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DEPARTMENT OF COMMERCE

UNITED STATES BUREAU OF MINES
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INFORMATION CIRCULAR

MILLING METHODS AT THE CONCENTRATOR OF THE WALKER MINING CO., WALKERMINE, CALIFORNIA

BY

M. R. MCKENZIE AND H. K. LANCASTER

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MILLING METHODS AT THE CONCENTRATOR OF THE WALKER MINING CO., WALKERMINE, CALIF.[1]

By M. R. McKenzie[2] and H. K. Lancaster[3]

INTRODUCTION

This paper describing the milling methods at the Walkermine concentrator, Plumas County, Calif., is one of a series being prepared by the United States Bureau of Mines on milling methods and costs in the various mining districts throughout the United States.

ACKNOWLEDGMENT

The authors wish to acknowledge their indebtedness to James O. Elton, manager of the International Smelting Co., and to Henry A. Geisendorfer, manager of the Walker Mining Co., for permission to present this paper; to H. A. Geisendorfer and J. D. Roberts, shift boss, for historical facts, and to D. D. MacLellan, geologist, for geological information.

LOCATION

The Walker mine and mill are located at Walkermine, Plumas County, in the northeastern part of California and at an elevation of 6,200 feet in the Sierra Nevada. Walkermine is about 27 miles northeast of Portola, a division point on the Western Pacific Railroad which is about 60 miles west of Reno, Nev.

Weather conditions and heavy snowfall usually make the road between Portola and Walkermine impassable during the winter and early spring months. During this period, transportation of passengers and supplies is conducted over an aerial tramway 9 miles long the terminal of which terminal is located at Spring Garden, Calif. Construction of this tramway, which was built chiefly for the shipment of concentrates, was completed in October, 1920.

GEOLOGY

The geology of the Walker mine deposit is described in detail by J. S. Diller in U. S. Geological Survey Bulletin 353, 1908, Geology of the Taylorsville Region, Calif.

In brief, the orebodies occur along a shear zone which cuts through a highly garnetiferous schist, known locally as the Robinson schist. The ore shoots, which are composed of chalcopyrite in quartz and silicified schist, are not connected and may be regarded as individual deposits. They range from 300 to 2,000 feet in length and from 5 to 100 feet in width.

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1 The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6555."

2 One of the consulting engineers, U. S. Bureau of Mines, and mill superintendent, Walkermine concentrator.

3 One of the consulting engineers, U. S. Bureau of Mines, and assistant mill superintendent, Walkermine concentrator.

ORE TREATED

The Walker ore has complex mineralogical associations but may be classified as a gold and silver bearing chalcopyrite-magnetite-quartz ore. Recent examination of the ore by R. E. Head, chief microscopist of the United States Bureau of Mines, showed the approximate percentages of mineral constitutents to be as follows:

	Per cent
Quartz	75.0
Garnet	5.0
Chlorite	2.5
Other nonopaque minerals	5.0
Metallic minerals	12.5
Total	100.0

The metallic minerals, which as stated amount to 12.5 per cent of the ore, are distributed as follows:

	Per cent, by weight	
Magnetite	59.76	
Pyrite	7.80	
Pyrrhotite	1.94	
Minor metallic gangue minerals	1.10	
Total metallic gangue minerals		70.60
Chalcopyrite	24.17	
Chalcocite	1.60	
Minor copper bearing minerals	2.55	
Noncopper-bearing minerals	1.08	
Total metallic ore minerals		29.40
All metallic minerals		100.00

The ore is very resistant to crushing and fine grinding. During the spring months considerable difficulty is encountered in crushing operations due to the moisture content in the ore.

The tabulation which follows presents a chemical analysis of typical mill heads averaged for a 6-month period.

Typical analysis of mill heads

Per cent					Ounces per ton	
Copper	Iron	Sulphur	Lime	Insoluble	Gold	Silver
1.687	9.0	2.1	1.1	79.2	0.05	0.833

HISTORY

Milling operations began in June, 1916, with the completion of a 75-ton capacity pilot plant, which was erected at a distance of 4,700 feet from the shaft and at a much lower elevation. Transportation of the ore from the mine to the mill was accomplished by an aerial tramway.

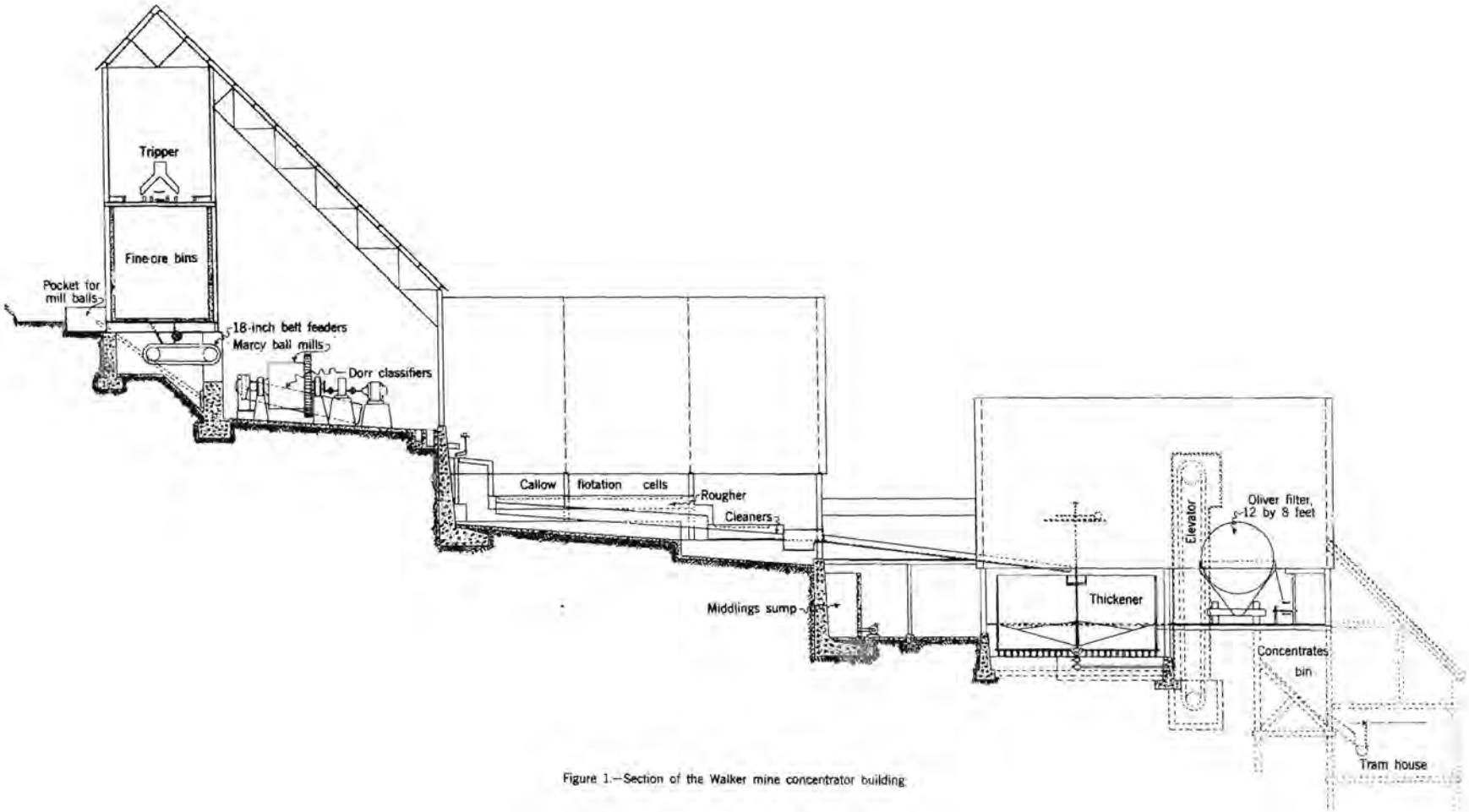


Figure 1.—Section of the Walker mine concentrator building.

The treatment of ore in this pilot plant may be briefly summarized as follows:

(a) The mine ore was crushed to 2-inch size by Joshua Hendy crushers, one 12 by 24 inch and one 9 by 15 inch.

(b) The crusher product was ground to 4 per cent plus 48-mesh in two No. 64½ Marcy ball mills, each operated in closed circuit with a 4-foot 6-inch by 15-foot 9-inch Dorr classifier.

(c) The classifier overflow pulp, which contained 42 per cent of solids, was elevated a distance of about 60 feet to the flotation division, comprised entirely of sloping bottom Callow cells.

(d) The flotation concentrates were partially dewatered by two Callow cones, further thickened in a Dorr thickener and filtered by one 6 by 8 foot Oliver filter.

(e) The tailings were discharged into a canyon and no attempt was made to recover water except that contained in the concentrates thickener overflow.

Power was furnished locally by a steam plant of 350-hp. capacity until 1917 when electric power was made available by the completion of a power transmission line 14 miles long by the Great Western Power Co.

Reagents used in the pilot mill were lime, coal tar, and pine oil. Coal tar was replaced by thiocarbanilide in 1922.

During the operation of the pilot plant the International Smelting Co. acquired an interest in the property and, in addition to securing electrical power previously mentioned, drove a working tunnel 1 mile long for the purpose of developing the mine 1,000 feet vertically below the outcrop. This tunnel was also connected with the upper workings and since 1922 has served for transporting mine ore to the mill, the aerial tramway formerly used for this purpose being abandoned.

In 1922 the size of ball-mill feed was reduced from 2 inches to 1 inch by the installation of rolls. At this time the mill capacity was increased to about 300 tons of ore per day.

A larger mine production necessitated the building of a new mill of 750-ton capacity, which was completed and started to operate in December, 1923.

GENERAL DESCRIPTION OF PRESENT MILL

The present mill is built on a hillside a short distance from the portal of the main working tunnel. The location selected was well suited to standard mill construction and provided reasonable fall for gravity flow of pulp through the mill and down the valley to the tailings pond. The mill buildings are of steel and concrete with sides and roofs made of Anaconda corrugated zinc.

A typical longitudinal section of the concentrator building is presented in Figure 1.

The coarse and intermediate crushing plants are located in separate buildings at one side of the mill proper. The mill proper includes four sections. Each section is equipped with a Marcy ball mill which operates in closed circuit with a Dorr classifier; these are followed by rougher, cleaner, and scavenger Callow flotation units. A thickening and filtering unit handles the combined flotation concentrates from the four mill sections.

On account of the isolation of the mine and mill, it is necessary to maintain well-equipped machine, electrical, blacksmith, and carpenter shops. These shops can meet almost any emergency, which insures continuity of operations.

Capacity

The mill as first designed, with three No. 75 Marcy ball mills and three flotation sections, was operated for some time at the rate of 750 tons of ore per day. Grinding during

this period was maintained at 4 per cent plus 48-mesh size. The mill capacity was later increased to 1,200 tons per day by changing the degree of grinding previous to flotation treatment from 4 to 14 per cent plus 48-mesh size. It might be interesting to note that the small sacrifice in recovery entailed by coarser grinding was more than offset by the lower cost of milling which resulted from the larger tonnage treated.

In September, 1929, the capacity was further increased from 1,200 to 1,700 tons per day by the installation of a fourth mill section. This latter section is identical with the three original sections except that the grinding unit is larger and comprises a No. 77 Marcy ball mill followed by a suitable classifier; the larger grinding mill accounts for the additional 100-ton ore capacity of this section.

Water Supply

Fresh water is obtained from springs and from the mine. The spring-water supply amounts to approximately 100 gallons per minute but this water is only available for mill use after camp requirements are satisfied. Water is pumped from the mine at the rate of about 300 gallons per minute, and this source provides the chief new water supply for the mill. The only water reclaimed from milling operations is that from the concentrates dewatering division. This amounts to approximately 60 gallons per minute and is returned to the supply tank located above the mill, where it is mixed with the fresh water.

Power

The Pacific Gas and Electric Co. furnishes power to the mine and mill transformers from Caribou through its Veramont substation at 22,000 volts. Motors of 100 hp. or larger are operated at 2,200 volts and smaller motors at 440 volts. A 110-volt circuit is used for lighting.

PRESENT METHOD OF CONCENTRATING

A flow sheet of the crushing plant and concentrator with a legend which gives details of machines used is presented in Figure 2.

Coarse Crushing

Longitudinal sections of the coarse and intermediate crushing units are given in Figure 3.

Ore is hauled from the mine to the crushing plant during three shifts. Ore trains which comprise eleven 3¼-ton capacity side dumping cars are drawn by 35-hp. Baldwin-Westinghouse electric locomotives. The ore is dumped onto a sloping steel rail grizzly having 11-inch spaces and after passing through the grizzly falls into a 1,500-ton capacity, cylindrical, steel receiving bin.

Ore is drawn from this bin by a motor-driven, 42-inch, Anaconda-type pan conveyor which discharges onto an inclined grizzly having 1½-inch spaces. The oversize is fed to a Traylor crusher set at 3½ inches. The crusher is 15 by 24 inch size, is driven by belt from a 150-hp. motor and will handle 85 tons of material per hour.

The grizzly undersize drops directly onto an inclined 20-inch conveyor belt and provides a cushioning layer for the crusher product which drops onto the same belt. This belt is driven by a 15-hp. motor and delivers the ore to the intermediate crushing unit passing under an electromagnet enroute for the removal of tramp iron. A picker is stationed at this conveyor for the removal of wood.

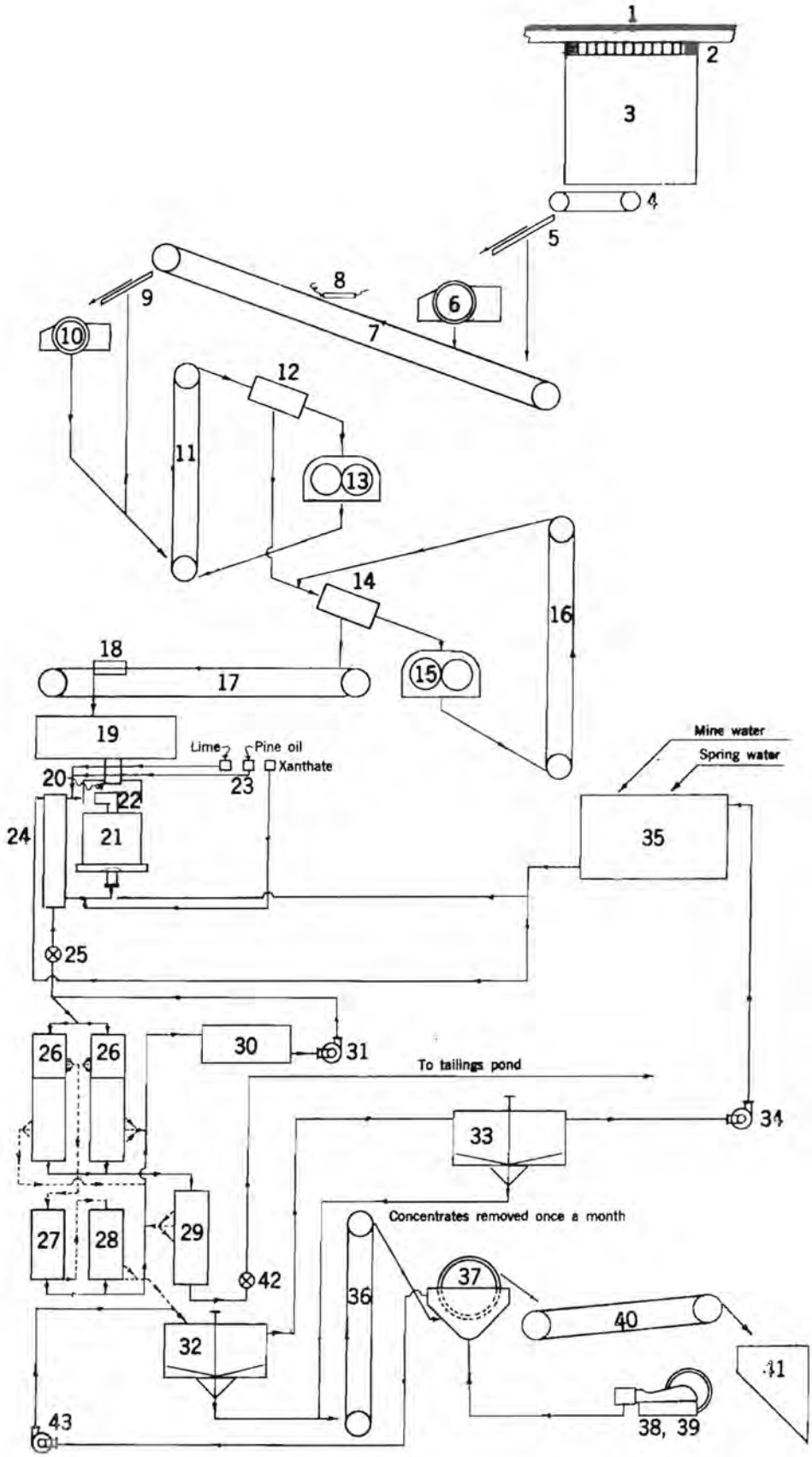


Figure 2.– Flow sheet of crushing plant and concentrator

Legend for flowsheet of crushing plant and concentrator

Number[1]	Description of machines
1	Track from mine.
2	One grizzly, 11-inch spaces.
3	Ore bin, 1,500-ton capacity.
4	One pan conveyor, 42-inch.
5	One grizzly, 1½-inch spaces.
6	One Traylor jaw crusher, 15 by 24 inch.
7	Belt conveyor, 20-inch.
8	Electromagnet.
9	One grizzly, 1¼-inch spaces.
10	Two Anaconda jaw crushers, 8 by 20 inch.
11	One bucket elevator, 16-inch.
12	One trommel screen, 1¾-inch holes.
13	One set Anaconda rolls, 24 by 55 inch, set at 1-inch.
14	Two trommel screens, 1-inch holes.
15	One set Anaconda rolls, 24 by 55 inch, set at ⅜ inch.
16	One bucket elevator, 16-inch.
17	One belt conveyor, 20-inch.
18	One tripper conveyor.
19	Fine-ore bin, 2,400-ton capacity.
20	Four feed conveyor belts, 18-inch.
21	Four Marcy ball mills, three No. 75 and one No. 77.
22	Four scoop boxes.
23	Reagent feeders.
24	Four Dorr duplex classifiers, three 6 feet by 18 feet 4 inches and one 6 feet by 23 feet 4 inches.
25	One Galigher sampler for heads.
26	Eight Callow rougher flotation machines, two 3-foot 11-pan units per mill section.
27	Four primary Callow cleaner machines, one 3-foot 4-pan unit per mill section.
28	Four secondary Callow cleaner machines, one 18-inch hoppered-type unit per mill section.
29	Two Callow scavenger machines, 3-foot 7-pan units.
30	One middlings sump, tank capacity 2,000 gallons.
31	Three Krogh pumps, 3-inch.
32	Two Dorr concentrates thickeners, 12 by 25 foot.
33	One Dorr thickener, 11 feet 4½ inches by 46 feet.
34	One centrifugal pump, 3-inch.
35	Water storage tank, capacity 100,000 gallons.
36	One bucket elevator, 16-inch.
37	One Oliver filter, 12 by 8 foot.
38	One Oliver vacuum pump, 14 by 8-inch.
39	One Oliver compressor, 9½ by 8 inch.
40	One belt conveyor, 18-inch.
41	Concentrates storage bin, 290-ton capacity.
42	One Galigher automatic sampler for tailings.
43	One centrifugal pump, 1½-inch.

1 Refer to numbers of Figure 2.

Intermediate Crushing

Ore from the coarse-crushing unit is delivered onto an inclined grizzly having 1¼-inch spaces. The grizzly oversize is fed to two 8 by 20 inch Anaconda-type jaw crushers. The grizzly undersize joins the crushed material and the combined products are fed by a bucket elevator to one 40 by 72 inch trommel screen having 1¾-inch diameter round holes. The elevator is driven by a 20-hp. motor and is equipped with buckets 16 by 8 inches in size. The trommel operates in closed circuit with a pair of 55 by 24 inch Anaconda rolls set with a 1-inch spacing; the rolls product returns to the elevator which feeds the trommel. The trommel undersize is distributed to two 40 by 72 inch trommels having 1-inch round holes. These trommels operate in closed circuit with one pair of 55 by 24 inch Anaconda rolls, set at ⅝ inch, the rolls product being returned to the trommels by a 16-inch bucket elevator.

The trommel undersize product, minus 1-inch size, comprises the feed to the grinding units and is conveyed to the 2,400-ton capacity fine-ore bin by a 20-inch belt equipped with a tripper.

The coarse rolls are driven by a 100-hp. motor, the two Anaconda crushers and the fine rolls by a 150-hp. motor, and the three trommels by a 10-hp. motor.

Grinding and Classifying

As previously indicated the concentrator is divided into four units for grinding and flotation operations. The three original grinding units are each equipped with one No. 75 Marcy ball mill which operates in closed circuit with a Dorr duplex classifier 6 feet by 18 feet 4 inches in size. The fourth unit was, as previously mentioned added to increase the capacity of the original mill and is equipped with one No. 77 Marcy ball mill which operates in closed circuit with a Dorr Duplex classifier 6 feet by 23 feet 4 inches in size.

Each No. 75 Marcy mill is driven at a speed of 24 r.p.m. by a 200-hp., 900 r.p.m., induction motor through a Falk herringbone-gear speed reducer. The No. 77 mill is also driven at a speed of 24 r.p.m. by a 200-hp., 900 r p.m., synchronous motor through a Westinghouse-Nuttal speed reducer.

Ball charges carried in the Nos. 75 and 77 mills weigh 9 and 13 tons, respectively, and are maintained by the daily addition of 4-inch forged steel balls. Ball consumption is 2.074 pounds per ton of ore ground.

Shell and feed end liners are of manganese steel, the shell liners being of the shiplap type. Grate sections are of rolled chrome steel and have ¼-inch openings. The tabulation which follows gives the life of liner parts and the consumption of liners per ton of ore ground.

Life of liner parts and consumption of liners per ton of ore ground

	Life of liner, hours	Liner consumption, pounds per ton of ore
Shell liners	3,200	0.273
Feed end liners	4,300	0.176
Grate bars	4,200	0.176
Total		0.563

The classifiers used with the No. 75 grinding mills are set at a slope of 3½ inches to the foot and are operated at a speed of 27 strokes per minute by 5-hp. motors. The classifier which serves the No. 77 mill is set at a slope of 3 inches per foot and is operated at a speed of 25 strokes per minute by a 5-hp. motor.

Ore from the fine-ore bins is delivered to the center of each drum and scoop type ball-mill feeder by an 18-inch conveyor belt. Each No. 75 mill receives feed at the rate of 16⅔ tons per hour and the No. 77 mill at the rate of 23½ tons per hour. The grinding mills operate with an average circulating load of 145 per cent and with pulps containing from 77 to 78 per cent of solids.

The degree of grinding is maintained at 12 per cent plus 48-mesh; classifier overflow pulps contain from 46 to 50 per cent of solids.

Table 1, page 9 presents screen analyses of ball-mill feed and of intermediate and final grinding-circuit products.

Flotation

For simplicity of control and metallurgical accounting the classifier overflow pulps of the four grinding sections are combined, sampled and then distributed equally to four flotation units. The equipment of each flotation section comprises two 3-foot, 11-pan, standard Callow rougher machines, one 3-foot, 4-pan, standard primary Callow cleaner, and one 18-inch, hoppered-type, secondary Callow cleaner.

The two rougher machines operate in parallel; rougher concentrates are removed from the first three pans and middlings froths from the remaining eight pans. The rougher concentrates, which have an average content of 15 per cent of copper, are cleaned in two stages, the final stage producing finished concentrates. The middlings froths of the rougher machines join the tailings of the two cleaner cells and flow by gravity to a common pump sump, and from there are returned to the head of the rougher cells by three 3-inch Krogh sand pumps, each of which is driven by a 15-hp. motor.

The tailings from the rougher cells of the four flotation sections are combined and distributed to two 3-foot, 7-pan, Callow scavenger units which produce middlings froths and final waste tailings. The middlings froths join the middlings of the rougher and cleaner units in the common sump and are returned to the heads of the roughers.

Cell blankets of 4-ply, quilted, 18-ounce canvas are used and have a life of from 60 to 90 days.

Air for flotation operations is furnished at 4.15 pounds per square inch pressure by two No. 6½ Roots bloweres and one Connersville blower. The Roots blowers are each link-belt driven at a speed of 172 r.p.m. by a 150-hp. motor. The Connersville blower is also link-belt driven at a speed of 240 r.p.m. by a 75-hp. motor.

The reagents used in flotation comprise lime, potassium ethyl xanthate (Z-3), and steam-distilled pine oil. Sodium aerofloat was used for a short period, but recently its use has been discontinued.

Dry hydrated lime is fed to the ball mills from small hoppered feeders at the rate of 1.2 to 1.6 pounds per ton of ore milled. These amounts produce a protective alkalinity of about 1.09 pounds of CaO per ton of mill water which is sufficient to insure the desired metallurgical results. Operators are required to make hourly titrations for protective alkalinity and to make immediately any changes in the rate of adding lime as indicated by these titrations.

Xanthate is added as a 25 per cent solution to the classifier overflow pulps by a scraper feeder at the rate of 0.18 pound per ton of ore treated.

Steam-distilled pine oil is added to the ball mills by a scraper feeder at the rate of 0.16 to 0.22 pound per ton of ore. A rather large amount of this reagent is necessary on account of the coarseness of the flotation feed and also due to the fact that flotation operations are conducted in a circuit which is essentially a fresh-water circuit.

DEWATERING AND HANDLING OF CONCENTRATES

The concentrates pulps which contain from 20 to 25 per cent of solids, flow by gravity to two 25 by 12 foot Dorr thickeners. The thickened pulps containing 75 per cent of solids are delivered to one 8 by 12 foot Oliver drum-type filter by a 16-inch bucket elevator. The filter is chain driven by a 3-hp. motor. The concentrates produced are handled by operating the filter on two of the three daily shifts, one operator being required on each shift.

A vacuum amounting to 22 inches of mercury is maintained at the filter by one 14 by 8 inch Oliver vacuum pump which is driven by belt from a 15-hp. motor. Blowing air is furnished at 5 pounds pressure by a 9½ by 8 inch Oliver compressor, driven by belt from a 15-hp. motor. The filtrate is handled by a 1½-inch centrifugal pump in place of the usual barometric leg. A filter cover gives approximately six months of service before replacement is necessary.

The overflows from the two Dorr thickeners are conveyed to a spare 45 by 12 foot thickener, where a small additional recovery of fine concentrates is made. These concentrates are allowed to accumulate and are dewatered in the filter about once each month.

The filter cake, which averages ¼ to ½ inch in thickness and which contains from 8 to 10 per cent of moisture, is discharged onto a 14-inch conveyor belt and delivered by this belt to a 290-ton capacity storage bin. The concentrates are loaded from this storage bin into 800-pound capacity tramway buckets; the latter are trammed to Spring Garden where the concentrates are dumped into railroad cars for shipment to the Tooele plant of the International Smelting Co.

The tramway is of the double rope type and is 9 miles long. The loaded side is equipped with 1½-inch locked-coil track cable and the light side with 1-inch cable of the same construction. The buckets are equipped with automatic grips which engage a ¾-inch Lang Lay traction rope which is driven by a 50-hp. motor.

Labor employed on the tramway includes 1 foreman, 3 loaders, 3 unloaders, 2 line riders, and 1 agent, who is located at Spring Garden.

Since the completion of the aerial tramway in 1922, it has been an important factor in plant operation as it is the only means of transporting passengers, mine and mill supplies and camp provisions during the months of heavy snowfall.

DISPOSAL OF TAILINGS

The tailings of the scavenger flotation cells contain from 33 to 36 per cent of solids and are conveyed by a wooden launder for a distance of about ¾ mile to a large impounding pond. Proper precautions are taken to prevent tailings from entering near-by streams.

MILL SAMPLING

Samples of the heads as represented by the combined classifier overflow pulps, the concentrates, and the final tailings are taken during each shift by Galigher automatic samplers. The samples are dewatered in a small pressure filter and after being dried are split to convenient-size assay pulps.

An analysis for copper content is made on each shift sample for mill guidance and control. A composite sample is made from shift samples for metallurgical accounting. These composite samples are assayed for copper, gold, silver, and insoluble contents.

Cars of concentrates are sampled by pipe samplers at Spring Garden before being shipped to the smelter.

METALLURGICAL AND OPERATING DATA

Screen analyses of concentrator intermediate and final products are presented in Table 1. Table 2 gives chemical analyses of mill heads, final concentrates, and tailings; and Table 3 shows the percentage distributions of copper, silver, gold, iron, and insoluble in final concentrates and tailings. Metallurgical data for the period June to November, 1930, are presented in Table 4, and the distribution of labor is shown in Table 5.

