.02	3.19	.015 ✓	087	71.4	72.7	16.7	48	1.50	1.45	0.86	40.83
17	33	5.05	1.04	4.61	0.99	110	1.02	3.19	.025 ✓	170	72.1	70.6	16.8	46	1.53	1.47	0.88	41.58
18	34	2.94	.25½	2.86	0.25	110	1.05	3.30	.005 ✓	.080	73.2	69.4	16.7	47	1.44	1.49	0.92	41.08
19	12	4.20	.43½	1.44	0.15	110	1.19	3.74	.010 ✓	.085	75.2	69.5	16.6	46	1.33	1.30	093	32.78
20	—	—	—	—	—	110	073	2.29	—	—	—	—	—	—	—	—	—	34.27
Feed	521	.166	.0254	86.63 ✓	13.25	2185		74.76	10.752 oz	.0048	12268	19167		11.8 8701				#775.33
Waste	54	#5.81	#0.889	84.79 Rec		.0342	#1.20	.38 loss	12.4%	2.9%	72.1	74.5	16.7%	45.8%				#1.49
	575	.89		.166	.0254			74.38	87.6%	169								
Recovd		#4.92		73.38 oz				84%	dissolved									
									.0206									
									72¢									
Camp	711			121.17 oz ✓	20.20 oz ✓			101.84 oz ✓										
								.56	2.0%									
								102.30 oz										

95.70
8.28
87.42

74.29
8.28
82.57

74.29 / 82.57 = 90% Recovery by ppt

91.3 by assays

Benton Mill Jan 1938

3600 Tons to date av 7.09

Sept
Oct
Nov
Dec
Jan

		Tons x oz	$	Tails	Tails	Tails x Tons	Gold Sol		Gold Sol oz Wnet	Sumd	Slns	Dns	KCN	CaO	Balls	Sands	Waste
20	.106	2.12	3.71	—			9	.0140	0.12	68.6	17.8	—	1.70	1.15	206		
34	.120	4.08	4.20				55	.0252	1.36	69.8	17.2		1.72	1.38	279		4
34	.150	5.10	5.27				108	.0313	3.27	72.2	17.4		1.61	1.25	121		4
35	.134	4.69	4.70	.0202	.71	0.71	111	.0275	3.05	64.4	16.8		1.29	1.06	200		4
35	.130	4.55	4.55	.01115	.39	.39	112	.0300	3.36	70.7	17.0		1.54	1.40	121	0.011	4
36	.120	4.32	4.20	.0251	.88	.90	110	.0283	3.08	71.4	17.0		1.71	1.41	121	0.0005	6
36	.160	5.76	5.60	.0114	.40	.41	110	.0290	3.19	72.9	17.2		1.58	1.40	121	0.011	6
35	.140	4.90	4.90	.0104	.36½	.36	109	.0335	3.65	75.3	17.7		1.55	1.40	121	0.010	7
35	.200	7.00	7.00	.0204	.71	.72	108	.0293	3.16	68.9	17.0		1.51	1.32	121	0.020	4
33	.280	9.24	9.80	.0194	.68	.64	110	.0295	3.24	71.8	17.0		1.56	1.41	121	0.019	5
34	.120	4.08	4.20	.0184	.69½	.63	110	.0350	3.85	74.6	16.9		1.50	1.49	121	0.0180	6
30	.145	4.35	5.08	.0150	.52½	.45	110	.0400	4.40	73.5	16.9		1.54	1.43	121	0.014	4
32	.134	4.29	4.70	.0104	36½	.33	110	.0363	3.99	77.7	16.8		1.53	1.38	121	—	6
33	.100	3.30	3.50	.0084	29½	.28	110	.0262	2.86	68.2	16.8		1.55	1.42	121	0.008	6
33	.100	3.30	3.50	.0063	.22	.21	110	.0350	3.85	73.8	16.8		1.52	1.38	121	0.006	5
33	.080	2.64	2.80	.0084	29½	.28	110	.0382	4.20	73.7	16.9		1.57	1.32	103	0.008	5
33	.056	1.85	1.96	.0084	29½	.28	110	.0353	3.88	75.5	16.9		1.57	1.24	121	0.008	5
28	.065	2.28	2.28	.0136	47.6	.38	110	.0330	3.63	75.8	17.1		1.52	1.52	—	0.012	8
25	.156	3.90	5.46	.0188	65.8	.47	110	.0295	3.24	84.8	16.5		1.53	1.04	—	0.018	6
15	.100	1.50	3.50	.0124	43.4	.19	110	.0250	2.75	80.0	17.0		1.54	1.06	—	0.012	11
25	.040	1.00	1.40	.005	17.5	.02	110	.0205	2.23	79.6	17.0		1.54	1.04	—	0.005	9
25	[illegible]	1.65	2.31	.002	.07	.05	110	.020	2.20	78.8	17		1.53	1.02	— (192)	0.002	6

