

WALKER MINING COMPANY

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Anaconda Copper Mining Company

GEOLOGICAL DEPARTMENT

REPORT ON
RECENT DEVELOPMENT

IN THE
WALKER MINE

PLUMAS COUNTY, CALIFORNIA

BY
M. H. GIDEL

Butte, Mont.
Oct. 1920.

REPORT ON

RECENT DEVELOPMENT

IN THE

WALKER MINE

PLUMAS COUNTY, CALIFORNIA

INTRODUCTION

On August 23rd. and 24th., 1920, I took geologic notes in the new work in the Walker Mine. My previous examination was made in December, 1919, since which time considerable development has been done on the Third and Lower levels. The accompanying Long-Section has been prepared from data furnished by Mr. V. A. Hart for the purpose of showing the new ore developed on the Lower level in relation to the levels. In drilling north-westward on the vein, a geological ore shoot on the upper levels. Geologic features such as faults and dikes are also shown, and portions of the vein averaging three percent or more in copper are colored red.

NEW DEVELOPMENT

Third Level

On the Third Level the main drift was extended 315 feet north-west on the vein. Three small shoots of ore having a combined length of 155 feet were developed here. See map. From this new drift, a 170 foot diamond drill hole into the hanging-wall cut no mineralization of consequence.

At a point 110 feet north of the winze beyond the intersection of the large ore-shoot and fault, another hole was drilled into the hanging-wall. No vein was found here. The purpose of this work was to determine whether or not the ore-shoot was displaced to the right by the fault.

The main drift southeast was extended 140 feet in irregular oxidized vein.

Adit or Lower Level

From the main crosscut on the Adit Level, the Walker Vein has been developed for a distance of 1400 feet, largely by drifting. A drill-hole from the main crosscut cut 2.1 per cent copper ore, which point marks the present southern limit of development on the vein in the property. The discovery of ore bunches in the first 60 feet of drifting from the crosscut was encouraging in view of the fact that the main ore shoot in the upper workings was several hundred feet farther northwest, and that it had a flat pitch northward between the Third and Fourth levels. In drifting northwest-ward on the vein, a granite dike 40 feet wide was cut. This dike cut the vein and contained inclusions of ore and gneiss near the south contact. The vein was displaced by the granite, presumably to the left, although another vein was found to the right in drill-holes. The vein exposed in the crosscuts to the left (west) north of the dike is quartzzy and contains much less sulphide than that portion of the vein south of the dike. The vein cut in the drill-holes to the right or hanging-wall corresponds mineralogically to the vein in drift south of the dike.

In drifting north on the vein, another granite dike six feet wide was cut. Small lenses of ore were developed. It is probable that the south portion of the main ore shoot occurs in the drift between points that are 220 feet and 100 feet south of the raise. For about 100 feet on either side of the raise

the vein contains less than two percent copper. Ore in the raise begins at a point about 35 feet above the sill. From a point 100 feet to 270 feet north of the raise, the ore is 10 to 15 feet wide and averages 3.40 per cent copper. Northward beyond this limit, the vein shows an average copper content under 2.5 percent. A clay seam has appeared on the hanging-wall side of the vein. It is probably the same fault or wall that terminates the ore body on the upper levels.

A portion of the above described drift does not develop the full width of the vein. Assays shown on the map without widths were obtained on car samples from a drift of normal size, that is, five or six feet wide.

From the drift on the lower level five holes were drilled. Two holes 580 feet apart were drilled into the foot-wall. No veins were cut, which fact would lead one to correlate the foot-wall vein in the main crosscut with that drifted on north of the forty foot granite dike.

Three holes were drilled in the hanging-wall side of the drift. The first one is located about 90 feet north of the larger granite dike. A strong vein was cut in this hole which contains ore. Another hole 200 feet north of this cut lean quartz, and a third hole near the raise cut no mineralization. This hanging-wall vein is probably a branch of the main vein, diverging from same to the southeast.

CONCLUSIONS.

The ore developed on the Lower level beneath the ore shoot on the Fourth level totals 320 feet in length, has a width of nine to fifteen feet, and contains about 3.3 percent

copper. On the Fourth level the ore shoot is 700 feet long, is 15 to 30 feet wide, and is estimated to contain 4.53 percent copper. The Lower level shows a split in the ore shoot with lean vein intervening. Briefly stated, the showing of ore on the new Lower level is not as good as that developed on the upper levels of the mine. There is more quartz in the vein on the Lower level than on levels above.

However, there remains the possibility that a flat pitching portion of the ore shoot lies northwest of the present face of the Lower drift on the hanging-wall side of the fault. This is suggested only by the meagre exposure of a wedge-shaped body of ore on the hanging-wall side of the fault near the winze on the Fourth level.

It is probable that more ore can be developed beneath the small shoots exposed in the north end of the Third level. Drifting should be continued in this direction on the Lower level with adequate drilling or crosscutting into either wall at intervals of four hundred or five hundred feet.

Respectfully submitted,

M. H. Giddell

Butte, Mont.
Oct. 1920.

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Anaconda Copper Mining Company

GEOLOGICAL DEPARTMENT

W A L K E R M I N E

SITUATION AS OF APRIL 15, 1923

Letter to

V. A. HART, MANAGER

By

Paul Billingsley

May 1, 1923

P L A T E S

- Plate 1 - Long Section showing grade
- Plate 2 - Long Section showing widths
- Plate 3 - Long Section showing tonnage
- Plate 4 - Composite map showing suggested development

T A B L E S

- Table 1 - Operations
- Table 2 - Calculation of tonnage
- Table 3 - Calculation of grade

Salt Lake City, Utah.

May 1, 1923.