Table 1.- Screen analyses of concentrates intermediate and final products

Screen size	Weight, per cent									
	No. 75 Marcy mill units				No.77 Marcy mill unit			Flotation products		
	Ball-mill feed	Ball-mill discharge	Classifier sands	Classifier overflow	Ball-mill discharge	Classifier sands	Classifier overflow	Concentrates	Middlings	Tailings
Plus 1-inch	5.4	-	-	-	-	-	-	-	-	-
Plus ½-inch	41.3	-	1.4	-	-	0.9	-	-	-	-
Plus 4-mesh	23.0	2.6	8.1	-	1.2	4.7	-	-	-	-
Plus 8-mesh	9.5	4.7	8.5	-	2.5	6.0	-	-	-	-
Plus 30-mesh	9.0	30.0	43.5	2.5	23.8	46.5	2.2	-	-	3.2
Plus 48-mesh	1.8	14.0	14.8	11.2	14.3	15.4	10.5	4.8	3.0	15.7
Plus 65-mesh	2.9	8.1	6.4	22.4	11.4	8.4	14.6	6.8	1.5	5.5
Plus 100-mesh	0.5	6.8	3.3	2.5	7.0	3.3	6.2	18.1	4.5	13.8
Plus 150-mesh	2.4	6.0	3.8	15.5	10.5	4.2	9.0	14.5	4.4	10.0
Plus 200-mesh	2.9	6.1	3.7	2.3	6.5	3.3	12.2	6.8	6.0	10.7
Minus 200-mesh	1.3	21.7	6.5	43.6	22.8	7.3	45.3	49.0	80.6	41.1
Totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 2.- Chemical analyses of mill products, June to November, 1930

	Weight, per cent	Analyses				
		Copper, per cent	Silver, ounces per ton	Gold, ounces per ton	Insoluble, per cent	Iron, per cent
Heads	100.0	1.687	0.833	0.05	79.0	9.0
Concentrates	6.41	24.00	9.920	0.49	14.5	22.1
Tailings	93.59	0.163	0.200	0.02	83.5	8.1

Table 3.- Mill recoveries and losses, June to November, 1930

	Weight, per cent	Distributions, per cent				
		Copper	Silver	Gold	Insoluble	Iron
Concentrates	6.41	91.2	73.3	62.7	1.2	15.8
Tailings	93.59	8.8	23.7	37.3	98.8	84.2

Table 4.- Metallurgical data, June to November, 1930

Ore treated, total	tons	268,255
Days operated	number	169.67
Operating time per day	hours	24
Amount of ore treated per 24 hours, average	tons	1,580.62
Ore treated per man-shift per 24 hours, average	do	38.51
Sections operated, average	number	3.84
Ore treated per section per 24 hours, average:		
No. 75 Marcy mill units	tons	400
No. 77 Marcy mill unit	do	500
Concentrates produced, total	do	17,290.54
Copper produced, total	pounds	84,027,948
Concentrates produced per 24 hours, average	tons	101.90
Recoveries:		
Copper	per cent	91.21
Silver	do	76.32
Gold	do	62.73
Ratio of concentration	tons into 1	15.57
Pressure of flotation air, per square inch	pounds	4.15
Alkalinity of mill water, CaO per ton of water	do	1.09
Plus 48-mesh material in flotation tailings	per cent	11.10
Consumptions of water, reagents and supplies per ton of ore milled:		
Net water used	gallons	325 to 350
Lime	pounds	1.40
Pine oil	do	0.321
Potassium ethyl xanthate (Z-3)	do	0.084
Sodium aerofloat (use discontinued)	do	0.075
Balls	do	2.074
Liners	do	0.563

Table 5.- Distribution of labor

	Number per 24 hours
Mill superintendence:	
Mill superintendent	1
Shift foremen	3
Coarse and intermediate crushing departments:	
Crusher operators	2
Crusher helpers	2
Rolls	2
Screens	2
Electromagnet	2
Grinding and flotation departments:	
Ball mills	3
Flotation operators	3
Flotation helpers	3
Filter department:	
Operators	2
Repair and shop crews:	
One repair foreman and 20 men	21

Distribution of electric power, May, 1931

Department	Kilowatt-hours	Per cent
Primary crushing	42,804	7.22
Secondary crushing	42,804	7.23
Grinding	348,631	58.83
Flotation	149,765	25.27
Filtration	8,561	1.45
Totals	592,565	100.00

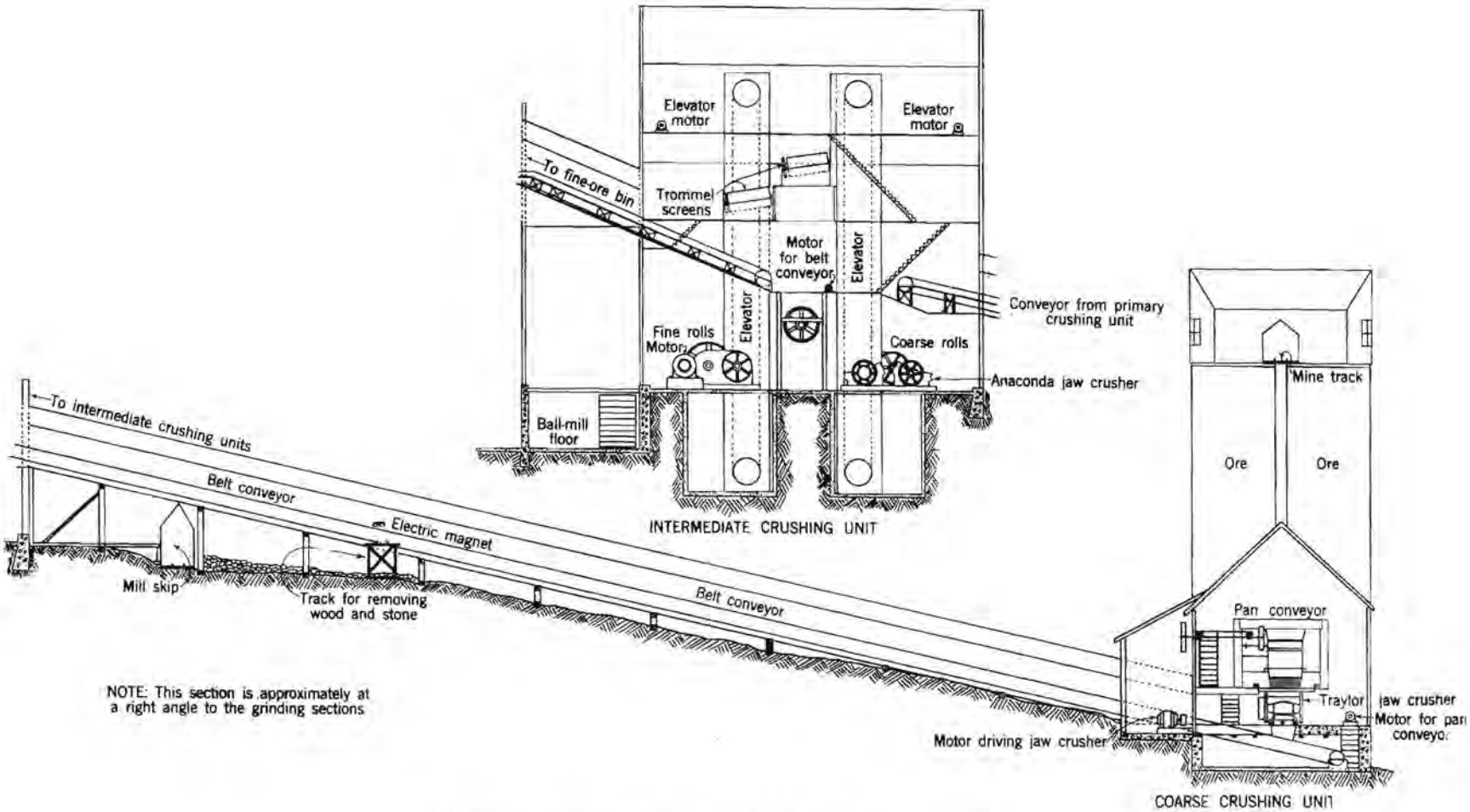


Figure 3.—Longitudinal sections of the coarse and intermediate crushing units

Acid Mine Drainage on Public and Private Lands, The Walker Mine Experience Plumas County, California

William A. Croyle and Steve E. Rosenbaum

California Regional Water Quality Control Board, Central Valley Region

Walker Mine, Plumas County

Location Map(s)

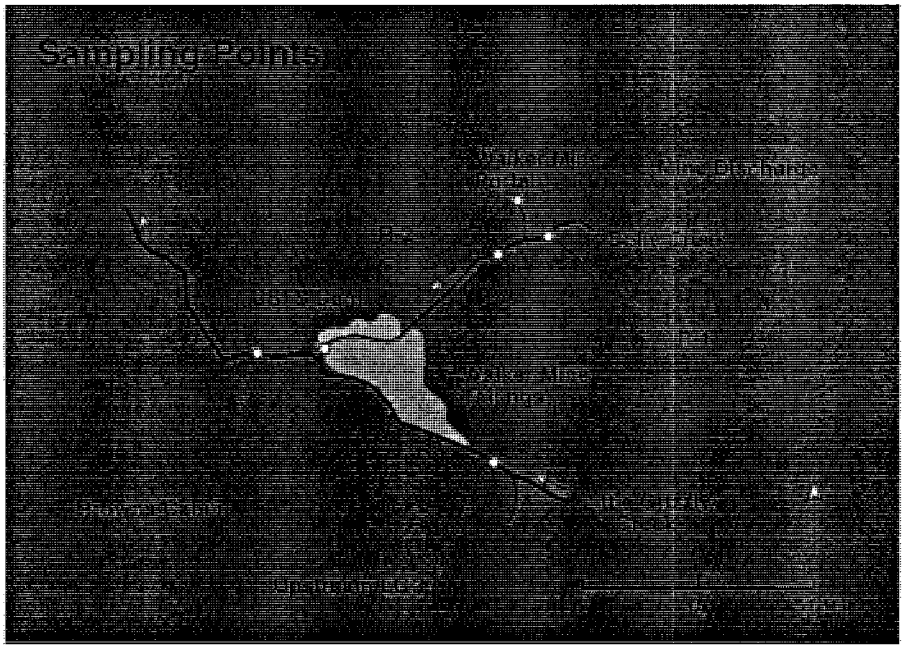
- **Location Map**
  - Show Northern Sierras, Tahoe , Reno, Quincy, Portola, Mt. Engels?
- **Little Grizzly & Ward Creek watersheds, Indian Ck**
- **Site map**
  - layout of mine, portal, workings, sinkholes
  - tailings, Dolly Ck & FS Dam, LGC, Brown's Cabin
- **use 2 or 3 maps if needed**
- **See Notes for topics to discuss with maps**

Walker Mine, Plumas County

Public & Private Lands

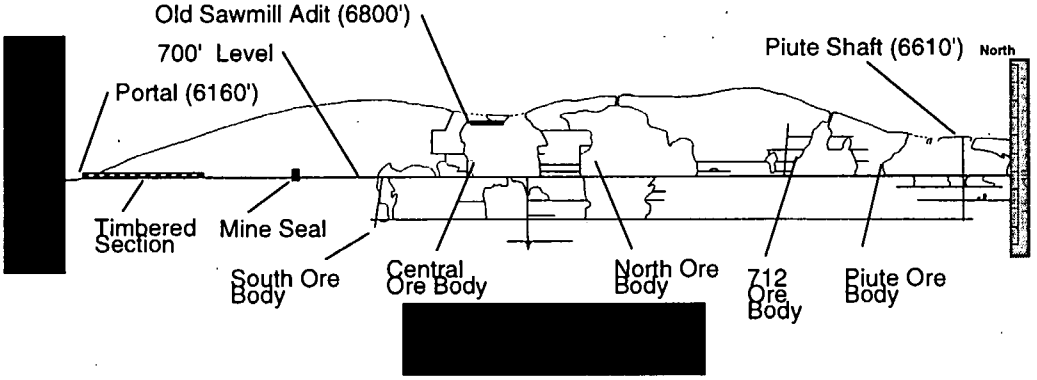
- Mine site: Patented claims, AMD discharge, uncooperative owner, lengthy permitting, enforcement & litigation, remediation by State
- Tailings: National Forest land, erosion & AMD, uncertain responsibility, solution through CERCLA and stakeholders, remediation managed by Forest Service
- List "stakeholders" & funding sources for USFS

Walker Mine, Plumas County



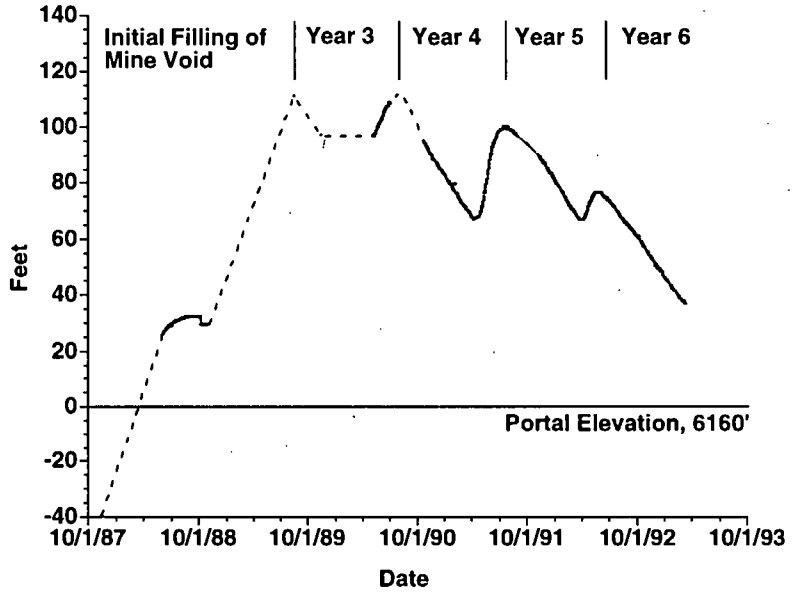
Walker Mine, Plumas County

Longitudinal Section along 700' Level



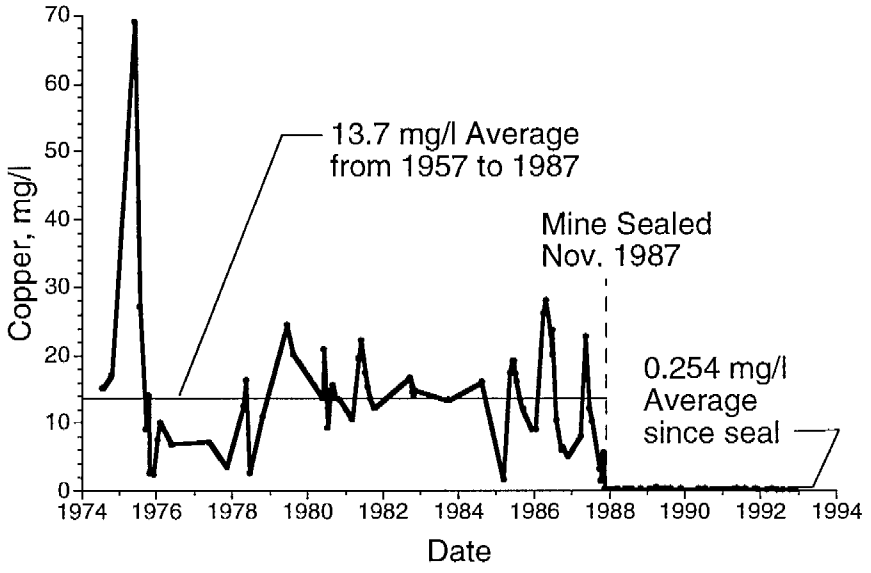
Walker Mine, Plumas County

Water Elevation Behind Mine Seal

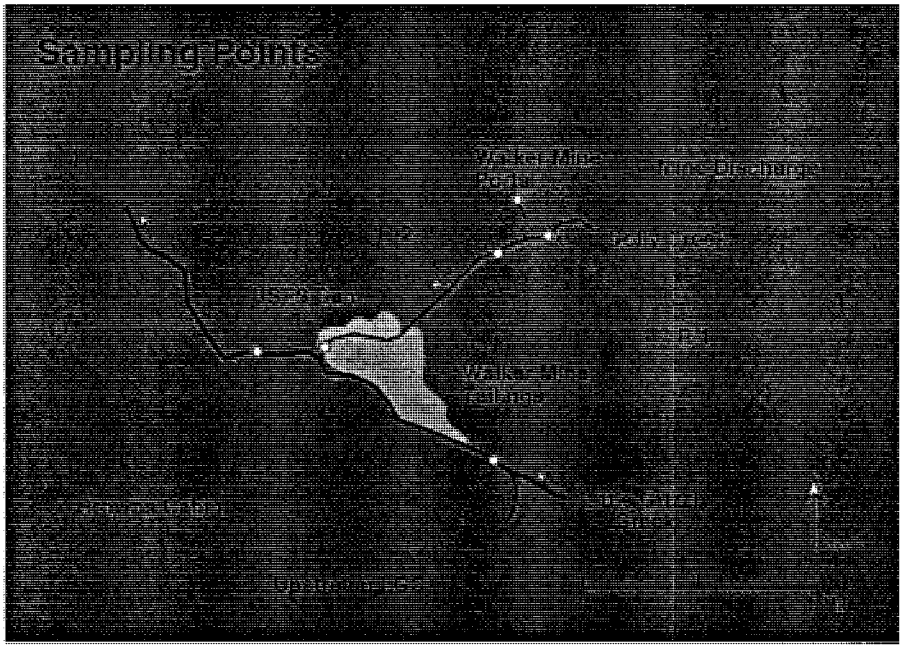


Walker Mine, Plumas County

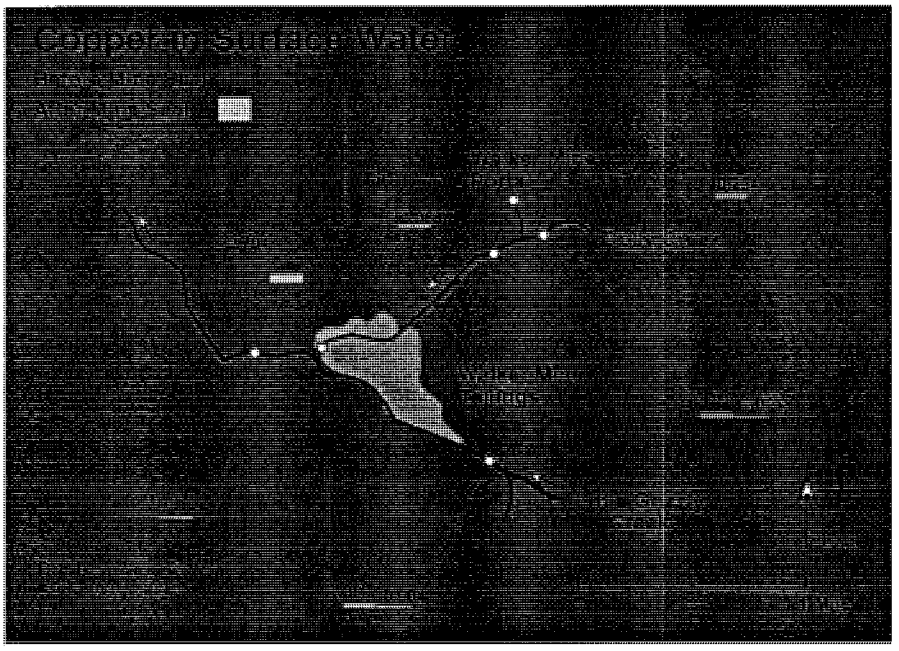
Copper in Portal Discharge 1974 to 1992



Walker Mine, Plumas County



Walker Mine, Plumas County



Walker Mine, Plumas County

Conclusion

- Traditional enforcement & litigation at mine
- Watershed approach at tailings
- Substantial AMD reduction & watershed improvement
- Ongoing responsibility, work & expense

WALKER MINE

The On-Going Effort To Improve the Environment

The continuous charge by the Water Quality Control Board that the owners and operators of Walker Mine have done nothing for 28 years to abate the pollution of Grizzly Creek is totally inaccurate, misleading and capricious as the chronological record will reveal. Let's examine that record.

1928 Anaconda created an evaporation pond and constructed a ditch around the tailings pond so the effluent could first go through a process of sedimentation and then be channeled to the side of the tailings pond rather than picking up toxicity by going through it.This procedure was followed until the Anaconda shut down in 1942 and was operative for several years thereafter.

1942 to 1959 During this period, the tailings dam on U.S. Forestry property broke - and the carefully constructed diversionary ditches which Anaconda had built broke their banks and water freely went through the tailings pond picking up toxicity. The U.S. Forestry were notified by the newly created California Water Control Board and did nothing about reconstituting the diversionary ditches or or in re-constructing the dam so water continued to be toxic to the extent it would not support a fishery.

1960 Before the Porter-Cologne Act S 13305 was passed, the owners of Walker Mine re-created settling ponds, and re-created ditches around cave-ins to reduce toxicity. We have pictures take and a report by C.D. Barnes of Oroville substantiating the effort made. At this time there was no penalty and the owners

proceeded with due diligence although the Forestry did nothing to repair the dam.

1960 Commenting on what the owners had done, L. E. Trumbell wrote to Col. J. S. Gorlinski, the chairman of the California Water Control Board on 6/10/60:

"There is ample evidence . . . mine operators found it prudent to carefully divert water around the glory hole area . . . "

1961 L. E. Trumbell to Col. J. S. Gorlinski 8/4/61: "Currently excellent water conditions in Little Grizzly Creek."

1962 L. E. Trumbell to Col. J. S. Gorlinski 8/20/62: "Walker Mine drainage has stopped . . . coupled with a year of normal precipitation. Trout survived winter and spring in all parts of Grizzly Creek."

During ensuing years, a substantial cave-in occurred and several years may have been taken to fill up the mine until water began to flow from the ventilator shaft several hundred feet above the main portal.

Darrell Payne, County Surveyor-Engineer, wrote on 6/16/69: "It would be a simple matter to prevent at least 95% of the upper runoff from entering the mine shafts and and glory holes by reconstructing diversion ditches and furrows thereby directing the runoff and away from the mine entrance. Little Dolly Creek below the mine site should then be sufficient to dilute what minor amounts occur from underground seepage within the mine workings."

1969 Noranda Report: During 1969, Norandex constructed several ditches around the surface subsidences near Piute and Discovery Shafts. This action diverted all visible surface water away from the underground workings, and a noticeable decrease in in discharge flow was observed several days later.

1970 Noranda Mining Engineer Frank Condon 12/14/70: "CWQCB have made no recommendations to avert the pollution - and admit there may not be a feasible solution to the problem. I presented Norandex Program and they were impressed. They asked that the stipulations concerning cooperative government approval be removed."

The Plan By Norandex

1) Ditch diversion - needing U.S. Forest and Plumas County Road Department cooperation.
2) Opening the portal (which had caved) to the 712 orebody to reduce toxicity for which they needed Fish & Game cooperation for a temporary stay of pollution standards.
3) Construction of settling ponds to lessen the sudden rush of water in opening the portal.
4) Maintenance of diversionary ditches near Piute and Old Discovery Shafts.

1971 and 1972 Norandex Report (page 22):

"Norandex offered to put pollution plans into effect, but was rebuffed by a threat from Fish & Game to the effect that they would be liable for $6,000/day fine if the process caused pollution . . . of Grizzly Creek."

Norandex, a Canadian based company, had great difficulty in equating the harsh requirements and rhetoric with nothing being done by the U.S. Forestry when they judged that an equal or more pollution was caused by failure to repair the tailings

dam and diversionary ditches around the tailings.

1973 The owners of the mine engaged Dr. Frederick Kruger, Dean of the School of Mines, Stanford University, to advise them. His report of 12/4/73: Following two measure would greatly reduce the flow, and possibly reduce concentration of copper, zinc and sulfate:

1) Bulldoze diversion ditches around old mine workings . . . much oxidation and leaching can be prevented.
2) Repair 'windrowed' settling area so it can suspend solids before discharging into Dollie Creek.

The following two measures by the U.S. Forestry are necessary:

1) Divert natural drainage of creek around old tailings pond to prevent it from becoming a leachant, etc.
2) Repair tailings dam at end of tailings pond so that fine grained tailings cannot be eroded and washed downstream into Little Grizzly Creek.

During this year, the owners also hired Jones & Stokes Associates, prominent fish consultants, who advised them: "The normal numbers of adult trout in Little Grizzly may be 100 to 300 per mile - where people like to fish it amounts to 50 user days per mile per year. The amount of money value is not great - if 100 catchable fish per mile there are 1000 catchable fish at 1/4 lb. or 250 lbs. worth $250 at the hatchery and $1250 in the stream."

1974 The owners were introduced by Dr. Kruger to William McClung, a mining engineer with considerable experience with toxic mine drainage, who concurred in Nornada's evaluation to drain the mine and possible cut off or divert the underground water at its point of entry into the mine. This was almost complete when The CWQCB obtained an injunction to halt further progress, but the owners were able to convince the court of the folly of CWQCB's challenge and draining the mine continued. (See

Feather River Bulletin article of Nov. 14, 1974.)

The owners also began a two year systematic clean up of 40 acres of mining camp that was cluttered with metal debris that was partially causing the drain off water to become toxic.

1975 Mine was retimbered 500 feet and a pipeline was constructed at the portal to channel the water from the mine to cement tanks. Railroad tracks were replaced at mine entrance to provide access for further cleaning the tunnel.

1976 Pipeline was buried and two settling tanks were activated to settle water before tin-tank operation commences. Underground machinery acquired and constructed for further clean-out. An interior settling pond within the mine was constructed. Amax was now the operator and cleaned the flumes inside the mine and reconstructed the tunnel up to the next cave-in.

1977 Amax timbered and cleaned out a major cave-in at the 900 ft. level.

By November 24th, the water volume had been reduced to 15 gallons per minute.

Amax reconstructed tunnel to 1000 ft and covered their earlier constrcution with earth.

1978 Conoco is now the mine operator and cleaned the tunnel to 1500 ft., and constructed a settling pond of a larger dimension. Conoco also constructed a new pipeline from the settling pond to below the mine property entrance. They further diverted flume water away from general drainage area to the settling pond.

1979 Conoco, with a 4 to 6 man crew, worked extensively to clean out the tunnel, replaced 12" pipe with 30" pipe to avoid washouts, repaired snow shed, and constructed an airline for use in further cleaning of the tunnel. During this time, the owners were constructing a mine trammer for use in tunnel work.

1980 Conoco had spent $85,000 on the portal and settlement ponds when the CWQCB put a stop order on further finishing of the pond when it was 95% complete. (Conoco totally cancelled their plans even though they were in the process of making a show place complete with landscaping.) Mr. William Crooks, Executive Director of the CWQCB, stated to Conoco water specialists that "the tailings don't contribute to pollution in any appreciable way." This was disputed by Conoco's water specialist and is contrary to the earlier advice given by Dr. Kruger, Dean of the School of Mines, Stanford University, and by Amax engineers and Noranda engineers, and the owner's consultants.

1981 Instead of proceeding with Dr. Kruger's policy and Conoco's planned operation for abating pollution, the CWQCB sent their engineer Frank Pearson to advise, and channels were constructed by the owners and Conoco to his design. Pearson was working on a process for water treatment that he claimed was economically feasible and his pilot project was put in operation.

1982 Pearson's plan was finally produced in a form not understandable to the average mining engineer, but costing-out the project proved far too expensive for implementation.

1983 Property owners entered into a contract with Triad Minerals to mine the water to acceptable standards. This contract was never implemented because the CWQCB brought a law suit against the owners.

There was also proposed and in the designing stage by water consultants and engineers another plan which also was arrested by the untimely law suit brought by the CWQCB.

1984 The mine is now operated by SBC Corporation International formerly the Standard Bullion Corporation of Salt Lake City. The owners have a plan and the operators have a plan that will abate the pollution using a technique developed by the Canadian government to extract metals from polluting mine streams. They are currently negotiating for such a plan to become operative. Prior to instituting such a plan, the owners and operators filed with the CWQCB to lower the standards required by the CWQCB to that of drinking water standards set by the national Environmental Protective Agency (NPDES). The regional board turned down this request, and the owners and operators have appealed the decision to the State Water Resources Board stating that the action of the regional board was arbitrary, misleading, capricious and contrary to law.

The water from Walker Mine is drinkable in its natural state as it flows from the portal, and contains many minerals found in purchased mineral water for human consumption, or found on the label of many favorite cereals where minerals are put back into grain for health purposes.

Pollution Problems: During the 1916-1941 period of operation of the Walker Mine by Anaconda's subsidiary, the tailings from the flotation plant flowed down Dolly Creek to Grizzly Creek, where they were dammed to form a pond many acres in extent. The trees which were inundated were killed. These dead snags together with the barren tailings form an unsightly area, which although it is on Forest Service lands, calls attention to past mining activity, and focusses attention upon the present effluent from the mine.

For perhaps the last ten years there have been complaints of fish kill in Grizzly Creek. Investigations have shown two sources of pollution. First, the most obvious, but perhaps the least offensive, is the drainage from the Seventh Level adit. This drainage from the portal of the mine reaches a maximum estimated flow of 150 gallons per minute during the peak of runoff from melting snow in the Spring, and diminishes to 30 gallons per minute during the summer. This outflow may be decreased by ditching around the old mine workings to prevent the inflow of surface waters. The pH of the water may be as acid as 3.7, and the content of copper may be as high as 22 parts per million. However, a few hundred yards down stream the copper content may be less than 2 parts per million.

Second, the least obvious, but probably the largest contributor of acidity and heavy metals to the waters of Grizzly Creek, is the leaching of the tailings pond. This has been lessened by diverting the waters of Dolly Creek and Grizzly Creek around the tailings, but the diversion has not been maintained and so the waters percolate through the tailings and pick up polluting acid and heavy metals. The old scars of mining have become overgrown and camouflaged by vegetation so that they have not been mentioned as yet as a form of "visual pollution."

POTENTIAL OF THE WALKER MINE

From a geological viewpoint the Walker Mine has potential for the development of additional ore reserves, both for underground and for surface mining.

Ore in Depth on the Shear Zone: Anaconda, the operating company during the 1917 to 1941 period of production, encountered the multiple problems of heavy ground, flattening dip, increased pumping, and increased hoisting from the lower levels of 1000 and 1200 feet, and therefore did not pursue the

LETTER

ON

W A L K E R M I N E

BY

V. A. HART

Salt Lake City, Utah.
Sept. 19, 1915.

F-192 5-12-14 5m

International Smelting Company
Tooele Plant

WM. WRAITH
GENERAL MANAGER

SALT LAKE CITY, UTAH, Sept. 19, 1915.

Mr. Wm. Wraith, General Manager,
International Smelting Company,
Salt Lake City, Utah.

Dear Sir:-

This letter states my impression and opinion at this time of the Walker Mine, located in Plumas County, California.

The reports on this property by Messrs Cowan and Hansen go into detail on claims, location, timber, wood and water, all of which is apparently as stated, although as yet I have made no investigation of claims, titles,&c. They also state the results on two flotation tests on the ore. This, also, has not been investigated.

The points on which I desire to lay special stress, and on which I may differ some from the statements in the above mentioned reports are relative to climatic conditions, ore, its deposition and tonnage, cost of mining and development, and cost of haul and freight.

CLIMATIC CONDITIONS: The mine is situated at an altitude of about 6700 feet or approximately 2000 feet above Portola, the shipping point. Portola has been known to have fourteen feet of snow on the ground at one time, and the intervening country and the mine can be safely estimated at from 6 to 15 feet of snow on the ground at one time per winter. If the roads can be kept open, this will materially help in the hauling although it will leave the roads across the numerous flats impassable for some months in the spring.

The attached memorandum shows my hauling estimate from which I have my hauling charge of at least $6.50 per ton of concentrates.

WORKINGS, ORE, DEPOSITION, etc: The plan and sectional sketches which accompany this letter show the extent of the main workings. From these it will be seen that the ore has been developed for a length of about 110 feet on the 65 foot level and 13 feet on the 125 foot level.

This ore is a heavy primary sulphide (chalcopyrite with much pyrite)which occurs in two pronounced forms, first, as an impregnation of the diorite, so-called (a very hard dense black felsitic rock inclined to be very blocky), and, second, as a filling or cementing material accompanied by much quartz which has filled the interstices of the brecciated diorite along the fault. The first form shows only on the 65 foot level. The north end of this level has softened considerably, and the partially disintegrated diorite has been enriched by some secondary boronite. A small oxidized slip showing on the foot wall side.

A small half inch seam, without gouge matter, marks the hang wall side or east limit of the ore. This shows a pronounced strike of about N 10° to 22° W and a dip of about 75° to the east. This checks the location of the ore on the 125 foot level.

The amount of brecciation has been very small. Instead of much fine crushing near the slip, the tendency has been toward blocking and this is clearly shown by the vertical walls of the crosscuts, so

termed, on the two levels. These crosscuts really run with the formation and are, in my opinion, along cross breaks at approximate right angles to the main break. Sampling at these points is apt to give one an erroneous idea as to the width of mineable ore, hence, the only safe way to prove or disprove this contention is to perform the work as outlined by broken lines on the plan sketch.

This tendency towards large blocking and the exceeding hardness of this formation, together with no defined footwall are points that mitigate very much against the property.

Miners state that the quartz is "bunchy", a condition expected in a deposition of this sort. Ore is difficult to follow. (See sketch map showing where ore was evidently lost and they hunted for it.) "Two runners with butterfly vale type drills made from 5 to 7 buckets of muck (35 to 49 cu. ft. 1½ to 2½ tons) per shift on drifting on 65 foot level," - Foreman. It took two good miners three shifts to put in one round of holes (14 holes 3½ to 4 ft. deep) on the 125 ft. level. Holes were loaded within 6" of collar with 60% powder in order to break wall. This was at a point near where sample No. 96 was taken. It required from 15 to 20 mails to cut some of the harder samples and then they were very shallow trenches. Shaft was contracted for $30.00 per foot - power and hoisting muck furnished. Contractor worked three shifts and quit.

The above will show a condition which means high mining and development costs. Water is an unsolved problem. At present it is very easily handled. What it will do in depth is problematical.

From a tonnage standpoint, I at present would not feel safe in estimating over five to six feet in thickness of workable ore, and this would be Probably Ore only. I consider a primary ore such as this is to be good for great depths if the interstices or voids were present in which it could form. The chances are that the harder or non-disintegrated material at depth will not be impregnated and only ore of the second form mentioned above, will be found.

The attached memorandum shows probable and possible tonnage together with estimated costs and net profits per ton under different copper markets, based on Mr. Cowan's expressed willingness to contract work at the figures used.

As to the possible length of this ore shoot, I can only state this: The shaft is located on a likely gossin cropping. To the south is a flat which shows nothing. To the north the gossin shows up the hill for a total length of sixty to eighty feet. Above this or further to the north is a heavy iron capping of limonite and hematite. No gossin to be seen. This iron shows a width of from 60 to 150 feet and is easily traceable for at least 1500 feet and probably much more. The present ore shoot now extends slightly further north then the surface gossin. Whether it will continue on under the iron for a long distance, I cannot say, but I do not think that it will. If this iron cropping should be underlain by ore, the property would be an immense one.