9000 Straw 60

November 37

3191

25-31		1525					Solar		Solar		Heads x Tons		Tails x Tons		Sol		Quasi Sand Tank		Screen		Tails Past	
									30 91		31.17		6.10									
	1	23	.236	.035	.023	8.28	1.22	89	.0375		3.35		5.42		.81		.0018	.0230		77.1 85.3		42½
	2	26	.156	.0194		5.47		95	.0305		2.90		4.06		.50					78.6 86.9		46.70
	3	26	.184	.0251		6.45		97	.0338		3.30		4.78		.65					78.7 82.4		47.70
	4	23	.086	.0185		3.00	1.32	83	.0382		3.18		1.98		.43		.00185	.0133		78.4 86.7		43
	5	27.5	.124	.031		4.34	1.08	80	.0428		3.42		3.41		.85		.0038	.0150		76.7 81.8		47.90
	6	27	.124	.037		4.48	1.29	99	.0423		4.20		3.35		1.00		.0047	.0200		78.3 82.4		49½
	7	30	.19	.0382		6.68	1.34	100	.0402		4.00		5.70		1.15		.0038	.0265		73.6 83.5		48½
	8	31	.14	.0418		4.90	1.46	90	.0377		3.40		4.35		1.30					75.7 75.0		45½
	9	30	.12	.0304		4.20	1.03	96	.0340		3.27		3.60		.91					73.3 73.6		44½
	10	31.5	.124	.032		4.35	1.12	98	.0360		3.54		3.92		1.01		.0033	.0220		73.5 73.1		43.6
	11	31	.126	.0325		4.40	1.13	79	.0425		3.36		3.90		.99		.0010	.0250		73.7 75.7		46½
(819) 27.2 tons	12	31.337	.16	.0279		5.60	.98 (119)	86	.0438 (Qu 30)		3.77	41.69	4.86	49.43	.87	10.47	.0013	.0200		.755 84		43
	13	31	.164	.0137		5.73	.48	92	.0452		4.15		5.08		.42		.0015	.0100		75.5 76.6		44
	14	32	.150	.0161		5.30	.56½	90	.0470		4.23		4.80		.53		.0008	.0143		73.7 73.3		46½
	15	29	.296	.0273		10.20	.96	90	.0464		4.18	3.425	8.60	67.91	.79	12.21	.0008	.0250		75.6 72.6		44
	16	32	.196	.0122		6.88	.43	90	.0417		3.77		6.08		.38		.0008	.0100		73.2 74.1		42½
	17	31	.156	.026		5.47	.86	90	.0467		4.21		4.84		.86		.0018	.0200		73.2 74.1		42½
	18	32	.126	.0268		4.82	.92	90	.0438		3.95		4.04		.92		.0043	.0165		71.2 75.2		44½
	19	32	.180	.0190		6.30	66½	82	.0493		4.05		5.77		.61		.0005	.0165		73.2 62.9		41.90
	20	33	.186	.0266		6.51	.93	80	.0490		3.93		6.15		.88		.0022	.0175		71.7 71.7		45½
	21	31	.304	.1226		10.21	.79	84	.0510		4.30		9.41		.72		.0038	.0125		71.8 75.8		44½
	22	32	.184	.0367		6.40	1.29	92	.0515		4.73		5.89		1.18		.0060	.0200		75.3 75.8		44½
	23	32	.100	.041				91	.0463		4.21		6.40		1.32		.0046	.0260		71.3 73.3		45½
	24	32	.190	.0296				86	.0527		4.53		6.09		.95		.0035	.0200		74.5 74.9		44
	25	31	.244	.0400				77	.0608		4.68		7.56		1.29		.0038	.0300		72.9 72.7		46½
	26	31	.164	.049				107	.0430		4.60		5.10		1.55		.0070	.0290		72.0 75.5		43
(53)	27	32	.140	.0372				43	.0467		4.61		4.96		1.19		.0022	.0300		70.5 75.4		43

LIST OF MAPS

1	Map of Josephine County, Oregon.
2	Dotan Quadrangle Corps of Engineers USA Topography.
3	Claim Map Benton Group.
4	Elmers Assya Map Old.
5	Benton Map No. 5 of Elmers report with additions.
6	Plan of development new ore zone
7	Assay Map Longitudinal section new ore zone
8	General Map of Hamptons old.
B-14	General Elevations Mill
B-21	Mill Flow Sheet
B-24	General Plan of Mill.

Not included supplified on reque
" " " " "
" " " " "

BENTON MINE OF LEWIS INVESTMENT COMPANY

Glendale, Oregon.

Month	Tons Milled	Tons Waste	Bullion Gold Ounces	Total Value	Value per Ton	Tail Assay	Head Computed	Head By Assay	Recovery	Gross Head
1937										
Sept	800	37	63.98	$2239.30	$2.788	$1.77	$4.56	$6.73	61.2%	$3648.00
Oct	600	49	145.49	5092.15	8.487	1.93	10.42	10.41	81.5	6252.00
Nov.	906	112	129.88	4545.80	5.017	1.04	6.06	6.07	82.9	5454.00
Dec	521	54	117.16	4100.00	7.871	0.88	7.75	5.81	88.6	4037.75
1938										
Jan	773	143	86.63	3032.05	3.922	0.42	4.34	4.27	90.3	3354.82
Feb	694	91	77.15	2700.25	2.984	0.528	3.51	3.70	85.0	2841.20
Mar	211	13								
April	Shut down	-	-	-	-	-	-	-	-	
May	700	67	51.88	1815.80	2.737	0.553	3.39	4.83	84.3	2373.00
June	926	98	111.76	3911.60	4.224	0.58	4.80	4.88	87.9	4444.80
July	829	92	157.04	5496.40	6.630	0.76	7.39	7.84	89.7	6126.31
Aug	1035	209	323.45	11320.75	10.938	1.03	11.97	10.48	91.4	12388.95
Sept	886	164	282.65	9892.75	11.165	1.06	12.22	11.39	91.3	10826.92
Oct	1016	294	311.82	10913.70	10.472	1.21	11.68	12.08	89.7	11866.88
Nov.	858	258	219.62	7686.60	8.958	0.95	9.91	9.72	90.4	8502.78
Dec	149	36	65.66	2298.10	15.42	1.24	16.66	-		2446.58
1939	10,904	1717	2144.17	75,045.25	6.882	0.873	7.755		88.7	84,563.99

Bullion ounces gold is from precipitate returns from Selby Smelter.
Computed head is value in Bullion per ton plus average tail assay.
Average head assay is from daily feed sample assay.
Recovery is bade on actual bullion returns plus average assay times tonnage.
Gross head is computed heads times tonnage for month.
Feb and March were added together for one clean up.