Mr. V. A. Hart, Manager,
Walker Mining Company,
Spring Garden, California.

Dear Sir:

During my recent visit to the Walker mine I was much impressed with the extent to which the stoping has encroached upon the ore reserve blocks. A surprising proportion of the ore-body, as viewed on a long section, has already been broken. To check the accuracy of this impression I have made some calculations, regarding which I will be glad to have your opinion.

GRADE:

Before outlining my ore reserve blocks I determined the average grade of ore for each portion of each level and raise, using the samples on the 20 scale map at the mine. The results are indicated on the accompanying long section (Plate 1). For emphasis I have colored the areas of the different grades. According to the car samples, therefore, there is an ellipsoidal area in which the ore averages about 6%. This area covers only the north end of the 4th level, but extends from No. 2 Raise on the 5th to beyond No. 1 Raise, and on the 6th to beyond No. 3. It does not reach the Tunnel level; terminating below the 600 level about 50 feet down No. 2 Raise and 75 feet down No. 3. Above this 6% ellipse, and to the west of it, are areas of 4% and 5% ore, and beyond these in turn are zones of 2% and 3% material.

For the whole ore body below the 300 level, as it exist-

ed prior to stoping, I found an average grade of 4.35% copper - which checks remarkably closely your figure of 4.36% for the same area. (Blocks 4, 5, 6, 7 & 8). The significant point is that this average on which we agree is the result of a lot of 6% ore at the north end balancing a lot of 2% and 3% ore at the south end. Your stoping has thus far been done almost entirely in the 6% area, and the ore drawn from these stopes has averaged about 5.75% (a weighted average of crude and mill ore since June 1st - See Table 1).

TONNAGE:

I laid out my ore reserve blocks as shown on Plate 1, endeavoring within reason to make each block represent material of uniform grade. Following is a list in parallel of your blocks and mine:

ORE BELOW 3rd LEVEL PRIOR TO EXTRACTION.

Hart.

3rd - 4th Level.

Billingsley.

3rd - 4th Level.

Block	Tons	Grade	Block	Tons	Grade
4	215,430	4.48%	A	124,327	4.32%
5	2,500	4.48	B	28,437	3.26
			C	50,774	4.56
			S	11,270	2.00
Total	217,930	4.48	Total	194,808	4.00
<u>4th - 5th Level</u>			<u>4th - 5th Level</u>		
6	243,795	4.926	D	54,950	5.40
			E	44,128	5.23
			F	19,600	5.53
			G	37,905	3.27
			Total	156,583	4.85

ORE BELOW 3rd LEVEL PRIOR TO EXTRACTION.

Hart. 5th - 6th Level.			Billingsley. 5th - 6th Level.		
Block	Tons	Grade	Block	Tons	Grade
7	169,886	4.40	H	34,504	6.24%
			I	32,683	5.72
			J	9,454	5.71
			K	26,295	3.38
			L	5,852	2.00
			Total	108,569	5.12
<u>6th Tunnel Level.</u>			<u>6th Tunnel Level</u>		
8	128,375	3.039	L	17,100	5.47
			M	9,705	3.96
			N	12,072	5.00
			O	18,630	2.00
			P	31,200	3.17
			R	14,114	2.00
			Total	102,821	3.47
Totals	759,966	4.36		562,781	4.35

In calculating my tonnages I used horizontal widths scaled off the 20 scale geologic notes at 20 ft. intervals. The figures are shown on plate 2. These horizontal widths I averaged and multiplied by horizontal lengths, and the resulting area by the vertical height of the block; the results being the volume of the block. This I divided by a factor representing Cu. ft. per ton of ore - 10 in the rich blocks, 11 in the medium, and 12 in the lean siliceous south end.

I next endeavored to find out what is left, as of April 15th, 1925. For this purpose I re-measured my blocks from the tops of the slopes, and added a reasonable allowance for pillars. The calculations are given in Tables 2 and 3 and the results in

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summary are as follows:

ORE AS ORIGINALLY, AND AMOUNT BROKEN & LEFT

<u>500 - 400</u>	<u>Original Tons</u>	<u>Left Tons</u>	<u>Broken (x)</u>	<u>In Stopes</u>	<u>Percent Broken</u>
A	124,327	110,050*	14,277	2,500	11.5
B	28,437	27,120	1,317	-	4.7
C	50,774	27,272	2,502	-	11.4
S	<u>11,270</u>	<u>11,270</u>	<u>-</u>	<u>-</u>	<u>0.0</u>
	194,808	175,712	19,096	2,500	9.8
<u>400 - 500</u>					
D	54,950	18,698*	26,252	15,674	66.0
E	44,128	16,216*	27,912	11,991	63.3
F	19,600	12,212*	7,388	7,293	37.8
G	<u>37,905</u>	<u>32,016*</u>	<u>5,889</u>	<u>1,252</u>	<u>15.6</u>
	156,583	79,142	77,441	34,220	49.4
<u>500 - 600</u>					
H	34,504	14,359*	19,945	6,451	59.2
I	32,683	12,620*	19,063	9,327	58.4
J	9,454	9,454	-	-	0.0
K	26,295	24,115	2,181	-	8.3
Q	<u>5,822</u>	<u>5,512</u>	<u>320</u>	<u>-</u>	<u>5.5</u>
	108,569	67,060	41,509	15,778	38.2
<u>600 - 700</u>					
L	17,100	17,100	-	-	0.0
M	9,705	9,705	-	-	0.0
N	12,072	12,072	-	-	0.0
O	18,630	17,077	1,553	-	8.4
P	31,200	30,428	772	-	2.5
R	<u>14,114</u>	<u>11,375</u>	<u>2,739</u>	<u>-</u>	<u>19.4</u>
	102,821	97,757	5,064	-	4.9
Total	562,781	419,671	143,110 x	52,498	25.5

* Including pillars.

x Figures for ore broken obtained by deducting Tons Left from Original Tons.