The conditions under which you are investigating this property are, I believe, as follows:-

For $65,000 you get 65,000 shares of preferred stock together with 65,000 shares of common stock as bonus. Total preferred stock issued 100,000 shares. This preferred stock is to be taken up from the first $100,000.00 net proceeds obtained from the ore.

For an additional $40,000 you are to obtain a further 250,000 shares of common stock, making you a total of 315,000 shares. This together with an equal amount held by other parties in a voting trust, giving you practical control of the property. This means a net expenditure of $40,000 (after the $65,000 for preferred stock has been returned) less smelting profits for 315,000 shares of stock or over one-fourth of the property - capitalization being 1,250,000 shares.

These conditions are such as to well merit the expenditure of about $830.00 on the development now under way. An excellent gamble at the very worst.

Should this property prove up 12 feet of ore of average grade as sampled, I would not hesitate a moment on closing with the above conditions and optioning all other stock possible on nine months' and upward time without cash payments. If at a figure of 50¢ or less, I would feel that a 10¢ per share payment would be justified.

If the new work proves up 12 feet of ore, of grade used in memorandum, I would say that under better than a 14¢ copper market, you would have the required tonnage of very probable ore - over 20,000 tons - practically in sight.

Should, however, this thickness fall to six feet, it means that the present development must be extended for another hundred feet in depth, and an additional eighty feet in length or a total block of ore one hundred eighty-nine feet in length by two hundred feet in depth must be developed in order to expect $100,000.00 net proceeds on a 14¢ copper market, proportionately less if market is higher.

This condition makes this proposition a gamble pure and simple, and one would hardly be justified in taking it unless a large percentage of stock could be optioned at a very nominal figure. A speculative value on the entire property, under this condition, of anything over $250,000.00 to $300,000.00 would be considered excessive and then it would be considered only a fair gamble.

Respectfully submitted,

VAH:H

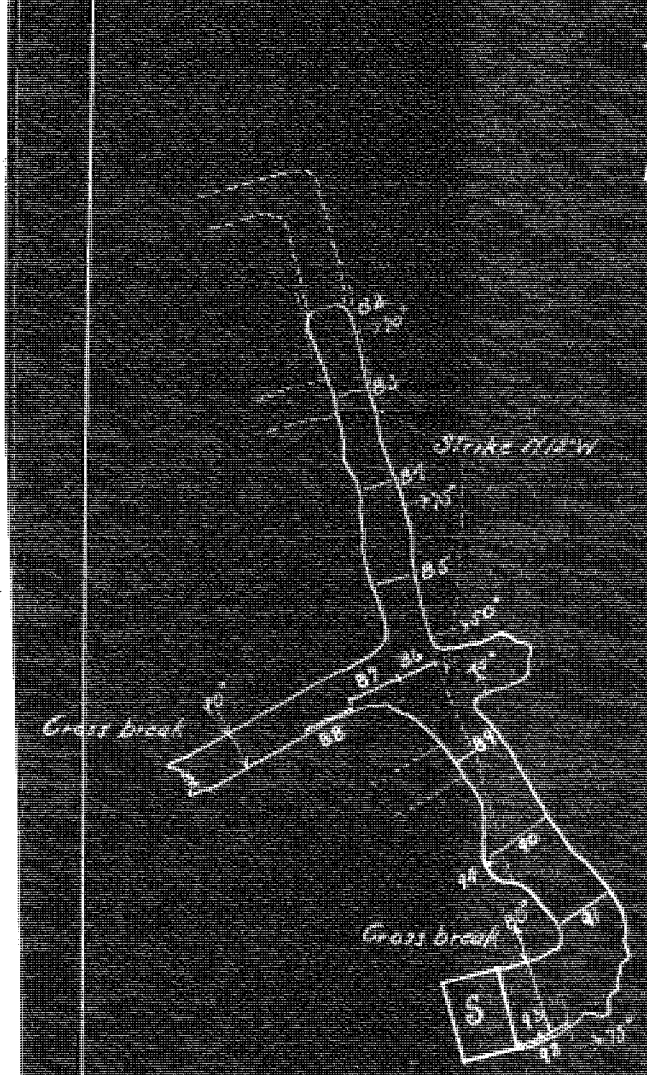
PLAN

WALKER MINE

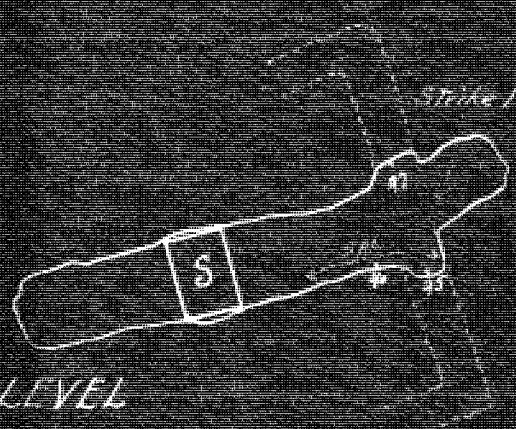
1" = 20'

—SAMPLES—

No.	Width	Ft.	Oz.	Cu.
82	5'	.06	3.9	1025
83	3.8	.06	3.0	2.10
84	8.2	.04	2.5	4.70
85	4.8	.02	3.4	3.35
86	4.4	.05	4.85	7.35
87	6.4	.10	7.8	10.80
88	5.0	.04	2.0	2.10
89	3.0	.02	0.9	8.45
90	8.8	.01	0.9	1.05
91	7.0	.2	0.2	0.90
92	3.0	.06	5.1	7.20
93 V	6.0	.04	3.6	3.55
94 V	4.0	.05	6.35	8.10
95 V	5.0	.04	3.5	6.20
96 V	5.0	.035	2.2	3.10
97 V	5.0	.04	3.5	6.20
DH	15.0	.03	2.0	3.10 (N—W/4)

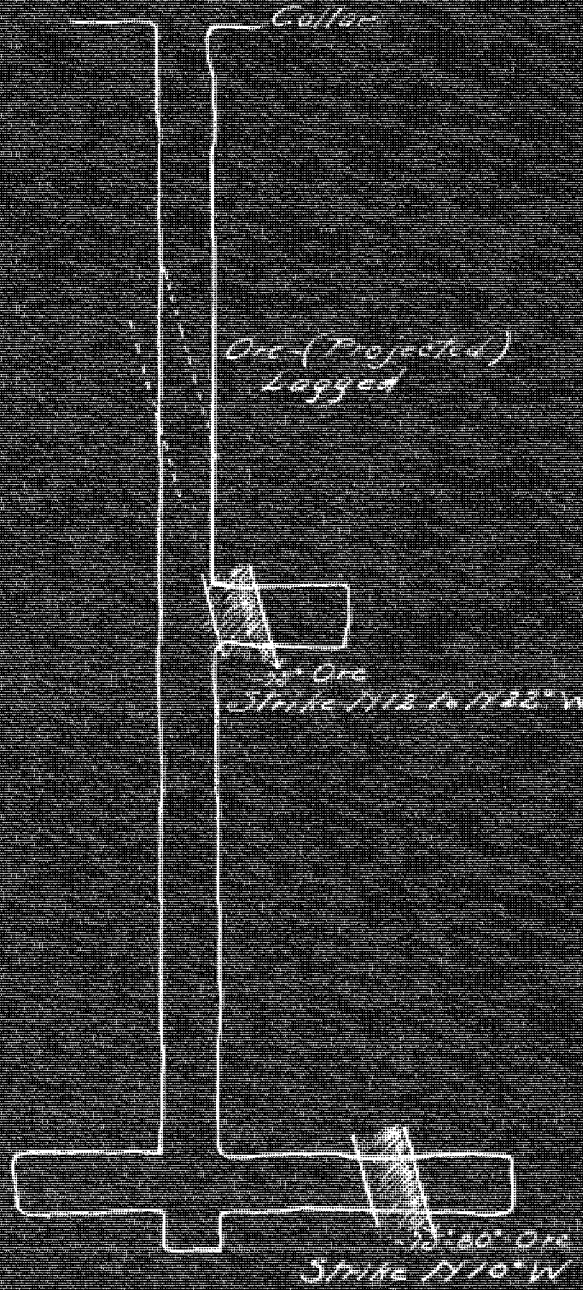


PLAN 65' LEVEL



PLAN 125' LEVEL

8-10-25 M.



WALKER MINE

SECTION THROUGH SHAFT

ON

EAST-WEST PLANE

1" = 20'

9-19-28-A

4108

RECEIVED
U. S. LAND OFFICE
SACRAMENTO, CALIF.
JUN 14 1926

FORMS FOR FILING EVILENCE OF CONSTRUCTION.

Form 5.

State of California,
County of Plumas, ss:
C. de Arrieta, being duly sworn, says that he is the chief engineer of (or was employed to construct) the canals, ditches, laterals, and reservoirs of the Walker Mining Company; that said canals, ditches, laterals, and reservoirs have been constructed under his supervision, as follows: The termini of a canal, ditch, or lateral, and the initial point of the survey of a reservoir should be fixed by reference of course and distance to the nearest existing corner of the public survey, a total length of constructed canals, ditches, and laterals of 0.10 miles, and a total area of constructed reservoirs of 90.24 acres; that construction was commenced on the 1st day of June 1919, and completed on the 30 day of December 1919; that the constructed canals, ditches, laterals, and reservoirs, as aforesaid, conform to the map and field notes which received the approval of the Secretary of the Interior on the 4th day of August 1920.

C. de Arrieta
Chief Engineer

Sworn and subscribed to before me this 7 day of June 1926

Alfred N. Waite.
Notary Public.

--- 0 ---

Form 6.

I, J. O. Elton, Vice-president of the Walker Mining Company; that the canals, ditches, laterals, and reservoirs described as follows (describe as in Form 5) were actually constructed as set forth in the accompanying affidavit of C. deArrieta, chief engineer (or the person employed by the Company in the premises), and on the exact location represented on the map and by the field notes approved by the Secretary of the Interior, on the 4th day of August 1920; and that the Company has in all things complied with the requirements of the act of Congress March 3, 1891, granting right of way for canals, ditches, and reservoirs through the public lands of the United States.

J. O. Elton
Vice President of the Walker Mining Company.

(Seal of Company.)

Attest:
Secretary.

US 000221

C O P Y.

CONTRACT.

-----O------

THIS AGREEMENT, made and entered into this 12th day of August, 1916, at Salt Lake City, Utah, by and between WALKER MINING COMPANY, a corporation organized under the laws of the State of Arizona, party of the first part, hereinafter designated as the Mining Company, and INTERNACIONAL SMELTING COMPANY, a corporation organized under the laws of the State of Montana, party of the second part, hereinafter designated as the Smelting Company, WITNESSETH: that

WHEREAS, the Mining Company is the owner and in possession of a group of mining claims known as the Walker Mining Claims situated in Plumas County, State of California, upon which mining claims is situated a mill which is supposed to be completed and ready for operation; and

WHEREAS, the Mining Company is indebted to various corporations and individuals in a large sum of money and desires to borrow from the Smelting Company funds with which to pay a portion of said indebtedness, and also desires to enter into a contract with the Smelting Company under which the Smelting Company will advance to the Mining Company the necessary funds with which to carry on the Mining Company's mining and milling operations; and

WHEREAS, the Smelting Company is willing, upon the terms and for the considerations hereinafter set forth, to advance a portion of the moneys necessary to pay off said present indebtedness and also to advance the moneys necessary for the further development of the said mining claims and to begin the mining and concentration and shipment of ores and has also, contemporaneously with the execution of this agreement, entered into a contract with the Mining Company for the purchase and smelting of the ores produced by it:

NOW THEREFORE, in consideration of the premises and of the mutual covenants hereinafter contained, it is covenanted and agreed between the parties as follows:

1.

The Smelting Company agrees forthwith to loan to the Mining Company the sum of Seventy-five Thousand Dollars ($75,000.00) to apply upon the outstanding indebtedness of the Mining Company. This loan is to bear interest at the rate of six per cent (6%) per annum and is to be repaid to the Smelting Company out of the net earnings of the Walker Mining Company, and if such net earnings shall prove insufficient for that purpose, the said sum with interest as aforesaid, shall at any and all events become due and be payable by the Mining Company to the Smelting Company on January 1, 1918. For the purpose of computing the interest on said loan, any and all amounts applicable to the reduction of said indebtedness shall be treated as being paid to or received by the Smelting Company on the first day of the month next succeeding the month in which, according to the accounts of the Smelting Company, said net earnings were made.

2.

The Smelting Company shall forthwith begin the following development work upon said group of mining claims: It shall, at its own expense and without the right to recover from the Mining Company any part of the cost thereof, continue the sinking of a two-compartment shaft on the Bullion Mining claim. Two hundred feet of sinking additional to what is already done shall be done by the Smelting Company in this shaft. In addition thereto, the Smelting Company shall also, at its own expense and without cost to the Mining Company, drive five hundred (500) feet of drifts or cross-cuts or both from said

shaft at such point or points as in its judgment will tend best to develop the mining ground. Said sinking and driving are to be done in good and minerlike fashion and are to be completed prior to July 1, 1917.

3.

The Walker Mining Company hereby agrees that during the entire period until July 1, 1917, it will place and keep in charge of the operation of its mine and mill a Manager nominated by or satisfactory to the Smelting Company, and up to and including July 1, 1917, the entire management of the business of the Mining Company so far as pertains to the completion and operation of its mill and the conduct of its mining and milling operations, shall be under the exclusive supervision and control of such Manager.

4.

It being understood between the parties hereto that there is a possibility of more money being required for the purpose of completing the successful installation of the process for the treatment of ores in the mill now constructed, and it being understood between the parties hereto that it will be necessary to provide additional moneys for the carrying on of mining and milling operations and the transportation of ores and for meeting the other expenses incidental to the operation of said property, the Smelting Company agrees and undertakes to furnish from time to time as required and without interest, the moneys necessary for the operation of said mine and mill as a going concern, charging the amounts so advanced by it to the Mining Company in its accounts and crediting in said accounts the sums realized from ores produced by the Mining Company and for which the Smelting Company is obligated to pay under the smelting contract

hereinbefore referred to. In the event that for any reason the operations of the mine and mill shall not prove profitable and should the Smelting Company upon ascertaining this fact decline to proceed further under this agreement and decline to furnish additional moneys for the operation of the mine and mill and for the carrying on of the general operations of the Mining Company, it shall have the right to charge against the Mining Company and recover from it the net amount so due as shown by its account of said operations, but in no event shall it have the right to recover an amount in excess of Twenty Thousand ($20,000.00) Dollars, it being hereby expressly understood and agreed that all expenditures over and above the amount realized from ores and concentrates shipped and over and above the sum of Twenty Thousand ($20,000.00) Dollars additional, shall be at the sole risk of the Smelting Company. Such net balance due from the Mining Company shall be repaid to the Smelting Company on or before January 1, 1918, but without interest.

5.

By way of further assurance to the Smelting Company, the Mining Company has at the time of the execution of this agreement procured to be placed in the possession of the Smelting Company the written resignations of four of the Board of Directors of the Mining Company, the same to be used at the discretion of the Smelting Company at any time prior to July 1, 1917, for the purpose of giving to the Smelting Company the control of the Board of Directors of the Mining Company.

6.

The Smelting Company is at liberty at any time to cease to advance or become responsible for moneys for the operation of the said mine and mill. It shall not, however, have the right to suspend or refuse to continue the sinking of the shaft

or the driving of the 500 feet of drifts or cross-cuts hereinbefore stipulated for. The Smelting Company covenants that during the period while it shall continue to furnish the moneys required for the operation of the mine and mill it will furnish the same in such amounts and at such times as to enable the Manager nominated by it to prosecute such operations vigorously and continuously, except as such continuous operation may be interrupted by fires, floods, strikes, weather conditions or other contingencies which, being beyond the control of the said Smelting Company, shall make it impracticable to operate said mine and mill or either of them. And said Smelting Company agrees that it will furnish such moneys and exercise its influence or control over such Manager so that in the mining and milling of ores and in the shipment of ores and concentrates under the said smelting contract, only such ores or concentrates will be mined, milled and shipped as will in the sound judgment of the Smelting Company afford a profit to the Mining Company, and will in other respects so cause said mine and mill to be managed, controlled and operated as, if possible, to yield the largest and best profit to the Mining Company.

7.

The Mining Company agrees that the Smelting Company shall be repaid for the moneys advanced by it as hereinbefore set forth, prior to any payments being made by the Mining Company to the holders of its preferred stock.

8.

It is understood that the Smelting Company is under no obligation to advance any moneys to defray expenses of litigation not incident to the operation of the property, nor is it under obligation to defray any of the general corporate ex-

penses or salaries of general officers of the corporation, if any, provided that so long as it shall continue to furnish moneys for the operation of the mine it will also furnish such additional moneys as may be necessary for the defense of the Gladden suit, reimbursement of such advancements to be treated as though made for the operation of the mine and mill.

9.

The Smelting Company shall see to it that the Manager of the property placed in charge of its operations as hereinbefore provided shall keep such vouchers, accounts and other records as will tend to show the operations of the mine and of the mill and of other activities of the corporation, according to the methods ordinarily adopted by corporations engaged in the mining and milling of ores.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed by their respective officers thereunto duly authorized, in duplicate, the day and year first above written.

WALKER MINING COMPANY,

By J. R. Walker,
Its President.

ATTEST:

John F. Cowan,
Secretary.

INTERNATIONAL SMELTING COMPANY

By William Wraith,
Its General Manager.

FORM 396 6-37 2M

WALKER MINING COMPANY

WALKERMINE

PLUMAS COUNTY, CALIFORNIA

L. F. BAYER, MANAGER

November 29,1937

Walker Mine

Mr. Reno H. Sales, Chief Geologist
Anaconda Copper Company
Butte, Montana

Dear Sir:

I have submitted the Annual Ore Reserves for Walker Mine dated Nov. 1, 1937, and you will no doubt receive a copy in the near future. I took into consideration the use of the term,"Available Ore", that has been misused in the last few tabulations and changed the headings so that they are not so misleading. I had hoped to talk over the whole set-up with Mr. Lyon and make more changes than I did, but the closing of the mine made rather a rushed job of out of it, and I had no chance to rebuild the thing as I would have liked to.

There are still several bad features about the Reserve that I hope to see corrected next time. The extraction figures do not include all ore from headings, and do not add up to the total tons delivered to the mill. Also, any dilution from wall rock through caving or poorly directed mining is credited to breakage and production, causing the block to over produce which makes it necessary to credit additional ore as developed. Also, ore that is lost in nonrecoverable pillars must be shown as written off, while any ore recovered above that which is estimated as recoverable must be placed in the column for developed ore. I suppose these headings should read,"Written Off or Lost in Pillars", and,"Developed or Pillars Recovered above Estimate".

The assay correction factors remain unchanged. Although you told me that assay results should not be adjusted to figures that are subject to a yearly change, the results worked out so well that I decided to leave them go and make all the changes at once.

They are milling about 300 tons per day from the upper Piute country. This ground is getting heavy so it is a case of getting all the ore possible before it caves.

I am enclosing the last tabulation af the Available Ore Reserve. The figures taken from this and shown at the bottom of the Annual Ore Reserve do not include broken ore.

Respectfully yours,

Seth K Droubay

S. K. Droubay

INTERNATIONAL SMELTING & REFINING COMPANY

MINING DEPARTMENT

818 KEARNS BUILDING SALT LAKE CITY, UTAH

May 13, 1938

SUBJECT:

WALKER MINE

91701

Mr. J. O. Elton, Manager,

O f f i c e s.

Dear Sir:

Attached please find copies of the period report of the Walker Mining Company, which gives a summary of the operations for the last period, and for the month of April, 1938.

27,527 pounds of recoverable copper were produced during the period, and 147,620 for the month.

The estimated cost per pound was 8.6271¢ for the period, and 9.7604 for the month.

The mill operated four days during the period, and milled 1,989 dry tons of ore, assaying 0.881% copper,.037 ozs. gold and .81 ozs. silver.

57.15 tons of concentrates were produced, averaging 24.90% copper, .646 ozs. gold and 19.45 ozs. silver.

The mill was down April 25th, 26th and 27th, due to ore shortage. As previously advised, mill tonnage will increase when the north end of the Piute starts producing.

The operations for the month show only a slight profit, having been penalized by expense for digging ditches to by-pass water from the spring runoff around the Piute surface caves, which would otherwise flood the main haulage level.

The ditch has been completed around Dolly Gulch, and the water is flowing through it. Some water is coming down through 655 Stope in the Piute, but is not giving any trouble as the ditch is carrying the major part of it.

Concerning the roads, the county crews should now have started work on both the Portola and Genesee roads. The Portola road may be opened to the mine before the end of this month.

Operations for the month of May will probably compare with those of April, which is still far better than any shutdown which might be considered.

Yours very truly,

John F. Dugan.

JFD:H
Enc.

Walker

April 26, 1939.

Mr. Seth K. Droubay,
Walkermine,
Plumas County, Calif.

Dear Mr. Droubay:

I received your letter of April 21st with geological sketches showing recent advances made in 471-C drift and 904-B drift in the Walker Mine, also copy of recommendation No. 22, and three tabulations of available ore reserves in the mine on February 1st, March 1st and April 1st.

I note the following monthly decreases in ore reserves to be:

During	January	22,399 Tons
"	February	22,599 "
"	March	5,994 "

which, on April 1st leaves a total reserve of 1,338,922 tons, averaging 1.27% copper.

I concur with your suggestion to drive 471-C drift southwesterly beyond 559-B Raise on the extension of 712 Ore zone, in preference to drifting on the weaker vein structure exposed in the southwest faces on the 500 and 600 levels. Last summer, Mr. Kildale and I traversed the surface above this mineralized zone and concluded that it would be desirable to drift some distance to the southwest towards a plug of diorite porphyry, which terminates a highly silicified, iron-stained, sheared zone that cuts across the schist. The porphyry plug is approximately 1600 feet, S. 50° W. from the face of 471-C drift.

I also note that Recommendation No. 22 proposes a plan for the normal development on the 900 level of the downward projection of the south

portion of the Piute orebody. This proposed work should make available a considerable tonnage of ore.

I find that our maps do not show the position of diamond drill hole No. 10, drilled from the surface and in the area north of the Piute orebody. Did this hole cut any mineralization? Judging from the northwest strike of the northernmost ore found in 904-B north drift, it may be advisable to soon turn a crosscut to the west from the north face of the drift to test the possibility of the vein structure extending in that direction.

I am glad to know that Virgil Chamberlain is rendering good work.

Yours very truly,

MHG:KM

M. H. GIDEL

cc:Messrs. Kelley
Weed
Sales-(Inc.sketches and
Lyon Apr.1, ore reserve
Dugan Statement).


7-41
C.X.W. 13-12

STATEMENT 1941

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Walker Mining Company

PLUMAS COUNTY, CALIFORNIA

P. O. WALKERMINE, CALIFORNIA

OPERATING OFFICE

KEARNS BUILDING, SALT LAKE CITY, UTAH

★

(Incorporated under the Laws of the State of Arizona)

★

CAPITAL STOCK

COMMON—Authorized - - - 1,750,000 shares at $1.00 per share
Issued - - - - - - 1,749,308 shares at $1.00 per share

★

Directors

J. R. WALKER E. L. MAY J. O. ELTON J. B. WHITEHILL
P. T. FARNSWORTH, JR. J. F. DUGAN JOHN BAGLIN

Officers

J. R. WALKER, *President*
J. O. ELTON, *Vice-President*
J. B. WHITEHILL, *Secretary-Treasurer*

Transfer Agents

H. I. CARSON, Transfer Agent, 25 Broadway, New York City, N. Y.
ROM WARBURTON, Transfer Agent, 820 Kearns Building, Salt Lake City, Utah

Annual Meeting: May 5, 1942, at 3 P. M. in Room 202, Phoenix National Bank Bldg., Phoenix, Arizona.

To the Stockholders of
Walker Mining Company:

Your property was on an operating basis from January 1st to October 24th, 1941, when it was closed down because of unfavorable ore development and inability to operate under the prevailing price of copper.

Vigorous exploration work by diamond drilling and underground extensions has been carried on for more than two years in an effort to develop pay ore. This thorough but costly exploration work was justified by the geological conditions exposed on the upper levels of the mine, but the uniformly negative results clearly demonstrate that further expenditures are not warranted.

Before ceasing operation officials of the Company reviewed the situation fully with the various Governmental agencies at Washington in an endeavor to secure a more favorable price that would permit the Company to continue production, but after long discussion it was agreed that there was no alternative to closing down. Since then, a premium payment of 5c per pound of copper has been authorized by Metals Reserve Company, but as this applies only to production in excess of quota based upon 1941 production, your Company is barred from receiving such bonus payment.

The year's operations resulted in a loss of $289,034.43, as indicated in the Income Account.

The mill operated throughout October 30th until mill bins had been emptied and a general cleanup accomplished.

The total advances for all class of drifts, crosscuts, raises, etc. for the year 1941 were 6,950 linear feet. In addition 4,007 feet of diamond drilling were driven for exploration purposes.

There were no major expenditures for construction during the operation.

Ore broken during the year.....263,554 wet tons

The mill operated 258 days treating an average of 1,129 tons per working day.

Ore milled .....291,438 dry tons

Concentrates produced, including lime scale.....14,387.257 dry tons

There were shipped to the smelter 14,929 dry tons of concentrates, lime scale, and precipitates with net recoverable content of 7,248,128 pounds copper, 166,581 ounces silver, and 10,938 ounces gold.

The entire production of silver and gold was sold. Deliveries of copper amounted to 9,529,996 pounds, leaving 901,484 pounds on hand at the end of the year all of which has been sold for delivery in 1942.

All equipment and material in the mine below the main haulage level that would pay to salvage was hoisted before the pumps were removed. All mine and mill equipment was put in good shape for the shut down. A small crew of six men were left at the mine and one at Spring Garden, the tramway terminal, to watch warehouse stocks and equipment and protect the camp from damage by fire or heavy snows during the winter.

The financial statements of your Company for the year ending December 31, 1941 certified by Messrs. Pogson, Peloubout & Company, Certified Public Accountants, are herewith submitted for your information.

Respectfully,
J. R. WALKER,
President

Salt Lake City, Utah, April 1, 1942.

Walker Mining Company

BALANCE SHEET—DECEMBER 31, 1941

ASSETS

FIXED ASSETS—see note:		
Mines and mining claims		$1,286,053.73
Operations were discontinued in October 1941. (See report of President). For basis of valuation see note.		
Plant and equipment at mine, mill, camp and shops and aerial tramway	$1,680,177.85	
Less reserve for depreciation	1,321,529.71	358,648.14
		1,644,701.87
INSURANCE FUND DEPOSIT (securities at cost)		32,287.50
EXPENSES PREPAID		4,456.80
CURRENT ASSETS:		
Supplies on hand—at cost	160,763.65	
Ores on hand—at estimated realizable value	7,730.83	
Copper on hand—at market	106,149.74	
Accounts receivable	3,556.45	
Cash	14,630.32	
Indebtedness of affiliates—current	106,430.87	399,261.86
		$2,080,708.03

LIABILITIES

CAPITAL STOCK:		
Authorized—1,750,000 shares of the par value of $1.00 each. Issued and outstanding—1,749,308 shares		$1,749,308.00
DEFICIT:		
Balance December 31, 1940	$ 108,701.25	
Net loss of the year 1941, without deduction for depletion	289,034.43	397,735.68
		1,351,572.32
CURRENT LIABILITIES:		
Accounts payable—trade	20,404.05	
Wages payable	550.03	
Accrued taxes	6,810.64	
Freight and refining	2,584.45	
Indebtedness to International Smelting and Refining Company	654,820.58	685,169.75
RESERVE FOR WORKMEN'S COMPENSATION INSURANCE		43,965.96
		$2,080,708.03

INCOME ACCOUNT—YEAR ENDED DECEMBER 31, 1941

Deliveries of metals		$1,632,598.52
Cost of deliveries:		
Copper on hand at December 31, 1940—at market	$ 374,839.70	
Production cost	1,477,790.39	
	1,852,630.09	
Less copper on hand at December 31, 1941—at market	106,149.74	1,746,480.35
Operating loss without deduction for depreciation and depletion		113,881.83
Interest paid	18,557.57	
Loss on sale of securities	225.00	
	18,782.57	
Interest received	1,105.01	17,677.56
		131,559.39
Depreciation		157,475.04
Net Loss, without deduction for depletion		$ 289,034.43

Walker Mining Company

NOTE TO FINANCIAL STATEMENTS

NOTE—FIXED ASSETS—BASIS OF VALUATION

Mines and mining claims and plant and equipment at mine, mill, camp and shops and aerial tramway of Walker Mining Company are carried on its books at cost, such cost being represented in the case of mines and mining claims to the extent of $1,250,000.00 by par value of capital stock issued therefor and in the case of all other fixed assets by cash cost thereof.

Depreciation has been written off on a unit of production basis.

In order to comply with the Government income tax requirements for the purpose of computing depletion, additional entries respecting the valuation of the mining property have been recorded upon the books of the Company; but being made in compliance with the Regulations of the Bureau of Internal Revenue only, the result of such entries is omitted from the current statements.

The values of fixed assets are shown on the bases above set forth and do not indicate current values which could be established only by current appraisals.

To the Board of Directors,

Walker Mining Company,

Salt Lake City, Utah

We have examined the Balance Sheet of Walker Mining Company as of December 31, 1941 and its Income and Surplus Accounts for the calendar year 1941, have reviewed the system of internal control and the accounting procedures of the Company and, without making a detailed audit of the transactions, have examined or tested accounting records of the Company and other supporting evidence, by methods and to the extent we deemed appropriate. Our examintaion was made in accordance with generally accepted auditing standards applicable in the circumstances and included all procedures which we considered necessary.

The practice of the Company in computing its net income without deduction for depletion of metal mines is in accordance with accepted accounting procedures in industries engaged in the mining of copper, silver and gold and is in agreement with the accounting practices and procedures consistently maintained by this Company and others similarly situated, and the Company is advised by counsel that such procedure is in accordance with legal requirements.

Operations were discontinued in October 1941. Values of mines and mining claims are stated at cost and do not indicate current values. See President's report.

In our opinion, the accompanying Balance Sheet and related Income and Surplus Accounts together with the notes attached thereto or appearing threon, with the explanation in the preceding paragraph, present fairly the position of Walker Mining Company at December 31, 1941, and the results of its operations for the calendar year 1941, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

POGSON, PELOUBET & CO.,
Certified Public Accountants

New York, April 1, 1942.

STATEMENT 1941

★

Walker Mining Company

PLUMAS COUNTY, CALIFORNIA

P. O. WALKERMINE, CALIFORNIA

OPERATING OFFICE

KEARNS BUILDING, SALT LAKE CITY, UTAH

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(Incorporated under the Laws of the State of Arizona)

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Before ceasing operation officials of the Company reviewed the situation fully with the various Governmental agencies at Washington in an endeavor to secure a more favorable price that would permit the Company to continue production, but after long discussion it was agreed that there was no alternative to closing down. Since then, a premium payment of 5c per pound of copper has been authorized by Metals Reserve Company, but as this applies only to production in excess of quota based upon 1941 production, your Company is barred from receiving such bonus payment.

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The financial statements of your Company for the year ending December 31, 1941 certified by Messrs. Pogson, Peloubout & Company, Certified Public Accountants, are herewith submitted for your information.

Respectfully,
J. R. WALKER,
President

Salt Lake City, Utah, April 1, 1942.

Walker Mining Company

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Loss on sale of securities		225.00	
		18,782.57	
Interest received		1,105.01	17,677.56
			131,559.39
Depreciation			157,475.04
Net Loss, without deduction for depletion			$ 289,034.43

To the Stockholders of
Walker Mining Company

Your company did not operate during the year 1943. It was closed down in October 1941, and the conditions which caused the shutdown, as given in the 1941 Annual Report, have not materially changed.