This is a letter describing the Benton Mines of the Lewis Investment Company. It is written in report form. The writer is solely responsible for the statements herein and expresses only his opinions. While I have had to rely upon information from others, compiled data from the mine, together with personal observation, I have been satisfied with the sources. It would seem, if I stick to a report form, that a conclusion is warranted.

CONCLUSIONS:

I think a development fund of $50,000 should be provided for this property. First $25,000 to be expended in vigorous development at about double the present rate. The balance to be expended if the first half develops as satisfactorily as expected.

As gold mines offered during the last four years, I think the general conditions surrounding it, the geology, present developments, terms, equipment on the ground and the mine being in actual operation, the Benton mine is above the average offered.

When asked last fall to see if one of the larger mining companies would furnish additional capital and relieve the Lewis Investment of the responsibility for management of the mining end, I recommended they continue the operation themselves. A mine which will pay for its own development is too good to sell, as a rule. If the present ore zone in the hanging continues to develop tonnage of the same grade as the last three months I hardly see the necessity of taking any one else in.

There is some evidence but it will take some considerable development to prove whether it would be better to mine the whole ore zone as a low grade ore on a 300 to 500 tons basis or to continue on a basis of 50 to 75 tons a day and high grade ore. There is a viewpoint other than that of a mining engineer which might make it advisable for the Lewis Estate to sell control to a responsible operating and experienced mining company and retain an interest in either case. I am somewhat sympathetic to this view, taking into account the character and purposes of The Lewis Estate and its management for the best interest of the various heirs.

LOCATION:

The Benton Mines of the Lewis Investment Company are located in T. 35 S. Range 8 West of Josephine County, Oregon. The camp is located where Drain Creek empties into Whiskey Creek.

Whiskey Creek empties into the Rogue river about 1½ miles southerly of the camp.

Generally speaking, the Benton mines are in Southern Oregon, about 26 miles northwesterly of Grants Pass, Oregon, which is on the Southern Pacific R. R. See Maps 1 and 2.

CLAIMS:

The Benton group of claims, seven claims and a fraction, are patented under M.S. 496, Patent No. 164,539, as listed below: (See Map 3.)

Benton	Louisiana
Georgia	Ruby Hill
Missouri	Texas
Carson Hill	Arizona

The above total 150 acres. A mill site claim has als been taken up covering the camp and mill locations and the junctions of Whiskey and Drain creeks. Three claims have also been located covering the ground Northeast of the present workings.

The JCL group owned also by the Lewis Investment Company is under lease to one of the Lewis Estate heirs and her husband, who operate a small Straub Mill and take out some high grade ore. The JCL group has not been considered in this short report.

TITLES:

The titles are in the name of the Lewis Investment Co. Lewis Building, Portland, Oregon.

HISTORY:

Mr. John C. Lewis developed the JCL and Benton groups about the period of 1891 to 1905. There is no record on hand of the production from the JCL group and the work at the Benton was all development work.

The Gold Bug group lies east of the Benton (See Map 3). A small stamp mill and a cyanide plant operated for some years, and produced $750,000.00. It was operated by Senator Jones of Nevada and associates.

Mr. Bailey, a reputable mining engineer, started the California Tunnel from Reuben Creek about 1921. He had advanced this tunnel about 7000 feet to within 1500 feet more or less of the Gold Bug ground when he died in 1929. The money was furnished principally by Mr. Wheeler, a Tacoma lumberman. Nothing further has been done there. Bad air prevents entering beyond about 3000 feet from the portal. The tunnel does offer a very good chance to learn the character of the territory easterly of the Gold Bug.

Whether there is more than a geographical relation or not between the Alameda and Oriole mines due South with the JCL, Benton and Gold Bug groups is a matter of conjecture.

Creditable reports show the A lameda has a large tonnage of ore containing gold, silver and copper. It has had more development work than any other property in the vicinity. Development work was carried on during the period of 1910 to 1928. Its production has never been important and the ore treatment is a problem.

The Oriole, near Galice, produced shipping ore around 1900 to 1910. There are some fair sized stopes from which shipping ore was taken. Records are not at hand, although may be secured. Some 3000 tons were milled in 1936 which showed a value of $9-12.00. Not a wonderful mine but one which has promise and would warrant a large company spending some money on further development. The milling characteristics of the ore are very similar to the Benton although the ore occurrence differs in some ways.

On the whole, there is not much to be said for or against the record and history of the surrounding district.

The JCL took out high grade ore in the early days but I have no record of the production. One of the Lewis heirs and her husband took a lease on the JCL four or five years ago and have been taking out high grade and milling it in a little Straub mill. The production lately has not been significant.

A careful examination has not been made lately of the JCL group. Completion of the CCC road mentioned later will warrant a thorough investigation as it will then be a reasonable haul to the Benton mill.

The first time the Benton came to my attention was about 1930. The information was rather scarce, scattered and incomplete at that time. Mr. W. W. Elmer examined the Benton and prepared a report for the Lewis Estate in the spring of 1931. This report did not show enough ore then to justify a mining operation but looked favorable for further development.