These figures can be checked against other data, namely, the monthly returns from the mine, as tabulated in Table 1.

From June 1, 1922, to April 15, 1923:

About 110,000 tons were reported broken,

About 60,000 tons were reported drawn.

The tons broken were all between the Tunnel and 300 levels, but this does not include all rock ever broken in this area, since the tunnel, No. 2 Haise, No. 1 Haise, and parts of the 500 and 600 drifts were driven before June 1st. About 25,000 tons should be added to cover these workings, making a total of 135,000 tons broken as compared with 143,000 obtained by deduction.

During this interval 50,000 tons were left in the stopes 2500 tons were in 408 stope previously, making a total of 52,500 as compared with 52,498 above.

The ore drawn came from Blocks D, E, F, H, and I. It averaged 5.746% copper, while the average of these blocks is 5.53%. The ore has come from the better parts of Blocks D, E, and F, the remaining upper portions being lower grade than those stoped thus far.

If the long section is correct, and it was made carefully from Arieta's stope sections, there can be little error in the percentage which has been broken. It figures out 25.5% - roughly, one quarter. From the mine records it appears that this quarter has yielded about 135,000 tons of broken ore. At this rate the total orebody between the 300 and tunnel levels will yield about 540,000 tons.

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There is still another angle to be considered. While only one quarter of the total has been broken, this quarter has included the very best ore in the deposit, so that the richer ore has been depleted to an extent far greater than 25%. The following tabulation shows this feature.

Tons Above.	Original below 300.	Left * Below 300.	w Above 300.	Percent left.
6%	34,304	14,359	-	41.8
5.5	96,041	49,645	-	51.6
5.0	224,291	113,731	-	50.7
4.5	255,065	141,003	-	55.2
4.0	379,392	251,053	-	66.1
3.5	389,097	260,758	-	67.0
3.0	512,955	374,437	60,700	72.9
2.0	562,781	419,671	60,700	74.5

Average grade of ore left in place - 3.9%

* Including pillars.

w Hart's figures, excluding "probable ore".

The broken ore in stopes is of higher grade and will increase the reserves above 5% by about 50,000 tons, and those between 3 and 3.5% by 47,000 tons.

Including all these items, the following ore will be available for the future:

Above 5%	About 165,000 tons
Between 4% and 5%	About 140,000 tons
Between 3% and 4%	About 230,000 tons
Between 2% and 3%	<u>About 45,000 tons</u>
Total above 2%	About 580,000 tons.

I believe this is the maximum that can be counted on

unless additional ore is developed. It is therefore essential that development work be vigorously pushed.

DEVELOPMENT:

There are three main areas to explore:

1st - The north mineralized zone already explored on the 3rd level. This was weak and low grade on the 3, only at two places exceeding 3%, but the main orebody shows so much improvement below that level that it is quite possible the north mineralized zone will contain ore on the lower levels. The present work on the north end of the 600 is well calculated to test this possibility. The drift should be run straight, with a course about N 20° W, which will keep it within the vein. Crosscuts should be run to foot and hanging-wall at 100 ft. intervals.

2d - The southward extension of the main mineralized zone. The main orebody becomes weak and lean at its south end, and remains so for 700 or 800 ft, but on the tunnel level there are indications at the extreme south of an improvement in grade. It is possible that still farther south the zone will open out into another orebody. This should be determined by a thorough exploration of the vein south of its intersection with the adit tunnel. The vein must be recovered beyond the fault which there cuts it off, and followed by a drift, with frequent crosscuts to the walls.

3d - The main orebody terminates to the north against a north-west fault, the intersection following closely the line of No. 2 Raise. On the lower levels at least this fault

looks as if it were post mineral. There may therefore be a chance of recovering the vein beyond it.

Other faults have complicated the situation, and have made it doubtful if the missing segment can be found on the upper levels. On the Tunnel Level, however, the chances are better, and I recommend that this level be extended beyond the North-west Fault for about 150 ft.

There is also a slight possibility that the impoverishment found on the tunnel level will not persist below. This should be tested by a winze, sunk from the tunnel level in the best part of the ore shoot. It should be sunk for a depth of at least 200 ft, with appropriate crosscuts and drifts, in order to make a conclusive test.

All the work above recommended is indicated in red on the accompanying composite map.

Very truly yours,



PB/CH.

T A B L E 1

WALKER MINE OPERATIONS

	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	1st half April	Total
Tons broken	3,176	5,158	7,547	9,501	7,000	7,700	15,400	16,500	13,800	15,600	8,000(e)	108,382
Tons drawn	3,047	4,270	5,717	4,420	5,170	5,402	6,167	6,949	6,417	7,135	3,500(e)	58,194
Tons milled (s)	4,575	6,224	6,372	4,866	5,308	4,856	5,118	5,390	5,136	7,469	3,500(e)	58,814
Crude ore	-	-	-	33	715	839	1,041	1,473	1,410	695	350(e)	6,556
% Cu. Heads	6.575	5.650	5.646	5.784	5.180	4.684	4.933	4.555	4.204	4.600	4.600(e)	
% Cu. Crude	-	-	-	10.335	11.865	11.769	11.867	11.182	10.568	11.000 ^o	11.000(e)	
% Cu. Mine Run	6.575	5.650	5.646	5.815	5.974	5.728	6.105	5.977	5.574	5.144	5.200(e)	5.746

(e) Estimated

(s) 10,000 tons on stock pile June 1 available for
milling in addition to ore drawn.

TABLE 2.