Three to six men were employed as caretakers and watchmen, who kept the plant and mine in as good repair as possible with so small a crew.

The financial statements for the year ending December 31, 1943, certified by Messrs. Pogson, Peloubet and Company, Certified Public Accountants, are submitted for your information.

Respectfully,

J. R. WALKER,
President

Salt Lake City, Utah, March 31, 1944.

THE WALKER MINE

PLUMAS COUNTY, CALIFORNIA

December 10, 1942

Property of
H. A. Geissenhofer
1931 Napa ave
Berkeley 7, Calif.

Prepared By
HENRY J. KAISER COMPANY
Development & Engineering Division

THE WALKER MINE

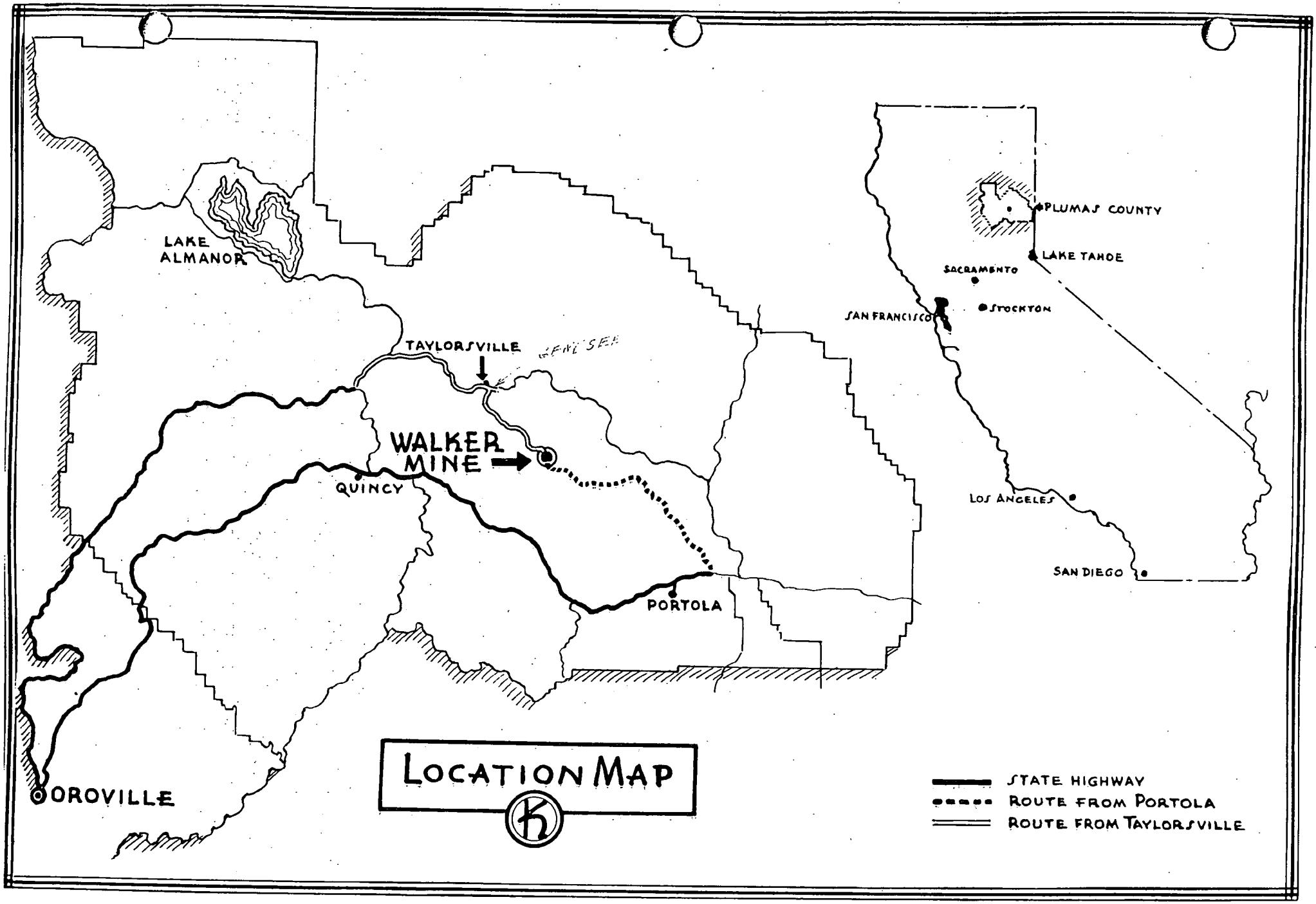
PLUMAS COUNTY, CALIFORNIA

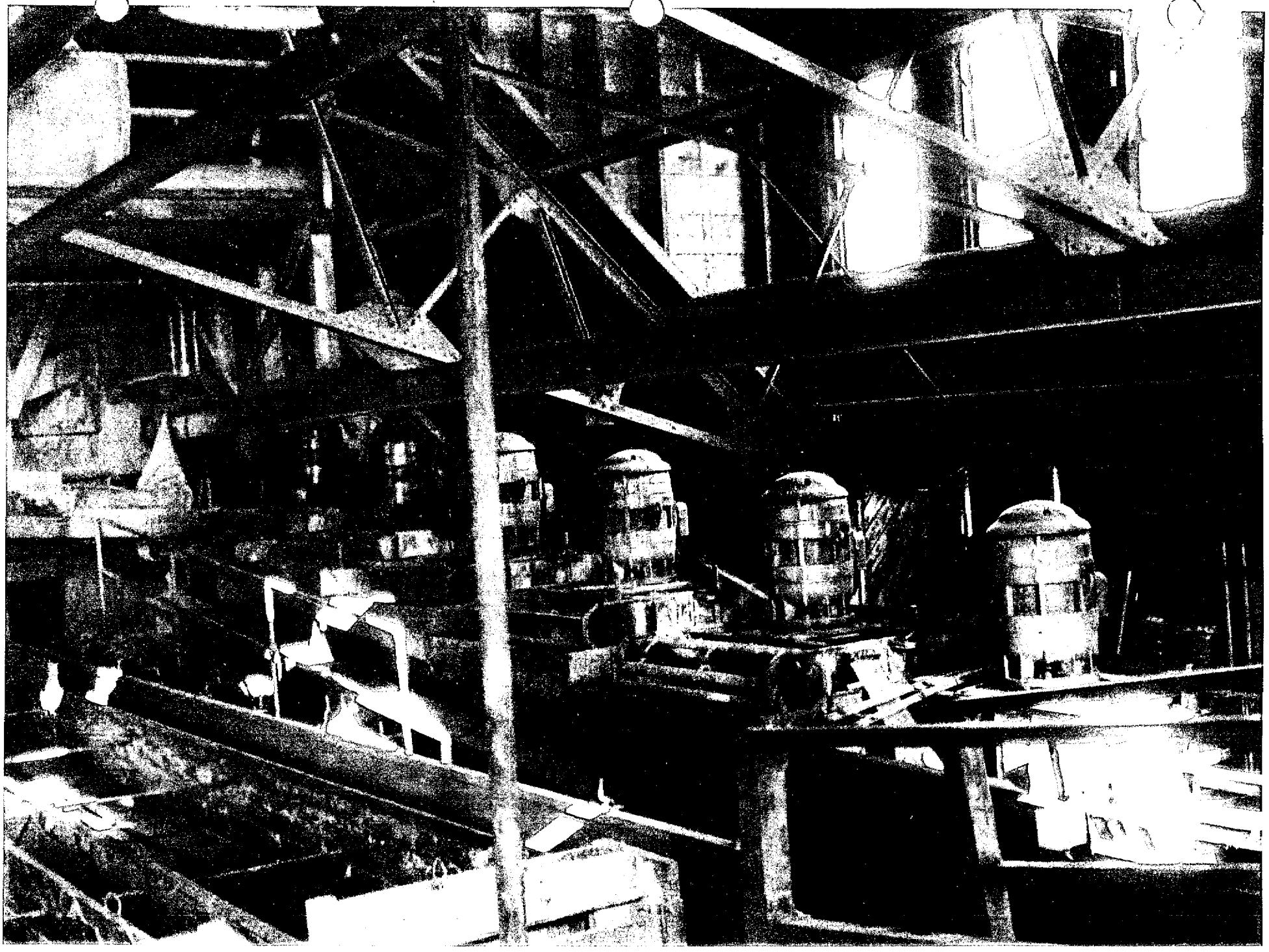
December 10, 1942

Property of
H. A. Geissendorfer
1931 Napa ave
Berkeley 7, Calif.

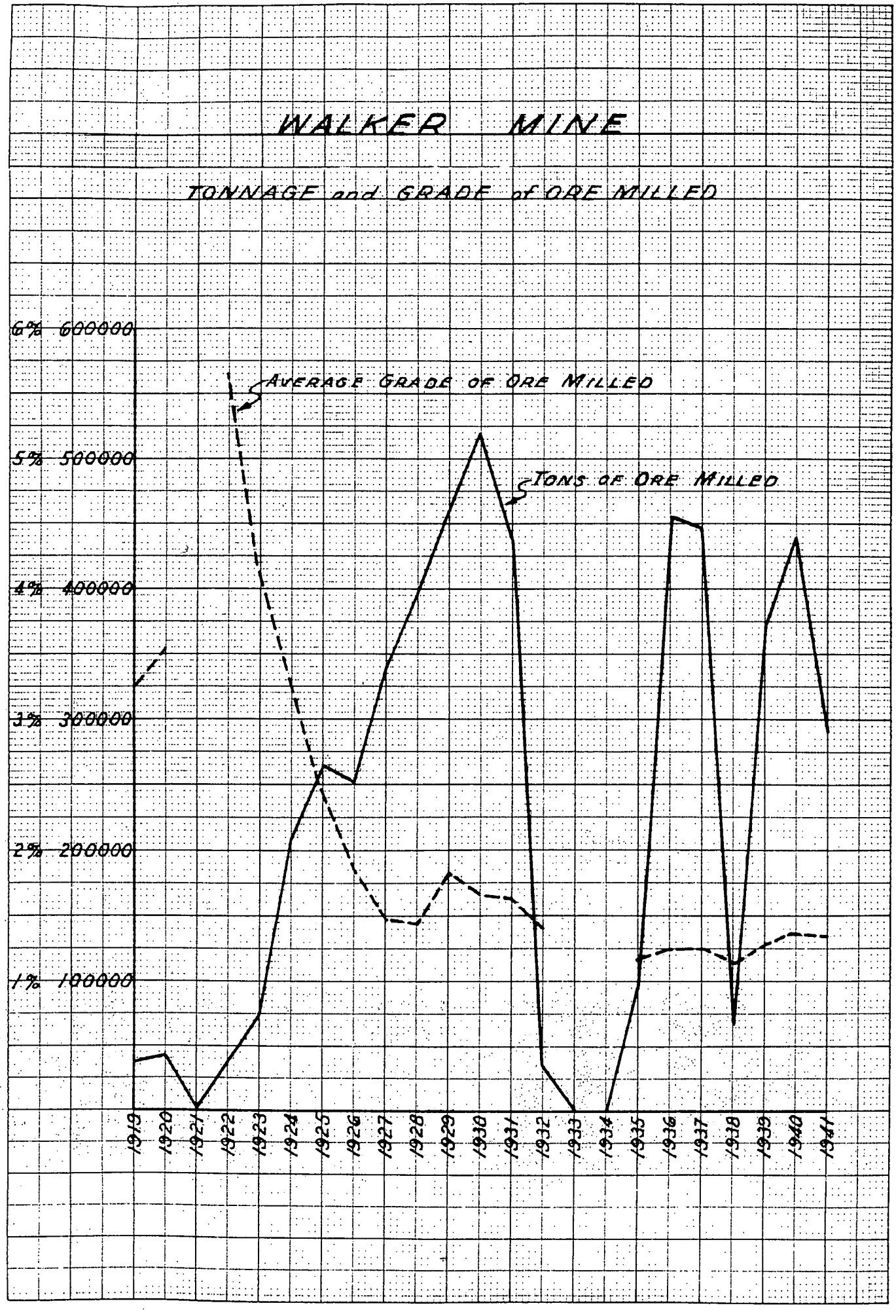
Prepared By
HENRY J. KAISER COMPANY
Development & Engineering Division

TYPICAL ROAD TO GENESSEE


LAKE ALMANOR
TAYLORSVILLE
WALKER MINE
QUINCY
PORTOLA
OROVILLE
PLUMAS COUNTY
LAKE TAHOE
SACRAMENTO
STOCKTON
SAN FRANCISCO
LOS ANGELES
SAN DIEGO
LOCATION MAP
K
STATE HIGHWAY
ROUTE FROM PORTOLA
ROUTE FROM TAYLORSVILLE



FLOTATION SECTION


WALKER MINE
TONNAGE and GRADE of ORE MILLED
6% 600000
5% 500000
4% 400000
3% 300000
2% 200000
1% 100000
AVERAGE GRADE OF ORE MILLED
TONS OF ORE MILLED
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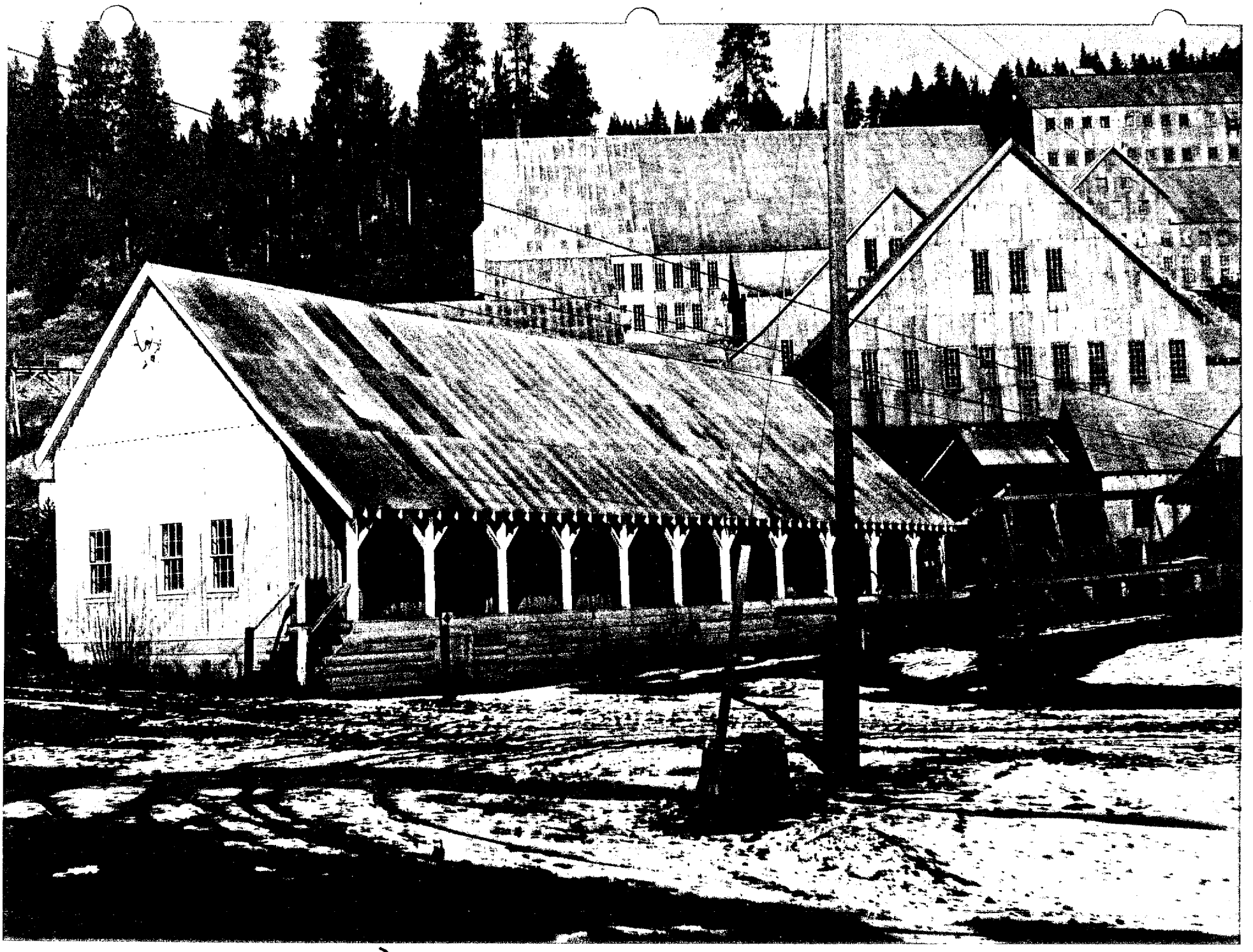
VIEW OF CAMP



WAREHOUSE – MILL BUILDING ABOVE

INTRODUCTION

As authorized under the letter of intent from the War Department, Office of the Chief of Engineers, and by the District Engineer, to the Kaiser Company, Incorporated; the Walker Mining Company, owners of the Walker Mine, Plumas County, California have been contacted and reports on their operation of the described property have been obtained.

The Kaiser Company has made as complete a check of the property as was possible in the limited time available, and has studied maps and data of the Walker Mining Company.

It is our conclusion that the mine could produce copper concentrates at a cost of $4.00 per ton on a 500-ton per day basis for approximately two years. These concentrates, when smelted would yield 3½-4 million pounds of copper yearly, with a chance of increasing the ore reserves by additional exploration work.

The mine and mill could be readied for operation within thirty days time.

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RECONNAISSANCE SURVEY OF WALKER MINE

PLUMAS COUNTY, CALIFORNIA

A reconnaissance trip to the Walker Mine was made on Friday, December 4th. The party was composed of the following members:

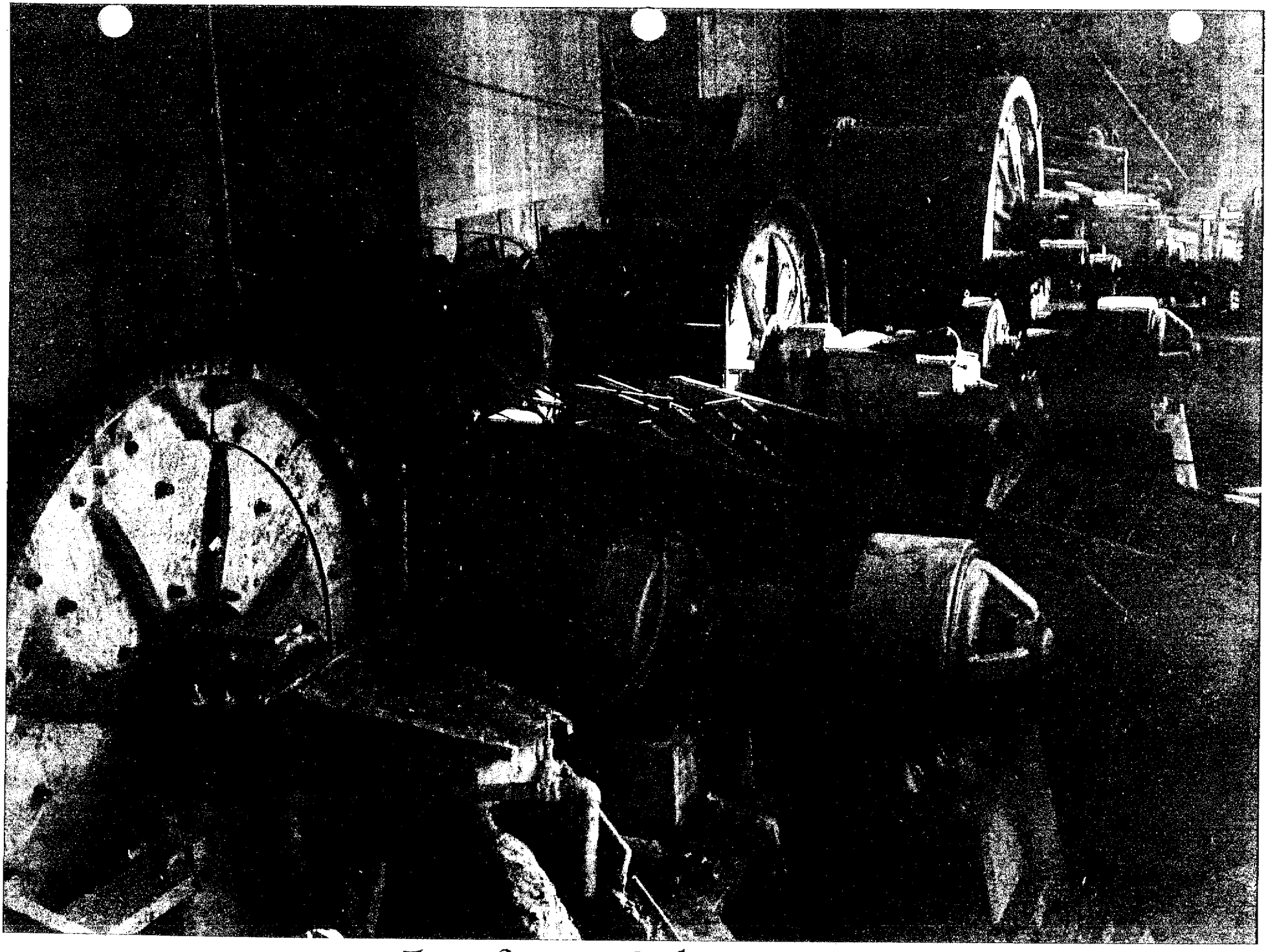
Benjamin T. Rogers, Major, U. S. Army Engineers,
Resident Engineer.
R. E. Knight, Manager, Henry J. Kaiser Company
Dev. & Eng. Division.
J. E. Winter, Chf. Design Engineer, Henry J. Kaiser Company,
Dev. & Eng. Division.
R. E. Frankenberger, Chf. Estimator, Henry J. Kaiser Company,
Dev. & Eng. Division.
W. C. Laut, Master Mechanic, The Permanente Metals Corporation.

The party left Oakland Thursday evening, December 3rd, 1942 stopped overnight at Quincy, California, and arrived at the mine Friday morning at eight o'clock. There they met the following party members who had reached the mine the previous day:

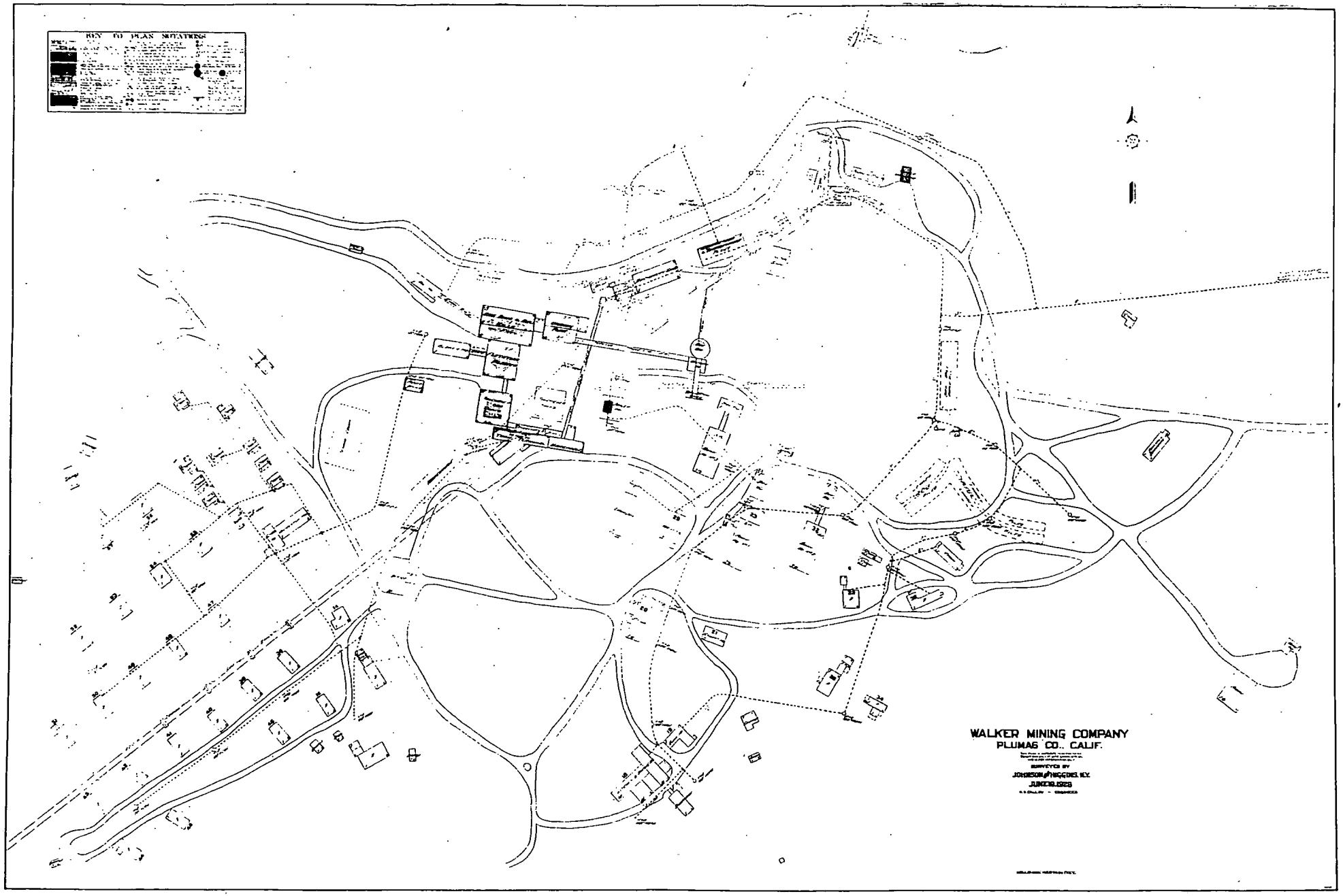
E. P. Hurt, Geologist, Henry J. Kaiser Company,
Dev. & Eng. Division.
Augustus Locke, Consulting Geologist, Henry J. Kaiser Company,
Dev. & Eng. Division.
H. A. Geisendorfer, former manager of the Walker Mine Company.

The distance from Oakland to Quincy is 296 miles, and two routes lead from Quincy to the mine. One route follows the state highway number 24 to Portola, a distance of forty-five miles. A dirt road with easy grades leads to the mine from a point two miles east of Portola. The length of this dirt road is 22 miles. It was found in good condition but in many spots the road was frozen. Many points gave evidence of being extremely soft and with poor bottom in warmer weather. Any heavy trucking over this route would require the use of considerable rock surfacing but no major construction. The other route from Quincy was followed by the party upon their return from the mine Friday afternoon, with considerable saving in mileage. This route follows a mountain road from the mine to Genessee, a distance of 12 miles. This portion of the road is through very rugged country and has a number of stiff grades and sharp turns. The road for the most part has been cut in the side of a slope and except in dry weather the passing of oncoming vehicles would have to be done with extreme caution. From Genessee to Taylorsville the road is a good dirt road for approximately 9 miles. From Taylorsville the road is a surfaced two-lane state highway. The total distance of this route from the mine to Quincy is 40 miles.

Mr. Geisendorfer, Mr. Locke and Mr. Hurt delayed their return from the mine for two days to make a further study of the ore reserves.



FINE GRINDING SECTION


KEY TO PLAN SHEETINGS
WALKER MINING COMPANY
PLUMAS CO., CALIF.
SURVEYED BY
JOHNSON & HIGGINS, M.V.
JUNE 20, 1928

GENERAL FACILITIES

AT

THE WALKER MINE

The Walker Mine was shut down in the fall of 1941 and some of its equipment was advertised for sale. At the present time, however, only a small amount of equipment or supplies have been sold and the mine, mill, and camp was found generally to be ready to reopen following a more complete check-up and conditioning normally required in any plant shut down this long. No essential equipment is lacking, but worn parts should be replaced to prevent serious shut downs after operations commence. Warehouses appear to have a good stock of general supplies and repair parts. A reasonable supply of reagents for the mill appears to be on hand. Main power lines are still connected but the distribution lines to the various camp buildings generally need to be reinstalled, together with a few feeder lines to some of the panel boards. Telephone lines will need replacing. Some facilities such as cooking utensils for the camp, mattresses, cots and so forth will be needed, although a few cots are still on hand. Some small tools will also be required although the warehouses appear to have quite a general variety.

Mr. Frank Irwin, general clerk who has been in charge of the property with only the assistance of a watchman, has an inventory of all plant equipment and supplies taken immediately following the shut down of the plant a year ago. The list has not been revised to account for the pieces of equipment and small tools sold or damaged, but he has kept a record of all shipments from which the inventory record may be corrected.

SURVEY OF MILL CONDITION

ORE BIN

The ore is transported from the mine in cars drawn by electric locomotives and dumped into the cylindrical steel bin, 2,000 ton capacity. The bin is in excellent condition. The ore is discharged from the center bottom of the bin on a rack and pinion operated gate to a 3'6" x 16' pan feeder.

The pan feeder should be overhauled at once, but can be operated in its present condition. One tail sprocket has been replaced by an ordinary plate and is badly worn. The rollers should be replaced and need new pins and bushings for the chain. Before starting up this feeder it should be dismantled and thoroughly gone over.

The feeder is driven by a long belt drive from the motor to a worm gear reduction. The low speed side of the worm gear is then reduced through a spur gearing to the head shaft. The gears are in good condition.

PRIMARY CRUSHER

The feeder discharges over a grizzly into the primary jaw crusher. The grizzly is worn out, but two spare grizzlies are in the warehouse. The primary crusher is a 15 x 24" Traylor jaw crusher. The jaws are worn. There are several replacement jaw and toggle plates around the mill. The bearings should be cleaned and inspected before starting up this crusher. From its external appearance, the crusher seems to be in good condition. The jaw crusher discharges on to an 18" belt which conveys the ore to the secondary crusher. The belt has been removed from this conveyor, has been rolled up, and is now in the warehouse. The belting is badly cut, but can be used for a limited period of time. There is a magnet to extract trap iron from the ore before it enters the secondary crusher. It appears that the drive, the troughing rolls, and return idlers are in good condition. This conveyor discharges into the secondary crusher.

SECONDARY CRUSHER

The secondary crusher is a 5½' Symons Cone crusher. It is driven by 200 h.p. 2200 volt Westinghouse induction motor through a twelve section V-belt drive.

There are spare eccentric bushings, cones, drive shaft with bevelled gear, and extra crushing cone, and the spare shaft mounted with mantle and two new mantles. From an external appearance the crusher seems to be in excellent condition.

FINE CRUSHING

The discharge from the crusher is fed to a belt bucket elevator. The belt and buckets seem to be in good condition. The casing is wood, the drive for the elevator is in operating condition, but in the very near future some of the gears and pinions will have to be changed.

The material from the bucket elevator is discharged on to a 4 x 8 vibrating Allis Chalmers screen. The V-belt drive and anti-friction bearings is throughout. The screen is a single-deck screen. There are several replacement screens in the mill. The screen is in excellent operating condition.

The undersize from the screen is delivered to a pair of rolls. They are Anaconda type crushing rolls, and it is counter shaft belt driven by a 100 h.p. motor. The rolls should be completely over-hauled before starting. The shells are badly worn; all liner plates should be replaced. The side of the casing is cracked and worn through. Three spokes of the fly wheel are broken but have been patched with gusset plates. The rolls have been operating in this condition.

The material which passes through the rolls is discharged into the bucket elevator and again goes under the screens. The under-size from the screen is fed on to a belt, which transports the crushed ore to the fine ore bins in the mill building. The bins are in very good condition.

The material is discharged from the belt mentioned above into the bins by means of a tripper. The tripper is belt driven. The drive wheels are badly worn and should be replaced before starting up the mill.