Recalculations when gold advanced to $35.00 showed a possible profit and I recommended that Mr. Albert Burch check the whole thing over again and give his opinion. Mr. Burch made a brief report and an offer on behalf of one of his clients.

The Lewis Estate then concluded to go ahead with it themselves and appointed Mr. Burch Consulting Engineer and in which service he has continued ever since.

This was in the fall of 1935. The general situation then was briefly as follows: There was a tonnage above No.2 level estimated at 15,000 tons of $12.60 ore with a possible 5-10,000 tons more.

The surface is well covered with overburden, under brush and trees with few outcrops. The rises were all dangerous, as the timber had rotted, and would require new timbering throughout for examination. Situation was judged from ore exposures No. 1 and No. 2 Levels 240 feet apart vertically.

The Portal of No. 2 Tunnel is about 30 feet above Drain Creek which has steep sides and no suitable location for camp and mill site. The nearest site and practically only site for several miles around was the junction of the Drain with Whiskey Creek.

Mr. Burch recommended the driving of the Kansas cross cut tunnel from this site to the projection of the Benton vein ore chutes which would give about 240 feet of depth below No.2 level, and would be about 1800 feet long.

The Kansas tunnel was started by Earl Greenough of the Coeur d'Alenes late in 1935 barely getting supplies and equipment in before the road became impassable in December. The Kansas level reached the projected plane of the Benton vein in the summer of 1936. Several thin veins and seams were found but nothing of any importance. Drifting on some of these did not develop anything substantial. It was desirable if possible to raise to No. 2 level upon ore. This delayed the program 3 - 4 months.

Mr. Hershey came in for a consultation after several months and located the present raise. This raise encountered some ore about 80-90 feet up but nothing of any real importance until near No. 2 level.

Originally it was expected the Kansas raise and level and stoping preparations would be completed about February, 1937.

Due to the road being impassable from December 1st to about April 15th a mill could not be completed until about July or August, 1937, unless materials and equipment were hauled in before December 1, 1936.

Metallurgical testing had been postponed until the character of the ore in the vicinity of the Kansas level could be seen. Finding no ore at the Kansas level, metallurgical testing was started on the ore from No. 1 and 2 levels. Preliminary testing had shown cyanide would be the probable process selected, and this was confirmed upon careful sampling and testing. It was definitely decided to go ahead as fast as possible with the erection of a mill and this was started in June, 1936, although final testing work had just started. All materials and equipment for the mill were gotten in to the camp by 1936 and the construction carried on during the winter, 1936-37.

Troubles in locating the Kansas raide, raising and preparing for stoping took longer than expected and was completed in August, 1937.

Milling started August 28, 1937. It was only possible to start one shrinkage stope and this would only produce about 35 tons daily. This stope was advanced about 80 feet from No. 2 level by February, 1938. The vein pinched at this point to a narrow seam.

The general opinion as to the character of the Benton vein and its structure made it seem probable that it would pinch and enlarge at times and did not cause much alarm. Mr. Burch was of the opinion that the stope had gone off upon fault and that the vein itself was in the hanging. The stope was stopped and raising started with the idea of leaving a pillar so the stope could be drawn. He also requested Mr. Hershey to consult with him.

It was some time before Mr. Hershey arrived and in the meantime the raises had encountered some ore in the hanging.

Since then the work has been concentrated upon the development of the ore encountered in the hanging. Development work has produced about 35 tons daily which is milled as mined.

Mr. Greenough resigned in the spring of 1937 to do some work at his Atlas Mine in the Coeur d'Alenes. Mr. Ed Stenger of Berkeley, California was appointed to succeed him and has carried on the work under Mr. Burch ever since.

GEOLOGY:

The general geology is shown on page 115 of Emmons "Gold Deposits of the World". Also page 253, "Ore Deposits of the Western States," A.I.M.E. volume. Diller also in USGS Bulletins 280 and 546 covers the general geology. Diller's work is in error in the vicinity of the Benton mines.

There is a large area of granite exposed in the vicinity of Grants Pass with many smaller areas adjacent. The last outcrop seen on the Rogue River road is about 4 miles west of Merlin. The Rogue River from there on shows a continuous strip of schists, slates, serpentines and greenstone down to the sea. This series is generally considered to be Jurassic or older. It is heavily folded in places and frequently intruded by stocks and dykes.

The Benton mine is located within a tongue of granodiorite, about 1500 feet wide in the vicinity. It is very fine grained at the mine and of course near the vein is altered. D. C. Livingstone made some sections of specimens for W. W. Elmer in his report and Livingstone termed it quartz diorite or granodiorite.

The westerly contact of the grano diorite and the schist passes near the camp site at the junction of Whiskey and Drain creeks. The trail on the east side of Whiskey creek crosses the contact back and forth all the way to the Rogue River about 1½ miles. The granodiorite is very coarsely crystallized near the river and is undoubtedly much wider, as there is an abundance of grano diorite all the way up the river to the JCL mine. The Benton tongue is evidently one tongue of a large stock, centering near the river and the JCL. The west side of Whiskey creek is entirely in schist and following down the Rogue westerly a mile shows schist only. There is a small outcrop of serpentine below the Reno mill lying between the west side of Whiskey creek and north side of the Rogue river but is of no importance.

Both the Gold Bug and the JCL mines lie in the schist easterly of the Benton tongue and close to other tongues of granodiorite.

The original Benton vein has a strike of north 20 east. It contained a shoot three feet wide, 150 feet long and was considered to extend from No. 2 level to No. 1 level, 278 feet above and also to extend to the surface 100 feet above No. 1 level. It dipped about 80-85 degrees southeasterly.