WALKER MINE

ORE RESERVES

CALCULATION OF TONNAGE
IN PLACE

* Exclusive of pillars.

Block No.	TOP			BASE			Total Area	Ave. Area	Ave. Height	Volume	Cu. ft per ton Factor	Tons*
	Length	Width	Area	Length	Width	Area						
A	330	40.3	13,299	300	27.4	8,220	21,519	10,760	110	1,183,600	11	107,600
B	110	18.1	1,991	220	15.6	3,432	5,423	2,712	120	325,440	12	27,120
C	210	13.9	2,919	100	20.8	2,080	4,999	2,500	120	300,000	11	27,272
D	130	30.0	3,900	130	32.5	4,225	8,125	4,062	40	162,480	10	16,248
E	140	27.2	3,808	130	22.3	2,899	6,707	3,354	40	134,160	10	13,416
F	55	15.0	825	130	16.0	2,080	2,905	1,452	60	87,120	10	8,712
G	280	18.0	5,050	180	12.3	2,214	7,264	3,632	100	363,200	12	30,266
H	120	28.7	3,444	120	28.0	2,160	5,604	2,802	45	126,090	10	12,609
I	160	16.0	2,560	160	20.0	3,200	5,760	2,880	40	115,200	10	11,520
J	200	10.4	2,080	0	0	0	2,080	1,040	100	104,000	11	9,454
K	160	10.8	1,728	220	17.2	3,784	5,512	2,756	105	289,380	12	24,115
L	120	17.8	2,136	120	20.0	2,400	4,536	2,268	75	170,100	10	17,100
M	120	20.0	2,400	125	23.5	2,938	5,338	2,669	40	106,760	11	9,705
N	165	18.3	3,019	0	0	0	3,019	1,509	80	120,720	10	12,072
O	0	0	0	180	20.7	3,726	3,726	1,863	110	204,930	12	17,077
P	225	17.2	3,870	160	15.5	2,480	6,350	3,175	115	365,145	12	30,429
Q	0	0	0	90	14.0	1,260	1,260	630	105	66,150	12	5,512
R	90	14.0	1,260	90	15.0	1,350	2,610	1,305	105	136,500	12	11,375
S	140	16.1	2,254	0	0	0	2,254	1,127	120	135,240	12	11,270

Total in place

402,871

Original
Blocks.

											Hart's Factor	Our Tons	Hart's Tons	Hart's Grade	
(4)	300-400	800	25.7	20,560	600	22.2	13,200	33,760	16,880	125	2,110,000	10	211,000	215,430	4.48
(6)	400-500	600	22.2	13,200	630	15.4	9,702	22,902	11,451	140	1,603,140	10	160,314	243,795	4.926
(7)	500-600	530	15.4	9,702	550	16.9	9,295	18,997	9,498	115	1,092,270	10	109,227	169,866	4.40
(8)	600-700	550	16.9	9,295	570	18.9	10,773	20,068	10,034	120	1,204,080	10	120,408	128,375	3.04

600,949 757,466

÷ 11 =

546,317

T A B L E 3

WALKER MINE

ORE RESERVES

CALCULATION OF GRADES

Block No.	TOP			BASE			Total Product	Total Area	Average Grade
	Area	Grade	Product	Area	Grade	Product			
A	13,380	4.12	55,145	7,660	4.38	33,560	88,705	21,040	4.22
B	1,991	3.00	5,973	3,260	3.42	11,180	17,153	5,251	3.26
C	2,919	5.00	14,595	2,288	4.00	9,152	23,747	5,207	4.56
D	4,020	4.47	18,000	3,830	6.38	24,440	42,440	7,850	5.40
E	3,640	4.27	15,560	2,665	6.53	17,427	32,987	6,305	5.23
F	700	5.00	3,500	2,100	5.71	12,000	15,500	2,800	5.53
G	4,770	3.37	16,110	1,728	3.00	5,184	21,294	6,498	3.27
H	3,830	6.38	24,440	2,136	6.00	12,816	37,256	5,966	6.24
I	2,665	6.53	17,427	3,019	5.00	15,095	32,522	5,684	5.72
J	2,100	5.71	12,000	-	-	-	12,000	2,100	5.71
K	1,728	3.00	5,184	3,760	3.29	12,380	18,564	5,488	3.38
L	2,136	6.00	12,816	2,400	5.00	12,000	24,816	4,536	5.47
M	2,400	5.00	12,000	2,938	3.16	9,284	21,284	5,338	3.98
N	3,019	5.00	15,095	-	-	-	15,095	3,019	5.00
O	-	-	-	3,725	2.00	7,452	7,452	3,726	2.00
P	3,760	3.29	12,380	2,480	3.00	7,440	19,820	6,240	3.17
Q	-	-	-	1,260	2.00	2,520	2,520	1,260	2.00
R	1,260	2.00	2,520	1,450	2.00	2,900	5,420	2,710	2.00
S	2,254	2.00	4,508	-	-	-	4,508	2,254	2.00

NOTE

To be appended to Walker report of April 15, 1925.

In determining available tonnage, there must be deducted from the above figures a certain quantity represented by pillars of ore which cannot be recovered until it is no longer necessary to maintain the shaft and chutes. This time will come only at the last stage of operations.

The management has determined that these pillars, as carefully measured, contain 75,751 tons.

INTERNATIONAL SMELTING CO.
GEOLOGICAL DEPARTMENT

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Anaconda Copper Mining Company
GEOLOGICAL DEPARTMENT

WALKER MINE

Situation as of April 19, 1924.

Letter to J. O. Elton.

By

Paul Billingsley.