The main drive pulley is a cast iron pulley and should be re-placed at once. The pinion should be replaced for the tripper. The belt on the conveyor has been removed and rolled under the tail pulley and seems to be in good condition. The conveyor is driven by ten horsepower motor through a 12' flat belt drive on to a counter shaft, thence through spur gears to the head pulley. The gear and pinion are worn. The pinion will have to be replaced in the very near future. The head pulley is 19½" face by 30" diameter cast iron.

MILLS AND CLASSIFIERS

The fine grinding is done in Marcy ball mills. The ore is fed from the bins to the four ball mills by belt conveyors. The gates are of the rack and pinion type. All of the belt feeders should be dismantled, inspected, and overhauled. Some of the pulleys are in poor condition. The rolls and idlers should be overhauled and the drives should be overhauled and inspected.

The discharge from the feeder conveyors is discharged into the center of the mills. The feed end of the mills are equipped with scoop feeders, which take the rejects from the classifiers. All of the scoops need attention and relining on all of the mill.

The No. 1 mill has a steel scoop box, which appears to be in good condition. Mills Nos. 2, 3, and 4 have wood scoop boxes, which should be replaced by steel scoop boxes. No. 1 mill is 8 x 6, the Nos. 2 and 3 mills are 7 x 5, and the No. 4 mill is 7 x 7.

The No. 1 mill is driven by a 250 h.p. synchronous motor 2200 volts. The other mills are driven by 200 h.p. induction motors. The trunnions are in good condition. The gears and couplings are in good condition. The motors are in good condition.

We inspected No. 1 mill and found that the breast liners were worn and should be replaced in the near future. The feed and discharge liners were in good condition. We found some spare liners for the mils. The discharge from the mills flow through a launder into Dorr classifiers.

Before starting any of the mills, they should be cleaned out and inspected. The ball charges should be checked and all bearings should be thoroughly gone over and the motors should be cleaned. The couplings should be repacked with grease and the shafts checked for alignment.

The discharge from the mills is transported to Dorr Rake Classifiers through launders. The rejects from the classifiers are laundered to the scoop box of the mill. The fines from the classifiers flow by gravity through pipe lines to the flotation system. The classifiers appear to be in fair condition. Some of the rakes should be replaced. The plates for these rakes are on hand. The cases should be thoroughly cleaned and the gearing and bearings should be inspected.

There are several replacement parts on hand for the classifiers.

FLOTATION

The flotation system should be thoroughly cleaned and inspected before starting up. The battery of electric flotation cells appear to be in very good condition, but the motors and machinery should be thoroughly inspected before operation starts.

The flotation concentrates are fed to an Oliver Drum filter which appears to be in good condition. The canvass was fairly new before the plant shut-down, but during the period of idleness the wire wrapping that holds the canvass in place has rusted to a considerable extent and may need replacing. There is sufficient wrapping wire at the filter for one replacement.

TRAM

The concentrates from the filter are dumped into bins, which in turn dump into the tramway buckets. The gates are rack and pinion type. A thorough inspection of the machinery and equipment for the tramway should be made before operations are started. Some of the cables may need replacing, and the cable should be greased. The towers should be thoroughly inspected before a heavy load is imposed upon them.

The tramway is now operated periodically for transporting mail and small supplies to the camp. The tramway is about nine miles long, and the travel time is about one hour and fifty minutes one way. The machinery seems to be in good operation.

AIR COMPRESSORS

The inspection of the mining equipment above ground revealed that there were four Ingersoll-Rand air compressors about 3,000 cubic feet capacity. This capacity is installed near the portal of the mine. We were told that there is another compressor house with a capacity of about 1,500 cubic feet. The compressors which we saw seem to be in good condition, but should be thoroughly inspected before starting up.

Three of these compressors are belt drive and are of the Corlas Valve type. The other compressor is of the Poppet Valve type with synchronous motor mounted on the main shaft.

The air receivers are on the outside of the building, and should be inspected and tested before a pressure is applied.

PNEUMATIC TOOLS

There are twenty-one Ingersoll-Rand drifters with hand screw feed, complete with mounting attachments. Automatic feed can be installed on these drifters. There are no hose connections or water lines. There are eighteen stopers with automatic air feed, Gardner-Denver Model, 11S-1A. There are five jack hammers and about fifteen paving breakers. Sufficient column bars and mountings are on hand for the above mentioned tools, but are now under a snow pile and could not be inspected. All of the air hose has been removed from the camp and no hose is available at the camp for operating any of the pneumatic machinery.

The inspection of the warehouse showed that there was quite a number of repair parts on hand for the drilling equipment. It also revealed that there is sufficient stock of steel to start operations. Both round and square steel is on hand.

ROLLING STOCK

There are several mine cars which can be operated with a small amount of work being done on them. Several repair parts are on hand. Steel plate will be required, however, for repairing the boxes of the cars. The mine locomotives are now operating, but should be inspected by the operating crew so they will be acquainted with their condition before starting operations.

LUMBER

There is a large quantity of timber in the lumber yard, enough for one year's operation.

RESERVOIR

The high pressure water reservoir was not inspected, but our guide informed us that it needs a new cover.

GASOLINE SHOVEL

There is a link belt gasoline engine driven shovel. The cable is in good condition. The tracks, sprockets, rollers, etc., are in good condition. The swing gear is in fair condition. The radiator may leak, but can be repaired easily. This shovel has not run for about $1\frac{1}{2}$ years and in that time the pet-cocks have been closed. This indicates that the motor should be started with caution.

There is a 50' boom and drag line at the camp. There is a Cleatrack, No. 40 caterpillar tractor. The caterpillar is equipped with a Gar Wood hoist and dozer. This piece of equipment is in good condition and ready for operation.

BOILER HOUSE

The boiler house is used to generate steam for heating the mill building, the machine shop, and the hospital. It has two Scotch marine boilers with brick setting. One boiler is oil burning and the other is scrap wood burning. There are no feed pumps or injectors for these boilers. The boiler feed is made up from the camp water supply pressure.

FRAMING SHOP

The framing shop is complete with all tools necessary for mine operation. The machinery seems to be in excellent condition, and probably could be started up with a minimum of work.

MACHINE SHOP

The machine shop is completely equipped with machinery sufficient to maintain all equipment that is on the job. There are no electric welders on the job, but there is a considerable stock of welding rod.

BLACKSMITH SHOP

The blacksmith shop is equipped with all the necessary hammers and tools for doing general blacksmithing. When the mine was in operation, detachable bits had been used for drilling. Equipment for sharpening these bits has been removed from the plant and new equipment will be required to start operations. However, there is on hand an Ingersoll-Rand sharpener for shanking and threading the steel for the detachable bits. Heat treating and tempering forges and equipment are on hand for the steel sharpener.

It appeared that there is sufficient pipe and fittings on hand to start operations. Some pipe has been removed from the mine and can be reused. There is a considerable stock of new pipe and fittings in the warehouse. The extent of this inventory can be determined later.

To start milling operations, we believe, that a crew of about seventy-five skilled mill mechanics, electricians, machinists, etc., will be required. About thirty days will be required to put the mill into operating condition. During this time another crew of men will be required to put the mine into operating condition and dewatering.

MESS HALL

It was found that the building needs complete renovating before it can be used as a mess hall again. There are seven, ten man, tables which can be used. The range is still in the kitchen, but it is in very poor condition and we doubt if it can be repaired satisfactorily.

PRELIMINARY STUDY

OF

PRODUCTION RECORDS

AND

ORE RESERVES

On Friday, December 4, 1942 Mr. Geisendorfer conducted Mr. Knight, Major Rogers, Mr. Locke and Mr. Hurt through the 700 level, the principal opening and haulage level of the mine. Several sublevels, stopes, crosscuts and hoist stations were inspected as well as many of the geologic features.

Messrs. Locke, Geisendorfer and Hurt completed their study of the mine reports, maps, mill records and other data on December 6, 1942 and returned to Oakland.

The following section of this report by Mr. Locke and Mr. Geisendorfer analyzes the possibility of reopening the mine. Included are production records of the mine, estimates of tonnage and grade of ore available and an estimate of the cost of producing copper under the present conditions.

SUMMARY OF CONCLUSIONS

The estimate of the Mine Superintendent (Exhibit II), of 500 tons daily for two years, seems to us reasonable. Moreover, we believe that, with good luck in the recovery of the now flooded workings below the tunnel level, and in the mining of ore which might be recovered in a big block left above the tunnel in the middle of the mine, this figure could be increased.

At 500 tons per day safe cost of ore to the mill bin is $4.00 per ton.

By Augustus Locke

By H. P. Geisendorfer

HISTORY

The history is shown in the exhibits, plates and tables. Following are additional notes.

Ownership during principal production: 50.4%, International Smelting and Refining Co., balance, scattered. The concentrates have been smelted by the controlling owners.

Dividends paid total some $275,000, and the company now owes its controlling owners $655,000.

The Walker vein outcrops for a mile or more in a north-northwest line and is covered at either end by lava. It has developed a succession of 4 large chalcopyrite orebodies along a steeply east-dipping shear zone for a length of 7,000 feet; and, 1,000 feet farther, under the lava, another orebody which has not yet been proved to be large. The orebodies from south to north are: South, Central, North, 712, Piute, and North Piute. The wall rocks are sediments metamorphosed to hard Robinson schist which has flat, southwest-dipping layers which correspond, at least in part, to the original beds. The Central orebody above the 7th or Tunnel level was the richest, having contained originally about a million tons of 4% copper ore. The North orebody was large and low grade but became richer downward. The 712 was much smaller, low grade on the fringes, and contained many high grade stopes. The Piute was very large, low grade and much flatter than the others; its stoping width averaged 40 feet. All the orebodies plunge down the east-dipping shear zone below the levels reached by mining. The vertical developed depth in these orbodies varies between ~~700~~ 750 and 500 feet below tunnel level BELOW MAIN HAULAGE LEVEL — ABOVE THIS LEVEL IT IS MINED TO SURFACE

Through 1925, the Central orebody above the Tunnel was the principal producer. The North orebody by that time had been reached but little mined. Since then, development has gone down to a 10th level 500 feet deeper than the Tunnel level, and, under the Central and North orbodies, to a 12th level 750 feet deeper than the Tunnel. Development has also gone northward. In the later 1920's, although nothing was found to equal the rich Central orebody, increased tonnage output and good market kept the mine in a good position. Beginning 1931, the bad market, and later, man-power deficiencies all but ki it off.

After two shutdowns, the owners reopened the mine in 1939 in expectation of a better market and of good results from a campaign diamond drilling. Neither expectation was realized, and the International Company had to put money in from 1939 to 1941. In Octobe of the latter year, the mine was again closed, not for lack of ore because, with the low grade ore available, the operation was unprofitable at 12¢. The mine is flooded in the Piute to the Tunnel level to the south of the Piute to the 8th level, 150 feet deeper, where must find an outlet. The big pumps have been taken away from the property. The Piute hoist is in condition.

Flooded to

X Now flooded to tunnel level 1947

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X Now 1947 flooded to tunnel level

AVAILABLE ORE

See Plate I, Exhibit I, Exhibit II, and Table III.

Exhibit II is the closing report by Mr. W. T. Warren, Jr., the Mine Superintendent, discussing further operation. It contemplates:-

(1) Two years' operation;

(2) 500 tons of ore daily, or between 3½ and 4 million pounds of copper yearly;

(3) On a cost-plus basis.

These conclusions were based: (1) on good figures of tonnage and grade; and (2) the experience and judgment of Mr. Warren.

Mr. Warren, a recent graduate of Stanford, was associated with the operation in the intervals when it was running from about 1935 to the end, as Safety Engineer and, finally, as Mine Superintendent. He was enthusiastic and energetic, and, though not a seasoned old head, would be expected to get his ideas into the right shape on the ability of the mine to produce competitively.

It should be realized, however, that when this report was written, he and all his companions were acting under orders to retreat, and that they had no occasion to experiment with cost-plus operation. The closing ore reserve estimate (Table III) shows in the blocked, probable, and possible classes 3-1/4 million tons gross, and 1 million tons recoverable averaging 1.37% copper, 0.76 oz. silver, and 0.035 oz. gold. It might be expected that cost-plus operation could make a bigger proportion of the gross available, though there is no present way of telling how much.

COST OF ORE TO MILL BIN

(H. A. Geisendorfer)

With pumping in Piute end only (350 to 400 gallons per minute, with output of 500 tons per day, a $3.50 cost to the mill bin is th best that could be hoped for under favoring conditions. But there be grief from caving and handling wet sticky ore in the now-flooded Piute and North Piute, and some leeway is therefore necessary. $4 to the mill bin is as good a cost as can now be counted on at 500 per day.

Pumping from completed well with IT-6555 #5 ZK

FUTURE DEVELOPMENT POSSIBILITIES

(H. A. Geisendorfer)

Short Range

Develop the block above the Tunnel between the North orebody and the 712, 800 feet long and 1,000 feet high. This is very promising.

Prospect this same area below the Tunnel. The mineral shear zone is only a few feet in the hanging wall from the Tunnel.

Prospect the area under the 712 orebody. This can be done by raising from the 10th level.

Drive the 10th level under the North Piute orebody discovered on the 9th level; and prospect the country to the north of this orebody either by extending this level or by diamond drilling from the surface.

Long Range

On the Tunnel or 7th level, a DRIVE cross cut east (into the hanging wall) 400 or 500 feet, or a distance to be determined for deep diamond drilling 1,000 to 1,500 feet. This I would do opposite the central part of the North orebody and opposite the central part of the Central orebody. Ores of the North orebody are much higher in grade below the Tunnel level than they were above, but in both these orebodies on and above the 10th level they are much more broken up and harder to mine clean than they were above the Tunnel level. DUE TO PARALELL AND ADJACENT FAULTS - OFTEN CUTTING THE VEIN ON 10TH. LEVEL

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Reason: On the Tunnel level, paralleling the vein only a short distance in the hanging wall and dipping a little steeper than the vein, is a heavy fault. On the 10th level this fault is in contact with the vein and in places has entirely cut it off. I believe this fault to be largely post-mineral, a normal fault with a considerable throw. I believe deep drilling will show the vein on the hanging wall side of this fault and, away from its influence, probably richer in mineral and more easily mined. Some rich ore was found east of the fault on the 10th level, and I believe also on the 12th level, under the North Orebody.

Conclusion: If such drilling picks up the vein as anticipated, a larger mine can be expected at depth than has already been mined.

To mine this deep ore and open up levels 2,000 feet below the Tunnel level, a 4-mile crosscut tunnel has been projected from a point near Genesee. This tunnel would drain large volumes of water, prospect promising, parallel structures, and be used as a haulage tunnel. The portal would be near 4,000 foot altitude, and be easily accessible the year around. It would be easily accessible to rail facilities near by, or a low level rail connection could be built to the works at the portal. A fertile valley nearby could be used for housing, and for small farms for employees.

MINERALIZATION IN THE WALKER MINE SHEAR ZONE AND IN THE ROBINSON SCHIST.

THE WALKER MINE SHEAR ZONE IS A WIDE BELT OF FRACTURING IN THE ROBINSON SCHIST TRENDING ABOUT N.20 W. IT WAS DEVELOPED FOR A DISTANCE OF 1½ MILES, AND PRODUCED MORE THAN FIVE MILLION TONS OF ORE. THE FRACTURES HAVE BEEN FILLED WITH QUARTZ CARRYING VALUES IN COPPER AS CHALCOPYRITE AND SOME GOLD AND SILVER. MINERALIZATION HAS OCCURED IN TWO STAGES, FIRST THE QUARTZ CARRYING ABOUT ONE PER CENT COPPER, 1 OZ. SILVER, AND .05 OZ. GOLD. THIS BRITTLE QUARTZ FILLING WAS THEN SUBJECTED TO CROSS FRACTURING ALONG N.E. FISSURING INTRODUCING COPPER ONLY AS CHALCOPYRITE, WHICH RESULTED IN THE RICH ORE BODIES. MUCH OF THE STOPING WAS 30 FEET WIDE OR MORE, AND OCCASIONALLY AS MUCH AS 80 FEET.

THE SCHIST CARRIED CHALCOPYRITE MINERALIZATION TO A GREATER OR LESS DEGREE EVEN FOR GREAT DISTANCES FROM THE SHEAR ZONE. MANY DRIFTS AND CROSSCUTS WERE DRIVEN IN THIS WALL ROCK AND SAMPLED ON 5 FOOT INTERVALS ASSAYING FROM 0.20 TO 0.80 COPPER, AND LARGE AREAS NEAR THE SHEAR ZONE AVERAGED 0.80% COPPER.

THE SCHIST IS CUT OFF BY GRANITE ON THE SOUTH AND A DIAMOND DRILL HOLE WEST IN THE NORTH OREBODY ENTERED GRANITE AT 600 FEET, AND TO THE NORTH OF ANY WORKINGS GRANITE OUTCROPS TO THE WEST OF THE SCHIST. THE SCHIST GOES DEEP, EXPOSED ON CLOVER CREEK AT MORE THAN 2000 FEET BELOW WALKER MAIN WORKINGS, AND CARRYING CONSIDERABLE BORNITE.

A 20 FOOT CROSS DYKE OF BASIC ROCK RESEMBLING THE SCHIST IN THE SOUTH OREBODY WAS ENTIRELY BARREN OF MINERALIXATION. IT CUT THE SHEAR ZONE AT NEAR RIGHT ANGLE, BUT THERE WAS NO DISPLACEMENT OF THE VEIN. THE DYKE HAS A SLIGHT SELVAGE ON EACH WALL.

I AM STRESSING THE MINERALIXED CHARACTER OF THE WALL ROCK FOR FUTURE REFERENCE IN CASE THE COUNTRY MUST GO TO A MUCH LOWER GRADE ORE IN A FUTURE EMERGENCY, ESPECIALLY IF TAKEN IN CONNECTION WITH REMEINING ORE BODIES.

BERKELEY, CALIFORNIA 3/18, 1954, H.A. GEISENDORFER

CONCLUSIONS

by Augustus Locke

My work entitles me to no original opinion about either unexplored blocks, depth, or north extensions.

Evidently the geologists who worked here concluded that the mine would not improve with depth. In other words, they must have believed that the ore was affected primarily by the fault and not merely displaced by it later. The principal unexplored block, between the North and 712 orebodies, must likewise have been avoided for reasons which were considered good; for it has obvious attractions including some ore on its lower edge and barite and other mineralization at the surface 1,000 feet above. I suggest that anyone thinking of going after this block, or of going down after deep ore, first take a good look at the evidence and reasoning used by the geologists.

The mine is now at a low ebb, and any arrangements for exploration ought to be made on that basis. In other words, after many years with plenty of work, including diamond drill holes, to get extensions and parallel veins, it would be folly to think of this as anything but a very serious undertaking, with unquestionable risks of failure. Nevertheless, it is good practice, within bounds, to keep on trying experiments in the vicinity of good orebodies. I suggest, for example, the following:-

(1) A complete account of the reasons why certain parts had little exploration, including the part under the bottom levels.

(2) An attempt to put together the rock structure-pattern, with the idea that the rich ore might correlate with unique features which could be projected into unexplored ground. Relation of ore to given layers of the schist is an example. The geologists have already worked on this subject, but we found no record of it at the mine.

(3) In this kind of ground, with faults braided into the vein, it has often proved very difficult to get a sharp answer, even from such a thorough study as was made by the geologists here. Unless, therefore, the preliminary picture should prove clearly and strongly adverse, I should favor the kind of work which Mr. Geisendorfer suggests, if it could be done under easy conditions of terms, costs, etc. This would be a good depression job.

EXHIBIT I

WALKER MINING COMPANY

MANAGER'S REPORT - 1941

Mr. J. R. Walker, President
Walker Mining Company
818 Kearns Building
Salt Lake City, Utah

Dear Sir:

The following is the annual report of operations for the Walker Mining Company, covering the ten month period, beginning January 1, 1941 and ending November 1, 1941. Also, combined with this report is the closing summary.

MINING DEPARTMENT

Tonnages of Ore Mined and Produced (DRY)

Orebody	Ore Broken	% Cu	Ore Produced	% Cu	Waste Broken	Waste Produced
South	1,307	2.24	7,465	1.18		
Central	24,163	2.02	27,712	1.75	65	
North	86,727	1.30	112,957	1.26	322	
712	54,447	1.37	50,987	1.33	7,113	
Piute	81,845	1.34	83,127	1.37	7,744	
North Piute	8,297	1.17	8,280	1.22		
TOTAL	256,786	1.40	290,528	1.35	15,244	
		0.67 Oz. Ag.		0.66 Oz. Ag.		
		0.042 Oz. Au.		0.042 Oz. Au.		

Summary of Heading Progress for Mining

Headings	Orebodies South	Central	North	712	Piute	No. Piute	Total
Large Size Drifts			163	71	214		448
Large Size Crosscuts			79				79
Small Size Drifts				277	43		320
Small Size Crosscuts				4			4
Small Size Stope Drifts					19		19
Three Compartment Raises						43	43
Two Compartment Raises				188		22	210
Large Size Chute Raises			82		689		771
Small Size Chute Raises				48	91		139
Small Size Stope Raises				132			132
TOTAL			324	720	1,056	65	2,165

Summary of Heading Progress for Development

Heading	Orebodies South	Central	North	712	Piute	No. Piute	Total
Large Size Drifts			145	452	1,200	458	2,255
Large Size Crosscuts			32	45	136	180	393
Small Size Drifts				786	81	80	947
Small Size Crosscuts				263	210	188	661
Three Compartment Raises				20		30	50
Two Compartment Raises				269	35	53	357
Large Size Chute Raises					25		25
Small Size Manway Raises				91	6		97
TOTAL			177	1,926	1,693	989	4,785
GRAND TOTAL - MINING & DEVELOPMENT			501	2,646	2,749	1,054	6,950

Summary of Diamond Drilling Development

Orebody	No. of Holes	Total Footage	Remarks
North	4	218	Developed no ore.
712	7	1,087	Developed no ore.
Piute	17	1,558	Thirteen holes of 1,313 feet total length failed to develop any ore. Four holes of 245' total length helped block out 1,300 tons of assured ore and 5,000 tons of probable ore.
No. Piute	9	831	Four holes of 302 feet total length failed to develop any ore. Five holes of 529' total length helped block out 13,500 tons of assured ore and 20,600 tons of possible ore.
Surface	1	313	Developed no ore.
TOTAL	38	4,007	

DIAMOND DRILL MINING

Breakage from Diamond Drill blasting amounted to 50,851 tons, at 1.37% Cu. and was carried out in 420B, 630, 640-740, 830, 920-920A Blocks of the North Orebody 705B Block of the 712 Orebody, and 845A, 855B Blocks of the Piute Orebody. The total footage of drilling required for this breakage amounted to 23,880 feet, making an average of 2.13 tons per foot of hole.

This brings the total tonnage broken by this method to 161,405 tons and the total drill footage to 61,167 feet, thus averaging 2.64 tons per foot of hole.

At the time operations were suspended, the Level Pillars between 420B and 310A Stopes were being recovered by this method and upon completion would have finished the Diamond Drill mining program.

SUMMARY OF MINING

SOUTH OREBODY

No development work was done in this Orebody and mining was confined to the recovery of 750A Pillars.

Breakage and Production figures for the Orebody are as follows:

	Breakage			Production	
	Tons	% Cu	Waste	Tons	% Cu
Stopes	1,307	2.24		7,465	1.18
Total	1,307	2.24		7,465	1.18

There was no additional ore developed in this Orebody and the recoverable amount was reduced from 160,000 tons at 1.33% Cu., to 155,400 tons at 1.31% Cu., through mining and transferring to non-recoverable pillars. There is no broken ore remaining in the Stopes.

CENTRAL OREBODY

No development work was done in this Orebody and mining was limited to 880B and 1080C Stopes.

Breakage and Production figures for the Orebody are as follows:

	Breakage			Production	
	Tons	% Cu	Waste	Tons	% Cu
Stopes	24,163	2.02	65	27,712	1.75
Total	24,163	2.02	65	27,712	1.75

The recoverable ore reserve was reduced from 85,900 tons at 2.01% Cu., to 69,900 tons at 1.99% Cu., through mining and caving. There is no broken ore remaining in the Stopes.

NORTH OREBODY

Development work in the Orebody was confined to extending 1201DN and driving two short crosscuts, 1211xcE and 1212xcE, into the hanging wall on the 1200 Level. What probable ore was developed, proved to be badly faulted and would present a number of difficulties in order to extract.

937CxeW, 938CDN, and 938CDS, were driven in order to prepare 920-920A Pillars for recovery by Diamond Drilling.

973ADN, and 877ARs provided a slusherway and ventilation to facilitate the mining of 840C Stope.

NORTH OREBODY (Continued)

Breakage was carried out in 420B Stope, 420B Pillars, 620B Stope, 630 Pillars, 640-740 Pillars, 740-760 Pillars, 830 Stope, 840A Stope, 840C Stope, 920-920A Pillars, 920B Stope, and 940A Stope. Diamond Drill Blast work accounted for 44,251 tons of the total breakage.

Breakage and Production figures for the Orebody are as follows:

	Breakage			Production	
	Tons	% Cu	Waste	Tons	% Cu
Headings	2,854	1.02	322	2,854	1.01
Sideswipes	343	0.75		343	1.01
Stopes	83,530	1.32		109,760	1.26
Total	86,727	1.31	322	112,957	1.26

The recoverable ore was reduced from 228,700 tons at 1.30% Cu. to 151,400 tons at 1.25% Cu., through mining and writing off of caved areas. There are 2,450 tons of 1.33% Cu. ore remaining in the Stopes.

Diamond Drilling was confined to short holes into the footwall and hanging wall on the 1200 Level North. These holes consisted of Nos. 76, 77, 78, and 79, and did not locate any ore.

712 OREBODY

Exploration work was done principally to develop the footwall vein and prepare the various blocks for mining. 315C, 317C, 319C, 322C, 323C, 324C, 325C, 329C, 330C, 331C, and 332C, are headings driven to connect, open up and develop the 300 Level and prepare 317 Block for stoping.

406D, 407D, and 408D are headings driven to explore the extent of the vein above 517D Block.

591B and 592B were driven from 517BDS, which is the main footwall drift heading south, to prospect for the vein.

593B was driven to explore the upward extension of the vein and prepare 517D Block for stoping.

595B, 596B, 597B, and 598B, are headings driven to open up and prepare 517C Block for stoping.

622F were crosscuts driven to explore the footwall vein in 617D Block and 616F was a raise driven to prepare 617D Block for stoping.

623F and 624F are headings driven to prepare 617C Block for stoping.

678EsDN and 679EsDN were driven to explore the footwall vein on the sub-level.

712 OREBODY (Continued)

711E is the main footwall drift exploring north along the footwall vein and also 723E, which took off from 711E.

713E, 720E, and 722E, are raises driven to provide ore passes for 617D, 617C, and 617A Blocks respectively.

716E is a raise driven to prepare 705E Block for stoping.

735C is a drift driven to prepare 705A Block for stoping.

1017 is the main level heading being driven to connect with the Piute Orebody and 1076B is a crosscut from this heading to provide a drill station.

1085B was driven from 1077B to prospect for the southward extension of the Piute mineralization; and 1087B and 1088B are development headings driven from this drift.

There was also ore broken in 405E, 417B, 517C, 605E, 617C, 617D, 705A, 705E, Stopes, and 705B Pillars.

Breakage and Production figures for the Orebody are as follows:

	Breakage			Production	
	Tons	% Cu	Waste	Tons	% Cu
Headings	6,664	1.17	6,247	6,664	1.27
Sideswipes	1,332	1.33	527	1.532	1.64
Stopes	46,251	1.40	339	42,791	1.33
Total	54,447	1.37	7,113	50,987	1.33

Diamond Drilling consisted of seven holes and none of them developed any ore. Holes Nos. 91 and 92 were drilled 61 feet and 69 feet respectively, for distances from the 600 Level to prospect the footwall vein and they proved to be an absolute blank. Hole No. 82 was drilled 74 feet from 711EDN to prospect the footwall vein and yielded no ore. Hole Nos. 74, 75, 102, and 102A, were drilled 260 ft. 332 ft., 260 ft. and 31 ft. respectively from the 1000 Level to prospect the southward extension of the Piute Orebody. Some mineralization in these holes, but nothing to call ore.

Recoverable ore reserves were reduced from 254,100 tons at 1.48% Cu., to 229,900 tons at 1.50% Cu. Although 25,728 tons of additional recoverable ore were developed, the decrease is due mainly to extraction. 3,000 tons of 1.22% Cu. ore remain broken in the stopes.

PIUTE OREBODY

Development work in Piute was confined to the 900 Level South and from 1017DN, which was being driven from 706AW to connect with the Piute Orebody.

878ADS is a drift driven to service 845C Block.

PIUTE OREBODY (Continued)

903BDS is the main level heading driven to prospect the southward extension of the ore, and 843C and 944 C were crosscuts driven from this drift to prospect the footwall and hanging wall. Narrow high grade veins separated by bands of waste, were encountered in this development work and the face of the heading still was showing these narrow veins at the time operations were suspended. Two narrow stopes, 946A and 946B, were extended up on these veins from 903B, and in the case of 946B, the veins appeared to be pinching out about 35 ft. up the dip (31 deg.). 928C, 929C, 930C, and 931C, were flat raises with herringbone connections driven from the 900 to the 800 Level, to prepare 945 and 955 Blocks for stoping. These raises and subsequent stoping, showed the vein to consist of bands of ore separated by bands of waste, instead of being solid as had at first been thought.

941C is a raise driven from the 900 ore pocket to facilitate the production of 915 Block directly into the pocket; and 946C were drifts driven from the raise to serve as slusher ways.

949C is a drift driven from 903BDS to open up the footwall vein in 946A Stope.

1017DN is the main 1000 Level heading, driven to prospect the downward extension of the Orebody and to connect with the shaft. 1077B, 1078B, 1079B, 1080B, 1082B, 1084B, 1089B, and 1090B, were development headings from 1017DN, to prospect the 1000 Level. Of these, 1079BxcW was the only place to give promise of ore.

1083B were drifts driven from 1079BxcW to sill out and open up the vein, which averaged about 5 ft. in width.

1086B is a raise extended up the dip (31 deg.) on the ore and yielded some very good ore, being especially high in gold. The gold values averaging 0.14 oz. for the entire raise, which included waste broken with the ore. The vein pinched to less than one foot wide at a point 75 ft. up the dip.

1091B were drifts driven from 1086B at a sub-level elevation to prospect the extent of the vein. The south drift gave the best showing, averaging 0.600 oz. in gold, but at the time of suspension of operations, the ore in the face gave indications of spraying out.

Breakage was carried out in 845, 845A, 845C, 855A, 855B, 855C, 865, 915A, 915B, 915C, 945, 945A, 946A, 946B, and 955C Stopes.

Breakage and Production figures for the Orebody are as follows:

	Breakage			Production	
	Tons	% Cu	Waste	Tons	% Cu
Headings	10,015	1.34	7,272	10,015	1.39
Sideswipes	6,763	1.47	379	6,763	1.46
Stopes	65,067	1.33	93	66,349	1.36
Total	81,845	1.34	7,744	83,127	1.57

PIUTE OREBODY (Continued)

Diamond Drilling development consisted of 17 holes. 16 of these, Nos. 83 to 90 inclusive, 93, 94, 95, 98, 99, 104, and 105, being drilled from the 1000 Level, ranging in length from 25 to 226 feet. Only three of these, Nos. 85, 86, and 87 drilled from 1079BxcW, developed any ore. The other hole, No. 106, was drilled 75 feet from the 900 Level South and the first 15 ft. yielded fairly good assays.

Recoverable ore reserves were reduced from 508,200 tons to 320,800 tons, at 1.21% Cu. 17,378 tons of additional ore was developed, but the decrease is due to extraction, writing off of low grade marginal tonnages, and reclassifying tonnages in some blocks. There were 1,540 tons of 1.33% Cu. ore broken in the stopes.

NORTH PIUTE

All development work was confined to the 900 Level and 934-40C Block.