There are no stope assay maps available but from the mill records a good grade of ore was stoped for 20-25 feet above the No. 2 level.

Three quartz veing, two of which are 5 feet wide and another 2 feet wide, were found in the hanging wall in a xone about 30 feet wide. This zone contains considerable pyritized diorite with quartz veinlets some of which assay well.

The quartz veins have a strike N. 35-40 east, dipping 65-70 degrees northwesterly. They are displaced by short slips of one or two feet, freQuently.

The line of intersection of this hanging wall ore zone with original Benton mine is a line rising to the northeast. Development along the course of the original Benton requires a combination of incline raises and drifts to keep on the ore. This would show several things which might be interpreted several ways. The dip of the ore zone is not well defined as yet by development and sampling. If the ore zone strike was co-incident with the strike of the three new veins and had the same dip the line of intersection would incline upwards in the opposite direction.

There are two possibilities; there may be a transverse fault at this point or the strike of the ore zone may be approximately north and south. If the strike is north and south the quartz veins would then be transverse fissures of quartz in a general sheared zone running north and south,

This intersection line comes into the Benton vein 25 feet above the level of No. 2 and breaks into the north end of the stope at that height. There is evidence of movement and drag ore in the plane of the Benton vein. The hanging wall of the stope showed quartz here and there which was not desirable at the time to remove. South of the stope sampling and other evidance indicate some cross cutting might uncover the ore zone to the east of the No. 2 drift.

If this intersection line holds, then the intermediate level should strike ore several hundred feet south of the Kansas raise. Likewise drifting south on the Kansas level from the point of intersection with the plane of the Benton vein should find ore also.

There has been some indication of these quartz veins feathering out to the northeast but drifting further has come in to good ore.

I do not think any worthwhile conclusion can be reached at this time nor until considerable more development work has been finished.

The quartz veins are principally quartz and pyrite. The gold is not visible and the Dorr Classifier has never shown an accumulation of coarse gold in it. Only a small percentage of gold is free. It is closely associated with the pyrite as the best recovery is obtained when the ore is ground to 50% minus mesh and tabled. The table concentrate ground separately to 96% minus 200 mesh, then cyanided with the coarser ground gangue and quartz.

The heavily pyritized diorite will run as high as the quartz. Diorite with quartz veinlets and some pyrite runs $2 - 6.00, and in sorting at the mill is always included in the mill feed. Barren diorite only being rejected.

The diorite itself is broken down in the zone of the vein to sericite, chorite and clay.

Occasionally a little molybdenite is found.

The character of the mineralization is the same from the Kansas level to surface and samples showing any Quartz or pyrite will show $2.00 to $20.00 where ever found in the vicinity.

TOPOGRAPHY:

The topography is so well shown upon Map No. 2 it is not necessary to describe it. The elevation at the mill is 850 feet and the Rogue river at the mouth of Whiskey creek is 400 ft.

The annual temperature is about the same as Portland, Seattle and Vancouver, for the same elevation. The rainfall is not as heavy. Starting along the line of Gold Beach to Medford, rain is less than north. The mine is 45 miles in a direct line east of the Pacific ocean.

Drain creek runs a minimum of about 70GPM and Whiskey creek a minimum of 600 GPM.

The local timber is of poor grade and is used principally for fire wood only.

TRANSPORTATION:

The mine is now served by a Forest Service road 18 miles long from Glendale on the Southern Pacific R.R. This road is shown on Map 2, climbs out of Glendale and finally passes over Mt. Reuben at an altitude of 4400 feet or about 100 feet below the summit. It then drops slowly down to where the road forks for the Benton mine. It follows Drain creek to the camp connected with No. 1 level portal by a short spur and passes No. 2 portal. The road extends beyond the camp for a mile and a quarter south on the west side of Whiskey creek, ending at the Reno mine.

To drive this road during spring, summer and fall (April to December) in a car or truck, requires about one and a half hours. Snow in the vicinity of Mt. Reuben, together with insufficient rock on a clay bottom in places and steep grades make the road difficult for heavy hauling in the winter. The last three winters heavy hauling has been completed before December 1st and a pack train has been used during the winter months.

There is an all-winter road well built which leaves the main Pacific Highway near Merlin and runs down the Rogue river to Graves Creek where a bridge crosses the Rogue River to the north side. (See Map No. 2) This road has been extended by CCC workers every winter toward the Glendale road and will join in it in the vicinity of the Gold Bug Mine at an elevation of around 2000 feet. This road is used in the winter and passengers walk in from the end of the CCC road, about an hour's walk on the trail. The pack train comes in on this route once a week with fresh supplies, mail and repairs. The CCC are again working on this road and every winter it has been expected it would be finished. This road could be kept open most of the winter, probably by one trip over it with a bulldozer and perhaps it would be impassable for cars and trucks for a matter of three or four miles during one period of two weeks.

GOVERNMENTAL CONDITIONS:

The claims are in the Siskiyou National Forest. The Forest Service permitted operation during the fire season last summer after considerable argument. They maintain a telephone line and mine has connection to Grants Pass and service is fair. Generally, Forest Service officials have been cooperative in many ways and relations between the mine and Forest Service are satisfactory.

There has been some agitation about stream pollution of the Rogue river by mining operations, principally placer

miners' debris. As it is possible to settle the tails and stack them and secure a clear overflow to waste this is not of any great importance. The flow of Whiskey creek is so large that it will take care of any free cyanide in the tails.

ASSAY MAPS:

Map No. shows a longitudinal section of the mine and this in connection with the other maps numbers will give you an idea of the new ore zone.