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INTERNATIONAL SMELTING COMPANY
GEOLOGICAL DEPARTMENT

620 KEARNS BUILDING
SALT LAKE CITY, UTAH

April 22, 1924

Mr. J. O. Elton, Manager
International Smelting Company
OFFICES

SUBJECT: WALKER MINE

Dear sir:

Following is the situation at the Walker Mine as of April 19, 1924.

1- 703 drift, at the south end of the 700 level has reached a point 350 feet from its initial point. The vein continues of good grade, the width varying from 4 to 6 feet. In the last 100 feet the course has changed from southeast to nearly due south. This should make this vein converge toward the larger branch which lies to the west, and it is hoped that the crosscut west, which is now to be started at the 350 foot point, will encounter this western vein within 25 or 30 feet.

A raise should be started soon from 703 drift at a point which I do not wish to decide until after discussion with you. Several locations are possible and you may prefer one to another from the point of view of mining convenience.

2- The north end of the 700 has been driven about 40 feet on the course outlined. (712 drift)

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2- Mr. J. O. Elton

3- Sub Level - The work done in accordance with the recommendation has disclosed a large wedge of vein lying north of the shaft. It is about 50 ft. in width, and has been developed for a length of about 100 ft. In grade and character it resembles the vein at the north end of the 600 level, and there is little doubt that it will completely bridge the gap between the main orebody and this northern portion of the vein. The interval between the present face of the sub level and the first crosscut in the vein on the 600 is about 300 ft. This will be developed on the sub level. (637 S. drift)

4- 616 North - In the last 200 feet the vein has somewhat improved in grade. The latest crosscut, No. 657, shows on the hanging wall about 25 ft. of 2.5% ore. The total width has increased to over 50 feet.

Unfortunately, at this point a very strong fault, coming in from the west, is beginning to truncate the vein. The fault runs N-S, dipping 60 deg. East. It will soon, therefore, be necessary to recover the vein on the other side.

In order to secure all possible information as to the throw of this fault, I made a new examination of the surface, which was facilitated by the small amount of snow. The accompanying sketch shows the results. The fault seen on the 600 is marked on the surface by a pronounced saddle in the ridge. Beyond this the outcrop can be followed readily, and appears markedly stronger than at any other place north of the main orebody. It contains much barite, also. When projected to the

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3- Mr. J. O. Elton

600, with the same dip as the more southerly part of the vein, it lies about 350 feet to the north of the present 600 face. The recent improvement shown in the vein underground together with the stronger surface indications, convince me that it will be desirable to extend the 600 level northward into this new block. The proper directions have been given.

5- 504 SOUTH This work has advanced about 50 feet, and the grade of ore disclosed has been somewhat better than was anticipated. If commercial ore extends for any distance in this drift it will be advisable to push out the sub level and prepare for stoping a new block.

6- 401 HANGING WALL - The drift has advanced about 50 feet, the vein maintaining the same width and grade.

out 7- GENERAL - AS a result of specific gravity tests made for Mr. Hart, the factor of cubic feet per ton has been changed from 10 to 11 and 11.5. This change reduces the tons broken by 15% and raises the costs accordingly.

Very truly yours,

Paul Billingsley

PB/P

CC: CPK
CC: WmW
CC: RRS

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Anaconda Copper Mining Company

GEOLOGICAL DEPARTMENT

W A L K E R M I N E

R E C O M M E N D A T I O N S

Letter to

Mr. J. O. Elton

June 2, 1924

INTERNATIONAL SMELTING COMPANY
GEOLOGICAL DEPARTMENT

C
O
P
Y

620 KEARNS BUILDING
SALT LAKE CITY, UTAH

June 2, 1924

Mr. J. O. Elton, Manager
International Smelting Company
OFFICES

Subject: WALKER MINE

Dear Sir:

After examining the most recent developments at the Walker Mine I revised the recommendations as follows:

700 Level

South End - Stop 734 crosscut. This has served its purpose by cutting the large vein to the west of 703 vein. The large vein is low grade here, as it was in the main tunnel.

Resume drifting south in 703 drift. The vein here continues good and must be explored farther south. Rock will go for ore.

Raise from 703 drift where best for mining practice.

North End - Continue 712 on same course. This has encountered the vein, the same block no doubt as that in 637 sub-level above. It carries enough copper in 712 to go to the mill.

600 Sub-level

Stop all work as the 712 face is now in the vein at a point directly below the north face of 637 S, and the vein can be best explored from this point on the 700 level.

600 Level

North End - Turn 616 to course N 5 deg W which is

2- Mr. J. O. Elton

parallel to the fault which has cut off the vein. The new course should lead to the vein northwest of the fault, according to the surface evidence as projected to this level. After 90 feet on the new course a crosscut should be run N 85 deg E to reach the good ore on the hanging wall of the vein East of the fault. Rock goes for waste until vein is recovered.

500 Level

South End - Continue 504 drift on course S 28 deg. to 30 deg. E according to strike of vein. Rock goes to mill. Vein on this level is materially better than it was either on 300 above or 700 below.

The above recommendations were given in writing to Mr. Greninger.

Very truly yours,

PB/P

CC: CFK
CC: ~~MMW~~
CC: RHS

(Signed) Paul Billingsley

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Anaconda Copper Mining Company

GEOLOGICAL DEPARTMENT

W A L K E R M I N E

Letter to

Mr. Wm. Wraith

July 6, 1925

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Salt Lake City, Utah

July 6, 1925

Mr. Wm. Wraith
25 Broadway
New York, N. Y.

Dear Sir:

At the request of J. O. Elton I visited the Walker mine on June 29th and 30th in connection with the expected adverse report of Forest Ranger W. H. Friedhoff on some of the claims included in the application of the Walker Mining Company for patent.