934C, 939C, and 947C, were the main level drifts driven to prospect the north and south extension of the ore. 950C and 952C were development crosscuts driven from 947CDS.

940C and 942C were raises driven to block out and prepare 934-40C Stope. 948C, 951C, 953C, and 954C, were development headings driven from these raises to open up and prepare this same Block. The commercial ore in this block lies in a zone varying from 5 to 30 feet wide on the hanging wall side, and the upward extension of the ore would probably stop at the 800 Level elevation or less.

The only Stope being mined in this Orebody is 934-40C Block.

The Breakage and Production figures for the Orebody are as follows:

	Breakage			Production	
	Tons	% Cu	Waste	Tons	% Cu
Headings	5,755	0.97		5,755	0.88
Sideswipes	1,208	1.62		1,208	1.82
Stopes	1,334	1.58		1,317	1.83
Total	8,297	1.17		8,280	1.22

Diamond Drill development consisted of one Surface Hole, No. 57, which was completed at 1028 feet and yielded some mineralization but no ore, and 9 holes underground, ranging from 60 to 149 feet in length. Of these holes, Nos. 80, 81, 100, and 103 developed no ore. Nos. 96, 97, and 101 helped develop the ore in 934-400 Block, and Nos. 107 and 108 showed about 5 feet of good ore as well as scattered mineralization below the 900 Level.

Recoverable ore reserves were reduced from 105,000 tons to 55,200 tons of 1.70% Cu. 1,858 tons of additional recoverable ore was developed and the decrease is due to extraction, writing off of some low grade tonnage, and reclassifying of other tonnages. The broken ore in stopes amounted to 17 tons of 2.30 Cu.

MINING CLAIMS

The assessment work on the Copper King Group of seven claims was started on June 27, 1941 and completed on August 5, 1941. The main tunnel was extended 30 feet, at a total cost of $696.41.

A new group of seven claims, known as Add Nos. 1 to 6 and Add Extension were located on July 11, 1941, to cover any possible extension of the Piute Orebody.

Discovery pits were dug on each of these seven claims from July 17th to July 31, 1941.

MINE OPERATING IMPROVEMENTS

During the past year, the mine operating improvements were kept to a minimum, owing to the uncertainty of future operations. The following work which was necessary for continued operations was completed.

1. Piute 700 Station re-timbered and that portion of the shaft between the 700 Station and the sub-level. Also some extensive re-timbering of the Piute Shaft between the 900 and 1000 Levels.

2. 784 Pump Station was entirely re-built. The pumps here were on timber over the sump. This timber had rotted to such an extent, that it was no longer safe. As it was necessary to entirely re-construct the old station, an entirely new arrangement of pump setting was decided on, which made for better operating and greatly reduced the number of pipe fittings. This resulted in a marked increase of pump capacity and reduction in pumping time.

3. Four of the main tunnel cars were taken apart and put on the 1000-706 haulage. For their operation there, it was necessary to do a very limited amount of work, such as re-modeling chute lips and changing some timber. This operated very satisfactorily in reducing the number of men on the haulage crew and increasing tonnage.

PRECIPITATES

Recovery of copper from mine water was conducted during the spring months. The cleanup resulting in the following:

Precipitates produced, dry tons	20.201
Grade, % Copper	67.3
Ounces Silver per ton	0.25
Ounces Gold per ton	0.005

MILL

Operations of the Mill for the year are summarized as follows:

Ore milled, dry tons	291,438.00
Grade, % Copper	1.350

MILL (Continued)

Ounces Silver per ton	0.695
Ounces Gold per ton	0.050
Operating Days	258.08
Ore milled per day, dry tons	1,129.25
Ratio of Concentration	20.3816
Concentrate produced, dry tons	14,245.56
Grade, % Copper	25.197
Ounces Silver per ton	11.539
Ounces Gold per ton	0.7689
Lime Scale recovered, dry tons	53.49
Grade, % Copper	7.735
Ounces Silver per ton	9.226
Ounces Gold per ton	13.1887
Total Concentrate, including Lime Scale, dry tons	14,299.05
Grade, % Copper	25.132
Ounces Silver per ton	11.531
Ounces Gold per ton	0.8154
Recovery, Percent - Copper	91.33
Silver	81.36
Gold	79.30
Ball Mill Hours	18,002.5
Percent of Ball Mill hours in operation	72.66
Dry tons per Ball Mill hour	16.19
Grind by Ball Mills - plus 48 mesh	4.66
- minus 200 mesh	45.22
Tailings Grade, % Copper	0.12
Ounces Silver per ton	0.111
Ounces Gold per ton	0.0117

Reagent and grinding ball data:

	Pounds Per Ton	Cost
Lime	0.521	$0.0056
Pine Oil	0.105	0.0071
Xanthate Z3	0.082	0.0110
Xanthate Z5	0.041	0.0111
Sodium Sulphide	0.0075	0.0004
Total	0.7567	$0.0352
Grinding Balls - 3", 4", and 5"	2.475	$0.0856

MILL (Continued)

Mill Notes:

Symons — One shaft and head ruptured, necessitating purchase of new unit.

Ball Mills — Re-set No. 3 Reduction Unit.
Replaced one set of bearings in No. 4 Reduction Unit.
No. 2 Shell cracked and welded, finally broke again, and a new half shell was installed.
No. 3 Shell started to separate at middle flange joint. Shell re-set and new flange bolts installed.

Flotation — A further change made in treatment of middlings. The 50 ft. Dorr thickener was cut into the middling circuit to thicken the middlings before pumping back to Ball Mill circuit.

Filter — One third of the vacuum pipe on the Oliver Filter was replaced.

Tailing Pond - One Break in tailings dike occurred in March, necessitating a sand bag patch in the dike. No serious loss of tailings resulted.

On account of the Mine closing October 24, 1941, the last ore was milled October 30, 1941, and cleanup of concentrate and lime scale continued November 24, 1941.

GENERAL

During the year, it was realized that the ore reserves which could be at 12¢ copper, were rapidly becoming exhausted Before the year was up lose approximately the daily tonnage from the following places:

Ore Reserves Exhaust

600	Tons from 706 Shaft
300	Tons Diamond Drill rock from North Orebody Pillars and tunnel.
300	Tons from Piute 800 Level
1,200	Tons Total

This would bring the daily production down from 1500 Tons per day, (the necessary tonnage for profitable operation), to around 300 Tons. Possibly an additional 175-200 Tons could be picked up from other parts of the Mine; but this would only mean a production of 475-500 Tons per day. This tonnage would come from numerous working places scattered all over the Mine and with the exception of some ore in 712, and 900 Piute; from places abandoned in the past as being unprofitable. Various estimates were made with the result that it was entirely out of the question to break even, even with a moderate increase in the price of copper.

However, last year development work opened up a very attractive body of ore on the South Piute 900. This was larger and of better grade than on the 800 above and if it continued to improve going down to the 1000, might very well re-place the stopes that were exhausted. In fact, with a continued improvement in grade, which the Geological Department believe very possible, the outlook for future operations would be very bright.

MILL (Continued)

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300 Tons Diamond Drill rock from North Orebody Pillars above the tunnel.
300 Tons from Piute 800 Level
1,200 Tons Total

This would bring the daily production down from 1500 Tons per day, (the necessary tonnage for profitable operation), to around 300 Tons. Possibly an additional 175-200 Tons could be picked up from other parts of the Mine; but this would only mean a production of 475-500 Tons per day. This tonnage would come from numerous working places scattered all over the Mine and with the exception of some ore in 712, and 900 Piute; from places abandoned in the past as being unprofitable. Various estimates were made with the result that it was entirely out of the question to break even, even with a moderate increase in the price of copper.

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GENERAL (Continued)

If the necessary development work had been done from the Piute Shaft have had a serious effect on production, so 1017 from 706 Shaft was to get in under the South 900 Piute.

In August of the present year, sufficient work had been done by drif crosscutting, and Diamond Drilling, to satisfy the management that t ore in all probability, did not extend down to the 1000 in sufficien to make a new mine. Nevertheless, in order to exhaust all possibili work was continued here until about the middle of September. From t work was confined to the small body of ore in 1086B. Here, as menti elsewhere in this report, a small showing of ore of much higher valu normal in gold was encountered. There was no chance of this develop anything that would make a new mine, but if operations were to be continued under some form of a Government subsidy, it might well develop into something that would help out. Further development proved this body to be extremely irregular, with a bad hanging wall and hence difficult and expensive to mine, and only capable of producing a limited tonnage.

to satisfy the Management (Acme)

On October 24th, it was decided to cease operations and pull the pumps. Before the pumps were removed, all equipment and material that would pay to salvage was hoisted from below the tunnel level, and an eight foot, reinforced concrete bulkhead was built in 1017; so that the north end of this area could be operated from the Piute Shaft without pumping out 706. To make the connection from the 1000 Piute, would require 115 feet of drifting and 20 feet of raise.

During the last week of October and early part of November, all available material in Mill Bins, middling tanks, etc., was run through the Mill. The two concentrate thickeners were cleaned out and shipped. The Mill was then carefully gone through for Lime Scale and this material sacked and shipped. All equipment was gone over and left in shape for the shut down, and the same was done for the Mine equipment.

We were very pleased that this wind up work was done without an accident of any kind.

Respectfully submitted,

H. M. Hartmann
Manager

HMH:dm

GENERAL (Continued)

If the necessary development work had been done from the Piute Shaft, it would have had a serious effect on production, so 1017 from 706 Shaft was pushed to get in under the South 900 Piute.

In August of the present year, sufficient work had been done by drifting, crosscutting, and Diamond Drilling, to satisfy the management that the Piute — ore in all probability, did not extend down to the 1000 in sufficient size, to make a new mine. Nevertheless, in order to exhaust all possibilities, work was continued here until about the middle of September. From then on, work was confined to the small body of ore in 1086B. Here, as mentioned elsewhere in this report, a small showing of ore of much higher value than normal in gold was encountered. There was no chance of this developing into anything that would make a new mine, but if operations were to be continued under some form of a Government subsidy, it might well develop into something that would help out. Further development proved this body to be extremely irregular, with a bad hanging wall and hence difficult and expensive to mine, and only capable of producing a limited tonnage.

On October 24th, it was decided to cease operations and pull the pumps. Before the pumps were removed, all equipment and material that would pay to salvage was hoisted from below the tunnel level, and an eight foot, reinforced concrete bulkhead was built in 1017; so that the north end of this area could be operated from the Piute Shaft without pumping out 706. To make the connection from the 1000 Piute, would require 115 feet of drifting and 20 feet of raise.

During the last week of October and early part of November, all available material in Mill Bins, middling tanks, etc., was run through the Mill. The two concentrate thickeners were cleaned out and shipped. The Mill was then carefully gone through for Lime Scale and this material sacked and shipped. All equipment was gone over and left in shape for the shut down, and the same was done for the Mine equipment.

We were very pleased that this wind up work was done without an accident of any kind.

Respectfully submitted,

H. M. Hartmann
Manager

HMH:dm

EXHIBIT II

WALKER MINING COMPANY

MINE SUPERINTENDENT'S CLOSING REPORT

The following report is a discussion of the Walker Mine proper in general, and available ore in particular. As an aid to studying this report, a complete set of longitudinal-vertical projection prints are included which should be followed during the reading. Discussion starts with the South Orebody, West Vein; then the South and Central Orebodies, etc., proceeding North through the Mine and ending with the North Orebody, Piute. Quite complete operating notes regarding the condition of raises, caved areas, ore passes, etc., have been marked on the prints and will be of some value to an operator.

SOUTH OREBODY - WEST VEIN

The only available ore in this section of the Mine is in the 775 N and S Stope Blocks. The engineer's reports show the available ore and values. The grade is as low as to make it uneconomical to mine at 12¢ copper. All broken ore was pulled out, but the condition of the area is amenable to further mining. As a suggestion, a suitable method would be the driving of sub levels (as shown) and the subsequent slotting and mining by diamond drills. This would not be too difficult to accomplish, although the block would be rather expensive to mine considering the grade of ore.

There is still some ore left below the 700 Level, but it is quite lean and presents many problems. First, the service winze (700aWz) is in poor shape for hoisting; it would need re-timbering from the 700 Level to the 900 Level. Secondly, the cost of dewatering and the cost of pump maintenance per ton of ore would be very high. Third ly, all existing stopes are either caved or filled and any new blocks would have to be produced through the levels; levels are not in shape to handle ore, and the shaft pockets are merely "prospecting" pockets and not very good at that. The mining problem would be quite costly as there is a persistent hanging wall fault of great length which is located some 3 to 12 feet from the ore. The ground on either side of this fault is rotten and will not hold. Stoping within 6 feet usually brings in the fault, plus some eight to ten feet of waste. Of course, a cut and fill method, or a timber method of stoping could be used, but again the cost would be very high for the amount of ore and the grade.

SOUTH AND CENTRAL OREBODIES

The South Orebody area shown on this long section represents the hanging wall vein. The hanging wall vein has always been a higher grade than the footwall vein, but has been made up of stringers that have little width. Regarding the ground available below the 700 Level, the same facts hold true as mentioned under discussion of the "SOUTH OREBODY." Above the main level all blocks ex-

SOUTH AND CENTRAL OREBODIES (Continued)

cept two have been cut off by the granite, and have been mined completely. The two blocks left (really only one), are in the 750 A zone. 750A Stope proper was mined previous to 1937, but mined some 30 feet wide on a vein of about 6 feet. The stope finally caved to the hanging wall fault on the north end. As the south end was still open for an ore pass, some development was done here above the 600 Level and the vein opened up. It is possible to mine this block, but at a high cost. The amount of work involved, plus the narrow width of the vein, plus the time and money to re-open service ways, decided us against mining this block. Production would be low, and the cost very high.

The Central Orebody above the 700 Level is essentially lost and not available. The main parts were caved some years ago, and since that time the majority of the pillars have been robbed. There are several small areas left above the 500 Level which, under some conditions, might be recovered; however, the amount of repair work necessary and the time involved to prepare the blocks, plus the hazard and the small tonnage, made it uneconomical for us to handle.

The Central Orebody below the 700 Level is mined out except for one small block - 880A. This block was not mined because it was not economical under existing conditions. It is directly below the main transformer rooms and almost directly under the 706 hoist; the ore pass to the main haulage level on the 1000 Level is blocked, due to 1080C Stope caving during drawing off. Blocks south of the shaft have been completely mined out and for the most part filled. These blocks presented a difficult mining problem, due to bad ground conditions, which was overcome by leaving frequent pillars, and dropping off areas that would have slowed up the breakage progress. Previous to 1937, a cut and fill method was tried on these blocks which was not successful, due to slow breakage and production as compared to shrinking and using plenty of pillars.

After completion of the 880 and 880B Blocks, these areas were used for waste disposal. The dump is very handy, and is still available for another years supply of waste.

Below the 1000 Level, no ore was found.

NORTH OREBODY

With the exception of two small blocks of ground, the North Orebody has been mined to completion. Above the 700 Level, there is a small block of ground left in 420B Stope that we were diamond drilling for breakage when the mine closed down. The work was proceeding by slotting, and will take about six weeks work to complete. On completion, the sill pillars for 310A Stope will be out, which will let down about 2,000 tons of broken rock that is in this stope. All other blocks above the 700 have been thoroughly gone over several times - the last time by diamond drilling all available pillars, which work completed the mining to the end point.

NORTH OREBODY (Continued)

On the 700 sill there is left the "740-760" pillar area. Work is about 1/3 completed here and the remaining ore is still available.

Work below the 700 Level was completed with the diamond drilling of available pillars and the subsequent caving of the largest stopes. The only real block of ground that we had here was that included in the 920 and 920A Stopes. This ground was mined completely - the minimum of sheet pillars were left, and the ore boundaries on the North and South were mined clean as far as ground conditions would allow. The area south of 797 Raise was mined mainly to keep up production while the 920 and 820 Blocks were being prepared. This ground was very broken up by foot end hanging wall faults and by numerous cross faults. We simply "grabbed" ahold wherever possible; mining the favorable ground as fast as we could, and then coming back andlong holing the pillars to the end point. Shrinking the ground after first preparing it by a system of strike raises was the method used - and which adapted itself very well to our needs.

On the 1200 Level, mineral was picked up in considerable quantity below the 1020 and 1030 Blocks. The faulting, however, instead of being less intense, was much heavier and the mineral highly broken up and scattered, which automatically closed the ground to economical stoping.

As an operating note, it should be remembered that 794 Raise is in very poor shape due to dry rot. 706E Raise is in excellent shape and can be used as a service manway to the 400 Level. Notes on the prints indicate caving areas, serviceable manways, waste areas, etc.

712 OREBODY (FOOTWALL AREA)

The footwall area may be divided into four blocks. Each block has been completely blocked out and prepared for stoping above the 700 Level. Ore below the 700 Level appears very sketchy, and in fact below the 600 Level, it has been very disappointing. Extensive prospecting was carried out on the 1000 Level with small success. On the long section, the four areas have been laid out for observation, with operating plans for future work. By checking the assay and geological maps, information as to tons and grade may be had. Following is a discussion:

1) The 17D block was carefully prospected and laid out, and a shrink stope started. We had been somewhat apprehensive due to blocky ground conditions and fairly low grade ore. After carrying the stope up some 60 feet we found that fissuring was too heavy for us to hold protective pillars. Plans were made and show on the print, for cutting an intermediate level from which to proceede with shrinkage operations again. This was decided upon because of the excellent ore blocked out from the 500 Level to a point some 20 feet below the 400. Work was actually started when word

712 OREBODY (FOOTWALL AREA) (Continued)

of the shut down came. This plan can be carried to completion very nicely.

2) The 17C block is an excellent shrinkage area. The hard work has all been done and the ground prepared for fast stoping. Between the 600 and the 500 the ore was very spotty, and the ground a bit rotten. However, all of the good ore was extracted and work carried to the 517C Block. The grizzly level has been established, benches cut, etc., and the stope is now in good shape. The operating plan was to carry the block through to the 300 Level and establish another grizzly level, using 410DRs as the main service above the 400. The ore on the south is being stopped by raise laterals, and on the north by a distinct waste dike. The ore grade is good from a point 40 feet below the 400, up through the 300, and the mining problem is simple.

3) The 17A block is well laid out and prepared for stoping above the 500 Level. At the time this work was done, we had planned to hand tram the ore from the 500. Prospecting on the sub level, at a later date (678EsDN), showed ore from the sub level to the 500. It was then decided to open up this ground before stoping above, in order to get a little fast breakage and also to provide a gravity ore pass direct through to the main haulage level and save the high cost of hand tramming. Work on the sub level has been completed, and work on driving the main haulage level in under the ore was almost completed (another 50 feet to go), when word of closing down came in. A separate layout sheet for this entire block is included in the prints, and shows plans for the transfer raise, location of the ore, etc. There is some 60,000 tons of a 1.88% copper in the block.

4) The 05E and 17B blocks are a bit more complicated than the others, and present a good many "ifs." 605E Stope is a grand stope, and can be continued without too much trouble. When word of closing was received, the stope was pulled dry, but only after a protective bulkhead was placed in the service raise. The plan for continuing this stope is through two slusher, sub-level drifts - from 613F Raise through to 696E Raise, cutting a slot through to 605E Stope, and then diamond drilling and breaking to the slot from both sides. The ground around 696E Raise is not any too good, and caution must be used when breaking gets close. On the satisfactory completion of the block, and providing the ore pass through 696E Raise is still intact, the pillars in 517B Stope may be mined.

The ground on the North side of this block is very much altered, and the ore is good grade only in spots. This makes selective mining without timber diffi-

712 OREBODY (FOOTWALL AREA) (Continued)

cult. The character of the ore is very "gummy," due to its altered condition and we found that in 517B Stope we could only produce 30% of the broken ore by gravity - the remainder packing tight in the ore passes, and having to be slushed to clean it out. We did slush out the ore, but the operation was too costly to try again.

The ore in this block above the 400 had to be square setted (405E Stope). It is quite good ore, but dangerous ground - which makes it expensive to break. 405E Stope was carried through to the 300 Level and silled off. At this point the ground is highly oxidized and so wet in the spring as to make it practically impossible to mine. The 417B block may, or may not be a good one. The plan was to carry it with square sets for about three floors in order to determine the character of the ground. If satisfactory at this point, we intended to carry it as a stull rill - dropping the ore to the 400 Level and slushing it over to the ore pass. This block of ore can be mined, but will be rather high cost - any may present more trouble than anticipated.

Under "operating notes," it should be remembered that this entire 712 area is very wet in the spring; in fact after a heavy winter, we have had to limit production to one chute because the others were impossible to load from due to water. Also, the upper levels are highly oxidized and it is doubtful if the Mill could handle much of this ore at a time. All pipe lines, track, etc., are in place and in good condition. Service raises and levels are all open and in excellent shape. The main trouble in this Orebody is that the grade is not too high, and the ore blocked out will not last very long. 712 is an excellent fill in orebody, for tonnage - but it has a very short life. The water for drilling has been furnished from the 200 Level at 794 - feeding into two concrete reservoirs on the 500 Level just off of the shaft. At this point we had two Worthington plunger pumps that forced the water through to the stopes. We had an auxilliary pump on the 400 Level to force the water to the 300 Level and above.

712 OREBODY - MAIN VEIN

In this case it is merely my personal opinion that the main vein of the 712 Orebody is mined to completion, with one exception. The exception is the ground as shown on the print around 709E Winze. This particular block was not touched as it was considered too high cost under existing conditions. This is correct, as the ore would have had to be slushed or trammed, and hoisted to be produced. Then again, there was about 30 to 50 gallons of water a minute to be handled out of the bottom (depending upon the season). The grade here is excellent, but the tonnage is small and pegged at about 50 feet down.

All other areas in this vein have been mined to completion some years ago, or have proven so low grade as to be impossible to mine on other than a cost plus basis. There are a few small stringers here and there (see geological maps), but I do not think that they would pay to mine under any conditions. Most of the country is caved, or filled. It is in poor condition; all mining except

712 OREBODY - MAIN VEIN (Continued)

but I do not think that they would pay to mine under any conditions. Most of the country is cavod, or filled. It is in poor condition; all mining except that above the 400 Level, 505 #2 Stope, and 605A Stope, was done previous to 1937.

PIUTE OREBODY

The Piute Orebody, except for six blocks, is completely mined out, end point - that is to say, the orebody as we know it now. Above level, except for one zone, the ore has been mined to the end point of it has caved through to the surface. The 625 and 625A Blocks a available for mining, but the ore is too oxidized to handle in the block was stopped by Mr. Weed as unprofitable, in the fall of 1939.

M. Weed

The area between the 700 and the 700 sub level is too low grade to existing conditions. The area from 845B Stope, north to 825B Stop completely mined out as far as safe mining is concerned. These stopes were first roughed out, then gone over once again and all pillars robbed that we deemed safe to take, and then gone over a third time and forced until they started to sluff. The pillars just above the 800 Level were not mined as they would have been unprofitable under existing conditions.

North of the shaft on the 900 Level, 915A Stope has been prepared, and was just starting to produce when the closing order came. This stope is not a profitable stope, but was being run to serve as a fill in for tonnage. All stopes north of 915A have been mined to the end point - the ground having taken weight, and deemed unsafe for slushing.

South of the shaft on the 900 Level there are four stopes available. They are 955C, 945, 945A, and 946A. These stopes are high cost stopes, as they are all coarse breakers and must be slushed. There is a good tonnage of available ore here, but the stopes do litt le better than break even because of the said high cost of production, and cost of maintenance of the Piute lower levels.

On the 1000 Level (from the 706 side) there is a small showing of good gold ore. This mineralized zone appears to be the downward extension of the 946A and B blocks. The character of the rock is very similar. Stoping through offers many problems that make for high cost. First of all, the distance to the 900 Level on the slope is 350 feet. Secondly, the hanging wall is quite slick, and very broken and blocky, which prevents any type of open stope and big breakage. Next, and probably the most important problem is that there is no continuous vein - but rather a group of "eschelon" streaks, which fade out as they go up, and as they go south. This "phenomenon" can be readily seen by closely checking the geological maps. All in all, the block is not large enough to make a new mine, or compact enough to give enough tonnage to pay for keeping the whole 1000 Level open.

712 OREBODY - MAIN VEIN (Continued)

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PIUTE OREBODY

The Piute Orebody, except for six blocks, is completely mined out, and to the end point - that is to say, the orebody as we know it now. Above the 700 sub level, except for one zone, the ore has been mined to the end point and most of it has caved through to the surface. The 625 and 625A Blocks are still available for mining, but the ore is too oxidized to handle in the Mill. This block was stopped by Mr. Weed as unprofitable, in the fall of 1939.

The area between the 700 and the 700 sub level is too low grade to mine under existing conditions. The area from 845B Stope, north to 825B Stope has been completely mined out as far as safe mining is concerned. These stopes were first roughed out, then gone over once again and all pillars robbed that we deemed safe to take, and then gone over a third time and forced until they started to sluff. The pillars just above the 800 Level were not mined as they would have been unprofitable under existing conditions.

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PIUTE OREBODY (Continued)

Regarding operating notes here: The Piute shaft from the 700 sub to the 900 pocket is in very good shape except that new rails are needed for the muck skip tracks. From the 900 to the 1000 the North compartment, used as a spill pocket, needs all new dividers and about ten new end plates to put it in top shape. The shaft from the 700 sub to the surface is good enough for an air pass, but little else. The timber is in fair shape but is all out of line. It should all be re-lined and re-blocked. All stopes and working places active at the last are in excellent shape. Service raises, etc., are plainly marked on the long section.

NORTH PIUTE OREBODY

The North Piute Orebody consists of only a small block of ore. Examination of the Geological Maps for this Orebody will show the extent. We had started to lay out a sub-level caving block North of 940C Raise and were planning on starting South with a block in a couple of weeks. This whole area must be layed out carefully, and run strictly by assay values as the ore is very spotty, and sometimes the values are very deceiving to the eye. The footwall portion of the ore is highly oxidized, contains little or no gold, and must be timbered. The hanging wall section is fairly hard rock with cross fault zones - fair copper and fair gold; if the whole vein were of this material, shrinkage stope methods - with some reservations - could be used.

This is the only zone in the North Piute that carries any mineable ore.

CONCLUSION

After first setting up a condition - that any future operation of the Walker Mine be done on a "cost-plus" basis - the following presents itself as a possibility:

The ore left above the 700 Level can be mined out readily in two years. the rate of production would be between 150 and 250 tons per day. Due to the scattered locations quite a crew of men would be needed to get out this small tonnage. The ore would come from 750A Stope, 775 Stope (N), 775 Stope (S), 420B Stope, 740-760 Pillars, 605E Stope, 417B Stope, 617D Stope, 717A Stope, 705A Stope, the 709E Wz area, and possibly some from the Piute Pillars. As stated above, at the end of two years, this ore should be all mined out.

The ore below the 700 Level in Piute would have a higher value due to increased gold and silver values and a somewhat higher copper content. To offset this, there is the hoisting cost, the slushing cost, level tramming, pumping maintenance, shaft maintenance and a higher breaking cost, due to more difficult ground conditions, narrower veins and the need for

CONCLUSION (Continued)

greater selectivity. With the new 1000 bulkhead in place dewatering would only have to take place in Piute; no water would have to be handled from below 712 and on south. The 1000 Level Piute could be driven some 120 feet south to connect with the 1000 Level from the 706 side, and the 1000 (706), be driven some 800 feet north to connect up to the Piute shaft for disposal of ore and waste. A new pump station should be established and the 1000 pockets cut. With the Piute lower levels ready to go, the maximum production from here would be about 300 tons per day. This maximum is not calculated according to the tons that can be hoisted, but according to the available stopes for production. After two years time, the present available ore should be cleaned up.

Summing up, the picture is of an operation producing a maximum of 500 tons daily (after the necessary preparation has been taken care of), for about two years. Costs will be high because of the relatively small tonnage and number of men that would have to be employed. The number of men would have to be high owing to the wide scattering of the working places and the amount of maintenance work that would have to be done. At the end of two years, all the present available ore would be mined out.

The above discussion of course, is based on the supposition that no new ore will be found. There are possibilities, however. We have exhausted all leads in the immediate vicinity of our ore boundaries, but there are two other possibilities involving long range work. First, the continuation of either the 900 North (Piute) heading, or better yet, the extension of 1017DN through the North Piute Orebody and on past it. Second, further prospecting of the footwall of the 712 "fissure" area - possibly out in the direction of the surface showings mapped and studied by Virgil Chamberlain, the mine Geologist. There are other spots that could be explored, but the above two seem the most logical.

It must still be born in mind, that all of this conclusion is based upon the original set of conditions (or an appropriate substitute), that any work done be on a cost-plus basis, and that any reasonable price for copper would not be enough to make the operation economical.

Respectfully submitt ed,

(Signed) W. T. Warren, Jr.
Mine Superintendent

EXHIBIT III

WALKER MINING COMPANY

CLOSING OPERATING REPORT - SALVAGE OPERATION

Stripping of the Mine below the 700 Level was started on Friday, October 24, 1941, and except for a few details, completed on Thursday, November 6, 1941; the operation took thirteen days with a crew of about 50 men.

Stripping consisted of taking out all equipment below the 700 Level - pumps, tools, muck moving equipment, ventilation and electrical equipment, pipe (except pump discharge columns in the Piute and 784 Shafts and some old three-inch on the 1000), and all track switches. No rail was taken up except the straight lengths of 61-1/2 pound rail on the 1000 (1,200 feet).

Six weeks prior to the major stipping operation, a salvage "campaign" was started throughout the entire mine, which consisted of removing all excess pipe, rail, scrap, etc., and storing same in bins and racks outside the Portal. This work netted 11,432 feet of assorted pipe, 8,393 feet of assorted rail, 20,300 pounds of scrap iron, 3,300 pounds of pipe fittings, etc., and made the final operation comparatively simple.

In conjunction with the closing down operation, a concerete bulkhead was put in on the 1000 Level, at a point 1,140 feet south of the end of 1017 DN. This bulkhead was so placed that if and when the Piute lower levels are opened up again, on connecting the 1000 Levels it will not be necessary to drain out the water below the 700 Level, that lies south of Piute (See engineer's sketch).

PUMP DATA

Our salvage operation plan was based entirely on the time allowed the pumps, and completing the 1000 water bulkhead.

The 706 pumps were pulled October 26th and 27th, taking 12 hours p water took 32 hours to fill the 1200 Level, three days to come up Level, and ten days to the 1000 Level. From this point, the rise slow to the water level, which is some 20 feet below the 800 Level

The Piute pumps were pulled October 29th, taking three-and-one-hal all. The water reached the back of the 1000 station in two-and-or and the 900 Level in four days - once in the shaft, the water rais rate of .704 sets per hour (from the 1000 to the 900). The rise Level will be very slow and will take some three or four months.

Water filling H.G. workings

Pulling the pumps included removing all compensators, switches, electrical equipment, foot valves, check valves, discharge valves, phones, tools, and miscellaneous equipment.

EXHIBIT III

WALKER MINING COMPANY

CLOSING OPERATING REPORT - SALVAGE OPERATION

Stripping of the Mine below the 700 Level was started on Friday, October 24, 1941, and except for a few details, completed on Thursday, November 6, 1941; the operation took thirteen days with a crew of about 50 men.

Stripping consisted of taking out all equipment below the 700 Level - pumps, tools, muck moving equipment, ventilation and electrical equipment, pipe (except pump discharge columns in the Piute and 784 Shafts and some old three-inch on the 1000), and all track switches. No rail was taken up except the straight lengths of 61-1/2 pound rail on the 1000 (1,200 feet).

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PUMP DATA

Our salvage operation plan was based entirely on the time allowed for pulling the pumps, and completing the 1000 water bulkhead.

The 706 pumps were pulled October 26th and 27th, taking 12 hours per unit. The water took 32 hours to fill the 1200 Level, three days to come up to the 1100 Level, and ten days to the 1000 Level. From this point, the rise will be very slow to the water level, which is some 20 feet below the 800 Level at 784.