I do not have the assays of the stope faces on the first shrinkage stope. The first third of this stope milled about $7.79. During September, 1937, the ore was unavoidably diluted with a lot of waste. There was only 250 tons of waste sorted out prior to milling. Changes in the sorting plant greatly improved sorting conditions some time in December.

The development work and ore drawn and stoped up to February and from then on with occasional pulling of the stope gave 412 tons of waste and 3304 tons of mill ore running $3.06 per ton.

The development work in the new ore zone gave 465 tons of waste sorted out and 2750 tons which milled $10.60 during July, August and September.

During this period the mine was served by a two compartment raise, one for ore and one a manway with a timber hoistway. There was no way of disposing of waste except one old raise which could be filled for about 30 feet.

The new waste compartment was started some time ago and will be completed this month which will be an improvement and stop mixing of ore and waste.

The development work in the new ore zone was done both in quartz and diorite, some of which was pyritized and some not. The development was through a xone 30 feet wide containing the three quartz veins. This probably explains the difference between the regular mine samples in the ore zone and the mill heads computed from bullion returns.

It is generally considered the new ore zone as shown on this assay map will produce at least 10,000 tons of ore about $11.00 average, as now developed.

The old shrinkage stope has been drawn upon from time to time since last January and there is only about 3000 tons at the most left in it.

According to W. W. Elmers report there should be 1400 tons of $14.00 ore directly above the shrinkage stope on No. 1 level. What is now known of the mine there is probably less actually blocked which could be called certain on the other hand the probable ore whichhe does not mention is increased.

MINING:

The first stope was mined by shrinkage system at a satisfactory cost. It was pulled from the chutes and trammed to the Kansas raise. Two men trammed the ore from the Kansas raise and did the crushing and sorting at the mill.

There is not sufficient development at the present time to plan the mining of the new ore zone. It is not certain, either, whether the new ore bodies should be mined by selective mining or whether the whole zone should be mined and milled as a low grade ore body. Development work and further sampling will be required to come to any sound conclusion.

MILLING:

The General Plan and Elevation of the mill and Drg. B-21 showing flow sheet will give a general idea of the mill.

The mill is a nominal 50 ton straight Counter Current Decantation Cyanide Plant.

The ore is dumped intp a coarse ore bin of 50 tons capacity. A shaking screen has been added which takes the mine ore direct from the bin. Wash water sprays are used to clean the ore for sorting. Sorting is done by two men upon the vibrating screen which may be stopped or started as required. Coarse waste is removed by hand and dropped down a chute to a mine car which is sent to dump as often as required.

The screen has 1/4" round holes which remove the fines, and wash water, and these are sent to a drag classifier which make a very fine overflow and reclaims the sand which goes to a belt conveyor and to fine ore bin.

The plus one inch material goes to an Allis Chalmers Blake Crusher 9"x 15". The minus one inch and the crushed

material go to a 20" Traylor Fine Reduction crusher which discharges on a belt conveyor going to the mill bins. The final mill feed is nominally all minus 1/2" There seems to be some trouble with fines and keeping the crusher set up and the final product to the mill bins in generally about minus 3/4" The crushing plant is driven by one large motor and group drives.

The Mill bin is a three inch fir tank 12' dia. by 22' high with 4" bottom holding 100 tons. The feeder is belt feeder equipped with variable speed motor and push button conttwol. The head shaft is equipped with counter. One skirt board is hinged so that slide scoop will scrape off full load of belt for the same length each time, and into a small container. This strip is weighed once an hour which together with the counter gives the tonnage. The Ball mill is a 5'x 6' Williamson Ball Mill, Overflow type, manganese lined, with spur gear and Tex rope drive to a 50 HP motor with ammeter. The ball mill runs in close circuit with a Dorr DSFR 3' wide by 18'4" long motor driven latest type Dorr manufacture and of the light type. Lime is fed to the sane return by a General Engineering lime feeder.

The grind is kept at about 70% minus 200 mesh.

The overflow of the classifier goes to No. 1 Thickener and the thickened product to the Agitators and from there thru four Thickeners arranged for Counter Current Decantation Washing.

The Thickeners and Agitators and Sludge Pumps are all new, of Dorr Company manufacture. The Agitators and Thickeners are of the latest beam type support enclosed worm gear mechanism. Thickeners have overload alarms to central switchboard. The Thickeners and Pumps are all driven by one motor with a group drive of chains as they are not housed in. They are controlled by push button. The tanks are fir tanks and the mechanisms of the thickeners are independently supported and not on the tank sides. The bottom of the tanks are raised above a drained concrete floor sufficient for easy access.

Tail is sampled by automatic sampler.

The Gold tank is mounted on the same level as the thickeners and will take overflow of mill solution or gold solution. Mill solution is pumped back by an Allis Chalmers pump with float control to Mill solution tank above mill. Gold solution is pumped to Merrill Crowe Precipitation unit of the bag type. The Barren solution is pumped to aerating tower above Barren solution mill above mill.

The washing Thickeners are equipped with air lifts to mix the thickened pulp with the oncoming wash water and Barren

solutions. These air lifts raise the pulp about 18" above thickener overflow level and drop over baffles for areation of pulp.

The valves are all of the Nordstrom lubricated type. Fittings are on hand for heat exchange between Deisel jacket water and solutions. Jacket water is used on No. 5 Thickener for wash water.

The General Engineering Company tests recommended the grinding of the ore to 50% minus 200 mesh tabling, and re-grinding the table concentrate to 98% minus 200 mesh and then cyaniding the table tail and reground concentrate together. The mill was built and arranged for this flow sheet but the tables and regrind unit have never been purchased as the ore in sight did not warrant the expenditure. Until the ore reserves warrant it the present flow sheet is making the maximum profit under the circumstances.