On July first I saw Mr. Friedhoff at Yerington and talked over the situation fully. Friedhoff had, however, already sent in his report and recommendations on the Walker claims to the District Forester's office at Quincy so that it was impossible to do anything more than to get first hand knowledge of Friedhoff's attitude regarding the Walker claims.

I found that Friedhoff had a good knowledge of the geological conditions surrounding the Walker mine. He impressed me as holding a friendly feeling toward mining companies, particularly those actively engaged in mine development. Friedhoff has had many years experience in forestry work and particularly in connection with the location and patenting

July 6, 1925

of mining claims within the National Forest boundaries covering Plumas County, California and surrounding territory.

I learned from Friedhoff that the patenting of the Walker claims, included in the present application for patent, had been the subject of much discussion between himself and Mr. V.A. Hart, former manager of the Walker Mining Company, and that he Friedhoff had at all times held an adverse opinion as to certain ones of the group. The views he expressed to me may be better understood after I have explained the geology in the situation.

I am enclosing herewith a geological map for your guidance. It also shows the claims held by the Walker Mining Company. Included within the violet colored boundary are claims already patented. Surrounding these patented claims, and lying within the blue boundary, are the claims included in the present application for patent and which have been approved for patent by Mr. Friedhoff. Claims included in the present application for patent, but which have been reported upon adversely by Friedhoff are bounded in red. Certain additional claims, namely the Summit 1 to 7 respectively, are recent locations made by the Walker Mining Company.

The geology of the situation is well shown on the map, the Walker veins and ore bodies occur in the schist. The course or trend of these ore bodies, as shown by the mine workings, is a northwest southeast direction, generally parallel to the strike of the rather indistinct bedding of the schist.

July 6, 1925

The schist is intruded by an irregular body of granite which appears also to be later in age than the ore bodies. The area of granite exposed at the surface is shown in green color. That its actual volume is much larger than this is shown by the main adit tunnel which discloses granite beneath the lava.

Both schist and granite have been covered in the southerly and easterly portions of the Walker group by a late flow of andesitic lavas, colored brown on the map. There is no question but that these lava flows are relatively recent and that they appeared long after the Walker vein in the schist had been exposed by erosion and considerably oxidized.

We therefore have three geological formations occupying the area under consideration. Of these three the schist is known to be mineral bearing. The granite has not been shown to contain ore bodies. In the mine workings of the Walker mine a small dike, undoubtedly an off-shoot of the main granite mass, cuts through the Walker vein ore indicating the granite to be of later age than the Walker ore bodies. In the Main Adit, however, there are many fissures which cut the granite, but which are mineralized only slightly if at all. In the larger area exposed to the south and west of the Walker Mill extending down into Grizzly Valley no veins have been discovered within the granite. The evidence as to mineralization in the granite, while generally negative in character is not conclusive.

The andesitic lava flows in the vicinity of the Walker mine form a part of an extensive flow covering a large area lying

July 6, 1925

to the east and northeast of the Walker property. These rocks upon weathering change to a dark red brown color with a resulting soil of a similar color. These flows are relatively recent geologically and show absolutely no evidence of mineralization.

Referring now to the patentability of these claims, Friedhoff rejects the claims outlined in red upon the ground of lack of mineral discovery. By reference to the map it will be seen that the great majority of the lode claims rejected lie within the area occupied by lava. The Pacific No. 12, Pacific No. 13, Grizzly, and Grizzly No. 1, lie partly within lava and partly within granite. The Pacific No. 3 appears to be largely within lava although it is probable that schist might be disclosed near its north end line by a small amount of trenching.

The Dolly Gulch Placer covering the basin-like area upon which the mill and town have been built, contains a small area of schist near its western boundary. The remaining area is occupied by lava and granite, but the deep covering of wash prevents an accurate tracing of their respective boundaries.

I examined carefully a large part of the ground covered by these claims. I inspected the 25' tunnel on the Grizzly No. 9 claim, also the small shaft on Grizzly No. 10 and the small pit on the Summit No. 1. I was compelled to conclude from my own personal examination that there is no possibility of a mineral discovery within the lava itself. In the large block of claims covered by lava therefore the only mineral discovery possible is in the rocks underlying the lava flow. Where schist is

July 6, 1925

present mineral indications sufficient for discovery undoubtedly can be found. But in the granite areas beneath the lava, the hunt for a sufficient mineral showing to support a valid lode location might prove costly or even entirely unsuccessful. The depth of the lava is too great, and the possibilities of mineral too slight, to justify sinking shafts on these locations for the purpose of making a mineral discovery.

In the case of the Dolly Gulch Placer location which Friedhoff also rejects, on the grounds of non-discovery of placer gold, the situation is rather peculiar. Within the Dolly Gulch Placer location there is included a Mill Site location made by the Walker Mining Company. Friedhoff's statement is that a mill site location requires from the locator under oath the statement that the ground is non-mineral in character. If this be true there is an apparent lack of consistency on the part of the Walker Mining Company to ask for a mineral patent on the Dolly Gulch Placer and a patent on the Mill Site as non-mineral ground.

Some recent panning tests for gold in a pit sunk along the creek below the mill and within the Dolly Gulch Placer claim, failed to show any gold colors. This work is being carried on in other pits in the hopes of meeting with favorable results.

The situation confronting the Walker Mining Company may be summarized as follows:

- 1.- Of the 40 lode claims included in the recent Patent

July 6, 1925

Application seventeen (17) have been passed and recommended for patent by Friedhoff. These seventeen claims, together with the ten claims already patented protect the Walker on strike for a distance of approximately 9000 feet, or 1500 feet south of the most southerly workings on the tunnel level, and 3500 feet beyond the most northerly drift on the 600 level.

2. The original Mill Site has been recommended by Friedhoff for patent, but the new Walker mill is not on this mill site claim.