The Piute pumps were pulled October 29th, taking three-and-one-half hours in all. The water reached the back of the 1000 station in two-and-one-half days, and the 900 Level in four days - once in the shaft, the water raised at the rate of .704 sets per hour (from the 1000 to the 900). The rise to the 700 Level will be very slow and will take some three or four months.

Pulling the pumps included removing all compensators, switches, electrical equipment, foot valves, check valves, discharge valves, phones, tools, and miscellaneous equipment.

STRIPPING DATA

During the pump pulling operation, stripping was carried out in Piute and 706 on a definite, planned basis; 3 shifts, seven days a week. Lay off of the men started Tuesday, November 4th, and ended Thursday, November 6, 1941.

Removal of all equipment was carried out in four phases, as follows:

1. All pneumatic tools and supplies: machines, hoses, bars, arms, steel, wrenches, picks, axes, saws, etc.

2. All secondary muck moving equipment: cars, slushers, scrapers, mucking machines, wire rope, etc.

3. Ventilation and electrical equipment, air and water lines, track switches, etc. General clean-up and re-check of all faces and working places.

4. Locomotives, electric cables in shafts, and any miscellaneous items.

The engineer's inventory sheets show itemized lists of all equipment and supplies removed.

BULKHEAD DATA

The concrete water bulkhead shown on the maps and on the engineer's sketch was constructed as follows:

The section poured averaged 6 ft. x 12 ft. (76 square feet), and is 8 ft. thick. Keyways were cut 18 inches deep on either rib. 104, 18-inch holes were drilled around the circumference of the section, on 2-ft. centers. 1-1/4 inch round steel was driven and wedged in the holes with a minimum of 2 ft. left protruding.

Before pouring, two drain lines were laid; a three-inch line extending 6 ft. south and 10 ft. north of the dam, with a three-inch gate valve on the south side; a six-inch line extending one ft. south and 2 ft. north of the dam, with a six-inch gate valve on the north side. During pouring, the six-inch valve remained shut and the three-inch valve open. On completion of pouring, the three-inch valve was closed off, completely sealing off the dam.

A coffer-dam was put in north of the main dam to hold out the water during the bottom pour, after which the top, sides and bottom were sealed and washed clean. Pouring started at 12:00 noon, October 30th. The bottom was cleaned up and blown out and 4 inches of grout laid down. The aggregate was all hand mixed. The mix was 4 parts gravel (+ 1 inch and - 4

BULKHEAD DATA (Continued)

inch), 2-1/2 parts sand, and 1 part cement.

Concrete was poured thick and well puddled in the forms. While pouring the top 1/3 of the dam, 12 grout pipes were laid (1 inch) and placed carefully in order to make sure that grouting would penetrate all pockets. For re-enforcing, old drill steel and old 25 lb. rail was used - this material was interlaced in roughly 14 inch squares. Pouring was completed at 4:00 AM, November 2nd, 64 hours after starting in. After setting 30 hours, the forms were pulled. The face looked very good, although we used one sack of cement in filling an uneven spot on the top part of the dam. 48 hours after the pour the dam was grouted. A cement (quick set - 24 hours) and water mix was used, being forced through the grout pipes by a Worthington plunger pump at about 100 pounds pressure. Seven sacks of cement were forced in and all cracks were sealed. 24 hours after grouting, the perimeter of the dam was gone over again with a sand and cement mixture. We tried to do a thorough job on this bulkhead, and took a great deal of pains with the work. Leonard Palmer was directly in charge and was on the spot during all important phases. Mr. John Cone, Safety Engineer, took several pictures of the dam during the working interval, and one print is included in this report. Mr. Eldon Lomnes, Chief Engineer, has made a complete sketch of the bulkhead, which is included in this report.

GENERAL

All skips in the mine have been blocked up securely, and cables heavily doped.

All powder has been put in the main magazine for future disposal. All primers have been disposed of.

Tin for precipitating purposes has been stored underground, in 704 Drift; it will stay dry and serviceable here.

700 Level and sub-level stations, toolrooms and hoist rooms have been thoroughly cleaned.

All lamps, lamp equipment, and supplies are being crated.

CONCLUSION

The general condition of the mine proper after closing down is excellent. Mr. Whitney and Mr. Palmer have checked and double-checked all working places since the removal of the equipment, and final check-up has been made by myself.

CONCLUSION (Continued)

All materials and equipment are out, below the 700 Level with the following exceptions:

1. Old 30 lb. and 40 lb. rail on 800 Level (Piute), 900 Level (Piute), 1000 Level (706), and 1200 Level (706).

2. 800 ft. of track (mainly curved 61 -1/2 lb.), on 1000 Level (706).

3. Pipe columns in the following Shafts and Winzes:

    1. Piute (700 to 1000)
    2. 797 (700 to 1000 sub)
    3. 706 (700 to 1000)
    4. 784 (700 to 1000)

The pipe can be used to good advantage in any future de-watering operation, but under existing conditions, the pipe and rail would not have been worth salvaging.

From the 700 Level up, no "permanent installations" were touched except in 794 Rs. In 794 Rs and the North Orebody in general, everything of any value at all has been salvaged. The upper Piute levels are also stripped clean, except for the shaft and sub-level hoist. In 712, all pipe and rail remain in place.

After November 15th, all men in the operating department will be released. These men include ten bosses and seven days pay men only.

Long sections showing proposed operating plans, etc., will follow this report in about two weeks, as it was deemed advisable to get this in as soon as possible.

In closing, I would like to say that a great deal of credit id due all bosses on the efficient manner in which the stripping work was carried out - there were no accidents - not even a cut finger, or a broken toe. Leonard Palmer and Bruce Whitney deserve equal credit, as they were the Assistant Superintendents in direct charge.

Respectfully submitted,

(Signed) W. T. Warr en, Jr.

W. T. Warren, Jr.
Mine Superintendent

WTW:dm
Encl. 2

MILL & TRAM HEADHOUSE

TABLE I

YEARLY MILL RECORD

		Dry Ton Ore	% Cu. Head	% Cu. Tail	Oz. Silver Head	Oz. Silver Tail	Oz. Au Head	Oz. Au Tail	Mill Das. Opr.	Dry Tons Per Day	Conc. Per Da. Dry Tons
Dec. 91.33% - 1-1-41 to 11-1-41		291,438.	1.350	0.112	0.695	.111	.050	.0117	258.	1229.25	
	1940	437,450.	1.370	0.129	0.691	.118	.0480	.0134	325.33	1344.63	64.18
	1939	367,041.	1.287	0.146	0.676	.147	.0516	.0151	302.	1215.37	57.42
Shut down 11 mos.	1938	66,822.	1.137	0.185	0.938	.232	.0501	.0154	155.	431.11	16.24
	1937	447,050.	1.259	0.135	0.822	.171	.0481	.0132	336.33	1329.20	62.78
Dec. 86.73%	1936	453,794.	1.247	0.1445	0.8795		.0437		359.	1264.65	
Dec. 85.45 Start in Fall after 3 1/2											
Years	1935	89,524.	1.1730	0.1786					118.	758.68	
Shut Down	1934										
Shut Down	1933										
Dec. 92.40 Shut Down	1932	34,741.	1.401	0.1123					30.	1158.03	
" 90.49 Some Curtailment	1931	432,294.	1.6317	0.1648					239.	1495.83	
" 91.06	1930	518,509.	1.6713	0.1596					333.673	1553.94	
" 92.06	1929	457,637.	1.8103	0.1546					361.33	1266.54	
" 91.2944	1928	391,275.	1.4431	0.1334					360.	1086.	
" 92.696	1927	340,156.	1.4903	0.11538					361.	942.26	
" 92.66854	1926	250,082.	1.8716	0.1474					363.	688.93	
" 94.488 Crd. Ore shipped	1925 --	(41.22	12.44		3.3		0.0975		364.	723.65	
Mill Ore	1925 --	(263,411.	2.432	0.1496							
	1924 --	(205,309.	3.2684	0.176					364.	565.67	
Dec. 95.844	1924 --	no crude									
" 95.58 Mill Ore	1923 --	(87,041.	4.123	0.12946					355.	245.19	
Crd. Ore shipped	1923 --	(	10.441	10.	3.219		0.0858				
" 95.591	1922 --	(38,652.	5.6196	0.332					217.	278.12	
Crd. Ore shipped	1922 --	(6,27755	11.634								
	1921	Driving main adit and tuning up Mill									
Crd. Ore shipped		3,274.54	12.								
Dec. 94.79	1920	41,825.	3.55	0.22							
" 92.75	1919	38,785.	3.23	0.28							
	TOTAL	5,262,429.31									

Low recovery for 1935 and 1936 is due to some oxidization of broken ore in the stope during the previous three and one-half years of shut down.

TABLE

CRUDE ORE & CONCENTRATES REC'D BY SMELTER
SMELTER SETTLEMENT
BEFORE SMELTER DEDUCT.

REC			Conc. Rec'd. Dry Tons	Grade % Cu	Pounds Copper	SILVER Oz Per Ton Conc.	SILVER Total Oz.	GOLD Oz Per Ton Conc.	GOLD Total Oz.
92.75%		1919	5982.5	19.36					
94.79%		1920	2295.24	19.778	907,988	7.462	17128.57	0.1941	145.444
Mill not operating		1921							
95.59%	Conc.	1922	14297.	20.025	5,726,224	6.563	93835.89	0.2152	3076.676
	Crude	1922	3137.775	11.634	730,339	3.369	10575.22	0.0844	264.951
95.58%		1923	13658.58	22.645	6,186,018	6.678	91207.18	0.2686	3668.927
	Crude	1923	7790.	10.441	1,626,673	3.219	25077.519	0.0858	668.231
95.844		1924	26747.347	24.584	12,659,429	8.4577	217764.28	0.3191	8216.408
94.488		1925	25973.367		12,753,759		230665.03		8746.599
	Crude		41.217		10,255		136.02		3.194
92.6685		1926	18174.4375		8,818,172		162079.77		7478.94
92.696		1927	19382.565		9,360,264		189974.65		11747.038
Lime Scale		1927	8.494		368		499.38		663.373
Precipitates on Fe			15.209		2,719				.418
91.2944 (New Mill Pt.)		1928	22,501.148		10,356,598		212796.80		12657.495
Lime Scale			3.708		144		164.89		353.706
92.06 (New Mill)		1929	32261.710		15,031,978		294561.86		15400.359
Copper Scrap			1.0975		2,145				
Lime Scale			4.053		260		195.15		367.607
91.06		1930	33251.245	23.722	15,775,669	11.361	377765.56	0.4951	16462.046
Lime Scale			5.160	4.860	502	44.195	228.05	84.675	436.923
90.49		1931	25485.471	25.187	12,836,117	12.631	321902.87	.5386	13216.481
Lime Scale			5.5905	2.535	283	31.05	173.59	60.970	340.853
Ball Mill Cl.			18.248	2.010	734	3.027	55.24	2.531	46.186
Conc. lost in trans.			46.305	24.07	11,147	12.815	296.69	.4619	10.695
92.46 Down - 11 mos.		1932	2106.2315	25.393	1,069,672	13.540	28517.68	.6147	1294.671
Ball Mill Cl.			5.823	2.33	271	16.675	97.10	24.3725	141.921
Lime Scale			2.094	2.73	114	28.362	59.39	51.153	107.114
Down all yr. Lime Scale									
"		1933	2.6835	2.355	126	37.5725	100.83	62.4525	167.591
" all year.		1934							
85.45 Start up Precipitates		1935	97.342	60.4925	117,769				
Concentrates			8526.51	22.465	1,584,445	13.377	47173.90	.5970	2105.235

TABLE II (Cont'd)

			Conc. Rec'd. Dry Tons	Grade % Cu	Pounds Copper	SILVER Oz Per Ton Conc.	SILVER Total Oz.	GOLD Oz Per Ton Conc.	GOLD Total Oz.
	Mill Circ. Circuit	Conc.	25.004	5.88	2,940	9.11	227.79	10.922	273.094
86.73	Conc.	1936	22192.076	22.442	9,961,664	12.71	282069.45	.5613	12457.480
	Precipitates		11.886	53.4625	12,710			.0275	.327
	Lime Scale		6.4985	2.485	322	28.299	183.90	50.789	330.052
	Conc.Precip.& Lime Scale								
		1937	21481.888	23.708	10,185,911	13.577	291665.61	.7354	15798.284
	" " "	1938	2413.4535	24.993	1,231,374	18.918	46603.79	.9041	2227.209
	" " "	1939	17056.5965	24.34	8,303,086	11.114	189569.63	.7549	12868.563
	" " "	1940	21009.5935	25.945	10,901,940	11.921	250455.23	.7366	15475.626
	" " "	1941	14387.257	25.197 *	7,248,128	11.539	*166581.	.7689	*10980.

* = Recovery - after smelter deduction

	RECOVERY	REAGENTS	POUNDS PER TON OF ORE	COST PER TON OF ORE
1941	Cu. 91.33%	Lime	0.521	0.0056
	Ag. 81.36%	Pine Oil	0.105	0.0071
	Au. 79.30%	Xanthate Z3	0.082	0.0110
		Xanthate Z5	0.041	0.0111
	Ratio of Concentration	Sodium Sulphide	0.0075	0.0004
	20.3816 to 1			
		TOTAL	0.7556	0.0352
		Grinding Balls - 3", 4", & 5"	2.475	0.0856

Copper Tons 83,700 — Oz Silver 3,592,267 — Oz Gold 179,396

165,811,251 lbs. — 120 Ton Ag ± — 6 Ton Au ±

Production of Walker Mine 1920-1941 inc

TABLE III A

SOUTH OREBODY - EAST VEIN

BLOCK	GROSS ORE BLOCKED OUT: PREPARED FOR STOPING	GROSS ORE BLOCKED OUT: NOT PREPARED FOR STOPING	GROSS PILLARS	PROBABLE ORE	POSSIBLE ORE	ESTIMATED RECOVERABLE ORE	GRADE: % Cu	GRADE: Oz Ag	GRADE: Oz Au
650					5,000	3,500	1.36	0.94	0.056
710 - 710A			4,500			3,500	2.32	0.40	0.040
750 A Stope			4,700			2,200	1.60	0.94	0.056
810				4,000		2,800	1.40	0.50	0.040
810					8,000	5,400	1.40	0.50	0.050
810 A					10,000	7,500	1.70	0.60	0.050
850 A				7,000		5,200	1.60	0.40	0.040
850 A					13,000	10,000	1.30	0.40	0.040
910 Stope			2,500			1,500	1.78	1.21	0.058
910					12,000	9,000	1.40	1.21	0.058
950 A					20,000	15,000	1.30	0.40	0.040
1010 Stope			4,000			3,000	1.28	0.60	0.050
1010 A "			4,000			3,000	1.50	0.60	0.050
1050 A			3,000			2,000	1.24	0.50	0.040
1050 A				17,000		13,000	1.11	0.50	0.040
1110					17,000	NONE	1.20	0.50	0.040
1110 A					14,000	"	1.30	0.46	0.030
1150 A					12,000	"	1.20	0.40	0.030
TOTAL EAST VEIN			22,700	28,000	111,000	86,400	1.41	0.59	0.045
Ore Blocked Out			22,700			15,200	1.65	0.65	0.048
Probable Ore				28,000		20,800	1.27	0.48	0.040
Possible Ore					111,000	50,400	1.39	0.62	0.047
Estimated Recoverable Ore						86,400	1.41	0.59	0.045

November 1, 1941

TABLE III A

(Continued)

SOUTH OREBODY - WEST VEIN

BLOCK	GROSS ORE BLOCKED OUT: PREPARED FOR STOPING	GROSS ORE BLOCKED OUT: NOT PREPARED FOR STOPING	GROSS PILLARS	PROBABLE ORE	POSSIBLE ORE	ESTIMATED RECOVERABLE ORE	GRADE: % Cu	GRADE: Oz Ag	GRADE: Oz Au
790 - 790 A			1,500			700	0.92	0.37	0.039
775			6,500			3,000	1.00	0.80	0.040
775					8,000	6,000	1.21	0.80	0.040
775					24,000	18,000	1.00	0.80	0.040
890			5,000			3,000	1.65	0.90	0.050
890					10,000	7,500	1.20	0.95	0.051
875					22,000	16,500	1.00	0.80	0.045
1090			5,000			3,600	1.65	0.50	0.040
1090				10,000		7,700	1.65	0.50	0.040
1090					4,000	3,000	1.38	0.50	0.040
1190					14,000	NONE	1.25	0.40	0.040
TOTAL WEST VEIN			18,000	10,000	82,000	69,000	1.19	0.75	0.043
Ore Blocked Out			18,000			10,300	1.41	0.70	0.043
Probable Ore				10,000		7,700	1.65	0.50	0.040
Possible Ore					82,000	51,000	1.08	0.80	0.043
Estimated Recoverable Ore						69,000	1.19	0.75	0.043
EAST VEIN			22,700			15,200	1.65	0.65	0.048
				28,000		20,800	1.27	0.48	0.040
					111,000	50,400	1.39	0.62	0.047
WEST VEIN			18,000			10,300	1.41	0.70	0.043
				10,000		7,700	1.65	0.50	0.040
					82,000	51,000	1.08	0.80	0.043
TOTAL SOUTH OREBODY			40,700	38,000	193,000	155,400	1.31	0.66	0.044
Ore Blocked Out			40,700			25,500	1.56	0.67	0.046
Probable Ore				38,000		28,500	1.37	0.48	0.040
Possible Ore					193,000	101,400	1.23	0.71	0.045
Estimated Recoverable Ore						155,400	1.31	0.66	0.044

Central Orebody

Nov. 1, 1941

Block	Gross Ore Blocked Out: Prepared for stoping	Gross Ore Blocked Out: Not prepared for stoping	Gross Pillars	Probable Ore	Possible Ore	Estimated Recoverable Ore	Grade: %Cu.	Grade: oz Ag.	Grade: oz Au.
580				3500		2500	2.87	0.50	0.010
680-780			10,000			6000	3.00	1.00	0.080
700 level pillars			24,000			16,000	2.32	0.40	0.030
880&880 Stope			36,000			4900	1.69	0.70	0.080
880				6900		2300	1.69	0.70	0.080
880 A		13,000				9800	2.17	0.50	0.040
880 A				5000		3700	1.50	0.40	0.040
980 B				15,000		5000	1.52	0.40	0.050
980 A Stope			6000			2000	1.78	0.50	0.050
980 A "				2500		1000	1.74	0.50	0.050
1080				27,000		5000	1.47	0.60	0.040
1080					15,000	7500	1.28	0.40	0.040
1080 A			5200			2600	1.79	0.40	0.040
1080 A				3200		1600	1.94	0.50	0.040
1180					38,000	none	1.30	0.40	0.040
1180 A				6000		"	1.50	0.50	0.040
1180 A					6000	"	1.30	0.40	0.040
TOTALS	13,000		81,200	69,100	59,000	69,900	1.99	0.52	0.045
Ore Blocked Out			94,200			41,300	2.25	0.55	0.047
Probable Ore				69,100		21,100	1.73	0.50	0.044
Possible Ore					59,000	7,500	1.28	0.40	0.040
Estimated Recoverable Ore						69,900	1.99	0.52	0.045

Nov. 1, 1941

North Orebody

Block	Gross Ore Blocked Out: Prepared for stoping	Gross Ore Blocked Out: Not prepared for stoping	Gross Pillars	Probable Ore	Possible Ore	Estimated Recoverable Ore	Grade: %Cu.	Grade: oz Ag.	Grade: oz Au.
230			3,000			1,500	1.83	0.40	0.030
230-330			5,000			3,500	1.30	0.40	0.030
310-410			5,000			3,000	1.60	0.40	0.040
610 A(420B)			14,000			6,000	1.09	0.40	0.030
610 A(620B)			27,000			18,000	0.86	0.40	0.030
610-630(5,000 T more produced than estimated)			2,800			none	1.42	0.40	0.040
640-740			4,000			none	1.30	0.60	0.050
(740-760) 700 Level Pillars			71,500			46,700	1.34	0.60	0.050
920				93,000		46,500	1.17	0.40	0.040
920 A-820 A			113,400			none	1.19	0.60	0.050
920-820			84,800			"	1.36	0.80	0.050
930			49,000			4,600	1.52	0.60	0.050
940			55,800			none	1.41	0.60	0.050
950				45,000		"	0.91	1.00	0.015
1020			28,000			12,000	1.58	0.80	0.030
1030			32,600			3,600	1.15	0.50	0.030
1040			30,000			2,000	1.37	0.50	0.030
1120				21,000		none	1.59	0.50	0.030
1120					21,000	"	1.59	0.50	0.030
1130				11,200		"	1.45	0.50	0.030
1130					11,200	"	1.45	0.50	0.030
1140				11,600		"	1.51	0.50	0.030
1140					11,600	"	1.51	0.50	0.030
1220				9,000		4,000	1.30	0.50	0.030
1230				6,000		none	1.50	0.50	0.030
1240				5,500		"	1.49	0.50	0.030
TOTALS			525,900	202,300	43,800	151,400	1.25	0.51	0.040

North Orebody

Block	Gross Ore Blocked Out: Prepared for stoping	Gross Ore Blocked Out: Not prepared for stoping	Gross Pillars	Probable Ore	Possible Ore	Estimated Recoverable Ore	%Cu	Grade: oz Ag.	oz Au.
Ore Blocked Out			525,900			100,900	1.28	0.55	0.040
Probable Ore				202,300		50,500	1.18	0.41	0.039
Possible Ore					43,800	none	-	-	-
Estimated Recoverable Ore						151,400	1.25	0.51	0.040

III-D

Nov. 1, 1941

710 Orebody

Block	Gross Ore Blocked Out: Prepared for Stoping	Gross Ore Blocked Out: Not prepared for Stoping	Gross Pillars	Probable Ore	Possible Ore	Estimated Recoverable Ore	%Cu	Grade: oz Ag.	oz Au.
631					15,000	7,000	1.00	1.89	0.027
731					14,000	7,000	1.00	1.87	0.027
785					25,000	12,000	1.00	0.80	0.040
TOTAL					54,000	26,000	1.00	1.39	0.033
Ore Blocked Out									
Probable Ore									
Possible Ore					54,000	26,000	1.00	1.39	0.033
Estimated Recoverable Ore						26,000	1.00	1.39	0.033

Nov. 1, 1941

712 OREBODY

Block	Gross Ore Blocked Out: Prepared for Stoping	Gross Ore Blocked Out: Not Prepared for Stoping	Gross Pillars	Probable Ore	Possible Ore	Estimated Recoverable Ore	% Cu	Grade oz Ag.	oz Au.
505					3,000	1,300	1.35	1.50	0.030
505				4,000		3,000	1.28	1.50	0.030
505					3,000	2,200	1.28	1.50	0.030
505 B			4,000			2,000	1.71	1.00	0.030
505 B					15,000	11,200	1.03	1.00	0.020
605			4,000			none	3.64	2.00	0.040
605			6,500			"	4.55	2.00	0.040
605					7,000	3,500	1.68	1.50	0.030
605 B			4,000			2,000	1.66	1.20	0.030
605 C			2,000			1,500	1.92	1.00	0.030
605 C					16,000	12,000	1.00	0.50	0.020
705			15,000			none	1.60	1.30	0.030
705			11,000			2,000	1.37	1.50	0.035
705				6,000		4,000	1.95	0.50	0.030
705 B			8,000			4,000	1.10	0.80	0.020
700 level pillars			3,000			1,000	1.83	2.00	0.050
805				25,000		15,000	1.86	1.50	0.040
805					25,000	15,500	1.74	1.20	0.040
East Split									
705A	7,500		2,000			6,000	1.97	1.20	0.059
805 A				8,000		6,000	1.40	1.00	0.060
805 A					5,000	3,700	1.35	1.00	0.050
Footwall Vein									
317 C				19,800		10,800	1.66	0.86	0.030

712 OREBODY

Block	Gross Ore Blocked Out: Prepared for stoping	Gross Ore Blocked Out: Not prepared for stoping	Gross Pillars	Probable Ore	Possible Ore	Estimated Recoverable Ore	Grade: %Cu.	Grade: oz Ag.	Grade: oz Au.
317 C					1,600	900	1.40	0.70	0.030
417 C		37,000				15,000	1.47	0.70	0.030
417 .				10,400		7,800	1.43	0.84	0.024
417					22,600	11,300	1.41	0.89	0.029
417 B	5,200					1,700	2.00	1.70	0.030
517 D				8,400		4,200	1.26	0.20	0.023
517 D					8,800	3,700	1.33	0.26	0.025
517 C	32,800					9,900	1.18	0.58	0.026
517 C			2,100			1,000	1.00	0.59	0.015
517		39,000				20,000	1.96	0.67	0.022
517				18,700		9,000	1.59	0.55	0.023
517 B	5,000					2,000	1.50	1.08	0.020
617 D	10,000					5,000	1.13	0.20	0.020
617 D				3,000		2,000	1.10	0.30	0.020
617 C			1,000			500	0.90	1.32	0.023
617					20,200	10,000	1.76	0.45	0.023
617 B(605 E Stope)	22,500					9,000	1.40	1.43	0.030
717 B(705 E Stope)			4,700			1,200	1.30	1.40	0.029
1017 D					17,000	9,000	1.10	.40	0.030
TOTAL	83,000	76,000	67,300	103,300	144,200	229,900	1.50	0.87	0.030
Ore Blocked Out			226,300			83,800	1.56	0.87	0.029
Probable Ore				103,300		61,800	1.60	0.93	0.033
Possible Ore					144,200	84,300	1.37	0.83	0.029
Estimate Recoverable Ore						229,900	1.50	0.87	0.030

November 1, 19

TABLE III F

PIUTE OREBODY

BLOCK	GROSS ORE BLOCKED OUT: PREPARED FOR STOPING	GROSS ORE BLOCKED OUT: NOT PREPARED FOR STOPING	GROSS ORE BLOCKED OUT: GROSS PILLARS	PROBABLE ORE	POSSIBLE ORE	ESTIMATED RECOVERABLE ORE	GRADE: % Cu.	GRADE: Oz. Ag.	GRADE: Oz. Au
615			108,400			10,000	1.20	1.00	0.050
625-725-725 A			33,000			8,000	1.15	0.50	0.040
735 A			5,000			2,000	1.08	0.80	0.050
765			14,000			5,000	0.95	1.20	0.040
745-755			36,000			10,000	1.10	1.00	0.030
Above 700 South			75,000			40,000	1.06	1.00	0.030
" 700 North			40,000			20,000	1.22	0.80	0.030
835	43,200					5,400	1.05	1.00	0.030
835					20,200	3,200	1.05	1.00	0.030
845			141,000			7,000	1.20	1.27	0.050
855			113,000			5,700	1.25	1.00	0.040
865			60,000			4,800	1.34	1.20	0.040
815			135,300			4,000	1.34	1.20	0.040
825			61,700			NONE	1.10	1.00	0.030
935				10,600		5,000	1.30	0.90	0.030
935					23,200	10,000	1.30	0.90	0.030
945	37,000		40,000			39,000	1.32	0.99	0.037
(94,200 too high)									
945				34,000		15,000	1.37	0.90	0.030
955	22,000		32,000			15,000	1.37	0.80	0.030
-6,000 too much									
955				20,000		10,000	1.20	0.80	0.030
955					5,200	2,600	1.00	0.80	0.030
965		12,700				6,400	1.25	0.80	0.030
965				12,000		6,000	1.00	0.50	0.030
965					6,300	3,700	1.00	0.50	0.030
915	26,200					13,000	1.00	1.00	0.030
915			42,500			10,000	1.21	1.00	0.030
915				20,400		10,400	1.10	0.90	0.030

TABLE III F
(Continued)

PIUTE OREBODY

BLOCK	GROSS ORE BLOCKED OUT: PREPARED FOR STOPING	GROSS ORE BLOCKED OUT: NOT PREPARED FOR STOPING	GROSS ORE BLOCKED OUT: GROSS PILLARS	PROBABLE ORE	POSSIBLE ORE	ESTIMATED RECOVERABLE ORE	GRADE: % Cu.	GRADE: Oz.Ag.	GRADE: Oz.Au
1035				2,600		1,300	1.75	0.56	0.119
1035					34,000	17,000	1.30	0.72	0.035
1045				26,400		13,200	1.45	0.80	0.030
1045					15,100	7,500	1.40	0.80	0.030
1055				8,000		4,000	1.37	0.80	0.030
1055					2,500	1,200	1.25	0.60	0.030
1015				6,600		3,300	1.05	0.90	0.030
1015					4,300	2,100	1.05	0.90	0.030
TOTALS	128,400	12,700	936,900	140,600	110,800	320,800	1.21	0.90	0.034
Blocked Out Ore			1,078,000			205,300	1.19	0.96	0.035
Probable Ore				140,600		68,200	1.25	0.82	0.032
Possible Ore					110,800	47,300	1.25	0.78	0.032
Estimated Recoverable Ore						320,800	1.21	0.90	~~0.34~~ 0.034

TABLE III G

NORTH PIUTE OREBODY

BLOCK	GROSS ORE BLOCKED OUT: PREPARED FOR STOPING	NOT PREPARED FOR STOPING	GROSS PILLARS	PROBABLE ORE	POSSIBLE ORE	ESTIMATED RECOVERABLE ORE	GRADE: % Cu	Oz Ag	Oz Au
934-40 N & S	27,000T					13,500	1.79	0.30	0.020
"				19,800		9,900	1.67	0.30	0.010
"					14,200	7,100	1.67	0.30	0.010
Below 900				22,400		11,200	1.67	0.30	0.010
"					27,100	13,500	1.67	0.30	0.010
TOTALS	27,000 T			42,200	41,300	55,200	1.70	0.30	0.012
Blocked Out Ore			27,000			13,500	1.79	0.30	0.020
Probable Ore				42,200		21,100	1.67	0.30	0.010
Possible Ore					41,300	20,600	1.67	0.30	0.010
Estimated Recoverable Ore						55,200	1.70	0.30	0.012

TABLE III H

COMPARISON NOV. 1941 RECOVERABLE ORE ESTIMATE WITH JAN. 1941 ESTIMATE

CLASS OF ORE	ESTIMATE OF JAN 1 1941	EXTRACTION	REMAINDER	ABSTRACTED FOR RECLASSIFICATION	WRITTEN OFF OR TRANSF'D. TO NON-RECOVERABLE PILL.	BALANCE	TRANSFERED FROM PREVIOUS CLASSIFICATION	DEVELOPED OR ADDITIONAL RECOV. PILLARS	ESTIMATE OF RECOVERABLE ORE NOV. 1, 1941	% Cu.	Oz. Ag.	Oz. Au
SOUTH O. B.												
Blocked Out	37,800	1,307	36,493	7,700	3,293	25,500	----	----	25,500	1.56	0.67	0.046
Probable Ore	23,800	----	23,800	3,000	----	20,800	7,700	----	28,500	1.37	0.48	0.040
Possible Ore	98,400	----	98,400	----	----	98,400	3,000	----	101,400	1.23	0.71	0.045
TOTALS	160,000	1,307	158,693	10,700	3,293	144,700	10,700	----	155,400	1.31	0.66	0.044
CENTRAL O. B.												
Blocked Out	71,200	23,763	47,437	13,900	4,166	29,370	----	11,929	41,300	2.25	0.55	0.047
Probable Ore	14,700	----	14,700	7,500	----	7,200	13,900	----	21,100	1.73	0.50	0.044
Possible Ore	NONE	----	----	----	----	----	7,500	----	7,500	1.28	0.40	0.040
TOTALS	85,900	23,763	62,137	21,400	4,166	36,571	21,400	11,929	69,900	1.92	0.52	0.045

(Continued)