There are really two classes of ore being treated. An ore running about 50% quartz and 50% diorite of about $10.00 grade and the settling rate is satisfactory for this type of ore.

The low grade straight diorite ore requires more settling area than provided. However the Dorr Company say that trays can be put in present tanks which would provide 80% more area and would take care of about 60 tons in 24 hours.

There is no reason to make any changes for increased capacity at this time, which has only been 30-36 tons daily.

The mill is driven by an Atlas Imperial Deisel Engine and while it had been used about one year, was bought direct from the Atlas Imperial Factory after being overhauled and was sold with a new guarantee. It has been entirely satisfactory It drives an A.C. 125 KVA Generator thru a Tex Rope Drive. This was a rewound used generator. It has a new voltage regulator. This unit is pulling about 91 HP at the Generator or about 115 HP at the engine which is rated at 140 HP.

The old development unit, a Fairbanks Morse High speed Diesel short belt drive to a small compressor is installed in the mill and has a Tex Rope drive to a 30KVA A.C.Generator. This provides mill air when the mine compressor is down and also light and power if main mill engine is down. It is also used to keep the thickeners and agitators running until cleared when an actual shutdown is contemplated for some period.

The mine compressor and the Diesel driving it are also placed at the mill so one Diesel operator looks after all engines

The mill is only partially enclosed for this climate. The equipment was all new of standard types except the Allis Chalmers jaw crusher, the ball mill and crushing plant motors, the Atlas Imperial Mill Engine and Generator and the Mine Compressor. Machinery is set well on good concrete foundations and so far shows no signs of settling. The excavation was all in dirt by bulldozer as no rock was found on the mill site.

A typical month this summer is shown on attached sheet and mill production from start to date.

The gold is very fine and associated with the pyrite it cyanides well. The free gold which will amalgamate is too small to bother with. Combination of amalgamation and flotation gives good results on high grade ores in this district where the contents are 0.5 oz. and larger but very poor results on ores containing 0.1 to 0.4 oz. gold. There is about one ounce of silver to 13 ounces of gold in the ore.

MINE EQUIPMENT, ETC.

The general mine openings and the extent is quite well shown in the attached mine maps.

The Kansas Crosscut tunnel is in solid grano diorite which stands well. It is a good haulage level and would serve for a large tonnage with heavier rail. The present track is about lb. well laid, straight, and tunnel is to grade.

The Kansas Raise was originally a two-compartment raise. One for ore and one for timber slide ladders and pipe. The enlargement of this raise to a three compartment raise giving one compartment for waste is practically completed.

The main Mine Compressor is a 15 x 9½ x 12 Ingersoll Rand Type XRB, short belt drive rated at 675 cu. ft. This is driven by a new Fairbanks Morse Diesel 2 cyl. 12"x 15" rated at 120 HP. Compressor was a used compressor but in good shape and has given good service. The small compressor is also piped to furnish mine air if main compressor is down.

There are about eight 20 cubic foor ore cars. Air is transmitted with new large pipe to the mine thru the Kansas Tunnel and Raise. The mine has three stopers, two drifters and one jack hammer, two tugger hoists and one converted steam hoist used in the Kansas Raise. Jack Hammer bits are used.

CAMP:

The camp has a main house (old) which has dining room, cook's room, storage for meat and supplies, kitchen, etc. There are two guest rooms, shower and bath.

Superintendent or manager's house - two rooms with bath.

There is an old house used by the head Diesel engineer's family for several years. A small house was put up for the mill superintendent this year, and a small house for the women chief cook and office girl. There are five four-room new bunk houses all connected by covered way to change house with hot water, showers, etc. One warehouse, one mine office and assay office.

Assay office is fitted with new equipment, electric crusher, grinders, etc. Also modern pressure filter in the mill for soluble losses and determining dissolution rates at various stages. Also full equipment for various mill solution determinations, gold tests, etc., both mill and assay office. Standard screen scales, etc.

SUPPLIES:

Grants Pass has excellent wholesale and supply houses. Lumber and mill timber come from the saw mill at Glendale or smaller saw mills in vicinity. Diesel oil is delivered by Standard Oil or other companies by truck. The oil storage is good for about four months and should probably be slightly increased.

LABOR:

The labor conditions are good but it is not worth while going into. A larger operation might change the labor conditions considerably. A small crew of about 25 in a remote district like this is not subject to the influences found in larger camps near other mines.

PERSONNEL AND OWNERSHIP:

Personnel of owners and operators is not generally listed in the information for a mining report, however it often has a bearing.

The Lewis Investment Company is the incorporated Estate of Allen Lewis. Allen Lewis established his business in 1851 in

Portland. It became the best known wholesale house in the northwest, and not only sold but purchased wool and various products which were sent to them for sale and shipment; as times changed it became a wholesale grocery, manufacturing some lines. About 1928 they and another old house, the Ehrmans, joined and formed the General Grocery Co. and started a line of their own chain stores. Ehrmans finally purchased their interest along about 1931. There are eight heirs or shares, some represented by Allen Lewis' children and some are divided among grand children, so there are more than eight persons. One of them is a director of the First National Bank, another is Manager of two well known logging companies, and Mr. Hunt Lewis, together with Mason Bingham, look after the Estate affairs. The Estate owns the Lewis Building in Portland several pieces of downtown business property, docks, investments and bonds. The Benton mine has been owned by the Estate and several other pieces of ming property for a matter of 30 years.