3. Twenty-three lode claims have been rejected for patent by Friedhoff on the ground of non-discovery of mineral. Of these twenty-three claims, seventeen lie wholly within the lava area and there is no possibility, in my judgment, that a mineral discovery can be made by trenching or by shallow shafts. Of the remaining six claims, granite is disclosed on the surface or in the Main Adit, within five of them, and on the sixth claim, which is the Pacific No. 5, the surface area is largely lava but a small amount of surface trenching might disclose schist but not necessarily any mineral showing.

4. The Dolly Gulch Placer upon which the new mill and most of the town and surface works have been built, is rejected by Friedhoff on similar grounds, that is of non-mineral discovery.

It remains for the Walker Mining Company to decide upon a course of action in the face of these rejections. My personal views may be summarized as follows:

1.- Claims lying wholly within the lava without mineral

showing on surface or in underground workings should be withdrawn from the Patent Application but should be held by assessment as in the past. These include the following:

Grizzly	No. 1
"	" 2
"	" 3
"	" 4
"	" 5
"	" 6
"	" 7
"	" 8
"	" 9
"	" 10
"	" 11
"	" 12
Panama	No. 3
"	" 4
"	" 5
Standard Extension	
Reliable	No. 3
Pacific	" 11

2. Recent locations made wholly within the lava should be abandoned. These include:

Summit	No. 1
"	" 2
"	" 3
"	" 4
"	" 5
"	" 6
"	" 7

Timber is now being cut from these locations. No doubt the government will require the Walker Mining Company to pay for any and all timber cut from such abandoned locations.

July 6, 1925

3. In the case of the following claims, namely, the Grizzly, Pacific No. 10, Pacific No. 12 and Pacific No. 13 which cover the 1250 feet of the Main Adit nearest its portal, the Walker Mining Company should ask for patents, on the ground that the small fissures in the granite disclosed within these claims constitute a sufficient mineral showing, and that adequate assessment work for patent has been performed through the construction of the Main Adit which passes through portions of these claims. These claims stand exactly upon the same footing as the Pacific No. 9 claim which has received the approval of Friedhoff.

This same ground however can be secured by abandoning the claims as lode locations and covering it by tunnel site locations following the line of the tunnel, and patents for same can be secured without mineral discovery. As tunnel site locations they carry mineral rights but not surface rights. This would mean an additional expense to the Walker Company sufficient to pay the cost of making re-locations and the mineral surveys for patent.

4. Friedhoff suggests a way out of the difficulty with the Dolly Gulch Placer.

There is now in force what is known as the "exchange grant" ruling of the Interior Department. I do not know at this time whether this ruling is in effect through an Act of Congress or merely a Land Office ruling, but I presume it is the former.

July 6, 1925

Friedhoff suggests that the Walker Mining Company acquire from a fee owner somewhere in Plumas County, title to a tract of equal acreage of out-over land, and exchange such acquired acreage with the Government for the ground covered by the Dolly Gulch Placer. He is positive that such a plan is feasible and practical and legal, and in fact, he knows of no other way by which the Walker Mining Company can acquire full title to this ground if it is decided to be non-mineral in character since it is within the Forest Reserve. He says out-over lands can be had for \$2.50 to \$5.00 per acre.

It is apparent that the Walker Mining Company requires, for housing and other purposes, slightly more land than is included within the Dolly Placer. The exact amount needed should be determined so that ample acreage of out-over land will be secured for exchange.

One element of danger has occurred to me in this situation as it affects the new mill and all surface structures built on ground outside the original mill site location. If, as Friedhoff claims, the Dolly Gulch Placer has no merit or standing as a placer location it certainly would not hold the ground as against a lode claimant who might enter upon the placer, and, finding sufficient mineral showing within the small schist area shown on the map, he could locate a lode claim in such a manner as to include the new mill, and other valuable buildings.

To forestall this possibility I have written Funnell to make one or more lode locations, placing them on the ground

July 6, 1925

in such a manner as to cover the mill and all buildings or other surface improvements not included in the original Mill Site location.

From Mr. Tunnell's letter of a former date you can figure what the Walker Mining Company will owe the Government for timber already cut from claims rejected by Friedhoff. It amounts to about \$7,000 in round figures.

I should add here that I am entirely unfamiliar with any past history of Walker Group of claims. I know nothing of the how, when or why of the location of these claims in the lava area. Friedhoff states that in the past the Walker Mining Company has set its Main Adit tunnel work against the whole group as constituting annual assessment work. He flatly states that this tunnel does not tend to develop the Grizzly claims and therefore is not acceptable as assessment work. My own opinion is that the Adit tunnel does tend to develop all of the group because it is actually the proper method to develop that whole area.

Very truly yours,

RHS/P

(Signed) Reno E. Sales

1611

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Atacanda Copper Mining Company

GEOLOGICAL DEPARTMENT

WALKER MINE

Development on 700 and 900 levels

Letter to

Mr. J. O. Elton

By

Tom Lyon

April 14, 1928

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April 14, 1928

Mr. J. O. Elton, Manager
International Smelting Company
Offices

Subject

WALKER MINE

Dear Sir:

Enclosed you will find map of the 900 level beneath the Central ore body and the extreme northern development on the 700 level, known as the Piute ore body.

The 900 level is now opened up for a distance of 650 feet in fair ore, the vein north of the winze is narrow except for the extreme north end and at this point it is low grade. The fault, which terminated the ore to the north on the 700 level, has not appeared on the 900 level, although if it maintained the dip that prevailed from the 300 to the 700 level, it would have cut the vein on the 900, 160 feet north of the winze. Evidently the dip between the 700 and 900 is much flatter than it was above the 700 level.