COMPARISON NOV. 1941 RECOVERABLE ORE ESTIMATE WITH JAN. 1941 ESTIMATE

CLASS OF ORE	ESTIMATE OF JAN 1 1941	EXTRACTION	REMAINDER	ABSTRACTED FOR RECLASSIFICATION	WRITTEN OFF OR TRANSF'D. TO NON-RECOVERABLE PILL.	BALANCE	TRANSFERRED FROM PREVIOUS CLASSIFICATION	DEVELOPED OR ADDITIONAL RECOV. PILLARS	ESTIMATE OF RECOVERABLE ORE NOV. 1, 1941	% Cu.	Oz.Ag.	Oz.Au.
NORTH O. B.												
Blocked Out	214,700	80,085	134,615	46,500	29,208	58,907		41,993	100,900	1.28	0.55	0.040
Probable Ore	4,000	----	4,000	----	----	4,000	46,500	----	50,500	1.18	0.41	0.039
Possible Ore	10,000	5,223	4,777	----	4,777	----	----	----	NONE	----	----	----
TOTALS	228,700	85,308	143,392	46,500	33,985	62,907	46,500	41,993	151,400	1.25	0.51	0.040
710 OREBODY												
Blocked Out	----	----	----	----	----	----	----	----	----	----	----	----
Probable Ore	----	----	----	----	----	----	----	----	----	----	----	----
Possible Ore	26,000	----	26,000	----	----	26,000	----	----	26,000	1.00	1.39	0.033
TOTALS	26,000	----	26,000	----	----	26,000	----	----	26,000	1.00	1.39	0.033
712 OREBODY												
Blocked Out	107,500	45,066	62,434	----	----	62,434	----	21,366	83,800	1.56	0.87	0.029
Probable Ore	58,200	3,862	54,338	----	----	54,338	5,000	2,462	61,800	1.60	0.93	0.033
Possible Ore	88,400	1,000	87,400	5,000	----	82,400	----	1,900	84,300	1.37	0.83	0.029
TOTALS	254,100	49,928	204,172	5,000	----	199,172	5,000	25,728	229,900	1.50	0.87	0.030
PIUTE O. B.												
Blocked Out	391,300	71,393	319,907	27,500	97,090	195,317	6,800	5,183	205,300	1.19	0.96	0.035
Probable Ore	60,900	5,795	55,105	7,300	6,700	41,105	20,500	6,595	68,200	1.25	0.82	0.032
Possible Ore	56,000	----	56,000	6,800	23,800	25,400	14,300	7,600	47,300	1.25	0.78	0.032
TOTALS	508,200	77,188	431,012	41,600	127,590	261,822	41,600	17,378	320,800	1.21	0.90	0.034
NORTH PIUTE O. B.												
Blocked Out	35,000	4,758	30,242	28,300	----	1,942	9,700	1,858	13,500	1.79	0.30	0.020
Probable Ore	35,000	----	35,000	24,000	18,200	- 7,200	28,300		21,100	1.67	0.30	0.010
Possible Ore	35,000	----	35,000	3,200	28,700	3,100	17,500	----	20,600	1.67	0.30	0.010
TOTALS	105,000	4,758	100,242	55,500	46,900	- 2,158	55,500	1,858	55,200	1.70	0.30	0.012
GRAND TOTAL	1,367,900	242,252	1,125,648	180,700	215,934	729,014	180,700	98,886	1,008,600	1.58	0.85	0.042

November 1, 1941

TABLE III-I

RECAPITULATION SHEET

CLASS OF ORE	RECOVERABLE ESTIMATE OF JAN 1 1941	EXTRACTION	REMAINDER	DEDUCTIONS: ABSTRACTED FOR RECLASSIFICATION	DEDUCTIONS: WRITTEN OFF OR TRANSF'D. TO NON-RECOVERABLE PILL.	BALANCE	INCREMENTS: TRANSFERRED FROM PREVIOUS CLASSIFICATION	INCREMENTS: DEVELOPED OR ADDITIONAL RECOV. PILLARS	RECOVERABLE ESTIMATE NOV. 1, 1941	%Cu.	Oz.Ag.	Oz.Au
Blocked Out	857,500	226,372	631,128	123,900	13[illegible],757	373,471	16,500	280,329	470,300	1.41	0.79	0.036
Probable Ore	196,600	9,657	186,934	41,800	24,900	120,243	121,900	9,057	251,200	1.41	0.65	0.034
Possible Ore	313,800	6,223	307,577	15,000	57,277	235,300	42,300	9,500	287,100	1.29	0.78	0.034
GRAND TOTAL	1,367,900	242,252	1,125,648	180,700	215,934	729,014	180,700	98,886	1,008,600	1.37	0.75	0.035

CLASS OF ORE	JANUARY 1, 1941 GROSS	JANUARY 1, 1941 RECOVERABLE	NOVEMBER 1, 1941 GROSS	NOVEMBER 1, 1941 RECOVERABLE	INCREASE GROSS	INCREASE RECOVERABLE	DECREASE GROSS	DECREASE RECOVERABLE
Blocked Out	2,554,100	857,500	1,992,100	470,300			562,000	387,200
Probable Ore	448,000	196,600	595,500	251,100	147,500	54,500		
Possible Ore	730,200	313,800	646,100	287,200			84,100	26,600
GRAND TOTAL	3,732,300	1,367,900	3,233,700	1,008,600	147,500	54,500	646,100	413,800

TABLE IV-A

(H. A. Geisendorfer using Plate I)

From Plate #1 Ore Remaining above 7th Level - Estimate by H.A.G.--using Long Stope Section

Place	Tons Sure	Tons Probable	Grade % Cu.	Development Possibilities
S.O. Body--N.W. Sect. above 7th Level	5,000	10,000	1.35	Probably some
So. End of Central		25,000	1.10	None
N. End of Central	5,000	Pillars	2.00	40,000 T-2% in Pillars--above Haulage available on first salvage only
S.O. Body F.W.				Possibility of considerable 0.80 to 1% above 6th Level
N. Ore Body-S. End	20,000		1.00	Probably considerable ore 1% in big block south of this ore body--heavy pillars above
Block between N. Ore body 712 Ore Body	40,000	100,000	1.00	This block has large development possibilities. Undeveloped except sixth Level which is only partly on vein--800' long and nearly 1000' high--good surface showing-with much Barite.
712 Ore Body-Main Vein	35,000	50,000	1.15	South end towards surface has dev. possibility
712 Hanging Wall	7,000	———	2.00	
712 Footwall Sec.	120,000	135,000	1.50	Possibility of developing more ore
Piute--S.end--Pillars above 7th Level	70,000	50,000	1.10	Conditioned on abandoning the level. (Levels can be abandoned as caving will not affect foot wall drifts)
Piute-N. end Pillars above 7th Level	30,000	10,000	1.25	Conditioned on abandoning the level
	332,000	380,000	1.28	Considerable development possibilities as above
	@ 1.28% cu.	@ 1.23% cu.		

TABLE IV-B

(H. A. Geisendorfer Using Plate I)

From Plate I — Ore Remaining Below The 7th Level-Estimated By H.A.G. Using Long Section In Connection With Mine Superintendent's Closing Report.

Place	Tons Sure	Grade % Cu	Tons Probable	% Cu Grade	Development Possibilities
North Piute Orebody	20,000	1.67	80,000	1.67	10 Level should be driven out under this orebody-with large possibilities.
Piute Orebody-N. of Shaft	30,000	1.25	30,000	1.25	May be possibilities below 9th Level.
Piute Orebody-S. of Shaft	100,000	1.30	130,000	1.30	Possibilities below 9th Level-and in salvage.
712 Orebody					No development except 709 E.W. showing 5% ore-large possibilities.
North Orebody between 7th and 10th Levels	60,000	1.25	75,000	1.30	Development and salvage possibilities.
North Orebody between 10th and 12th Levels			110,000	1.50	Good Ore developed on 12 Level-so large ore possibilities in this area but mining conditions difficult.
Central Orebody between 7th and 10th Levels	30,000	1.70	40,000	1.63	Some salvage operations possible.
Central Orebody-below 10th Level			50,000	1.32	Possibilities-little development has been done.
South Orebody-H. Wall between 7th and 10th Level (Pillars)	25,000	1.40	60,000	1.37	Must be developed by 8th and 9th Levels mostly.
South Orebody below 10th Level			20,000	1.25	Indicated by 10th Level.

TABLE IV-B
(continued)

(H. A. Geisendorfer Using Plate I)

From Plate I — Ore Remaining Below The 7th Level-Estimated By H.A.G. Using Long Section In Connection With Mine Superintendent's Closing Report.

Place	Tons Sure	Grade % Cu	Tons Probable	% Cu Grade	Development Possibilities
South Orebody	12,000	1.65			Block above pump station.
	277,000	1.38	515,000	1.42	

Upon starting up, the Piute Orebody below the 7th level should be pumped out first. This makes 350 gal. water after draining storage in the rocks. Later the 10th and 12th levels South of Piute can be pumped out - this orebody makes about 500 gal. per minute after draining storage in the rocks.

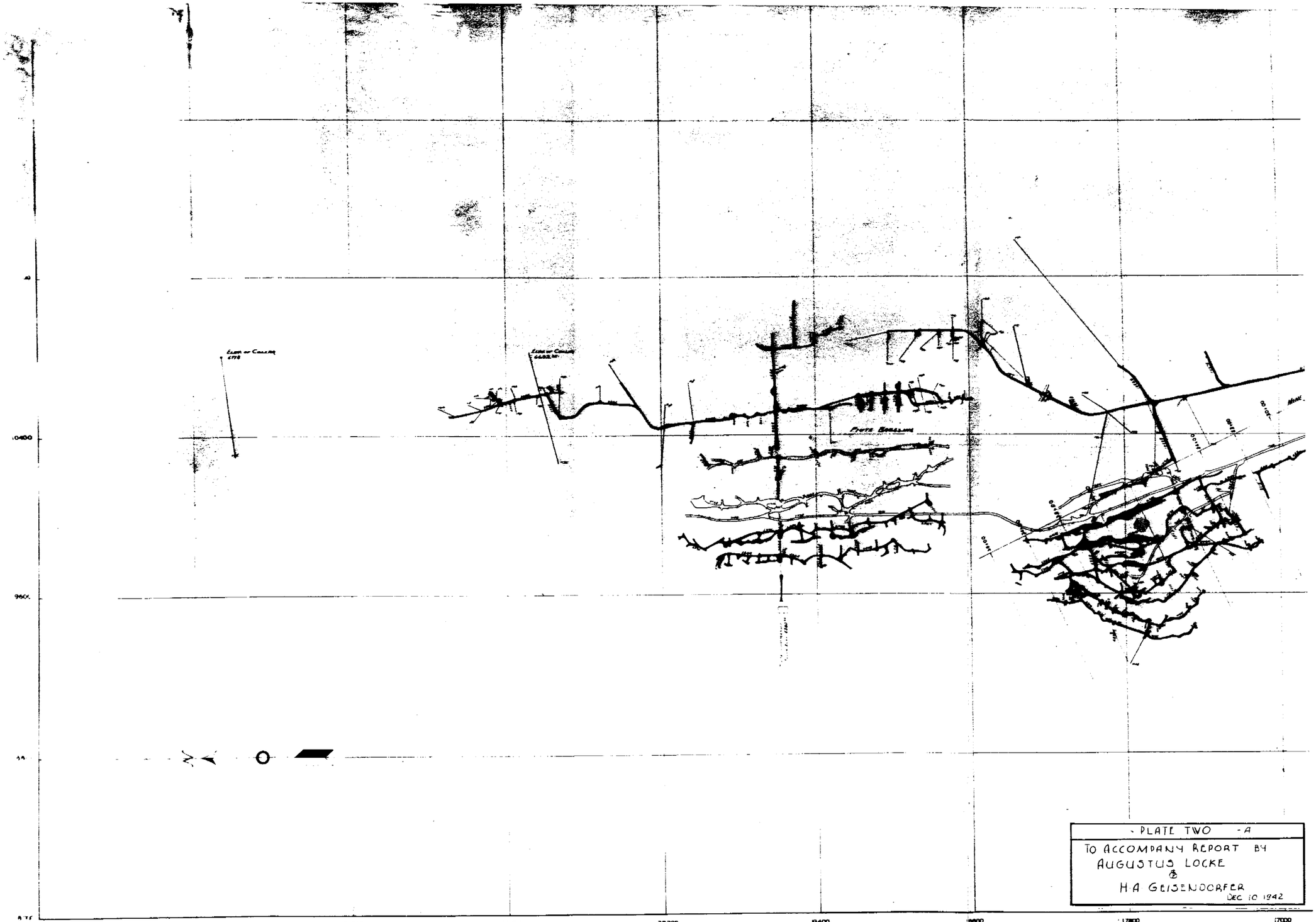
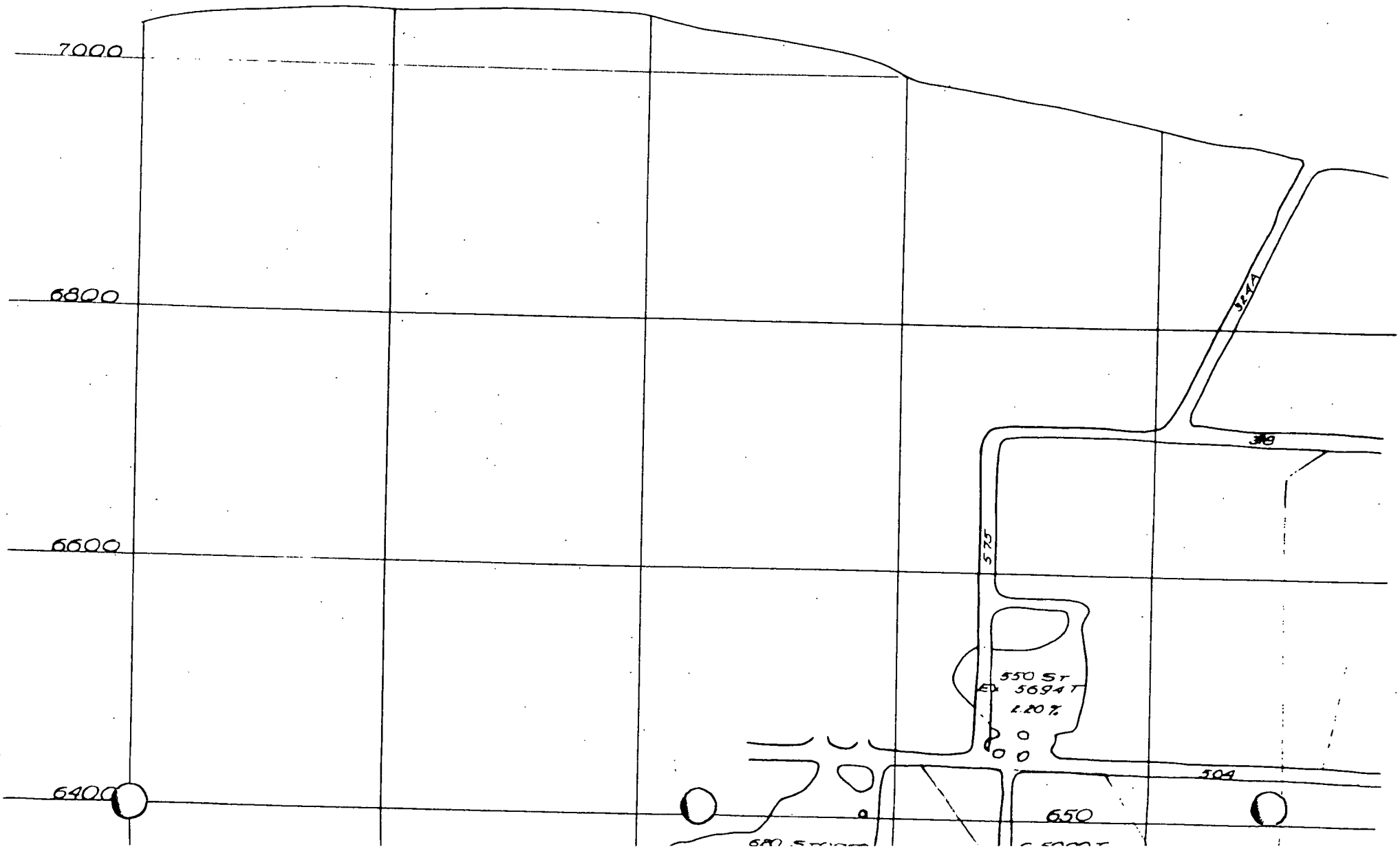


PLATE TWO - A

TO ACCOMPANY REPORT BY
AUGUSTUS LOCKE
&
H A GEISENDORFER
DEC 10 1942


7000
6800
6600
6400
514A
309
575
550 ST
5694 T
1.20%
504
650

SOUTH OREBODY

HANGING WALL SPLIT

6600
6400
6200
6000
5800
5600
5400
5200
5000

575
550 ST
Ex 5694 T
2.20%
504
650
G 5000 T
R 3500 T
1.36%
620 STOPE
Ex 10 541 T 2.52%
710 STOPE
Ex 12 551 T 2.22%
710 ST
Ex 4300 T
1.98%
750A
STOPE
Ex 20 735 T 1.36%
R 3500 T 2.32%
G 40000 T
R 26000 T
Ex 22,095 T
1.87%
810
810A
G 10 000 T
R 7 300 T
1.70%
850A
G 7000 T R 3200 T
G 13 000 T
R 10 000 T
1.30%
810 STOPE
PILLARS
G 8000 T
R 5400 T 1.40%
833
910
Ex 23 205 T 2.04%
G 12 000
R 9 000
1.40%
950A
G 20 000
R 15 000
1.30%
910 STOPE
G 3000 T R 3000 T 1.28%
700A WX
931
1010 STOPE
PILLARS
Ex 32 253 T 1.51%
1010 A ST
Ex 27 972 T 1.29%
1050A
G 7 000 T
R 3 000 T
1.47
G 4000 T R 3000 T 1.28%
G 4000 T R 3000 T 1.50%
G 3000 T R 2000 T 1.24%
1017
1110
G 9000 T
1.20%
G 8000 T
1.20%
1110A
G 7000 T
1.20%
G 7000
1.30%
1150A
G 6000 T
1.20%
G 6000 T
1.20%

26+00S
22+00S
18+00S
14+00S
10+00S
6+00S

UTH OREBODY

CENTRAL OREBODY

NORTH OREBODY

PLATE ONE -A

TO ACCOMPANY REPORT BY

AUGUSTUS LOCKE

H.A. GEISENDORFER

Dec 10 1942

WALKER MINING COMPANY

ANNUAL ORE RESERVES-NOVE. 1'41

LONGITUDINAL SECTION - LOOKING NESTERLY

SCALE 1"=100'

712 OREBODY

PIUTE OREBODY

NORTH PIUTE OREBODY

PLATE ONE -B

TO ACCOMPANY REPORT BY:

AUGUSTUS LOCKE

& H.A. GEISENDORFER

DEC. 10 1942

MINE BASELINE, N25°30 W

12000

11200

10400

9600

8800

17000

16200

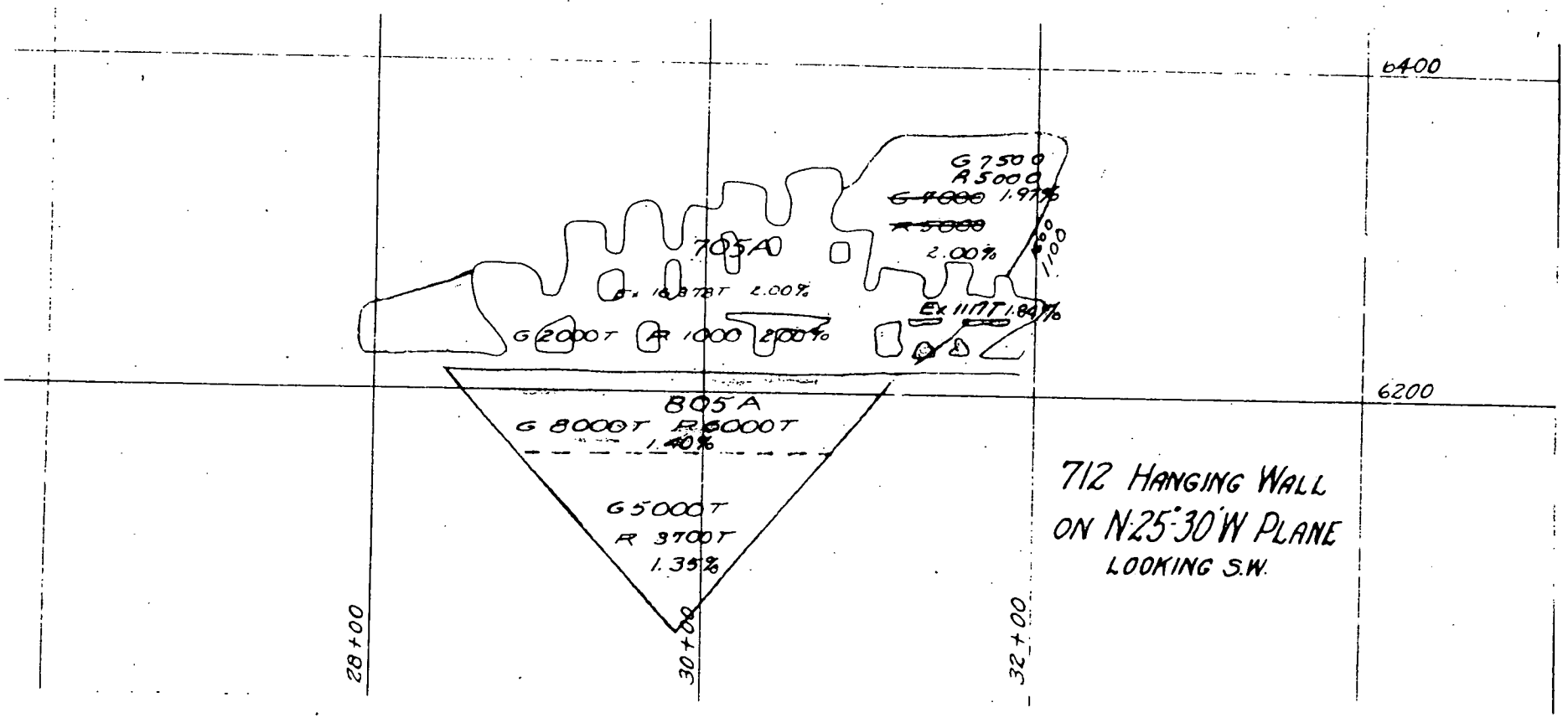
LEGEND

200 LEVEL
300 "
400 "
300 INTERMEDIATE
500 LEVEL
600 "
700 "
800 INTERMEDIATE
800 LEVEL
900 "
1000 "
1200 "
SHAFTS

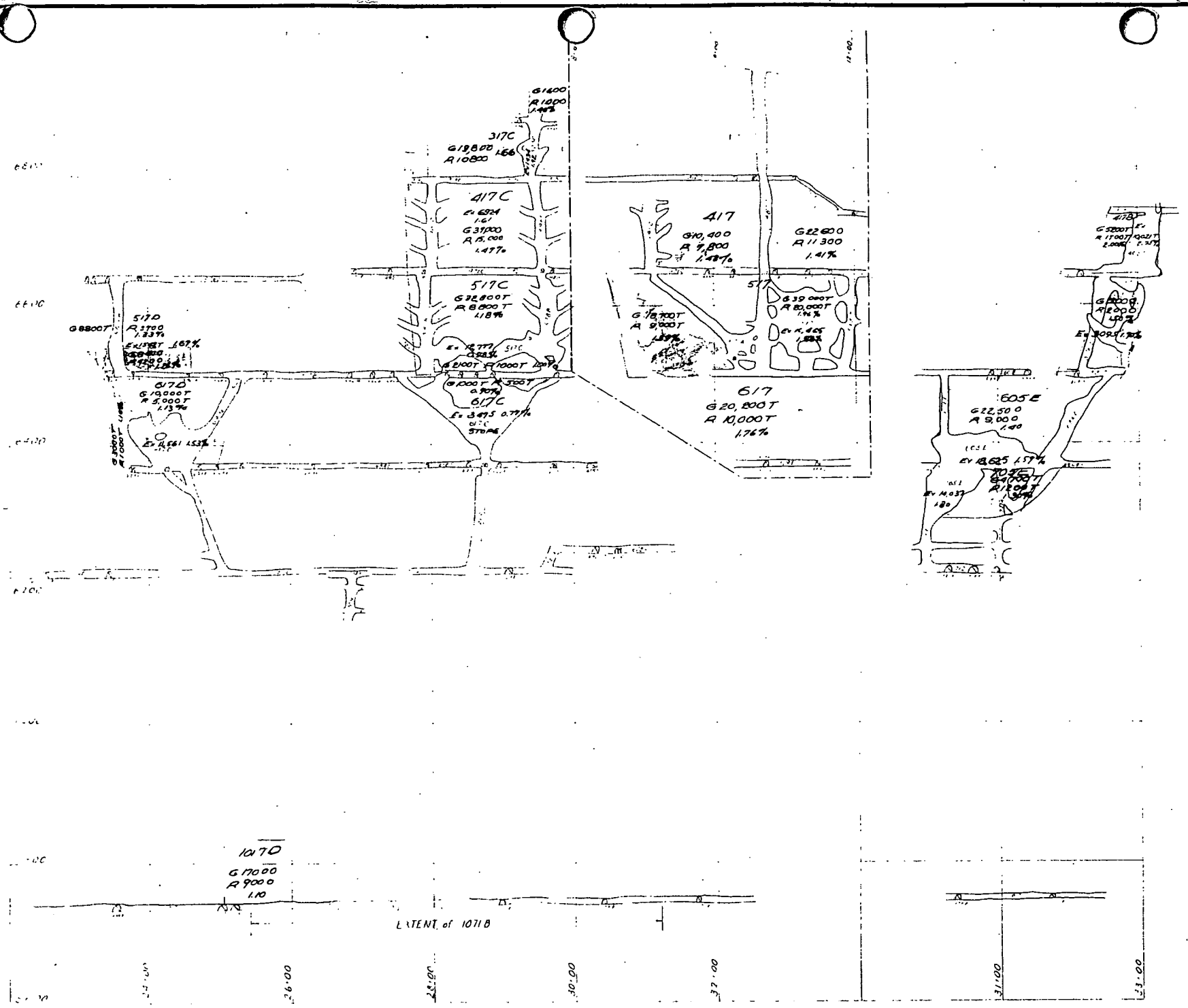
PLATE TWO -B

TO ACCOMPANY REPORT BY
AUGUSTUS LOCKE
&
H.A GEISENDORFER
DEC 10 1942

MAGMA MINES CO.
MINE COMPOSITE - PLAN
EXCLUSIVE SHEETS
Scale 1" = 200' DATE MAY 21, 1942



712 HANGING WALL
ON N 25°30' W PLANE
LOOKING S.W.


317C
G18800
R10800
417C
G31000
R15000
517C
G32800T
R8800T
617C
G20,800T
R10,000T
1.76%
417
G22600
R11300
1.41%
517
G39000T
R20,000T
617
605E
G22,500
R9,000
1.40
EXTENT of 1071B

MAP ↑

Important MAP! ↓ See other side

Walker Mine
Calif

GROUP OF CLAIMS

WALKER MINING CO.

Compiled mostly from U.S. Surveyor's Plats covering mineral Survey No. 5382 A and B. Also showing part of Mineral Survey No. 5495 and 5531 of the UNITED STATES SMELTING - REFINING and MINING Co.

Scale 1" = 800 Ft

Nov. 5 1927
June 1932

N

T.25N., R.12E., M.D.M.

T.25N., R.11E.

T.24N., R.12E.

T.24N., R.11E.

SEC 30

SEC. 29

SEC. 31

SEC. 32

SEC. 5

SEC. 6

SEC. 7

SEC. 8

September Morn No. 3 Pat. Nov. 14, 1928

September Morn No. 2 Pat. Nov. 14, 1928

September Morn Nos. 1 Pat. Nov. 14, 1928

Three Pounder (Unsurveyed)

Two Pounder (Unsurveyed)

Nine Pounder (Unsurveyed)

Eleven Pounder (Unsurveyed)

Red Bird No. 13 (Unsurveyed)

Red Bird No. 7 (Unsurveyed)

Panama No. 6 (Unsurveyed)

Panama No. 7 (Unsurveyed)

PIUTE No. 2 5582A

PIUTE No. 3 5582A

PIUTE 5582A

Sur. No. 4965 Walker Extension

Sur. No. 4965 "Valley" Extension

Sur. No. 4965 "Rob E." Extension

Sur. No. 4965 "Highland" Extension

Sur. No. 4965 "Copper Center" Extension

Sur. No. 4965 "Sullivan" Extension

PACIFIC No. 7 5582A

PACIFIC No. 8 5582A

PACIFIC No. 1 5582A

PACIFIC No. 4 5582A

PACIFIC No. 2 5582A

PACIFIC No. 3 5582A

PACIFIC No. 5 5582A

PACIFIC No. 6 5582A

PANAMA No. 2 5582A

PANAMA No. 3 5582A

PANAMA No. 4 5582A

PANAMA No. 5 5582A

Sioux Lode 5953

STANDARD 5582A

RELIABLE EXTENSION 5582A

RELIABLE 5582A

STANDARD EXTENSION 5582A

PACIFIC No. 9

PACIFIC No. 10

PACIFIC No. 11

PACIFIC No. 12

PACIFIC No. 13

PACIFIC No. 14

IRON DYKE Survey No. 5495

IRON DYKE No. 8 Survey No. 5495

IRON DYKE No. 4 Survey No. 5495

IRON DYKE No. 2 Survey No. 5495

IRON DYKE No. 3 Survey No. 5495

PLUMAS No. 9 Survey No. 5495

PLUMAS No. 8

PLUMAS No. 7

IRON DYKE No. 5 Survey No. 5495

HEAVY IRON Survey No. 5531

IRON DYKE No. 6 FRACTION

IRON DYKE FRACTION Survey No. 5531

LENA No. 3 Survey No. 5531

LENA Survey No. 5531

LENA EXTENSION No. 2 Survey No. 5531

LENA EXTENSION No. 3

LENA EXTENSION No. 9

LENA No. 10

LENA No. 15

LENA No. 16

LENA No. 17

LENA EXTENSION No. 1

PLUMAS No. 3 E. 13200

PLUMAS No. 4

PLUMAS No. 2

PLUMAS

GRIZZLY

GRIZZLY No. 5

GRIZZLY No. 6

GRIZZLY No. 4

GRIZZLY No. 2

GRIZZLY No. 1

GRIZZLY No. 7

GRIZZLY No. 8

GRIZZLY No. 9

GRIZZLY No. 10

GRIZZLY NUMBER ELEVEN

GRIZZLY NUMBER TWELVE

DOLLY GULCH PLACER

Pat. April 8, 1929 Serial 022990

UNITED STATES SMELTING REFINING AND MINING COMPANY

Tailing Pond

Co.

Walker

April 23, 1946

M E M O R A N D U M

Mr. Barry, Secretary of Plumas Mining Company - organized to acquire all of the physical assets of Walker Mining Company - stated that the Safeway Signal Company had sold ball mill and many of the supplies before present group became interested in the property. Their cost of remaining assets was $250,000. They are very optimistic. Their operations will be on a small scale and at low cost. They have already sold surplus lumber - $11,000; miscellaneous supplies $20,000; and are selling about 200 of the smaller cabins at $275 each, the buyers standing all expenses in connection with removal and transportation. This, of course, is due to serious housing shortage. The American Box Company offered them $42,500 for the standing timber, but they prefer to hold it. They have now 14 men in the mines and a few others preparing the surface. The man in charge of operations is a miner, formerly employed by Mr. Kaiser of shipyard fame.

The object of Mr. Barry's visit was to secure the original contract with the Western Pacific. He states that Walker Mining Company paid Western Pacific $12. a year rental for the area in which railway spur was located. The spur was removed by Western Pacific and they are now trying to force them to replace it. I advised Mr. Barry that none of the records of Walker Mining Company were ever kept in New York, but if they are available, he will locate them through Mr. Warburton, formerly Secretary of the Company in Salt Lake City, Utah.

E.O.S.

cc: Mr. R. S. Newlin 11/1/46