Mr. Albert Burch has been consulting Engineer, making a regular monthly visit since the start of the Kansas tunnel and oftener if required. Mr. Burch is so well known it is not necessary to add anything.

Mr. Earl Greenough drove the Kansas Crosscut tunnel. He is a graduate mining engineer and a cousin of the Coeur d'Alene Greenoughs, original owners of the Morning mine.

Mr. Ed. Stenger has been in charge since the spring of 1937. He is a graduate mining engineer of Berkeley with extra work in geology. He has worked for Mountain Copper, U. S. Smelt and Ref. Co., Russio Asiatic, Ltd. and is about 50 years old.

The mine has not lacked for funds nor for competent direction, and there are no alibis nor old tales. It has been a straight mining operation conducted with about the usual amount of skill and luck that have made any of the present operating mines.

It is a question, certainly not fully answered at this date, as to what its future character will be. There is some reason to believe it may turn into a large operation requiring the mining and milling of 300 to 500 tons a day of $6.00 ore. It may also develop that selective mining of better portions at the rate of 50-75 tons will be the best operation.

If it should develop into a large mine, it would not be proper for the Lewis Estate to invest such a large proportion of their capital in mining. They, of course, wish to retain their capital already invested in the mine and see the matter through.

The camp can only take care of a crew of around 25 men during the winter. Their wisest course is to operate the mill and to carry on development work slowly, the mill furnishing the funds.

The development work should be carried on at about twice its present rate which would require shutting down the mill and devoting the whole camp capacity and resources to development.

The Georgia vein which is cut by the Kansas Crosscut and parallels the Benton vein needs work done upon it. Some work has been done but it warrants some exploratory work.

The zone east of the Benton vein some 500 feet to the contact with the schist should be explored with a diamond drill at several places over a length of 1500 feet or more. Ore has been found in this district both on the contact and within the schist as well as within the diorite.

The ore zone both north and south of the Kansas raise on the No. 2 level needs more development work.

The general trend of the ore zone and the results from a few rounds require some work south on the Kansas level in the vicinity of the Benton vein.

The claims south show upon sampling some of the best assays obtained on the property, particularly near an old shaft and arastra down Whiskey Creek about a quarter of a mile below the mill.

GENERAL:

A close mining examination with a several hundred samples would not be warranted at the present time. The Lewis Estate would prefer to operate under the present program until next spring to develop the situation further.

However, an examination by a mining geologist with a careful study would be worth while.

The mine information, reports, mill reports, etc. can be taken as reliable as far as they go.

As far as available, gold mines go which have been on the market the last four years, if they have any tonnage they are tied up in some way. If the title is good, those with large ore reserves blocked on four sides have been equipped and are, or have, finished operating.

It is almost necessary to take a chance on good geology and general conditions and develop a gold mine to get one. A mining report is of not much service as where it's a matter of geology and development and future possibilities examining engineers' opinions are more or less direct expressions of their own characters which are various.

This is a letter written in report form. Some of the statements are based upon personal observations, and knowledge some is compiled from the office of the Lewis Investment Co. some is from talks with Albert Burch and Ed. Stenger, but have not quoted their opinions or any one elses direct. The opinions are my own. I am not as thoroghly acquainted with the mine as Mr. Burch or Mr. Stenger but I have been through the mine on numerous occasions and have dug into a number of matters upon which I have made statements, and have seen certain things and have agreed or disagreed from what I saw.

I am thoroughly familiar with the milling end, as I designed the mill, made several trips during construction of it, located its position, and have been down since operation and made several changes after operation. The daily mill reports were laid out by me and started and the mill routine and collection of information and there is a full record complete of the milling operations.

Like all metallurgists I have kept one eye on the mine and the other on the mill and have kicked about the feed and cleanliness of mining. I have no connection with the operation at the present time other than the fact of having built the mill I am naturally interested in it. I have of course had access to any information available at the mine or office here.

Yours very truly,

F. R. Hines.

LEWIS INVESTMENT CO. - BENTON MINE

August 1 to August, 30 1938

Ball Mill hours 727	97.8%	elapsed time
Tons milled 1035	33.4	tons per day

Average Mill Heads Assay	$10.48	→ Computed head based on Bullion $11.97
" Assay Total Tails	1.029	
" " Sand "	0.987	
" " Soluble loss	0.042	

Gold Recoverdd (heads minas tail $9.45 90.2%

Gold Solution Precipitated - tons 3548 (3.42 tons per ton of ore
(0.082 oz. per ton solution
($2.87 per ton of solution

Gold precipitated - ounces 291.4 ..... $10,199.00

Classifier overflow	+ 100#	0.9%
	+ 200#	29.1%
	- 200#	70.0%

Classifier overflow - % solids	16.8%	
Tails % solids	55.5%	

Sodium Cyanide used lbs	1085	1.05#	per ton
Lime " "	8200	7.9	" "
Zinc " "	122	0.12	" "
Lead Nitrate " "	30	0.029	" "
Balls Charges	3500	3.88#	" "
Fuel Oil used - gals	368		
Tons waste sorted out.....	209	20.2%	
Mill Labor cost	$1361.92	1.32	per ton

	Mill Solution	#5 Thickener
KCM (equivalent) lb per ton solution	1.63	0.69
Free Lime " " " "	1.91	1.09

THE BENTON MINE

Glendale, Oregon.

of the

LEWIS INVESTMENT COMPANY,

Lewis Building,

Portland, Oregon.

Report by P.R. Hines,

668 N. Tillamook Street,

Portland, Oregon.

Nov. 26, 1938.