The Piute ore body has been opened up for about 650 feet and shows fair values (about 2% copper) for the entire distance. The Piute tunnel, 345 feet vertically above the workings on the 700, shows oxidized quartz for a distance of 50 feet, which is probably the upward projection of the Piute ore body.

Very truly yours,

TL/P

Tom Lyon

6011-4

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Anaconda Copper Mining Company

GEOLOGICAL DEPARTMENT

WALKER MINE

Proposed Lower Tunnel

Letter to Mr. J. O. Elton

By

Tom Lyon

August 14, 1929

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August 14, 1929

Mr. J. O. Elton, Manager
International Smelting Company
O f f i c e s

Subject:

WALKER MINE

Dear Sir:

The accompanying map and sections show the tunnel which has been proposed that will cut the Walker vein approximately 2200 feet below the 700 level. There are several things to consider regarding driving of this tunnel. First, what evidence is there that the ore will exist at this elevation? Regarding this question, I would say that the indications are very favorable for the existence of ore at this level. In the first place, our 1000 foot level, which is being driven northward beneath the Central ore body has been in ore for the last 1000 feet (See Section), and has demonstrated the ore to be more continuous on the 1000 foot level than it was on the 700; the grade of the ore is two per cent and the average width for this distance is eight feet. In the second place, at the Five Bears property, which is located at the portal of the proposed tunnel, several copper ore bodies were encountered. Unless there has been some faulting between the Walker and Five Bears mines, I think that the indications found at the Five Bears would lead to the belief that the Walker ore bodies should extend to this depth.

As you know during the past year the costs at the Walker have been remarkably low. It will be impossible to continue these costs

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2- Mr. J. O. Elton

August 14, 1929

Subject: Walker Mine

when all of the ore extraction comes from beneath the 700 level. If we wait until a shaft is sunk 2200 feet below the 700 level to determine the advisability of driving this tunnel, and then take additional time to drive the tunnel itself, we may be too late to accomplish the purpose of the tunnel, which would be to drain the mine and avoid the additional cost of pumping and hoisting ore.

In addition to reducing costs, etc., the tunnel would prospect a very likely area. I have been over the surface of this area a number of times and find that it is covered with brush and soil and there are very few outcrops. It will be remembered that the outcrop over the Piute ore body occupied space of about 20 by 50 feet and did not look at all promising. Outcrops like this could easily be missed in the heavy timber and brush which grow over the area which the lower tunnel would prospect.

I believe that if your proposed method of financing this tunnel could be accomplished that it would be good business to start the tunnel immediately, as it will require 16,400 feet of work to reach a point beneath the northernmost workings on the Piute ore body.

Very truly yours,

Tom Lyon

Tom Lyon

TL:F

611-7

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Anaconda Copper Mining Company

GEOLOGICAL DEPARTMENT

WALKER MINING COMPANY

Victor Group of Claims

By

D. D. MacLellan

May 3, 1930

WALKER MINING COMPANY

SPRING GARDEN

PLUMAS COUNTY, CALIFORNIA

May 3, 1930

H. A. GEISENDORFER, MANAGER

Mr. Tom Lyon,
818 Kearns Building,
Salt Lake City, Utah.

Dear Friend Tom:

Under separate cover I am sending you a map which shows the new claims which I have just finished locating along the grano-diorite contact to the north of our present holdings. These claim, the Victor group as shown on the map, consist of 36 claims arranged as two tiers along a common end line which has a bearing of about N 30° W. The southernmost pair of these claims overlap claims 36 and 38 of our Scot group, while the northernmost meet where Davis gulch broadens out to join the Genesee valley. The elevation of the discoveries of this pair is probably about 3600 feet.

As soon as the weather clears up I shall resume my investigations in that region, this time to determine the advisability of taking up another double, or single row of claims parallel to and adjoining the Victor group on the west. Although much of this ground is already taken up, the geology is interesting: quite a few outcrops of Robinson schist occur along the westernmost tier of the Victor group.

There are at least two groups of claims owned by outsiders, located within the area in which we are now interested.

5/3/30

One group consists of at least two claims which were located by Pearl C. Goodhue in 1926. I could find no evidences of assessment work, although I could hear a man chopping trees or something on one of these claims as I was doing our location work. He did not see me, nor is there much chance of his finding our location notices. This property probably lies in its entirety within our Victor group. A member of the Goodhue family once managed the Five Bears Mine; another brother owns and lives on the Keystone property, just below the Five Bears. Andy Hardwick and myself visited with him last summer.

Another group, called the Blue Rock, probably lies beyond the western end line of our present Victor claims, but would almost certainly be included in any additional tiers which we might take up to the west of these. This group was located only last October and appears to have its boundary lines roughly surveyed, so that I ought to be able to locate them definitely and tie them in to our property on some future map. The locator of this group is also a woman.

The Sobrero property probably lies too far to the west to be invaded even by a second double row of Victor claims, should we see fit to take up such.

Regarding the geology as shown on this map, the inked contacts are generally exact; the contact along the Victor group, for example, is shown as accurately as can be determined

5/3/30

without excavation. A considerable amount of investigation still remains to be done in the region west of these claims.

I have arranged with McKenzie to lend me a man Friday to go with me into camp. He is a new man who knows nothing about the country, or very much of anything else. His chief duties will be the frying of hotcakes and the chasing away of bears. Mack pays him \$4.25.

As I come in to camp every so often, I will be able to keep in touch with you should you have any instructions to give regarding this work.

The weather is still blustery and mean. The Portola stage is running, but somewhat uncertainly. Everything proceeds normally. I shall let you know when the roads are definitely open.

Hoping to see you out here soon, I am

As ever,

Mack

Mac.